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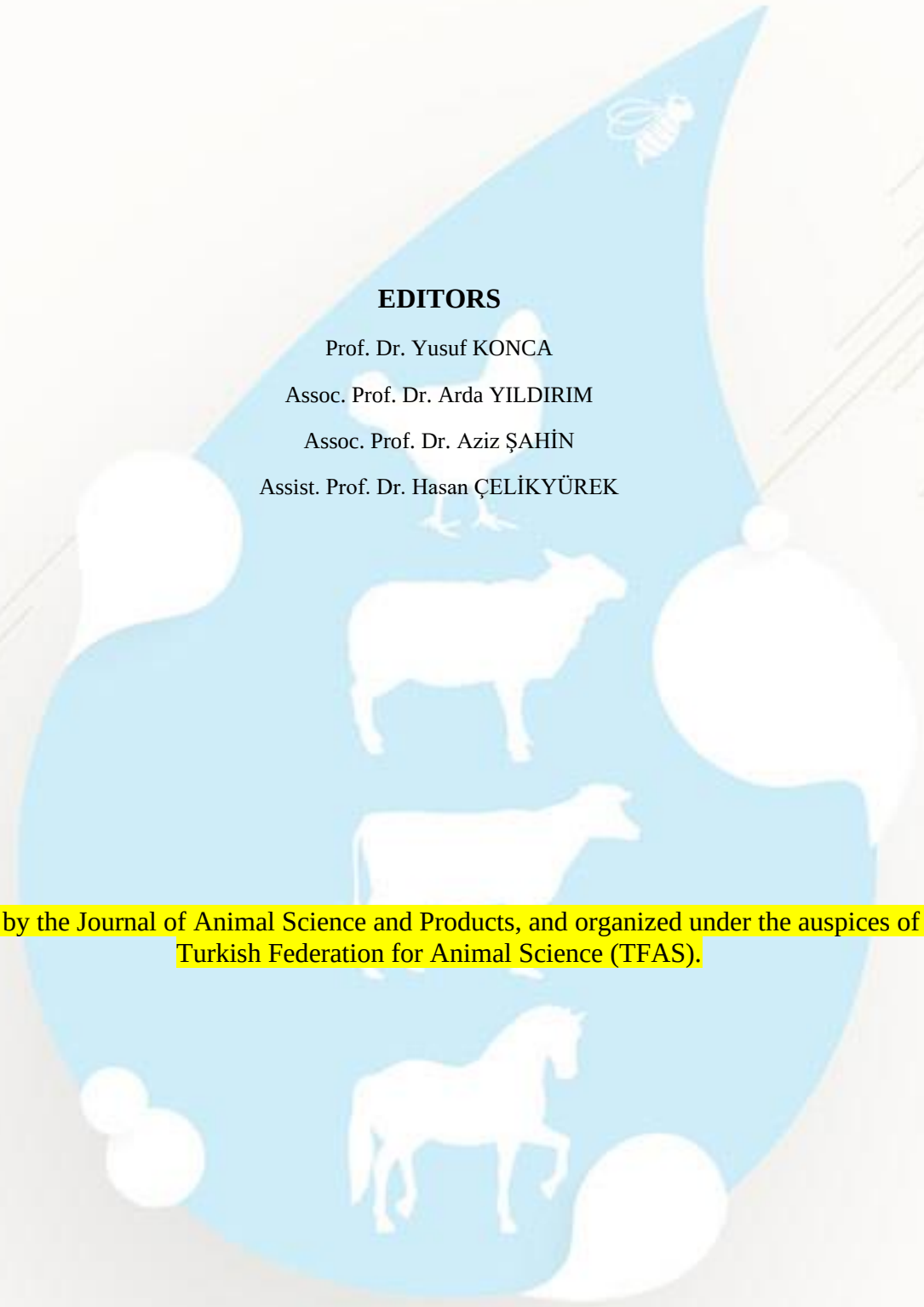

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Contents

Preface

Animal production has a great importance in the development of countries. The importance of animal foods with an adequate and balanced diet for the development of the body, the regeneration and functioning of the tissues is an undeniable fact. The zootechnical activities aim to contribute to the development of the country by providing more and more reliable production of animal products. In this context, the 11th International Animal Science Congress, organized by Turkis Federation of Animal Science was held between 20-22 October 2019 at the Ramada Hotel in Cappadocia with the participation of academicians, researchers and sector representatives. A total of 187 scientists from Iran, Iraq, England, Indonesia, Azerbaijan, Pakistan, Saudi Arabia, Brazil, Romania, Egypt, South Africa, Nigeria, Somalia, Uganda, Ghana, Colombia and different universities of Turkey and research institutions participated to the conference. The Conference Organising Committee would like to thanks Turkish Scientific Council (Tubitak), White Meat Producers Association (BESD-Bir), Turkish Feed Industial Association (Türkiyem-Bir) and Nevsehir Dairy Cattle Breeder Association to their support to confrence. Also, The Conference Organising Committee would like to thanks Chairman of Congress Prof.Dr. Yusuf Konca, members of the organizing committee, secretaries, the science committee, the colleagues who participated in the conference and the companies and other contributors.

We wish to the conference help to animal husbandry sector, which is extremely important in terms of raising healthy generations with high mind and body power. We hope that oral presentations and poster presentations will be beneficial to decision makers, animal breeding sector employees, all colleagues, students who are trained in animal science and the whole education community.

The 11th International Animal Science Congress Organizing Committee

INVITED SPEAKERS

Prof. Dr. Yusuf Konca, Chairman of Conference,
Dr. İsmail Mert, Deputy Chair of Animal Science Federation

Prof. Dr. Minoo Rassoulzadegan, University of Nice Sophia Antipolis
"RNA-mediated heredity of epigenetic states: experimental mouse models"

Prof. Dr. Filiz Karadaş, Van Yüzüncü Yıl University
,"Carotenoids in poultry nutrition: not only a source of pigments but also immune modulators"

Assoc. Prof. Dr. Abdollah Mohammadi-Sangcheshmeh, University of Tehran
"Assisted reproductive techniques in cattle dairy farm: state-of-the-art and applications implications"

Prof. Dr. İbrahim Ak, Bursa Uludag University
Innovative and Sustainable Grazing-Based Dairy Systems Integrating Cows and Young Stock: General State of the Organic Dairy Cattle Farms in Turkey

Agr. Eng. Bilsay Kancı, Member of Animal Science Federation
"Agriculture 4.0 – The Future of Farming Technology"

Prof. Dr. Filiz Karadaş, Van Yüzüncü Yıl University

"Carotenoids in poultry nutrition: not only a source of pigments but also immune modulators"

Introduction

Carotenoids are groups of natural occurring pigments that responsible of a bright color in marigold, paprika, carrots, tomatoes, bird plumage (flamingo, canary ext.) and marine animals (crustaceans, salmon) (Pfander, 1992). Carotenoids are showing much diversity in natural distribution, structure and function. These pigments change from different colors such as from light yellow to dark red (Ong and Tee, 1992; Surai 2002). More than 1100 carotenoids have been identified until now (Yabuzaki, 2017) but only 60-75 of them are procures of Vitamin A and beta-carotene is most important one. Fucoxanthin from marina algae is most abundant carotenoid in nature lutein, violaxanthin comes after (Davison et al., 1993).

Physiological function of carotenoids

Carotenoids have taken scientific interest for human and animal health as their function related to major roles in vision, protect formation of cataract and macular degeneration, immune response, brain function and antioxidant activity (scavenging and inactivating free radicals), inhibition of serious diseases such as cancer, atherosclerosis, to be key elements for breeding success due to sexual selection (Surai et al., 2016; Brossard et al., 2017). Carotenoids are useful for protection of cells against photooxidative damage and therefore they are important applications in environment, food and nutrition, disease control, and as potent antimicrobial agents (Kirti et al., 2014). Therefore, for animal health and animal products quality carotenoids should be part of animal feed (Amaya et al., 2014).

Chemical structure of carotenoids

Carotenoids are divided in two main groups called as carotene which are not contain oxygen atom in their molecular structure as a first group. In this group well-known carotenes are beta-carotene, alpha-carotene and beta-cryptoxanthin (Goodwin 1986). The other group of carotenoids which are called as xanthophyll also known as oxicarotenoids which are contains oxygen atom in their molecular structure. The best known xanthophyll are lutein, zeaxanthin and lycopene (Surai 2002).

Absorption and bioavailability for poultry

Carotenoids except of some species aphids, cannot be done synthase by vertebrates de novo and they must get them from their diets. They are oil-soluble molecules and they are chemical compounds which are very sensitive against oxygen, temperature and light (Ciapara et al., 2004). In most previous report showed that many wild avian species egg yolk carotenoid concentrations are comparatively higher than egg yolk carotenoid concentration of commercial layer (Speake at al., 1999; Surai et al., 2001; Ewen et al., 2006; Karadas et al., 2005). Even the same species comparison of wild and captured ones showed that egg yolk carotenoid concentration was very much higher than captured in farm condition (Karadas et al., 2017). Surai et al., (2012) reported that most of wild bird's egg yolk were highly rich by carotenoids and it has been connected with carotenoids probably play specific roles in avian embryonic development (Surai at al., 2000, Karadas et al., 2005), as an integral part of the antioxidants system, by recycling vitamin E. Therefore we need to reconsider for farm reared bird diet carotenoid concentration.

Occurrence in nature and feed sources of carotenoids

Carotenes are bioactive substances and they are mainly synthesized by plants, fungi, bacteria and algae (Kirti, 2014). Carotenes, which give the egg yolk yellow pigment, are groups and they consist of more than 750 compounds in nature (Surai 2004; Kirti et al., 2014). More European countries (Germany, England, Italy, France, Poland) conducted surveys showed that consumer prefer organic or free-range eggs to conventional eggs (Nys, 2000). Carotenes and xanthophylls in poultry diets have been accepted as feed additives in European Union (EU) countries since 1970s (Surai 2004, Alay and Karadas 2016). Currently, synthetic carotenoid production is most common manufacturing methods in the global market to improve egg yolk and skin color of salmon fish and broiler skin (Pasarin and Rovinaru, 2018). Canthaxanthin is common synthetic red xanthophyll in poultry diet is available as Carophill®red and yellow xanthophyll is known as β-apo-8-carotenoic acid ethyl ester (Apo-ester) Carophill®yelow produced by DSM Nutritional product, Switzerland. The alternative of these products are Lucantin®red and Lucantin®yelow are produced by BASF company from Germany (Marounek and Pebriansyah 2018). The advantage of synthetic carotenoids is technologically feasible and cost effective. They are more stable and activity and bioavailability is higher than compare to natural one. Transfer from feed to egg yolk for canthaxanthin and apoester are about 40%, 55% respectively but it is very low 17% for marigold (Pasarin and Rovinaru, 2018). Resent surveys conducted in 2014; that their global market share is 1.5 billion USD. It is expected to increase by 3.9% year-on-year in 2019 and reach US $ 1.8 billion. The highest share of β-carotene in the global carotene market, which was 233 million dollars in 2010, was estimated to reach 309 million dollars in 2018 (Anonymous, 2015). However, awareness and demand of consumer increased for natural colorants has driven the industry to develop natural sources of carotenoids to replace chemical synthesis pigments (Pasarin and Rovinaru, 2018; Olesen, 2010). Carotenoid rich feed ingredients are known as maize, corn, tomato, greed beans, lucerna meal or extract (Karadas et al., 2005, 2006), pumpkins, prunes, or red pepper (Amaya et al., 2014; Zakynhions et al., 2016) are natural ingredients. Recently, more research has been done on microbial sources of carotenoids that using as environmental-friendly method for the

production of carotenoids pigments as a natural resources of carotenoids to replace synthetic pigments additives (Das, 2007; Priyadarshani and Rath, 2012). The most known microalgae which accumulate carotenoids in their biomass, are Chlorella, Chlamydomonas, Dunaliella, Muriellopsis and Haematococcus spp, could be economical alternatives to synthetic ones at the market in the future (Bhosale and Berstein, 2005).

Immunocompetence of carotenoids

Immunocompetence of carotenoids in wild birds have received substantial attention since it has been reported by Moller at. all (2000) carotenoids-health promoting properties and immune system modulation. Later in 2003 Faivre et al reported that immunization of captive male blackbirds (Turdus merula) with sheep red blood cells (SRBC) showed that reduction of intensity of bill coloration, to activate the immune system by removing carotenoids stored in the beak to increase the immune response. At the same year Blount et al. (2003) confirmed that individuals with higher circulating carotenoid levels in Zebra Finches birds' plasma produce larger T-cell-mediated and humoral immune responses (PHA) compare to non-supplement carotenoid group. It is also mentioned that carotenoid dependent bright coloration of plumage in various male wild bird species as a sign of their health and immunity (Blount 2003). Even in a colorful song birds maternally derived carotenoids pigments effects on progeny survival, sex ratio and sexual attractiveness was reported by McGraw et al., 2005. For example, in the blue tit, carotenoid supplemented eggs nestling showed that they had longer tarsi, faster immune response, grew brighter yellow feathers than non-supplemented carotenoids nestling (Biard et al., 2005). It has been reported that there is links between immune response and carotenoids in at least 12 wild bird species, either by the positive effect of carotenoid supplementation or by stimulation of immune system that depleted carotenoid stores (Sepp et al., 2011). There is also sufficient attention given to investigate immunomodulation function of carotenoids in wild birds, however, immunocompetence link between dietary carotenoids is still waiting for some important answer in commercial poultry. Because, immunomodulating properties of carotenoids would depend on many different factors: including carotenoid concentration and assimilation from diet, diet composition, concentration of other antioxidant and prooxidant (polyunsaturated fatty acid) any stress sources, specific immune challenge and other factors (Surai et al., 2016). In our previous study we reported that humoral antibody titers increase when feed is supplemented with 100 mg/kg (Lutein and Lycopene) and 25 mg/kg (Canthaxanthin and Apo-ester) to commercial broiler diets compare to non-vaccinated negative control or vaccinated non carotenoids supplemented positive control group (Karadas et al., 2016) against Newcastle vaccine as an immune response. We also report that 100 ppm high dose of beta-carotene did show immune response to Newcastle vaccine only compare to negative control group but did not show immune compare positive control group (Karadas et al., 2016).

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Innovative and Sustainable Grazing-Based Dairy Systems Integrating Cows and Young Stock: General State of the Organic Dairy Cattle Farms in Turkey

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Introduction

The healthy living and environmental awareness for human beings increase in parallel to the demand for nutritive, healthy and safe food consumption. Especially in developed countries, organic food production and consumption increase day by day. In 2018, the world market for organic production reached $ 96 billion US dolar. Reducing the use of antibiotics and anthelmintic to increase milk yield and quality in organic dairy cattle production is one of the most important issues related to animal husbandry. During the rearing of the calves with their mothers and grazing together on the pasture; it has been suggested that antibiotic and anthelmintic use can be minimized as a result of the elimination of the side effects of stress on animal health, improvement of animal welfare, performance, and productivity and the development of new grazing systems (Edward, 1983; Krohn, 2001; Ravinet et al. 2014; Johnsen et al. 2015; Olde et al. 2016). In this project conducting within the scope of Core Organic Co-found and supported by the EU, 15 institutions from 8 countries are involved. The aim of the project is to determine the effects of cow-calf rearing on mother and calf health and milk yield and to identify and disseminate good practices in different countries. In the Turkish part of the project, the structural properties of organic dairy cattle farms, feed, milk yield, and quality are intended to be identified.

Materials and Methods

Within this project, all of the organic cattle farms (total 10 farms) in Turkey are visited. In order to determine the general status of organic dairy cattle enterprises, face-to-face surveys were conducted. In addition, roughage and concentrated feed, milk and fecal samples are taken from the 6 different organic dairy cattle farms located in the different geographical regions of Turkey during the 4 different seasons. The raw nutrient analyzes in the roughage and concentrated feed samples; silage quality parameters in silage feed samples; dry matter, fat, protein, lactose, ash, total count of bacteria, somatic cell count, Vitamin E, Omega-3 and CLA contents in milk samples were determined. Internal parasite analyses were performed in the fecal samples. As a result of feed, milk and fecal analyzes conducted in 4 different periods of the year; data on roughage and concentrated feed quality characteristics, milk quality characteristics and internal parasite content of organic dairy cattle enterprises are obtained.

Results

The results of the surveys conducted in the organic dairy cattle enterprises are given in Table 1. As can be seen in Table 1, land assets of the enterprises engaged in organic dairy production in different regions of Turkey, pastures, and pasture usage periods, cattle breed to be used for breeding and their numbers with the production conditions are quite different from each other.

Table 1. Survey results of organic dairy cattle farms

Data of Farm and Production	Farm Number	Minimum	Maximum	Average	SD
The presence of land (Decare)	7	98	20.000	4.169	248.0
Pasture area (Decare)	6	40	70.000	21.137	519.6
Pasture grazing time (Month)	4	5	8	6.5	1.08
Number of milking cows (Head)	7	127	10	317	127.1
Age at first insemination or overrun (Month)	7	13	36	20.8	10.48
Number of insemination per pregnancy	6	1	2	1.6	0.38
First calving age (Month)	7	22	48	30.3	11.20
Service period (Day)	7	45	90	65	15.49
Lactation period (Month)	6	200	305	261.7	48.6
Duration between two maternities (Day)	7	365	450	405	38.3
Number of lactation	6	3	4	3.25	0.29
Daily milk yield averagely (L/Head)	7	13	28	15.5	5.80
Fat content of raw milk (%)	4	3.6	4.4	3.94	0.12
Protein content of raw milk (%)	4	2.8	3.5	3.25	0.30
Somatic cell count of raw milk	2	25.000	200.000	112.500	123.7
Calf death rate from weaning (%)	6	2	10	3.78	3.90
Mastitis rate (%)	6	0	30	11.87	14.45

In the Aegean and Black Sea regions, there is Holstein breed that is common and has a higher milk yield. It was determined that the number of animals and average milk yields were higher in these farms, because of the limited pasture facilities and more indoor farming was performed and silage usage was widespread. In the eastern enterprises; it was observed that Montafon, Simental, Zavot breeds or hybrids were used, pasture-based animal husbandry, calves were sucked together with their mothers and milk yield was lower. It is determined that registered production is performed in enterprises with a high number of animals and milk yield and quality are higher. The number of enterprises engaged in organic dairy cattle production has been decreasing due to insufficient support for organic livestock.
The results of the analyses of feed and milk samples taken from 6 different organic dairy cattle farms are given in Table 2. As can be seen in Table 2, significant differences were observed between the feed samples taken from different farms, nutrient contents of feeds and milk qualities.

Table 2. Raw nutrient contents in the roughage samples taken of the organic dairy cattle farms

	Nutrient content of dried roughage feed								Roughage Feed Variety
Amount	DM	CP	EE	CF	ADF	ADL	NDF	CA	
Maximum	9.49	16.57	2.26	31.09	46.42	9.37	66.71	9.92	Dried Alfalfa hay, Pasture hay, Meadow hay, Oat hay, Straw, Cereals hay
Minimum	5.47	5.03	0.92	22.84	27.84	5.52	39.46	4.98	
Average	7.82	10.69	1.49	27.81	36.93	6.44	52.24	8.32	
SD	4.95	0.41	0.18	0.30	0.71	0.06	0.94	0.15	

DM:Dry Matter, CP:Crude Protein, EE:Ether Extract, CF: Crude Fiber, ADF: Acid Detergent Fiber, ADL:Acid Detergent Lignin, NDF:Nötr Detergent Fiber, CA:Crude Ash

The raw nutrient contents of the silages used in different farms are given in Table 3. As seen in Table 3, dry matter contents of corn silages ranged between 24.12-34.90% and average dry matter content was 30.47%. The pH of silage samples is between 3.64-3.70 and the silage quality was found to be good.

Table 3. Nutrient content of corn silage samples in organic dairy farms

Amount	DM %	CP %	AF %	CF %	ADF %	ADL %	NDF %	CA %
Maximum	34.90	2.81	0.97	7.20	10.14	0.97	15.29	1.75
Minimum	24.12	1.86	0.50	6.37	8.38	0.80	13.01	1.31
Average	30.47	2.34	0.69	6.83	9.10	0.86	14.00	1.55
SD	4.95	0.41	0.18	0.30	0.71	0.06	0.94	0.15

The data regarding the raw milk quality characteristics of the organic dairy cattle enterprises are given in Table 4. It was determined that there were big differences between the nutrient content, total number of bacteria and somatic cell numbers of raw milk samples obtained from different farms.

Table 4. Raw milk quality characteristics in the organic cattle farms

Amount	Dry Matter	Protein %	Fat %	Lactose %	TBC (cfu/mL)	SCC (per mL)	CLA %	Omega-3 %	Vit E (mg/kg)
Maximum	13.27	3.34	4.20	5.06	780.000	618.000	0.60	0.47	0.59
Minimum	9.30	2.38	2.80	3.68	3.000	48.000	0.10	0.11	0.25
Average	11.69	2.95	3.58	4.71	154.117	280.167	0.36	0.32	0.41
SD	11.69	2.95	3.58	4.71	154.117	280.167	0.36	0.32	0.41

TBC: Total Bacteri Count SCC: Somatic Cell Count CLA: Conjuge Linoleic Acid

Conclusion

If organic dairy cattle farms in the different regions of Turkey are considered, the criteria regarding its animal husbandry conditions indicate big differences. While the farms in the western regions do not have the opportunity to benefit from pasture, the farms in the eastern part of Turkey have mostly pasture-based production. Among the farms; there are large differences in the land areas, number of animals, milk yield, milk quality, and other performance parameters. In the farms that have a high number of animals, was observed that more regular records are kept and regular breeding is performed. In terms of animal health and welfare, due to their significant impact, animals should be allowed to benefit from pastures in organic dairy cattle farms.

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SECTION I

ANIMAL NUTRITION
(Oral Presentations)

The Effect of Different Technologically Treated and Multi-Enzyme Addition Barley in Egg Rations on Egg Yield, Egg Quality and Egg Yolk Fatty Acids

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Introduction

Although in recent years has increased corn production in Turkey (6.4 million tonnes in 2015) have proved insufficient to meet the need for animals to feed and maintained a significant amount of imports. 1.7 million tons of corn imports made in 2015 and 389.661 thousand dollars has been spent for these imports (TUIK, 2015) The climate of Turkey is not conducive to different regions of the barley farming has led to the production of these products as traditional. While barley can be used in large and small ruminant feeds in sufficient amounts without any problems, its use in poultry feeds is limited due to the inclusion of large amounts of barley in poultry, leading to digestive disorders and performance problems. It is widely used to reduce antinutritional factors (Robert et al 2006). In order to solve these problems and to use these cereal feeds in poultry nutrition and to use them successfully, researches have been made on various applications. The most common of these applications are technological processes; flaking, pelletizing, expander and annealing processes. In addition, exogenous enzymes such as beta-glucanase and cellulase are used to increase the digestibility of cellulose present in the arab (Gurbuz and Salih 2017). For this purpose, the use of different levels of flake barley and pelleted barley, which have been widely obtained recently, have been investigated in different ratios in egg rations. In addition, the effects of technological processes and the effects of enzymes were compared by adding multi enzyme additive to the egg rations fed with barley weighted rations.

Material and method

Trial, control 0% barley (maize weighted) (K), 15% broken barley (A1), 15% pellet barley (A2), 15% flake barley (A3), 30% broken barley (A4), 30% pellet barley (A5), 30% flake barley (A6), 30% broken barley + Enzyme (0.025%) (A7), consists of 8 different groups. In the study, 64 brown ATAK-S laying hens of 36 weeks were divided into 8 different treatment groups (Anonymous, 2007). For each treatment, 8 chickens were placed in individual cages. The chickens were determined by chance and the lighting period was 16 hours in light and 8 hours in darkness in individual cages. Feed and water are given freely. The diets were prepared with approximately 17.2% crude protein and 2735 kcal / kg ME, 3.80% Calcium.

Result

As a result of the trial; The feed consumption varied between 98,10-107,31 g according to the groups and it was found to be statistically different (P <0.05).

Table 1. Effect of Barley Using Different Treated and Multi-Enzyme Additions (%) in Egg Rations

	GROUPS										
	K	**A1**	**A2**	**A3**	**A4**	**A5**	**A6**	**A7**	**SEM**	**P**	**N**
OYT	102,65^{b}	105,73^{a}	107,31^{a}	103,14^{b}	102,92^{b}	98,10^{c}	99,46^{c}	99,32^{c}	77,85	0,0001	***
OYA	57,97^{bc}	56,45^{c}	62,98^{a}	59,28^{bc}	58,52^{bc}	57,15^{bc}	59,50^{abc}	60,41^{ab}	33,,13	0,007	**
OYK	39,70^{cb}	40,36^{b}	41,95^{a}	39,02^{c}	37,22^{d}	38,84^{c}	40,68^{b}	41,76^{a}	19,00	0,0001	***
OYV	70,13^{b}	70,87^{ab}	71,64^{a}	71,10^{ab}	71,51^{a}	70,68^{ab}	70,93^{ab}	70,82^{ab}	1,79	0,184	-

a, b, c, d The same lines are different. K: Corn Control, A1: 15% Mash Barley, A2: 15% Pellet Granular Barley, A3: 15% Flake Barley, A4: 30% Mash Barley, A5: 30% Pellet Granular Apra, A6: 30% Flake Barley, A7 : 30% mash Barley + Enzyme, OYV: Average Egg Yield (%), N: non significantly, *: P <0.05, **: P <0.01, ***: P <0.001, SEM: Standard Error Mean, OYT: Average Feed Consumption; OYA: average egg weight; OYK: average egg mass OYK: Average Egg yield%

When the effect of different processed barley and multi enzyme addition on egg weight was examined, it was found that the highest egg weight was obtained from A2 (62.98 g) chickens and the lowest egg weight was obtained from A1 (56.45 g) chickens. According to the results; It was determined that feed consumption of 15% barley groups was high and feed consumption of 30% barley groups was low. In general, low feed consumption can be caused by the amount of barley added to the ration and the high temperatures during the experiment period. As a result of the trial; The feed consumption varied between 98,10-107,31 g according to the groups and it was found to be statistically different (P <0.05).

When weekly changes of egg yield are examined, it is seen that feeding with A1, A2, A3 groups, A4, A5, A6, A7 groups has no significant effect on egg yield. The highest egg yield was found in the A2 group with the highest 71.64% and the K group with the lowest 70.13%. In general, there was no difference between the groups in terms of egg yield.
The Haugh unit was not affected by the trial procedures, but the values obtained were not based on the values given in the Turkish Standard Institute's natural egg classes scale. When the Haugh Unit, which is one of the egg quality criteria in the 8th week, is seen in the K group with the lowest 85,25, it is seen that the highest is in the A1 group with 92,13.

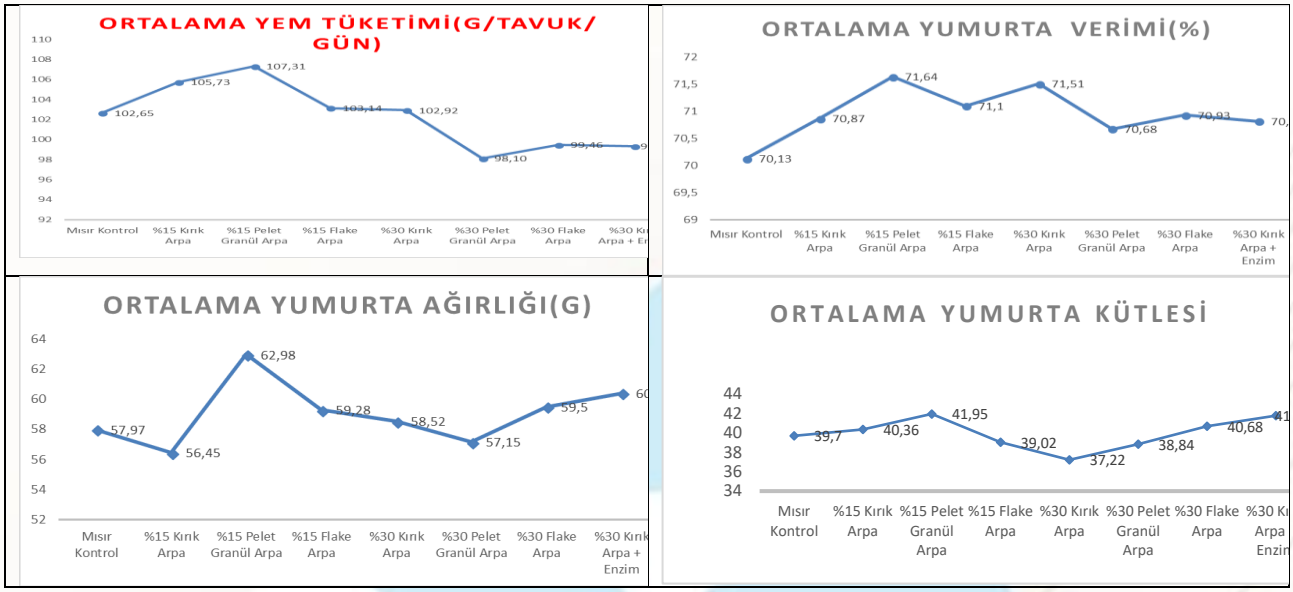

Figure 1. The Effect of Different Processed and Multi-Enzyme Added Barley on the Use of Egg Rations (%)

According to the results; It was determined that feed consumption of 15% barley groups was high and feed consumption of 30% barley groups was low. In general, low feed consumption can be caused by the amount of barley added to the ration and the high temperatures during the experiment period. When weekly changes of egg yield are examined, it is seen that feeding with A1, A2, A3 groups, A4, A5, A6, A7 groups has no significant effect on egg yield.
The highest egg yield was found in the A2 group with the highest 71.64% and the K group with the lowest 70.13%. In general, there was no difference between the groups in terms of egg yield. When the effect of different processed barley and multi enzyme addition on egg weight was examined, it was found that the highest egg weight was obtained from A2 (62.98 g) chickens and the lowest egg weight was obtained from A1 (56.45 g) chickens. The Haugh unit was not affected by the trial procedures, but the values obtained were not based on the values given on the natural egg classes scale of the Turkish Standards Institute. When the Haugh Unit, which is one of the egg quality criteria in the 8th week, is seen in the K group with the lowest 85,25, it is seen that the highest is in the A1 group with 92,13. Results obtained with egg quality; Yörük and Bolat (2003) and Yıldız (2010) show similarities with the studies they have done.
In the experiment, omega 6 (n-6) and omega 3 (n-3) fatty acids; Linolelaidic acid, one of the omega 6 fatty acids, was also found to differ between treatments. The lowest value in terms of linolelaidic acid was A3 group with 0,022 and the highest value was A2 group with 0.046 (Shafey et al 1992).

Table 2. The Effect of Using Different Processed and Multi-Enzyme Barley on Egg Quality in Egg Poultry Rations

	GROUPS									
K	**A1**	**A2**	**A3**	**A4**	**A5**	**A6**	**A7**	**SEM**	**P**	**N**

Egg weight (gr)	57,87^{a}	55,25^{a}	61,37^{a}	58,14^{a}	58,75^{a}	56,42^{a}	61,50^{a}	58,25^{a}	34,12	0,3302	-
Shape index	73,81^{a}	74,43^{a}	74,12^{a}	75,14^{a}	74,75^{a}	74,50^{a}	73,58^{a}	73,56^{a}	2,34	0,9577	-
Egg width (mm)	42,11^{a}	41,61^{a}	43,16^{a}	42,77^{a}	42,69^{a}	42,31^{a}	42,68^{a}	41,98^{a}	1,95	0,3465	-
Egg length (mm)	57,31^{ab}	56,65^{ab}	58,01^{a}	52,61^{b}	57,40^{ab}	57,18^{ab}	58,37^{a}	57,43^{ab}	22,56	0,3252	-
Strength (kg / cm2)	0,37^{a}	0,42^{a}	0,45^{a}	0,41^{a}	0,53^{a}	0,42^{a}	0,43^{a}	0,42^{a}	0,017	0,5974	-
Shell weight (gr)	7,21^{abc}	7,03^{bc}	7,77^{ab}	7,85^{a}	7,14^{abc}	6,98^{bc}	6,84^{c}	7,65^{ab}	1,09	0,0321	*
Shell Thickness (mm)	0,29^{a}	0,31^{a}	0,30^{a}	0,33^{a}	0,32^{a}	0,30^{a}	0,29^{a}	0,31^{a}	0,001	0,6531	-
Color	10,75^{b}	10,87^{ab}	11,25^{ab}	11,14^{ab}	11,50^{ab}	11,57^{ab}	11,33^{ab}	11,87^{a}	1,07	0,2921	-
Height of yellow (mm)	19,85^{a}	18,33^{bc}	19,34^{ab}	18,49^{bc}	18,63^{bc}	18,20^{c}	18,12^{c}	18,49^{bc}	2,76	0,0030	**
Yellow width (mm)	42,23^{a}	42,73^{a}	43,15^{a}	41,50^{a}	43,50^{a}	41,48^{a}	42,79^{ab}	42,38^{ab}	3,89	0,4201	-
Length of white (mm)	84,06^{a}	85,47^{a}	84,79^{a}	85,10^{a}	83,85^{a}	81,44^{a}	80,61^{a}	85,93^{a}	25,09	0,5609	-
Width of white (mm)	67,15^{a}	68,50^{a}	69,80^{a}	65,62^{a}	66,24^{a}	64,67^{a}	66,02^{a}	66,64^{a}	20,49	0,6906	-
White height (mm)	7,19^{b}	8,27^{a}	7,89^{a}	8,07^{a}	7,76^{ab}	7,81^{a}	8,06^{a}	8,05^{a}	0,84	0,0226	*
Yellow weight (gr)	15,55^{ab}	14,63^{b}	16,08^{b}	14,62^{b}	15,14^{ab}	14,69^{b}	15,26^{ab}	15,35^{ab}	2,00	0,0287	*
White weight (gr)	35,37^{bc}	33,34^{c}	37,52^{ab}	35,51^{bc}	36,45^{ab}	35,03^{bc}	38,39^{a}	35,24^{bc}	17,78	0,0034	**
Haugh unit	85,25^{b}	92,13^{a}	88,37^{ab}	90,13^{a}	88,33^{ab}	89,29^{a}	89,30^{a}	90,09^{a}	31,05	0,0227	*

a, b, c, d The same lines are different. K: Corn Control, A1: 15% Mash Barley, A2: 15% Pellet Granular Barley, A3: 15% Flake Barley, A4: 30% Mash Barley, A5: 30% Pellet Granular Apra, A6: 30% Flake Barley, A7 : 30% mash Barley + Enzyme, N: non significantly, *: P <0.05, **: P <0.01, ***: P <0.001, SEM: Standard Error Mean Color: Roche color range consisting of 15 slices is used.

There was a significant difference between oleic acid and egg fatty acids (P <0.05). In addition, the results of the trial, lazora et al. (2003) in their study, approximately 72-75% of the total grain in barley, wheat and rye containing mixed feeds with the opinion that the addition of enzymes does not increase egg yield Mathlouthi et al. (2003), Oloffs et al. (1994), Ciftci et al. (1997) showed similarity with the results that the addition of mixed enzyme to barley-containing egg diets did not affect egg production. As a result, the use of 30% heat-treated or multi-enzyme added barley in egg poultry rations has no negative effect on egg yield, egg quality and egg fatty acids, and 30% heat-treated barley or multi-enzyme added barley was successfully It can be used.

Table 3 Effect of Different Processed Barley on Egg Fatty Acids in Laying Hens

GROUPS

	A	B	C	D	E	F	G	H	SEM	P	N
Myristic Acid	0,520^{a}	0,457^{c}	0,388^{d}	0,389^{d}	0,571^{a}	0,440^{c}	0,525^{b}	0,383^{d}	0,01	0,0011	***
Myristoleic Acid	0,034^{c}	0,029^{c}	0,083^{a}	0,016^{d}	0,019^{d}	0,019^{d}	0,051^{b}	0,036^{c}	0	0,0011	***
Pentadecanoic Acid	0,073^{abc}	0,068^{bc}	0,068^{bc}	0,085^{a}	0,077^{ab}	0,064^{bc}	0,058^{c}	0,071^{abc}	0	0,04	*
Palmitic Acid	28,14^{cd}	28,30^{c}	26,76^{e}	27,80^{d}	29,06^{b}	27,71^{d}	30,44^{a}	28,37^{c}	2,33	0,0011	***
Palmiteloic Acid	0,94^{bc}	1,08^{b}	0,85^{c}	0,89^{c}	0,86^{c}	1,74^{b}	1,59^{a}	1,60^{a}	0,19	0,0011	***
Heptadecanoic Acid	0,274^{ab}	0,263^{ab}	0,252^{a}	0,303^{ab}	0,277^{ab}	0,256^{ab}	0,226^{b}	0,192^{b}	0,02	0,2378	-
Cis-10 Heptadecanoic	0,040^{a}	0,063^{a}	0,180^{a}	0,059^{a}	0,044^{a}	0,046^{a}	0,046^{a}	0,065^{a}	0	0,45	-
Stearic Acid	17,96^{a}	15,53^{c}	14,94^{d}	13,96^{e}	16,52^{b}	14,93^{d}	16,03^{bc}	10,69^{f}	9,14	0,0011	***
Oleic Acid	26,88^{c}	30,33^{b}	25,26^{c}	26,85^{c}	23,19^{d}	25,90^{c}	29,48^{b}	35,41^{a}	28,61	0,0011	***
Linolelaidic acid (n-6)	0,035^{ab}	0,038^{a}	0,046^{a}	0,022^{b}	0,044^{a}	0,041^{a}	0,032^{ab}	0,023^{b}	0	0,0206	*
Linoleic Acid (n-6)	21,63^{d}	20,53^{e}	27,47^{a}	25,82^{b}	25,73^{b}	23,41^{c}	18,11^{g}	19,25^{f}	23,12	0,0011	***
gama-Linolenic Acid (n-6)	0,097^{e}	0,093^{e}	0,112^{cd}	0,123^{b}	0,118^{bc}	0,200^{a}	0,121^{b}	0,108^{d}	0	0,0011	***
alfa-Linolenic Acid (n-3)	0,336^{d}	0,300^{e}	0,443^{b}	0,343^{d}	0,356^{d}	0,400^{c}	0,246^{f}	0,468^{a}	0,01	0,0011	***
Arachidic Acid	0,222^{e}	0,239^{d}	0,251^{c}	0,266^{b}	0,222^{e}	0,242^{d}	0,241^{d}	0,371^{a}	0	0,0011	***
Heneicosanoic Acid	0,390^{d}	0,369^{e}	0,615^{a}	0,493^{b}	0,470^{c}	0,488^{bc}	0,308^{f}	0,370^{e}	0,01	0,0011	***
Cis-11,14-Eicosadienoic Acid	0,206^{a}	0,153^{a}	0,207^{a}	0,180^{a}	0,162^{a}	0,235^{a}	0,197^{a}	0,397^{a}	0,01	0,558	-
Behenic Acid	1,238^{cd}	1,035^{f}	1,312^{b}	1,271^{bc}	1,152^{e}	2,036^{a}	1,220^{d}	1,307^{b}	0,183	0,0011	***
Tricosanoic Acid	0,023^{a}	0,029^{a}	0,358^{a}	0,023^{a}	0,029^{a}	0,032^{a}	0,035^{a}	0,021^{a}	0,027	0,485	-
Lignoceric Acid	0,656^{bc}	0,718^{b}	0,730^{b}	0,713^{b}	0,726^{b}	1,741^{a}	0,702^{b}	0,599^{c}	0,279	0,0011	***
Nervonic Acid	0,047^{d}	0,053^{c}	0,069^{b}	0,047^{d}	0,054^{c}	0,160^{a}	0,043^{e}	0,041^{e}	0,003	0,0011	***
Cis-4,7,10,13,16,19 Doc Acid (n-3)	0,239^{e}	0,247^{de}	0,262^{cd}	0,270^{c}	0,252^{cd}	0,506^{a}	0,246^{de}	0,411^{b}	0,019	0,0011	***

a, b, c, d The same lines are different. K: Corn Control, A1: 15% Mash Barley, A2: 15% Pellet Granul Barley, A3: 15% Flake Barley, A4: 30% Mash Barley,A5: 30% Pellet Granul Apra A6: 30% Flake Barley,A7: 30% mash Barley + Enzyme, N: non significantly, *: P <0.05, **: P <0.01, ***: P <0.001, SEM: Standard Error Mean

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Effect of Activated Clinoptilolite and Inactive Brewer's Yeast Mixture on Backfat Thickness and Musculus Longissimus Dorsi (MLD) Depth in Humid Regions

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Introduction

Lambs fed within high quality roughage and concentrated feed in humid area always have a potential risk to contaminate with harmful microorganisms, toxins and secondary metabolites due to storage conditions of feeds. In order to prevent the synergistic effects of mycotoxins with each other, different types of toxin binders, including activated clinoptilolite aliminosilicates, yeasts, organic acids and enzymes could be used In cases where toxin formation cannot be prevented (Phillips et al., 1988; Filya et al, 1999; Ghaemnia et al., 2010). This study was conducted to investigate the effects of adding activated clinoptilolite (60%) and inactive brewer's yeast (40%) mixture (0%, 0.1%, 0.3% and 0.5%) to lamb rations which feed in humid regions, on backfat thickness and Musculus longissimus dorsi thoracis et lumborum (MLD) depth.

Materials and methods

A total of fourty eight Kivircik male lambs with an average 62±4 days weaning age and 23.71±3.35 kg live weight used in this study. Lambs were randomly divided into 4 experimental groups with 8 head singles and 4 head twins according to birth type and adapted to concentrate to reduce the incidence of rumen acidosis for 1 week before study. Concentrate feed and fresh water were given ad libitum, whereas 150 g of alfalfa per lamb per day was provided for 56 days. The chemical composition of roughage and rations used in the study is presented in Table 1. Initial and final backfat thickness and MLD depth were measured made by ultrasound using Mindray DP-20 ultrasound device and 75L50EAV model of transrectal linear probe.

Dry matter (DM), crude protein (CP) , crude ash (CA), ether extract (EE) and, crude fibre (CF) compositions of roughage and rations were analysed using the AOAC methods (AOAC, 1990). The neutral detergent fibre (NDF), acid detergent fibre (ADF) and acid detergent lignin (ADL) contents were analysed according to the methods reported by Van Soest et al. (1991). Metabolizable Energy (ME) was calculated according to TSE-9610 (2008).

Table 1. Chemical components of roughage and rations used in the study (%)

Ration	DM	CP	CA	EE	CF	NDF	ADF	ADL	ME
Alfalfa hay	930,1	166,2	80,6	19,4	287,1	411,2	321,2	111,5	1,74
Control	890,7	168,2	81,3	35,8	106,0	435,7	112,0	61,7	2,71
A *(0.1%)*	883,6	166,5	76,7	36,1	105,7	439,2	115,3	59,4	2,72
B *(0.3%)*	890,7	168,1	78,3	35,6	104,8	435,4	114,5	59,7	2,72
C *(0.5%)*	883,1	166,2	80,6	35,5	103,8	437,6	111,4	56,6	2,72

DM: Dry matter (g/kg); CP: Crude Protein (g/kg); CA: Crude Ash (g/kg); CF: Crude Fiber (g/kg); NDF: Neutral Detergent Fiber (g/kg); ADF: Acid Detergent Fiber (g/kg); ADL: Acid Detergent Lignin (g/kg); ME: Metabolizable Energy (Kcal/kg)

Results

In this study, the effects of adding activated clinoptilolite (60%) and inactive brewer's yeast (40%) mixture with different proportions to lamb rations on backfat thickness and MLD depth were investigated. Ultrasound measurement of experimental groups are given in Table 2. The results showed that backfat thickness in Group A (0.1%) statistically had more higher backfat thickness than control and other groups ($p<0.5$). Adding 0.3% and 0.5% of activated clinoptilolite-inactive brewer's yeast mixture had no negative effect on backfat thickness ($p<0.05$). On the other hand adding 0.5% of activated clinoptilolite-inactive brewer's yeast mixture to lamb rations had positive effect on MLD depth ($p<0.0.5$).

Table 2. Ultrasound measurements of experimental groups at different periods

Variable	Period	Control	Ration A (0.1%)	Ration B (0.3%)	Ration C (0.5%)
Backfat thickness (mm)	Initial	2.71 ± 0.20^{ab}	2.14 ± 0.20^{b}	2.71 ± 0.21^{ab}	2.17 ± 0.20^{b}
	Final	2.54 ± 0.20^{ab}	3.19 ± 0.22^{a}	2.56 ± 0.20^{ab}	2.63 ± 0.20^{ab}
MLD Depth (cm)	Initial	$2,08 \pm 0,07^{bc}$	$1,94 \pm 0,07^{c}$	$2,07 \pm 0,07^{bc}$	$2,03 \pm 0,07^{bc}$
	Final	$2,16 \pm 0,07^{a-c}$	$2,21 \pm 0,08^{a-c}$	$2,31 \pm 0,07^{ab}$	$2,42 \pm 0,07^{a}$
Skin Thickness (mm)	Initial	2.76 ± 0.24^{ab}	$2.56 \pm 2,41^{b}$	3.04 ± 0.27^{ab}	2.81 ± 0.24^{ab}
	Final	3.74 ± 0.25^{a}	3.38 ± 0.27^{ab}	3.07 ± 0.25^{ab}	3.68 ± 0.25^{a}

Levels not linked by the same letter are significantly different

Conclusion

These results indicated that adding activated clinoptilolite (60%) and inactive brewer's yeast (40%) mixture at 0.5% on lamb raiton could be used to increase MLD area without any increasing of backfat thickness ($p<0.05$).

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Effect of Dietary Multi-Enzyme Supplementation on Growth Performance and Nutrient Digestibility of Broilers Fed Mash or Pellet Diets

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Abstract
This study was conducted to investigate the thermotolerance and efficacy of a new commercial multi-enzyme product (Endofeed® DC) on growth performance, relative carcass and organ weights, nutrient digestibility and metabolic energy value in broilers fed corn-soybean meal diets in mash or pellet forms. A total of 320 male day-old Ross 308 broiler chicks were randomly divided into 6 treatments with 13 replicate per treatment. The experiment was maintained to 42 days and had a 2×3 factorial arrangement of treatments involving mash or pellet diet supplemented with 0, 125 or 175 mg/kg of a multi-enzyme product. Growth performance parameters were checked weekly and digestibility of nutrients were measured on the 21 and 42st days of the experiment. At the end of the study, it was determined that the addition of pelleting plus 175 g/t dose multienzyme significantly increased the body weight (BW) and feed intake (FI) values in the early period ($P<0.05$), the BW and FI values between 22-42 and 0-42 days were found to be similar between the groups ($P>0.05$). Increased dose of multienzyme and pelletization significantly improved feed conversion rate (FCR) ($P<0.05$). The feed form*multienzym interaction was found to be significant in 0-21 days for BW and FI, and for all three periods in FCR ($P<0.05$). Mash feed decreased the European Productivity Efficiency Factor (EPEF) ratio compared to pellet, and it was observed that the EPEF value increased with the increasing dose of multienzyme in both feed forms. While there was no difference between the groups in terms of relative weight of carcass, liver, proventriculus, intestine, abdominal fat ($P>0.05$), mash feed was found to significantly increase the weight of gizzard compared to pelleted feed ($P<0.05$). In addition, while the pelletizing process and addition of the multienzyme increased significantly the P digestibility and apparent metabolisable energy (AME) value on days 21 and 42 of the trial ($P<0.05$), it was found that the difference between the groups in terms of digestibility of dry matter (DM), organic matter (OM), crude protein (CP) was similar ($P>0.05$). As a result, the pellet feed form and the increased dose of multienzyme supplementation have been found to improve the EPEF ratio and increase the AME value in broiler chickens.
Key words: Multienzyme, performance, digestibility, AME, feed form, broilers

Introduction

Corn, wheat and soybean meal are the main components of poultry diets. However, the feed value of these raw materials is limited by antinutritive factors such as polysaccharides (NOP) in the polymeric structure they contain. (Denstadli et al., 2010). The reason for this is that poultry lack the endogenous enzymes that can degrade NOP. The high water soluble NOP (cellulose, xylan, arabinoxylan and β-glucan, etc.) content in cereal based diets increases the viscosity of the digestive system, resulting in less digestibility of nutrients, which leads to deterioration of growth performance in broilers (Nahas and Lefrançois, 2001; Józefiak et al., 2004). The decrease in nutrient digestibility is due to the high viscosity limiting the activities of endogenous enzymes and destroying the intestinal mucosal surface. (Nahas and Lefrançois, 2001). This results in lower nutrient absorption and consequently lower productivity. In addition, water soluble NOP excess increases the water consumption in broilers and causes wet and sticky excreta welded litter problem (Austin et al., 1999). As a matter of fact, the negative effects of NOP can be overcome by supporting the diets with exogenous enzymes (Lazaro et al. 2004). It was determined that the addition of β-glucanase and xylanase enzymes to the compound feeds increased the daily body weight gain of broiler chicks and improved feed conversion rate. On the other hand, it is reported that these enzymes decrease the intestinal content viscosity and increase contact between endogenous enzymes and nutrients, thus improve nutrient digestibility. In addition, Waititu et al. (2014) found that there is an interaction between the diet and the enzyme in terms of feed conversion ratio in broilers fed with two different diets prepared predominantly in the diet with wheat, corn and soybean meal (BMS) or sorghum, cottonseed and sunflower seed (SCS) and three different multi-enzyme mixtures, which have equivalent phytase activities but with different carbohydrate (excluding invertase) and protease activities.

Broiler chicks can not benefit from phosphorus in the form of phytate in the plant composition. Therefore, the phosphorus requirements they need are met by the addition of phosphorus from the outside. The high levels of phosphorus used in broiler diets increase the cost of feed on the one hand, while the excess phosphorus excreted by the feces causes a large environmental pollution. Therefore, by using exogenous enzymes (phytase), the evaluation of the herbal phosphorus sources is increased and the phosphorus supplementation to the diets is reduced. Some studies have shown that dietary phytase increases nutrient digestibility and mineral material availability in broilers (Zyla et al.,2001). On the other hand, several studies have shown the synergistic effects of phytase and NOP enzymes on growth performance, nutrient digestibility and viscosity. Peng et al. (2003) reported that the combination of phytase and xylanase significantly increased phytate digestibility by 77.8% and improved feed conversion ratio by 7.3% compared to phytase alone. Lee et al. (2010) informed that in broilers fed with corn, wheat, and soybeans-weighted diets, multi-enzyme supplementation of mixed feeding phytase plus NOP enzymes improved growth performance and mineral status of the tibia. It was also reported that the performance improvement observed was associated with decreased intestinal viscosity via the dietary enzyme complex.

It is also known that feed form has a significant effect on growth performance and feed intake in broiler chicks (Dozier et al., 2010). Many researchers also noted that body weight is increased in broilers fed with pellet feed compared to those fed with mashed feed, while the feed conversion ratio is improved as well. (Chewning et al., 2012; Lv et al., 2015). Pellet feeds have advantages such as reducing feed waste, alleviating selection feed, eliminating pathogens, improving flavor and improving nutrient digestibility (Lv et al., 2015). However, the pelletizing process costs in these feeds are high and the temperature during the process has disadvantages in terms of the negative effects of the enzyme structures. Therefore, this study was carried out to investigate the effects of different doses of dietary multienzyme on growth performance, relative carcass and organ weights, nutrient digestibility and metabolic energy value in broilers fed corn-soybean meal diets in mash or pellet forms.

Materials and methods

Chicks, Diets and Experimental Design: In the study, 320 day old male broiler chicks (Ross-308) were used as animal material. The chicks were purchased from a commercial hatchery. The trial was carried out in a total of 6 groups, each containing 52 chicks. Each group consisted of 13 sub-groups and each sub-group consisted of 4 animals. The study was planned in the factorial form (2 x 3) of two different feed forms (mash, pellet) and three different enzyme doses (0, 125 and 175 g/t feed). Among these six dietary treatment groups formed for the experiment, **T**; mash mixed feed without any enzyme additives (positive control), **T1**; 125 g enzyme added to each tonne of mash mixed feed (50 Kcal ME/kg less from T Diets), **T2**; 175 g enzyme added to each tonne of mash mixed feed (50 Kcal ME/kg less from T Diets), **P**; pellet mixed feed without any enzyme additives (positive control), **P1**; 125 g enzyme added to each tonne of pellet mixed feed (50 Kcal ME/kg less from P Diets), **P2**; 175 g enzyme added to each tonne of pellet mixed feed (50 Kcal ME/kg less from P Diets). The enzyme (Endofeed® DC) was used in the broiler diets contains per gram, a minimum of 1100 Units of endo-1,3(4)-β-glucanase (glucanase) and 1600 Units of endo-1,4-β-xylanase (xylanase) and it was produced by *Aspergillus niger* NRRL 25541. The feed raw materials to be used in the study were obtained from a commercial feed factory and the mixed feeds of the experiment were prepared at the feed production facility in the Department of Animal Science of Dicle University. Pellet feeds were formed by pressing the mashed feed produced under dry air flow at 72 ° C. The disc temperature was measured at 90 ° C while the mashed feed was in the matrix. The mash feed was measured at 72 ° C after 4 mm outlet and at 50 ° C when it reached 2 cm. Approximately 20 minutes after the application of hot dry air flow, the temperature of the pellet feed is reduced to 25 ° C and humidity to 12% in 15 minutes. Then the pellets were stored in 25 kg bags.

The nutrient contents of the mixed feeds in mash and pellet form to be used in the experiments are prepared mainly in corn and soybean meal according to the nutrient requirements of broiler chickens reported in NRC (1994). During the experiment, broiler chick grower feed (22.5% HP, 3050 and 3000 Kcal ME/kg) from day 1 to day 21, and broiler finisher feed from 22th day to slaughter day (day 42) , 3230 and 3180 Kcal ME/kg). Composition and nutrient contents of mixed feeds used in the study were given in *table 2.1*. Wood flour was used as the litter in the experiment and the research was carried out in a full environmental controlled closed experiment coops set in Department of Animal Science, Faculty of Agriculture, Dicle University. In the first 5 days of the experiment, it was taken into consideration that the in-coop ambient temperature was between 33-34 °C and this temperature was gradually decreased to 21-22 °C on the other days of the study. Group feeding was applied for chickens in each pen (0.4 m x 1m = 0.4 m^2), feed and water were presented *ad libitum*. During the experiment, 23 hours of light and 1 hour of dark plan were applied. The experiment was maintained to 6 weeks.

Feed analysis: Determination of the nutrient content of the mixed feed used in the experiment (excluding crude cellulose) was made according to Weende analysis method (Naumannn and Bassler, 1993); The determination of the crude fiber was done according to the Lepper method (Bulgurlu and Ergül, 1978). Additionally, metabolical energy content was calculated using the regression equation recommended by Turkish Standards Institute standard No. 9610 (TSI, 1994).

Table 2.1 Ingredients and chemical composition of experimental diets (as-fed basis)

	Grower (1.-21. Days)		**Finisher (22.-42. Days)**	
Feed stuff, %	**Control**	**Treatments***	**Control**	**Treatments***
Corn	50.50	51.50	57.00	58.00
Soybean meal (46 % CP)	19.50	19.50	20.00	20.00
Full fat soybean meal	25.00	25.00	15.50	15.50
Sunflower oil	1.00	-	4.00	3.00
Dicalciumphosphate	2.10	2.10	1.75	1.75
DL-Methionine	0.20	0.20	0,10	0.10
L-Lysine HCl	0.15	0.15	0.10	0.10
Limonstone	1.00	1.00	1.00	1.00
NaCl	0.30	0.30	0.30	0.30
Vitamin and Mineral premix[1]	0.25	0.25	0.25	0.25
Total	**100**	**100**	**100**	**100**
Calculated values				
Crude protein, %	22.5	22.5	20.0	20.0
ME, Kcal/Kg	3050	3000	3230	3180
Ca, %	1	1	0.90	0.90
Available P,%	0.46	0.46	0.40	0.40
L-lysine, %	1.34	1.34	1.11	1.11
Methionine+Cystine, %	0.90	0.90	0.73	0.73
Na, %	0.15	0.15	0.15	0.15

*ME values of the treatment group diets with enzyme addition were formulated to be 50 kcal/kg less than the control groups.

[1]Vit.+Min. Mineral mixture provides the following nutrients per kg of diet: vitamin A, 12,283 IU; D3, 3,000 IU; E, 28 ppm; Biotin, 0.27 ppm; Fe, 75 ppm; Zn, 74 ppm; Cu, 74 ppm; Se, 0.31 ppm.

Growth performance and measurement of organ weights: In order to determine the growth performance characteristics, animals were weighed individually on the same day and hour, and feed intake for each subgroup was recorded on the basis of repetitions. The feed conversion rate was calculated by dividing the feed intake values determined weekly for each repetitions by the body weights obtained between these periods. The deaths were recorded on a daily basis and necessary corrections were made considering the feed conversion rate. At the end of the experiment, randomly selected 10 animals from each group were weighed and killed by exposure to carbon dioxide. Then, the results obtained by weighing the weight of the warmed carcasses, liver, gizzard, proventriculus, intestine and abdominal fat were given in proportion to the body weight (%) in terms of proportional values (g/100g Body Weight).

Digestibility analysis: On the 21st day of the trial and at the end of the experiment (day 42), each treatment for the determination of dry matter (DM), organic matter (OM), crude protein (CP), ether extract (EE), calcium (Ca) and phosphorus (P) excreta samples from 8 different pens per group were collected quantitatively and daily. The collected excretas were dried at 85 °C until a constant weight and the excreta samples of the groups were homogenized and labeled. Then the diet and excreta were ground to pass through a 1-mm screen. Diet and excreta nitrogen content was determined according to the kjeldahl method reported by AOAC (1990) and the amount of nitrogen obtained was multiplied by 6.25 to calculate the CP value. Again, the diet and excreta samples were dried for a minimum of 4 hours in the oven at 105 °C, and their crude fiber was analyzed by AOAC (1990) method, while the acid insoluble ash amounts were analyzed according to the methods reported by Vogtmann et al. (1975). Diet and excreta's ether extract analyzes were determined by using the soxhlet extraction device, and the starch values of the diet and ileum digesta were determined according to the method reported by Afnor (1997). All values are expressed in dry matter. The value-adjusted apparent metabolisable energy (AME, kcal/kg) corrected for nitrogen was calculated using the formula (feed intake x gross energy of diet) - (the amount of excretas output x gross energy of excretas) / feed intake. In the European Productivity Efficiency Factor (EPEF) calculated at the end of the experiment, {[(Viability,%) x (average body weight per head, kg)] / [(Growth duration, days) x (feed intake per kg of body weight)]}*100 formula is used.

Statistical analysis: The statistical analysis of the data obtained in the research conducted according to 2X3 factorial experimental design were performed in SPSS 15.0 (SPSS, 2009) program. Two-way analysis of variance (ANOVA) was applied for the significance of the differences between the statistical calculations of the groups and the mean values of the groups; The tukey test was applied to determine the significance control and interaction effects of the differences between the groups. Significance levels ($P<0.05$) were determined (SPSS, 2009).

Results

Estimates of genetic parameters obtained by the best models (lowest -2LogL) are summarised in Table 1. In all cases The periodic effect of multi-enzyme addition at different doses to mash or pellet feed on growth performance and organ

weights in broiler chickens (0-21, 22-42, 0-42 days) is shown in *tables 3.1* and *3.3*; the effects of European Production Efficiency Factor (EPEF) value on day 42 and *in vivo* nutrient and mineral digestibility at 21st and 42nd days are shown in *tables 3.2* and *3.4*, respectively. When *table 3.1* is examined, the difference between the body weight (BW) and feed intake (FI) of the groups is statistically significant between 0-21 days (P <0.05), it was seen highest BW and FI P2 groups (922.58 g and 1119.93 g). The lowest BW was found in the T group (799.67 g) and FI in the P1 group (1011.97 g). BW and FI values of the groups between 22-42 and 0-42 days were found to be similar (P>0.05). When the groups were examined in terms of feed conversion rate (FCR), the differences between the rates of all periods were found to be statistically important (P <0.05).

Table 3.1 Effect of dietary multi-enzyme on growth performance in broilers

Treatments[1]	Body weight gain(g/bird)			Feed intake(g/bird)			Feed conversion ratio(g/g)		
	0-21d	22-42d	0-42d	0-21d	22-42d	0-42d	0-21d	22-42d	0-42d
T	799.7^{b}	1919.2	2718.8	1054.8^{ab}	3138.7	4193.5	1.29^{b}	1.65^{b}	1.54^{c}
T1	817.6^{b}	1882.9	2700.4	1055.3^{ab}	3169.0	4224.4	1.30^{b}	1.63^{b}	1.54^{c}
T2	801.8^{b}	1890.3	2692.0	1025.9^{ab}	3155.7	4181.7	1.27^{ab}	1.65^{b}	1.53^{b}
P	901.3^{ab}	1913.8	2815.1	1034.7^{ab}	3223.0	4257.7	1.17^{a}	1.64^{b}	1.49^{ab}
P1	841.1^{b}	2013.1	2845.2	1011.9^{b}	3238.9	4250.8	1.24^{ab}	1.56^{a}	1.46^{a}
P2	922.6^{a}	1964.8	2887.3	1119.9^{a}	3215.7	4320.2	1.18^{ab}	1.59^{ab}	1.46^{a}
SEM[2]	10.58	10.78	24.08	6.97	20.68	22.42	0.01	0.01	0.01
Feed Form									
Mash	812.6^{b}	1892.5	2699.7^{b}	1044.9	3156.1	4193.7^{b}	1.28^{b}	1.64^{b}	1.56^{b}
Pellet	888.3^{a}	1963.9	2852.2^{a}	1044.3	3136.9	4283.6^{a}	1.18^{a}	1.59^{a}	1.47^{a}
SEM[2]	10.9	18.59	24.44	7.56	24.59	21.77	0.10	0.06	0.07
Multi-enzyme **(**g/t feed**)**									
0	854.4	1911.0	2770.5	1040.2	3150.6	4222.9	1.22	1.65^{b}	1.52
125	829.3	1948.0	2777.3	1032.4	3149.4	4236.5	1.25	1.59^{a}	1.51
175	867.8	1930.6	2785.6	1052.1	3139.4	4241.9	1.23	1.61^{ab}	1.51
SEM[2]	10.93	18.59	24.44	7.70	24.60	21.77	0.01	0.01	0.01
Main effect	*P-value*								
Feed Form	**	NS	**	NS	NS	**	**	**	**
Multi-enzyme	NS	NS	NS	NS	NS	NS	NS	**	NS
Feed Form* Multi-enzyme	**	NS	NS	**	NS	NS	**	**	**

[a-c]Means within a column with different superscripts are significantly different at the *P*-value shown

[1] Each value represents the least square mean from 13 cages per each treatment.

[2]SEM=pooled standard error of mean. ***P*≤0.05, NS (Not significant).

T; mash feed (positive control), **T1**; mash feed+125 g enzyme, **T2**; mash feed+175 g enzyme, **P**; pellet feed (positive control), **P1**; pellet feed+125 g enzyme, **P2**; pellet feed+175 g enzyme.

Accordingly, the FCR between 0-21 days was highest in T (1.29) and T1 (1.30) groups, the lowest in P (1.17) group. 22-42. FCR T (1.65), T1 (1.63), T2 (1.65) and P (1.64) groups were similar and higher than the other groups, and the lowest was found in the FCR P2 group (1.56). FCR was found to be the highest in T and T1 groups (1.54) between the 0-42 days and the lowest in P1 and P2 groups (1.46). Feed form*multienzyme interaction was found to be significant for the FCR between 0-21 days for BW and FI in three periods (P <0.05). On the other hand, it can be said that the effect of the feed form on performance in broiler chicks is significant (P<0.05), whereby the pellet form increases BW, FI and improves the FCR. On the other hand, the effect of different doses of multi-enzyme supplementation on performance was found to be insignificant (P>0.05). The multi-enzyme addition to feed increases the BW by Alam et al. (2003), 14-42, Dersjant-Li et al. (2015) is 0-42., Taheri and Shirzadegan (2017) is 11-42. days, according to Zhu et al. (2014) 1-21., Hajati (2010) 1-28., Mohammed et al. (2018) on days 7-35, they did not change BW. Yu and Chung (2004), reported that the addition of glucanase + xylanase mixture in the warm season increases BW, protease + amylase addition is reduced; both enzymes had no effect in the cold season. The findings obtained from the study on the addition of feed form or enzyme, the effect on FI (0-42.day) was found to be compatible with Ahmed and Abbas (2013), Shabani et al. (2015), Stefanello et al. (2015); and incompatible with Alam et al. (2003), Hajati et al. (2009) and Özkan (2009); On FCR, compatible with Jafarnejad et al. (2010), Torres et al (2013), Stefanello et al (2015), and incompatible with Özkan (2009) and Zakaria et al (2010).

Table 3.2 Effects of dietary Enzymes Supplementation in to mash and pellet diets on The European Production Efficiency Factor (EPEF) in broilers

Treatments[1]		**The European Production Efficiency Factor (EPEF) (42 day)**
Feed Form	**Multienzyme (g/t feed)**	
Mash	0	384,0
Mash	125	388,2
Mash	175	434,1
Pellet	0	402,1
Pellet	125	459,6
Pellet	175	470,8

[1] Each value represents the least square mean from 13 cages per each treatment.

In *table 3.2*, the effect of different doses of multi enzymes on EPEF in powder or pellet form was investigated. The EPEF ratio among the groups was the lowest in the group T (384) and the highest in the P2 (470) group. Accordingly, positively influenced the addition of multi-enzyme and pellet EPEF. This increase in EPEF was attributed to the higher BW of animals fed the multienzyme supplemented pellet form. Murugan and Ragavan (2017), also known as (BPEF - European Performance Factor (EPF) / Production Performance Factor (PEF), defined EPEF as an important indicator of performance in chickens. In research, they reported that climatic conditions have a significant impact on performance and EPEF. Mohammadi et al. (2013) reported that the addition of *Prosopis juliflora* seed at around 4 to 6% decreased the EPEF value in broilers with the dose, and this decrease was mainly attributed to the fact that treatment in the 0-21 day period increased the rate of ration crude fiber compared to the control group. Al-Nasrawi (2016) reported that the feed form had an effect on the EPEF value and that the highest EPEF value was crumble, followed by pellet and mash form.
In *table 3.3*, the effect of different doses of multi enzymes on mash or pellet form was examined on the organ weights of broiler chickens on day 42. Accordingly, when the groups were compared in terms of organ weights, the differences between liver, proventriculus, intestine and carcass weights and abdominal fat ratio were not significant ($P>0.05$). Gizzard weight was higher than the pellet (1.72 %) in mash form (2.31 %) ($P<0.05$). Feed form*multienzyme interaction was found to be significant only for gizzard weight ($P<0.05$). On the other hand, the effect of the feed form or the addition of multi enzymes on organ weights was insignificant and the differences between organ weights of the groups were similar ($P>0.05$), Abbas (2013) reported that the feed form had no effect on the carcass and organ weights. Lv et al. (2015) reported that the form and size of the feed had an effect on the gizzard weight and the weight of the gizzard decreased in pellet form due to the shortening time of the mechanical digestion. As a matter of fact, in our study, it was seen that the animals fed with pellet form had less gizzard weight than the mash form. On the other hand, Hajati et al. (2009) reported that the addition of multienzyme did not alter the organ weights. Zakaria et al (2010) reported that organ weights cannot be affected by the addition of multi enzymes. The literature on the effect of multienzyme on organ weights is similar to our study.
In *table 3.4*, it was investigated the effect of multi-enzyme addition to powder or pellet at 21st and 42nd days, *in vivo* dry matter digestibility (DPD), organic matter digestibility (OMD), crude protein digestibility (CPD), Ca digestibility (CaD) and digestibility of P (PD) was investigated. According to the data obtained, multi enzyme addition of mash or pellet increased P digestibility at 21st and 42nd days and improved AME value ($P>0.05$). The highest AME and PD values were found in the P2 group (2929.4 kcal/kg feed and 65.8% respectively) for the 21st day and again the highest AME values were determined in the P2 (3118.5 kcal/kg feed) with P1 (3112.8 kcal/kg feed) groups for the 42nd day ($P<0.05$). At the 42nd day of trial, the highest P digestibility values were detected in the P1 (62.8%) and P2 (62.43%) and these differences were significant ($P<0.05$).

Table 3.3 Effects of dietary Enzymes Supplementation in to mash and pellet diets on organ weight in broilers

Treatments[1]	Organs weights (g/100g BW)					
	Liver	Gizzard	Proventriculus	Intestinal tract	Carcass weight	Abdominal fat pad
T	2.01	2.36[a]	0.33	5.25	73.14	0.69
T1	2.03	2.34[a]	0.36	5.85	72.29	0.76
T2	1.96	2.21[ab]	0.39	5.60	73.70	0.92
P	1.92	1.74[c]	0.33	6.32	72.32	0.83
P1	1.91	1.89[bc]	0.32	5.29	73.60	0.81
P2	1.95	1.51[c]	0.34	5.48	73.95	0.79
SEM[2]	0.04	0.04	0.01	0.12	0.20	0.04
Feed Form						
Mash	2.00	2.31[b]	0.35	5.55	73.22	0.77
Pellet	1.93	1.72[a]	0.33	5.71	73.28	0.80
SEM[2]	0.03	0.08	0.01	0.12	0.19	0.03
Multi-enzyme (g/t feed)						
0	1.95	2.10	0.33	5.71	72.83	0.73
125	1.98	2.11	0.34	5.57	73.20	0.79
175	1.97	1.82	0.37	5.62	73.81	0.84
SEM[2]	0.03	0.06	0.06	0.12	0.19	0.03
Main effects	*P-value*					
Feed Form	NS	**	NS	NS	NS	NS
Multi-enzyme	NS	NS	NS	NS	NS	NS
Feed Form*Multi-enzyme	NS	**	NS	NS	NS	NS

[a-c]Means within a column with different superscripts are significantly different at the *P*-value shown

[1]Each value represents the least square mean from 10 birds per each treatment.

[2]SEM=pooled standard error of mean. ***P*≤0.05, NS (Not significant).

T; mash feed (positive control), T1; mash feed+125 g enzyme, T2; mash feed+175 g enzyme, P; pellet feed (positive control), P1; pellet feed+125 g enzyme, P2; pellet feed+175 g enzyme.

While the feed form did not show effect on nutrient digestibility and AME at 21st day, CDP and PD ratios and AME values were found to be higher in pellet form at 42nd day (P<0.05). When the groups were examined in terms of multi enzyme addition, the difference between them was not statistically important (P>0.05) in the 21st day, at 42nd day the highest AME value has been seen at 175 mg/kg supplemented group (3094.4 kcal/kg feed) and the PD ratio in the 125 mg/kg supplemented group (62.1%). The effect of process groups, feed form and multienzyme addition on DMD, OMD and CaD ratios was insignificant (P>0.05). Feed form*enzyme interaction was found to be important for AME and P digestibility (P<0.05).

Namkung and Leeson (1999) found that phytase enzyme increases AME value, but Ravindran et al. (2001) reported that there was no effect. It was also reported that the mechanism of AME is not fully known but affected by CP digestibility (Ravindran et al., 2001). Although this situation did not correspond with our study. On the other hand, Johnson et al (2014) reported that addition of phytase did not change the DMD and CPD ratios, Oliaeli et al. (2016) reported that they increased the addition of multi enzyme. Accordingly, it is possible to say that the effect of enzymes on nutrient digestibility and AME value varies according to the addition of feed as a single or a mixture.

Table 3.4. Effects of dietary Enzymes Supplementation in to mash and pellet diets on nutrient digestibility and AME value in broilers

Treatments[1]	**Measurements**											
	Dry Matter (%)		Organic matter (%)		Crude Protein (%)		AME (kcal/kg feed)		P (%)		Ca (%)	
	21th d	42nd d	21th d	42nd d	21th d	42nd d	21th d	42nd d	21th d	42nd d	21th d	42nd d
T	72.6	71.5	80.4	84.8	82.2	85.2	2818.5^{b}	2946.9^{b}	59.5^{b}	56.8^{c}	41.3	43.5
T1	71.8	72.0	81.1	85.4	83.2	85.3	2858.9^{ab}	3042.5^{ab}	61.4^{ab}	60.6^{abc}	44.1	47.1
T2	71.3	72.3	81.0	84.2	83.0	85.2	2884.8^{ab}	3063.0^{a}	63.7^{ab}	58.7^{bc}	41.9	46.2
P	71.8	71.4	81.4	84.9	83.1	86.4	2855.2^{b}	3050.6^{ab}	61.0^{ab}	60.7^{abc}	42.4	44.0
P1	71.8	72.1	80.8	84.6	83.4	88.1	2880.5^{ab}	3112.8^{a}	63.0^{ab}	62.8^{a}	41.7	45.0
P2	71.6	72.0	81.4	83.8	83.3	87.4	2929.4^{a}	3118.5^{a}	65.8^{a}	62.4^{ab}	42.5	45.8
SEM[2]	0,29	0.27	0.27	0.18	0.41	0.381	8.68	13.50	0.49	0.81	0.47	0.690
Feed Form												
Mash	71.9	72.0	80.8	84.8	82.8	85.3^{b}	2856.5	3014.3^{b}	61.6	58.6^{b}	42.5	45.5
Pellet	71.7	72.0	81.2	84.4	83.3	87.1^{a}	2888.3	3097.9^{a}	63.3	62.3^{a}	42.2	44.9
SEM[2]	0.29	0.27	0.28	0.19	0.42	0.47	8.69	13.28	0.54	0.54	0.47	0.45
Multi-enzyme (g/t feed)												
0	72.1	71.4	80.9	84.8	82.7	85.8	2840.5^{b}	2998.8^{b}	60.3^{b}	58.7^{b}	41.9	43.7
125	71.8	72.2	80.9	84.9	83.3	86.4	2869.7^{ab}	3073.5^{a}	62.2^{ab}	62.1^{a}	42.9	46.0
175	71.5	72.4	81.2	83.9	83.2	86.5	2907.1^{a}	3094.4^{a}	64.7^{a}	60.4^{ab}	42.2	45.9
SEM[2]	0.29	0.27	0.28	0.19	0.42	0.38	8.69	13.28	0.54	0.54	0.47	0.45
Main effects	*P-value*											
Feed Form	NS	NS	NS	NS	NS	**	NS	**	NS	**	NS	NS
Multi-enzyme	NS	NS	NS	NS	NS	NS	**	**	**	**	NS	NS
Feed Form* Multi-enzyme	NS	NS	NS	NS	NS	NS	**	**	**	**	NS	NS

[a-c]Means within a column with different superscripts are significantly different at the *P*-value shown

[1]Each value represents the least square mean from 10 birds per each treatment.

[2]SEM=pooled standard error of mean. ***P*≤0.05, NS (Not significant).

T; mash feed (positive control), T1; mash feed+125 g enzyme, T2; mash feed+175 g enzyme, P; pellet feed (positive control), P1; pellet feed+125 g enzyme, P2; pellet feed+175 g enzyme.

Conclusion

As a result, pellet feed interaction with supplementary and increased dose of multienzyme improved the rate of feed conversion by causing hydrolysis of NOPs in broiler feed. Therefore, the EPEF value increased and thus increased the in-coop efficiency. On the other hand, the combination of exogenous glucanase and xylanase resulted in NOP hydrolysis in the diets, leading to increased access to the substrat of endogenous digestive enzymes in the intestines, which led to an increase in AME and improved P digestibility. The pellet feed form increased the AME value by decreasing the choice of feeding and the progression of nutrients in the digestive tract. In addition, the pellet feed form reduced the weight of the gizzard by shortening the mechanical digestion time of the feed particles and increased the gizzard efficiency. Therefore, it is recommended the addition of multienzyme and pelleting processes in broiler chickens fed with cereal-weighted for improving growth performance and nutrient digestibility.

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Effect of Dried Stevia Rebaudiana Inclusion to the Feed of Quails (*Coturnix coturnix*) on Live Weight

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Introduction

Poultry production is an economical and important sector for Turkey as well for the world. In poultry quails are strong, durable and easy to grow birds with significantly high growth rates (Drowns, 2012). As lots of health issues are taken into consideration by growers, feed ingredients and new materials are becoming more important every year in terms of increased world population (Türkoğlu et al., 2014). Stevia is a sugar substitute plant and known to be a material for low calory diets and is told that it can be used in human nutrition and animals as well (Yang and Hua, 2014). As there has not been any research ivestigating the effects of dried Stevia as a feed ingredient this study would be important to show how this plant effects live weight during the rearing period of Japanese quails. As it is told to be beneficial under some stressful conditions (Takahashi et al., 2001), Stevia as a feed ingredient was investigated under normal conditions to have any effect on live weight in the research to obtain data if it can be used in the feed as an ingredient.

Materials and methods

The trial design was applied as random parcels in five replicates of each treatment and in every treatment 10 birds were used with a total of 40 Japanese quails (coturnix coturnix). The treatment groups were organise as control (C), stevia (0.1%) as St.1, stevia (0.2%) as St.2 and stevia (0.5%) as St.5. The birds were weighed at 3rd week and at the slaughter age (6th week) and were recorded individually by a precision scale (Radwag AS220 R2, Poland). Twenty quail cages (5 tiers) were used for the first three weeks (Cimuka CB25-03-5K, Turkey) and laying cages were used for the rest of the rearing period (Cimuka BYK-03-5K, Turkey) and in every cage two male quails were reared in each cage compartment. Standard quail starter feed was used for the first two weeks and quail layer feed was used rightafter until the slaughter age (Kalite Yem San. AŞ., Turkey). Stevia rebaudiana was dried under 75˚C in dry air oven for 3 hours and was packaged right after in glass containers. Dried stevia was grinded into powder form and were included in the feed as three doses of 0.1% (St.1), 0.2% (St.2) and 0.5% (St.5). These feed were given to the birds during the whole rearing period.
Statistical analyses were made by MINITAB software version 16 (Minitab, USA). The data were analysed for homogeneity and after this descriptive statistics were taken from the data. Detailed analyses were made using one-way ANOVA and Tukey's test was used to determine if the differences between the treatment groups were important. The results were given as mean±SEM.

Results

From the findings of the research, quails reared under normal conditions with inclusion of Stevia resulted in poorer live weights in both 3 weeks and 6 weeks. These findings were given in Table 1. As being a sugar replicate and used as human diet programme additive, Stevia can be told as an appetite concealer ingredient in diets of quails as well for men.

Table 1. Effect of Stevia on Live Weight of Japanese Quails.

Traits	Treatment	3rd Week Live Weight (g)	Slaughter Weight (g)
Live Weight (LW)	Control (C)	101.233 ± 5.73 a	183.130 ± 9.560 a
	Stevia (0.1%)	92.733 ± 3.43 ab	167.490 ± 4.890 ab
	Stevia (0.2%)	87.267 ± 2.04 ab	166.960 ± 6.630 ab
	Stevia (0.5%)	77.267 ± 5.09 b	151.090 ± 5.770 b
P Value		0.009	0.038

[ab] The differences on the same column with different superscript letters are significant (P<0.05).

As seen in Table 1 the inclusion of dietary Stevia makes the birds lighter numerically becoming significant in dose of %0.5 (P<0.05). Birds eat less and as well get less weight. This result is in line with other research as Stevia reduces general appetite and food consumption resulting in less body weight in man and some animals (Takahashi et al., 2001).

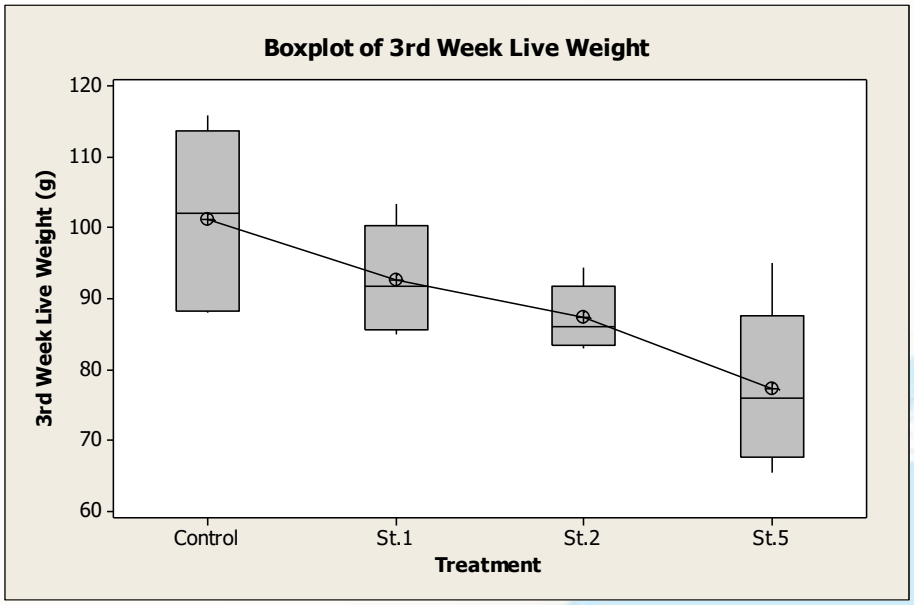

Figure 1. The 3rd Week Live Weight of Quails Fed With Different Doses of Stevia.

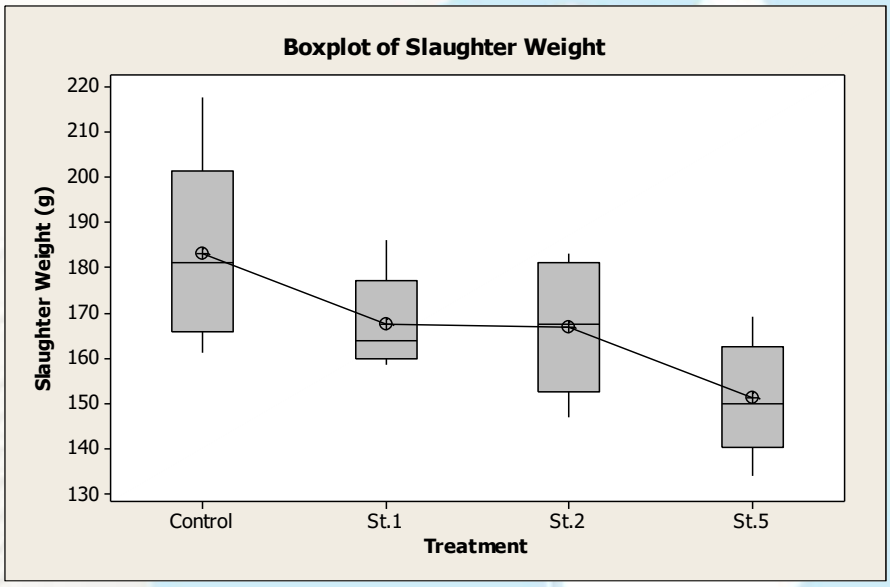

Figure 2. The 6th Week Live (Slaughter) Weight of Quails Fed With Different Doses of Stevia.

Conclusion

From the findings of the experiment it can be told that, Stevia should not be used in broiler type quails as it has potential to conceal appetite and reduce live weights of the birds. However, it can be used in layer type quails and brooding stocks to achieve higher laying performance of birds and may enhance fertility. In these terms, further investigations should be made to make clear of their effects.

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Chemical Contents of Styrax (*Styrax officinalis* L.) Leaves at Different Phenological Stages

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Introduction

Reducing production costs in animal husbandry is only possible by using traditional raw materials at optimum level and finding new alternative raw materials to them, determining their qualifications and using them in animal feeding. For this purpose; some legume trees, resistant to dry conditions and rich in nutrients, have come to the fore in many regions of the world in recent years. The fruits of these trees have the potential to produce significant amounts of energy, protein and other nutrients in each year. In addition to legume fruits, shrubs are an alternative feed source that is widely used in the world, especially in the feeding of goats and sheep (Aygün et al., 2018). Evergreen shrubs and young leaves and shoots become important nutrients especially due to the high crude protein, phosphorus and carotene contents during the hot summer periods when feed sources are limited (Holechek, 1984). However, there is a lack of data on the chemical composition of Styrax (*Styrax officinalis* L.) shrubs at different phenological stages. Hence, this study was aimed to investigate chemical composition of Storax leaves at different phenological stages.

Materials and methods

Styrax samples were taken from three different points in four different district of Balikesir (Bandirma, Erdek, Gonen and Manyas) at three different phenological stages (early vegetative, flowering and discernible seed) by hand clipping between April and June in 2019. Dry matter (DM), crude protein (CP), ash, ether extract (EE) and, crude fibre (CF) compositions of samples were analysed acording to Weende analysis system. The neutral detergent fibre (NDF), acid detergent fibre (ADF) and acid detergent lignin (ADL) contents were analysed by using a fibre analyser (Velp FIWE6, Italy) according to the methods reported by Van Soest et al. (1991). In order to determine cellulose (Cell) and hemicelluloses (Hcell) content of the Styrax leaves, NDF, ADF and ADL values were compared so that the difference between NDF and ADF was considered for hemicelluloses while ADF and ADL difference was being analysed to identify cellulose content.

Results

In this study, chemical components of Styrax shrubs at different phenological stages were investigated and results are presented in Table 1.

Table 1. Chemical components of Styrax (*S. officinalis* L.) Leaves (%DM)

Phenological Stages	District	DM, %	CP	Ash	EE	CF	NDF	ADF	ADL	Hcell	Cell
Early vegetative		30,97^{b}	19,79^{a}	6,51^{a}	5,18^{a}	15,23^{c}	27,82^{c}	20,03^{c}	6,51^{b}	7,79^{b}	13,52^{b}
Flowering		29,19^{c}	13,67^{b}	4,70^{c}	3,40^{c}	17,72^{b}	34,84^{a}	23,60^{b}	9,68^{a}	11,25^{a}	13,92^{b}
Discernible seed		39,20^{a}	12,07^{c}	5,12^{b}	4,05^{b}	20,56^{a}	33,96^{b}	26,81^{a}	9,26^{a}	7,15^{b}	17,55^{a}
SEM		0,27	0,10	1,01	0,07	0,11	0,16	0,16	0,18	0,21	0,22
	Bandirma	32,26	15,01	5,45	4,22	18,73	32,58	25,25	8,26	7,33^{b}	16,99^{a}
	Erdek	31,51	16,09	5,23	4,05	18,25	32,22	24,34	8,89	7,88^{b}	15,45^{ab}
	Gonen	33,82	14,96	5,34	4,28	17,09	31,34	22,09	8,56	9,25^{ab}	13,53^{b}
	Manyas	34,89	14,65	5,55	4,29	17,27	32,70	22,24	8,23	10,45^{a}	14,01^{b}
SEM		0,91	0,61	1,03	0,16	0,36	0,45	0,42	0,42	0,45	0,49
Early vegetative	Bandirma	29,78^{de}	19,76^{a}	7,84^{a}	5,42^{a}	16,20^{de}	28,15^{d}	21,84^{f}	6,92^{d-f}	6,31^{ef}	14,92^{bc}
	Erdek	29,93^{c-e}	20,19^{a}	5,87^{c}	5,37^{a}	15,96^{e}	28,47^{d}	21,61^{f}	6,88^{ef}	6,86^{d-f}	14,73^{bc}
	Gonen	31,72^{cd}	19,76^{a}	6,42^{b}	5,32^{a}	14,28^{f}	26,28^{e}	17,90^{g}	6,98^{de}	8,37^{cd}	10,92^{f}
	Manyas	32,45^{c}	19,47^{a}	6,09^{bc}	4,59^{bc}	14,49^{f}	28,39^{d}	18,76^{g}	5,27^{f}	9,63^{c}	13,49^{c-e}
Flowering	Bandirma	27,92^{e}	14,35^{b}	4,84^{de}	4,17^{cd}	19,00^{b}	35,66^{ab}	25,67^{c}	7,89^{c-e}	9,99^{bc}	17,78^{a}
	Erdek	27,54^{e}	14,71^{b}	4,75^{e}	2,83^{f}	17,41^{c}	33,56^{c}	23,96^{de}	10,02^{ab}	9,60^{c}	13,93^{cd}
	Gonen	31,30^{cd}	13,01^{cd}	4,62^{e}	3,15^{f}	17,04^{cd}	34,21^{bc}	22,25^{f}	10,10^{ab}	11,96^{ab}	12,15^{d-f}
	Manyas	30,01^{c-e}	12,61^{c-e}	4,59^{e}	3,46^{ef}	17,44^{c}	35,95^{a}	22,52^{ef}	10,69^{a}	13,43^{a}	11,83^{ef}
Discernible seed	Bandirma	39,08^{b}	10,92^{f}	4,26^{f}	3,08^{f}	21,00^{a}	33,93^{c}	28,23^{a}	9,96^{ab}	5,70^{f}	18,27^{a}
	Erdek	37,08^{b}	13,36^{c}	5,13^{d}	3,93^{de}	21,38^{a}	34,64^{a-c}	27,45^{ab}	9,76^{ab}	7,18^{d-f}	17,69^{a}
	Gonen	38,44^{b}	12,12^{de}	5,14^{d}	4,37^{b-d}	19,96^{b}	33,54^{c}	26,11^{bc}	8,60^{b-d}	7,42^{d-f}	17,51^{a}
	Manyas	42,21^{a}	11,88^{e}	6,11^{bc}	4,81^{ab}	19,88^{b}	33,75^{c}	25,45^{cd}	8,73^{bc}	8,29^{c-e}	16,73^{ab}
SEM		0,53	0,19	1,01	0,13	0,21	0,32	0,32	0,36	0,42	0,43

DM: Dry matter; CP: Crude Protein; CF: Crude Fiber; NDF: Neutral Detergent Fiber; ADF: Acid Detergent Fiber; ADL: Acid Detergent Lignin;
Hcell: Hemicelluloses; Cell: Cellulose , SEM: Standard Error of Mean
$^{a-f}$ Means in a column with different superscripts are significantly different (P<0.05)

The DM contents of *S. officinalis* was ranged from 29,12% to 39,20% during the phenological stages. The CP, ash, EE and CF contents of *S. officinalis* were ranged from 12,07%-19,79%, 4,70%- 6,51%, 3,40%-5,18%, 15,23%- 20,56% on DM basis.

Conclusion

The results showed that, *S. officinalis* was found to highest CP value, and lowest NDF, ADF, ADL, cell contents early flowering period. It can be said that Styrax shrubs could be grazed until the end of the flowering period considering the regional differences.

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Nutritional Composition and Gossypol Level of Genetically-Improved the Nazilli Glandless Cotton Seed and Cold Expeller Cotton Seed Meal

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Introduction

Cottonseed meal is the by-product of oil extraction from cotton seeds. As a protein-rich feed, cottonseed meal is a common source of protein for ruminants, notably it is used as a partial substitute for soybean meal. Cotton by-products are a financially viable option for diet formulation due to their relatively chemical composition and low cost. However, the presence of gossypol limits their use at high proportions, as gossypol can be toxic at high levels (Oliveira et al., 2018). The cheapest way to eliminate the harmful effects of gossypol on human and animal nutrition is by breeding varieties that do not contain gossypol in their seeds. Glandless cotton seed obtained by hybridization breeding at Aydın/Nazilli Cotton Research Institute (1991-2001) was registered in 2002. Nazilli Glandless cotton seed is a productive, superior variety of technological values. Although there are many studies on the use of cotton seeds and meal in the feeding of various farm animals, the research on glandless cotton seeds and meal is not at the desired level. In this study, it was aimed to determine the nutrient contents of the newly developed Nazilli Glandless cotton seed variety, to reveal the chemical compositions, total phenolic compounds, antioxidant capacity and gossypol levels.

Material and methods

For the use of feed material in nutrient analysis, T.C. Ministry of Agriculture and Forestry Aydın/Nazilli Cotton Research Institute Directorate produced Glandless Nazilli cotton seed corticated-decorticated grain, cold-pressed corticated-decorticated cotton seed meal raw materials formed. After weighing, the samples were milled in a mill to pass through a 1 mm sieve and prepared for analysis. Prepared samples were subjected to 3 repetitive chemical analyzes of each sample in the feed analysis laboratory of the special feed factory. Dry matter (DM), crude protein (CP), crude cellulose (CC), ash and organic matter (OM) of the samples were analyzed in accordance with AOAC (2000).

Samples were dried in the oven at 70 °C for 48 hours and then 0.2 g of each sample was weighed. Then, 5 ml of HNO_3 and 2 ml of H_2O_2 were added to these samples and burned in microwave device (Mars 6) according to wet burning method. At the end of the combustion, the final volume of the samples was filled to 20 ml with distilled water and the concentrations of Ni, Cd, Pb and Al (heavy metals) in these samples were determined on ICP-OES device (Kaçar and Inal, 2008). Total phenolic determination Folin-Ciocalteu method was used. The method is based on the fact that the phenolic compounds dissolved in water and organic solvents form a colored complex with Folin-Ciocalteu in an alkaline medium. The resulting violet-violet complex gives maximum absorbance at 760 nm (Slinkard and Singleton, 1977). The results are given in mg seed in mg gallic acid equivalent (mg GAE/g). Each of the cotton seed and cold pressed meal samples was taken into 200 vials of tared cap glass tubes and 10 mL of methanol/dichloromethane mixture (5:1) was added. After vortexing and incubation for 30 minutes in an ultrasonic bath, it was extracted in a refrigerator (+4 °C) for 2 days. Antioxidant activity analyzes were performed on the extract. Antioxidant activity analyzes were performed in 3 replicates and the results were calculated by calculating the mean and standard error values of 3 parallel analyzes. Pure compounds were tested by using the TEAC assay. The TEAC value is based on the ability of the antioxidant to scavenge the radical cation 2,2‘-azinobis(3- ethylbenzothiozoline-6-sulfonate) ($ABTS^{\bullet+}$) measured by spectrophotometric analysis (Re et al., 1999). The results are given in the form of trolox equivalent antioxidant capacity (TEAC) mmol. Total antioxidant activity was investigated using Ferric Reducing Antioxidant Power (FRAP) assay according to the method described by Oyaizu (1986). Free and total gossipol levels of glandless cottonseed were determined spectrophotometrically by the methods reported by TSE (1988). Differences in nutrient value between corticated and decorticated glandless cotton seed; and cold-pressed corticated-decorticated samples in terms of characteristics discussed in the present study were determined by t-test. Nutrient values obtained according to chemical analysis method of each feed analyzed in the study were matched. For this purpose, SPSS 17 package program was used (SPSS 2010).

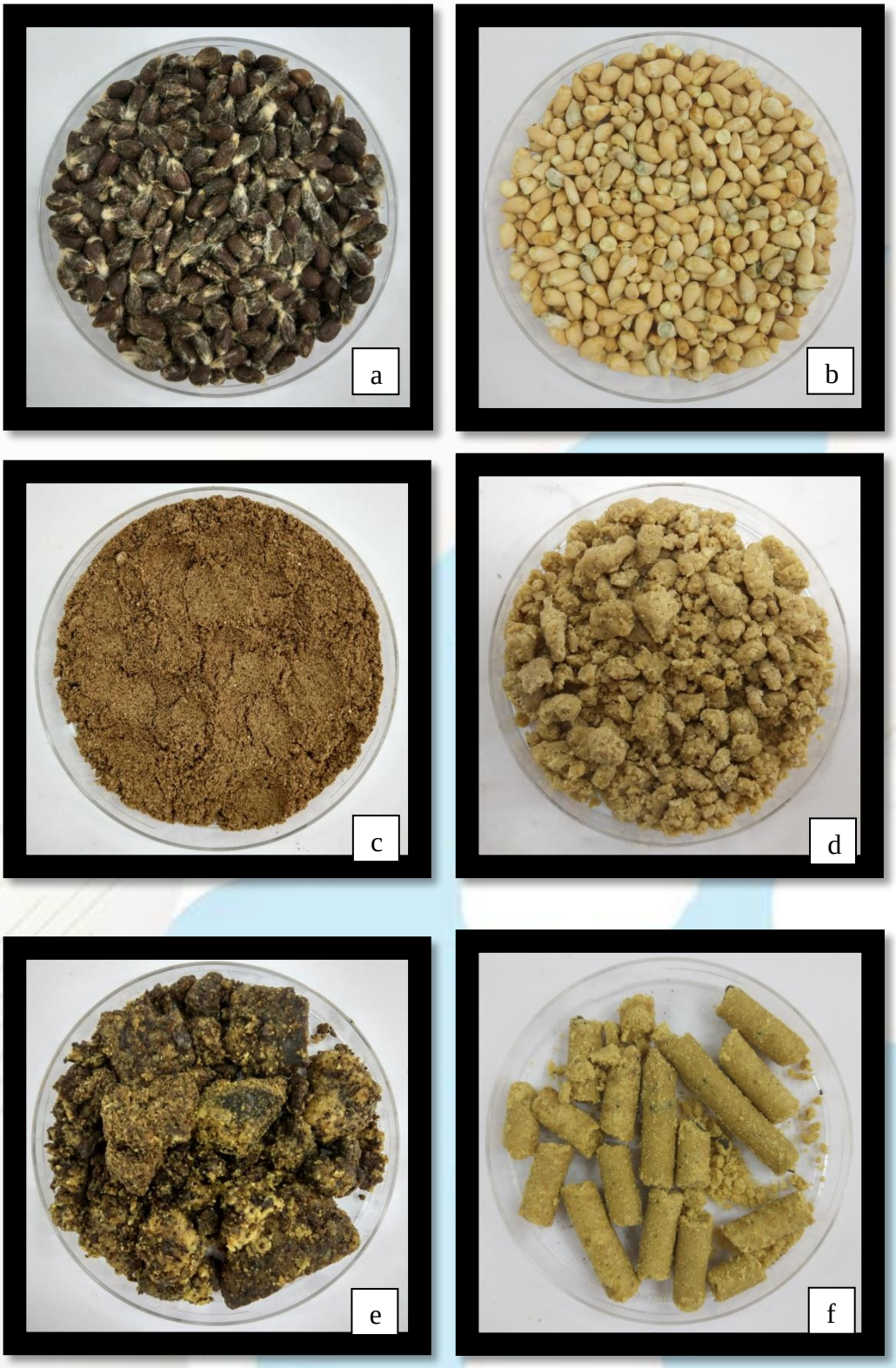

Fig 1. a: Glandless cotton seed, **b:** Decorticated glandless cotton seed, **c:** Ground glandless cotton seed, **d:** Ground decorticated glandless cotton seed, **e:** glandless cotton seed meal, **f:** decorticated glandless cotton seed meal.

Results

Table 1. Nutrient composition of Glandless Cotton Seed and CSM (as based DM; Mean±SEM)

	Glandless Cotton Seed		Glandless Cotton Seed Meal	
Nutrients	**Corticated**	**Decorticated**	**Corticated**	**Decorticated**
OM	95.87±0.04 ^{a}	95.25±0.01 ^{b}	95.35±0.04	94.98±0.03
CP	26.73±0.43 ^{b}	40.05±0.22 ^{a}	33.24±0.04 ^{B}	42.09±0.02 ^{A}
CC	17.65±0.91 ^{a}	2.28±0.19 ^{b}	13.94±0.21 ^{a}	7.78±0.39 ^{b}
Ash	4.13±0.02 ^{b}	4.75±0.03 ^{a}	4.65±0.01 ^{b}	5.02±0.01 ^{a}

Means within a row followed by different superscripts differ significantly ($^{A, B}$: P<0.01; $^{a, b}$: P<0.05).

Table 2. Minerals composition of corticated–decorticated Glandless Cotton seed and CSM (as based DM; Mean±SEM)

	Glandless Cotton Seed		Glandless Cotton Seed Meal	
Minerals	**Corticated**	**Decorticated**	**Corticated**	**Decorticated**
Ni, mg/kg	2.38±0.05	3.05±0.16	3.48±0.21	3.79±0.21
Cd, mg/kg	0.02±0.00	0.02±0.00	0.03±0.00	0.03±0.00
Pb, mg/kg	0.13±0.06	0.13±0.07	1.07±0.11	1.33±0.07
Al, mg/kg	4.2±0.00 ^{a}	1.6±0.73 ^{b}	12.7±1.05	14.8±2.15

Means within a row followed by different superscripts differ significantly $^{a, b}$: P<0.05).

Table 3. Free and total gossipol levels of glandless cotton seed used in the study (mg/kg)

	Glandless Cotton Seed	
Gossypol	**Corticated**	**Decorticated**
Free gossypol	294±15 ^{B}	521±2 ^{A}
Total gossypol	440±4 ^{B}	706±20 ^{A}

Means within a row followed by different superscripts differ significantly ($^{A, B}$: P<0.01).

Table 4. Total phenolic compounds and antioxidant activity

	Glandless Cotton Seed		Glandless Cotton Seed Meal	
Test	**Corticated**	**Decorticated**	**Corticated**	**Decorticated**
Fenolic compounds (mg GAE/g)	7.87±0.05 ^{A}	2.18±0.02 ^{B}	5.86±0.02 ^{A}	1.91±0.01 ^{B}
TEAC (µmol TE/g)	716.7±0.63 ^{A}	566.7±0.63 ^{B}	647.2±0.91 ^{A}	587.9±0.97 ^{B}
FRAP (µmol TE/g)	66.07±0.28 ^{A}	49.79±0.30 ^{B}	52.23±0.50 ^{A}	47.27±0.22 ^{B}

Means within a row followed by different superscripts differ significantly ($^{A, B}$: P<0.01).

Non-essential heavy metals (Cd, Pb, Ni and Al) were found to be well below the levels that would not threaten plant seed and animal health. Cotton seed has very low activity in preventing free radical formation by reducing Fe^{3+} ions to Fe^{2+}. This was determined by comparison with BHA (5633.8±131.5 µmol TE/g) and BHT (4734.5±95.6 µmol TE/g) standard.

Conclusion

Nazilli glandless cotton seed contains relatively low levels of gossypol and high levels of crude protein and is relatively higher in nutritional properties. It can be said that the antioxidant activity of phenolic compounds, which are found in Nazilli glandless cotton seed and cotton seed meal, may contribute to animal health and production efficiency. Further research is needed to improve the feed value of glandless cottonseed and cottonseed meal or to determine performance and product quality in livestock.

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Digestibility and Energy Value of Glandless Cottonseed in Adult Cockerels

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Introduction

Cottonseed and cottonseed meal is often cited as one of the protein sources for its relatively high protein content, low cost per unit of protein and high availability throughout the world. The application of cotton seed or meal as a substitute for soybean meal been assessed in many poultry species (Diaw et al., 2011). Glandless cotton seed obtained by hybridization breeding at Aydın/Nazilli Cotton Research Institute (1991-2001) was registered in 2002. Nazilli Glandless cotton seed is a productive, superior variety of technological values. Although there are many studies on the use of cotton seeds and meal in the feeding of various farm animals, the research on glandless cotton seeds and meal is not at the desired level. Energy value of poultry diets constitutes a major part of their nutritional properties and their cost. Dietary energy value is expressed as metabolisable energy (ME), which is preferred to digestible energy (DE) because, in birds, faeces and urinary losses are voided together through cloaca. In most cases, ME is expressed as apparent metabolisable energy (AME) corrected to zero nitrogen retention (AMEn) (Carré et al., 2014). There is lack of information describing the AMEn and nitrogen digestibility values of mentioned glandless cottonseed (GCS, variety Nazilli). In this study, it was aimed to determine the energy value and digestibility of glandless cotton seed in adult cockerels.

Material and methods

For the use of feed material in digestibility analysis, T.C. Ministry of Agriculture and Forestry Aydın / Nazilli Cotton Research Institute Directorate produced Glandless Nazilli cotton seed corticated formed. Sixteen adult cockerels (Isa Brown) were randomly assigned to each experimental diet. Animals were housed in individual metabolic cages with wire floors, and kept in an environmentally controlled room. Feed ingredients were ground, mixed with basal diets and given in mash form to birds (Table 1). The experimental diet was corn (82%)-GCS (15%) based diet. The AME of the experimental diets was measured using the European Reference Method with *ad libitum* feeding and total excreta collection (Bourdillon et al., 1990). Breeding illumination was 16 hours of light followed by 8 hours of darkness.

Table 1. The composition of diets, %

Ingredients	R1	R2
Corn	97.00	82.00
Glandless cottonseed	-	15.00
DCP	1.50	1.50
Calcium carbonate	0.70	0.70
Sel	0.30	0.30
Vitamin + Oligoelements	0.50	0.50

***** Each kg of vitamin–mineral premix contained: vitamin A, 3.000.000 IU; vitamin D_3, 860.000 IU; vitamin E, 20.000 mg; vitamin K_3, 1.000 mg; vitamin B_1, 1.000 mg; vitamin B_2, 1.600 mg; vitamin B_3, 20.000 mg; vitamin B_5, 5.000 mg; vitamin B_6, 1.400 mg; vitamin B_{12}, 4 mg; biotin, 60 mg; folic acid, 600 mg; choline, 110.000 mg; Cu, 4.005 mg; Fe, 11.639 mg; Mn, 16.166 mg; Se, 40 mg; Zn, 18.020 mg; Co, 120 mg; I, 400 mg and antioxydant, 10.000 mg.

Energy and nitrogen values are determined by the technique of digestive balance (Fig. 1), with total collection of excreta from cockerels grow older than 12 months. For this, the birds housed in individual cages in digestive balance and accustomed to the experimental diet for 3 days and then were fasted (24 hours for 16 hours for cocks). They are then fed for two days then again fasted. Collection of excreta held every day during the last 72 hours of assessment. Feed and excreta were then lyophilized, and analyzed for the digestibility and nitrogen fraction energy. For the latter, the estimation of the non-protein nitrogen digested is calculated as the difference between the total nitrogen excreted and estimated by the determination of uric acid urinary nitrogen. Homogenized and dried feed and excreta samples were then subjected to chemical analysis with standard method of AOAC (2000) for the determination of nutrient (dry matter, crude protein, crude fat and ash). The gross energy (GE) of feed and excreta was determined in an IKA C2000 Basic bomb calorimeter (Dynamic 25º).

ME measured in vivo by the digestive balance method. The proteins contain 16% nitrogen and each gram of nitrogen in the form of uric acid provides 8.22 Kcal (Hill and Handerson, 1958). Hence the formula for calculating the AMEn. The calculation of the AME is based on the individual measurement of the amount ingested and gross energy of excreta and feed. The AME and AMEn values were calculated using the following formula with appropriate corrections made for differences in DM content:

(1) AME (Kcal/kg) = (Qa * EBa-Qe * Ebe)/Qa
(2) AMEn (Kcal / Kg) = AME – (ΔN *8220)/Qa
With Qa = quantity of feed ingested (kg DM)
Qe = quantity of lyophilized excreta (kg DM)

EBa = gross energy of the feed (Kcal / kg DM)
EBe = gross energy of excreta (Kcal / kg DM)
ΔN (kg) = N ingested - N excreted = (Qa * N dry feed) - (Qe * N freeze-dried excreta)
N = Nitrogen content expressed as a percentage
8220 (cal) = Heat of uric acid combustion from the oxidation of 1 g of nitrogen contained in body proteins (Larbier and Leclercq, 1992).
The uric nitrogen in the faeces is determined spectrophotometrically by the method of Marquardt (1983), the principle being that the UV absorbance of a chicken excreta extract in perchloric acid is due to the Uric acid.
The digestibility of apparent nitrogen based on uric acid was calculated as follows: The excreta samples of birds fed basal and test diets were analyzed for uric acid content. The protein content of excreta samples was corrected based on uric acid as: (% nitrogen of excreta sample-% nitrogen of uric acid in excreta sample)×6.25. With these corrected data, digestibility of protein based on uric acid was calculated by the procedure of Ten Doeschate et al. (1993).
Statistical analysis was performed by the General Linear Model procedure for a complete randomized design (SPSS 13.0). Data was analyzed using one-way ANOVA, and differences among means were investigated using Duncan's multiple range tests using SPSS software.

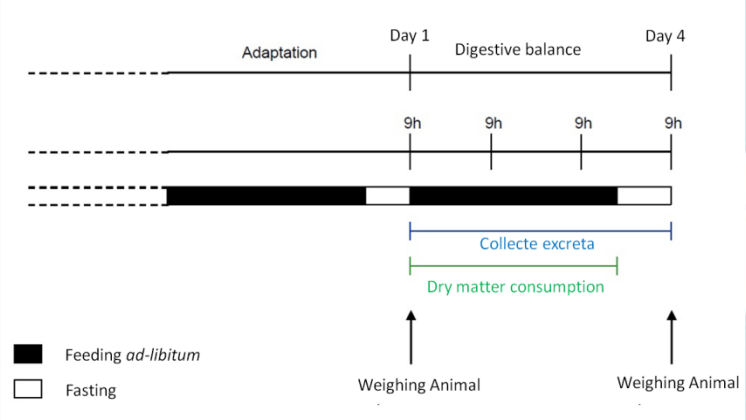

Fig.1: Scheme of the digestive balance

Results
The chemical composition of GCS, corn and diets, expressed on a dry matter basis, is presented in Table 2. GCS contained 94.42 % DM, 35.57 % crude protein and 5291 kcal per kg gross energy.

Table 2. The composition of some nutrients of diets and feeds (DM, %)

Nutrients	GCS	Corn	R1 (Corn)	R2 (GCS+Corn)
Gross Energy, kcal/kg	5604	4424	3783	4046
Dry matter	94.42	88.96	87.66	88.75
Crude protein	37.67	8.24	7.42	12.04
Crude fat	26.14			
Crude ash	5.30			

Table 3 presents AMEn (basis on DM and feed) and the in vivo digestibility of protein in diets. It can be seen from the table that AMEn and nitrogen digestibility of GCS was the highest (P<0.05) than that of basal diet.

Table 3. Experimental diets energy value and nitrogen digestibility coefficient in Isabrown Cockerels

Parameters	R1 (Basal)	R2 (GCS+Corn)	SEM	P-value
AMEn, kcal/kg DM	3120 [b]	3199 [a]	8.905	**
AME_n, kcal/kg as feed	3559 [b]	3605 [a]	8.699	**
Apparent N digestibility, %	74.28 [b]	76.49 [a]	0.479	*

[a–b]Means with different superscripts within the same row differ significantly (*P<0.05; **P < 0.01)

ME values in corn and GCS were as 3216 and 3746 kcal/kg (basis on DM), respectively, and GCS digestibility of apparent nitrogen in adult cockerel was %78.41±1.58.

Conclusion
In this study, the digestibility of nitrogen, AMEn levels of glandless cotton seed were determined. The findings obtained in the research may contribute to the missing information. According to the findings of the research, it was shown that Nazilli glandless cotton seed variety can be used up to 15% easily in cockerels' rations. Further research is needed to improve the feed value of glandless cottonseed and cottonseed meal or to determine performance and product quality in

livestock.

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Kanatlı Hayvan Beslemede Bazı Artemisia Türlerinin Kullanım Olanakları

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Özet

Ticari kanatlı üretiminde yemden yararlanma, besin maddelerinin sindirilebilirliği, yem maliyeti, tüketici talepleri, emisyonlar ve sürdürülebilirlik oldukça önemlidir. Bundan dolayı, konvansiyonel ve alternatif ticari kanatlı üretiminde tıbbi-aromatik bitkiler, baharatlar ve ürünleri (esansiyel yağlar ve özütleri)'ne ilgi giderek artmaktadır. Bunlar bünyelerindeki antioksidan, antiinflamatuar, antimikrobiyal, bağışıklığı destekleme ve sindirim arttırıcı özellikli bioaktif bileşenlere sahip maddelerdir. Bu katkı maddeleri ayrıca antibiyotik ihtiyacını ve çeşitli emisyonları azaltıcı özellik taşıyabilmektedir. Bazı tıbbi-aromatik bitkiler ve baharatların ticari kanatlılarda kullanımı üzerinde çok sayıda araştırma yapılmıştır. Bununla birlikte üzerinde az sayıda çalışma yapılan tıbbi-aromatik bitkiler de bulunmaktadır. Artemisia cinsinin Kuzey Yarım Küre'de yayılış gösteren 250 ve Türkiye'de 22 türü bilinmektedir. Hoş kokulu uçucu yağında farklı etkili maddeler ve besin maddeleri bulunan artemisia türlerinin literatürde kanatlı hayvanlardaki en dikkat çekici etkileri antioksidant, antimikrobiyal ve bağışıklık sistemini destekleyici özellikleridir. Bazı artemisia türlerinin kanatlılarda koksidiostat özelliklerinin yüksek çıkması, oldukça ümit verici sonuç olarak değerlendirilmiştir. Bu derlemede belli başlı artemisia türlerinin özellikleri, kanatlı yemlerinde kullanımının sonuçları ve alternatif doğal bir yem katkı maddesi olarak kullanım olanakları üzerinde durulmuştur.

Anahtar kelimeler: Artemisia, kanatlı, antimikrobiyal, antioksidan

Abstract

Opportunities for the Use of Some Artemisia Species in Poultry Nutrition

Feed conversion, nutrient digestibility, feed costs, consumer demands, emissions and sustainability are all important factors in commercial poultry farming, and accordingly the popularity of medicinal and aromatic plants, spices and their products (essential oils and their extracts) are increasing in both conventional and alternative commercial poultry farming. These substances have bioactive components with antioxidant, anti-inflammatory, antimicrobial and immunity and digestion enhancing properties, and can also reduce the need for antibiotics, as well as the levels of various emissions. There have been several studies into the use of medicinal and aromatic plants and spices in commercial poultry farming, although some medicinal and aromatic plants have been studied less. The artemisia (A.) genus has 250 and 22 species in the Northern Hemisphere and in Turkey, respectively. The most remarkable effects of artemisia species which contain different active substances and nutrients in their volatile fats and give off a pleasant aroma, are their antioxidant, antimicrobial and immunity enhancing properties. Some species of artemisia have high coccidiostatic properties in poultry, which was considered to be a very promising result. In this review, properties of certain artemisia species, the consequences of their use in poultry diets and opportunities for their use as an alternative natural feed additive are investigated.

Key words: Artemisia, poultry, antimicrobial, antioxidant

Giriş

Konvansiyonel üretim hayvanlarda çevreye duyarlılığın ve stresin artmasına yol açarak üretim aşaması ve sonrasında istenmeyen bazı durumları ortaya çıkarmaktadır. Stresin artması sonucu oluşan oksidasyon, hücre bütünlüğü ve performansı olumsuz etkilemektedir (Mirfendereski ve Jahanian, 2015). Konvansiyonel üretim koşullarında stresin olumsuz etkilerini hafifletmek için kümesteki fiziki yapı ve ekipmanı iyileştirmenin yanı sıra hayvan besleme uygulamaları da önemlidir (Kahkönen vd., 1999). Sentetik yem katkı maddeleri dikkatli kullanılmadıklarında hayvanlarda ve bu hayvanların ürünlerini tüketen insanlarda sağlık sorunlarına neden olabileceğinden (Erkek vd., 1996; Polat vd., 1999) dolayı rasyonlarda doğal alternatif katkı maddelerine ilgi artmıştır (Cherian vd., 2013). Bu maddeler genellikle tıbbi ve aromatik bitkiler ile bunların özütlerini içermektedir (Erhan, 2015).

Kekik, biberiye, tarçın, nane, çörekotu, deniz yosunları, sarımsak gibi tıbbi ve aromatik bitkiler üzerinde çok sayıda araştırma yapılmıştır. Bununla birlikte artemisia türlerinin kanatlı hayvanlardaki etkilerinin araştırıldığı yeterli sayıda çalışma bulunmamaktadır. Bu derlemede kanatlı hayvanların rasyonlarında kullanımına rastlanan artemisia türlerinin temel özellikleri ve doğal yem katkı maddesi olarak kullanım olanakları üzerinde durulmuştur.

Bazı Artemsia Türlerinin Temel Özellikleri

Asteraceae familyası, artemisia (A) cinsine ait olan tarhunun Kuzey Yarım Küre'de 250, Türkiye'de 22 türü bulunmaktadır. Ülkemizde de bulunan *A. dracunculus* türünde (tarhun, kurutulmuş tüm bitki) %24 protein, %45 karbonhidrat, %7 yağ, %7 lif (Attokaran, 2017), uçucu yağ (%0.4-0.8), acı madde ve tanen içermektedir (Güner vd., 2000). Tarhunun yapraklı dalları iyot, mineral tuzlar, A ve C vitamini yönünden zengindir (Türközü vd., 2014; Çil ve Kara, 2015).Tarhunun aktif sekonder metabolitlerinin esans yağlar, kumarinler, flavonoidler ve fenolkarbonik asitler olduğu ve tarhunun potansiyel anti-enflamatuar, hepatoprotektif ve antihiperglisemik etkilerine vurgu yapılmıştır (Obolskiy vd., 2011). Tarhunun bağırsak paraziti ve bakteriyel enfeksiyonların tedavisinde kullanılan antibakteriyel özellikli maddeler içerdiği kanıtlanmıştır (Al-Attar, 2006).

Kurutulmuş *A. annua* yapraklarında 4271 kcal/kg brüt enerji, %27.8 ham protein, %4.7 ham yağ, 83.5 µg/g α- tokoferol, 27.5 µg/g γ-tokoferol, 4918 µg/g fenolik madde ve toplam 111.0 µg/g E vitamini ve 452.8 mM TE/g toplam antioksidan aktiviteye sahip olduğu rapor edilmiştir (Cherian vd., 2013). Araştırmacılar *A. annua* yaprağının n-3, n-6 esansiyel yağ asitleri ve toplam esansiyel yağ asidi (%53.95) konsantrasyonu bakımından zengin; makro mineral içerik sıralamasının da potasyum, kalsiyum, magnezyum, kükürt ve fosfor olduğunu saptamışlardır. Yüksek protein, enerji, esansiyel yağ asitleri, amino asitleri, fenolik bileşikler, vitamin içeriği, esans yağları ve yüksek antioksidan potansiyeli ile *A. annua* bitkisinin kanatlı diyetlerinin formüle edilmesinde kullanılabilecek önemli bir yem katkı maddesi olabileceği ifade edilmiştir (Brisibe vd., 2009; Cherian vd., 2013). Kanatlılarda koksidiyoza karşı mücadelede *A. annua* yaprakları ve izole edilen aktif bileşiklerinin etkili olduğu rapor edilmiştir (Allen vd., 1997; Allen ve Fetterer, 2002). *A. sieberi* yağının ana bileşenleri kafur (% 44), 1,8-cineole (% 19), terpinen-4-ol (% 2,5) ve α-terpineol (% 2)'dur (Weyerstahl vd.,1993).
Anadolu'nun geniş bölgelerinde doğal olarak yetişmekte olan *A. absinthium* (pelin otu, acı pelin, ak pelin ve büyük pelin) antipiretik, antiseptik, antihelmintik, tonik ve diüretik olarak kullanılmaktadır (Baytop, 1999). *A. absinthium*'un kimyasal bileşiminde terpenler, caryophellene, sabinil asetat ve krizantenil asetat (Kostadinovic vd., 2012), *A. sieberi* ekstraktında santonin, sesquiterpen laktonlar ve bisiklik monoterpen glikozitler, dvanone ve ilgili bileşikler, siklik sesquiterpenler saptanmıştır (Mahboubi, 2014). İlk kez *A. annua*'dan izole edilen (Mahboubi, 2014) artemisinin, sesqueterpen lakton endoperoksit olarak tanımlanan ikincil doğal bir metabolit olup (Kostadinovic vd., 2012) *A. sieberi* ekstraktının artemisinin içeriğinin, yaz ve sonbaharda sırasıyla % 0.2 ve% 0.14 (Arab vd., 2006; Mahboubi, 2014) olduğu bildirilmektedir.
Artemisinin, anethole ve estragole tarhun türlerinden izole edilen önemli antimikrobiyallerdir. Birçok artemisia türünün ekstraktındaki artemisinin bazlı bileşiklerin anti-parazitik etkileri (Arab vd., 2006; 2012) ve yüksek antioksidan kapasitesi nedeniyle önemli tıbbi faydalarının olduğu bildirilmiştir (Ferreira, 2009). Anethole ve Estragole tarhunda bulunan en önemli bileşikler (Kordali vd., 2005a; Soltan vd., 2008; Hosseinzadeh ve Farhoomand, 2014) olup; bakteri, maya ve mantarlara karşı güçlü antimikrobiyal özelliklere sahiptir (Minakshi vd., 2002). Söz konusu maddeler Salmonella enterica'ya karşı hem bakteriyostatik hem de bakterisit etkiye sahiptir (Kubo ve Fujita, 2001). Bununla birlikte artemisia türleri arasında antimikrobiyal ve antioksidan potansiyelleri bakımından farklılıklar olduğu belirtilmektedir (Kordali vd., 2005a, 2005b).

Kanatlı Rasyonlarında Artemisia Türlerinin Kullanımı
Brisibe vd. (2008), etlik piliç ve yumurta tavuğu rasyonlarına %20'ye kadar kurutulmuş *A. annua* yaprağı ilavesinin herhangi bir yan etkisi olmadan ilave edilebileceğini, yem tüketimi, canlı ağırlık artışı, yumurtlama performansında iyileşme ve yumurta sarısının renginde yoğunluğun artması şeklinde güçlü fizyolojik etkilerinin olduğunu belirtmişlerdir. Ayrıca *A. annua* yapraklarında çok çeşitli fitokimyasalların bulunması nedeniyle insan ve hayvanlarda doğal bir parazit kontrolörü olarak rol oynayabileceği vurgulanmıştır.
Khalaji vd. (2011), diete %1 *A. sieberi* ilavesinin etlik piliçlerin canlı ağırlık ile yemden yararlanmalarını ve plazma lipit profilini etkilemediğini, ancak sadece 21. günlük yaşa kadar olan yem tüketimini düşürdüğünü ($P<0.01$) belirtmişlerdir. *A. sieberi* ilavesinin dışkıdaki koliform ve *E coli* popülasyonunu azalttığı (sırasıyla $P<0.01$ ve $P<0.05$) belirlenmiştir. Ayrıca *A. sieberi'*nin, monositleri önemli ölçüde artırdığı ($P<0.05$), ancak gastrointestinal pH, antikor yanıtı ve karkasın farklı bölümlerinin uzunluğu ve göreceli ağırlığı üzerinde etkili olmadığı ve diete %1 *A. sieberi* yaprağı ilavesinin etlik piliç sağlığını ve performansını iyileştirdiği bildirilmiştir.
Oral yolla iki Eimeria türünün (*Eimeria acervulina* and *Eimeria Maxima*) enfekte edildiği free range sistemde yetiştirilen iki etlik piliç genotipinin (White Bresse L40 ve Kosmos 8 Ross) rasyonlarına ilave edilen kurutulmuş *A. annua* L. yapraklarının koksidiyozu önleyici etkisinin araştırıldığı çalışmada (de Almeida vd., 2012), canlı ağırlık artışı, genotip, cinsiyet ve *A. annua* ilave guruplarının arasında üç yönlü bir etkileşim olduğu, Kosmos 8 Ross dişileri Artemisia tedavisine olumlu yanıt verirken, erkeklerin olumsuz yanıt verdiği ve White Bresse L40 genotipinin cinsiyetleri arasında küçük farklılıklar bulunduğu tespit edildi. Ayrıca her iki genotipten gelen piliçlerin *Eimeria acervulina* ve *Eimeria maxima'*nın neden olduğu koksidiyoz enfeksiyonu ile iyi başa çıktığı ve kurutulmuş *A. annua* yaprakları ile desteklenen piliçlerde salgılanan oosit sayısının azaldığı ($P<0.05$) bildirilmiştir. Araştırmacılar kurutulmuş *A. annua* yaprakların bir botanik koksidiyostat olarak diete ilave edilmesinin free range sistemde yetiştirilen piliçlerde oosit sayısını önemli ölçüde azaltması nedeniyle *A. Annua'*nın kanatlı endüstrisinde ticari kayıplara yol açan koksidiyozu önleme stratejisinin bir parçası olabileceğini rapor etmişlerdir.
Kostadinovic vd. (2012), *Eimeria tenella* ile enfekte edilen etlik piliç rasyonlarına 3 mg/kg/gün dozunda *A.absinthium* ekstraktı ilavesinin koksidial enfeksiyon şiddeti, oosit çıkış sayısı ve kanlı ishalde azalma olduğunu bildirerek *A.absinthium'*un antikoksidial aktivite gösterdiğini ve koksidiyoza karşı potansiyel bir koruyucu madde kaynağı olabileceğini rapor etmişlerdir.
Cherian vd. (2013) etlik piliç dietlerine %2 ve 4 oranında öğütülmüş *A. annua* yaprağı ilavesinin deneme sonu canlı ağırlık, günlük ağırlık artışı, yem tüketimi, karkas ağırlığı, yemden yararlanma oranı; karaciğer, abdominal, göğüs ve but kası yağ içeriği; karaciğer, dalak ve kalp ağırlığını etkilemediğini; ancak lipit oksidasyon ürünlerinin (TBARS) *A. absinthium* ilaveli diyetlerle beslenen piliçlerin but ve göğüs kaslarında daha düşük ($P<0.001$) olduğunu bildirmişlerdir. Ayrıca diete *A.absinthium* ilavesi kalın bağırsak+rektum içeriği ve kör bağırsak pH değerlerinde önemli değişikliklere yol açmış olup, %2 *A.absinthium* ilaveli dietle beslenen piliçlerde ileal içerik pH'ı ve %4 ile beslenen piliçlerde kör bağırsak içeriğinin pH'ı en düşük ($P<0.01$) olarak tespit edilmiştir. Araştırmacılar *A.absinthium'*un kanatlı diyetlerine eklenebilecek antioksidan potansiyeli olan doğal bir fitojenik yem katkı maddesi olabileceğine dikkat çekmişlerdir.

Gholamrezaie Sani vd. (2013) etlik piliç dietlerine *A. annua*'nın 2000 ve 4000 ppm metanolik ekstraktının ve %0.5, 1 ve 1.5 oranında yaprak tozu ilavesinin ağırlık kazancını artırıp yem tüketimini düşürerek yemden yararlanmayı iyileştirdiğini tespit etmişlerdir ($P<0.05$). İntradermal olarak 16. günde enjekte edilen fitohemaglutinin-P'ye verilen cilt tepkisi, enjeksiyondan 24 ve 48 saat sonra ölçüldüğünde *A. annua* ekstrakt ve yaprak tozu ilavesinin hücresel bağışıklığı arttırdığı belirtilmektedir ($P<0.05$). Ayrıca tarhun ilavesinin, toplam SRBC (sheep red blood cell), IgG titresi, thymus ve bursa fabricius ağırlıklarını artırdığı bildirilerek ($P <0.05$), piliçlerin hücresel ve humoral bağışıklık performansını artırdığı rapor edilmiştir.

Diete %1.5 *A. annua* ilavesinin lasaloside göre antikoksidial etkisini karşılaştırmak için *Eimeria tenella* ile enfekte edilen etlik piliçlerle yürütülen çalışmada (Drăgan vd., 2014) lasalosid grubundan üç (3/20), tarhun grubundan altı (6/20) ve pozitif kontrol grubundan 19 piliçte (19/20) enfeksiyon görülürken tarhun grubundan sadece iki tavukta, pozitif kontrol grubundan 17 tavukta kanlı ishal görüldüğü ve bunların 7 tanesinin öldüğü tespit edildiği belirtilmiştir. *A. annua* ilaveli grubun dışkı oositleri (%95.6; $P<0.05$) ve lezyon skoru (%56.3; $P<0.01$) pozitif kontrole göre daha düşük, negatif kontrol grubundan sonra en yüksek canlı ağırlık artışı (68.2 g/gün) ve tüm deney grupları arasında en iyi yemden yararlanma oranı (1.85) kaydedilmiştir. Araştırmacılar enfeksiyon sonrası günlük diyetin %1.5'inde *A. annua* yaprak tozunun, lasalosid gibi sentetik koksidiyostatlar için değerli bir alternatif olabileceğini bildirmişlerdir.

Deneysel broyler koksidiyozunda yeme *A. sieberi* granüle özütü (GEAS) ilavesinin monensine göre antikokidial etkisini karşılaştırmak için, oral yolla enfekte edilmiş dört *Eimeria* türünü alan piliçlerde; yem tüketimi, canlı ağırlık, ağırlık kazancı ve yemden yararlanmayı iyileştirdiği ve oosit sayısını azalttığı görülmüştür (Kheirabadi vd., 2014). Araştırmacılar *A. sieberi* granüle özütü (GEAS) ilavesinin, polieter iyonofor bileşiği olan monensin ile karşılaştırılabilir ölçüde büyüme performansı parametrelerini geliştirip, oosit sayısını azalttığını; kanatlı hayvan endüstrisinin en önemli paraziter hastalığı olan koksidiyozda geleneksel antikokoksidial etkenlere karşı artan direnç nedeniyle, yeni antikokoksidiyal bileşikler bulunmasında *Artemisia* türlerinin ümit vaat edici olduğunu bildirmişlerdir.

Hosseinzadeh ve Farhoomand (2014), etlik piliç dietlerine %0.125, 0.25 ve 0.5 düzeyinde kurutulmuş *A. dracunculus* yaprağı ilavesinin kalp, karaciğer, dalak, bursa fabricus, karkas, ve abdominal yağ ağırlıkları; plazma glikoz, kolesterol, trigliserid, VLDL, LDL ve HDL parametrelerini üzerine etkili olmadığını tespit etmişlerdir. Hosseinzadeh vd. (2014), etlik piliç dietlerine %0.125, 0.25 ve 0.5 düzeyinde kurutulmuş *A. dracunculus* yaprağı ilavesinin yem tüketimi ve karkas özelliklerini etkilemediğini, ancak ağırlık kazancı, yemden yararlanma oranı, ölüm oranı ve üretim etkinlik indeksinin diete %0.5 tarhun ilavesinde olumsuz etkilendiğini tespit ederek *A. dracunculus* seviyesinin rasyonda % 0.5'ten daha düşük tutulması gerektiğini önermişlerdir. Hosseinzadeh and Moghaddam (2014), etlik piliç dietlerine %0.125, 0.25 ve 0.5 düzeyinde kurutulmuş *A. Dracunculus* yaprağı ilavesinin taşlık, Bursa fabricus, mide ve pankreas ağırlığı ve duodenum, jejunum, ileum, kör bağırsak, rektum ve bütün bağırsak ağırlığı ve söz konusu bağırsak bölümlerinin uzunluğu üzerine etkisi olmadığını ($P<0.05$) bildirmişlerdir. Gharetappe vd. (2015), etlik piliç dietine %0.4 *A. dracunculus* yaprağı ilavesinin canlı ağırlık, ağırlık artışı, yem tüketimi ve yemden yararlanma, besin sindirilebilirliği, Newcastle hastalığına karşı antikor titresi ve kesim özellikleri üzerine etkili olmadığını rapor etmişlerdir.

Kostadinovic vd. (2015), etlik piliç dietlerine 0, 100, 150 ve 200 g/kg dozlarında *A. absinthium* ilavesinin tüm guruplarda vücut ağırlığını artırıp yemden yararlanma oranın iyileştirdiğini ($P <0.05$) tespit etmişlerdir. Diete 200 g/kg *A. absinthium* ilavesinin kontrol grubuna kıyasla plazmada malondialdehitin (MDA) konsantrasyonunu önemli ölçüde azalttığı, Glutatyon peroksidazın (GSHPx) aktivitesini ise artırdığı gözlenmiştir. Diete 100 ve 150 g/kg *A. absinthium* ilavesinin lipit peroksidasyonu, plazma ve karaciğerdeki antioksidatif koruma enzim aktivitesi üzerinde hiçbir etkisi olmamıştır. Diete *A. absinthium* ilavesi göğüs eti verimini artırmıştır. Protein içeriği biraz daha yüksek, yağ içeriği daha düşük olmasına rağmen beyaz etin besleyici kalitesi üzerine *A. absinthium'*un etkisi olmamıştır. Araştırmacılar *A. absinthium'*un diyete dahil edilmesinin piliçlerin performansını iyileştirdiği ve antioksidan durumunu desteklediğini; piliçler için doğal bir yem katkı maddesi olarak kullanılabileceğini rapor etmişlerdir.

Japon bıldırcını diyetlerine % 0.5, 1, 1.5 ve 2 düzeyinde tarhun ekstraktı ilavesinin (Angas vd., 2015), 1-42 yem tüketimi ve yemden yararlanma oranı, kan şekeri, kan kolesterolü ve kan trigliserit miktarına etkisi olmadığı, ancak ağırlık artışını olumsuz etkilediği tespit edilmiştir. Diete % 0.5 tarhun ekstrakt ilavesi en yüksek karkas ve göğüs ağırlığına yol açmış ancak karaciğer, kalp ve uyluk ağırlığında gruplar arasında anlamlı bir fark gözlenmediği bildirilmiştir.

70% çam iğnesi ve 30% *A. annua* karışımından elde edilen ekstraktın (CHM) yumurtacı tavuk diyetlerine %0.5 ve 1.0 seviyelerinde ilave edildiği çalışmada (Li vd., 2016), yumurta ağırlığı, mortalite, yumurta kabuk kalınlığı, albümin yüksekliği, Haugh birimi, yumurta kabuğu kırılma mukavemeti ve yumurta şekli indeksi CHM'den etkilenmemiştir. Diyete CHM ilavesinin yumurta verimini iyileştirdiği ($P<0.05$) ve en düşük yemden yararlanma oranının %1.0 CHM dozunda gözlendiği bildirilmiştir. CHM ilavesinin kırık çatlak yumurta oranını, yumurta sarısı kolesterolünü, serum kolesterol, trigliserit, düşük yoğunluklu lipoprotein kolesterolü (LDL-C) ve alanin aminotransferazı (ALT) düzeylerini düşürdüğü ve serum yüksek yoğunluklu lipoprotein kolesterolün (HDL-C) seviyelerini artırdığı ve CHM ile beslenen tavuklarda serum total protein, serum albumin, serum glukoz ve aspartat amino transferaz (AST) değerlerinde bir fark gözlenmediği tespit edilmiştir. Araştırmacılar diyete CHM ilavesinin yumurtacı tavuklarda, yumurta üretimi ve yumurta kalitesini artırıp ve serum kolesterol konsantrasyonlarını düşürdüğünü ve yumurtacı tavuk diyetlerinde %1.0 CHM ilavesinin sağlığa duyarlı tüketiciler için düşük kolesterol ve yüksek yumurta sarısı fosfolipit içeriği olan yumurtalar üretmek için uygun bir yöntem olabileceğini rapor etmişlerdir.

Yıldırım ve Tunç (2018), etlik piliç dietlerine %0.1, 0.2 ve 0.5 düzeyinde kurutulmuş *A. dracunculus* ilavesinin kanat ve baş ağırlığı dışındaki, diğer karkas özelliklerinin önemli ölçüde etkilenmediğini belirterek en düşük baş ağırlığı ($P<0.01$) ve en yüksek kanat ağırlığının ($P<0.05$) kontrol grubunda gözlendiğini bildirmişlerdir.

Kaya vd. (2019) tarafından yapılan çalışmada, farklı yerleşim sıklığında (5 veya 7 tavuk/tekerrür) barındırılan yumurtacı tavuk rasyonlarına 0, 1.2, 6 ve 12 g/kg seviyelerde öğütülmüş *A. dracunculus* ilavesinin performans özelliklerinden canlı ağırlık kazancı, ortalama yumurta ağırlığı, deneme başı ve deneme sonu canlı ağırlığı özelliklerini ve yumurta sarı indeksi dışındaki diğer yumurta kabuk kalite özelliklerini etkilemediğini tespit etmişlerdir. Rasyona *A. dracunculus* ilavesi günlük yem tüketimi ve hasarlı yumurta oranını azaltıp ($P<0.01$), yumurta verimi ve yemden yararlanmayı artırmıştır ($P<0.01$). Diyete tarhun ilavesinin serum CORT ve TOS, serum, karaciğer ve yumurta malondialdehit, bağırsakta *E. coli* ve toplam mezofilik aerobik bakteri sayısını azaltıp ($P <0.05$) serum total immünoglobulin seviyelerini arttırdığını ($P<0.05$) bildiren araştırmacılar, diyete tarhun ilavesinin, genel olarak performans parametrelerinin iyileştirilmesinde, stres kaynaklı sonuçları hafifletmede lipid peroksidasyonunu azaltmada, bağışıklık sistemini düzenlemede, bazı bağırsak mikroorganizmalarını kontrol etmede etkili olabileceğini rapor etmişlerdir.

Sonuç ve Öneriler

Araştırma sonuçları kanatlı hayvan diyetlerine artemisia türlerinin toz veya özütünün ilave edilmesinin genel olarak performans parametreleri ve sağlığın iyileşmesinde, antioksidan durumu destekleyerek stres kaynaklı sonuçları hafifletmede, lipid peroksidasyonunu azaltmada, hücresel ve humoral bağışıklık performansını artırarak bağışıklık sistemini düzenlemede doğal bir fitojenik yem katkı maddesi olarak eklenebileceğini göstermektedir. Kanatlı hayvan endüstrisinin en önemli paraziter hastalığı olan koksidiyozda kullanılan geleneksel antikokoksidial etkenlere karşı artan direnç nedeniyle, yeni antikokoksidiyal bileşikler bulunmasında Artemisia türlerinin koksidiyoza karşı ümit vaat edici ve değerli bir alternatif olabileceği anlaşılmaktadır. Ülkemizde de bulunan tıbbi ve aromatik bitkilerden olan Artemisia türlerinin kanatlı hayvan rasyonlarına doğal yem katkı maddesi olarak kullanımının yararlı olacağı düşünülmektedir.

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SECTION II

ANIMAL BREEDING AND GENETIC

(ORAL PRESENTATIONS)

Comparison of Non-linear Growth Models to Describe the Growth in Turkey Genotypes

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Introduction

Growth in a bird is an important phenomenon which a whole of complex physiological and morphological processes from hatching to maturity which is defined as the increases in the weight and volume measurements of the organs or body for mentioned time interval (Narinç et al., 2010; Narinç et al., 2017). Many mathematical models have been used to model the growth in poultry species accepted on the basis of the reality of the biological growth of a bird, that the dependent variable has an estimated asymptotic value when the independent variable is at infinity. It is possible to examine the studies on the poultry by using growth models under three categories, namely "determination of the best-fitting model", "the comparison of various application results with the growth models", and "the estimation of genetic parameters of growth model parameters". There have been quite a few studies undertaken toward the determination of growth trend in poultry. These studies have been conducted on broilers, turkeys, partridges and quails mostly. In some studies, the best fitted a certain model for a poultry specie is determined. However, which growth model is appropriate for available flock should be used. For example, the growth curve parameters were estimated for large white turkey flock by Şengul and Kiraz (2005) with four different non-linear models (Gompertz, Logistic, Morgan-Mercer-Flodin, and Richards). They reported that Gompertz, Logistic and Richards models were more suitable models for growth data of large white turkey. Besides, Von Bertalanffy, Richards, and Morgan were compared with the Gompertz function for growth profiles of turkey hens from commercial flocks (Porter et al., 2010). The results showed that the Gompertz model can be a limitation and that the relationship between body weight and age in turkeys was best described using flexible growth functions. The Morgan equation provided the best fit to the data set and was used for characterizing the growth profiles of turkey hens. The aim of this study is to determine the best fitted growth model by modeling the growths of five commercial turkey genotypes. With this aim the Gompertz, Logistic, Von Bertalanffy and Richards growth models were used in this study.

Materials and methods

The growth profiles (Table 1) of five Aviagen Turkey genotypes (BUT 6, BUT 10, But Premium, Nicholas 300, Bronze) from the Management Handbook of Aviagen (2013) were used in this study to investigate the relationship between body weight and age in different male strains of turkeys.

Table 1. The growth profiles of five Aviagen Turkey genotypes

Days	BUT 6	BUT Premium	BUT 10	Nicholas 300	Bronze
1	0.06	0.07	0.06	0.07	0.07
7	0.18	0.17	0.17	0.17	0.17
14	0.39	0.38	0.36	0.37	0.36
21	0.73	0.70	0.65	0.67	0.66
28	1.22	1.17	1.07	1.11	1.11
35	1.90	1.80	1.64	1.69	1.72
42	2.75	2.61	2.35	2.42	2.48
49	3.77	3.57	3.20	3.29	3.40
56	4.94	4.67	4.16	4.28	4.44
63	6.22	5.86	5.21	5.36	5.57
70	7.57	7.11	6.31	6.50	6.76
77	8.96	8.39	7.45	7.67	7.98
84	10.36	9.68	8.59	8.85	9.20
91	11.76	10.96	9.74	10.03	10.42
98	13.16	12.23	10.88	11.21	11.63
105	14.55	13.51	12.03	12.39	12.84
112	15.95	14.80	13.19	13.58	14.07
119	17.33	16.09	14.35	14.78	15.29
126	18.70	17.38	15.51	15.98	16.52
133	20.04	18.64	16.65	17.15	17.72
140	21.33	19.87	17.76	18.29	18.88
147	22.56	21.04	18.83	19.39	20.00
154	23.72	22.16	19.85	20.44	21.06

The functions used to describe the growth curves of turkeys are presented in Table 2. The Gompertz, logistic, Richards and Von Bertalanffy equations were fitted to the data to model the relationship between body weight and age. The model expressions of the Gompertz, Logistic, Von Bertalanffy and Richards functions and their coordinates of the point of inflection are presented in Table 2.

Table 2. Expressions and point of inflections of commonly used growth functions

Growth Model	Equation	IPT	IPW
Gompertz	$Y_t = \beta_0 . e^{-\beta_1 e^{-\beta_2 t}}$	$\ln(\beta_1)/\beta_2$	β_0/e
Logistic	$Y_t = \beta_0 (1 + \beta_1 . e^{-\beta_2 t})^{-1}$	$-\ln(1/\beta_1)/\beta_2$	$\beta_0/2$
Richards	$Y_t = \beta_0 (1 + \beta_1 . e^{-\beta_2 t})^{\beta_3}$	${\beta_2}^{-1} \ln(\beta_3 \beta_1)$	$\beta_0((\beta_3 - 1)/\beta_3)^{\beta_3}$
Von Bertalanffy	$Y_t = \beta_0 (1 - \beta_1 . e^{-\beta_2 t})^3$	$\ln(3\beta_1)/\beta_2$	$8\beta_0/27$

In the equations, "t" denotes time, "y" weight, "β_0" the maximum body weight the animal is assumed to be able to reach, "β_1" the biological constant about the shape of the curve, "β_2" the biological constant about the growth rate, and "β_3" the shape parameter. These parameter models are special cases of the more flexible Richards function, which a variable point of inflection has specified by the shape parameter (β_3). The Logistic, Gompertz and von Bertalanffy functions have fixed growth forms with the point of inflection at about 50, 37 and 30% of the asymptote, respectively (Porter et al., 2010). Model parameters were analyzed using with SAS 9.3 software NLIN procedure Levenberg-Marquardt iteration method (Karaman et al. 2013). Goodness of fit criteria to compare the studied functions that explain growths of Japanese quail are follows, Determination Coefficient, R^2=1-(SSE/SST); where, SSE: Sum of square errors, SST: Total sum of squares. Adjusted Determination Coefficient, adj.R^2=R^2-((k-1/n-k)(1- R^2)); where, n: the number of observations, k: the number of parameters. Mean Square Error, MSE=SSE/(n-k); where, n: the number of observations, SSE: Sum square of errors, k: the number of parameters. Akaike's Information Criteria, AIC=n.ln(SSE/n)+2k; where, n: the number of observations, SSE: Sum square of errors, k: the number of parameters. Schwarz Bayesian Information Criterion BIC=n.ln(SSE/n)+k.ln(n); where, n: the number of observations, SSE: Sum of square errors, k: the number of parameters (Narinç et al. 2014).

Results

The goodness of fit criteria (R^2, MSE, adjusted R^2, AIC, BIC) and model parameters estimated using non-linear regression analyses for growth models were shown in *Table 3*.

Table 3. The goodness of fit criteria (R^2, MSE, adjusted R^2, AIC, BIC) and model parameters

Genotype	Model	R^2	Adj. R^2	MSE	AIC	BIC	β_0	β_1	β_2	β_3
BUT 6	Gompertz	0.99985	0.99983	0.02822	-32.43	-29.02	33.06	5.16	0.01761	
	Logistic	0.99844	0.99829	0.28737	20.95	24.36	25.71	35.97	0.03704	
	Richards	***0.99999***	***0.99998***	0.00284	***-91.05***	***-86.51***	41.27	0.68	0.01132	94.32
	Von Bertalanffy	0.99998	***0.99998***	***0.00278***	-85.74	-82.34	41.98	0.94	0.01098	
BUT Premium	Gompertz	0.99980	0.99978	0.03247	-29.19	-25.79	31.22	5.06	0.01726	
	Logistic	0.99833	0.99816	0.26818	19.36	22.77	24.12	34.72	0.03649	
	Richards	***0.99998***	***0.99997***	0.00400	***-83.16***	***-78.62***	41.19	0.64	0.01016	96.36
	Von Bertalanffy	0.99997	***0.99997***	***0.00397***	-77.55	-74.14	40.00	0.93	0.01068	
BUT 10	Gompertz	0.99981	0.99979	0.02407	-36.09	-32.68	28.44	5.02	0.01691	
	Logistic	0.99839	0.99822	0.20601	13.30	16.70	21.75	34.44	0.03611	
	Richards	***0.99998***	***0.99998***	0.00262	***-92.87***	***-88.33***	37.74	0.65	0.00997	98.74
	Von Bertalanffy	0.99997	***0.99998***	***0.00256***	-87.66	-84.25	36.94	0.92	0.01034	
Nic 300	Gompertz	0.99982	0.99980	0.02500	-35.21	-31.81	29.28	5.02	0.01692	
	Logistic	0.99840	0.99824	0.21702	14.50	17.90	22.39	34.46	0.03613	
	Richards	***0.99998***	***0.99998***	0.00277	***-91.62***	***-87.08***	38.68	0.65	0.01005	98.62
	Von Bertalanffy	***0.99998***	***0.99998***	***0.00267***	-86.62	-83.21	38.02	0.92	0.01034	
Bronze	Gompertz	0.99980	0.99978	0.02931	-31.55	-28.15	29.67	5.06	0.01726	
	Logistic	0.99833	0.99816	0.24207	17.01	20.41	22.93	34.68	0.03648	
	Richards	***0.99998***	***0.99997***	0.00364	***-85.34***	***-80.79***	39.13	0.64	0.01016	96.32
	Von Bertalanffy	***0.99998***	***0.99997***	***0.00361***	-79.73	-76.32	38.00	0.93	0.01068	

The R^2 and adjusted R^2 values of growth models were found close each other, and owing to these values are too close to 1, all of the functions for all genotypes have been assessed quite good explain the data. The MSE values of all five turkey genotypes were found to be quite low, while only the Logistic model was slightly higher. The lowest AIC and BIC values were determined in Richards model for all turkey strains. The deviations of residuals of growth models by turkey genotypes were shown in Figure 1.

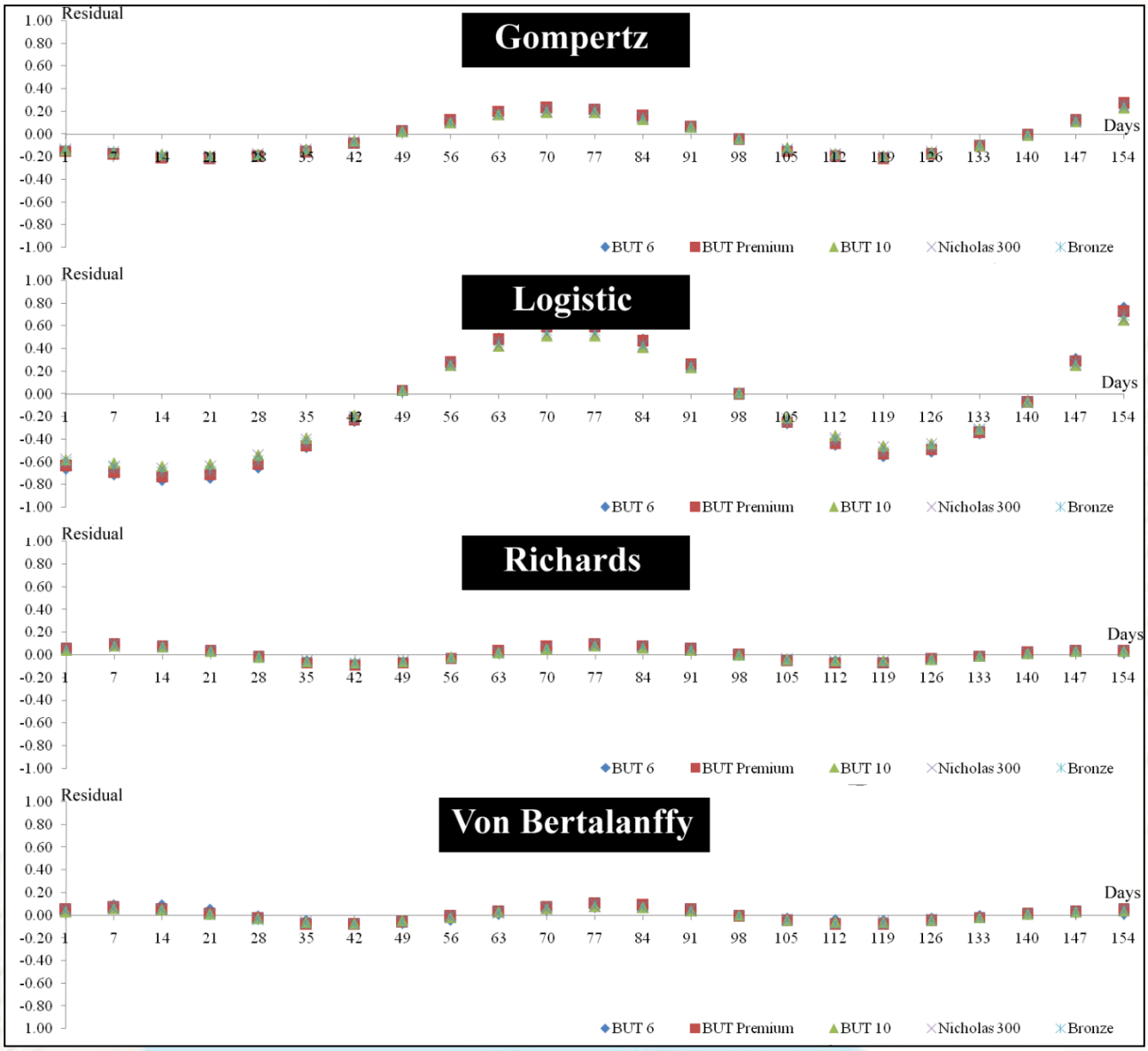

Figure 1. Residuals of predictions in time points of growth functions by turkey genotypes

Conclusion

In the current study, the best fitting growth model for all turkey strains was determined to be the Richards growth function according to the lowest values of MSE, AIC and BIC and the highest R^2 and adjusted R^2. Our results are in disagreement with the previous reports putting forward that the Gompertz model was the best-fitting model for galliforms (Tzeng and Becker, 1981; Akbaş and Oğuz, 1998; Narinç et al., 2010). Growth is a phenomenon affected by both genetics and environmental conditions, and thus, it does not depend on species, strain, line or family (Narinç and Aksoy, 2012; Üçkardeş and Narinç, 2014).

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The Histomorphologic Examination of Midgut Section of Black Sea Trout (*Salmo Labrax* Pallas 1814)

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Introduction

The midgut section in the fish intestine contains the intestine and a variable number of pyloric caeca (Floris, 2010). Intestine and pyloric caeca play a curicial role in digestion and absorption of nutrients consumed by the fish (Khadse and Gladhikar, 2016; Mumford et al. 2007). Therefore, histomorphological monitoring of these structures are necessary for fish nutrition studies. This study was carried out to knowledge about the histomorphology of pyloric caeca and intestine of Black Sea trout (*Salmo labrax* Pallas 1814).

Materials and methods

Fifth-generation Black Sea trout (15 months and 417.43±8.61g) grown at Central Fisheries Research Institute were used in this study. The fish were kept in the freshwater tanks (9.81-12.1ºC) fed by spring water in January-November 2017 from larvae to smolt stage. Afterwards, the fish were transferred to the marine cages in November 2017 where they were kept for 6 months in 9.5-16.1ºC. Pyloric caeca and intestine tissues of twenty fish were taken from marine cages in May 2018, and placed into 10% formalin. Intestine was examined by dividing into three parts: anterior, middle and posterior. Pyloric caeca, anterior, middle and posterior were examined in one piece. Anterior intestine was defined as section attached to the intestine of pyloric caeca. Pyloric caeca was examined by taking from the region near to final point of section attached to the anterior intestine. Middle intestine was defined as from final point of section attached to the intestine of pyloric caeca to macroscopic spiral image of the intestine. Posterior intestine was defined as from macroscopic spiral image of intestine to 1.0 cm beyond of anus. Tissues sections were placed into tissue cassettes and exposed to the dehydration process and embedding in paraffin blocks, tissues were cut 5-µ thickness, and prepared and stained with hematoxylin and eosin solution. subsequently, layers of each tubular (serosa, muscularis, submucosa, villi length and villi width) were photographed and evaluated by using an image processing and analysis system (ZEN 2012 SP2) (Xu et al. 2003). Fish were fed until the feeling of satiety during experiment.

Results

The highest villi length (VL) and villi width (VW) were respectively obtained in middle part (523.13±41.69 µm and 75.74±17.90 µm). This was respectively followed by anterior (450.01±45.49 µm and 52.79±9.45 µm) and pyloric caeca (397.20±47.95 µm and 59.87±3.92 µm) ($P>0.05$). Serosa, muscularis and submucosa layers were decreased from the beginning of the anterior intestine to the beginning of the posterior intestine. The thickest muscularis was respectively obtained in anterior as 127.35±14.47 µm. This was respectively followed by middle as 82.53±10.49 µm and pyloric caeca (44.72±5.53 µm) ($P<0.05$). The thinnest muscularis was obtained in posterior intestine (30.41±7.58 µm). The thickest serosa and submucosa were respectively obtained as 51.27±13.15 µm, and 72.37±20.70 µm in anterior. This was followed by middle as 37.34±11.74 µm and 40.17±11.72 µm. The thinnest serosa and submucosa were obtained posterior (19.20±1.93 µm and 15.69±1.45 µm) and pyloric caeca (20.58±2.75 µm and 16.37±1.89 µm) ($P>0.05$). In terms of villi development, posterior intestine was more different than other three tissues, and had a complex villi structure. Therefore, villi development didn't measure in the posterior intestine. Crypt depth was not seen in the intestine and pyloric caeca.

Table 1. Pyloric caeca and intestine morphology of Black Sea trout

Parts	Serosa	Muscularis	Submucosa	Villi length	Villi width
Anterior	51.27±13.15^{a}	127.35±14.47^{a}	72.37±20.70^{a}	450.01±45.49^{b}	52.79±9.45^{b}
Middle	37.34±11.74^{b}	82.53±10.49^{b}	40.17±11.72^{b}	523.13±41.69^{a}	75.74±17.90^{a}
Posterior	19.20±1.93^{c}	30.41±7.58^{c}	15.69±1.45^{c}	NM	NM
Pyloric caeca	20.58±2.75^{c}	44.72±5.53^{c}	16.37±1.89^{c}	397.20±47.95^{b}	59.87±3.92^{b}

Mean values in column with different superscripts were significantly different ($P<0.05$), NM: Not measured

Conclusion

Intestine has four layers including mucosa, submucosa, muscularis and serosa. Histological structure of fish intestine may vary depending on feeding habits, food, age, body shape and weight (Mokhtar et al. 2015). The layers of intestine sections and pyloric caeca of the Black Sea trout were histologically similar to each other, but not morphologically. Besides, pyloric caeca had villi of different length and width like intestine. Mumford et al. (2007) stated that the pyloric caeca are histologically similar to intestine, and has a digestive and absorptive function. It was understood that intestine sections (anterior, middle and posterior) were morphologically different from each other. However, intestine sections and pyloric caeca should be examined more comprehensively to better understand the histomorphology of midgut section of the Black Sea trout.

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Productive Life and Culling Reasons in Çanakkale Sheep Production

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Introduction

Culling rates affects production costs as well as effectiveness of genetic selection. A high culling rate decreases the average productive life. Functional productive life ensures that the animal remains in the herd because of its characteristics such as disease resistance and high adaptability, while actual productive life determines the productivity. A long productive life is a result of health and reproduction performance, which also shows the full capacity of the animal. It is important for manage the culling rate to know the culling causes of each production systems. In this study, productive life, culling rates and culling reasons were determined in two breed-based sheep production systems in Çanakkale.

Materials and methods

Data from Sakız and Tahirova breeds subprograms of "National Community Based Small Ruminant Breeding Program" were used, which supported by the General Directorate of Agricultural Researches and Policies of the Turkish Ministry of Agriculture and Forest. In the Sakiz breeding program, started in 2012 with 3281 ewes, 2061 first lambing sheep from 29 sires and 1589 dams, were analyzed. The values in 2013 started Tahirova breeding program were 3645 ewes, 1627 first lambing sheep from 89 sires and 1598 dams, respectively. The average productive life of sheep were calculated using the 5 years average culling rate $\left[Productive\ Life = \frac{100}{Replacement\ Rate}\right]$, which the culling rate was assumed as replacement rate. Chi-square test was performed to compare the ability to stay in the flock of first lambing ewes, which first lambing in first or second year of ages. The culling reasons were collected via a survey in 68 farms. A binomial distribution based GEE was applied to compare the culling reasons of the breeds, where odds ratios was calculated using the equation $\Psi=e^b$ (e is the Euler's number and b is the estimate derived from GEE).

Results

The 5 years' averages culling ratio of Sakız flocks was 17.6% and the same values for Tahirova flocks was 20.6%. The average productive life of Sakız and Tahirova flocks was 5.68 and 4.85 years, respectively. The first lambing age of Sakız ewes was 619.6 days, while Tahirova ewes lambing firstly of an age of 490.2 days. Average lambing intervals of 368.4 days for Sakız and 377.0 days for Tahirova were calculated. 5.62 lambing per flock and ewe were performed by Sakız sheep and 4.70 by Tahirova sheep. The in flock stay rates in second and third lambing of firstlings, which first lambing in first or second year of ages, were shown in figure 1. 23% and 24% firstlings of Sakız sheep are not in the flock at the second birth (P=0.8955), while the values of Tahirova sheep are 21% and 29% (P=0.0440), each for first lambing ewes in first age or second age, respectively. These percentages at the third birth are 32% and 41% (P = 0.0184) for Sakız and 37% and 41% (P = 0.0124) for Tahirova.

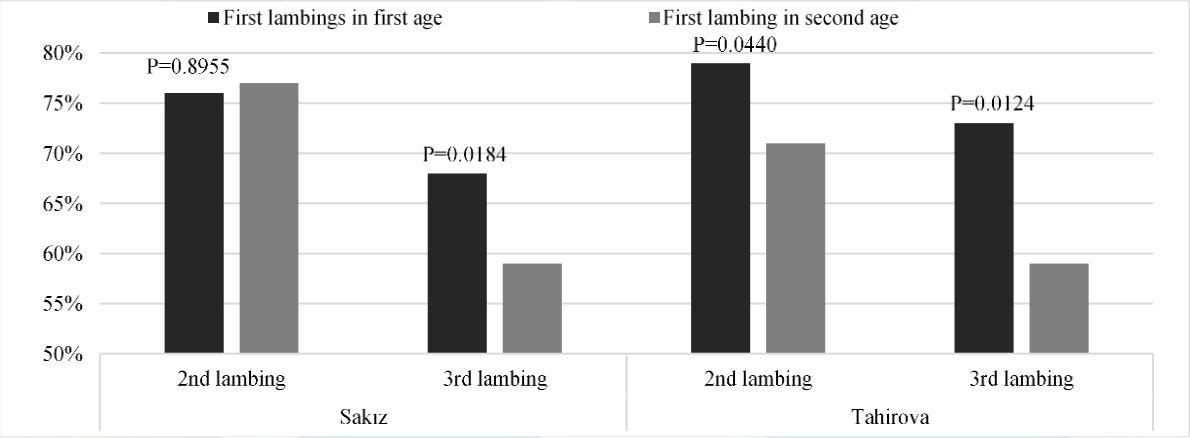

Figure1. Stay in flock ratios of ewes, first lambing in first or second age

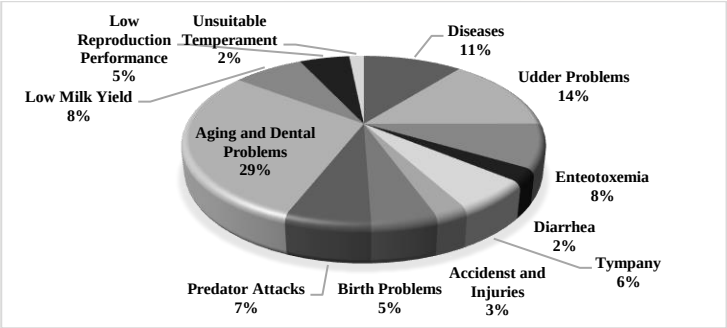

Figure 2. Percentage share of culling reasons in Çanakkale sheep production

The ratios of culling reasons reflect the extensive nature of Çanakkale's sheep production. Aging, usually accompanied by dental problems, take the first place of the culling reasons (figure 2). The relatively high culling rates due to enterotoxaemia and predator attacks illustrate this fact.
Milk (P=0.0051) and reproductive (P=0.0012) performance are more important reasons for culling in Tahirova farms compared to Sakız farms. On the other hand, Sakız farms lose more sheep through predator attacks than Tahirova farms (P=0.0493).

Table 1. Estimates (b), their standard errors (SE) and odds ratios (Ψ), as well as P-values to compare breeds culling reasons

Sakız									
Culling reasons	b	SE	Ψ	P	Culling reasons	b	SE	Ψ	P
Milk Yield	-1.47	0.55	0.23	0.0051	Udder Problems	-0.49	0.62	0.62	0.4399
Reproduction	-1.73	0.55	0.18	0.0012	Tympany	-1.06	0.59	0.35	0.0683
Diseases	-0.08	0.51	0.93	0.8804	Predator Attacks	1.26	0.70	3.54	0.0493
Birth Problems	-0.09	0.64	0.91	0.8881	Aging	-1.70	1.09	0.18	0.0637

The b value of Tahirova is 0,0 and the Ψ value is 1.0

Conclusion

Sakız farms have relative low culling ratios, while this values in Tahirova farms are in optimum area (Rogers et al., 1988). Literature reports of herd life in sheep ranged from 4.4 years to 6.6 years (Brash et al., 1994; El Saied et al., 2006; Vatankhah and Zamani, 2007; Kern et al., 2010). The average herd life (productive life +first lambing age) of Tahirova farms are within this values, while Sakız sheep exceed the literature reports. Ewes, first lambing in the second age leave the flock earlier than the ewes, first lambing in the first age. It may be that reproductive intact sheep already in the first age lambing, or that the sheep with weak reproduction performance at first in the second age lambing. The low replacement rate and the high first lambing age of the Sakız sheep can only be achieved with a low input production system. The first lambing age of Tahirova sheep indicate on an early developed breed. A higher replacement rate in the optimal range and an early development as well as the higher culling reasons in milk and reproductive performance of Tahirova farms than the Sakız farms indicate a better management practice of the Tahirova farmer.

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Compare of Milk Components and Milk Lipid Profiles in Morkaraman and Tuj Sheep

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Introduction

Milk has the high nutritional value among animal products. Consumption of milk and the dairy products are very significant for healthy life. Milk consumption depends on socioeconomic and sociocultural conditions. As in many societies, consumption of cow milk is also in the first place in Turkey. However, milk consumption from other livestock such as sheep and goat generally varies according to the regions, but is generally significant (Besler and Ünal, 2006; Yerlikaya ve Karagözlü, 2008).

Sheep milk components differ from genotype, age, season, weather, lambing interval, type of birth, feeding conditions and udder structure. On the other hand in general milk components consist of 18.8% dry matter, 7.5% fat, 5.6% protein and 4.6% lactose. Milk fat contributes unique characteristics to the appearance, texture, flavor, and satiability of dairy products. The composition of milk fat varies somewhat according to the breed, stage of lactation, season, geographical location, and feed composition (Yılmaz et al., 2004; Miller, 2006; Park et al., 2007). Milk lipids consist of triacylglycerol, diacylglycerol, phospholipid, cholesterol and free fatty acid. The fat contributes about 48% of energy of whole milk (Miller, 2006; Cengiz, 2015; Özyürek, 2017).

The objective of this study was focused on milk components and milk lipid profile of Morkaraman and Tuj ewes.

Materials and methods

This study was carried out on 31 Morkaraman and 36 Tuj ewes at Food and Livestock Application and Research Center of Ataturk University. The birth season, which started in April, continued until May. About 2 months old lambs were weaned and all of flock started to pasture by June. In order to determine the milk components and lipid profiles at control milking at the first days, middle and end of the pasture, samples were taken and brought to Milk Analysis Laboratory of Department of Animal Science.

Milk component analysis was performed with Lactoscan MCC device at Milk Analysis Laboratory in the Department of Animal Science. Lipid profiles in milk samples were determined by using HPTLC (High Performance Thin Layer Chromatography) method reported by Kaynar et al., (2013).

The GLM procedure of the SPSS (2011) 20.0.0 package program was used for the analysis of variance of the milk components and lipid profiles. Differences between groups were determined by the Duncan Multiple Comparison test.

Results

The means of the milk components are given in Table 1. The breed had a very significant ($p < 0.05$) effect on the milk components, but in contrast to previous studies age was an insignificant factor for milk components. Milk components are important variables for research, so the fat ratio was found higher than the average of the literature (Çelik and Özdemir, 2003; Ocak, 2009; Yilmaz et al., 2011). Non-fat dry matter, protein, lactose and ash were higher in Tuj than in Morkaraman sheep. However, fat content was lower ($p<0.01$) in Morkaraman than in Tuj sheep. It was determined that breed x age interaction had only a significant effect on the milk fat ($p < 0.05$) (Table 1).

Table 1. Least squares and standard errors of milk components of Morkaraman and Tuj sheep

Sources	Milk fat %	Non-fat dry matter %	Protein %	Lactose %	Ash %
Breed	**	**	**	**	**
Morkaraman	9.24 ± 0.13	9.43 ± 0.05	2.99 ± 0.02	5.52 ± 0.03	0.92 ± 0.01
Tuj	8.73 ± 0.12	9.88 ± 0.04	3.19 ± 0.02	5.75 ± 0.03	0.96 ± 0.01
Age	ns	ns	ns	ns	ns
2	8.99 ± 0.16	9.69 ± 0.06	3.10 ± 0.02	5.65 ± 0.03	0.94 ± 0.01
3	8.69 ± 0.22	9.61 ± 0.08	3.09 ± 0.03	5.60 ± 0.05	0.94 ± 0.01
4	8.93 ± 0.18	9.64 ± 0.07	3.09 ± 0.02	5.61 ± 0.04	0.94 ± 0.01
5	9.09 ± 0.20	9.65 ± 0.07	3.08 ± 0.03	5.64 ± 0.04	0.94 ± 0.01
6	9.22 ± 0.22	9.72 ± 0.08	3.10 ± 0.03	5.68 ± 0.05	0.95 ± 0.01
BreedxAge	*	ns	ns	ns	ns

*: $p<0.05$; **: $p<0.01$; ns: non-significant; a, b: Mean values with different letters are significantly different at $p<0.05$.

Table 2 shows the effects of breed and age on the milk lipid profiles of Morkaraman and Tuj sheep. Except for cholesterol

and phospholipid, the effect of breed on other milk lipids was not significant. Morkaraman had lower cholesterol than Tuj. On the other hand, Morkaraman had higher phospholipid than Morkaraman. The age had insignificant effect on the lipid profile except triacylglycerol and monoacylglycerol.

Table 2. Least squares and standard errors of milk lipid profiles of Morkaraman and Tuj sheep

Sources	Triacylglycerol %	Free fatty acid %	Cholesterol %	Monoacylglycerol %	Phospholipid %
Breed	ns	ns	*	ns	*
Morkaraman	90.53 ± 0.14	2.37 ± 0.06	2.66 ± 0.05	3.32 ± 0.06	1.11 ± 0.1
Tuj	90.49 ± 0.13	2.35 ± 0.06	2.82 ± 0.04	3.32 ± 0.06	1.03 ± 0.1
Age	*	ns	ns	*	ns
2	90.38 ± 0.18^{ab}	2.43 ± 0.07	2.80 ± 0.06	3.28 ± 0.07^{ab}	1.10 ± 0.04
3	90.36 ± 0.24^{ab}	2.39 ± 0.10	2.68 ± 0.08	3.45 ± 0.10^{a}	1.10 ± 0.06
4	90.09 ± 0.20^{b}	2.51 ± 0.09	2.81 ± 0.07	3.52 ± 0.08^{a}	1.10 ± 0.05
5	90.87 ± 0.22^{a}	2.18 ± 0.09	2.77 ± 0.07	3.17 ± 0.09^{b}	1.04 ± 0.05
6	90.83 ± 0.24^{ab}	2.28 ± 0.10	2.63 ± 0.08	3.19 ± 0.10^{ab}	1.01 ± 0.05
Breed x Age	ns	ns	ns	ns	ns

*: p<0.05; **: p<0.01; ns: non-significant; a, b: Mean values with different letters are significantly different at p<0.05.

Conclusion

In this study, the milk fat was generally determined above the literature. It is thought that milk production with high fat content may be more beneficial for producer due to the profitability and for consumer due to the rich nutrient content. Literature studies on the detection of lipid profiles in sheep are limited and the studies concentrate generally on cow milk. This case creates a gap for sheep milk and dairy products. This study has taken a step to fill this gap and it is suggested that new studies must be done to resolve this shortcoming.

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Investigating the mRNA expression of IL-8 in Response to Lipopolysaccharide (LPS) and Lipoteichoic Acid (LTA) Stimulation in Sheep Alveolar Macrophages

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Introduction

The immune system of an organism is the most important defense system against harmful pathogens and this system is tightly regulated by the timely expression of several genes. Interleukin-8 (*IL-8*) is a chemoattractant cytokine produced by a variety of tissue and blood cells. It has a distinct target specificity for the neutrophil cells. *IL-8* attracts and activates neutrophils in inflammatory regions. The aim of present study was to investigate the dynamics of expression of *IL-8* in response to LPS and LTA in different time points which could later be used to select sheep against respiratory diseases effectively (Janette and Etheresia, 2016).

Material and Methods

In the current study, we employed both *in vitro* and *in vivo* experimental setup. In the case of *in vitro* study two different time points (4 and 24 h) have been used. After the collection and purification of alveolar macrophages cells (AMs), they were stimulated with LPS 10 ug/ml, LTA 10 ug/ml and with the combination of LPS 10 ug/ml + LTA 10 ug/ml and left for 4 h. Then, total RNA extraction, cDNA synthesis and quantitative Real-Time PCR were performed to find out the dynamics of mRNA expression of *IL-8*.

For *in vivo* study, a total of twenty-four healthy lambs from two different breeds, 12 Akkaraman and 12 Romanov lambs, were used in this study. The animals in the treatment groups were exposed to LPS (20 µg/kg), LTA (500 µg/kg) and with the combination of LPS + LTA (20+ 500 µg/kg), while the control group was given 500 µg/kg of PBS (1X). After 24 h the lamb was euthanized, then, from the collected lungs the BAL fluid was isolated and the alveolar macrophages cells were purified, then total RNA extraction, cDNA synthesis and quantitative Real-Time PCR were performed to find out the level of mRNA expression of *IL-8* (Islam *et al.* 2013).

Results

In vitro study: 4 h exposure of AMs cells to LPS, LTA and a combination of LPS+LTA treatments resulted in a significant increase in the expression of mRNA level of *IL-8* compared to control. In addition, there were significant differences in the expression levels of *IL-8* between 4 h and 24 h trials in response to LPS and a combination of LPS + LTA, were 4 h treatment showed higher levels of *IL-8* expression than 24 h treatment, but there were no significant differences mRNA expression of *IL-8* with LTA between 4 h and 24 h trials.

In vivo study: When the Romanov and Akkaraman lambs were exposed to LPS or LTA or a combination of LPS + LTA, the expression of *IL-8* in alveolar macrophages was significantly higher than that of control groups after 24 h of treatment. Furthermore, *IL-8* resulted in a significant difference in the mRNA expression levels in Akkaraman and Romanov lambs in response to LPS or LTA or a combination of LPS + LTA after 24 h of the treatment. were Romanov lambs showed higher levels of *IL-8* expression than Akkaraman lambs after 24 h treatment.

Discussion

In vitro study: In 4 h trial, the exposure of AMs to LPS, LTA and with the combination of LPS + LTA treatments resulted in a higher mRNA expression of *IL-8* compared to 24 h trial. This is in accordance with previous findings which indicate that the production of *IL-8* secreted at high levels between 4 h and 8 h after activation of the monocytes (Kang *et al*. 2002).

In vivo study: The results of our study indicated that the Romanov lambs present high and significant mRNA expression levels differences of *IL-8* compared with Akkaraman lambs in exposure to LPS or LTA or a combination of LPS + LTA after 24 h of the treatment. Previous study showed that macrophages and other cells such as endothelial cells, airway smooth muscle cells, and macrophages can produce *IL-8*. As well as, *IL-8* can be involved in most acute and chronic inflammatory diseases and several infections which is acute in nature (Konrad and Reutershan, 2012).

Conclusion

Our study clearly demonstrated that stimulation of alveolar macrophages with LPS, LTA and LPS + LTA in *in vitro* for 4 h treatment significantly increase the expression of *IL-8* compared to 24 h treatment. In addition, the in vivo experiments revealed that the Akkaraman lambs showed higher resistant to respiratory diseases than Romanov lambs, this was clear from the higher and significant mRNA expression levels of *IL-8* presented in Romanov lambs in response to all treatments compared with Akkaraman lambs after 24 h of treatments.

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Effects of Some Plant Extracts Supplementation on Laying Performance and Metabolic Profile in Laying Hens at Different Cage Density

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Introduction

In poultry farming, many factors such as vaccination, transportation, cage density, cold and hot climate create stress on animals. This leads to deterioration of intestinal microflora balance and weakening of the immune system. As a result of this, the quantity and quality of the products obtained are reduced and profitability decreases. Plant extracts have been used in many areas, antimicrobial and antioxidant properties have been known for a long time and many researches are made on these issues. The region in which the plant extracts are mainly effective in animals is the digestive system, either by destroying the pathogenic microflora, or by increasing the concentration of the microbial population in the digestive system, leading to better digestion and absorption of nutrients. It has been determined by various researches that plant extracts have positive effects on feed conversion ratio and performance (Wenk 2000; Jamroz and Kamel 2002; Alçiçek *et al.* 2003; Parlat et al., 2005). This study was carried out to determine the effects of some plant extracts supplementation on laying performance and some metabolic profile in laying hens at different cage density.

Materials and Methods

This study was carried out to determine the effects of some plant extracts supplementation into the basal diet of Lohmann LS white commercial laying hens reared in poultry houses of Food and Livestock Application and Research Center of Ataturk University. One hundred ninety two Lohman White commercial laying hens which are 36 weeks old, were fed with rations including 250 mg/kg of anise extract (AE), 250 mg/kg of black cumin seed extract (BCE) and 250 mg/kg of thyme extract (TE) for 12 weeks. A total of 192 Lohmann white layers were randomly allocated three tier battery (50x46x46 cm) cages, each having 6 replicate cages as subgroups, were housed at a density of 3 and 5 hens/cage (respectivly 766 and 460 cm^2/per hen). During the research, 16-hour lighting was applied. Feed and water were given ad-libitum. The experimental diet (16.4% CP, 2670 Kcal ME/kg) was obtained from a commercial feed mill in Erzurum. Egg production and feed consumption were measured daily. At the middle and at the end of the experiment, 6 animals from each group were selected and blood samples were taken from the wing vena using heparinized tubes and centrifuged at 3000 x g for 5 minutes. Glucose was determined by using commercial kits (DDS Spectrophotometric Kits, Istanbul Turkey) as well as corticosterone using RIA (Beuving and Vonder, 1977). Factorial arrangements of two cage densities and four groups were tested in a complete randomized block design experiment. Two-way ANOVA was then conducted using the GLM Procedure (SPSS, 20.0, 2011).

Results and Conclusion

Table 1 shows the effect of plant extract and cage density on laying performance. Plant extracts had negative effects on egg production and feed consumption comparing with the control ($P<0.01$). Hens placed in high density cages consumed less amount of feed and produce less amount of egg than hens placed in low density cages.

Table 1. The effect of cage density and plant extract supplementation on laying performance and metabolic profile

Plant Extract	Cage Density	Egg production (%)	Feed consumption (g)	Egg weight (g)	FCR (kg feed/kg egg)	Corticosterone (ng/ml)	Glucose (mg/ml)
Control	3	91.96	120.93	65.60	2.02	3.80	280.60
	5	88.36	116.06	66.45	2.05	4.08	306.32
AE	3	81.11	94.57	62.70	1.92	3.45	239.53
	5	80.03	94.73	64.68	1.88	3.88	287.20
BCE	3	84.51	99.76	66.04	1.84	4.16	311.65
	5	82.28	93.96	65.35	1.80	3.63	264.49
TE	3	80.33	97.93	65.02	2.03	4.09	281.32
	5	80.93	90.17	64.36	1.90	4.05	306.52
SEM		2.36	2.25	0.84	0.151	0.123	3.47
	P>F						
Cage Density (CD)		0.049	0.005	0.533	0.143	0.685	0.0001
Plant Extract (PE)		0.0001	0.0001	0.026	0.503	0.017	0.0001
Time (T)		0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
CDxPE		0.837	0.340	0.323	0.893	0.002	0.0001
CDxT		0.316	0.0001	0.442	0.013	0.646	0.820
PExT		0.657	0.216	0.155	0.745	0.449	0.0001
CDxPExT		0.979	0.485	0.770	0.676	0.220	0.0001

Except for egg weight and corticosterone, the cage density affected egg production, feed consumption, FCR and glucose. Increasing the cage density in layers decreased feed consumption. The lowest feed convertion ratio value in the cage density groups was obtained in the five hen/cage density group (Table 1).

The levels of blood glucose and corticosterone among the treatment groups were found statistically significant. Hens placed in high density cages had higher serum glucose concentration than hens placed in low density cages. As cage density increased, serum glucose concentration increased ($P<0.01$). It was observed that corticosterone concentration was not affected by cage density (Table). It was showed that the glucose and corticosterone levels were significantly decreased by supplemental AE.

In this experiment, cage density was confounded with feeder space per hen. However, it was intended to create a stressing condition. Numerous studies have performed to evaluate the effects of cage densities on laying performance and their results are conflicting (Ramos et al., 1986; Bishop 2004; Hayirli et al., 2005). In the present study, except for depression in feed consumption and egg production percentage, increasing cage density did not affect other laying performance parameters. But further investigations are needed to clarify the use of plant extracts in layer diets and its effects on performance and metabolic profile.

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Investigation of the effects of Coumaphos (ABvarC®) and Flumethrin (Varostop ®) on the control of Varroa destructor in honeybee (Apis mellifera L.,) colonies and their effects on colony development

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Introduction

Varroa destructor (Anderson and Trueman, 2000) is a dangerous parasite that infects honey bees (*Apis mellifera* L.,) worldwide, causing significant economic losses in the beekeeping and agricultural area. Varroa is a very important problem that absorbs the blood of adult bees, larvae and pupae, weakens the colonies if left untreated, kills them and leads to the loss of bee products. In recent years, new form medicines with chemical and herbal active substances, which are practical and effective in practice, which do not require intensive labor force against Varroasis, have been introduced to the market. This study was carried out in the Çukurova region in the spring of 2016 in order to determine the efficacy of ABvarC® (Coumaphos) and Varostop® (Flumetrin) against *Varroa destructor* and the effects of colonies on population development.

Materials and methods

The study was carried out in 2016 (February 22-April 18) in 17 colonies selected randomly from colonies having the same strength colony population as queen bees reared from the same colonies (ItalianxCarniol hybrid). Colonies were randomly distributed in 3 different study groups (ABvarC, Varostop and Control). The experimental design used in the study consists of Group A (ABvarC), Group B (Varostop) and Group C (Control). ABvarC (Coumaphos) and Varostop (Flumethrin) were used as a chemical product for 5 weeks between February 29-April 4. Mavrik® (Fluvalinate) (April 4-April 11) was applied to the study group colonies (ABvarC, Varostop and Control) after trial. All the fallen varroa and dead bees were counted daily in colonies after chemical (5 weeks) and control application (1 week). The efficacy of the chemical application was calculated with all the data obtained (Higes et al., 1997). The number of adult-brood bee population on frame (number / colony) and the adult-brood surface area (number/colony) of the colonies were estimated every 21 days by digital photograph machine in 3 measurement periods (29.02.2016-21.03.2016-11.04.2016) (Jeffree, 1951). It was determined whether chemical applications against Varroa had an effect on colony population development. The number of adult-brood bee population on frame and the adult-brood surface area of the colonies were tested in a randomized block design by using SPSS 22.0 V. The mathematical model of randomized block design is $Y_{ij} = \mu+\alpha_i+\beta_j+e_{ij}$ i=1,2,...,t and j=1,2,...,b. Where μ is the mean effect, α_i is the i^{th} chemical applications effect, β_j is the j^{th} period effect, and e_{ij} is the term of error (Montgomery, 2001). Duncan test were used for multiple comparisons.

Results

After chemical applications (35 days) and control application (7 days) in research colonies, the total number of dead varroa was determined. Efficacy of chemical and control applications on Varroa and bees in colony were determined and results are given with Table 1 and Table 2.

Table 1. Efficacy of chemical and control applications on Varroa in colony

Treatments	N	The number of dead Varroa after chemical applications ($\bar{X} \pm S_{\bar{X}}$)	Number of dead Varroa after Fluvalinate ($\bar{X} \pm S_{\bar{X}}$)	Efficacy (%)
Group *A (ABvarC)*	6	163.00±16.18	2.16±0.83	98.69
Group *B (Varostop)*	6	136.33±20.30	1.33±0.49	99.03
Group *C (Control)*	5	45.40±3.58	63.20±7.92	41.80

Table 2. Efficacy of chemical and control applications on bee in colony

Treatments	N	The number of fallen bees after chemical applications ($\bar{X} \pm S_{\bar{X}}$)	The number of fallen bees after Fluvalinate ($\bar{X} \pm S_{\bar{X}}$)	Efficacy (%)
Group *A (ABvarC)*	6	6.33±1.28	1.00 ±0.36	86.35
Group *B (Varostop)*	6	7.50±1.02	1.50±0.56	83.33
Group *C (Control)*	5	0.20±0.20	0.80±0.80	20.00

When Table 1 has been examined, Varostop (Group B) (99.03%) has the highest effect on dead Varroa. Difference between groups is statistically significant (P<0.05). When Table 2 has been examined, ABvarC (Group A) (86.35%) has the highest effect on dead bees. Difference between groups is statistically not significant (P>0.05).

Effects of chemical applications on colony population development were examined and results are given with Table 3, Table 4, Table 5 and Table 6.

Table 3. The number of adult bee population on frames (number/colony)

Treatments	N	Measurement Periods ($\bar{X}\pm S_{\bar{X}}$)			**($\bar{X}\pm S_{\bar{X}}$)**
		29.02.2016[c]	21.03.2016[b]	11.04.2016[a]	
Group *A* [ab]	6	4.00±0	5.83±0.47	7.16±0.47	**5.66±0.31**
Group *B* [a]	6	4.00±0	6.33±0.33	8.00±0.25	**6.11±0.19**
Group *C* [b]	5	4.00±0	4.80±0.48	6.20±0.66	**5.00±0.38**
($\bar{X}\pm S_{\bar{X}}$)		**4.00±0**	**5.65±0.42**	**7.12±0.46**	**5.59±0.29**

When the difference between the periods have been examined, it is seen that the best period is April 11 with an average of 7.12 ± 0.46 (P <0.05). When the difference between the groups have been examined, it is seen that the best group is Group B (Varostop) with an average of 6.11 ± 0.19 (P <0.05).

Table 4. The number of brood bee population on frames (number/colony)

Treatments	N	Measurement Periods ($\bar{X}\pm S_{\bar{X}}$)			**($\bar{X}\pm S_{\bar{X}}$)**
		29.02.2016[c]	21.03.2016[b]	11.04.2016[a]	
Group *A* [a]	6	2.00±0.00	3.66±0.55	5.66±0.66	**3.77±0.40**
Group *B* [a]	6	2.00±0.00	4.50±0.42	6.50±0.34	**4.33±0.25**
Group *C* [a]	5	2.00±0.00	3.20±0.58	6.00±0.70	**3.73±0.42**
($\bar{X}\pm S_{\bar{X}}$)		**2.00±0.00**	**3.78±0.51**	**6.05±0.56**	**3.94±0.35**

When the difference between the periods have been examined, it is seen that the best period is April 11 with an average of 6.05±0.56 (P <0.05). There is no difference between the groups statistically (P>0.05).

Table 5. The adult surface area (number/colony)

Treatments	N	Measurement Periods ($\bar{X}\pm S_{\bar{X}}$)			**$\bar{X}\pm S_{\bar{X}}$**
		29.02.2016[c]	21.03.2016[b]	11.04.2016[a]	
Group *A* [a]	6	7800.00±489.89	11329.17±695.71	14525.00±1412.66	**11218.00±866.08**
Group *B* [a]	6	6816.66±607.40	11841.66±740.20	16875.00±394.49	**11844.44±580.69**
Group *C* [a]	5	6500.00±1358.67	9360.00±1186.52	14820.00±1020.00	**10226.66±1188.39**
$\bar{X}\pm S_{\bar{X}}$		**7038.88±818.65**	**10843.61±874.14**	**15406.66±942.38**	**11096.38±878.39**

When the difference between the periods have been examined, it is seen that the best period is April 11 with an average of 15406.66±942.38 (P <0.05). There is no difference between the groups statistically (P>0.05).

Table 6. The brood surface area (number/colony)

Treatments	N	Measurement Periods ($\bar{X}\pm S_{\bar{X}}$)			**($\bar{X}\pm S_{\bar{X}}$)**
		29.02.2016 [c]	21.03.2016[b]	11.04.2016[a]	
Group *A* [b]	6	4137.5±179.55	6900.00±897.84	11200.00±1277.61	**7412.5±785.00**
Group *B* [a]	6	4825.00±469.35	9708.33±1030.87	21000.00±2722.00	**11844.44±1407.40**
Group *C* [b]	5	4530.00±596.15	6630.00±1468.80	13510.00±1621.21	**8223.33±1228.72**
$\bar{X}\pm S_{\bar{X}}$		**4497.5±415.01**	**7746.11±1132.50**	**15236.66±1873.60**	**9160.09±1140.37**

When the difference between the periods have been examined, it is seen that the best period is April 11 with an average of 15236.66±1873.60 (P <0.05). When the difference between the groups have been examined, it is seen that the best group is Group B (Varostop) with an average of 11844.44±1407.40 (P <0.05).

Conclusion

As a result of the research, the efficacy of ABvarC® and Varostop® against *V. destructor* were found to be 98.69 % and 99.03 % respectively (Kumova, 2001; Gregorc and Smodiš Škerl, 2007; Smodiš Škerl et al., 2011; Mahmood et al., 2012; Girişgin et al., 2016). The efficacy of ABvarC® and Varostop® against bees were found to be 86.35% and 83.3 % respectively. The efficiency of ABvarC® and Varostop against Varroa destructor had been found significantly (P<0.05). No queens were lost in any of the colonies during the experiment. The ABvarC® and Varostop were also proved very effective for Varroa control. Honey bee parasitic *Varroa destructor* against of ABvarC® and Varostop can be used of more effective be advised to be applied to beekeepers.

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In ovo injection of beta alanine: performance, meat quality and some blood parameters of broiler chicks

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Introduction

The continuous development of the poultry industry is the result of advances in scientific knowledge and technologies in the field of nutrition (Campos vd., 2012). Since productivity after incubation in poultry depends on the efficiency of production characteristics such as growth, development, meat yield and egg yield , the growth and development rate of the embryo, which is the determinant of these characteristics, should be optimal. The success of production in poultry (turkey, broiler, etc.) used for meat production depends on improving carcass yield and meat quality (appearance, texture, juiciness, taste and functionality). In poultry target, rate cuts years old maximize breast meat yield of breast meat is to become an important aspect of the poultry industry. This is possible by genetic selection, maternal feeding, incubation (*in ovo* nutrient injection) and post-operative procedures. However, with these methods, meat yield was maximized to a certain extent. For this reason, it is recommended that a feed should be made to reach the maximum potential of the performance of the birds in the pre-emergence embryonic period and in the early post-emergence period. (Sirsat, 2018). This has encouraged research into how effective *in-ovo* and / or post-emergence amino acid feeding can be in meeting the nutrient requirements of animals near or at the exit and reducing their negative effects from the exit window. Beta alanine (βA) is a component of carnosine dipeptide, the biosynthesis of which is determined by the presence of βA as a substrate. The concentration of carnosine in the tissue is highly dependent on the composition of the diet. The main source of carnosine and anserine for humans is especially poultry, beef and fish. It can be suggested that chicken meat containing these peptides can be useful and contribute to human health due to its various functions. Therefore, the present study includes the prevention of factors that may have a negative impact on animal production (fasting time resulting from effects such as exit window, transport, etc.) by interfering with the critical periods of development by adding βA *in ovo* or post-hatching in broiler chickens and consequently improving performance and meat quality.

Materials and methods

In this essay from a commercial company (C.P.) purchased 1000 and averaged 45.6 g with a weight of broiler chicks (Ross 308) egg and freshly incubation obtained from these chickens were used. For this purpose, 672 Ross 308 broiler chicks were randomly distributed to 4 treatment groups with 6 replications (14 female-14 male chicks per repetition). The experimental groups were incubated on the 17th day of incubation with *in ovo* saline injected eggs (PC), eggs without injection (NC), on the 17th day of incubation with eggs from *in ovo* βA injected (İOβA) and the eggs obtained from the standard incubation procedure. From the beginning of the first week, 1% βA supplementation (Yβ A) chicks were formed. BA (sigma alderich No. H8125 and A9920) purchased from the free market was used to add the *in ovo* βA solution and broiler chicks to the initial feed. Corn and soy weighted ration was used as feed material. Broiler chick feed between 0-3 weeks (22% CP and 3050kcal / kg ME), broiler chick feed (20% CP and 3200 kcal / kg ME) were used between 4-6 weeks. In the experiment, 10 g / kg βA was added to the Yβ A groups in the first 7 days after starting. The animals were weighed weekly until the slaughter age and their live weights were determined. In addition, feed consumption was calculated by weighing feed at the same time. Using both data, feed utilization ratios (FCR = feed consumption (g) / body weight gain (g)) were calculated. Crude ash, fat, protein and dry matter analysis of breast and thigh muscles were performed according to the relevant procedures of AOAC (1990).. pH measurements were performed in the breasts and thighs of each cleaned animal at approximately 45 minutes (Von Lengerken et al., 2002). The meat samples taken during the slaughtering were prepared by using the method of Fanatico et al. (2007) in the thigh and breast meat of the slaughtered animals. Centrifugation of the samples between 0.9 and 1.1 g in 1.5 ml ependof tubes with 1500 g force was carried out for 4 minutes and the water retention capacity of the meat was discarded. Blood (total oxidant activity (TOS), total antioxidant status (TAS), triglyceride, cholesterol, protein and glucose concentrations in each treatment group 6 (3 male, 3 female) on day 7 and 42 days into sterile heparinized tubes during the 10 ml of blood was collected. Blood samples were immediately isolated by centrifugation at 4000 rpm for 10 min at 10 ° C and stored at -20 ° C until the day of analysis. Measurements were performed in the form of service procurement and some of them were performed as recommended by the company.

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Results

Table 1 shows feed consumption and live weight and feed utilization rates of broilers used in the present study at different ages. According to these results, βA did not affect live weight and feed consumption as indicated by Tomanoga et al. However, Tomanoga et al (2006) reported that the effect of βA on live weight and feed consumption. This difference between studies may depend on the type and line of poultry used and the amount or dose of βA used. In the present study, pH, water holding capacity L, a *, b * and nutrient contents were investigated to determine meat quality in ITM and PM (Table 2). In the present study, while the pH value of ITM was not affected by the treatments (Table 2, P> 0.05), PM pH

was found to be higher than NC in İOβA and YβA groups (Table 2., P <0.05). No significant difference in water holding capacity between treatment groups with ITM and PM (Table 2, P> 0.05) Qi et al. (2018) and Kralik et al. (2014). DM, CP and Ash contents of thigh meat were increased with βA *in ovo* or feed. (Table 3, P <0.05). This confirms our hypothesis that βA will increase the nutritional value of chicken meat. The blood parameters of broilers fed with *in ovo* βA or βA supplemented feed at day 7 and 42 are presented in Table 4. Except for the amount of blood TAS at the age of slaughter, no other features were affected by the treatments (P> 0.05). Blood TAS levels were higher in the NC group than in the IOβA group (P <0.05). This is probably due to the increased concentration of carnosine, which has a strong antioxidant ability (Boldyrev et al., 2013).

Table 1. Feed consumption, live weight, feed efficiency and carcass yield of broiler chickens obtained from eggs (YβA) injected with *in ovo* saline (PC), without injection (NC), *in ovo* βA (İOβA) and treated with standard hatching process.

	Days	PC	NC	İoβA	YβA	MSE	*P value*
	7	174.51	179.45	178.20	177.23	1.018	0.369
FC	21	1315.7	1310.1	1317.4	1334.7	13.28	0.931
	42	4274.3	4264.6	4126.0	4187.1	52.36	0.763
	7	140.51	145.95	142.08	137.95	1.456	0.258
BW	21	748.54	745.92	767.53	734.75	12.531	0.862
	42	2397.4	2359.3	2347.7	2267.7	30.59	0.467
	7	1.24	1.23	1.25	1.28	0.012	0.466
FCR	21	1.76	1.78	1.72	1.82	0.042	0.887
	42	1.80	1.78	1.75	1.85	0.018	0.315

MSE: Mean standard error, FC; Feed consumption, BW;Body weight, FCR; Feed utilization rate.
a, b: There were differences between the means carrying different letters in the same line (P <0.05)

Table 2. pH, and color (CIELab) properties of ITM and PM of broiler chickens obtained from eggs (YβA) injected with *in ovo* saline (PC), without injection (NC), *in ovo* βA (İOβA) and treated with standard incubation.

		PC	NC	İoβA	YβA	MSE	*P value*
PM	pH	6.42ab	6.38b	6.52a	6.44a	0.031	0.014
	STK %	64.55	64.56	66.52	63.09	0.538	0.187
	L*	58.40ab	55.32b	58.60a	63.95a	0.927	0.001
	a*	3.01ab	4.18a	4.16a	1.78b	0.216	0.001
	b*	6.21	7.47	7.44	7.36	0.480	0.380
ITM	Ph	6.11	6.18	6.30	6.26	0.028	0.080
	STK	63.46	63.06	62.66	64.70	0.572	0.629
	L*	60.74b	57.64b	53.16b	67.79a	1.078	<0.001
	a*	0.99b	1.81ab	2.89a	0.50b	0.245	<0.001
	b*	5.40	4.93	6.80	6.31	0.281	0.369

MSE: Mean standard error, *ITM: Ilio Tibialis Muscle, PM: Pectoralis Muscle.*
a, b: Differences between the means carrying different letters on the same line are important (P <0.05).

Table 3. ITM and PM nutrient content of broiler chickens obtained from eggs (YβA) injected with *in ovo* saline (PC), without injection (NC), *in ovo* βA (İOβA) and treated with standard incubation.

		PC	NC	İoβA	YβA	MSE	*P value*
DM	PM	27.79	26.88	28.03	27.65	0.256	0.437
	ITM	28.29a	26.58b	29.33a	26.62b	0.302	0.001
Ash	PM	1.31	1.05	1.21	0.96	0.065	0.249
	ITM	1.20a	0.94b	1.19a	0.87b	0.043	0.005
CP	PM	24.82	24.55	25.38	25.11	0.258	0.713
	ITM	25.13a	23.37b	25.95a	23.80b	0.266	0.001
CF	PM	1.36	0.93	1.09	1.25	0.083	0.284
	ITM	1.63	1.97	1.80	1.59	0.128	0.728

MSE: Mean standard error, *ITM: Ilio Tibialis Muscle, PM: Pectoralis Muscle.*
a, b: Differences between the means carrying different letters on the same line are important (P <0.05).

Table 4. Blood parameters of broiler chickens obtained from eggs (YβA) injected with *in ovo* saline (PC), without

injection (NC), *in ovo* βA (İOβA) and treated with standard incubation.

	PC	NC	İoβA	YβA	MSE	*P value*
7. gün						
TAS, (µmol/l)	0.90	0.44	1.06	1.34	0.156	0.200
TOS, (µmol/l)	14.69	20.82	20.39	16.40	1.903	0.634
Glucose, mg/dL	232.33	219.20	216.00	209.16	9.171	0.853
Protein, mg/dL	2.36	2.66	1.86	2.51	0.152	0.290
Cholesterol, mg/dL	179.66	153.60	165.1	177.83	9.206	0.753
Trıglycerıde, mg/dL	56.00	51.00	44.16	56.33	2.519	0.332
42. gün						
TAS, (µmol/l)	1.04ab	0.81b	1.36a	1.24ab	0.080	0.045
TOS, (µmol/l)	8.13	11.77	9.57	8.97	0.818	0.417
Glucose, mg/dL	222.16	218.50	231.50	231.50	3.506	0.638
Protein, mg/dL	2.16	2.23	2.21	2.10	0.045	0.759
Cholesterol, mg/dL	98.00	111.50	99.33	102.83	3.309	0.497
Trıglycerıde, mg/dL	34.66	42.50	34.00	42.33	2.080	0.298

MSE: Mean standard error, *ITM: Ilio Tibialis Muscle, PM: Pectoralis Muscle.*
a, b: Differences between the means carrying different letters on the same line are important (P <0.05).

Conclusion

Addition of 1% βA to the initial feed *in ovo* or first week increased meat quality and blood TAS. Therefore, although the antioxidant properties of the muscle have not been determined, it can be said that the antioxidant capacity of the muscles may be increased by increasing the amount of TAS. Thus, it can be concluded that the shelf life of broiler meats subjected to βA feeding by *in ovo* or feed can be increased.The fact that the nutrient value of thigh meat increased significantly compared to the control group confirms our hypothesis that βA will increase the nutritional value of chicken meat.

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The Effects of Age and Storage Period on the Egg Quality Properties in Quail (Yellow Japanese Quail) (Coturnix Japonica)

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Introduction

The yellow feather color of Japanese quails (Coturnix Japonica), also known as jumbo or Italian quail (Coturnix Japonica), occurs in the case of homozygous dominance of the ASIP gene in mammals (Minvielle et al., 2007).ASIP is an important pigmentation gene responsible for dorsoventral and hair cycle-specific melanin-based color patterning in mammals (Nadeau et al., 2007). The aim of this study is to determine the effect of age and storage time on the internal and external quality characteristics of the yellow feather-colored Japanese quails.

Materials and Methods

The eggs as trial material were obtained from yellow feather-colored Japanese quails at 8, 12, 16, 20, 24, 28 and 32 weeks of age. Eggs were obtained in two days from a total of 100 female animals placed in 5 cage layers with 20 animals in each cage layer. External and internal quality characteristics for the eggs of 75 for each storage period (0, 7 and 14 days), 225 for each age period and totally 1575 for each age period (ages 8, 12, 16, 20, 24, 28, 32 weeks) were determined. The investigated properties were age-varying egg weight, weight loss rate during storage, shape index, white index, white weight, white ratio, yellow weight and yellow ratio, yellow index, haugh unit value, shell thickness, shell ratio, shell weight per unit surface area and number of pores.In this study, one-way analysis of variance was used to compare the effect of age (8, 12, 16, 20, 24, 28 and 32 weeks) and storage (control, 7 and 14 days) periods; and Duncan's multiple comparison test was used to compare the means.

Results

The relative weight loss rate during storage was 1. 63% for 7 days storage and 2.52% for 14 days storage, and this feature changed according to storage periods ($p < 0.001$). The effect of age on egg weight was significant ($p < 0.000$); at the beginning of the experiment (8th week), 11.67 g of egg weight was 12.15 g at the end of the experiment.

Table 1. Effect of Storage Time on Relative Weight Loss (%)

Storage Period (days)	N	$\overline{X} \pm S\overline{x}$	F	P
7	549	1.631 ± 0.018^{B}	1205.151	0.000
14	553	2.523 ± 0.018^{A}		

The difference between the means indicated by a, b is significant ($P < 0.000$).

The storage time ($p < 0.001$) and the effect of age ($p < 0.000$) on the percentage of white were significant. Interaction between storage time and age was also significant ($p < 0.000$). The percentage of white was 55.06%, 55.63% and 55.517% for the control, 7 and 14 day storage periods, respectively. The percentage of yellow was unaffected by storage time but varied by age. The interaction between age and storage time was significant ($p < 0.000$).The shell weight was affected by the storage time and this value, which was 1,190 g in the untreated control group, was 1.180 and 1.169 g in 7 and 14 days of storage, respectively. The effect of age on shell thickness was significant ($p < 0.05$), but the effect of storage time was insignificant ($p > 0.005$). Shell weight (mg / cm2) per unit surface area varied with storage time and animal age ($p < 0.000$). Animal age was effective on the number of pores ($p < 0.000$), whereas the effect of storage time was insignificant.

Conclusion

Information on egg quality characteristics is mostly based on results made with chicken eggs. Egg quality characteristics differ between species as well as between races within the same species and between individuals within the same race. This study, which aims to reveal the effect of animal age and storage times on some external internal quality characteristics in yellow quail eggs of yellow feather, will provide a basis for further studies.

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Determination of lactation milk yield characteristics and somatic cell counts in Awassi Sheep

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Introduction

Milk, which is rich in fat, lactose, protein, vitamins and minerals, contributes significantly to the growth and development periods of living things. In addition, milk contains almost all of the nutrients required for living things to survive, to ensure their development, to perform various vital functions, and to be able to eat well and balanced (Demirci et al. 1992; Esenbuğa 2000).

In the sheep, milk components vary depend on genotype, age, season, weather, lambing interval and time, type of birth, nutritional conditions and udder structure. On the other hand, in general milk components consist of 18.8% dry matter, 7.5% fat, 5.6% protein and 4.6% lactose (Yılmaz et al 2004; Park et al 2007). Nutritional and health value also determines the quality of milk. The quality of milk and dairy products has a significant impact on consumption preferences due to developing technology and increasing welfare levels. One of the evaluation criteria applied to determine that the milk is healthy and high quality is the Somatic Cell Number (SHS) in which the milk is contained (Yöney 1998).

Materials and methods

In this study 31 Awassi sheep breed at Food and Livestock Application and Research Center of Ataturk University were used. The birth season, which started in April, continued until May. About 2 months old lambs were weaned and all of flock started to pasture by June. In order to determine lactation milk yield characteristics, control milking was started after weaning lambs and continued until the end of pasture in 15-day intervals. Samples were taken and brought to Milk Analysis Laboratory of Department of Animal Science. The lactation duration was determined by drying off the sheep which were below 50 g milk yield per day.

Lactation milk yield was calculated using Trapez II (Dutch Method) used by the International Registry Commission (ICAR) (Yakan 2012). Milk was analysed by DeLaval DCC device for the measurement of somatic cell count (SCC).

The GLM procedure of the SPSS (2011) 20.0.0 package program was used for the analysis of variance of the milk yield characteristics and SCC. Differences between groups were determined by the Duncan Multiple Comparison test.

Results

The means of the lactation milk characteristics are given in Table 1. It has been determined that age is insignificant for lactation milk yield, lactation length and average daily milk yield for 2, 3, 4, 5 and 6 age. The values for the lactation characteristics for the Awassi breed were found lower than the results of Macit and Aksoy (1996), Esenbuğa (1995) and Özbey and Akcan (2000). It was determined that lactation milk yield and average daily milk yield were the higher than the results of Akçapınar (2011) and Türkyılmaz et al (2018).

Table 1. The least squares averages and standard errors belong to lactation characteristics and SCC

Sources	Lactation Milk Yield (kg)	Lactation length (day)	Average Daily Milk Yield (g)	SCC (cell*1000/ml)
General Average	55.14±6.87	132.50±5.90	394.23±36.41	219.48±53.27
Age	ns	ns	ns	*
2	31.06±6.88	132.25±15.17	227.19±32.16	172.17±40.23[b]
3	47.86±15.00	122.43±12.71	362.00±74.48	211.50±64.71[b]
4	60.75±20.87	134.00±25.53	435.42±83.79	473.83±267.97[a]
5	75.55±29.41	126.00±19.05	538.61±156.13	87.67±19.99[b]
6	57.51±8.27	140.83±9.12	398.27±41.68	174.67±42.86[b]

*: p<0.05; ns: non-significant; a, b: Mean values with different letters are significantly different at p<0.05.

In this study, the ratios of milk components were found fat 8.92, non-fat solid 9.49, density 29.11, protein 3.03, lactose 5.54, ash 0.92 and freezing point -0.74, respectively. The least square averages of milk components are not significant except for milk fat (p <0.01).. When the milk components were examined, the fat ratio was found higher than the the Ibrahem and Ibtisam (2016), Turkyilmaz et al. (2018), Özbey et al. (2000), Özbey and Akcan (2000).

The results obtained for the effect of pasture on all dairy components are similar with Çelik and Özdemir (2003) and Tsiplakou et al. (2006) and for protein is different from Kiper (2016) in terms of the effects of the age factor on all milk components.

SCC were found that for 2 ages 172.17+40.23 cell*1000/ml, for 3 age 211.50+64.71 cell*1000/ml, for 4 age 473.83+267.97 cell*1000/ml, for 5 age 87.67+19.99 cell*1000/ml and for 6 age 174.67+42.86 cell*1000/ml. These results show that the averages of least-squares and standard errors of the somatic cell counts about different age were significant (p <0.05). SCC obtained in this study was determined lower than the SCC values in milk reported by in sheep milk as 1.694.643 cells/ml and Huntley et al. (2012) in sheep milk as 5.454.000 cells/ml, less than 3.000.000 cells/ml in

Akkaraman sheep by Yağcı (2005), Othmane et al. (2002) and Baro et al. (1994) 749.000 and 2.254.060 in the Churra sheep respectively, Riggio et al. (2007) as 1.484.000 cells/ml in the Italian milk sheep, Gonzalo et al. (2002) in Churra sheep breed as 880.000 cells/ml.

Conclusion

In this study, it is thought that lactation period, lactation milk yield and average daily milk yield of Awassi sheep were lower than the expected value because of the rains above the seasonal norms of region on June, daily single milking and poor pasture composition.

The milk fat in sheep milk was generally determined above the literature. It is thought that milk production with high fat content may be more beneficial for producer due to the profitability and for consumer due to the rich nutrient content.

The hygiene standards of milk provided have an important place among health and quality measures. Literature studies on the detection of SCC in sheep are limited and the studies concentrate on cow milk and the quality standards have defined by limiting the SCC in the sheep milk. SCC studies are insufficient in sheep milk, so it is suggested that new studies must be done to resolve this shortcoming. .

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Relationship Between Placental Features and Birth Characteristics in Goats

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Introduction

The placenta is a structure that provides an exchange of nutrients and wastes between mother and fetus systems [1, 2]. Placental traits are used as an important indicator of postpartum death of offspring in animals [3]. Mellor and Stafford (2004) reported that postpartum survival of offspring was associated with placental growth and development during pregnancy. Sheep and goats, which have a polycotyledon in their placenta structure, have an exchange between mother and offspring circulatory system [3]. Therefore, nutrient exchange capacity between mother and offspring depends on the placental properties and the number of placentom [4]. Placental traits associated with a nutrient transfer capacity of the placenta play an important role in determining the prenatal growth capacity of the fetus, such as birth weight and postpartum viability [5, 6]. To determine the effects of some systemic environmental factors on placental characteristics and birth weight in goats.

Materials and methods

The study was carried out on 48-head Saanen goats with different age and parity. Birth weight and gender of kids were recorded within the first hour after birth. Naturally, it was allowed to discard the placenta and placentas were collected immediately after birth. Each placental weight was measured individually after the placental fluid was removed. Total cotyledon numbers (TCN) and total cotyledon weights (TCW) of cotyledons removed from chorioallantois were also determined. The cotyledon length (CL), depth (CDP) and width (CWIT) were measured with a digital caliper and a different size of cotyledons (small, <10 mm diameter; medium, 10-30 mm diameter; large> 30 mm diameter

Results

The lowest placental weight was 310 grams in Saanen goats and the highest value was found in goats giving triple with 592 grams. The effect of goat kid gender on placental efficiency was significant ($P < 0.01$). The effect of placental efficiency on the placental weight was found to be significant ($P < 0.01$). The length of cotyledon in goats varies from 35 to 46 mm, while the overall average is 41.17 mm. The effect of the type of birth was significant ($P < 0.01$) on the cotyledon length and depth, while the effect of parity and goat kid gender was insignificant. In Saanen goats, the total cotyledon surface area, total cotyledon number and weight were significant only ($P < 0.01$) and the effect of gender and parity was insignificant. Total cotyledon surface area, cotyledon number and weight of the average averages; 67.27 cm2, 66.76 units and 153.51 g. The covariance effect on the cotyledon characteristics of the live weight in the Saanen goats was not significant. Total birth weight, cotyledon number, weight and surface area were found to be positive and statistically significant ($P < 0.01$).

Conclusion

In the study, it was found that parity, birth type, and gender, especially parity had significant effect on placental and cotyledon traits. However, due to the feeding level of the animals giving birth to the first placenta may show different morphological traits.

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Effect of different pre-warming durations before incubation on hatching results of partridge and guinea fowl eggs

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Introduction

The embryo starts to develop before lay by starting gastrulation (Gonzales & Cesario, 2003). A small percent (<5%) of embryo development occurs in the body of hen. After laying, developing of embryo stops by the complete of zona pellucida (Fasenko et al., 2001a). According to storage conditions, embryo remains constant until the start of incubation. Fluctuations in storage conditions, particularly in temperature affect embryo development. When the temperature reaches 21 to 28ºC, which is called physiological zero, embryo development starts (Fasenko, 2007). The duration between the lay and incubation varies according to breeder flock size and incubation capacity. Therefore, the embryos could be at different stages at the onset of incubation. This affects hatching window. The quality of hatched chicks is also affected by the duration of hatching window.

Eggs are pre-warmed before incubation to set the level of embryonic development to same stage. With pre-warming, it is aimed to avoid abnormal embryonic growth and increased embryonic mortality (Renema et al., 2006). The effects of pre-warming were well discussed in broilers (Fasenko wt al., 2001), but there is lack in the studies investigating the results in different poultry species. Current study executed the effects of incubation pre-warming on hatching results of partridge and guinea fowl eggs.

Material and methods

The study was conducted at Ondokuz Mayis University Experimental Farm Hatchery. Two different experiments were performed at different times. In the first experiment and 600 partridge eggs and in the second one 550 guinea fowl eggs were obtained from the flocks of Turkish Ministry of Agriculture and Forest Yozgat Partridge Breeding Station. Both guinea fowl and partridge breeders were 1 year old at the time of egg collecting. In both experiments, eggs were stored for 5 days in storage machine at 18ºC and 70% relative humidity and transferred to hatchery. All eggs were individually numbered, weighed and randomly divided to four equal groups. Broken and cracked eggs were unclassified. The incubation machine was set to 28ºC and 60% relative humidity. First group of partridge eggs (122 eggs) were placed to machine and 8 hours of pre-warming was applied, after 2 hours second group (123 eggs) and after 4 hours third group (123 eggs) was placed to incubation machine and 6 and 4 hours of pre-warming was applied individually. Finally, control group was placed and incubation machine was set to 37.7 ºC and 60% relative humidity for 21 days and then transferred to hatching machine which was set to 37.5 ºC and 75% relative humidity. Hatching started at 23 days and completed at 25 days. All procedure was applied to guinea fowl eggs in the second experiment. The groups were consisted of 128 eggs. Incubation period for guinea fowl eggs was applied as 28 days. Eggs were kept in incubation machine for 24 days at 37.7 ºC and 60% relative humidity and transferred to hatching machine which was set to 37.5 ºC and 75% relative humidity. Hatching started at 25 days and completed at 27 days. In both experiment, all eggs were individually weighed before transfer to determine incubation weight loss. When incubation completed all unhatched eggs were broken to determine embryonic mortalities and unfertile eggs. Fertility, hatchability and incubation yield was calculated as follows:

$$\text{Fertility (\%)} = \frac{100 * \text{Number of fertile eggs}}{\text{Number of total eggs}}$$

$$\text{Hatchability(\%)} = \frac{100 * \text{Number of hatched chicks}}{\text{Number of fertile eggs}}$$

$$\text{Incubation yield (\%)} = \frac{100 * \text{Number of hatched chicks}}{\text{Number of total eggs}}$$

Spss software was used for analyze of data. Analyze of variance was used to determine the differences between groups.

Results

The results of Experiment I was given in Table 1. Mean egg weight of the partridge eggs was determined as 21.01 g. This is in line with previous results about the egg weight of partridges at one year old (Yamak, 2015). Domestic poultry and waterfowl eggs generally lose 11 to 15% of their initial weight during incubation (Davis and Ackerman, 1997), although weight loss averages for various species can range from 10 to 23% (Carey, 1986). Significant differences were found between the weight losses of groups ($P<0.01$). Highest weight loss (10.01%) was obtained in 8 hours pre-warmed group, whereas lowest weight loss was found in control group (7.87%). Adequate weight loss results with well-developed embryo and this affects the hatchability. Similar to weight loss rates, highest hatchability was found in 8 hours pre-warmed group (92.94%), whereas lowest weight loss was found in control group (73.31%).

Table 1. Hatching results of partridge eggs with different pre-warming durations.

Pre-warming duration	n	Mean egg weight (g)	Weight loss (%)	Fertility (%)	Hatchability (%)	Incubation yield (%)
0 hrs	122	21.22a	7.87c	77.05	73.31c	56.61b
4 hrs	123	21,08ab	8.69b	67.48	75.48bc	50.41b
6 hrs	123	21,07ab	8.59b	70.73	89.50ab	63.42ab
8 hrs	123	20,67b	10.01a	80.48	92.94a	74.80a
Total	491	21,01	8.79	73.94	82.81	61.31
P		0.042	0.001	0.300	0.03	0.03

Table 2 represents the hatching results of guinea fowl eggs. The mean egg weight was found as 41,95 g. Similarly, Kuzniacka et al., (2004) reported the mean egg weight to be around 40 g. Egg weight loss during incubation was same in all groups and around 12%. Similar to the results of partridge eggs, hatchability increased when pre-warming applied to eggs before incubation, but highest hatchability was calculated in 6 hours pre-warming group (84.38%).

Table 2. Hatching results of guinea fowl eggs with different pre-warming durations.

Pre-warming duration	n	Mean egg weight (g)	Weight loss (%)	Fertility (%)	Hatchability (%)	Incubation yield (%)
0 hrs	128	41,98	12,17	87,49a	69,60b	60,93
4 hrs	128	42,27	12,07	76,74ab	80,07ab	62,02
6 hrs	128	41,76	12,09	73,64b	84,38a	62,02
8 hrs	128	41,80	12,67	85,27a	78,23ab	66,67
Total	512	41.95	12,25	80,79	78,07	62,91
P		0.245	0.221	0.300	0.03	0.03

As a conclusion, pre-warming of eggs before incubation could increase the hatchability of eggs. Altough egg weight loss of guinea fowl eggs was not effected by pre-warming, partridge eggs had better weight loss rates in pre-warmed groups.

Acknowledgment
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The effect of pre-warming on hatching results of stored broiler breeder eggs

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Introduction

In broiler industry, storage is crucial and most of the eggs are stored for both market demand and to fulfil hatchery capacity (Lima et al., 2012). Storage conditions are very important to keep embryo alive. Storage temperature must be below 24 ºC which is determined as physiological zero to avoid embryo development (Rocha et al., 2013). Eggs are heated before incubation to set the level of embryonic development to same stage. With pre-warming, it is aimed to avoid abnormal embryonic growth and increased embryonic mortality (Renema et al., 2006). In different studies, eggs were pre-warmed before storage to increase hatchability (Elibol et al., 2000; Petek and Dikmen, 2006). In this study, eggs were pre-heated before and after storage. The results were analyzed according to egg weight to determine optimal heating duration for egg weight groups.

Material and Methods

Two different experiments were conducted at Ondokuz Mayis University Experimental Farm's Hatchery Unit. In both experiments, eggs were obtained from the broiler breeder flock at the farm. A total of 750 eggs were collected during two days. All eggs were numbered and individually weighed and classified as light (<66.3g), medium (66.4- 70.7 g) and heavy (>70.8). Eggs were stored at 15 ºC and 75% relative humidity for 7 days. After storage, eggs were divided to four groups, each group including light, medium and heavy egg groups. . First group of eggs were placed to machine and 8 hours of pre-warming was applied, after 2 hours second group and after 4 hours third group was placed to incubation machine and 6 and 4 hours of pre-warming was applied individually. Finally, control group was placed and incubation machine was set to 37.7 ºC and 60% relative humidity for 18 days and then transferred to hatching machine which was set to 37.5 ºC and 75% relative humidity. All eggs were individually weighed at transfer to determine egg weight losses.

In the second experiment, eggs were daily collected, weighed and stored for 5,7 and 10 days after pre-warmed for 6 and 8 hours. At the end of storage period eggs were placed to incubation machine. Conditions of both storage and incubation machines were same as the first experiment. At the end of incubation all unhatched eggs were broken to determine embryonic mortalities and unfertile eggs. Fertility, hatchability and incubation yield was calculated as follows:

$$\text{Fertility (\%)} = \frac{100 * \text{Number of fertile eggs}}{\text{Number of total eggs}}$$

$$\text{Hatchability(\%)} = \frac{100 * \text{Number of hatched chicks}}{\text{Number of fertile eggs}}$$

$$\text{Incubation yield (\%)} = \frac{100 * \text{Number of hatched chicks}}{\text{Number of total eggs}}$$

Spss software was used for analyze of data. Analyze of variance was used to determine the differences between groups.

Results

The mean egg weight, egg weight loss, fertility, hatchability and incubation yield of first experiment was given in Table 1. Egg weight loss was significantly affected by pre-warming duration and egg weight. Egg weight loss increased with parallel to pre-warming duration. Highest egg weight loss was calculated in 8 hours pre-warmed group. Also, heavier light eggs had higher egg weight loss rates ($P<0.01$). Hatchability was also significantly affected by pre-warming duration and egg weight. Pre-warmed groups had higher hatchability than control group. Also, heavier eggs had significantly lower hatchability.

In the second experiment, eggs were stored after pre-warming. The results are represented in Table 2. Egg weight loss was not affected by pre-warming, but to the first experiment light eggs had lost more weight ($P<0.01$). Hatchability was not significantly affected by pre-warming but, the control group relative had lower hatchability. In conclusion, in both cases, pre warming before or after storage could improve hatchability.

Table 1. Hatching results of breeder eggs pre-warmed after storage

Pre-warming duration (hours)	Egg weight group	n	Mean egg Weight (g)	Egg weight loss (%)	Fertility (%)	Hatchability (%)	Incubation yield (%)
	Light	35	63,17	8,48	97,22	94,19	91,67
0	Medium	33	68,56	8,38	91,67	75,91	69,44
	Heavy	35	72,87	8,14	97,22	71,47	69,44
	Light	66	62,57	9,23	94,32	94,00	88,59
4	Medium	66	68,00	9,21	94,20	89,29	84,18
	Heavy	66	72,05	8,33	95,65	81,30	78,26
	Light	67	61,46	9,60	95,71	84,98	81,34
6	Medium	65	67,42	9,68	92,87	87,74	81,40
	Heavy	67	71,56	9,80	95,71	86,56	82,85
	Light	70	59,29	10,85	100,0	95,71	95,71
8	Medium	66	66,72	11,10	94,32	84,85	80,19
	Heavy	69	71,03	10,06	98,61	75,35	74,28
	Effects						
PW			**	**	NS	*	NS
0			68,20a	8,33d	95,37	80,52b	76,85
4			67,54b	8,92c	94,73	88,20a	83,68
6			66,81c	9,69b	94,77	86,42ab	81,86
8			65,64d	10,66a	97,65	85,31ab	83,39
EWG			**	**	NS	**	**
Light			61,38c	9,70a	96,82	92,22	89,33a
Medium			67,55b	9,77a	93,27	84,45	78,80b
Heavy			71,74a	9,22b	96,80	78,67	76,21b
PWxEWG			**	*	NS	*	NS

PW: Pre-warming, EWG: Egg weight group, NS: Insignificant, *:P<0.05, **:P<0.01

Table 2. . Hatching results of breeder eggs pre-warmed before storage

Storage Duration (days)	Pre-warming duration (hours)	Egg weight group	n	Mean egg Weight (g)	Egg weight loss(%)	Fertility (%)	Hatchability (%)	Incubation yield (%)
5	0	Light	12	64.65	11,96	100	75,0	75,0
		Medium	37	68.66	11,97	97,44	77,78	76,28
		Heavy	31	73,98	11,97	99,14	84,24	84,24
	6	Light	80	63,31	12,19	97,48	91,07	88,74
		Medium	80	68,62	11,99	91,21	80,91	73,79
		Heavy	80	74,60	11,17	97,48	84,65	82,53
	8	Light	80	63,67	12,35	98,72	93,73	92,50
		Medium	80	68,60	11,87	94,97	88,13	83,71
		Heavy	80	73,68	11,82	93,68	85,59	80,00
7	0	Light	25	64,17	11,84	95,83	96,30	92,13
		Medium	28	68,36	12,03	100	89,26	89,25
		Heavy	27	74,62	11,29	92,59	91,53	85,19
	6	Light	75	63,36	11,84	97,33	93,06	90,67
		Medium	75	68,55	12,23	98,67	90,44	89,33
		Heavy	75	74,16	11,79	94,67	81,70	77,33
	8	Light	75	63,67	12,47	97,33	90,32	88,00
		Medium	75	68,80	11,89	93,33	91,67	85,33
		Heavy	75	73,95	11,81	93,33	89,85	84,00
10	0	Light	41	63,15	12,31	92,67	84,61	78,39
		Medium	26	68,14	12,40	92,59	100	92,59
		Heavy	43	75,10	11,84	93,02	74,72	69,52
	6	Light	80	63,18	13,22	96,20	74,26	71,32
		Medium	80	68,78	12,28	92,35	89,06	82,33
		Heavy	60	73,79	11,49	86,67	94,17	81,67
	8	Light	80	63,26	12,89	98,76	76,02	75,02
		Medium	80	68,86	12,56	96,15	87,81	84,81
		Heavy	60	73,58	11,79	95,0	91,12	86,67
Effects								
SD				**	*	NS	*	*
5				68,94a	11,91b	96,78	84,57b	81,87ab
7				68,81a	11,96b	95,90	90,46a	86,81a
10				68,29b	12,38a	93,71	85,76b	80,26b
PW				**	NS	NS	NS	NS
0				69,38a	11,97	96,02	85,94	82,51
6				68,55b	12,04	94,68	86,59	81,97
8				68,53b	12,17	95,70	88,25	84,45
EWG				**	**	NS	NS	NS
Light				63,45c	12,44a	97,15	86,04	83,53
Medium				68,65b	12,13b	95,19	88,34	84,16
Heavy				74,11a	11,65c	94,05	86,40	81,24
SDxPW				NS	NS	NS	NS	NS
SDxEWG				NS	NS	NS	**	*
PWxEWG				*	NS	NS	NS	NS
SDxPWxEWG				NS	NS	NS	**	NS

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Determination of milk production characteristics, phenotypic, genetic and environmental trends in Jersey cattle

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Introduction

Jersey breed has reared densely in Black Sea Region of Turkey. Most particularly, this breed had a high adaptability considerably under environmental conditions of central and eastern Black Sea region over time and therefore it was used by the region farmers for breeding purpose.

To date, various methods have been used to estimate genetic parameters of 305-d milk yield, and phenotypic, genetic and environmental trends in Turkey. Environmental trend was computed by the regression of differences obtained from successive yields of cows on calving years, whereas phenotypic trend was calculated by the regression of standardized yields of cows on calving year (Kaygisiz, 1996; Aydin et al., 1998; Musani and Mayer 1997). Afterwards, REML, DFREML and MTDFREML methods have been employed (Ahmad et al., 2001; Leitona and Zeledon, 2008; Rehman et al., 2008; Bakir and Kaygisiz, 2009; Cetin and Koc 2011; Missanjo et al., 2011; Katok and Yanar, 2012; Sahin et al., 2014, Demirguc, 2015; Selvi and Yanar, 2016). Nowadays, Wombat software developed based on REML procedure by Meyer (2011) have been used (Sahin 2012; Tekerli et al., 2014).

The aim of this study was to determine the effect of environmental factors on actual and 305-d milk yields of Jersey breed cattle reared at Karakoy State Farm and to estimate phenotypic, genetic and environmental trends in relation to 305-d milk yield.

Materials and methods

The study's material comprised milk yield records of Jersey breed cattle reared at Karakoy State Farm located in Black Sea region of Turkey between the years 2005-2014. In the present study, 704 lactation records of 215 cows belonging to 26 sires were evaluated. A Wombat software program was used to estimate heritability and breeding values for 305-d milk yield. To determine phenotypic, genetic and environmental trends SPSS software program was used.

Results

The effect of parity, season and year factors on lactation length, actual and 305-d milk yields were found significantly ($P<0,05$). Averages of lactation length, actual and 305-d milk yields of Jersey cattle were found as 310 ± 5 days, 4462 ± 90 kg and 4183 ± 70 kg, respectively. In the enterprise, phenotypic, genetic and environmental trends per year were estimated at 27, 18 and 10 kg, respectively. Heritability (h^2) of 305-d milk yield was 0.344.

The phenotypic trends were consistent with those reported by Palmer et al. (1972) and Musani and Mayer (1997). The genotypic trends estimate were higher than those reported by previous authors (Banga (1992) 0.81±0.16 kg, Njubi et al., (1993) 0.7 kg, Musani and Mayer (1997) 0.8 kg, Singh et al., (2003) 0.40 kg, Rehman et al., (2008) 0.896 kg, Leiton and Zeledon (2008) 7.95 kg and Sahin (2009) 5,90 kg). Environmental trends estimated from Jersey cows were in agreement with Musani and Mayer (1997) who found 14.6 kg/ year, but higher than those (-14.0 and 32.2 kg/ year) reported by Palmer et al. (1972) and Nijubi et al. (1993). The heritability estimates for 305-d milk yield trait were in agreement with those reported by several authors (Makuza et al., 2001, Sahin 2004;2009, Unalan and Cankaya 2010, 2012).

Conclusion

The overall results of this study reflected that a significant improvement was recorded in phenotypic, genetic and environmental trends for Jersey cattle reared in Karakoy State Farm located in Black Sea region of Turkey between the years 2005-2014. In the present study, the estimated positive phenotypic, genetic and environmental trends showed that the Karakoy State Farm had a good herd management. The enterprise has taken a significant task in elite cattle breeding and, especially in presenting elite cattle to farmers. Application of the available herd management should be sustained identically for many years, in accordance with phenotypic, genetic and environmental improvements provided by years.

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Study on Heat Shock Protein Concentration and Dairy Performances in Heat-stressed Goats

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Introduction

In tropical and subtropical area, dairy goat are frequently subjected to various stressful factors including such as nutritional, chemical, psychological and environmental stress. Environmental stress due to tremendous changes in climatic conditions which have negative effects on dairy goats' productivity (Agossou and Koluman, 2017; Agossou et al: 2019). The major environmental parameters affecting the thermo comfort of dairy goat are ambient temperature, relative humidity, intensity of solar radiation and wind. The changes in these climatic components alter the homeothermy balance of goats leading to physiological and cellular, molecular and hormonal changes (Agossou et al., 2017). This thermoregulatory responses implemented by animals exposed to adverse environment help to reduce and dissipate body heat (Darcan and Güney, 2008). One of the crucial aspect of cellular thermoregulation in goat is the activation and formation of heat shock proteins, which are molecular chaperons that maintain native conformation of proteins and cell viability during stress period (Kishore et al., 2016). This study aims to assess the relation between the concentration of heat shock protein and dairy performances in goats under hot environment.

Materials and Methods

The research was performed at the Dairy Goat Research Farm of Çukurova University located in the province of Adana. The trials was carried out from June to August using 65 Saanen and 73 Alpine crossbred goats. Experimental animals were housed in semi-opened barn and fed based on total mixed ration with 40% roughage and 60% concentrate feed (18% crude protein and 2500 kcal ME/kg DM). 5-8 ml of blood were collected from jugular vein into heparinized vacutainers tubes. Blood samples were centrifuged for 15 minutes at 1500 rpm and 210ul and serum samples were extracted into microtubes. The serum samples were analysed to determine the concentration of HSP70 and HSP60 levels using ELISA test kit (SunRed Biotechnology Co., Shanghai, China).

Milk yields were weekly recorded using an automatic milking system equipped with a graduated reader. Composite milk samples were monthly collected into plastic tubes of 50 ml, and taken to the laboratory for composition analysis. The automatic milk analyzer Milkoscan FT-120 (FT-120; Foss, Hillerød, Denmark) connected to a computer was used to assess the total solids, pH, protein and fat contents of the milk.

During the trials, the recorded meteorological data i.e. ambient temperature and relative humidity were used to calculate the temperature humidity index (THI) according to the following formula:

THI = db - (0.55 - 0.55 RH) (db - 58); db: the dry bulb temperature (Abdel-Samee, 1996).

Statistical analysis following the GLM procedures in the Statistical Analysis System (SAS V. 2004). Differences were tested with Duncan's Multiple Range Test at a level of 5%.

Results and Discussion

The average ambient temperature range between 28.7 ± 0.1oC and 34.9 ± 0.1oC. The highest THI (82.65) were recorded in afternoon. The thermal comfort zone of goat is reach when the THI is equal or less than 70 (Lu, 1989; Silanikove, 2000). In contrary, goat are subjected to severe heat stress when the THI higher than 78 induces distress (Silanikove, 2000). The current study showed that the THI were higher than 78. Consequently the goats were under severe thermal discomfort.

On the other hand the results indicated that HSP 60 and HSP 70 were 4.4 ± 0.42 and 8.7 ± 0.72 ng/ml, and 13.9 ± 0.36 and 18.34 ± 0.47 ng/ml for Alpine and Saanen goats respectively. In term of breeds, the results showed that the HSPs expressions in Alpine goats is significantly higher than Saanen goats. This may be due to the morphological and coat characteristics. Regarding the lactation performances, the daily milk yield in Saneen goats was significantly higher than Alpine (0.9±0.1 vs. 1.6±0.2 l/day). However, the percentage of total solid (12.1±0.53 vs.11.2 ±0.3%), solids not fat (8.2±0.21 vs. 7.9± 0.3%), Fat (3.9±0.48 vs. 3.1± 0.1%). Protein (3.4± 0.32 vs.3.2± 0.2%) were significantly higher in Alpine group than Saanen. Furthermore, there was relative negative correlation coefficient between HSP concentrations and milk yield.

Conclusion

The cellular thermoregulatory response directly expressed by an increasing activation and formation of HSP 60 and HSP 70 was demonstrated to be negatively correlated to lactation perofmances in the thermal stressed goats.

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The Investigation of Biogenic Amines Content of Animal by Products (Chicken Meal, Meat-Bone Meal, Blood Meal and Fish Meal) in Turkey

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Introduction

Biogenic amines are produced in the result of various metabolic activities of plants, animals and microorganisms, they are small molecule and toxic compounds which increase in amounts resulting from metabolic processes in plants, animals and microorganisms. Aliphatic, alicyclic and heterocyclic organic small-molecule organic bases (Erginkaya et al., 1989, Bardöcz, 1995, Turantaş et al., 1998).

This research was carried out to determine the level of biogenic amines in feed materials of animal origin (meat and bone meal, blood, chicken and fish meal). In the experiment not only biogenic amines (tryptamine, β-phenylethylamine, putrescine, cadaverine, histamine, tyramine, spermidine and spermine) as well as moisture, raw oil, raw protein levels and raw ash level were determined.

Materials and methods

Animal by products obtained from big poultry companies located different city of Turkey **(**Adana, Antep, İzmir, Çanakkale) and fish meal samples obtained from poultry companies and fish meal producer factories located north part of Turkey called Samsun and Sinop cities. Collected samples were 5 sample fish meal, 1 sample blood meal, 4 samples meat-bone meal, 4 samples chicken meal, totally 14 samples animal by product meals were used for biogenic amines determination. Each sample were replicated as 6 for extraction of per sample in laboratory. Biogen amines were determined by Shimadzu Prominence LC 20 AD (Japon) High-performance liquid chromatography (HPLC) instrument according to Eerola et al. (1993), method.

Results

The results of experiment showed that the biogenic amines level of animal by products that used as a protein source for feed mixture tryptamine were 0.10-0.63µg/g, β-phenylethylamine 0.04-0.13 µg/g, putrescine 0.805-2.001 µg/g, cadaverine 0.85-1.54 µg/g, histamine 0.05-0.15 µg/g, tyramine 0.45-0.89 µg/g, spermidine 0.11-0.30 µg/g, spermine 0.17-0.23 µg/g for bone-meat meal; tryptamine 0.11-0.96 µg/g, β-phenylethylamine 0.06-0.20 µg/g, putrescine 0.26-2.82 µg/g, cadaverine 1.06- 4.82 µg/g, histamine 0.06-0.27 µg/g, tyramine 0.76-2.45 µg/g, spermidine 0.23-0.36 µg/g, spermine 0.25-2.16 µg/g for chicken meal; tryptamine 0.44-3.30 µg/g, β-phenylethylamine 0.62-1.56 µg/g, putrescine 2.59-7.47 µg/g, cadaverine 8.95-20.98 µg/g, histamine 9.28-33.06 µg/g, tyramine 6.60-12.41 µg/g, spermidine 0.47-1.38 µg/g, spermine 1.03-3.42 µg/g for fish meal and putrescine 2.92 µg/g, cadaverine 2.11 µg/g, histamine 0.08 µg/g, tyramine 0.03 µg/g, spermidine 0.16 µg/g, spermine 1.20 µg/g for blood meal respectively.

Conclusion

There is only the toxic histamine levels of fish related regulation have been identified in Turkey and there is no any restrictions on the another feed stuff animal by products is based on the current value to toxic levels. The level of biogenic amines of fish meal was significantly higher than other investigated animal by products. However, this level is not close to toxic level even these levels could have positive effects on growth performance of chicken.

Acknowledgements

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Immune response and gut microflora of broiler chickens in response to use of monoglyceride and organic acids as an alternative to antibiotic growth promoters

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Introduction

Pathogenic organisms compete with host for nutrients and reduce absorption of fat due to bile acids de-conjugation which may lead to reduced growth performance of birds (Engberg et al., 2000). Organic acid mixture is more efficient than antibiotic growth promoter in improving broiler performance and decreasing intestinal E. coli and Salmonella and could be used as a replacement of antibiotic growth promoter in broiler diet (Hassan et al., 2010). FRA AC34® is a commercial product which is a combination of monoglycerides of butyric acid, propionic acid and essential oils. This study was planned to evaluate the effect of combination of monoglyceride and organic acids supplementation on immune response and gut microflora in broilers.

Materials and methods

Two hundred and fifty day-old broilers chicks were randomly divided into five treatments having 5 replicates of 10 birds. A basal diet (CP: 20%; ME: 3000 kcal/kg) was prepared to serve as negative control (NC). In positive control (PC), birds were fed basal diet supplemented with Enramycin at 300 g/ton; while in other three dietary treatments, birds were fed basal diet and offered FRA AC34® liquid at 1.5 (FRA1.5), 2.0 (FRA2.0) and 2.5 ml/liter (FRA2.5) in drinking water. For immune response, blood samples were collected from 2 birds each replicate at 19th and 35th day of age. Antibody titer against Infectious Bursal disease were evaluated. Anti-body titres against Infectious Bursal disease was evaluated by ELISA (Nakamura et al., 1994). Nutrient agar was used for total bacteria count. Rogosa agar for Lactobacilli count, and Rapid E. coli 2 agar and E. coli supplement were used to quantify Escherichia coli. The culture plates for Lactobacilli was incubated at 30° C in a microaerobic environment whereas those for total bacterial count, E. and coli at 37° C in an aerobic environment for 24 hours. The cfu in log10 per gram for each of these bacteria within digesta was counted on the basis of colony morphology and characteristics. The data collected during this experiment was analyzed using GLM procedure of SAS (2009) and means were compared using Tukey's Test.

Results

Lactobacillus count was higher ($P < 0.05$) in FRA1.5 number and least in those fed PC. Number of Lactobacillus bacteria were not different ($P > 0.05$) in those supplemented with FRA2.5 and NC. However, it was reduced ($P < 0.05$) in those offered FRA2.0 than those fed FRA1.5. Lactobacillus count was not different ($P > 0.05$) in those birds fed NC than those in PC. However, it was not different ($P > 0.05$) in NC and FRA2.5. Coliform bacteria were unaffected ($P < 0.05$) in birds fed diets all treatments. Total bacterial count was reduced ($P < 0.05$) in broilers offered FRA1.5 than those offered FRA2.5. Antibody titer against IBD at 19th and 35th day was not different ($P > 0.05$) in birds fed diets supplemented with or without antibiotic (Table 1).

Table 1. Effect of FRA AC34® on antibody titer and bacterial count of broilers

Parameters	NC	PC	FRA1.5	FRA2.0	FRA2.5
IBD (19^{th} d)	338.5	901.6	465.6	454.9	397
IBD (35^{th} d)	76.9	263.2	1	6.2	207.8
Lactobacillus	15.7^{bc}	8.9^{c}	30^{a}	19^{b}	22^{ab}
Coliform	7.5	7.7	7.1	3.5	2.3
Total bacterial count	1.92×106^{c}	1.94×108^{ab}	1.3×108^{b}	2.1×108^{ab}	3.1×108^{a}

$^{a-b}$ Means within a row with different superscripts are significantly different ($P < 0.05$).
NC = Negaive control, PC = Poisitive control, FRA1.5 = 1.5 ml/liter, FRA2.0 = 2.0 ml/liter, FRA2.5 = 2.5 ml/liter.

Conclusion Organic acids supplementation improved lactobacillus count, reduced total bacterial count, however, did not improve antibody titers against ND and IBD. Supplementation of butyric acid in broiler diet had positive effect on beneficial bacteria (Abdelqader and Al-Fataftah, 2016).

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Influence of environmental factors on milk yield in Scottish dairy cattle

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Introduction

Milk production and the duration of the lactation are influenced by both genetic and environmental factors (Da Glória et al., 2012). We investigated the effects of environmental factors on milk production dynamics in Scottish lactating dairy cows.

Materials and methods

Historical lactation records (n=217406) from 2010 to 2019 were obtained from a Lely Astronaut robotic milking system. The incomplete Wood gamma function was fitted to the milk yield records to model lactation curve parameters including initial milk yield (a), inclining slope parameter (b) and declining slope parameter (c), peak milk yield (Ymax) and days in milking (b/c), rate of decline after the peak yield over time (persistency (S)), and total milk yield (TMY). Statistical analyses were carried out on 125,460 daily records from 163 cows over 449 lactations. The preliminary analyses were conducted to identify the initial model with significant fixed effects that decribes the lactation curve. The best (lowest AIC) initial model included the 2-way interactions terms for *inclining slope parameter (b)* x *parity* (primiparous, multiparous) and *declining slope parameter (c)* x *parity*. Thereafter, a total of 288 possible models incorporating both the indoor (microclimate) and outdoor weather elements (daily minimum, average and maximum values of temperature, relative humidity and temperature-humidity index) were generated and Generalized Linear Mixed Modeling (NLME package) in R (R Core Team, 2018) in Rstudio (RStudio Team, 2016) was used to make the fits and estimate model parameters. Two final models for the indoor and outdoor parameters were selected based on the lowest AIC values. Both models had similar significant fixed covariates which were 2 three-way interaction terms *b* x *parity* (primiparous, multiparous) x *2 days lagged minimum temperature* and *c* x *parity* x *2 days lagged minimum temperature*; and two-way interaction of *b* x *parity*.

Results

Two-day lagged minimum temperature ranged from -2.6 to 19.6 °C and from -8.0 to 17.0 °C for the indoor (-2d.minTb) and outdoor (-2d.minT) data, respectively. Average daily milk yield and parameters b and c were influenced by -2d.minTb and -2d.minT depending on the parity. Greater b (β=0.319) was found in primiparous cows while the rate of increase prior to the peak yield was lower (β=0.291) for multiparous cows. In primiparous cows, increase in -2d.minTb from -2.6 to 19.6 °C was associated with an increase in the rate of 'b' and daily milk yield by 0.18%, however, the effect in multiparous cows was much lower (0.025%). A greater decline in average daily milk yield and c was also observed with increased -2d.minTb for primiparous than multiparous cows. Despite multiparous cows having the highest a, greater Ymax and earliest day of peak production, TMY and S were greatest in primiparous cows. Primiparous cows took longer to attain the peak yield (110 days) compared to multiparous (62 days).

Conclusion

Though the model estimates for both indoor and outdoor were different, a similar pattern of milk output and its dependence on environmental factors was observed for both primiparous and multiparous cows. Our results indicate that primiparous cows were most affected by the minimum temperature 2 days before the milk yield measurements were taken compared to the multiparous cows.

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Investigation of the effects of markers in LEP gene 2nd exon (E2JW, E2FB) and TG gene 5 'promoter region (C422T) on live weight and hot carcass weight of Turkish Holstein cattle in Edirne region

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Introduction

Live weight (LW) is the weighbridge weight of animals before slaughter. LW is affected by sources of genetic and environmental variation (Krupa *et al*., 2005). Thanks to DNA technology in cattle, many genes associated with LW and hot carcass weight (HCW) properties have been identified (Dekkers and Hospital, 2002; Shin and Chung, 2007; Carvalho *et al*., 2009; Widmann *et al*., 2013, Kök and Atalay 2018). Among these genes, bovine Leptin (LEP) and Thyoglobulin (TG) gene generally play an important role in meat quality and meat yield.

Materials and methods

In the study, SNP markers of LEP gene (E2JW, E2FB) and TG gene (C422T) were determined by PCR-RFLP method in 100 head Turkish Holstein cattle (THC) in Edirne Region. Capillary Electrophoresis method was used for genotyping of cattle. Whether there is a relationship between LW and HCW and SNP markers of sample cattle, also phenotypic correlation between LW and HCW is discussed.

Results

Two different genotypes (CT, TT) in LEP E2FB and three different genotypes (AA, AT, TT) in LEP E2JW were observed. TG C422T SNP was monomorphic (CC) in THC. The mean LW of LEP E2FB locus genotypes of THC (kg) was CT 512.14 ± 79.78 and TT 506.50 ± 85.97 and average HCW (kg) was 286.25 ± 45.89 and 281.00 ± 42.13, respectively. According to the LEP E2JW AA, AT and TT locus genotypes of our bovine samples, average LW (kg) was 499.76 ± 69.30, 527.55 ± 91.16 and 509 ± 71.81, respectively. In eddition to, averages of HCW (kg) as 78.48±41.35, 293.45±48.69 and 307.75±57.02, respectively were determined. While the highest LW was in LEP E2JW AT genotype, it was determined that the best HCW was LEP E2JW TT genotype of THC. It is defined that average LW of TG C422T TT genotype of THC was 512.16±79.39 and mean HCW (kg) 286.30±45.40.

Conclusion

According to CT and TT genotypes of LEP E2FB loci the relationship between LW and HCW mean of THC was statistically insignificant ($p > 0.05$). The phenotypic correlation between LW and HCW was 0.604 ($p < 0.001$). According to the LEP E2FB / LEP E2JW / TG C422T markers, it is recommended that cattle in the CT / TT / CC genotype be considered as breeder in order to increase the meat yield of THC by MAS method.

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Use of watermelon (Citrullus lanatus) seeds in diets for fattening lamb

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Introduction

Feed is a major input into all animal production schemes. Conventional animal feed resources, especially in developing counties, are becoming very expensive due to competition with human and exportation of these products. Utilization of non- conventional animals feed resources to supplement energy and protein in ruminants diets become a necessity. Watermelon is widely produced and consumed in Sudan. Watermelon seeds are the major solid waste (Bawa and Bains, 1977)[1]. The dry seed of watermelon has been reported to contain about 32 g of protein and 51.4 g of fat per 100 g sample (Kamel *et al.*, 1985) what make watermelon seeds a potential source of protein and lipids.. This study was conducted to evaluate effects of feeding different levels of whole watermelon seeds on lamb feedlot performance.

Materials and methods

Twent-nine 6-month old lams of Sudan desert sheep with an average weight of 33.8 Kg were used in this study. The lambs were randomly divided into three groups (n=9) and assigned into three iso-caloric and iso- nitrogenous treatment diets with different in levels of water melon seeds for 52 days. The diets were WS0, WS10 or WS20 contained 0% (control), 10% and 20% water melon seeds, respectively. Feed intake was determined daily as the difference between the amounts of feed offered and refusals. Lambs live weight was taken weekly until the end of feeding trail.

Results

The initial and final weight, weight gain, feed intake and feed conversion ratio are presented in Table 1. Final weight, daily live weight gain, total weight gain and feed intake were significantly higher in WS0 (control) and WS20 groups compared to WS10 group, with no significant differences between WS0 and WS20 groups. Feed conversion ratio was higher in WS10 compared to WS0. However in WS20 the difference was not significance when compared to WS0 or WS20.

Table 1: Feedlot performance of lambs different in levels of water melon seeds

Parameter	Treatment groups			Level of significance
	WS0 (n= 9)	WS10 (n= 9)	WS20 (n= 9)	
Initial weight (kg)	33.83	33.80	33.72	ns
Final weight (kg)	46.52^{a}	43.0^{b}	46.03^{a}	$p < 0.05$
Daily live weight gain (g)	249.64^{a}	188.21^{b}	236.39^{a}	$p < 0.05$
Total live weight gain (kg)	12.98^{a}	9.79^{b}	12.30^{a}	$p < 0.05$
Daily dry matter intake (kg)	1.69^{a}	1.51^{b}	1.70^{a}	$p < 0.05$
Total dry matter intake (kg)	87.88^{a}	78.52^{b}	88.40^{a}	$p < 0.05$
Feed conversion ratio	6.81^{b}	8.02^{a}	7.19^{ab}	$p < 0.05$

^{a,b,c} Means within columns with different superscript letters are different among treatments

ns: not significant.

Conclusion

The finding of this result demonstrated that whole watermelon seeds can be inclusion in lamb fattening diet and supporting satisfactory feed lot performance. Lamb fed diet contained 20% W watermelon seed had similar feedlot performance to that fed conventional fattening diet. However, in a similar study that used water melon cake used in lamb fattening by (Beshir *et al.*, 2009), they reported a significant linear decrease in feedlot parameters with increasing of water melon cake in lamb diets.

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Effects of forage: concentrate ratio on abnormal stereotypic behaviors in Turkish Saanen goat-kids

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Introduction

Abnormal stereotype behavior is defined as behaviors that are regularly repeated, exhibited as an example, and do not have a clear purpose (Odberg, 1978; Yurtman ve ark., 2002). It was determined that sheep exhibited abnormal oral stereotyped behaviors housed in individual pens and restricted in feeding regime (Cooper ve Jackson, 1996). In goat production, where intensive production systems have increased, rations with different forage:concentrate (F:C) ratio are applied during the growth period. In this study, abnormal stereotypic behaviors were determined in goat-kids by fed different F: C ratio.

Materials and methods

The study was conducted in three singles and 15 twins, in total of 18 female Turkish Saanen goat-kids aged between 90-100 days. The average initial weight of the goat-kids is 19.8±2.60 kg. The study was conducted for 5 weeks. The goat-kids were divided into 3 groups randomly according to live weight, type of birth, and dam age. Three groups with F: C ratios of 20:80 (actual F: C=19.6:80.4), 60:40 (actual F: C=57.5:42.5) and 80:20 (actual F: C=77.0:23.0) were formed. The goat-kids were housed in individual pens at 1.10 m width x 1.50 length m x 1.50 m height. The fencing of pens have a interval of 7 cm. Alfalfa and concentrated feed is given separately in combined feeders. Water is *adlibitum* presented in plastic buckets with a diameter of 30 cm and a height of 40 cm. The waterers were cleaned and the water was refreshed in evenng. Wood slatted (5 cm wide and 2 cm apart) floors were placed on the concrete floors. Daily feed amounts of goat-kids were determined by considering their live weight (NRC, 2007). Feeding took place between 07:30-08:30 in the morning and 16: 30-17: 30 in the evening. Direct behavior observations were conducted by 3 observers weekly for 5 weeks. Behavioral characteristics were observed in continuous observation and time sampling method with 10-minute intervals for a total of 8 hours. In the analysis of the data showing binomial distribution, generalized estimation equations (GEE) were used for repeated measurements. In the statistical models, group (20:80, 60:40, 80:20) and observation day (1, 2, 3, 4, 5) and interactions were included as fixed factors. WALD chi-square test was used in *post hoc* analysis. A linear model including group, observation day, observation hours (1,..,8), group x observation day was utilized in the repeated measurement variance analyses for all behavioral characteristics observed continuously. The square root $\left(\sqrt{(y+10)}\right)$ transformation was applied to provide the prerequisites for analysis of variance. Tukey test was utilized in the *post-hoc* analyses. The analyzes were carried out with the program package SAS (1999).

Results

The behavior of alfalfa consumption, concentrate consumption, standing, rumination and anormal stereotypic (bar-biting, crib-biting, drinker-biting, chain-chewing, wool-biting) behaviors differed significantly according to forage:concentrate (F: C) groups (Figure 1). Alfalfa consumption were higher in the groups with high roughage (P≤0.05). Concentrate consumption, standing, rumination and stereotypic behavior in the 20:80 group differed significantly from other groups (P≤0.05). Concentrate consumption, standing and stereotypic behavior were higher in 20:80 groups than in other groups, whereas alfalf consumption and rumination behaviore were lower in the 20:80 group.

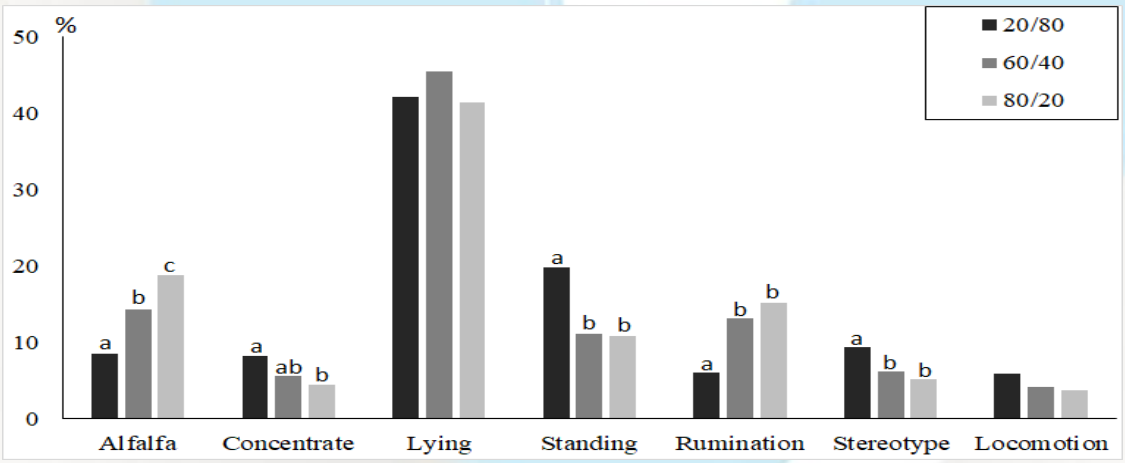

Figure 1. Observation ratio of some behaviors in goat-kids (Differences between means indicated with different letters for each behavior are significant, P≤0.05).

It was determined that bar-biting, crib-biting, drinker-biting, chain-chewing, interaction, scratching, rumination and

drinking behaviors differ significantly according to F: C groups (Table 1). The 20:80 group had higher frequency of other behaviors, except for drinking behavior than the 60:40 and 80:20 groups (P≤0.05). In drinking behavior, groups of 20:80 and 80:20 differed significantly. The observation day affected wool-biting, interaction and rumination behaviors, whereas group X observation day had no significant effects on behaviors.

Table 1. Means, standard errors ($\bar{x} \pm SE$) and P* values of some behaviors (times/kid/day) for F:C groups and other factors

Group	F:C=20:80	F:C=60:40	F:C=80:20	Group (G)	Observation Day (OD)	G x OD
Behavior	$\bar{x} \pm SE$	$\bar{x} \pm SE$	$\bar{x} \pm SE$	P	P	P
Bar-biting	14.53±2.69[a]	5.00±0.99[b]	5.06±0.90[b]	0.0001	0.3643	0.9168
Crib-biting	8.73±2.18[a]	3.43±0.59[b]	2.83±0.52[b]	0.0011	0.2430	0.2131
Drinker-biting	6.53±1.44[a]	3.56±0.67[b]	2.40±0.49[b]	0.0107	0.0707	0.7279
Floor-manipulation	10.10±1.17	14.46±1.76	13.10±2.18	0.2665	0.3255	0.9986
Chain-chewing	9.40±2.79[a]	0.86±0.37[b]	0.96±0.36[b]	0.0001	0.2710	0.2294
Wool-biting	1.36±0.42	2.36±0.71	1.63±0.64	0.4226	0.0022	0.3762
Bleating	5.43±1.90	5.23±1.39	7.70±2.35	0.6411	0.2658	0.5186
Pawing floor	1.33±0.42	0.83±0.32	1.73±0.93	0.5955	0.0556	0.1537
Interaction	5.10±1.23[a]	2.76±0.55[b]	2.63±0.58[b]	0.0638	0.0040	0.3129
Bipedal stance	17.76±2.48	18.00±2.21	16.33±1.46	0.9462	0.4755	0.1637
Lying	10.86±0.93	9.46±1.05	8.60±0.82	0.2325	0.3566	0.9763
Scratching	38.10±4.90[a]	33.76±3.42[a]	22.16±2.22[b]	0.0145	0.2119	0.9965
Rumination	13.10±1.68[a]	26.06±3.16[b]	28.26±2.96[b]	0.0001	0.0002	0.3868
Drinking	7.53±1.30[a]	5.00±0.48[ab]	4.36±0.68[b]	0.0561	0.9729	0.9688

* Square root $\left(\sqrt{(y+10)}\right)$ transformed data. Differences between means indicated with different letters in the same line for each behavior are significant (P≤0.05).

Conclusion

It has been observed that, forage deficiency has been found to significantly affect normal and abnormal behavior in growing goat-kids. The goat-kids in the 20:80 group exhibited concentrate consumption, standing, abnormal stereotypic behaviors (bar-biting, crib-biting, drinker-biting, chain-chewing) and scratching behavior significantly higher than 60:40 and 80: 20 groups. On the other hand, no significant differences were found between 60:40 and 80:20 groups. Similar to the present study, the increase in concentrate feed and decrease in rough feed in daily rations showed an increase in abnormal oral stereotypic behavior in lambs and heifers (Cooper et al., 1995; Redbo and Nordblad, 1997). Finally, it could be said that feeding with a high-concentration diet during the growth phase of goat-kids increase abnormal stereotypies, which can leads to negative well-being of the animals.

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The occupational accidents and preventions at sheep husbandry in Muş province

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Introduction The risk factors that the livestock workers faced vary according to the sector. In sheep-goat husbandry, the most important task in the care-feeding and management of animals falls into workers. Occupational Health and Safety (OHS) has significant economic implication particularly in terms of medical costs and economic productivity losses.
Sheep and goat breeding in Anatolia has been adapted to regional differences and has been characterized by the prominence of different applications (Aygün, 2017). It is true that more occupational health and safety intervention research focusing on preventing illness and injury needs to be conducted. Conducting this type of research is difficult and time-consuming; however, without increasing the number and methodological rigor of these studies, it will be difficult to identify effective intervention methods and confidently encourage their use (Goldenhar and Schulte, 1996). Animal production is associated with a variety of occupational illnesses and injuries.
This review concludes that more education about musculoskeletal disorders, general problems, zoonotic deseases and prevention is needed, and authorities serving rural communities are a critical link in providing this information. The work-related accidents encountered workers in the plateau have also been emphasized. This information has been prepared based on the personal observations and the experiences directly in the local area.

The place and importance of sheep breeding in Muş province Sheep husbandry is an industrial sector that they transforms the natural vegetation cover pasture and the pasture not used in the agriculture into the products such as meat, milk and, wool. There are breeds such as White Karaman, Red Karaman, Awassi, Dağlıç, Kıvırcık, and Karayaka among local sheep breeds of Turkey (İnan and Aygün, 2018). Small ruminant husbandry is indispensable and an important source of income for farmers in Muş province. Muş province is suitable for small ruminant breeding in terms of large pasture areas, water resources, and climate characteristics. It can be said that the province is rich in terms of underground and surface irrigation sources as well as a suitable land structure for the production of forage crops. Small ruminant husbandry is a major industrial sector in the Eastern Anatolia of Turkey and relies heavily on migrant and nomadic farm life.

The most common occupational accidents in sheep husbandry The hazard is anything that has the potential to harm. Hazard can affect the person, the material and the process. Also, hazards can cause accidents, diseases, loss of product, and machine damage etc. The occupational risk refers to the combination of the likelihood and severity of an injury or illness resulting from exposure to a hazard.
Workers who are away from social habitats and who work in the hills may be exposed to allergies or poisoning caused by the attack of various wild animals, such as bee or insect bites, as well as plants grown in the spring, pollen of fungi or various flowers. Employees are camels exposed to the sun because the work area is mostly open space. Therefore, excessive exposure to sunlight can cause dermatological problems.
Zoonosis is naturally called vertebrate animals to humans, and humans to animals to diseases or infections.
Other health and safety risks include skin problems, hearing loss, stress, and mental well-being issues particular to farming and the rural way of life. Occupational skin disorders are common in livestock workers. The effects of sun exposure are an important cause of morbidity in berivans and shepherds group .
Since livestock workers spend a great deal of time outdoors, they are at risk for physical stress from excessively cold and excessively hot environments. The magnitude of heat and cold stress problems in agriculture is not well documented. Tolerance to such environments varies among individuals and may be difficult to predict. Livestock workers should be provided the means to compensate for extremes of temperature. For example, adequate water supplies while working outdoors in hot climates are essential.
Berivans and shepherds' lung is one of many forms of *hypersensitivity pneumonitis*. This problem is becoming rare, which is likely due to the reduction of exposure to organic dust from the increasing mechanization of agriculture and the effect of livestock health and safety programs (Von Essen and McCurdy, 1998).
Another danger for berivans and shepherds is the waste of animals. Animal wastes are frequently stored underground and are a source of toxic gases. Entering confined spaces used for manure storage can lead to fatalities, which are often caused by hydrogen sulfide exposures (Von Essen and McCurdy, 1998).
Data on work injuries are not as readily available for berivans and shepherds in the nomadic small ruminant husbandry as for workers in other industries. Because it is difficult to keep such statistics. The number of farmers in the Turkey affected by pesticides is unknown. Little is known about the extent or magnitude of chronic health problems related to occupational exposure to pesticides. Although difficult, it is important to carry out further studies on the adverse health effects associated with pesticides among farm workers. Migrant farm workers have exposure to other hazards that may increase their risk of health problems: climate-dependent problems, such as heat stroke or cold shock, and occupationally caused infections such as anthrax, ascariasis, encephalitis, leptospirosis, rabies, salmonellosis, tetanus, and coccidioidomycosis. Sensory problems are common: eye problems, caused by irritation, infection, or injury from the wind, sun, dust or soil, agricultural chemicals, debris ejected from farm machinery, and allergic reactions to plants, and

hearing problems due to noise from farm machinery and cannery work.

Some suggestions and possible preventions It is extremely important that the breeders and the organizations engaged in animal husbandry have knowledge of occupational health and safety. The nature of nomadic small ruminant husbandry requires organization that is its own appropriate in accordance with local conditions for the occupational health and safety. These organizations should be units that are tried to be prevented by determining at the source of the danger. For this aim, the risks at work should firstly be determined. Then, solution suggestions should be presented to remove or minimize these risks.

Zoonotic diseases are one of the most important problems of berivans and shepherds in nomadic animal husbandry. Workers (berivans and shepherds) and animals must be vaccinated against various zoonotic diseases.

The rules of order and hygiene must be take into accounted during the milking and the shearing of the animals. Improved water supply should be combined with improved sanitation, special needs of berivans, and a separate toilet in each household to facilitate personal hygiene.

These approaches are necessary to obtain the cooperation of nomadic workers and their employers so that occupational exposures and protection as well as health consequences are accurately and completely ascertained. In addition, information about health effects should be obtained in a way that is not only culturally sensitive but also meaningful to study participants and yet comparable to that obtained through standardized instruments. Undertaking studies of occupational health risks in this population with these considerations will not only contribute to the understanding of such risks but can also further preventive efforts and lead to better health in this high-risk population. Effective prevention can reduce suffering and death and contribute to enhanced productivity in the workplace. In this way, both the employers and the employees gain (Aygün and Demir, 2015).

Taking precautions for occupational health and safety are very difficult, costly and time consuming. Among the difficulties is the varied nature of agriculture, the many ethnic groups engaged in the activities, the traditionalist view of farming families, and rapidly changing technology. Also, not all agricultural activities carry the same risk, and, as noted above, there are many special populations that must be considered.

Conclusion

There are many factors which limit the economic efficiency for production. One of them is production losses due to the workplace accidents and the occupational illness. The issue of occupational health and safety in animal production is very important as it is in many other areas. Occupational diseases and accidents that can be encountered by livestock workers at business have caused the losses of very serious economic and the qualify person in animal production (Aygün, 2015). In addition, the sustainability of production is negatively affected. The most common hazards at the animal production in Turkey are the zoonotic diseases, the ergonomics, the noise, the air conditioning, the chemicals, the animal attacks, the bites, the injuries, the accidents in transport, the psychological stress and, the skin-borne diseases etc. Especially, the animal hitting and the zoonotic diseases are very important in livestock husbandry. Therefore, the precautions related to the occupational health and safety must be taken for the workers at the livestock enterprises, the field, and the factories such as the feed, the skin, and the meat (Aygün et al., 2018). There are a number of characteristics of Turkish agriculture that need to be acknowledged for an effective occupational health and safety response to the farm injury or illness problem. In Turkey, preventive measures have started to be taken on occupational health and safety in livestock production.

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Investigation of full observation and missing observation in randomized block design

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Introduction

There are many design used in agricultural studies. Of these design, completely randomized design (CRD) is used mostly. In CRD, experimental material must be generally homogeneous. If the experimental material is not homogeneous, randomized block design (RBD) is used. There is no missing observation in experiment which is expressed as full observation. Missing observation consists of unexpected events occurring during the experiment. Sometimes, data may be lost in part of the study, some observations may be damaged in some blocks or error can be made when saving datas. In such cases, it is not right to discontinue the investigation or continue working without considering that unit. The only thing to do is to estimate the missing observation and then continue to study (Düzgüneş et al., 1987; Kayaalp and Polat, 2001; Çelik, 2012). The aim of this study was to compare the F test results and the relative efficiency both full observation and estimated missing observations in RBD.

Materials and methods

The milk yield of Alpin and Saanen dairy goat breeds were used as a material in Çukurova University, Faculty of Agriculture, Department of Animal Science, Research and Application Farm. Eight animals from two goat breeds were milked twice a day for 5 weeks in the morning and evening and milk yields were calculated separately. The average milk yields weekly are given in Table 1.

Table 1. The average milk yields weekly

Breed/Week	**1**	**2**	**3**	**4**	**5**	$\mathbf{Y_{i.}}$
Alpin	13.042	15.285	14.171	13.842	14.350	70.69
Saanen	15.592	15.642	16.428	16.657	16.042	80.361
$\mathbf{Y_{.j}}$	28.634	30.920	30.599	30.499	30.392	

The mathematical model of RBD is as follows.

$$Y_{ij}= \mu +\alpha_i + \beta_j + e_{ij} \quad i= 1 , 2, \ldots , t ; j=1, 2, \ldots , b \qquad (1)$$

Where:

μ: The mean effect,

α_i: The i^{th} treatment effect,

β_j: The j^{th} block effect, and

e_{ij}: The term of error (Montgomery, 2001).

Allan and Wishart (1930) developed method for the estimation of a single missing observation in RBD. Yates (1933) extended these method for several missing observations. The missing observation is found as follows.

$$\text{Missing Observation} = \frac{b.B+m.M-G}{(b-1)(m-1)} \qquad (2)$$

Where:

b: The number of block,

m:The number of treatment,

B: The sum of items in same block as missing observation,

M:The sum of items in same treatment as missing observation, and

G: The sum of all observations in that experimental (Bek and Efe, 1988).

The estimated relative efficiency (RE) of RBD vs. CRD is found as follows.

$$RE= \frac{(b-1)MS_B+b(m-1)MS_E}{(bm-1)MS_E} \qquad (3)$$

Where:

b: The number of block,

m: The number of treatment,

MS_B: The mean square of block, and

MS_E: The mean square of error (Düzgüneş et al., 1987).

Comparison between design is also provided by using follows the formula.

$$\frac{S^2_{RB}}{b} = \frac{S^2_{CR}}{n} \text{ or } n=b\frac{S^2_{CR}}{S^2_{RB}} \qquad (4)$$

Where:

$\frac{S^2_{CR}}{S^2_{RB}}$: The relative efficiency of the RBD,

S^2_{RB}: The RBD error variance,

S^2_{CR}: The CRD error variance (Düzgüneş et al., 1987; Çelik, 2012).

Results Variance analysis was performed full observation in RBD and the results are given in Table 2.

Table 2. ANOVA of data set with full observation

Source of variation	D.F.	S.S	M.S	F
Blocks	4	1.633	0.408	0.858
Treatments	1	9.353	9.353	19.69*
Error	4	1.902	0.475	
Total	9	12.888		

*: p<0.05

The blocks (weeks) were determined statistically not significant (p>0.05) and the treatments (goat breeds) statistically significant (p<0.05).

Relative efficiency of the RBD vs. CRD and n have been identified using Eq. (3) and Eq. (4).

RE = $\frac{(5-1)0.408+5(2-1)0.475}{(10-1)0.475}$ = 0.937.

n= 5(0.937) = 4.68.

Then, two observation were removed randomly. The average milk yields weekly with missing observation are given in Table 3.

Table 3. The average milk yields weekly

Breed/Week	1	2	3	4	5	$Y_{i.}$
Alpin	13.042	15.285	14.171	X	14.350	56.848
Saanen	15.592	Y	16.428	16.657	16.042	64.719
$Y_{.j}$	28.634	15.285	30.599	16.657	30.392	121.567=G_1

Firstly, Y is given an average value. $Y = \frac{\left(\frac{64,719}{4}\right)+\left(\frac{15,285}{1}\right)}{2}$ = 15.73

G =121.567+15.73= 137.297

$X_1 = \frac{5x16.657+2x56.848-137.297}{4}$ = 14.92

G=121.567+14.92=136.487

$Y_1 = \frac{(5x15.285)+(2x64.719)-(136.487)}{4}$ = 17.35

G = 121.567+17.35=138.917

$X_2 = \frac{(5x16.657)+(2x56.848)-(138.917)}{4}$ = 14.52

G = 121.567+14.52=136.087

$Y_2 = \frac{(5x15.285)+(2x64.719)-(136.087)}{4}$ = 17.45

G = 121.567+17.45=139.017

$X_3 = \frac{(5x16.657)+(2x56.848)-(139.017)}{4}$ = 14.50

G = 121.567+14.50=136.067

$Y_3 = \frac{(5x15.285)+(2x64.719)-(136.067)}{4}$ = 17.45

So, Y is fixed. Accordingly, these observation values were estimated as $\widehat{X}$=14.50 and $\widehat{Y}$= 17.45. Variance analysis was performed with estimated observation values in RBD and the results are given in Table 4.

Table 4. ANOVA of data set with estimated observation values

Source of variation	D.F.	S.S	M.S	F
Blocks	4	4.350	1.087	10.97
Treatments	1	11.657	11.657	117.74*
Error	2	0.198	0.099	
Total	7	16.205		

*: p<0.05

Since there are 2 missing observations, the degree of freedom of error is reduced by 2. The blocks (weeks) were determined statistically not significant (p>0.05) and the treatments (goat breeds) statistically significant (p<0.05).

Conclusion

The blocks (weeks) were determined statistically not significant ($p>0.05$) both full observation and estimated missing observations design. The mean square of block (0.408) was lower than the mean square of the error (0.475) for full observations. In addition, the relative efficiency of RBD vs. CRD was found to be less than 1 (0.937). n was found 4.68. In other words, if the experiment is carried out in CRD to achieve the same efficiency as RBD, there should be approximately 5 replicates. This means that the same amount of labor and expense will be made. For these reasons, it was decided that it would be more appropriate to carry out the experiment in CRD.

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Effects of Coriander Seed Oil Supplememtation to Diet on In-Vitro Gas Production and Rumen Fermentation Parameters

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Introduction

Methane produced by ruminants contributes to greenhouse gas production and global warming (IPCC, 2006). It has long been known that oil supplementation to ruminants' diets reduces enteric CH4 emissions (Czerkawski et al., 1975). Studies have shown that oils from different plants can alter acetic, propionic and butyric acid production and the number and variety of microorganisms in the rumen (Busquet et al., 2005; Kongmun et al., 2010). Feed additives are often used in studies to improve rumen fermentation and various combinations of feed raw materials are tried (Kongmun et al., 2010). Therefore, determining the gas production potential of coriander oil supplementation to the diet and also the potential of reducing methane production was determined in this study.

Materials and methods

In the study, the parameters were obtained as *in-vitro* incubation tecnique. The treatments were made by supplementation to basal ration (with a 60/40 roughage / concentrate ratio) at levels of 0, 5, 10, 15 and 20 mg / kg with coriander seed oils. Oil was obtained from commercially sold companies.

In the study, for *in-vitro* incubation four male goats with 2 years old (45-50 kg) cannulas were used as donor for rumen liquid. 400 ml of rumen liquid was taken from each animal before being fed in the morning, and then fermentation liquid was prepared by mixing with artificial spit 2: 1 by filtration through a 4-layer cheese screen (Menke et al. 1979). The rumen fluid was collected at 0, 4, 8, 12, and 24 hours of fermentation in order to determine the fermentation parameters in rumen during the study. The amounts of astringent, propionic and butyric acid were determined by using gas chromatograph. The data was analyzed by one way ANOVA by IBM SPSS statistics package program. The differences of means between groups were determine with Duncan's test. The significance level was %5.

Results

The effects of coriander oil supplementation to the diet at different levels on pH, GP, MP, OMD, ME, NEL and VFA are given in Table 1. When the results were examined, it was found that coriander oil supplemented to the diet did not affect pH, MP and VFA (P> 0.05), but gas production increased with the supplementation of oil and 20 mg/kg coriander to the diet significantly increased. While the percentage of methane production was not affected in the study, when total gas production was examined in mL, it was found that it increased with the supplementation of oil and significantly increased with the supplementation of 20 mg/kg coriander oil to the diet. Similar results were observed for OMD, ME and NEL.

Table 1. Effects of coriander oil supplementation to diet at different doses on gas production and rumen fermentation parameters.

	Coriander seed oil, mg/kg						
	0	5	10	15	20	SEM	P
pH	6.11	5.92	6.95	5.91	5.93	0.20	0.455
GP, mL/g DM	151.88^{b}	217.74^{ab}	180.11^{ab}	215.06^{ab}	221.77^{a}	8.84	0.027
MP, %	21.15	21.70	23.31	22.03	22.08	0.57	0.847
MP, mL	31.69^{b}	46.98^{ab}	42.05^{ab}	47.39^{ab}	49.05^{a}	2.13	0.041
OMD, mg/kg	403.8^{b}	507.4^{ab}	448.2^{ab}	503.1^{ab}	513.7^{a}	13.9	0.027
ME, Mcal/kg	6.09^{b}	7.76^{ab}	6.81^{ab}	7.69^{ab}	7.86^{a}	0.22	0.027
NEL, Mcal/kg	3.19^{b}	4.68^{ab}	3.85^{ab}	4.63^{ab}	4.78^{a}	0.20	0.025
Acetate, %	57.49	61.88	60.11	61.06	60.72	0.64	0.252
Propionate, %	22.68	18.70	20.05	21.15	22.07	0.51	0.078
Butyrate, %	19.83	19.42	19.85	17.80	17.21	0.63	0.600

SEM, standart error of means; P, level of significance; GP, gas production; MP, methane production; OMD, organic matter digestibilty; ME, metabolisable energy; NEL, net energy lactation

Conclusion

The use of oil in ruminant feeds is recommended especially for the reduction of methane production (Sejian et al., 2011). In addition, oils are supplemented in order to increase the diet energy concentration. However, due to the antimicrobial properties of the oil, the level is very important for ruminant diets. In this study, the aim was to suppress methane production. However, it was observed that oil supplementation do not affect methane production. Studies have reported that an oil-rich diet can be used to reduce methane production from rumen (Jalč et al. 2006). Oil supplementation, especially in dairy cattle diets, has been widely used to increase dietary energy content and to increase energy use required for milk production (Eugene et al., 2008; Chiquette et al., 2004). In a study, it was reported that oil supplementation to diet reduces and inhibits methane production, but these effects have been shown to vary according to the chain length of fatty acids and the composition of the basal diet (Eugene et al., 2008). Another study reported a significant reduction in

methane production when 10% coconut oil supplementation to the diet (Soliva et al., 2004). In the present study, it is seen that the oil supplementation to the diet affect rumen pH and gas production parameters. Although many factors affect the profile and amount of gas production in rumen, the presence of mainly cellulose structure and secondary metabolites are among the important factors (Babayemi et al., 2004). *In-vitro* gas production is known to be related to the presence and production of volatile fatty acids (VFAs) after substrate fermentation. Therefore, the gas production rate is also related to the ratio of substrate fermentation in the rumen (Blummel and Ørskov, 1993). In this study, the supplementation of coriander oil to the diet increased the total gas production. In a study, it was reported that black seed oil supplemented to wheat straw increased gas production, ME and OMD values (Yılmaz, 2009). However, in one study, it was reported that total gas production decreased with the supplementation of oil to the diet (Schauff et al., 1992). In ruminant diets, it has been reported that negative effects on the gas production and related digestion parameters are observed when the level in the diet is higher than 5% and above 8% in total (Boadi, 2004). In the present study, due to the fact that the oil content was less than 5%, the supplementation of oil to the diet (especially those with low unsaturated fatty acids) had a negative effect on gas production, but had positive effects.

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Effect of Solid State Fermentation With Whey on Nutrient Composition of Pomegranate Peel Supplemented Sunflower Meal

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Introduction

A balanced diet is one of the most important conditions for a healthy life. Animal products play an important role in fulfilling this requirement. Poultry products such as white meat and eggs have received more demand from other animal products because of their cheap and healthy nature. To meet this increasing demand, there has been an increased in a large number of poultry from year to year. Due to the increase in the number of poultry in our country, significant progress has been made in the compound feed production and feed industry. However, when raw material production performance is insufficient, raw material supply becomes difficult for compound feed (Battaloğlu 2007). Soybean meal, which forms the basis of plant protein sources in poultry, is mostly imported and high-cost feed group. Therefore, the use of other vegetable protein sources instead of soybean meal in poultry nutrition has been the subject of research. In this study, to increase the utilization possibilities of sunflower meal (SM), which is limited in poultry nutrition, it is aimed to improve the nutritional value by adding pomegranate peel (PP) to the SM by subjecting it to whey (W) and solid-state fermentation (SSF).

Materials and methods

In this study, it was aimed to determine the effect of solid-state fermentation (SSF) with whey (W) on the nutrient composition of pomegranate peel (PP) supplemented sunflower meal (SM). Experiment was conducted with six groups such as the first group SM + TW (tap water), the second group SM + W, the third group SM + W + 0.5% PP, the fourth group SM + W + 1% PP, the fifth group SM + W + 1.5% PP and the sixth group SM + W + 2% PP, respectively. The mixtures were prepared to complete 100 grams of sunflower meal with 0, 0,5, 1,0, 1,5 and 2,0 grams of pomegranate peel (PP), respectively. Each group consisted of eight replicates. Prepared mixtures were placed in 500 ml Erlenmeyer and 120 ml tap water was added to the mixing of the first group and 120 ml whey was added in other groups and then mixed homogeneously. Four of the Erlenmeyer prepared for each group without being fermented were dried at room temperature. The remaining Erlenmeyer was fermented at 32°C±2 for 48 hours. After fermentation, dry matter, crude protein, ether extract, crude ash, crude fiber, antioxidant activities, and yeast (Saccharomyces cerevisiae) numbers were determined in fermented and non-fermented feed samples.

Results

In the current study, crude protein and crude ash ratios of fermented feeds increased significantly and ether extract ratios decreased. It was observed that there was no change in the dry matter and the crude fiber content of the feed samples. The fermented sunflower meal had a significant increase in the yeast content and antioxidant activity (P <0.01). In this study, although the highest increase in crude protein content was achieved in SM + W + 0.5% PP group, SM + W + 1.5% PP had the lowest phytic acid content and highest antioxidant activity. It is concluded that the group is the most ideal in poultry feeding.

Table 1. Dry matter, crude protein, ether extract, crude ash, crude cellulose and antioxidant activities and yeast (*Saccharomyces cerevisiae*) numbers of fermented and non-fermented feeds after fermentation

GROUPS	Dry Matter %		Crude Ash %		Crude Protein %		Ether Extract %		Crude Fiber %		Antioxidant %DPPH		Yeast Numbers (k.o.b/g)	
	B.F	A.F	B.F	A.F	B.F	A.F	B.F	A.F	B.F	A.F	B.F	A.F	B.F	A.F
SM+TW	88,56	88,28	6,03	7,32	25,86	25,97	0,70	0,58	25,45	25,76	53,69	61,21*	4,77 x 10^3	5,72 x 10^{7**}
SM+W	88,75	87,77	7,24	7,48	26,09	27,83*	1,07	0,94	25,58	25,53	59,91	73,17*	6,00 x 10^3	6,52 x 10^{7**}
SM + W + 0.5% PP	88,48	86,99	6,60	7,07	25,59	30,57**	1,07	0,96	25,31	25,69	63,51	68,77	4,85 x 10^3	6,10 x 10^{7**}
SM + W + 1% PP	87,85	86,92	6,48	8,10**	26,16	26,98*	1,23	1,04	26,09	25,66	63,89	74,17**	5,02 x 10^3	6,19 x 10^{7**}
SM + W + 1.5% PP	88,79	89,50	6,41	7,97**	25,30	28,09*	1,15	0,89	25,14	25,62	66,21	86,54**	5,08 x 10^3	6,23 x 10^{7**}
SM + W + 2% PP	88,06	87,22	6,89	8,08**	25,97	27,23*	1,17	1,10	25,95	26,26	69,54	85,19**	5,23 x 10^3	6,12 x 10^{7**}
ASE	0,19	0,27	0,15	0,20	0,20	0,37	0,05	0,05	0,20	0,12	1,37	2,35	0,028	0,031
P	ns	*	**	ns	ns	**	*	*	ns	ns	**	**	ns	ns

A.F: After fermentation, B.F: Before fermentation SM: Sunflower meal TW: Tap water, W:Whey, PP: Pomegranate peel, ASE: Average standard error*: P<0.05, **: P<0.01 ns: Insignificant

Conclusion

The results obtained were found in parallel with previous studies. Depending on the fermentation in different feeds and different microorganisms; dry matter and crude fiber ratio, while there is no change in the current study, other studies have reported decreased dry matter and crude fiber rates as a result of fermentation (Baran 2017; Soltan et al. 2015 ve Hassaan et al. 2015; Safari et al. 2012). Crude ash, crude protein, yeast numbers, and antioxidant ratios in parallel with the current study of the Crude protein ratio due to the yeasts in the environment, whey and yeast due to the presence of crude ash ratio, pomegranate peel content due to the antioxidant content has been reported to increase. (Soltan et al. 2015; Hassaan et al. 2015; Baran 2017; Yaşar 2014; Rashad et al. 2011; Shi et al. 2017; Uysal 2017; Frias et al. 2008; Aggelopoulus et al. 2014; Martins et al. 2011; Tapati and Kuhad 2014; Tosun 2017; Bhanja and Kuhad 2014). It has been reported that there has been a decrease in ether extract values similar to the current study. (Rashad et al. 2011; Iluyemi et al. 2006; Lateef et al. 2008; Shi et al. 2017; Soltan et al. 2015; Uysal 2017). Consequently, it was found that the crude protein content and antioxidant activity of the fermented sunflower seed meal by joining pomegranate peel increased. As can be seen from the above-mentioned findings, sunflower seed has been given functional properties.

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Physiological Adaptation Associated with Expressions of Heat Shock Protein (70 and 60) in Dairy Goats

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Introduction

The adaptation mechanism of goats to the thermal stress includes behavioural, physiological, biochemical, hormonal, cellular and morphological responses. The exposure of cells to thermal stimuli leads to the activation and formation of heat shock proteins (HSPs) by genes. HSPs are molecular chaperons that maintain native conformation of proteins and cell viability during stress period (Kishore et al., 2016). They protect cells, tissues, and organs from stress by helping protein folding (assembly and refolding) in endoplasmic reticulum (Gade et al., 2010; Jee, 2016). HSPs' expression acts as a potential indicator of animal thermo-tolerance ability (Kishore et al., 2016). This study was undertaken to investigate the HSPs (60 and 70) expression and physiological parameters of heat-stressed goats.

Materials and Methods

This study was carried out at the Dairy Goat Research Farm of Cukurova University located in the province of Adana which is characterized by mild and wet winters and hot and dry summers. This study involved 160 goats of 18 months old: Saanen (n= 65), Alpine (n= 73) housed in semi-opened pens and fed on forage (oats and alfalfa hay), corn silage and 500g concentrate feed (18% crude protein and 2500 kcal ME/kg DM). The experiments were carried out in winter (January) and summer (July). Serum samples were obtained from 5-8 ml of blood samples were collected from jugular vein into heparinized vacutainers tubes. Blood samples were centrifuged for 15 minutes at 1500 rpm and 210ul of serum were taken into labelled microtubes and stored at –20°C. Serum HSP70 and HSP60 levels were assayed using ELISA test kit (SunRed Biotechnology Co., Shanghai, China).

Physiological data including rectal temperature (RT), respiration rate (RR) and pulse rate (PR) were recorded in the morning at (07:00-08:00) and afternoon (13:00-14:00). During the trials, the daily environmental data i.e. ambient temperature and relative humidity were recorded. The temperature humidity index (THI) according to the following formula:

THI = db - (0.55 - 0.55 RH) (db - 58); db: the dry bulb temperature (Abdel-Samee, 1996).

HSPs levels and physiological data were statistically analysed following the GLM procedures in the Statistical Analysis System (SAS V. 2004). Differences were tested with Duncan's Multiple Range Test at a level of 5% or 1%.

Results and Discussion

During trials, the average recorded THI were 55.09 and 80.81 in winter and summer respectively. The results indicated that experimental does were subjected to severe thermal stress in summer. Heat stress results into thermoregulatory misbalance which is manifested by the alterations of physiological parameters. In winter and summer, the RT in all breeds groups were significantly ($P< 0.05$) lower in morning ($35.1 \pm 0.25^{o}C$ vs. $36.2 \pm 0.13^{o}C$) when compared to the recorded value in afternoon ($37.6 \pm 0.12^{o}C$ vs. $40.7 \pm 0.3^{o}C$). In the current study, the PR ranged between 104.9 ± 2.27 and 111.9 ± 2.07 bpm, while RR varied between 67.1 ± 2.5 and 100.7 ± 3.17 breaths/minutes. Similar results were reported through literature (Darcan et al., 2007; Darcan and Güney, 2008; Patbandha et al., 2018; Agossou et al., 2019). The increase of ambient temperature during the day causes environmental stress and an increase of RT. In addition, the results indicated that goats had significantly ($P<0.05$) lower RR and PR in the morning. Animal exposed to thermal stress increase their respiratory magnitude and heart rate to loss heat by evaporation. This thermoregulatory mechanism helps to maintain homeothermy and avoid increased rectal temperature.

The serum concentration of HSP60 (11.1 ± 0.85 vs. 6.7 ± 0.62 ng/ml) and HSP70 (21.6 ± 0.76 vs.20.9 ± 0.53) were significantly higher ($P < 0.05$) in all breed groups during summer season when compared to winter. In addition, a positive and significant correlation was observed between THI, RT, PR, RR and HSP concentration. The current findings were in accordance with previous investigations (Kishore et al., 2016; Archana et al., 2017). High levels of HSP 60 and 70 were reported as indicator of thermo-tolerance in animals subjected to thermal stress and water deprivation.

Conclusion

In heat stressed dairy goats, the changes of environmental conditions associated with high ambient temperature lead to thermal stress. This negatively alters physiological state of goats causing an increase of RR, RT and PR and plasma level of HSPs. This thermoregulatory mechanism set by animal under hot environment contributes to maintain balanced homeothermy.

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The Expression of IL-1β gene In Response to Mannheimia haemolytica Bacteria in Sheep Alveolar Macrophages in vitro

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Introduction

Small ruminants, particularly sheep, are suffering from many respiratory diseases. Among the causative agents of respiratory diseases, the most important microorganisms are *Mannheimia haemolytica*. In the case of a most severe form of infection which is commonly known as the severe fibrinous pleuropneumonia characterized by fibrin deposition and merging, intra-alveolar hemorrhage, forceful leukocyte infiltration in alveoli of the lungs**.** Being a Gram-negative bacterium, *Mannheimia haemolytica* is causing respiratory diseases in animals and pneumonia which is the must dangers diseases that make a great economic loss. The sheep immune system is responsible for the detection, capturing and elimination of foreign bodies including bacteria. However, there are no substantial studies explaining the molecular mechanism of respiratory diseases and immune system response in sheep lung. Therefore, this study was conducted to investigate the expression pattern of *IL-1β*, one of the important genes in immune system, to understand the molecular mechanism underlying in *M. haemolytica* induced infection in sheep lung.

Materials and Methods

In this study, lungs form a local Turkish breed (Akkaraman) were collected from the slaughterhouse and the alveolar macrophages (AMs) were isolated according to the established protocol. The isolated bronchoalveolar lavage (BAL) cells were cultured for 4 hours and allowed the macrophages to attach with the floor. After that, the cells were washed to remove non-adherent cells. In this way, it is possible to obtain 90-95% pure alveolar macrophages. Three different doses of *M. haemolytica* were used (T0: control, T1: 1800, T2: 2700, T3: 5400 bacterial units approximately) for two different time points (4 and 24 h), then RNA was extracted, and the cDNA was synthesized. Finally, by using the real-time PCR, we investigated the expression levels of *IL-1β* as it is known to be highly involved in the pathways related to the innate immunity. GAPDH was used as the reference gene.

Result

We have collected a good number of AM cells from three lungs for our experiment. The cell culture picture indicated that the cells were in a good health and morphology before the treatment started. However, upon the exposure of *M. haemolytica*, we observed a lower trend of viability of the AM cells. The expression analysis of *IL-1β* gene revealed that the expression of this gene was higher in all treatment groups compared to control. However, treatment with 5400 bacterial unit in T3 group resulted in a significantly higher expression of *IL-1β* compared to other groups. In addition, it is important to note that T1 treatment at 4h experiment showed higher gene expression compared to 24h experiment, whereas T2 and T3 treatments presented higher gene expression of *IL-1β* in 24-h.

Discussion

Our study revealed for the first time that the exposure to *M. haemolytica* stimulates the immune response in the sheep alveolar macrophages in a time and dose-dependent manner. *In vitro* study: In 4 h trial, the exposure of AMs to *M. haemolytica* treatments resulted in a higher mRNA expression of *IL-1β* compared to 24 h trial, whereas T2 and T3 treatments presented higher gene expression of *IL-1β* in 24-h. The result of this study indicates there is a strong correlation between the expression of immune-related genes and the exposure to the M. haemolytica toxins or live bacteria which completely agrees with our results (U. N. Alhaji, J. Rivera, D. N. Atapattu, K. Owusu-ofori, and C. J. Czuprynski, 2015).

Conclusion

M. haemolytica causes pneumonia in all ruminants including sheep which is one of the most important causes of economic losses in the livestock industry. Our study clearly demonstrated that stimulation of alveolar macrophages with M. haemolytica Bacteria in in vitro for 4 h treatment significantly increase the expression of *IL-1β* compared to 24 h treatment Akkaraman lambs, this was clear from the high and significant mRNA expression levels of *IL-1β* presented in Akkaraman lambs in response to all treatments compared with control after 4 h and 24 h of treatments.

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Milk Yield and Composition of Lactating Kalahari Red Does Fed Moringa Oleifera Leaf Meal-Based Concentrates in Dry Season

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Introduction

Local milk production has consistently fallen short of demand especially in urban centres during dry seasons leading to massive importation of milk and milk products (Adewumi and Olorunisomo, 2009). Kalahari Red goats are not indigenous to Nigeria but have outstanding qualities of producing good milk sufficient for twins and triplets. Moringa leaves have also been shown to increase milk production (Estrella *et al*., 2000). Moreover, there is little or no study on milk yield and composition of this breed of goat since imported into Nigeria. Therefore, this work was designed to determine the milk yield and composition of Kalahari red goats so as to know its milking ability and its nutritional value in the dry season when fed with MOLM-based concentrates in dry season.

Materials and method

The harvested Moringa leaves (Nigerian ecotype) were air-dried and then hand-milled to obtain a product herein referred to as *Moringa oleifera* leaf meal (MOLM). A total of twenty (20) 2-year old lactating Kalahari Red does weighing 39.16±0.56 were used in the experiment for a duration of 98 days (14 days of adjustment period, 84 days for data collection). Newly born twenty seven (27) kids were allowed to suckle their dams freely for the first 20 days post-partum in order to have access to colostrum and good quantity of milk before commencement of the experiment. Prior to each day's milking, kids were separated from their dams for three hours (8:00 to 11:00 hours). The extractable 3-hour milk yield was measured using a measuring cylinder. Milk yield per day was determined by multiplying the 3 hour milk yield by 8. Milk secretion rate was obtained on hourly basis by dividing the 3-hour milk yield by 3. Milk composition was carried out in the Animal Physiology Laboratory, Federal University of Agriculture, Abeokuta. All data collected from parameters investigated were based on Completely Randomized Design and subjected to one way analysis of variance using the procedure of statistical analysis software SAS 9.1 (SAS, 2003) and treatment means were compared using Duncan's procedure of the same software. The statistical model focused primarily on inclusion level effect as the main treatment. The following model was thus used: $Y_{ij} = \mu + M_J + e_{ij}$; where Y_{ij} is the dependent, continuous variable; μ is the overall mean; M_j is the fixed effect of the *j*th postpartum inclusion of air-dried *Moringa oleifera* leaf meal (j = 0%, 5%, 10% 15%) and e_{ij} is the residual error.

Results

Table 1 shows the weekly milk yield (ml) of lactating Kalahari Red does fed *Moringa oleifera* leaf meal-based concentrates. Higher milk yield was observed in week 3 with 10 % *Moringa oleifera* leaf meal inclusion level compared with others and control. Also, Higher milk yield was observed on week 5 for 10 % MOLM (1002.00 ml) while 15%, 0% and 5 % had 793.60 ml, 725.33 ml and 635.20 ml respectively. Table 2 shows the effects of *Moringa oleifera* leaf meal-based concentrates on milk composition of lactating Kalahari Red does .Total solid, moisture, fat, protein, casein and whey were significantly ($p < 0.05$) influenced by the substitution levels of MOLM. As the level of MOLM increased, mean values recorded for fat also increased. Lactating does fed control diet recorded the highest solid non-fat content (10.95 %). The percentage of protein content was highest in group fed 10 % MOLM.

Table 1: Weekly milk yield (ml) of lactating Kalahari Red does fed *Moringa oleifera* leaf meal-based concentrates

	***Moringa oleifera* leaf meal inclusion level**				
Weeks	**0 %**	**5 %**	**10 %**	**15 %**	**SEM**
3	491.88^{b}	541.07^{a}	543.36^{a}	462.04^{c}	8.76
4	425.33	441.60	718.00	505.60	49.24
5	725.33	635.20	1002.00	793.60	89.90
6	631.96^{b}	780.33^{a}	862.51^{a}	516.00^{c}	33.87
7	650.67	689.60	1000.00	484.80	83.97
8	380.80^{b}	387.20^{b}	758.00^{a}	296.00^{b}	62.69
9	600.00	443.20	604.00	518.40	63.14
10	464.00	406.40	474.00	356.80	58.38
11	385.60	281.60	298.66	296.00	42.59
12	252.80	374.40	362.66	280.00	41.04
13	284.00	289.60	312.00	332.00	43.06
14	279.00	307.20	324.66	319.00	41.76

^{a,b,c} means in the same row with different superscripts differ significantly ($p < 0.05$)

Table 2: Effects of *Moringa oleifera* leaf meal-based concentrates on milk composition of lactating Kalahari Red does

Parameters %	*Moringa oleifera* leaf meal inclusion level				SEM
	0 %	5 %	10 %	15 %	
Total Solid	14.48^{bc}	16.09^{ab}	16.60^{a}	14.02^{c}	0.33
Moisture	85.51^{ab}	83.9^{bc}	83.39^{c}	85.97^{a}	0.33
Fat	4.16^{b}	5.14^{ab}	6.14^{a}	4.41^{b}	0.19
Solid-Non-Fat	10.32	10.95	10.46	9.64	0.25
Titrable Acidity	1.41	1.40	1.43	1.55	0.06
Lactose	2.82	3.38	3.17	2.48	0.32
Protein	3.10^{c}	3.93^{b}	4.64^{a}	3.47^{bc}	0.13
Casein	2.52^{c}	3.19^{b}	3.77 ^{a}	2.81^{bc}	0.10
Whey	0.58^{c}	0.74^{b}	0.87 ^{a}	0.65^{bc}	0.02
Ash	4.65	3.91	3.89	4.82	0.22

^{a,b} means in the same row with different superscripts differ significantly ($p < 0.05$)

Conclusion

According to Sarwatt *et al.* (2004), Moringa improved the milk yield due to a positive effect on the rumen environment, leading to increased rumen microbial output, and that the protein in Moringa also has good rumen bypass characteristics. High milk yields can be achieved during the dry season with Moringa supplement. MOLM has been reported to increase daily milk yield (Sarwatt *et al.*, 2004; Reyes-Sánchez *et al.*, 2006b) which was the highest in 10 % inclusion level when compared to others. MOLM at 10 % inclusion level elicited about 30.30 % more milk yield than the control. Moringa was readily accepted by the animals and did not seem to have any toxic effect or contain any factor limiting its intake. The findings are similar with Nadir and Eva Spo¨rndly (2005) who fed dairy cows with Moringa leaves at a level of 0.3 % of BW which resulted in a milk yield of 5.70 kg cow per day, and this was 13.00 % higher than the control treatment, which was grazing only. Sarwatt *et al.* (2004) found that when cotton seed cake was substituted by Moringa leaf meal at levels of 10, 20 or 30 % of DM, milk yield was significantly increased by 1.4, 0.9 and 0.8 kg cow per day respectively. The result of this study on the milk composition revealed that milk constituents did not follow a particular trend. While inclusion of *Moringa oleifera* levels had significant ($p < 0.05$) effect on milk composition. The result was in agreement with Anjum *et al*. (2007) who reported that treatment has effect on total solid. The findings show that 10 % inclusion level of the test ingredient had significant higher total solid, fat, protein, casein and whey contents when compared to those in other inclusion levels. This shows that milk quality is dependent on the nutrients combination of the feed as they were readily available for milk synthesis. *Moringa oleifera* leaf meal can be used to improve milk yield of Kalahari Red goats.

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Effects of Different Stocking Density on Tonic Immobility Reaction and Growth Characteristics in Japanese Quail Housed in Colony or Individual Cage

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Introduction

Japanese quail is used in commercial production for its meat and egg due to its qualities such as, the short-time generation interval, low feed consumption, high breeding ability, capacity to have a great number of quails per unit area, low breeding cost and high resistance against diseases. Besides, Japanese quail is also a model animal in biological scientific studies because of mentioned advantages (Minvielle, 1998). The quail is a good model for poultry, particularly as far as fear is concerned (Jones et al., 1982; Mills and Faure, 1986). Research on the welfare of poultry species raised for meat and egg production has identified a number of traits related in one way or another to the well-being of birds (Mignon-Grasteau and Minvielle, 2003). Fearfulness is one of them, and it can be determined using tonic immobility test in domesticated birds. Duration of tonic immobility (TI) is a well established criterion of fearfulness in birds, but its relation to production traits has been little studied. Fear is one of the most important factors in the occurrence of stress in birds and leads to significant economic losses. There are some studies on the level of fear, the relationship between fear and yield traits, and genetic background of fearfulness in Japanese quail (Minvielle et al., 2002; Mignon-Gresteau and Minvielle, 2003; Mignon-Grasteauet al., 2003; Calandreau et al. 2011). The aim of this study was to investigate the effects of the type of housing and cage stocking density on the fear level and growth characteristics of a Japanese quail flock. For this purpose, a total of 327 mixed sex Japanese quails housed in individual and group cages were grown at 7 different stocking densities and tonic immobility (TI) durations and growth traits were measured.

Materials and methods

This study was performed in the Poultry Research Unit of Akdeniz University, Turkey. Japanese quail (*Coturnix coturnix japonica*) were used as animal material. The quails used in the study were attached with wing numbers at hatch and were housed in six-floor for the first three weeks that environmentally controlled brooder cages with 96 x 43 x 21 cm compartments on each floor. All chicks with wing banded were weighted weekly hatching to eight weeks of age. The quails were fed with 24% crude protein, 2900 kcal / kg metabolic energy feed for three weeks. The quails were placed in individual compartments measuring 14 x 20 x 21 cm starting from the third week, during which period 20% crude protein was fed with breeding quail feed containing 2800 kcal / kg metabolic energy. Ad libitum feeding and a 23 h lighting program were applied from hatch to the end of the experiment. At the age of three weeks, 162 randomly selected quails were placed in colony cages with different stocking densities of 160 cm^2, 180 cm^2, 200 cm^2, 220 cm^2, 240 cm^2. The randomly selected 165 quails were housed in individual cages with different stocking densities of 280 cm^2 and 360 cm^2. As a result, a total of 327 quails were housed in two cage stocking densities (280 and 360 cm^2/quail) in individual cages and five cage stocking densities (160, 180, 200, 220, 240 cm^2/quail) in colony type group cages. 14 deaths occurred during the trial and substitute quails were added in their place in order to keep the stocking density. Tonic immobility durations were measured in order to determine fear levels when the quails housed in individual and group cages reached the age of 8 weeks. A wooden apparatus was prepared for this purpose and the quails were laid on their back with their heads upside down and supported by the chest and the animal was released after 10 seconds. The time during which the quails remained stationary without getting up was recorded. This was continued for a maximum of five minutes. The Richards nonlinear regression model was used to estimate the growth curve of each quail.

$$y_t = \beta_0 \left[1 - (1 - \beta_1) e^{\left[-\beta_2 (t-\beta_3)/{\beta_1}^{\beta_1/(1-\beta_1)}\right]}\right]^{\frac{1}{(1-\beta_1)}}$$

where yt is the weight of bird at time t, β_0 is the asymptotic (mature) weight, β_2 is the maximum relative growth (per day), β_3 is the age at maximum rate of growth (day), and β_1 is a shape parameter, with the property that ${\beta_1}^{1/(1-\beta_1)}$ is relative weight at point of inflection (Aggrey, 2002; Aggrey *et al*., 2003; Narinç et al., 2010). Individual growth curve parameters of Richards function were estimated for each bird using PROC NLIN (Marquart algorithm) procedure of SAS 9.3 software (SAS Institute Inc., Cary, NC). A nested design statistical model was used for analysis of variance in order to measure the effects of cage type and stocking density on TI duration, live weight and growth curve parameters of treatment groups.

Results

The results of variance analyses and mean values of tonic immobility durations, weekly body weights, parameters and inflection point coordinates by housing types and stocking densities are presented in Table 1. As it can be seen from Table 1, the stocking density did not have an effect on the duration of tonic immobility. On the contrary, it is possible to say that the average tonic immobility duration (107.89 sec) of quails housed in individual cages is higher than those (86.22 sec) housed in colony cages ($P<0.05$). There were differences in both the stocking densities and cage types in terms of mean values of live weight at 35, 42, and 56 days of age (all of $P<0.05$). The individual cages and higher stocking densities were found to have positive effect on body weight. In terms of sexual maturity parameter of growth curve model, there was a difference between housing types ($P<0.05$), but no difference was found between the stocking density groups ($P>0.05$). There were statistically significant differences (both of $P<0.05$) between the stocking density groups and cage

types in terms of the growth model's inflection point age and weight. The earliest inflection point age (20.64 day) was observed in quails housed in cage stocking density of 240 cm^2 in colony type cage, while the latest inflection point age (23.48 day) was found in individual housed quails in cage stocking density of 360 cm^2.

Table 1. The mean values of tonic immobility durations, weekly body weights, parameters and inflection point coordinates by housing types and stocking densities and the results of statistical analyses

Housing Type	Stocking Density (cm^2)	TI (sec)	BW 35 (g)	BW 42 (g)	BW 56 (g)	β_0 (g)	β_1	β_2	IP_A (day)	IP_W (g)
Colony Cage	160	84.06	150.69^{d}	170.52^{c}	185.45^{c}	193.90	1.88	0.118	22.53^{b}	91.23^{c}
	180	81.47	157.56^{b}	173.54^{c}	184.26^{c}	188.11	2.11	0.136	21.46^{c}	93.23^{c}
	200	93.99	152.77^{c}	170.07^{c}	183.49^{c}	190.99	2.26	0.140	22.88^{b}	94.41^{b}
	220	87.34	154.45^{b}	171.50^{c}	185.39^{c}	193.44	2.05	0.132	21.87^{b}	91.80^{c}
	240	86.31	147.90^{e}	167.41^{c}	182.44^{c}	192.58	1.51	0.099	20.64^{d}	83.04^{d}
General		86.22	152.82	170.77	184.31	191.77	1.97	0.125	21.91	90.95
Individual Cage	280	108.18	155.14^{b}	175.14^{b}	189.70^{b}	200.32	2.09	0.127	22.78^{b}	95.20^{b}
	360	107.13	161.93^{a}	184.67^{a}	197.98^{a}	207.18	2.20	0.134	23.48^{a}	101.71^{a}
General		107.89	157.06	177.84	192.04	202.26	2.12	0.129	22.98	97.04
SEM		3.15	0.95	1.16	1.19	1.76	0.06	0.001	0.21	0.94
Sources of Variation		P Values								
Housing Type		0.001*	0.027*	0.003*	0.001*	0.003*	0.175	0.557	0.010*	0.001*
Stocking Density		0.055	0.013*	0.008*	0.015*	0.089	0.100	0.137	0.025*	0.001*

$^{a-c}$Values within columns with no common superscript are different ($P \leq 0.05$).

The phenotypic correlations among duration of tonic immobility and growth related traits are shown in Table 2, and these correlations were not significant ($P>0.05$). On the contrary, the correlations between the mean weights of successive weeks are strong and positive. The correlations between β_0 and β_1 and β_2 are negative, but on the contrary, it is positive with inflection point weight.

Table 2. The phenotypic correlations between tonic immobility duration and growth characteristics

	TI	BW 35	BW 42	BW 56	β_0	β_1	β_2	IP_A	IP_W
TI	1.00	0.05	0.04	0.05	0.08	0.04	0.03	0.08	0.08
BW 35	0.05	1.00	0.86*	0.75*	0.40*	0.11*	0.13*	0.03	0.63*
BW 42	0.04	0.86*	1.00	0.90*	0.60*	0.12*	0.07	0.26*	0.76*
BW 56	0.05	0.75*	0.90*	1.00	0.80*	-0.12*	-0.20*	0.19*	0.62*
β_0	0.08	0.40*	0.60*	0.80*	1.00	-0.30*	-0.40*	0.05	0.31*
β_1	0.04	0.11*	0.12*	-0.12*	-0.30*	1.00	0.97*	0.73*	0.64*
β_2	0.03	0.13*	0.07	-0.20*	-0.40*	0.97*	1.00	0.60*	0.55*
IP_A	0.08	0.03	0.26*	0.19*	0.05	0.73*	0.60*	1.00	0.77*
IP_W	0.08	0.63*	0.76*	0.62*	0.31*	0.64*	0.55*	0.77*	1.00

*$P < 0.05$

Conclusion

According to the results of the study, it was found that the stocking density did not affect the tonic immobility duration, but surprisingly it was found that the birds housed individual were more coward. The findings of this study were consistent with the results of Minvielle et al. (2002), and Mignon-Grasteau and Minvielle (2003). Researchers have reported that the duration of tonic immobility is poorly associated with many production traits (egg yield, body weight, reproduction etc.), but they also suggest that this trait alone is not sufficient to provide information about the welfare situation of the animal. Mills et al. (1994) reported that quails with longer tonic immobility had higher egg weights, whereas shorter tonic immobility had higher egg yields. On the study of Mills and Faure (1991), the realised heritabilities found over the first 8 generations ranged between 0.2 and 0.3 (moderately level, but nonparametric estimation). Tonic immobility maybe highly heritable trait because of Faure et al. (2006) reported that the mean value of tonic immobility duration increased from about 50 s in the initial population to over 200 sec after 20 generations of selection and then varied between 200 and 250 s in the long tonic immobility duration line. It decreased to about 10 sec in the short tonic immobility duration line and remained reasonably stable in the randombred control line. The relationship between tonic immobility and other yield characteristics was found to be very low phenotypically, but the genetic relationships between them were never studied.

There is need for studies on the inheritance of this trait and the genetic relationships between these traits.

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Bottleneck Analysis of Kedah Kelantan Cattle Breed Based on Microsatellite Markers

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Introduction:

The Kedah Kelantan (KK) is the indigenous cattle breed of Malaysia and is mainly kept for meat production. KK is popular among the smaller farm owners because of its small compact body and low maintenance requirement (Payne & Hodges, 1997). This breed faces the same problems as other indigenous breeds around the world. The population size of purebred KK is fast decreasing and most of the commercial populations are actually crossbreds. There is also a lack of information on the genetic characteristics of KK. A bottlenecked population is a population which has been severely reduced in size sometime in the past. It is important to identify recently bottlenecked populations, because bottleneck reduces the genetic diversity, which leads to inbreeding depression. Consequently, this reduces the adaptive potential and increases the chance of population to become extinct (Cornuet & Luikart, 1996). Populations that have experienced a recent reduction of their effective population size exhibit a correlative reduction of the allele numbers and gene diversity at the polymorphic loci. The allele number is reduced faster than the gene diversity. Thus, in a recently bottlenecked population, the observed gene diversity is higher than the expected gene diversity under the assumption of equilibrium population (Cornuet & Luikart, 1996). Therefore, this study, was conducted in order to reveal the bottleneck in K K cattle breed.

Material and methods

Blood was collected from 56 animals of KK cattle. These animals were randomly selected from the nucleus herd of the Department of Veterinary Services Malaysia (DVS) at Pusat Ternakan Haiwan (PTH) in Tanah Merah, Kelantan, Malaysia. DNA was extracted from the whole blood using the QIAamp DNA Blood Kit (Qiagen) according to the manufacturer's instructions. 30 microsatellite loci were used in this study. These loci are the list recommended by FAO for genetic diversity studies in cattle (FAO, 2004). Polymerase chain reaction (PCR) was carried out in a total volume of 15 µl containing 1X PCR buffer, 1.5 mM $MgCl_2$, 0.2 mM dNTPs (Promega), 0.4 µM each of forward and reverse primers, 1 U Taq DNA polymerase (Promega) and 50 ng/ µl of genomic DNA. PCR was accomplished by using a touchdown programme. The PCR cycling conditions were as follows: initial denaturation for 8 min at 95 ºC, followed by 40 cycles of denaturation at 95 ºC for 45 s, annealing at temperatures ranging from 64 - 54 ºC for 45 s, and extension at 72 ºC for 1 min, and final extension at 72 ºC for 10 min. The PCR products were separated using capillary electrophoresis (CEQ 8000, Beckman Coulter) and the genotypes identified. Two approaches were used to detect whether the KK cattle types had experienced recent bottleneck events. The first approach was to evaluate heterozygosity excess (the sign, Standardized differences and Wilcoxon tests for heterozygosity excess under three mutation models, the IAM, TPM and SMM, were used) and the second was to evaluate the allele frequency distribution (mode-shift). This approach is a qualitative geographical method, where the microsatellite alleles were organized into 10 frequency classes, which permit checking whether the distribution followed the normal L-shaped form, where alleles with low frequencies ($0.01 - 0.1$) are the most numerous (Luikart *et al*., 1998).The BOTTLENECK software version 1.2.02 was used for data analysis.

Results and Discussion

The probability values for the sign test, standardized differences test and Wilcoxon test to detect heterozygosity excess under three mutation models (IAM ,TPM and SMM) are presented in Table 1. The results of Wilcoxon test under TPM and SMM showed no bottleneck pattern for KK cattle, while under IAM model showed bottleneck event. The results of sign and standardized differences tests under three mutation models (IAM, TPM and SMM) revealed recent bottleneck events for KK cattle. Similar contradictory patterns were observed in the golden strain Japanese quail (Emrani *et al*., 2011). The Wilcoxon rank test and standard difference test showed bottleneck event in the golden strain under IAM. However, under TPM and SMM these were not significant, suggesting that the bottleneck event did not occur in this strain. The discrepancies in these results may be attributed to the power of the tests and the mutation models themselves. Cornuet and Luikart (1996) recommended Wilcoxon test for microsatellite analysis stating that it is more powerful than sign and standardized differences tests. As for the mutation model, they recommended TPM to use with the Bottleneck analysis, because only few microsatellite loci follow the strict (one-step) SMM. TPM is considered as intermediate to SMM and IAM, and most microsatellite data sets better fit TPM than SMM or IAM (Di Rienzo *et al*. 1994). In the present study, the results of Wilcoxon test under TPM showed no bottleneck pattern for the KK cattle breed. For the bottleneck analysis using the allele frequencies distribution, there was no mode shift in the frequency distributions of alleles and normal L-shaped curve was observed (Figure 1); the alleles with the lowest frequencies (0.01–0.1) were observed to be most abundant. These distributions confirmed the results that KK cattle has not experienced a bottleneck event recently.

Table 1. Probability values for the Bottleneck analyses used to detect heterozygosity excess in Kedah Kelantan cattle

Breed	Model	Probability		
		Sign test	Standardized differences	Wilcoxon test
KK	IAM	0.041	0.040	0.013
	TPM	0.025	0.004	0.940
	SMM	0.000	0.000	1.000

IAM = Infinite allele model, TPM= Two-phased model, SMM= Stepwise mutation model.

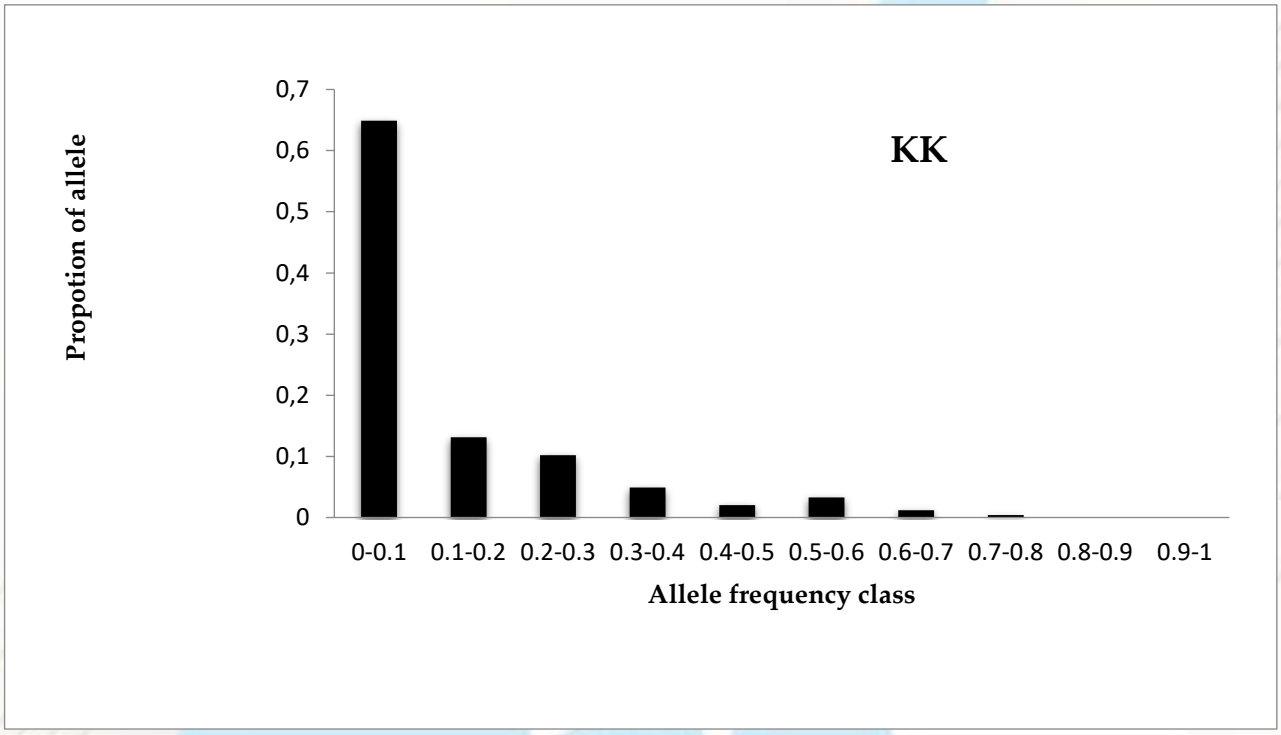

Figure 1. L- Shaped mode shift graphs showing lack of bottleneck in the Kedah Kelantan cattle.

Conclusion

The results indicated that the microsatellite loci recommended by ISAG/FAO and used in the present study are highly informative and suitable for genetic diversity evaluation and bottleneck studies. The KK cattle population has not undergone major bottlenecks in the recent past, which is important for cattle breeders and other conservation programs.

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Determination of Milk Production Characteristics, Phenotypic, Genetic and Environmental Trends in Jersey Cattle*1

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Introduction

Jersey's origin is Jersey Island between France and The United Kingdom. Jersey cattle were brought from USA to Samsun-Gokhoyuk studfarm in the year 1958, and then imported from England and Denmark (Elicin et al., 1991). Jersey breed has reared densely in Black Sea Region of Turkey. Most particularly, this breed had a high adaptability considerably under environmental conditions of central and eastern Black Sea region over time and therefore it was used by the region farmers for breeding purpose. The cattle breed used for crossbreeding and pure breeding have been reared officially for pure breeding purpose in Gokhoyuk State Farm connected with The General Directorate of Agricultural Enterprises in Turkey (Cankaya and Unalan, 2008).

Jersey cattle, known as one of the smallest ones among cattle breeds, is originated from Bos longifrons (brachyceros). Weight desired in mature Jersey cows is 400-500 kg. Mature Jersey bulls are approx. 600-725 kg. Jersey's milk is superior in fat and dry matter to other breeds with a fat percentage range of 4 to 8 (%). On the average, the breed produces 3800-4600 kg with the fat percentage of 5.3 (%). Butter production comes cheaper due to high fat percentage in its milk dry matter. The milk of the breed, preferred for obtaining fat and cream, has high carotene amount; therefore its milk color is yellow. The dry matter/fat ratio in the milk is high for cheese making or concentrated milk production (Ozhan et al., 2001). Birth weights of Jersey calves range from 19.8 to 23.3 kg. At the first periods of their lifetime, their weight gains are low, and they are not appropriate for young cattle fattening. Their meats are also not in good quality and delicious (Ozbeyaz et al., 1997). A large number of data for breeding studies are needed and number of subgroups in the obtained data is generally unbalanced. In this context, classical estimation methods could not be met the requirements in unbalanced data sets. Softwares used in the evaluation of the animal data sets can estimate variance components, heritability, and phenotipic, genetic and environmental correlations between traits by providing agreement of genetic and statistical models to the data. By means of these softwares, breeding values of animals can be also estimated (Akbas, 1998).

Recent developments of computer technologies offer opportunity of constructing mathematical models evaluating animals as a factor, and using nonlinear converge techniques in estimating variance components. Accordingly, Wombat (a tool for mixed model analyses in quantitative genetics by restricted maximum likelihood) is a popular program performing simultaneously analysis of random and fixed factors, and using techniques reducing possible data losses. With each passing day, more attention on the program has been received. Heritability can be estimated in the event of knowing error variance and variance between animals within the scope of animal model. Wombat program enables analysts to estimate the effect amounts of factors by solving random (animal, dam and sire etc.) and fixed factors simultaneously and then breeding values of animals by selecting BLUP (best linear unbiased prediction) option. The program estimates converging variance components of random factors i.e. animal, dam and sire on the basis of REML algorithm; therefore, prior variance values from previous studies facilitate the program's work in estimating variance components. Otherwise, converging operation can not be performed in the event that these prior values are not close to actual values (Tekerli et al., 2014).

To date, various methods have been used to estimate genetic parameters of 305-d milk yield, and phenotypic, genetic and environmental trends in Turkey. Environmental trend was computed by the regression of differences obtained from successive yields of cows on calving years, whereas phenotypic trend was calculated by the regression of standardized yields of cows on calving year (Kaygisiz, 1996; Aydin et al., 1998; Musani and Mayer 1997). Afterwards, REML, DFREML and MTDFREML methods have been employed (Ahmad et al., 2001; Leitona and Zeledon, 2008; Rehman et al., 2008; Bakir and Kaygisiz, 2009; Cetin and Koc 2011; Missanjo et al., 2011; Katok and Yanar, 2012; Sahin et al., 2014, Demirguc, 2015; Selvi and Yanar, 2016). Nowadays, Wombat software developed based on REML procedure by Meyer (2011) have been used (Sahin 2012; Tekerli et al., 2014).

To our knowledge, there is no information about determining the effect of environmental factors on milk yield traits (actual and 305-d milk yields) of Jersey breed cattle reared at Gokhoyuk State Farm located in Black Sea region of Turkey and estimating phenotypic, genetic and environmental trends for 305-d milk yield of Jersey cattle through Wombat software. Hence, the aim of this study was to determine the effect of environmental factors on milk yield traits (actual and 305-d milk yields) of Jersey breed cattle reared at Gokhoyuk State Farm located in Black Sea region of Turkey, and to estimate phenotypic, genetic and environmental trends in relation to 305-d milk yield in the past decade.

Materials and methods

The study's material comprised milk yield records of Jersey breed cattle reared at Gokhoyuk State Farm located in Black Sea region of Turkey between the years 2005-2014.

In the present study, 704 lactation records of 215 cows belonging to 26 sires were evaluated. In the herd management of Jersey breed cattle reared at Gokhoyuk Agricultural State Farm, the computer-aided Westfalia Dairy Plan has been used

*This study was derived from the first author's PhD thesis.

as a herd management program to remove problems resulted from human errors and to make better evaluations on the Jersey cows. Thanks to this program, individual data of animals are recorded manually and automatically. Records of the cattle used in the present study were obtained from the computerized herd management program. Cows available in the farm have been milked twice a day i.e. morning and evening. To calculate actual and 305-d milk yields of the cows in the farm, Holland method was used. These milk yields were calculated by the following formula (Tuzemen et al., 2013).

$$SV = \left(\frac{\Sigma S_i}{n}\right) . L$$

$$L = n. a - \left(\frac{a}{2} - A\right)$$

Where,
SV : Lactation milk yield, L : Lactation length, n : number of test days, a : test-day interval, A: Time between birth and the first test day, S_i : i. test-day milk yield.

Statistical analysis

In the present study, macro environmental factors i.e. calving year, calving season and parity were considered to be able to affect actual and 305-d milk yield traits. SPSS software program was used to determine influential factors for the traits SPSS (2004). Mean separation was determined for significant environmental factors by Duncan's multiple comparison test (Yildiz et al., 2011). The statistical model used for analysis of variance was as follows:

$Y_{ijkl} = \mu + a_i + b_j + c_k + e_{ijkl}$

Where;

Y_{ijkl} = i. parity, j. calving season, k. calving year, l. animal effect.

μ = Population mean,

a_i = i. parity effect (I = 1, 2, ….7),

b_j = j. calving season effect (j = 1. winter, 2. spring, 3. summer, 4. autumn),

c_k = k. calving year effect (k = 2005,……2014)

e_{ijkl} = random error with zero mean and variance σ_e^2

To estimate phenotypic trends for 305-d milk yield trait and the effect of environmental factors (parity and calving season), the following mathematical model was used in the SPSS statistical package program. 305-d milk yields were standardized according to the determined effect amounts. The mathematical model built with these purposes can be written as follows:

$Y_{ijk} = \mu + a_i + b_j + e_{ijk}$

Where;

Y_{ijk} = i. parity, j. calving season, k. cow's standardized 305-d milk yield amount,

μ = Population mean,

a_i = i. parity effect (i = 1,……..,7),

b_j = j. calving season effect (j = 1. winter, 2. spring, 3. summer, 4. autumn),

e_{ijk} = random error with zero mean and variance σ_e^2

Phenotypic trends were calculated by the regression of the standardized 305-d milk yields, standardized according to overall mean, on years in SPSS (2004) statistical package program (Bakir and Kaygisiz 2009; Tilki et al., 2009). With the objective to determine genetic trend in the present study, Wombat statistical program developed by Meyer (2011) was used.

The effect amounts of factors were estimated by solving random (animal, dam and sire etc.) and fixed factors simultaneously and then breeding values of animals by selecting BLUP (best linear unbiased prediction) option in 305-d milk yield trait with the help of Wombat program (Tekerli et al., 2014). Genetic trend was calculated by the regression of breeding values on birth year of the cows (Ahmad 2007). Heritability and breeding values were estimated through Wombat statistical package program. User notes and windows version of the Wombat software can be downloded from the URL address: http:/didgeridoo.une.edu.au/km/wombat.php (Meyer 2011). "Pedigree file", relavant to pedigree of animals, "parameter file" and "data file" (data of animals) were prepared. Wombat program were run by carrying Wombat.exe and these described files into same folder.

Results and Discussion

Environmental factors affecting actual and 305-d milk yield trait

Results of least squares means with standard errors and multiple comparison test of lactation length, actual and 305-d milk yield traits in Jersey cattle are given in Table 1. The effect of parity, calving year and calving season on actual and 305-d milk yield traits were found significantly ($P<0.01$), which was in agreement with those reported by several authors (Bashir et al., 2008, Lateef et al., 2008, Lemma et al., 2009, Teke and Akdag, 2010, Unalan and Cankaya, 2010-2012, Missanjo et al., 2011).

Table 1. Results of least squares means, standard errors and multiple comparison test of lactation length, actual and 305-d milk yield traits in Jersey cattle

Factors and Subgroups	N	Lactation length $\overline{X} \pm S_{\bar{x}}$	Actual milk yield $\overline{X} \pm S_{\bar{x}}$	305-d milk yield $\overline{X} \pm S_{\bar{x}}$
Overall mean	704	310 ± 5	4462 ± 90	4183 ± 70
Parity		**	**	**
1	213	314 ± 5ab	4076 ± 99b	3750 ± 77b
2	157	308 ± 6abc	4580 ± 117a	4328 ± 92a
3	108	306 ± 7bcd	4721 ± 135a	4521 ± 105a
4	69	313 ± 8a	4662 ± 160a	4368 ± 124a
5	65	315 ± 5abc	4681 ± 166a	4343 ± 129a
6	45	304 ± 10d	4316 ± 195b	4093 ± 152b
7	47	313 ± 10cd	4200 ± 192b	3876 ± 150b
Calving year		**	**	**
2005	5	323 ± 27a	3910 ± 525c	3643 ± 409b
2006	7	315 ± 22a	4582 ± 442ab	4390 ± 344a
2007	20	312 ± 14a	4436 ± 265ab	4146 ± 207a
2008	38	318 ± 10a	4286 ± 194ab	3904 ± 151a
2009	52	316 ± 9a	4452 ± 167ab	4164 ± 130a
2010	69	306 ± 7a	4549 ± 144ab	4293 ± 112a
2011	87	324 ± 6a	4829 ± 127a	4476 ± 100a
2012	143	322 ± 5a	4633 ± 104ab	4273 ± 81a
2013	182	321 ± 5a	4926 ± 93a	4580 ± 73a
2014	101	248 ± 6a	4023 ± 118c	3959 ± 93a
Calving season		**	**	**
Winter	147	322 ± 6a	4754 ± 127a	4431 ± 100a
Spring	156	316 ± 5ab	4517 ± 116a	4221 ± 91a
Summer	208	304 ± 5b	4208 ± 112b	3936 ± 88b
Autumn	173	299 ± 6b	4372 ± 118ab	4143 ± 92a

[a, b, c, d] : Means in rows with different superscripts are significantly different at P<0.05 or P<0.01

**:P<0.01; *P>0.05, $\overline{X} \pm S_{\bar{x}}$: means and standard error of means

Average lactation length of Jersey cattle reared in Gokhoyuk State Farm was found 310 ± 5 days, which was within the limits of 297-323 days given in literature (Tahtabicen 2008, Lemma et al. 2009, Sahin 2009, Unalan and Cankaya 2010, Kul 2013, Fernando et al. 2016). It could be also suggested that this figure was a good value for the farm. When calving years in lactation length were examined, small fluctuates were observed. The longest lactation length was recorded in the year 2011 with 324 days, whereas the shortest lactation length with 248 days was obtained in the year 2014. When the effect of season factor on lactation length was evaluated, it was determined that cows in winter seasons were milked longer time (322 days) compared to other seasons.

Actual milk yield average of the Jersey cattle was estimated as 4462 ± 90 kg. When actual milk yield were examined according to parity, actual milk yield reached to peak point (4721 ± 135 kg) at the third lactation, and started to decrease as from the fourth lactation. When change in actual milk yield was scrutinized in reference to calving years, actual milk yield was recorded at the lowest level (3910 ± 52 kg) in the year 2005, but it reached to maximum level with the average of 4926 ± 93 kg in the year 2013. When change in actual milk yield was evaluated according to calving season, it was seen that higher milk yield was obtained in winter season

In the present study, 305-d milk yield reached to peak level by increasing from the first lactation to the third lactation. In agreement with those reported by Nyamushamba et al., (2014), average of 305-d milk yield in Jersey cattle was 4183 ± 70 kg in the present study. The lowest 305-d milk yield amount was recorded in the year 2005, but the highest 305-d milk yield was obtained in the year 2013 (Table 1). 305-d milk yield amount recorded in winter season was relatively higher than those recorded in other seasons, and lower 305-d milk yield was found in summer season. Due to the fact that Gokhoyuk State Farm is located in Black Sea region of Turkey, happening warm-rainy in winter season could positively affect milk yield.

Phenotypic trends

Phenotypic trend is named as the change provided in a particular of period of time in a yield trait. Phenotype is composed of two parts i.e. genotype and environment. “Environmental trend” is described as the change that joint effects of all environmental factors affecting quantitative yield traits showed according to years, and “genotypic trend” is expressed as the effect degree that genetic improvement studies conducted in order to improve the studied yield traits indicated according to years (Kaygisiz 2000).

In the estimation of phenotypic trend, year factor was excluded from the studied linear model due to the fact that the regression of 305-d milk yield on years was taken. The effect amounts of environmental factors that influenced 305-d milk yield trait in the Jersey cattle are given in Table 2.

The regression of 305-d milk yields, standardized by using the effect amounts in Table 2, on years was taken and then the obtained regression prediction equation is presented in Table 3.

Phenotypic trend was estimated as 29.97 ± 17.10 kg, with the help of regression prediction equation (Table 3). This value

reflected that the improvement of 29.97 ± 17.10 in milk yield was provided per annually in the Jersey farm. The present findings were consistent with those reported by Palmer et al. (1972) and Musani and Mayer (1997). In literature, there is no published information on the estimation of phenotypic, genetic and environmental trends of Jersey cattle reared in both Gokhoyuk State Farm and other farms in Turkey.

Table 2. The effect amounts of environmental factors that influenced 305-d milk yield trait in Jersey cattle

Factors and subgroups	N	305-d milk yield (kg) $\overline{X} \pm S_{\bar{x}}$	Effect amounts
Overall Mean	704	4290 ± 41	
Parity		**	
1	213	3848 ± 63b	-442
2	157	4494 ± 74a	204
3	108	4597 ± 89a	306
4	69	4517 ± 111a	226
5	65	4516 ± 116a	226
6	45	4101 ± 139b	-189
7	47	3959 ± 135b	-331
Calving Season		**	
Winter	147	4501 ± 81a	211
Spring	176	4291 ± 74a	1
Summer	208	4056 ± 65b	-234
Autumn	173	4312 ± 73a	22

$^{a, b, c, d}$: Means in rows with different superscripts are significantly different at P<0.05 or P<0.01

**:P<0.01; *P>0.05, $\overline{X} \pm S_{\bar{x}}$: means and standard error of means

Genetic trend

Breeding values of the Jersey cows were computed by using BLUP option of Wombat statistical package program. To estimate the genetic trend, the regression of the breeding values of the cows on calving years was taken and the regression prediction equation obtained here is reported in Table 4.

From Table 4, it was understood that genetic trend annually was calculated as 18.71 kg/year, indicating that genetic capacity of the sires used for breeding purpose was good. The present estimate were higher than those reported by previous authors (Banga (1992) 0.81 ± 0.16 kg, Njubi et al., (1993) 0.7 kg, Musani and Mayer (1997) 0.8 kg, Singh et al., (2003) 0.40 kg, Rehman et al., (2008) 0.896 kg, Leiton and Zeledon (2008) 7.95 kg and Sahin (2009) 5.90 kg).

Table 3. Result of regression analysis for 2X-305-d standardized milk yields

N	Regression prediction equation	Standard error of regression coefficient
703	Y = - 56003.07 + 29.97 X	17.10

Table 4. Regression prediction equation for genetic trend

N	Regression prediction equation	Standard error of regression coefficient
703	Y = - 37549.89 + 18.71 X	7.33

Environmental trend

Environmental trend which is defined as the difference between phenotypic and genetic trends was estimated as 11.26 kg/year. Estimates of phenotypic, genetic and environmental trends reflected that managerial conditions were at sufficient level. Environmental trends estimated from Jersey cows were in agreement with Musani and Mayer (1997) who found 14.6 kg/ year, but higher than those (-14.0 and 32.2 kg/ year) reported by Palmer et al. (1972) and Nijubi et al. (1993).

Genetic parameters

Heritability estimates of 305-d milk trait according to parity are presented in Table 5. Genetic parameters of Jersey cattle reared in Gokhoyuk State Farm were used to estimate heritability values. Average heritability estimate of 0.344 was recorded for the Jersey cattle.

The present heritability estimates for 305-d milk yield trait were in agreement with those reported by several authors (Makuza et al., 2001, Sahin 2004; 2009, Unalan and Cankaya 2010, 2012), whereas some authors informed different results with Banga (1992) 0.54 ± 0.16 h^2, Leitona and Zeledon (2008) 0.21 h^2 and Missanjo et al. (2011) 0.30 h^2.

Table 5. Heritability estimates of 305-d milk trait according to parity

Parity	h2
1	0.346
2	0.345
3	0.344
4	0.344
5	0.343
6	0.343
7	0.343
Mean	0.344

h^2: heritability

Conclusions

The overall results of this study reflected that a significant improvement was recorded in phenotypic, genetic and environmental trends for Jersey cattle reared in Gokhoyuk State Farm located in Black Sea region of Turkey between the years 2005-2014. In the present study, the estimated positive phenotypic, genetic and environmental trends showed that the Gokhoyuk State Farm had a good herd management. The farm has taken a significant task in elite cattle breeding and, especially in presenting elite cattle to farmers. Application of the available herd management should be sustained identically for many years, in accordance with phenotypic, genetic and environmental improvements provided by years.

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Comparison of Different Back-Propagation Algorithms and Nonlinear Regression Models for Egg Production Curve Fitting

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Introduction

The egg production curves are used in decision making for economic projections and evaluate productivity for laying hens also it can be monitored in order to detect problems in the production curve indicating a possible disease, or any other issues. Egg production curves can be used to investigate the relationship between dependent and independent variables in poultry science. In egg production curve; the rise can be seen to the peak of the curve and the steady decline that ends the subsequent production process. In recent years, artificial neural networks (ANN) have been used as alternatives to regression analysis and successfully used in animal science. ANN is a very powerful method for poultry science, especially in nonlinear modelling. Various neural network models for curve fitting (Roush, 2006; Ahmadi and Golian, 2008; Ahmad, 2009; Ahmad, 2011; Kaewtapee et al., 2011; Savegnago et al. 2011; Wang et al 2012; Semsarian et al. 2013; Safari-Aliqiarloo et al 2017) can be seen as a subject of quite successful studies in poultry husbandry field.

Materials and methods

The material of the study consists of 100-layer hens' % hen day egg production over 54 weeks' period of egg laying, starting at 20 weeks of age. Data sets were analysed separately on the basis of the back- propagation algorithms used. The training data set of NN was determined randomly. Data set from 100 layer hens were collected from a commercial egg production farm located in Izmir- Turkey. The analyses were performed using the Matlab (R2016a) program. The accuracy of the models was calculated using the Mean Square Error (MSE), Mean Absolute Percentage Error (MAPE) and adjusted coefficient of determination (Adj.R^2).

In this study, different back propagation algorithms and egg production curve models were analysed comparatively in order to identify the functional relation for egg production curve. Compartmental, McNally, and Logistic models were used in the nonlinear regression analysis. Parameters were estimated by Levenberg–Marquardt iteration algorithm using MATLAB (R2016a). A convergence criterion was 1.0×10^{-8}. Egg production curve models are given in Table 1.

Table 1. Egg production curve models.

Models	Equations	Description
Compartmental Model McMillan (1981)	$y_t = a(e^{-ct} - e^{-bt})$	c= daily rate of increase in egg production; d= mean initial day of egg-laying; x= rate of production decrease after the peak.
McNally Model McNally (1971)	$y_t = at^b e^{(-ct+dt^{0.5})}$	b, c, and d are constants
Logistic Model Nelder (1961)	$y_t = a\{1 + e^{(b-(ct))}\}^{-1} e^{-xt}$	c= reciprocal indicator of the variation in day of production of first egg; d= mean day of egg production at sexual maturity; x= rate of production decrease after the peak.

y_t = egg production rate at t days of laying; a= asymptotic value of egg production at the peak of egg-laying (Görgülü and Akilli, 2018).

The optimal structure of the artificial neural network was evaluated with Bayesian Regularization (BR), Levenberg-Marquardt (LM), Scaled Conjugate Gradient (SCG), Gradient Descent (GD), Gradient Descent with Momentum (GDM), Gradient Descent with Momentum and Adaptive Learning Rate (GDX), Conjugate Gradient Back-propagation with Fletcher-Reeves Updates (CGF), Conjugate Gradient Back-propagation with Powell-Beale Restarts (CGB), Brayde Fletcher Gold Farlo Shanno Quasi Newton Back-propagation (BFG) and One Step Secant Algorithm (OSS) back propagation algorithms. Also tan-sig and log-sig activation functions, different number of hidden layers and neurons, different values of learning parameters were used. In neural networks analysis D-minmax normalization was used. In the D-min-max method, the data are scaled with the formula in Equation 1 in the range of [0.1-0.9]. Where; x': Normalized value of x_i, x_i:Orijinal value of x_i, x_{min} and x_{max} minimum and maximum value of x_i, respectively (Han and Kamber, 2001; Jain and Bhandare, 2011). The equations of the statistical error criteria are given in Table 2.

$$x_i' = 0.1 + (0.9 - 0.1)\frac{x_i - x_{min}}{x_{max} - x_{min}} \quad [1]$$

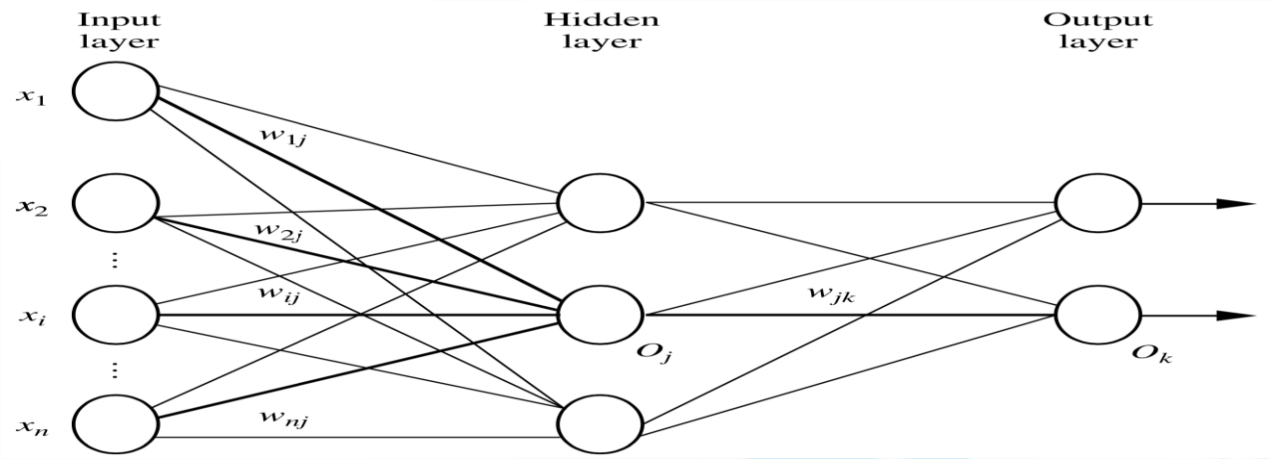

Figure 1. Multi-layer perceptron (Han et al., 2012).

Table 2 Statistical Error Criteria.

Statistical Error Criteria	Equation
Mean square error	$\text{MSE} = \frac{1}{n}\sum_{i=1}^{n}(y_i - \hat{y}_i)^2$
Mean absolute percentage error	$\text{MAPE} = (\frac{100}{n})\sum_{i=1}^{n}\left\lvert\frac{(y_i - \hat{y}_i)}{y_i}\right\rvert$
Adj.Coefficient of Determination	$AdjR^2 = 1 - (1 - R^2)\frac{(n-1)}{(n-p-1)}$

Where for the i^{th} record, $\hat{y}_i$: predicted value, y_i: actual value, n: number of records.

Results

The results of ANN were compared with different egg production curve models. Analysis results show that the most successful estimates are obtained by ANN and calculates more successful and effective results than the egg production curve models. Statistical criteria for evaluating the curve fitting of egg production models can be seen in Table 3. Statistical criteria for evaluating the curve fitting of back propagation algorithms are given in Table 4.

Table 3. Statistical criteria for evaluating the curve fitting of egg production curves.

Model	Parameter	Parameter Estimation	Standard Error	Statistical criteria MSE	MAPE	Adj.R^2
Compartmental Model	a	99.628	0.577	1.6292	1.1522	0.9886
	b	0.376	0.008			
	c	0.004	0.0001			
McNally Model	a	72.572	1.539	1.0400	1.0012	0.9884
	b	0.941	0.033			
	c	-0.027	0.002			
	d	-0.695	0.035			
Logistic Model	a	99.412	0.499	1.1688	1.0978	0.9871
	b	0.880	0.47			
	c	0.495	0.16			
	x	0.003	0.0001			

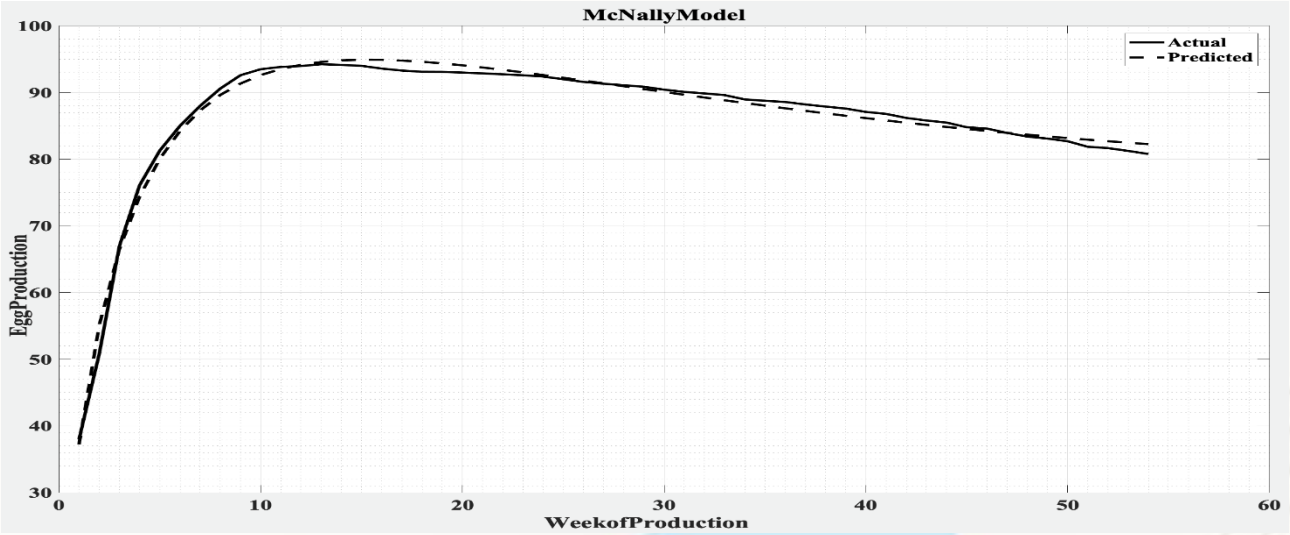

Figure 2. McNally Model Results

Table 4 Statistical criteria for evaluating the curve fitting of back propagation algorithms.

Back-propagation Algorithms	Activation Functions	MSE		MAPE		Adj.R^2	
		Test Set	Validation Set	Test Set	Validation Set	Test Set	Validation Set
Bayesian Regularization (BR)	TanSig	0.0272	0.2775	0.1394	0.4273	0.9892	0.9958
	LogSig	0.5339	2.2237	0.4005	0.9395	0.9994	0.9887
Levenberg-Marquardt (LM)	TanSig	0.7112	1.1320	0.4882	0.6427	0.9865	0.9906
	LogSig	0.0293	1.0325	0.1559	0.6733	0.9994	0.9987
Scaled Conjugate Gradient (SCG)	TanSig	4.3305	34.097	1.5898	3.9731	0.9226	0.6988
	LogSig	31.319	28.271	4.2400	5.6255	0.4077	0.7232
Gradient Descent (GD)	TanSig	65.392	114.25	7.5882	10.595	0.4313	0.0911
	LogSig	101.31	151.76	8.1820	10.745	0.1660	0.0397
Gradient Descent with Momentum (GDM)	TanSig	34.590	57.064	5.3436	7.1229	0.4016	0.4305
	LogSig	96.083	165.12	9.9440	13.015	0.0427	0.0384
Gradient Descent Adaptive a with Momentum (GDX)	TanSig	37.047	83.559	6.1475	9.1336	0.4291	0.2466
	LogSig	12.478	12.091	3.6233	3.8098	0.7817	0.9064
Fletcher-Reeves Algorithm (CGF)	TanSig	20.991	116.75	4.2755	8.7993	0.7271	0.1040
	LogSig	50.401	104.41	5.9806	9.2771	0.2323	0.1314
Powell-Beale CG Algorithm (CGB)	TanSig	1.4311	2.3573	1.1339	1.4581	0.9826	0.9915
	LogSig	119.20	134.98	10.785	12.601	0.1496	0.0738
Brayde Fletcher Gold Farlo Shamo Algorithm (BFG)	TanSig	0.8564	5.2805	0.6469	1.6507	0.9843	0.9715
	LogSig	20.797	84.457	3.7569	6.8868	0.6448	0.2779
One Step Secant Algorithm (OSS)	TanSig	113.88	98.115	9.9400	9.3233	-0.081	0.5397
	LogSig	7.6047	107.97	1.6939	6.0616	0.8761	0.1009

Conclusion

In this study, artificial neural network with different back propagation algorithms and egg production curve fitting models were evaluated comparatively. The results obtained with the BR algorithm were found to be more successful than the other algorithms. Results have showed that neural networks with different back-propagation algorithms are very successful in modelling egg production curve and can be used as an alternative tool egg production curve models.

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Effects of Dietary Red Fermented Rice on Growth and Slaughter-Carcass Traits in Japanese Quail

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Introduction

Japanese quail (*Coturnix coturnix japonica*) is the smallest poultry species that attracts more attention in the poultry industry due to the increasing consumption of meat and eggs. In addition, Japanese quail has become an important model animal for research due to its short-generation interval) and resistance to many poultry diseases *(Vargas-Sánchez ve ark. 2018*).The age of slaughtering in quails is between 6-8 weeks and these poultry which have 65-70% carcass yields attract attention with their aromatic meat flavor. Although there are many studies on meat quality in quail, it has been shown that meat quality characteristics of this species are very similar to turkeys from the same family *(Aksoy ve Narinç 2012)*. But it is known that meat quality is influenced by feeding, as well as performance characteristics. Red fermented rice (RFR), also known as red yeast rice, fermented rice dye, red Koji or phoenix, is a fermented food source traditionally consumed in Asia since ancient times *(Velioglu ve Yılmaz 2008)*.This product contains monacholine and mevinolin acid, which have a direct inhibitory effect on the activity of hydroxymethylglutaryl-CoA reductase, which acts as a key enzyme in cholesterol synthesis and is known to have a lowering cholesterol level for human health. In addition, extracts from red fermented rice have been used in place of nitrate and nitrite salts in meat products to eliminate the negative effects of these products on human health. In a laboratory study, the acute toxic effect of nitrite and nitrate on mice was not observed in the use of red fermented rice, but it also showed positive changes in lipid blood levels *(Jůzlová et al. 1996).* There are no studies in the literature where red fermented rice powder is used as feed additive material in livestock. In this study, it was aimed to investigate the effects of feeds prepared by adding red fermented rice powder at different levels to quail rations on fattening performance and slaughter-carcass characteristics. It is thought that the findings to be obtained as a result of the research will be beneficial in terms of economy and health in poultry breeding.

Materials and Methods

A total of 120 quail chicks of hatched daily age were grouped into three replicates with average live weight close to each other and 10 chicks in each trial unit. Groups were F0 (control: no additives), F1 (0.05% red fermented rice added), F2 (0.1% red fermented rice added), F3 (0.2% red fermented rice added) was distributed randomly. Live weights of birds were measured weekly from the beginning of the experiment to end of the experiment. Prepared experimental feeds were given to quail chicks from the first day as ad-libitum. The amount of feed given was recorded and the scattered feeds on the feeders and litter during the weekly weighings were cleaned and the increased feed amount was determined. The weekly average feed consumption of the chicks was found by subtracting the increased feed amount from the given feed amount. In the study, the average weekly feed efficiency was determined by dividing the average weekly feed intake of broiler quails by the weekly average live weight gain. At the end of the experiment (day 35), 113 animals were slaughtered. Hot and cold carcass weights of slaughtered quails, breast and thigh yields, wing, back, breast skin, heart, liver, and intestinal weights and ratios were examined. The ratio of internal organ weights to the live weight of broiler quails was determined by the relative weight (%) of the internal organs.

Results

The average values of weekly live weight of the experimental groups up to the 35th day, which is the slaughter age, are presented in Table 1. In the same table, the variance analysis results of live weight average of control, F1, F2 and F3 trial groups are also included. As it can be seen from Table 1, no statistically significant difference was found between the chickens weights ($p>0.05$), indicating that the experiment was established in a chance-dependent and balanced manner. No statistically significant differences were observed between the experimental groups in terms of live weight averages from the first week to the last week when the feed additive was started ($P>0.05$ for all weeks). F2 and F3 experimental group (173.89, 168.06 and 166.46 g respectively) were found to be higher ($P<0.05$). Table 2 shows the average weekly weight gain of the control, F1, F2 and F3 experimental groups from the first week to the slaughter age. The results of the analysis of variance related data are also included in the Table. As it is seen in Table 2, as in live weight averages, no statistically significant differences were observed between the experimental groups in terms of weekly live weight gain averages from the first week to the 35-day age when the feed additive was started ($P>0.05$ in all weeks). On the 35th day, the mean live weight gain (43.44 g) of the control group quails was higher than the group (28.44 g) with 0.05% red fermented rice powder added to the ration ($P<0.05$), as well as F2 and F3 experiment. The mean live weight gain (15.36 and 9,30 g respectively) of the quails in the control group was found to be the lowest ($P<0.05$) compared to the control and F1 experimental group quails ($P<0.05$). The average amount of feed consumed in the experimental groups up to the 35th day, which is the cut-off age, is given in Table 3. In the same table, control, F1, F2 and F3 experimental groups of the amount of feed consumed weekly analysis of variance results are also included. As shown in Table 3, no significant difference was observed between the experimental groups in terms of the amount of feed consumed from the moment the feed additive was started ($P>0.05$ in all weeks). The weekly and cumulative feed benefit ratios calculated by using the weights of the animals weighed weekly and the amounts of feed given are presented in Table 4. In the same table, the statistical analysis results related to the mentioned ratios are also included.

Table 1. Live weight average of the experimental groups (g/quail)

Trial Group	LW0	LW7	LW14	LW21	LW28	LW35
Control	9.10±0.15	36.18±0.69	78.56±1.45	120.85±2.56	152.25±2.91	195.70±4.13^{a}
F1	8.96±0.15	35.36±0.69	75.35±1.45	116.12±2.56	145.45±2.91	173.89±4.13^{b}
F2	8.85±0.15	34.49±0.74	74.51±1.56	114.81±2.81	146.01±3.19	168.06±4.52^{b}
F3	8.76±0.15	34.20±0.71	75.15±1.53	120.52±2.70	149.80±3.07	166.46±4.35^{b}
Significant	0.398	0.185	0.213	0.275	0.319	0.000

**The obtained results are given as mean ± standard error. Values indicated by different upper-case letters are statistically different from each other (P<0.05).*
LW: Live Weight
F1:Trial 1% 0.05g red fermented rice additive
F2: Trial 2% 0.1g red fermented rice additive
F3: Trial 3% 0.2g red fermented rice additive

Table 2. Average weight gain (g/quail) of the experimental groups

Trial Group	0-7.day	7-14.day	14-21.day	21-28.day	28-35.day
Control	27.66±0.71	42.79±0.89	41.29±1.26	31.40±1.10	43.44±3.17^{a}
F1	26.53±0.49	40.18±0.87	40.44±1.10	29.32±0.94	28.44±2.38^{b}
F2	21.51±1.78	34.65±2.69	34.47±3.25	29.01±2.71	22.05±2.30^{c}
F3	22.86±1.41	37.71±2.61	40.83±2.69	32.05±2.45	16.66±2.21 ^{c}
Significant	0.192	0.262	0.114	0.602	0.000

**The obtained results are given as mean ± standard error. Values indicated by different upper-case letters are statistically different from each other (P<0.05).*
F1:Trial 1% 0.05g red fermented rice additive
F2: Trial 2% 0.1g red fermented rice additive
F3: Trial 3% 0.2g red fermented rice additive

Table 3. Weekly feed consumption averages (g/quail) for experimental groups

Trial Group	0-7.day	7-14.day	14-21.day	21-28.day	28-35.day
Control	52.07±2.38	101.67±5.59	118.13±3.50	133.30±4.89	165.51±8.70
F1	55.73±2.38	99.47±5.59	119.73±3.50	134.33±4.89	145.32±8.70
F2	48.31±2.38	101.44±5.59	122.35±3.50	139.02±4.89	139.34±8.70
F3	49.25±2.38	106.22±5.59	113.03±3.50	131.61±4.89	143.73±8.70
Significant	0.248	0.956	0.516	0.838	0.200

**The obtained results are given as mean ± standard error. Values indicated by different upper-case letters are statistically different from each other (P<0.05).*
F1:Trial 1% 0.05g red fermented rice additive
F2: Trial 2% 0.1g red fermented rice additive
F3: Trial 3% 0.2g red fermented rice additive

Table 4. Feed utilization rate average of the experimental groups

Trial Group	**0-7.day**	**7-14.day**	**14-21.day**	**21-28.day**	**28-35.day**	**0-7.day**
Control	1.96±0.05^{b}	2.43±0.07	2.87±0.11^{b}	4.39±0.36	4.92±0.50^{c}	3.12±0.08^{b}
F1	2.13±0.05^{a}	2.52±0.07	3.02±0.11^{ab}	4.86±0.36	5.71±0.50^{bc}	3.41±0.08^{a}
F2	1.95±0.05^{b}	2.56±0.08	3.22±0.12^{a}	4.81±0.39	7.10±0.55^{b}	3.49±0.09^{a}
F3	1.97±0.05^{b}	2.64±0.07	2.53±0.12^{c}	5.32±0.38	9.36±0.53^{a}	3.49±0.08^{a}
Significant	0.033	0.253	0.001	0.358	0.000	0.003

**The obtained results are given as mean ± standard error. Values indicated by different upper-case letters are statistically different from each other (P<0.05).*
F1:Trial 1% 0.05g red fermented rice additive
F2: Trial 2% 0.1g red fermented rice additive
F3: Trial 3% 0.2g red fermented rice additive

According to the findings in Table 4, it was determined that the control group (1.96) had a statistically lower average than F1 (2.13) in the first week when additive was added to the ration (P <0.05). In addition, the average feed utilization of quail (0.05% and 0.02% red fermented rice powder in their rations (1.95 and 1.97) was not statistically different from the average of the quails in the control group (P> 0.05). It was found that red fermented rice added to ration in the second week did not cause any statistically significant difference in feed utilization ratio (P> 0.05). In the third week, there were differences in feed utilization rates between the experimental groups and these differences disappeared by the fourth week. In the fifth week, the best feed intake (4.92) was found to belong to the control group quails, and the worst feed

utilization rate (9.36) was obtained from the F3 experimental group (P <0.05). The best results were found in the control group (P <0.05) from the first week to the slaughter week in terms of the cumulative feed efficiencies (all of P <0.05).

Table 5. Cutting and carcass characteristics and yield

Trial Group	Control	F1	F2	F3	P Values
Hot Carcass (g)	137.01±2.70^{a}	121.07±2.70^{b}	116.98±2.95^{b}	114.90±2.84^{b}	0.000
Hot Carcass (%)	70.17±0.54	69.76±0.54	69.71±0.60	69.12±0.57	0.617
Cold Carcass (g)	142.47±2.73^{a}	124.95±2.73^{b}	119.68±2.99^{b}	118.23±2.87^{b}	0.000
Cold Carcass (%)	73.02±0.58^{a}	72.01±0.58^{ab}	71.30±0.63^{ab}	71.14±0.61^{b}	0.010
Heart (g)	1.63±0.05^{a}	1.51±0.05^{ab}	1.50±0.06^{ab}	1.41±0.05^{b}	0.034
Heart (%)	0.84±0.02	0.87±0.02	0.89±0.03	0.84±0.03	0.375
Liver (g)	5.02±0.26^{a}	4.54±0.26^{ab}	4.03±0.28^{bc}	3.75±0.27^{c}	0.005
Liver (%)	2.56±0.11	2.59±0.11	2.38±0.12	2.25±0.12	0.137
Gizzard (g)	4.75±0.20^{a}	4.14±0.20^{b}	3.92±0.22^{b}	4.20±0.21^{ab}	0.032
Gizzard (%)	2.42±0.09	2.38±0.09	2.32±0.09	2.51±0.09	0.497
Edible internal organs (g)	11.40±0.42^{a}	10.19±0.42^{ab}	9.45±0.46^{b}	9.36±0.44^{b}	0.003
Edible internal organs (%)	5.82±0.16	5.84±0.16	5.59±0.17	5.61±0.17	0.596
Gut (g)	8.06±0.37^{a}	7.32±0.37^{ab}	6.52±0.41^{bc}	5.68±0.40^{c}	0.000
Gut (%)	4.11±0.17^{a}	4.18±0.17^{a}	3.85±0.18^{ab}	3.42±0.17^{b}	0.009
Breast (g)	56.46±1.25^{a}	50.10±1.25^{b}	47.42±1.37^{bc}	45.22±1.32^{c}	0.000
Breast (%)	28.90±0.33^{a}	28.85±0.33^{a}	28.19±0.36^{a}	27.18±0.35^{b}	0.001
Thigh (g)	32.97±0.64^{a}	28.91±0.64^{b}	27.74±0.71^{b}	27.11±0.69^{b}	0.000
Thigh (%)	16.91±0.20	16.66±0.20	16.56±0.22	16.39±0.22	0.365
Wing (g)	12.58±0.23^{a}	11.56±0.23^{b}	11.11±0.25^{b}	11.11±0.24^{b}	0.000
Wing (%)	6.47±0.09	6.68±0.09	6.64±0.10	6.70±0.10	0.276
Back (g)	35.42±0.80^{a}	30.45±0.80^{b}	29.06±0.88^{b}	30.67±0.85^{b}	0.000
Back (%)	18.16±0.27^{ab}	17.52±0.27^{b}	17.32±0.30^{b}	18.46±0.29^{a}	0.020
Abdominal fat (g)	0.79±0.12^{a}	0.77±0.12^{a}	0.37±0.13^{b}	0.36±0.12^{b}	0.010
Abdominal fat (%)	0.42±0.06^{a}	0.42±0.06^{a}	0.21±0.07^{b}	0.21±0.06^{b}	0.015

**The obtained results are given as mean ± standard error. Values indicated by different upper-case letters are statistically different from each other (P<0.05).*
F1:Trial 1% 0.05 g red fermented rice additive
F2: Trial 2% 0.1g red fermented rice additive
F3: Trial 3% 0.2g red fermented rice additive

At the end of the experiment, slaughtered birds were measured according to experimental groups. The averages regarding the proportional values of these properties are given in Table 5. It was determined that the average of all the characteristics of the quails in the control group was higher than the average of 0.05, 0.1 and 0.2% red fermented rice powder. (P <0.05). In terms of abdominal fat rates, it was found that the average of control and F1 quail quails (0.42% and 0.42% respectively) were higher than the average of quail F2 and F3 quails (0.21% and 0.21%, respectively) (P <0.05).

Conclusion

This study was carried out to determine the effects of adding fermented rice powder to quail feed at different levels (0, 0.05, 0.1, 0.2 g / kg) on fattening performance and cut-carcass characteristics. There is no previous study in the literature on the addition of red fermented rice powder to the rations of poultry. For this reason, studies on similar feed additives obtained by biotechnological methods were taken into consideration in the discussion of the findings. The mean weight of quail chicks in the experimental groups varied between 8.76-9.10 g and there was no statistically significant difference between the average of the experimental groups (P> 0.05), which showed that the experimental groups were distributed homogeneously. These findings were consistent with the results of many studies (İnci 2002; Olgun 2005; Önel 2015; Duman 2016).In these studies, the average output weight of quails was found to be between 290.59-127.34 g.In addition, there are many studies in the literature that report higher and lower output weight averages of unselected and randomly mated quails. The reason for this is thought to be related to the more recent domestication and cage adaptation of Japanese quails as migratory birds, compared to many other poultry species. In the study, different levels of red fermented rice powder were added to quail diets 2-4. It was determined that it did not cause any difference in terms of live weight average between the weeks, but it had a negative effect in terms of live weight average in the 5th week. When Table 1 is examined, it is seen that adding different levels of red fermented rice powder to the ration causes a loss of 11-15% in live weights of quails in the fifth week. This result can be attributed to two reasons, the first of which contains monacholine and mevinolin acid, which have a direct inhibitory effect on the activity of hydroxymethylglutaryl-CoA reductase, which acts as the key enzyme in cholesterol synthesis; loss of live weight is thought to occur due to reduced digestibility of the feed. Yalçın et al. (2007) in a study carried out by adding different levels of garlic powder to the ration of some performance characteristics of laying quail were investigated.It is known that said garlic powder contains the active ingredient HMG-CoA contained in the same red fermented rice powder. It was found by the researchers that the addition of 0, 5 and 10 g / kg garlic powder to the ration had no effect on the body weight. Although the findings of this study do not support the results of this study, it is thought that the effect of the study on the live weight values of the quails was eliminated as a

result of the study. Tufan et al. (2015) in the study of quail feed ration of certain amounts of oxytetracycline antibiotic (0.1%), black seed (1%) and black seed oil (0.1%) were added to the fattening performance and carcass characteristics. The experiment was carried out with 180 chicks daily and the study lasted 35 days. In the experiment, it was determined that the cut carcass characteristics were statistically different and it was found to be higher than the study ($P < 0.05$). Red fermented rice was added to the quail diet and a decrease in live weight was observed. Abdominal fat amount was determined between 0.79-0.36 and a decrease was observed. This is thought to be caused by hydroxy methyl glutaryl-CoA, which acts as a cholesterol-lowering enzyme in the structure of red fermented rice. Although the addition of red fermented rice to the rations of fattening animals decreases the performance characteristics, it is thought that the products to be obtained may provide an advantage in terms of supply to the market as a functional food. In addition, the effects of the addition of red fermented rice powder to the rations of the poultry which have to keep the live weight under control should be investigated in future studies both in terms of flock management for rearing period of layers and the products to be obtained.

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Comparison of Lamb and goat kids in terms of Performance, Carcass Yield, and Meat Quality

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Introduction

Farming; Turkey's national development, animals and animal products in increasing foreign sales, in providing raw materials to industry, regional and inter-sectoral balanced development, the prevention of hidden unemployment in rural areas, the creation of new employment opportunities in the industrial and services sector and development finance has an important potential for based on the equity (Yenigün and Tüzün, 2002), rapid population growth in the climate of Turkey, social and economic development to meet the growing demand increases. Demand for animal products without increasing the number of animals, it is important to be achieved by increasing the yield obtained per animal. The increase in yields is possible by improving genotype and environmental conditions (Akçapınar, 1994). Red meat is the most valuable source of animal protein. Red meat, which is a rich source of nutrients due to its nutritional elements, protein, iron, especially mineral substances and B group vitamins, has a very important place in terms of nutrition. it contains essential amino acids which cannot be synthesized and must be taken with nutrients from outside and in sufficient and balanced way.

The presence of sheep and goats In the world and in Turkey

Sheep and Goats presence in the world and in Turkey are given in the table below. (TUİK)
Red meat sources; Cattle, Sheep, Goat, Pig, Llama, Buffalo, Camel, Kangaroo etc. meats obtained from animals. People living in regions with hot climates prefer goat meat to sheep and beef.

Table 1. World Sheep Goat Presence (1,000 heads)

	2012	2013	2014	2015	2016
Sheep-Goat	2.165.126	2.178.436	2.216.694	2.139.562	2.176.164

This is due to the fact that goat meat is less fatty and therefore can be kept for longer. Goat meat has a protein similar to sheep and beef, but its fat content is 50-65% lower. In addition, 1 g of goat and chicken meat is reported as 120 and 122 in calories respectively (Anonymous, 2003a).

Table 2. Turkey Sheep Goats (head)

Yıllar	Koyun	Keçi	Toplam
2014	31.140.244	10.344.936	41.485.180
2015	31.507.934	10.416.166	41.924.100
2016	30.983.933	10.345.299	41.329.232
2017	33.677.636	10.634.672	44.312.308
2018	-	-	46.117.399

On the other hand, goat meat and goat meat products in European countries and America are among the luxury consumables that can be sold at a very high price. Different goat meat products sold as packaged and processed can also be marketed over the internet (Anonymous, 2003c: Anonymous 2003d). In addition, many European countries (France and Spain), milk called the 1-month-old milk boy is sold in the market at a price 2-3 times higher than beef and lamb meat.

Table 3. Turkey Small Ruminant Meat Production

Yıllar	Cutting goat and sheep	Meat Slaughtered (kg)	Rate of goat and sheep %
2014	6.767.528	125.747	12
2015	7.007.652	134.011	12
2016	5.839.980	113.496	10
2017	7.203.204	137.583	12

Lamb And Goat Kids Performance Comparison

The results of fattening performances performed in weaned male lambs and male kid are given as average values in Table

4. (Daşkıran and Ertuğrul, 1994), (Tekel, 2007)

Table 4. Ankara goat male kids, Ivesi Lamb, hair goat boy Fattening performance

	Ankara goat kids	İvesi lambs	Kıl goat kids
Live Weight	14.54	20.75	25.03
Live Weight Increase	0.136	0.255	0.121
Feed Rating Rate	6.069	5.410	7.710
Feed Consumption	57.77	82.92	70.16
Cutting Weight	24.06	35.5	33.52

Fat content of this meat obtained from kid with carcass weight of 10-12 kg is quite low (Boyazoglu and Morand-Fehr, 2001). Kahramanmaras; According to the 2018 data, the total number of kids born is around 115 thousand. Approximately 60 thousand of this number consists of male kids..

Comparison of Carcass Characteristics of Lamb and Goat Kids

After breeding male kid and surplus female kid under intensive conditions, economic meat production is carried out by taking short and medium term intensive fattening. Demand in butchers; As male lambs are more common than goat-goat meat, male kid and female kid with surplus breeding have an important role in raising the need for red meat in general. The fattening studies carried out on Capricorns vary depending on market demands and remain limited numerically.

Table 5. Comparison of some carcass characteristics of Karya and Kıvırcık male lambs and male kid of Ankara and Kiliç goat (Altın et al., 2005), (Daşkıran ve Ertuğrul, 1994)

(%)	Karya Lamb	Kıvırcık Lamb	Tiftik Kids	Kıl Goat Kids
Arm	18.53	18.43	20.9	20.53
Shoulder-back-	22.53	21.37	24.0	27.90
Bhutan	30.59	31.23	32.0	30.52
Neck	9.01	8.77	10.3	10.70
Skirt	13.34	13.22	13.7	8.21
Tail	2.58	3.68	-	-

Lamb and goat kid Meat Fatty Acids

Fatty acid composition plays an important role in defining meat quality and is influenced by genetic and environmental factors. In many studies, differences were found in fatty acid composition in beef, lamb and pork (Diaz et al., 2003). In the studies, factors such as race, gender, age, feeding practices and muscle type were found to be effective on fatty acid composition. There are more than one hundred kinds of fatty acids in lamb fatty tissue and three fatty acids in this sense for fatty acid composition; palmitic acid (C16: 0), stearic acid (C18: 0) and oleic acid (C18: 1 n-9) (Beriain et al. 2000). Technological quality characteristics of meat affected by fatty acids; hardness, shelf life and aroma. In terms of hardness, the composition of fatty acids and different melting points are effective. In many studies, differences were found in fatty acid composition in beef, lamb and pork, and lamb meat was found to be the lowest in terms of n-6 / n-3 PUFA ratio (Diaz et al., 2003).

Table 6. Meat and fatty acids in lamb and goat carcasses (Yaralı, and Karaca 2011)

	Lambs	Goat Kids
Fatty Acids	Between Muscles	Between Muscles
C16:0 Palmitik Asit	23.95	20.99
C18:0 Stearik Asit	11.89	10.24
C18:1(cis 9) Oleik Asit	32.26	51.00
C18:2(cis9-12) Linoleik Asit	11.48	5.74
C18:3(cis6-9-12) Linolenik Asit	1.17	0.18
C20:4 Araşidonik Asit	0.65	2.27
PUFA Polyunsaturated Fatty Acid	18.31	
SFA Saturated Fatty Acid	45.56	

Meat Quality in Lambs and Capricorns

There are many factors affecting meat quality in lambs and kids. These factors are; animal characteristics such as race, sex, age, and environmental factors such as feeding practices, climate, slaughter hygiene and procedure. In many studies, it is reported that there are differences between carcass and meat quality by feeding lambs and kids in mixed feed or pasture. The main differences that occur here are flesh color, final pH, marbleization, softness, aroma, nutrient composition and meat-fat distribution.

Muscle pH in the live animal is between 7.0-7.3. About 40 min. until the pH is slightly decreased, 24 hours after the cut is between 5.4-5.7. Post-cut pH varies depending on the amount of lactic acid produced from glycogen during anaerobic glycolysis. If muscle glycogen is reduced by excessive fatigue, hunger and fear, this process is interrupted. The final value

of muscle pH affects the shelf life of the meat, consumer taste and meat consumption quality. In this sense, the final value of meat pH is affected by many factors such as the physiological status of the animal before slaughter, genotype, age, sex, live weight, lubrication, nutrition and production system (Sanudo et al., 2007).
As shown in Table 3, there was no difference in smell and color in raw meat. However, it was found that lambs had higher values in terms of marbleization. Lamb meat is less fat than goat meat. This is also expected in terms of inter-muscle fat. In addition, there was no significant difference between the two groups in terms of fried meat. This is in favor of Capricorn flesh. Fried goat meat is at least as similar as lamb meat in terms of smell, flavor and number of chewing. When the meats were boiled, it was found that lamb meat was worse in terms of smell, and capricorn meat was worse in terms of chewing number.

Table 7. Sensory tests of Capricorn and Lamb meat

Specifications	Goat Kids	Lambs
Dew (color)	4.25	4.25
Dew (smell)	5.00	3.75
Morning dew	2.75	4.00
Fried (smell)	5.00	5.00
Fried (flavor)	5.00	4.25
Fried (number of chewing)	4.50	4.50
Boiled (odor)	5.00	3,75
Boiled (flavor)	4.00	4.50
Boiled (number of chewing)	3.75	4.50

These findings provide some clues about the cooking techniques of kid meat. Capricorn meat is better consumed when fried or cooked with steam. After the organoleptic panel, it is similar in terms of all features, but when boiled, it turned out that goat meat is more advantageous in terms of odor and chewing number (Hatipoğlu et al., 2016).

Results

Goat breeding in Turkey is generally mountainous, forest, or on the edge of the area carried out in unfavorable agricultural field crop production and bush-scrub is the main food source of natural vegetation goats in the land of farming in grassland is maintained in mountainous regions without. Goat meat, especially young goat meat, in many Mediterranean countries is a sought-after nutrient. In our country, goat meat is generally consumed by low-income families. The fact that the goats do not have a great potential in terms of meat yield and that they come to the forefront with more milk yield has led to the studies on goat fattening to be at lower levels compared to sheep. A result of the evaluation of the studies and applications, it was found that goat meat is at least as good quality and valuable as lamb meat. For hair goats; The aim was to reduce the input costs due to the low cost of mixed goats, the inability to evaluate goat milk at high prices and the low milk yield in hair goats. As a result of this, the daily live weight increases in the kid did not reach the desired levels and remained low. In order to see the real fattening performance of hair goat kid, it is necessary to develop rumen development of the kid at early ages and to determine the most appropriate fattening and semi-intensive and intense fattening practices at different ages and periods on the basis of regions. Application of this fattening model; meat yield, profitability will increase significantly and as a result of fattening lamb fattening fattening between the daily live weight gain differences will be seen to be close to each other.

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Estimation of the number of chicken in Turkey by means of Artificial Neural Networks

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Introduction

Chicken meat and eggs are the best source of quality protein, and are badly needed by the many millions of people who live in poverty. In developing countries, the diet of people living in cities usually contains more animal protein than that of rural people (Farrell, 2013). The number of chickens worldwide has more than doubled since 1990. In 2017, there were some 22.85 billion chickens in the world, up from 14.38 billion chickens in 2000 (Anonymous, (2019). In this study, Artificial Neural Network (ANN) was used in order to estimates of number of chicken.

Materials and methods

The material of the study consists of the dependent and independent variables to be used in the projection of orange production amount in Turkey. The dependent variables are the figures of the number of chicken covering the years 1965-2018, and the independent variable is the 'series of years'. These variables have been complied from the web site of Turkish Statistical Institute (TSI) (TSI, 2018a; TSI, 2018b).

Artificial neural network (ANN), in many over complex mathematical problems which imply complicated non-linear equations, a multilayer perceptron network can be simply used by defining the weights and appropriate functions. Be based on the type of the problem in neurons, diverse activation functions can be used. An input layer for introducing problem inputs, a hidden layer, and another output layer which provides the solution to the problem are used in such networks. Such of networks are by a majority trained through Back Propagation method (Manhaj, 2002). Neural networks are machine learning models used principally to classify or predict data. The model architecture is performed starting from data and learning rules (Kim, 2017). Performance of trained model measured in terms of mean squared error (MSE) and correlation factor (R). The correlation factor R was generated by MATLAB software package while MSE value was measured from above. The trials were accomplished until correlation coefficient R approaches closer to the value one. The correlation factor R value close to one ensures better regression fit for given training set (Yang et al., 2003).

Results

The data has been divided into three parts: 70 percent was used for the training, 15 percent for validity and 15 percent for the test stage. In the multi layered Artificial Neural Networks, the transmission function amongst the input, output and hidden layers makes difference. The network with 8 neural hidden layers is operated based on TANSIG function. The network with 8 neural hidden layers reached the highest value of performance in the usage of TANSIG function. The performance graphic is shown in Figure 1. That means there is a graphic indicating the change of the error values belonging to the training, validation and test clusters in each iteration at the end of the training of the network. As seen in the graphic, iteration number in training of the network is given as 36 and the best performance has been achieved in the 30th iteration.

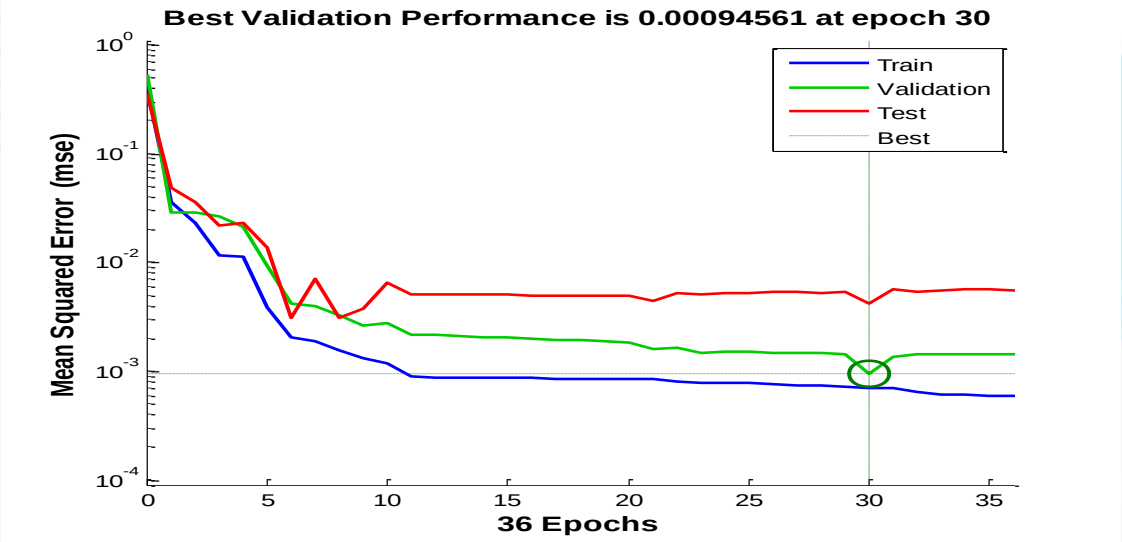

Figure 1. Network performance graph

In Table 1, the results of orange production estimations respecting the years 2019-2025, along with the established ANN model have been given. MSE values stated here is the mean squared error of the observation values between the years 1965 and 2018 used in comparing the real values with the test output values given by the network inferentially after the test. MSE value has been found as 0.00124 and the coefficient of determination (R^2) as 0.986. It has been estimated that the orange production will be between 1 941 106 and 3 522 957 tons during 2019-2025.

Table 1. Prediction of orange production in Turkey

Years	2019	2020	2021	2022	2023	2024	2025
Prediction	359 245 000	357 839 000	373 989 000	381 909 000	400 793 000	484 991 000	576 786 000

Conclusion

The results indicated that the established ANN model and the estimation process were successful. High regression and low MSE (Mean Squared Error) values in the stages of training, testing and validation also indicate such achievement. When the number of chicken estimations were examined, the production being 353 561 000 in 2018 is expected to increase by 63.14% and reach 576 786 000 in 2025.

It has been seen that Artificial Neural Networks model is very accomplishing in terms of estimating the existing data generally. It is thought that comparative examination of estimated performances will give much more influential results by combining Artificial Neural Networks with distinct alternative techniques in predictions studies for the future.

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Effects of Some Environmental Factors on Morphological Characteristics of Yalova Kıvırcık Sheep

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Introduction

Kıvırcık sheep is one of the Turkish sheep breeds and raised in the western Anatalion. Kıvırcık breeds are thin tailed and known with their meat quality and high palatability. Variation of Turkish sheep breeds have been researched in the recent years. Environmental factors are known to cause some morphological differences even within the same breed. There are some studies suggesting that Kıvırcık sheep in Yalova is a subtype/variety of Kıvırcık breed (Alarslan ve Aygün, 2019a; Alarslan ve Aygün, 2019b). The aim of this study was to characterize the adult body weights and body measurements in Yalova Kıvırcık sheep and to detect macro environmental factors affecting morphological characteristic of Yalova Kıvırcık. This research is a descriptive study.

Materials and methods

The research material was conducted at the National Animal Breeding Program which has 1-5≤ year-old 100 ewe and 10 ram. The sheep were weighed on 100 g sensitive bascule to determine body weight after 12 hours of starvation in 2019 after shearing. Body measurements of sheep meausered with a measuring stick and tape measure as taking by Ertuğrul (1991) and Karaca et al. (2012). Withers height, rump height, body length, tail length, rump width, chest width, chest dept, chest girth, shin girth, head length, head width, forehead width, ear length and ear width were measured after the sheep were put on a normal standing position on a flat surface. The analysis of data was performed by the least square means method with SPSS 23 software (SPSS, 2015) and Duncan's multiple-range test.

Results

Table 1 shows body weight, height and some length, Table 2 indicates width and girth measurements and Table 3 shows head measurements.

Table 1. The least square means for body weight, height and some lenght measurements.

		Body weight (kg)	Withers height (cm)	Rump height (cm)	Body length (cm)	Tail length (cm)
Factors	n	$\bar{x}\pm S_{\bar{x}}$	$\bar{x}\pm S_{\bar{x}}$	$\bar{x}\pm S_{\bar{x}}$	$\bar{x}\pm S_{\bar{x}}$	$\bar{x}\pm S_{\bar{x}}$
Flock		*				**
Flock-1	55	62.50±1.53	71.50±0.48	72.01±0.46	72.26±0.50	20.00±0.52
Flock-2	55	58.00±1.23	72.66±0.50	72.40±0.54	72.50±0.51	21.86±0.49
Ages			*			
1	13	58.18±3.56	72.00±1.27^{ab}	73.39±1.29	72.47±1.19	21.77±1.07
2	18	61.58±2.07	73.22±0.83^{b}	73.06±0.83	73.16±0.83	22.10±1.10
3	27	58.44±2.04	70.70±0.63^{a}	71.11±0.68	71.22±0.63	20.11±0.67
4	26	63.30±2.49	73.42±0.67^{b}	73.61±0.66	73.65±0.71	21.50±0.75
5≤	26	59.17±1.43	71.38±0.64^{ab}	71.27±0.68	71.62±0.60	20.00±0.65
Sex		***	***	***	***	***
Female	100	57.65±0.64	71.44	71.53±0.30	71.62±0.27	20.44±0.36
Male	10	86.14±2.58	78.40	79.00±1.16	79.70±0.84	25.80±0.85
General	110	60.24±1.00	72.07±0.34	72.21±0.35	72.36±0.34	20.93±0.37

*: p<0.05; **: p<0.01; ***: p<0.001; a, b: At a factor (column) the differences between the averages carrying different letters are significant. (p<0.05).

Table 2. The least square means for width circumference measurements.

		Rump width (cm)	Chest width (cm)	Chest dept (cm)	Chest girth (cm)	Shin girth (cm)
Factors	n	$\bar{x}\pm S_{\bar{x}}$	$\bar{x}\pm S_{\bar{x}}$	$\bar{x}\pm S_{\bar{x}}$	$\bar{x}\pm S_{\bar{x}}$	$\bar{x}\pm S_{\bar{x}}$
Flock		*	*	*	***	
Flock-1	55	23.96±0.35	22.95±0.28	33.78±0.34	97.47±0.91	8.38±0.10
Flock-2	55	22.96±0.22	22.01±0.23	32.80±0.27	93.32±0.73	8.10±0.09
Ages						
1	13	22.54±0.51	22.23±0.52	32.15±0.78	91.85±1.96	8.39±0.21
2	18	24.61±0.74	22.89±0.45	33.16±0.54	97.11±1.20	8.17±0.18
3	27	23.30±0.38	22.48±0.40	33.22±0.48	94.89±1.30	8.26±0.16
4	26	23.39±0.40	22.58±0.42	33.77±0.45	95.58±1.36	8.35±0.18
5≤	26	23.38±0.36	22.23±0.36	33.54±0.35	96.35±1.22	8.12±0.13
Sex		***	***	***	***	***
Female	100	23.14±0.20	22.14±0.17	32.81±0.18	94.43±0.58	8.07±0.53
Male	10	26.70±0.53	25.90±0.46	38.10±0.50	105.10±1.57	10.00±0.21
General	110	23.46±0.21	22.48±0.18	33.29±0.22	95.40±0.62	8.25±0.07

*: p<0.05; ***: p<0.001

Table 3. The least square means for head measurements.

		Head length (cm)	Head width (cm)	Forehead width (cm)	Ear length (cm)	Ear width (cm)
Factors	n	$\bar{x}\pm S_{\bar{x}}$	$\bar{x}\pm S_{\bar{x}}$	$\bar{x}\pm S_{\bar{x}}$	$\bar{x}\pm S_{\bar{x}}$	$\bar{x}\pm S_{\bar{x}}$
Flock		***	***	***		
Flock-1	55	27.98±0.20	15.96±0.19	10.60±0.13	12.52±0.16	7.86±0.11
Flock-2	55	26.69±0.30	14.35±0.17	9.87±0.14	12.10±0.15	7.85±0.08
Ages						
1	13	26.39±0.38	15.39±0.41	10.31±0.31	12.62±0.18	7.85±0.10
2	18	27.33±0.41	14.90±0.32	10.28±0.28	11.83±0.26	7.90±0.11
3	27	27.11±0.51	15.30±0.35	10.40±0.18	12.37±0.30	7.85±0.15
4	26	27.92±0.32	15.27±0.27	10.46±0.23	12.15±0.20	7.81±0.14
5≤	26	27.46±0.34	14.96±0.32	9.77±0.15	12.61±0.26	7.89±0.20
Sex		***	***	***		
Female	100	27.13±0.18	14.93±0.14	10.05±0.08	12.26±0.12	7.82±0.08
Male	10	29.40±0.65	17.40±0.22	12.10±0.38	12.90±0.46	8.20±0.13
General	110	27.33±0.19	15.16±0.15	10.23±0.10	12.31±0.12	7.85±0.07

***: p<0.001

The effect of farm on body weight (p<0.05), tail length (p<0.01), rump width (p<0.05), chest width (p<0.05), chest dept (p<0.05), chest girth (p<0.001), head length (p<0.001), head width (p<0.001), forehead width (p<0.001) was statiscally significant. The effect of age factor on withers height was statiscally significant. The effect of gender on, excluding ear length and width, body weight and all body characteristics was statiscally significant (p<0.001).

Discussion and Conclusion

In this study, the average body weight of Yalova Kıvırcık was found as 60.24 kg. This weight was determined higher than Özcan (1970a; 1970b), Yılmaz et al. (2004), breed registration form (Anonymous, 2019) (39.11, 38.14 kg, 55.2 kg and 47.5 respectively). Ceyhan et al. (2007) reported 62.60 kg, similar result with this study.

The results of body measurements of Kıvırcık sheep were higher than Özcan (1970a) and similar to the breed registration form. Also the body measurements of this research were found higher than the body measurement of Kıvırcık x Akkaraman G1crossbreed (Erol ve ark., 2017).

There are many varieties in Turkish sheep breeds even within the same breed. Norduz, Karakaş and Kangal genotypes which are variation of Akkaraman, are given as an example. Yalova Kıvırcık sheep breed is different from other Kıvırcık breed sheep. Yalova Kıvırcık sheep has lower distribution of fleece on the dorsal and dorsolateral, bare chest and abdomen, short tail with low fleece or no woolless tail. As a result, many of the Kıvırcık sheep population in Yalova (approximately 25.000) has this uniqe structure and remarkable.

Acknowledgements

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Effects of poultry red mite infestation and feed restriction during growth on feed intake and live weight in two chicken breeds

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Introduction

The development of an animal during the growth phase have an impact on the life performance and health. Diseases, pests as well as environmental stress can lead to developmental disorders and retarded growth, which in turn is characterized by a delayed production age as well as decreased production and quality. One of the most important environmental stress is malnutrition. Malnutrition, in terms of protein and energy deficiency are significantly associated with immunity (Chandara, 1997). Accordingly, appropriate nutritional conditions can reduce the incidence of disease by supporting the immune system (Klasing, 2007). The onset of a disease requires pathogens appropriate environmental conditions. In addition, the host should be sensitive to pathogens. A variation is among species, breeds and even individuals in terms of resistance and tolerance to diseases and pests. For example, Bacciu et al. (2014) reported that there is a genetic variation in coccidiosis resistance in chickens that can minimize the damage caused by the disease. However, genotypes (breeds or individuals) react differently in different environments, which is called genotype-environment interaction. Therefore, we wanted to know how different chicken breeds grow in different environments (nutrition and parasitic infestation).

Materials and methods

In the study, 240 chicks were used from two laying hen genotypes (Sussex, Atak-S) at the age of 1 day. Birds were divided in two groups as control and infested with poultry red mite (PRM). Half of both groups were fed *ad libitum* and by the other half were applied %20 feed restriction. Feed restriction was determined according to feed consumption of *ad libitum* group of control the day before. Throughout the study a 16L:8D photoperiods were applied. Feed intakes and live weights were weekly determined. In the study, the poultry red mite population started to decrease from the age of 10 weeks and no mite was observed after 12 weeks. An ANOVA-test was performed to determine the impacts of the effect sizes (infestation, genotype, fee offer) and interactions.

Results

Restricted feeding birds have consumed all the feeds offered. *Ad libitum* fed infested group was consumed more than control group in Atak-S genotype. But, this is exact opposite in Sussex genotype (Fig. 1).

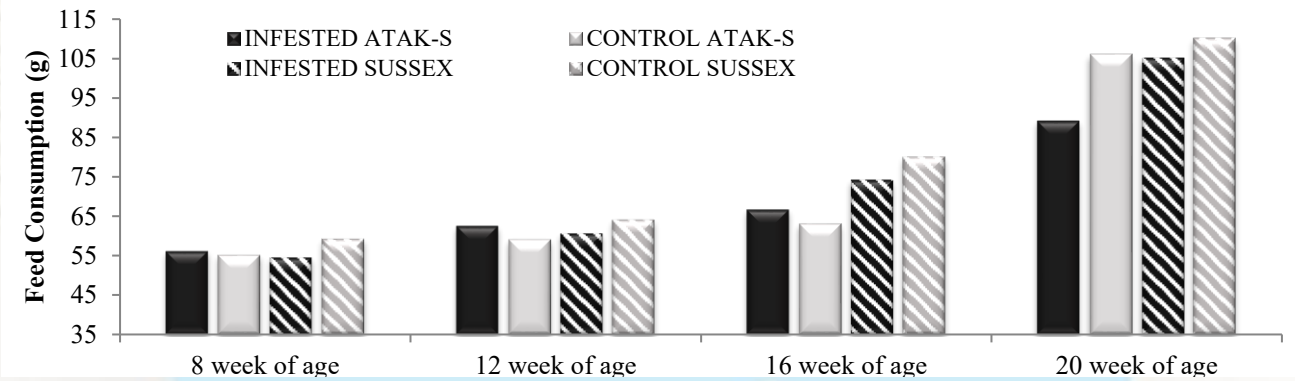

Figure 1. Daily feed consumption per animal by age (for all ages P<.0001)

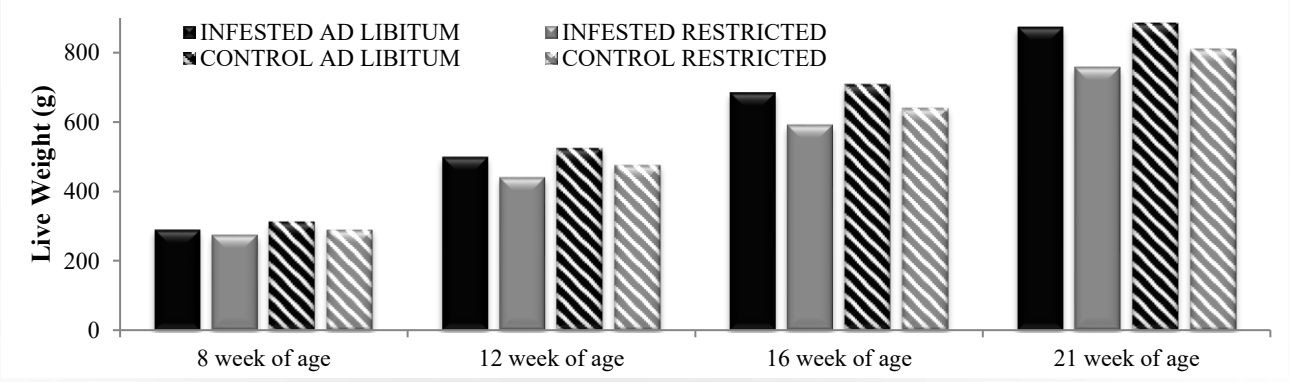

Figure 2. Live weights of infestation x feed offer groups in Atak-S (for all ages P<.0001).

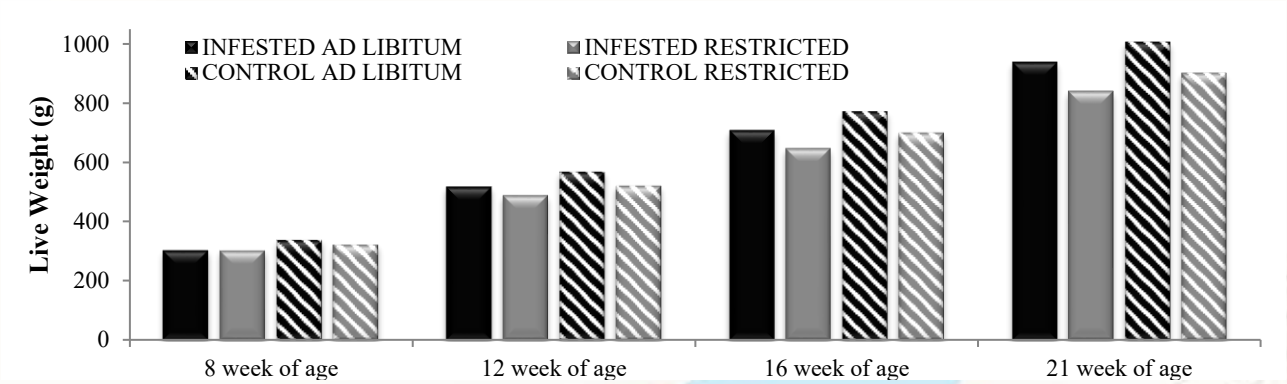

Figure 3. Live weights of infestation x feed offer groups in Sussex (for all ages P<.0001).

The infestation X genotype X feed offer interaction was no significant on live weight for all ages (P>0.05). However, as seen in Fig. 2 and Fig. 3, infestation X feed offer interaction was significant (P<.0001). Differences between subgroups differed by age, but the restricted fed infested birds always lagged significantly behind.

Conclusion

The effects of the parasites on the host are related to both the resistance mechanisms developed by the host against the parasite and the size of the parasite population affecting the host. In this study, the PRM population started to decrease from the age of 10 weeks of chickens and completely collapsed after the age of 12 weeks of the chickens. Konyalı (2016) reported that feed intake of infected birds with PRM increased in broiler and laying chickens. However, Islam et al. (1999) notice that *Lipeurus caponis* infestation resulted in decreased feed intake in chickens. Erdem (2017) write also that high infestation of PRM resulted with decreased feed intake in Japanese quails. Although, feed intakes until of 16 week of ages of the groups for Atak-S agree with the findings of Konyalı (2016), feed intake is lower in 20-week infected birds than in control birds. Control Sussex birds, however, consumed more food than infested Sussex birds in all ages.

The live weight trends of the subgroups are resulted as expected. In Atak-S chickens, however, after the mite population was collapsed, infested *ad libitum* birds seems to compensate their live weight. The infested and restricted feeding chickens, on the other hand, always lagged behind the restricted fed control birds. It seems like that in a suboptimal environment, the effects of the PRM infestation is stronger.

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RFID Technology and Usage Areas of Animal Husbandry

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Introduction

Radio frequency identification (RFID) technology is used in our daily lives, especially in textile companies, hospitals, warehouse management, agriculture and animal husbandry, cargo sector, traffic lights, turnstile transit systems, retail sector, file transfers, mobile phone payments and many other sectors. RFID technology is frequently encountered in developed countries of animal husbandry. The advantages of this technology that we have seen in animal breeding in our country in recent years, the difference from other systems, the working principle and current developments in the field of animal husbandry RFID technology is detailed in this study. In addition, in this study, RFID technology and current articles and products about this technology have been examined and it is aimed to transfer current information about animal husbandry sector and to give information about usage areas in animal husbandry.

RFID Technology and Working Principle

RFID is the transformation of data carried by radio waves into information in a controlled working environment. It can be used for tracking all living or inanimate objects. This technology, which started to be used with radar technology in the II.World War, is now working with chips that can read 1000 and more labels per second and receive information with thousands of characters memory. RFID technology with superior read and write speeds has many benefits. Some of these include: Reduces labor costs and reduces manual manpower; RFID tags can be customized or customized according to the job and location; optimizes productivity; improves the safety of shops, facilities and goods; automatic reading reduces manual processes and improves workflow.

RFID technology, which is one of the technologies that gained importance in recent years, is compared with barcode technology that is encountered almost everywhere today. The differences between these two technologies are shown in Table.1.

Table 1. RFID technology and barcode technology comparison

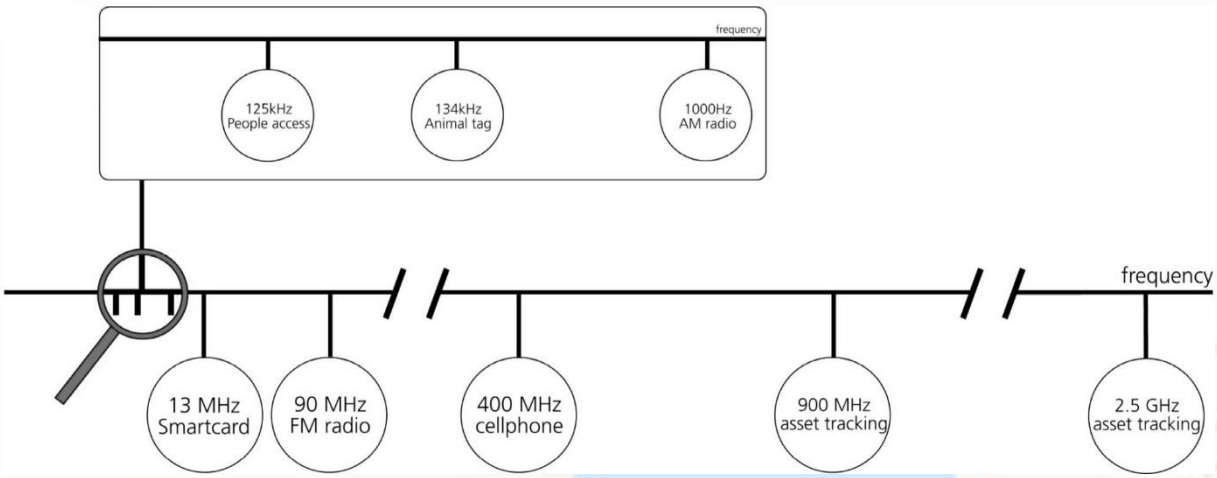
Barcode Technology	RFID technology
-Easily readable.	-The system is completely wireless and automatic.
- Visible outside the system.	- Read and write via software
-Each barcode can only be used for one product	-It is available.
- Provides a good classification.	- It's harder to reproduce.
-If it is damaged, it is not possible to work.	-Extra product descriptions can be made.
-A operator intervention may be required because it is not fully automatic.	-Uniquely identify the products through the program.
- System prices are cheap.	- System prices are expensive.

Components of RFID Technology

RFID is an automatic identification and monitoring system that has a microchip containing the object's information in its content, which can track and analyze with an antenna connected to this microchip and provides data exchange via radio frequencies by using a label that can be integrated to the objects. There are 3 main components that play a role in this information exchange. Reader, tag and antenna. Electromagnetic waves emitted by the reader reach the antenna of the label. These waves activate the microchip circuits on the label and modulate the microchip waves and send them back to the reader via the antenna. The information received by the reader is converted into a digital figure and displayed. There are controllers that play a role in the storage of the information in the system on the computer and communicate with the middleware (Maraşlı and Çıbuk, 2015).

Two kinds of RFID tags are active and passive. Passive labels are used more frequently in our country because they are cheaper. The major difference between passive labels and active labels is that the passive label does not have a power source unlike the active label. While active tags can receive data instantly and continuously at regular intervals, we can only retrieve data from passive tags with the help of a reader. The frequency range required for the passive label is therefore very low. The comparison of some frequencies with the ranges is given in Figure 1.

Figure 1. Radio frequency for animal tags

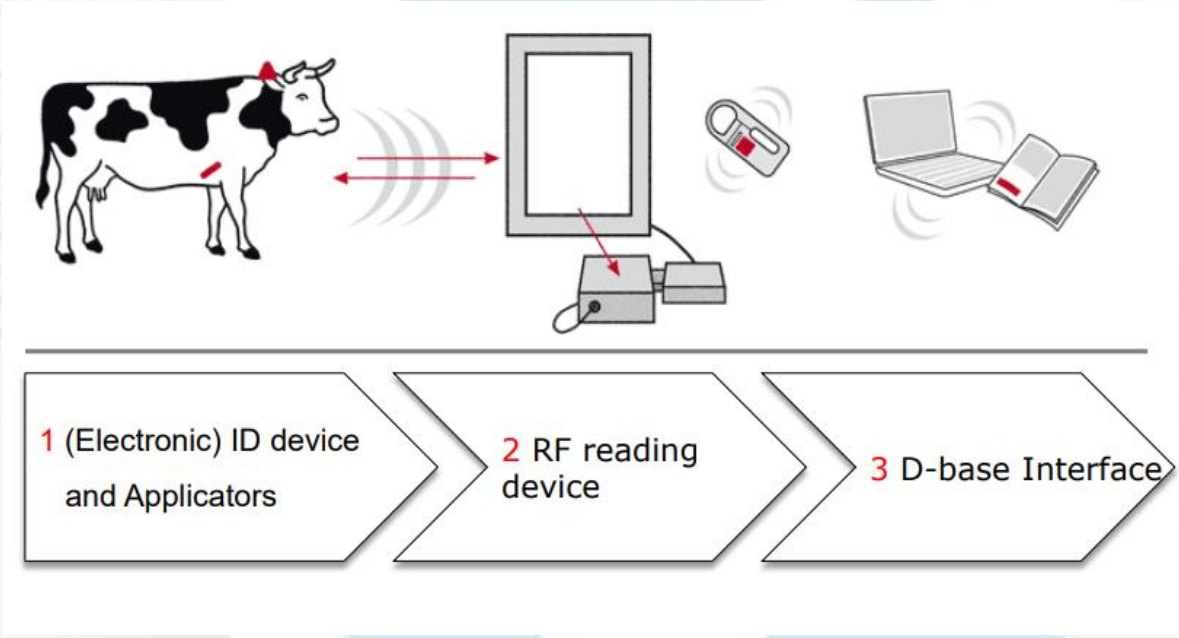


Usage Areas of RFID Technology in Animal Husbandry

RFID technology in animal husbandry is generally used for animal records, tracking systems, weighing systems. The most widely used RFID technology in the market is electronic labels and headphones. In addition to these products, many products functionally have RFID technology.

Electronic Identity (EID) means that individual animals can be tracked through an electronic ear tag throughout their entire life cycle. (Figure 2).

Figure 2. Basic RFID system with EID ear tags and boluses



The increase in the use of Electronic Identification (EID) or RFID tags has led to an increase in the number of export-dependent countries that offer mandatory traceability programs for disease control. The increase in smarter, more precise farming practices has also enabled this technology to be adopted. RFID tags provide accurate, fast and automatic identification of a single animal, eliminating the need to manually enter tag numbers (Figure 3.)

Figure 3. Example of RFID technology system in farm

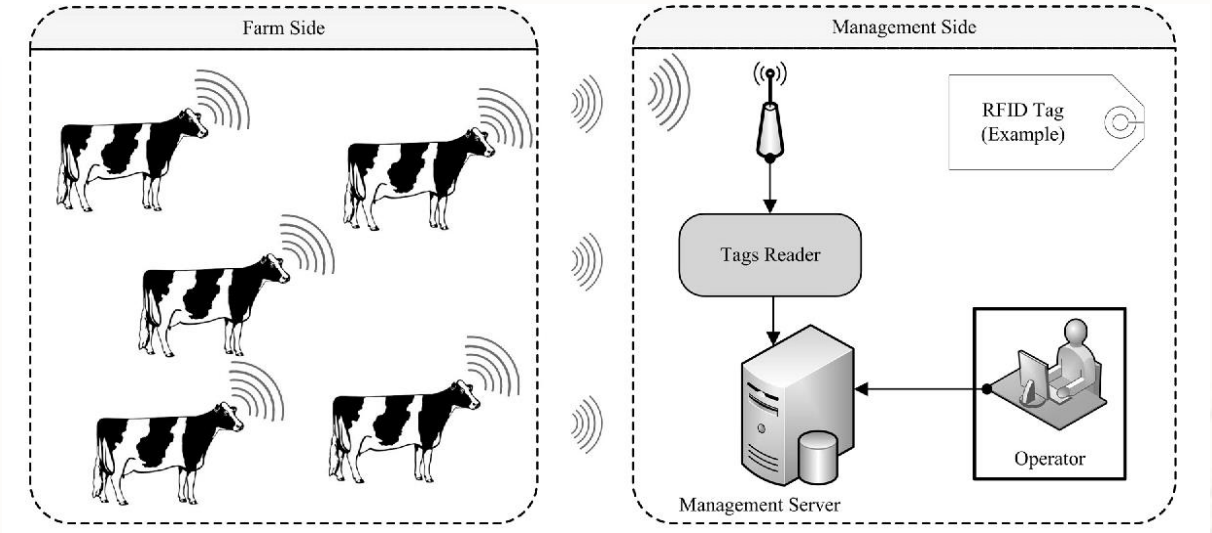
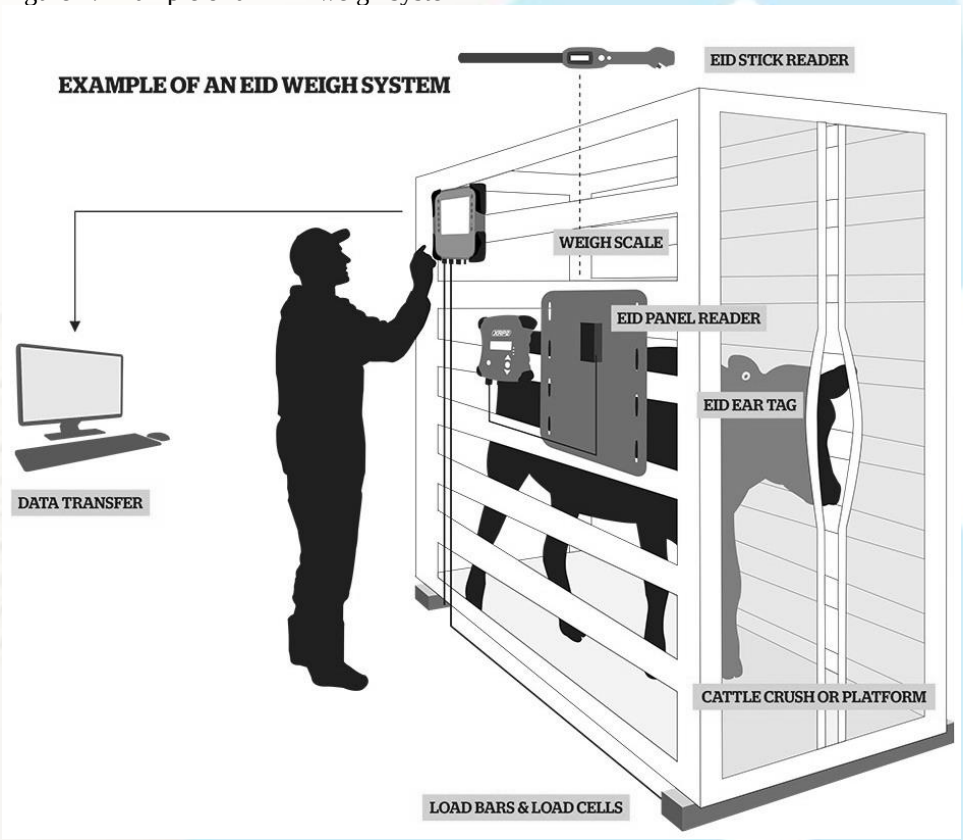


Figure 4. Example of an EID weigh system



In addition RFID makes it practical to record individual animal performance and other information such as reproductive or treatment information. Using RFID with electronic weighing scale indicator means you can instantly see the animal's full performance history while weighing; this will help you make important management decisions quickly. Over time, an animal's weight history can be monitored, good and bad performances can be determined, and the input of managed resources to maximize profit can be determined (Figure 4.).

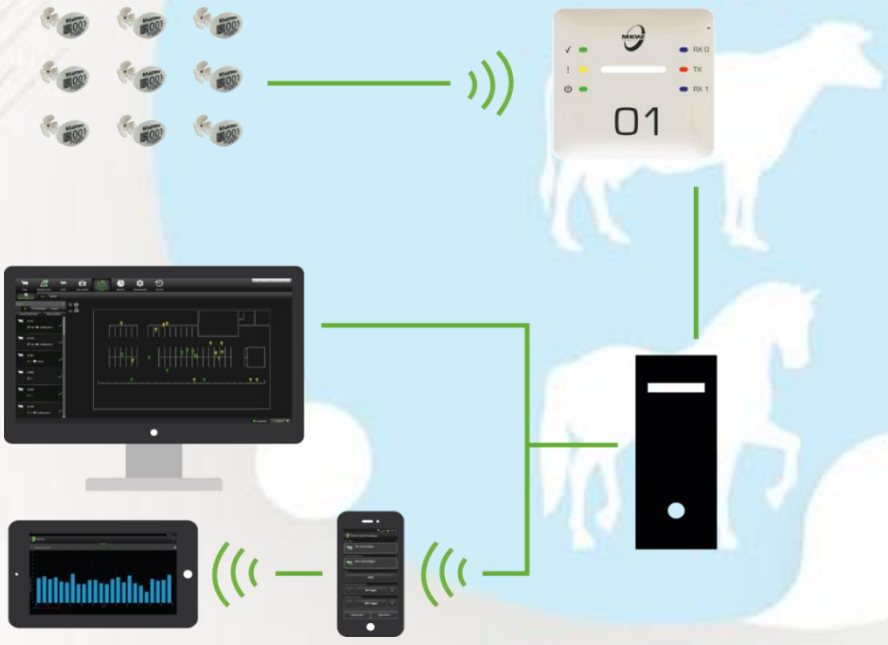
In our country, EID ear tags are compulsory in cattle by the Ministry of Agriculture and Forestry. Finally, the wearing of electronic ear tags has been made compulsory in lambs and kids. The benefit of employment in farm activities has therefore increased further. In addition, identification of animals by EID provides the breeder with the opportunity to better manage their individual performance.

In addition to electronic ear tags, EID systems include ceramic boluses, functional active RFID ear tags, implant subcutaneous chips, neck and ankle identification systems. (Figure 5.)

The RFID bolus is a ceramic capsule (UID code) containing a passive RFID microchip containing a unique, non-

replaceable, fraud protection code specific to each animal. The UID codes can be read from any non-conductive material (such as animal skin) regardless of the position of the microchip inside the animal, regardless of whether the animal is stationary or mobile. The bolus is implanted orally and the animal's adherence to rumen (second stomach) is greater than 99%. RFID boluses are suitable for cattle and sheep and
usually 20 grams, 52 grams or 72 grams in size.
EID tags with RFID technology are more common in cattle and sheep breeding. RFID tags suitable for poultry are usually for ring-shaped ankles, and tags for wings are also available.
Figure 5. Boluses, implants and leg band

Especially in large farms with a high number of animals, active tagged systems are more frequent. In addition to carrying the EID feature; rumination , location information and heat monitoring of the tracking automatically throws the system and the individual breeder has the opportunity to follow the animal continuously .(Figure 6.)
Figure 6. Example of RFID technology system with active ear tags and other components in barn



Conclusion and Discussion

RFID technology, which is used in many different sectors, is expected to solve many problems.
While the use of these systems brings time saving, labor costs and many advantages; There is also a disadvantage of creating security problems. Studies related to security vulnerabilities are continuing.
As a result, the current usage areas of RFID technology in animal husbandry have been examined and current information has been given about the latest systems. RFID technology for the future promises us in many areas. Thanks to this technology, it is envisaged that only modern enterprises will take place in our country and in the world with the increase in yields and systematic order in agriculture and animal husbandry, and traditional farming will be replaced entirely by these modern enterprises.

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The Effects of Diets With Different Protein Levels on Black Sea Trout (Salmo Labrax, Pallas 1814) Reproductive Performance

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Introduction

In this study, the reproductive performance of Black Sea trout broodstock specimens fed with diets containing different levels of protein is examined.

Materials and Methods

This study has been conducted in cooperation with Karsusan Trout Farm under the supervision of Central Fisheries Research Institute, Trabzon. In this study, a total number of 160 third generation of Black Sea trout broodstock is divided into 4 groups of 40 specimens, each group containing 20 male and 20 female specimens. Fish were fed for a period of four and a half month starting from August to December with feeds containing 35, 40, 45 and 50% of protein. Fish oil levels in all diets are kept at 15%. At the end of the trial, broodstock specimens prepared using 50 ppm benzocaine (Oswald, 1978), a standardized trout stripping protocol modified from Billard, 1992 was followed to obtain eggs and sperms, and the eggs in each group were fertilized with the sperms collected from the same group. Egg diameter is measured by using a method of measuring fish eggs (Von Bayer, 1910). Fecundity is determined by using method of Vladykov (2011).

Results

The highest fecundity (2097.00±552.94 unit per kg) is observed in group fed with 50% protein. Specimens fed with 40 and 45% protein had a fecundity of 1725.00±354.8 an 1818.44±665.67, respectively. The group fed with 35% protein showed the lowest fecundity (1531.67±352.53). There was no significant difference between groups in terms of fertilization rate (P>0.05) which varied between 97.62% and 98.98%. The number of eggs and the total weight of eggs was not significantly differentiated between groups, but the highest number of eggs are ovulated by the specimens fed with 50% protein (3771.71±1687.81 and 364.43±149.06) and with 45% protein (3718.22±2616.10 and 328.29±221.74). The highest average egg diameter (5.50±0.34 mm) is observed in specimens fed with 35% protein.

Table 1. Effects of different protein levels in feed on Black Sea trout reproductive performance

Groups	Av. No. of Eggs per broodstock	Egg diameter (mm)	Av. weight of eggs per broodstock (g)	Fecundity (unit per kg)	Fertilization rate (%)
35	2549.50±1337.69^{a}	5.50±0.34^{a}	265.71±152.12^{a}	1531.67±352.53^{c}	97.62±3.76^{a}
40	2868.89±1290.86^{a}	5.32±0.12^{ab}	264.88±134.77^{a}	1725.00±354.89^{bc}	97.59±2.68^{a}
45	3718.22±2616.10^{a}	5.21±0.11^{b}	328.29±221.74^{a}	1818.44±665.67^{bc}	97.70±4.86^{a}
50	3771.71±1687.81^{a}	5.41±0.29^{ab}	364.43±149.06^{a}	2097.00±552.94^{ab}	98.98±1.27^{a}

Mean values in column with different superscripts were significantly different (P <0.05)

Conclusion The evaluation of the data presented in this work addresses that the diet used in this study containing 50% protein was effective to increase the reproductive performance of Blacksea trout broodstock. Current knowledge can be enhanced by providing additional data for different levels and types of oil in diets. Future investigations are necessary in order to understand the reproductive performance of this species.

Acknowledgments

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Comparison of Some Traits of Dairy Cattle Farms From The Organic and Conventional Production

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Introduction

Organic farming has come out as a reaction against the negative effects of intensive input agricultural production methods on environment, human and animal health (Röss et al., 2008). According to recent studies, organic farming is applied in 181 countries on the area of 69.8 million hectares and the market volume is reported as 100 billion dollars (Willer and Lernoud, 2019). Dairy and dairy products are most demanded organic products after fruit and vegetables (Palupi et al., 2012). Organic dairy cattle farms differ from conventional production in that it is based on pasture contain basic practices for animal welfare and used limited concentrate in ration. In this study, it is aimed to compare some dairy cattle farms which produce under organic and conventional conditions.

Materials and methods

The data from the years 2011-2013 of two private dairy farms; one operating in Kelkit district of Gümüşhane province (Doğan Organik Süt A.Ş) and one operating in Lüleburgaz district of Kırklareli province (Yonca Hayvancılık A.Ş.) were used. The farm that produces in Gümüşhane is organic, whereas the plant in Kırklareli produces conventional milk, and in both of them Holstein Friesain is grown.

Results

Table 1 shows that the rate of metabolic disorders (23.5%) in organic dairy farms is lower than in conventional dairy farms (42.5%). Foot diseases are the most common problems in conventional milk cattle farm (13%) and mastitis (8%) in organic farm. In conventional milk cattle farm, the rate of culling herd caused by metabolic and other problems was 20% and in organic farm was 14%. The mortality rate (5%), which is the first reason for the culling from the herd, was the same in both farms. Foot diseases and fertility are the most important metabolic disorders leading to culling in conventional farms, and fertility (4%) is in organic farms.

Table 1. Metabolic disorders and reason for culling

Metabolic disorder	Conventional		Organic	
	Problems (%)	Culling (%)	Problems (%)	Culling (%)
Foot Diseases	13.0	3.0	2.5	0.5
Displacement of abomasum	4.0	2.5	0.5	0.5
Acidosis	8.0	1.0	1.0	0
Mastitis	10.0	2.0	8.0	1.5
Ketosis	1.5	0.5	4.0	1.0
Fertility	5.0	3.0	6.0	4.0
Milk fever	1.0	0	1.5	0
Mortality		5.0		5.0
Other		3.0		1.5
Total	**42.5**	**20.0**	**23.5**	**14.0**

Table 2 shows the average daily milk yield of Holstein Friesian cows reared in conventional and organic farms was 29 and 22 kg, respectively. Holstein Friesian cows reared under conventional conditions have higher feed efficiency and dry matter consumption. Conventional breeding has better performance in terms of insemination success, estrus detection rate and calving interval.

Table 2. Milk and reproduction traits

Traits	Conventional	Organic
Daily milk yield (kg)	29.0	22.0
Feed ration rate (milk/feed)	1.295	1.048
Dry matter intake (kg)	22.4	21.0
Forage intake (kg)	10.79	12.53
Insemination success (%)	33	28.0
Estrus detection (%)	50,0	40,0
Calving interval (days)	405	433

Conclusion

Consistent with the result reported in the previous studies (Hardeng and Edge, 2001; Bennesgard et al., 2003), the rate of metabolic disorders cattle reared under organic conditions is lower in this study. Because the concentrate feed is limited in daily ration in cattle raised under organic conditions, it causes less metabolic problems (Hardeng and Edge, 2001; Bennesgard et al., 2003). Foot diseases are higher in conventional dairy cattle farm due to the high use of concentrated feed and the lack of measures to improve animal welfare. Due to the high metabolic problems in the Holstein Friesian breeding under conventional conditions, the annual herd culling rate is higher (6%).

In accordance with previous studies (Sato et al., 2005; Bermudez et al., 2017), daily milk yield of cows raised under organic conditions was lower in this study (32%). The reason for this decrease is the limited use of concentrate feed in organic dairy cattle farms (Rosati and Aumaitra, 2004; Roesch et al., 2005; Nauta et al., 206). Because the energy, protein, vitamin and mineral needs of cattle raised under conventional conditions were better met; therefore, their fertility performance was better. Especially when breeds with high genetic potential such as Holstein Friesian are used in organic production, it is highly probable that negative energy balance resulting from limited use of concentrate feed in the ration. Its duration and severity negatively affect reproductive performance.

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Effects of Palmitic Acid Supplementation on Mid Lactational Performance of Dairy Goats

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Introduction

Supplementing animal with by-pass fat has been increase the energy consumption and feed efficiency. Using by-pass fat in the lactating ruminants diets have been widely studied by many researches (Chiliard et al., 2001; Bernard et al., 2005; Titi, 2011). Fat supplementation has been shown to increased milk production, milk fat content and improves milk fatty acid compositions (Chiliard et al., 2001; Titi, 2011). There are many types of fat sources that contain mixtures of different fatty acids are commercially available and some of them are studied in the literature and their results are variable (Rabie et al., 2012). There is a little information about using individual fatty acids on lactating animal performance. Palmitic acid (C 16:0) has been recently studied and has potentially increased milk yield and milk fat concentration in dairy cows (Lock et al., 2013; de Souza et al., 2017). The aims of this study was to evaluate the effects of using two levels of palmitic acid in the rations on mid lactation performance of dairy goats.

Material and Methods

The experiment was conducted on the Çanakkale Onsekiz Mart University Faculty of Agriculture Farm Animal Production Unit for 45 day. Thirty mid-lactation (81±12 DIM) Turkish Saanen goats were allocated in three groups (n=10). Control group (CON) fed only with total mix ration (TMR; 48.2 % DM, 16 % CP, 2.5 Mcal ME), high group (HIG) was received TMR supplemented with by-pass fat which contain 88% palmitic acid (C16:0), % 2.4 myristic acid (C14:0), % 9.2 stearik acid (C18:0) (Wilfarin, Natural Oleochemicals Sdn. Bhd.). Low group (LOW) received TMR supplemented with by-pass fat which contain 53% palmitic acid (C 16:0), % 1.8 myristic acid (C14:0), % 8.8 stearic acid (C18:0) (RumiGold Milagro.). By-pass fat supplements was given to the experiment animals 4% ration dry matter (DM) through the study. Goats were fed in group condition and feed offer twice a day (09:00 am in the morning and 04:30 pm in the afternoon). All diets were prepared to be isonitrogenous and isoenergetics. The amounts of TMR that offered to the goats were determined using NRC (2007) recommendations for mid lactation dairy goats. In the experiment feed consumption recorded daily and live weight was recorded in 15 day intervals. The body condition scores were recorded beginning, in the middle and at the end of the study. Milk production and milk nutrient composition determined by weekly. A repeated measurement variance analyses was performed with the fixed factors treatment groups (CON, LOW, HIG), age (2, 3, ≥4), birth type (single, multiple) and day in lactation as covariant as well as animal as random.

Results

The study performed in a group condition due to this the groups nutrient intake could not subjected to statistical analysis and the values were expressed as means ($\bar{x}$) and standard deviations (SD) in Table 1.

The dry matter (DM) consumption of goat groups was changed between 1.69-1.95 kg DM/day in the study. The performance values were given in the Table 2 as a least square means (LSM). There were no differences between milk yields (P=0.9076), live weight (P=0.2209) and body condition scores (P=0.3421) of the groups (Table 2).

Table 1. Daily nutrient consumption of experiment groups ($\bar{x}$±SD)*

Item	CON	LOW	HIGH
Dry mater intake kg/d	1.95±0.409	1.69±0.090	1.75±0.057
Crude protein[a]	311.78±15.499	270.12±14.034	273.31±9.169
Metabolisable energy[a]	4.87±0.242	4.97±0.219	5.11±0.143
Neutral detergent fiber[a]	798.74±39.706	692,01±35,954	715.58±23.490

*This values were calculated from the nutrient contents reported by the manufacture.
[a] g/kg DM

Table 2. Effects of palmitic acid levels on performance of lactating dairy goats, (SE[a] and P[b]-values)

Item	CON	LOW	HIGH	P
Live weight (kg)	52.60±2.353	47.97±2.094	47.48±1.896	0.2209
BCS	2.91±0.062	2.84±0.055	2.79±0.050	0.3427
4% FCM[c]	2.570±0.068	2.587±0.063	2.648±0.064	0.6706
Milk Fat (%)	4.409±0.103 b	4.704±0.092 a	5.260±0.086 c	<.0001
Milk Protein (%)	2.99±0.039a	2.84±0.035b	2.84±0.030b	0.0077
Milk Lactose (%)	4.270±0.053	4.502±0.059	4.727±0.050	0.4452
Milk Yield (kg/d)	2.29±0.153	2.33±0.136	2.25±0.123	0.9076

[a] Standard error of means
[b] Treatment effects (Diet)

[c] Yield of 4% FCM=[(0.4X milk yield)+(15Xmilk yieldX milk fat)

Milk dry matter (P=0.0011), milk fat (P<.0001) and milk protein contents were significantly changed by the groups. The highest milk dry matter content was measured in HIG group as 12.94%±0.120%. There were no differences between LOW group (12.42±0.129%) and CON group (12.32%±0.143%) for milk dry matter content. The highest milk fat content (5.260%±0.086%) was determined in HIG group and the lowest milk fat content was determined (4.409%±0.103%) in the CON group.

Conclusion

In recent study palmitic acid supplementation did not depress nutrient consumption of the groups. It is concluded that the addition of two levels of palmitic acid to the ration of lactating dairy goats in mid lactation did not change milk yield but enhance the percentage of fat, protein and total solids in the milk. Mathews et al. (2016) reported that 7 weeks supplementation of mid lactating dairy cows with palmitic acid (3.9 % ration DM) increased milk yield without depressing DM consumption. Milk yield responses of supplementing palmitic acid varied in the studies. Lock et al. (2013) and Rico et al. (2014) were reported that enriched palmitic acid supplementation no effect on milk yield whereas some studies have reported palmitic acid supplementation increased milk yield (Mosley et al., 2007; Piantoni et al., 2013). de Souza and Lock (2018) reported that enriched palmitic acid supplementation (1.5 % of ration DM) for 10 week increased milk yield and milk fat content.

There is needed for determine the blood levels of triglycerides, total cholesterol and milk fatty acid composition in further studies.

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The Effect of the Incubator O_2 and CO_2 Levels on Broilers' Hatchability

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Introduction

Management and different conditions of hatching eggs such as genetics, age, maintenance and feeding conditions of breeders, (Sarica et al., 2012; Elibol and Turkoglu, 2014) affect the overall incubation performance, mostly in common by hatchability.

It was told that levels of carbon dioxide (CO_2) and oxygen (O_2) in the incubator are very important for embryonic development and both should affect incubation performance (Lourens et al., 2007). As the air O_2 level decreases at high altitudes, the incubation performance and so the chick quality get worse. O_2 in the atmosphere is normally about 21%, (Stock and Metcalfe, 1984) and it was reported that low (<17 %) and high (25%) O_2 levels negatively affect hatching and chick performance (Stock and Metcalfe, 1984). In high places (3500 – 4000 m), like India and South America, hatchability rates drop to 20% (Ahmed et al., 2013). Compensation of this drop can be done by additional oxygen concentrators implanted to the incubators to increase the oxygen level of the air supplied. It is advised to increase O_2 level to 8.5% at 750m (Cobb, 2013) and 13.8% (Tullet, 2013) at 1500 m.

The experiment was done to investigate if the differences in the CO_2 and O_2 levels in the incubator and egg weight affect broilers' hatchability at 822m height and to examine the changes in hatchability by adding O_2.

Materials and methods

960 eggs from ROSS 308 middle-aged (41 weeks) single broiler breeder flock in Bolu were used in the experiment. Eggs were numbered individually and were weighed (±0.1 mg) by precision balance (Radwag AS 220.R2, Radwag Balance and Scales, Poland).

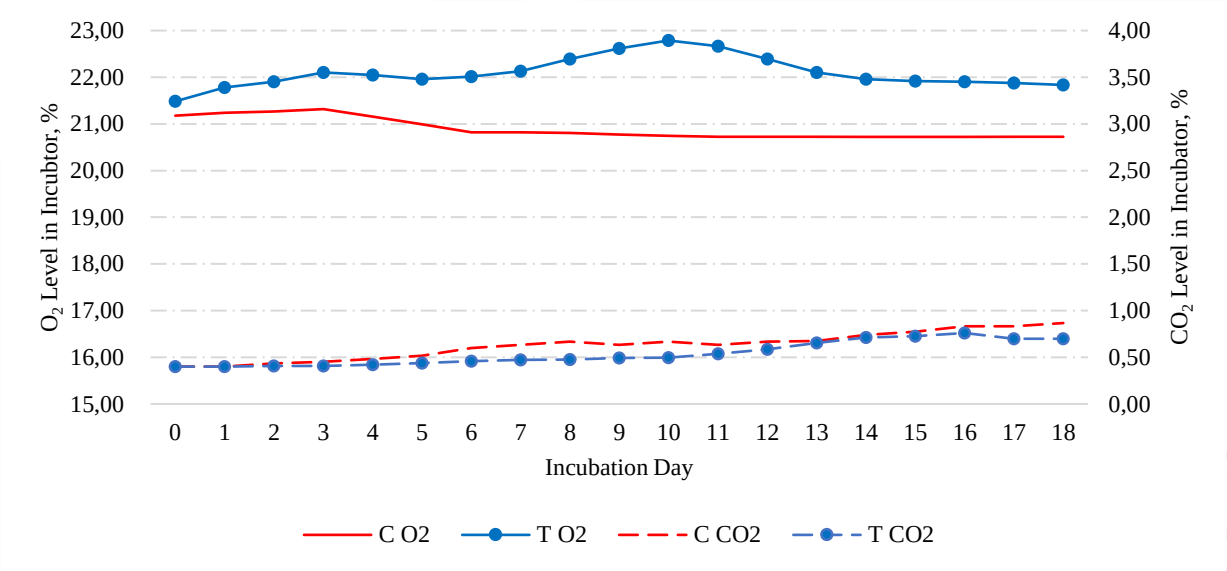
Incubation took place at the incubation laboratory of Bolu Abant Izzet Baysal University Faculty of Agriculture and Natural Sciences Department of Poultry Science with two identical incubators having capacity of 480 eggs (Cimuka 960SH, Cimuka Ltd. Co., Turkey). Both were equipped with six egg trays having a capacity of 80 eggs. As well six chick baskets with the same capacity were used after transfer of eggs. Single tray was taken as a replicate for treatments.

For three days eggs were stored at 18°C and 75% relative humidity. Then, the setter trolleys were randomly placed in the two identical incubators. Eggs were preheated at 24°C for six hours . Whole incubation period, incubators were organized to achieve 37.8°C (100.0°F) eggshell temperature.

Incubators were operated according to the control and treatment incubator ventilation programmes. Normal ventilation system was applied in the control groupwhere in treatment group, oxygen-enriched air introduction was delivered to the machine by oxygen concentrator (Hikoneb Oxybreath 10LPM, Kare Medical, Ltd. Co.). Purity of extra oxygen was 92 ± 3%. The total air drawn in the incubator was kept at about 10% of total. The trays were automatically turned 24 times a day.

CO_2 inside the incubators were measured by sensors (Hatch Eco2-01, Sti Cimuka Ltd., Turkey), and O_2 were measured and recorded by data loggers (PAC 7000, Drager Safety AG & Co. KGaA, Germany). Mean incubator CO_2 levels were 0.63% and 0.54%, and the incubator O_2 levels were 20.89% and 22.10 respectively in control and treatment respectively (Figure 1).

Figure 1. The CO_2 and O_2 levels measured in the incubator ventilation programme groups during the incubation period*



* C: Control (0.63% CO_2 and 20.89% O_2) and T: treatment (0.54% CO_2 and 22.10% O_2).

At day 18 of incubation, eggs were transferred to the hatching baskets maintaining their original places. As incubation ended, hatchability was calculated from the data obtained.
Statistical analyses were done using Minitab 16.1 softaware (2013), where analysis of variance (ANOVA) and post-hoc Tukey test were used to analyse differences between data of the treatment groups (Duzgunes et al., 1987). P-values less than 0.05 was considered to be significant. All the data were given as means ± standard error of the means (M±SEM).

Results

Average egg weight was 65.30 ± 0.24g (CV_{EW}=6.29). The EW differences between the egg weights (heavy, light and medium) were found to be significant (p=0.00), but found not to be significant between Incubator Ventilation Programme groups (p>0.05).

Table 1. The egg weight and hatchbility (H) values obtained from the study.

	Egg Weight, g	Hatchability, %
Egg Weight		
Heavy	69.63 ± 0.09[a]	90.33 ± 1.10
Medium	65.20 ± 0.04[b]	89.51 ± 1.16
Light	61.11 ± 0.08[c]	92.64 ± 0.87
Incubator Ventilation Programme		
Control	65.31 ± 0.13	90.42 ± 0.89
Treatment	65.28 ± 0.13	90.94 ± 0.78
p Number		
Egg Weight	0.000	0.100
Incubator Ventilation Programme	0,942	0,858

[abc] Different superscript letters show that the difference between the means of the groups are statistically significant (p<0.05).

According to the results, the level of the incubator O_2 level did not affect hatchability. This is thought to be due to the developments in the incubator technology and improved breeder quality during last decades.
The differences between hatchability of the groups were found not to be significant (p>0.05). It is considered that very small differences between the incubator O_2 levels should cause this. More clearly, drop in O_2 level was insufficiant at 822 m altitude. Coclusively, using an oxygen concentrator to prevent increasing CO_2 levels (from 0.54 to 0.63%) and drops of O_2 (from 22.10% to 20.89%) in areas with similar altitude may not be beneficial for hatchability.

Conclusion

As a result it can be told that incubator ventilation program does not have a significant affect on hatchability in middle-aged broiler breeders. The CO_2 and O_2 levels at the altitude of 724 m were found not to have a significant effect on hatchability, suggesting that it is unnecessary to use an oxygen concentrator or add oxygen to the incubator at these altitudes.

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Current Situation Analysis Of Beekeeping In Elazig

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Introduction

One of the biggest problems in developed or developing countries today is the lack of adequate and balanced nutrition. The rapidly increasing world population is also increasing the dimensions of this problem.

Against this rapidly developing problem, the agricultural authorities are looking for different solutions to increase animal and plant production.

One of these solutions is focused on the development of beekeeping which is one of the branches of animal production. Beekeeping creates a secure job and income opportunity especially for low-landed or landless farmers in our country and has become an important branch of agricultural activity in terms of developing the people living in the forests and the villages.

When the effect of bees on plant pollination is taken into consideration, the role of beekeeping in the agricultural sector becomes more evident (Kutlu: 2005,24-25).

Geographical location, unique topographic and geomorphological structure, forest areas suitable for the cultivation of industrial crops such as cotton, sunflowers, having different ecological characteristics, having a rich flora, flowering in different regions of the year, the existing honey plant species in the world ¾ It makes it a very convenient feature for reasons such as having the reputation of our country beekeeping and Turkey is increasing the chances of beekeeping (Fıratlı: 2000.17 to 21, Köselman: 2016, 308-321.).

The importance of honey in human nutrition, increased use of beeswax, pollen, royal jelly and bee venom, and the introduction of bee-keeping for the purpose of creating additional income sources of landless and landed farmers and low-income families have led to the increase and spread of the importance of beekeeping (Kaftanoglu: 1995.).

According to the data of 2017, there are 7,991,000 bee colonies in our country and 114,471 tons of honey is produced from these, and the yield per colony is calculated as 14,32 kg (Anonymous1: 2017.). Turkey in terms of production and the total number of colonies of honey is among the leading countries in beekeeping.

However, honey yield per colony and honey cannot perform the same in terms of foreign trade.

The world's average yield of honey per colony colony is around 13-17 kg from 24 kg in the colonies according to these values in Turkey.

There are 1030 active producers registered in the union in Elazığ, 67,373 thousand bee colonies and 229 tons of honey were produced and the average colony was 3.0 kg (Anonymous2: 2017).

Turkey Elazığ beekeeping contribute to beekeeping in some colonies was 0.2% in honey production was 0.83%.

Tunceli colonies average honey yield (3 kg / colony) Turkey colony average honey yield (14.32 kg / colony) 11:32 kg less. There are 77 organic honey producing plants and 2 queen bees producing plants throughout the province.

The aim of this study is to outline the structure and activities of beekeeping in the province, and to discuss the problems encountered and to make suggestions for the use of information and technology in order to ensure profitability and sustainability.

Materials and methods

Within the scope of the research, to determine the general status of beekeepers and beekeeping in Elazığ, a survey was conducted with face-to-face and a multiple-choice with 100 beekeepers randomly selected among 10% of the beekeepers' union members .

The survey includes 28 questions to determine the general structure of beekeeping conducted throughout the province.

In the survey form, the relationship between beekeepers, beekeepers have been doing beekeeping, the number of colonies, honey yield, non-beekeeping activities,reasons for starting beekeeping, beekeeping learning patterns, educational status, age, production diversity, fixed or migratory beekeeping status, income level , methods of combating diseases and pests, queen bee exchange times, queen bee supply places, colony losses according to years, the causes of death of dead colonies, varroa disease combat time and shape, as product marketing questions were asked.

Conclusion

Age of the beekeepers was in the first place in the 41-50 age group with a rate of 36%. averages were similar in the study. In many studies, the age group was examined and it was understood that the age group was more than 50 years old. Beekeepers with 6-10 years of experience are the first in 35% of beekeeping experience. In a study conducted in Kirsehir province, it was determined to be 1-10% at 77% [Firatli: 2000,17-21]. Our study in Elazig was similar to the study in Kirsehir. When the colony distribution of the enterprises is examined, there are between 100-200 colonies at the rate of 68% and the rate of those who make beekeeping with 200 or more colonies is 19%. The honey yields are examined, it is seen that the beekeepers with 30 or less beehives receive the most, but the numbers are similar to each other. According to this result, an average number of bees should be between 150 for an economic beekeeping. The education level of beekeepers was 3% literate, 48% secondary education, 34% high school and 15% university graduates.

Turkey A survey 40% of beekeepers across the elementary school, 24% were found to be university graduates and 33%

(Firatli: 2000.17-21).
Our study in Elazig was similar to the study in Kirsehir, but it was lower than the study in Van.
In parallel with the increase in the level of education, it is seen that the productivity has also increased.
It has been observed that there is an increase in the level of education Lack of hours
In our study, it was seen that 35% of families, 31% of beekeepers, 25% of related institutions and organizations.
In a study conducted in Tunceli, it was stated that 35% families and 24% beekeeping rates were effective in learning and performing beekeeping (Kutlu: 2017).
57% of the beekeepers in Pulumur district have seen a course, 11% stated that they have begun to learn by their father, 8% by themselves and 24% from another beekeeper (Yerlikaya: 2007). Elazig beekeepers follow the developments related to beekeeping by beekeeping books and publications by 6%, television programs by 32% and internet by 29%. In another study, it was found that 24.8% of the beekeepers used books, experienced beekeepers and the internet to increase their professional knowledge and experience (Köselman: 2016,308-321).
While 73% of the beekeepers participating in the study are the only source of income, apiculture income is 27%. In addition to the agricultural activities of the farmers, it is observed that beekeeping is 44% as additional income.
In the study conducted in Malatya, it was stated that beekeeping was generally performed as a stroller (85%) (Karlıdağ: 2015,23-32).
In this study we conducted in Elazig province, it was determined that stroller beekeeping was made less than beekeeping in Malatya province and it was seen that Adana, Mersin and Hatay were the most accommodation places.
When beekeepers need information or solve their problems, 52% turn to agricultural organizations, 19% to experienced beekeepers, and 29% to beekeepers' associations.
The lack of hours of the courses offered for the certification purposes only, without the caller and hive.
In order to eliminate the deficiencies, they do not have sufficient information, they have come to the fore that they want periodic information studies.
In the researches, it was stated that the average honey yields of bee colonies where one-year-old queen bees were found (23 kg) were given 21% more honey than the queen bees with two-year-old bee (19 kg) colonies (Kutlu: 2005, 19-22.).
In terms of queen bee usage, they change two by 21%. They usually provide queen bees from Mersin and two local businesses.
The rate of those who do not use queen bees is 50% and it is seen that they multiply their colonies by dividing them naturally (Happy Birthday: 2005). In a study conducted in the year of queen bee needs by producing their own.

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In vitro Effectiveness of Applied Acaricides Against Dermanyssus Gallinae Isolated From Free Range Farms

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Introduction

Dermanyssus gallinae (De Geer, 1778), poultry red mite, is the most dangerous ectoparasites of the poultry. This parasite feeds on blood of the host and the rest of the feeding time it hides in cracks and crevices in the near of its host. It can be difficult to detect because it is not present on the host expect of feeding time and it is a relatively small parasite. So, it is very difficult to estimate of the infestation rate regarding with *Dermanyssus gallinae*. The use of synthetic acaricides are one of the main methods of control against *Dermanyssus galliane*. But the use of chemical products is serious residual problem. After fipronil scandals in Europe, the farmers are more careful but uneasy and the consumers are more skeptical about poultry products. Additionally, Long-term and unconscious use of high concentrations of acaricides was resulted with lead to the resistance of D. gallinae to acaridial agents (Chauve 1998, Cencek et al. 2011, Zdybel et al. 2011; Koziatek and Sokół, 2015). Chirico and Tauson, (2002) were remarked that the using acaricides does not reduce the numbers of mites and there is the risk of the development of acaricide resistance. Rate of resistance by mites depends, among others, on frequency of acaricide application (Zdybel et al., 2011). Additionally, the control is more complicated because of biology and life cycle of *Dermanyssys galliane*. It was observed that the prevalence of poultry red mite was 73% in Canakkale Province (Konyali and Savas, 2016). The most widely used method is the applied of acaricides on the way of spraying to the reached areas of the barn. The aim of this investigation was to estimate the resistance of poultry red mite populations from free range barns to commonly used acaricides.

Materials and methods

The investigation was carried out on poultry red mites *Dermanyssus gallinae* collected from 5 free range farms of laying hens localised in Çanakkale Province. Mean number of birds in the examined farms was about 2500 (1500–5000). The mites were collected from farms into plastic tubes. Then the mites were divided into six containers (about 1-3 g of parasites in each tube). The investigations were carried out on living mites 2-3 d after collection from the farm. Efficacy of the acaricides was estimated by used method of Cencek et al. (2011). Examination was carried out on the plates made (patent No. P-376067; Cencek et al. 2011) using the veneer disc as the ground (imitating a rough surface). The seven commercial acaricides were investigated and the commercially names of used acaricides were reserved due ethical values. Each examination was carried out in four replicates and the solution of acaricide was applied to the plates. Four plates were constituted as the control group with moistened discs with water without acaricides. Mites were put on the surface of each plate discs (about 100 mites per disc) after drying (after 24 h). The dead mites were counted by using a stereoscopic microscope and reflected light on each plate. For each plate, a mortality rate of mites was calculated with the correction taking the mortality in the control group into consideration (so-called Abbott correction). An average constituted the final count, around four repetitions. An ANOVA-test was performed to determine the impacts of the effect sizes (farm and acaricide) and interactions.

Results

The mean results for the efficacy of acaricides against were presented in Table 1. This study of examined 7 commercial acaricides showed that the most effective against red mite populations were Ac4 and Ac1. Ac4 had 97.1% and Ac1 80.8% efficiency. The range of effectiviness was varied 0.00-100% in examined farms. It was found that there was variation between acaricides used and Ac3 and Ac5 had lowest efficiency according to this method. Table 2 presents the statistical analysis efficiency (%) of tested acaricides by farms. The presented results show that there were significant differences between used acaricides and examined farms regarding to efficiency ($P<.0001$). Additionally, Acaricide*Farm interaction was found to be significant on effectiveness ($P<.0001$; Table 2). Effectiveness of examined acaricides was varied by farms. But Ac4 was most effective in all farms.

Table 1. Mean, standard deviation (SD), the lowest and hightest values of efficiency (%) of tested acaricides

Acaricides	Ac1	Ac2	Ac3	Ac4	Ac5	Ac6	Ac7
Mean	80.8	42.6	10.7	97.1	8.0	71.0	48.0
SD	6.9	15.7	7.2	3.0	5.0	10.0	15.2
The lowest	70.6	15.0	0.0	90.0	0.0	50.0	25.0
The highest	96.0	76.0	23.6	100.0	21.0	93.1	77.0

Table 2. LS-means and standard error of means (SEM) for efficiency of (%) of tested acaricides by farms.

Farms	**Farm 1**	**Farm 2**	**Farm 3**	**Farm 4**	**Farm 5**	**SEM**	**Acaricide**	**Farm**	**Acar*Farm**
Acaricides	LSM	LSM	LSM	LSM	LSM				
Ac1	78.0^{k}	77.7^{k}	77.6^{k}	77.3^{k}	93.2^{m}				
Ac2	25.3^{e}	66.5^{hi}	40.3^{f}	46.1^{g}	34.9^{f}				
Ac3	5.8^{ab}	18.2^{d}	9.4^{bc}	16.2^{d}	4.1^{a}				
Ac4	96.6^{m}	98.4^{m}	97.8^{m}	97.3^{m}	95.4^{m}	2.1	<.0001	<.0001	<.0001
Ac5	7.1^{ab}	14.3^{cd}	3.7^{a}	4.8^{a}	10.0^{bc}				
Ac6	62.2^{h}	84.6^{l}	63.6^{hi}	71.8^{j}	72.8^{jk}				
Ac7	36.5^{f}	68.4^{ij}	36.8^{f}	38.6^{f}	62.5^{h}				

LSM: least-squares means; within a main effect (farm and acaricide), with uncommon superscript letters are different (P< 0.05).

Conclusion

The use of chemicals against poultry red mite is not always a definite solution. It was seen that farmers have no information on which agent, when and how they have to use. That is a big problem in the control of *Dermanyssus gallinae* due to the resistance of mites to used chemicals. The differences with regard to acaricide effectiveness were shown that acaricide resistance is big threat on examined farms. Although mites were obtained from only one region, the variation was observed between farms. It is assumed that the different applications of the farms have an effect on this variation. This study showed that the success of the acaricides used in the farms in order to control of mites may vary according to the farms. It should be noted that ineffective pesticide applications would resulted with labor losses, economic losses and additionally negative effects on animals and its products. It is required that the agents actively used throughout Turkey's acaricide market need to be examined and this will contribute to success in the control of *Dermanyssus gallinae*.

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Cow, Sheep and Goat Colostrum Content Comparisons

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Introduction

Interms of animal production, the loss of offspring in ruminants is a big problem in farm conditions and production has reached to damaging level. While increasing the survival of the ruminant offspring which closely related to colostrum quality and management. It is the defense system that protects the organism from external factors and is gained by some substances coming from milk and the diseases passed. Non-nutrient biologically active substances of colostrum, for example, IgG, somatotropin, prolactin, insulin and glucagon, come directly from the blood. Due to its role in the development of immunity due to its colostrum nourishing properties, its function in calf feeding is very important. The results of the study show that unlike humans, the placenta of ruminants is not permeable to macromolecules such as immunoglobulin (Ig) from the mother (Medvezki, 1989). This explains why calves are very sensitive to infection agents. It is reported that there is very little Ig in the calf blood serum before sucking colostrum, and there is little or no alternative support system with bactericidal and lysozyme activity (Gerovve et al., 1987). Therefore, the consumption of quality colostrum in the first hours after birth has a very important role in the development of calf health. Adequate and timely consumption of milk has a fundamental role in the development of passive immunity in calves. Although colostrum delays the development of an active immune response in calves, it is of great importance in preventing neonatal diseases (Blecha 1988; Blood and Radostits, 1989). However, there are differences in the level of immunoglobulin in calves and 41% of calves are reported to be below 1000 mg / dl (Sellers, 2001). The antibody content of colostrum is influenced by many factors. The age of the mother, nutritional status during the dry period, whether or not vaccinated during the dry period and the environment in which the mother is raised are the most important factors. Factors such as malnutrition of the mother, especially in the dry period, disruptions in the immune system and stress prevent the desired content of the antibody content of colostrum (Flesh, 1982). Research shows that the average concentration of IgG1, a subgroup of IgG in Holstein, is 48 g /L and ranges from 20 to> 100 g/L. In Jerseys, this is reported to be between 66 g/L and limits between 28 and 115 g/L. However, there are differences within the race. This variation in colostrum IgG content between 20 and 100 g/L raises the issue of colostrum deficiency and insufficiency. The age of the cows is an important factor affecting the quality of colostrum (immunoglobulin concentration). The colostrum of older cows is of higher quality than the heifers of their first birth. However, despite the fact that the animal is old, it is a very important factor in the disease it is exposed to, and whatever the pathogen is exposed to in the snow, it means protection against pathogen in the colostrum. The type of antibody in the colostrum develops depending on the disease or vaccination of the cow. In addition, they can produce antibodies specific to surrounding organisms in which cattle are grown. Leaking or expressing milk from prenatal breasts will significantly reduce colostrum antibody levels. The time to get colostrum from the cow, in other words, the first colostrum taken after birth, contains 2 times more immunoglobulin than later. In general, colostrum produced in excess amount has less Ig concentration than colostrum produced in less amount (Sellers, 2001). Cows that give more than 8 kg colostrum in their first milking generally have lower Ig concentration. This is a general assumption and does not mean that there is a constant relationship between Ig concentration and milk yield. Long-term corticosteroids taken up to 20 days before birth suppress (reduce) the immunoglobulin concentration in the colostrum. However, because the quality of the colostrum is very important, herd management must be taken into consideration. The quality of colostrum secreted by a cow can be determined by the total gamma globulin density. The amount and properties of colostrum produced also vary according to many factors. Many factors such as age, breed, pre-pregnancy feeding level, dry time, difficult birth, size and behavioral factors affect the quality of colostrum (Arthington, 1999; Earley and Morin et al., 2001; Logan and Penhale, 1971). Vaz et al. (2004) reported that 79.7% of colostrum samples had good quality, 14.9% had medium quality, and 5.4% had low quality grade. Milk fat is very valuable elements of milk. Due to its physical properties, milk fat positively affects the structure of dairy products. Essential fatty acids, medium chain fatty acids, vitamins are important in terms of nutritional physiology due to the ease of digestion and the energy it provides. Because it has a pleasant taste, it is important in terms of sensory superiority in dairy products. As it is a valuable substance, it is economically important in the pricing of milk and dairy products. Lipid content and characteristics affect milk quality and milk value. Laakso et al. (1996) reported that the proportions of stearic acid, oleic acid and short-chain fatty acids (C4–C10) in colostrum were low and increased thereafter. Palmquist et al. (1993) observed that the proportions of short-chain fatty acids, with the exception of C4, are low in colostrum. Laakso et al. (1996) reported that the relative amounts of C12–C16 in colostrum, in particular myristic and palmitic acids, were high initially and decreased with time post-partum. Lynch et al. (1992) reported that colostrum contains high levels of C18:0 and C18:1.

In this study, cattle, sheep and goats conditions in Turkey have developed immunity level and fatty acid composition were determined and compared aspect of fatty acid contents.

Materials and methods

Colostrum samples taken from first lactating mothers in intensive ruminant farms. For lipid analysis, 120 mL of methanol / chloroform (1/2) was added to 15 g of the sample and mixed in the homogenizer. 20 mL of 0.4% $CaCl_2$was added to the

filter paper, and next day, the upper layer of methanol-water is removed with the help of a seperatory funnel. Chloroform from the chloroform-lipid fraction is evaporated using a evaporator in a water bath at +60 ° C. From the extracted lipid, 4mL of 2M KOH and 2mL of n-heptane are added to 25 mg of the extracted fat sample for fatty acid. The mixture is stirred in a vortex for 2 minutes at room temperature and centrifuged at 4000 rpm for 10 minutes and the heptane layer is taken for analysis by gaschromatography (GC). pH changes in the colostrum were measured using a digital pH meter. For total crude protein analysis, 1 g of homogenized sample in Kjeldahl tubes was added to 2 Kjeldahl Tablets (Merck, TP826558) and 20 mL of H2SO4 and burned for 2-3 hours. 75 mL of water is added. The tubes with 25 mL of 40% boric acid (H3BO3) solution are added to the Kjeldahl apparatus and distilled with 40% NaOH for 6 minutes. The solution in the flasks taken from the Kjeldahl apparatus is titrated with 0.1 M HCl until the color is clear. For ash analysis, porcelain crucibles were dried in the oven for 2 hours at 103 ºC and tared on 0.1 mg sensitive scale. 3.3-5 g of the sample is weighed and burned at +550 ºC for 4 hours. Crucibles were freed in the oven at 105 ° C for 1 hour and cooled in a desiccator for 30 minutes, then tared on a sensitive balance of 0.1mg. Approximately 4-5g of homogenized sample is weighed into tared crucibles and dried at 105 °C (24 hours). Data were analyzed using the SPSS 2016 program. Data were analyzed by analysis of variance(ANOVA) in order to determine statistical differences between group of means. Significance was determined at $P<0.05$.

Results

Milk defined as the fluid secretion of the female mammary gland; through species-specific nutritional requirements of the neonate of the species. The composition of milk changes over the period of lactation depending on the many factors. The mammary gland secretation which produced immediately after parturition (Levieux & Ollier, 1999) or through the first few days after birth (Tsioulpas, Grandison, & Lewis, 2007) called colostrum. Chemical composition and fatty acid contents of ruminant colostrum is given Table 1.

Table 1. Chemical composition and fatty acid contents of ruminant colostrum

Species / content	Goat	Sheep	Cow	**P value**
Protein (%)	7,86±0,65	17,26±4,79	7,04±3,19	,000
Fat (%)	10,34±4,02	10,92±0,93	4,35±0,43	,000
Moisture (%)	70,85±0,73	76,57±6,84	82,88±1,85	,000
Ash (%)	1,00±0,38	1,99±0,78	0,51±0,74	,000
pH	6,32±0,03	6,13±0,01	6,16±0,09	,000
∑SFA	57,76	51,24	58,82	
∑MUFA	31,89	39,79	29,7	
∑PUFA	3,27	3,56	3,49	

Form table 1, can be seen that the fat and protein content of colostrum is high for sheep between the groups. The amount of fat content in infant feeding is very important in terms of energy production, absorption of fat-soluble vitamins and the provision of essential fatty acids. The amount of fat content in colostrum feeding is very important in terms of energy production, absorption of fat-soluble vitamins and the provision of essential fatty acids.

∑SFA ratio (51.24%) of sheep is lower than goat and cow colostrum (57.76% and 58.82%, respectively) while ∑ MUFA rates were high in sheep (39.79%) and low in goats and cows (31.89% and 29.7%), respectively. ∑ PUFA rates were high in sheep and cows (3.56% and 3.49%), although it was low in goats (3.27%). Polyunsaturated fatty acids (PUFA) are involved in the formation of hormone-like compounds. PUFAs are divided into omega-6 and omega-3 (Newton, 1997). Linoleic acid (C18: 2). y - linolenic acid (GLNA, C18: 3) and arachidonic acid (ARA, C20: 4) are the most important omega- 6 polyunsaturated fatty acids and are usually found in plants. Known (d-3 polyunsaturated fatty acids are α-linolenic acid (ALNA, C18: 3) and its metabolites eicosapentaenoic acid (EPA, C20: 5) and docosahexaenoic acid (DHA, C22: 6). The chemical composition of ruminants and the data obtained in the analysis of fatty acids are similar to the previous studies (Ahmadi et al. 2016). The fat content of colostrum is higher than that of milk (Kehoe et al. 2007; Morrill et al. 2012) Abd El-fattah et al. (2012) reported a decrease in the fat content of colostrum from Holstein cows from 8.04% at parturition to 3.9% after 5 days. The fatty acid composition of feedstuffs was a greater influence on the fatty acid composition of milk fat. Microbial action in the rumen results in greater modification of dietary fats. JAWORSKI and JAWORSKA (1973) indicated that milk fat of cows in the early period of lactation was characterised by higher concentrations of unsaturated fatty acids (especially in the second month) in comparison to the later lactation phases. PALMQUIST et al. (1993) indicated that colostrum had a low content of short-chain fatty acids (except for C4:0 acid) and a high content of C18:0 and C18:1 acids. The lowest content of trans C18:1 isomers, ranging from 1.32% to 2.45%, was noted in the colostrum samples taken on the day of calving. Paszczyk et al (2005) reported that the highest fat content was found in the colostrum on the day of calving which fat content fluctuated in the samples collected on subsequent days of lactation. Further some milk samples it was found to be low (on day 24 of lactation, as little as 2% of fat, and 2.2% of fat. also, the average contents of fat in the colostrum and milk of all cows amounted to 5.5% and 3.7%. Cows are in a negative energy balance after parturition because of high mobilisation of adipose tissue, fatty acids which are incorporated into milk fat (Belyea and Adams 1990). This reulted high levels of long-chain fatty acids in colostrum. Long-chain fatty acids inhibit short-chain fatty acids (Bauman and Davis 1974). Laakso et al. (1996) observed changes in the TAG distribution during the colostral period, i.e. the proportion of molecules with an acyl carbon number (ACN) 38–40

increased and those with ACN 44–48 decreased. Paszczyk et al. (2005) reported that colostrum contains a lower content of *trans* fatty acids and *cis*-9 *trans*-11 C18:2 (CLA) than milk.

Conclusion

Milk fat is very valuable elements of milk. Due to its physical properties, milk fat positively affects the structure of dairy products. Lipids contain vitamins A, D, E, and K as well as basic (i.e. linoleic and linolenic acids) and conditionally essential fatty acids (i.e. arachidonic, eicosapentaenoic and docosahexaenoic acids). Essential fatty acids, medium chain fatty acids, vitamins are important in terms of nutritional physiology due to the ease of digestion and the energy it provides. Because it has a pleasant taste, it is important in terms of sensory superiority in dairy products. As it is a valuable substance, it is economically important in the pricing of milk and dairy products. Lipid content and characteristics affect milk quality and milk value. Results of this study showed that chemical composition and fatty acids content are similar but differ from each other species significantly similarly previous study results.

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The Importance of Fatty Acids From Aquatic Food Products

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Introduction

Most of the studies showed that nutrients and eating habits have two main factors affecting the health. Recently, the diseases associated with high level of cholesterol are caused by the red meat. For this reason, authorities recommend to consume foods rich in unsaturated fatty acids. Considerable attention has been paid to the role of polyunsaturated fatty acids (PUFA) in human health (Lavie et al., 2009). Clinical studies suggest that high dietary intake of the omega-3 polyunsaturated fatty acids (omega-3 PUFA) found in fish oils (eicosapentaenoic and docosahexaenoic acids) may lower the incidence of heart failure (Duda et al. 2009). In animal studies, fish oil favourably changes cardiac mitochondrial function. The omega-3 PUFA found in plant sources, α-linolenic acid, may also be protective in heart failure; on the other hand, the evidence is not as compelling as for fish oil. This review summarizes the evidence related to use of omega-3 PUFA supplementation as a potential treatment for heart failure and discusses possible mechanisms of action.

Owing to their high nutritional quality as a food, fish and fishery products play an important role in a healthy human diet. They are rich in protein, contain low cholesterol, high percentage of polyunsaturated fatty acids of the n-3 family and essential minerals. Fish include high and balanced content of essential fatty acids especially EPA (C20:5 n-3) and DHA (C22:6 n-3). These fatty acids is crucial in human nutrition, health, and disease prevention.

There is extensive evidence in support of the concept that a high intake of omega-3 PUFA from fish oil (EPA and DHA) exerts cardioprotective effects in terms of coronary artery disease and sudden cardiac death (Kris-Etherton et al., 2003; Mozaffarian, 2008). On the basis of this evidence, current dietary guidelines recommend a daily intake of 1 g of EPA + DHA for primary and secondary prevention of coronary heart disease (Lichtenstein et al., 2006) while higher pharmacological doses of 3–4 g/day are recommended for the treatment of hypertriglyceridaemia (Jacobson, 2008). Epidemiological and experimental studies indicate that omega-3 PUFA of marine origin may prevent the development of heart failure at relatively low intakes that can be obtained only through high consumption of oily fish (~0.5 g/day of EPA + DHA).

Marine algae and phytoplankton are primary sources of omega 3 fatty acids. Omega-3 PUFA are one of the two classes of essential fatty acids, which cannot be synthesized by mammals because the necessary enzymes to place a double bond at the omega-3 position are absent (Roche, 1999). Therefore, omega-3 PUFA must be obtained from the diet. The most widely available omega-3PUFA for humans is α-linolenic acid (ALA, 18:3n-3) which is rich in some of vegetable oils such as flaxseed oil, canola oil, and soybean oil. ALA can be converted by chain elongation and desaturation into long-chain omega-3 PUFA containing 20 or more carbon atoms, EPA 20:5n-3 and DHA 22:6n-3. Approximately 1–5% of dietary ALA is converted to EPA, and an additional <0.1% is converted to DHA, in young men. In women, this conversion is somewhat greater and is reduced by ~50% with a Western diet rich in n-6 PUFA. Both EPA and DHA are found in fish oil, while DHA is found high level in eggs, mother's milk, and some algae.

Materials and methods

This review has been developed with the aim of generating an updated information on contents of omega-3 fatty acids in many freshwater fish, marine fish and other aquatic organisms and also to assess the effect omega-3 long chain PUFAs on health.

Results

Table 1 shows studies that lipid and fatty acids contents of many freshwater fish and marine species and also other aquatic organisms which relate to the study of omega-3 LC-PUFAs in the prevention and treatment of cardio vascular disease.

Table 1. Lipid and fatty acid compositions of freshwater fish, marine fish and other aquatic organisms

Freshwater fish	**% lipid**	**C18:2 n6**	**C18:3 n3**	**C20:5 n3**	**C22:6 n3**	**References**
Rainbow trout (*Oncorhynchus mykiss*)	1.0-1.12	3.63-4.2	1.7-3.95	8.1-8.19	21.8-32.2	(Blanchet et al., 2005; Fallah et al., 2011)
North African catfish (*Clarias gariepinus*)	3.21	6.98	2.23	2.10	6.72	Ozogul et al. (2007)
Common carp (*Cyprinus carpio*)	0.88	6.39	3.36	5.86	8.21	Ozogul et al. (2007)
Wels catfish (*Siluris glanis*)	0.54	2.50	1.22	2.76	14.8	Ozogul et al. (2007)
Tench (*Tinca tinca*)	0.61	2.18	0.93	8.71	16.8	Ozogul et al. (2007)
Kutum (*Rutilus frisii*)	1.52	1.48	1.01	13.8	9.97	Ozogul et al. (2007)
Zander (*Sander lucioperca*)	0.39	1.62	0.62	3.59	24.8	Ozogul et al. (2007)
Marine fish						
Anchovy (*Engraulis encrasicolus*)	0.50-6.22	nd	nd	10.30-10.76	22.25-26.57	Ozogul et al. (2012)
Silver sillago (*Silllago sihoma*)	0.73-2.36	0-0.96	0.34-0.40	7.29-7.54	14.47-15.83	Ozogul et al. (2011)
Por's goatfish (*Upeneus pori*)	1.07-2.10	1.10-1.23	0.39-0.68	4.78-6.75	14.44-29.99	Ozogul et al. (2011)
Sea bream (*Sparus aurata*)	0.86-1.2	1.10-2.18	0.12-0.83	4.98-6.52	15.51-34.87	Ozogul et al. (2011 and 2012)
Brushtooth lizardfish (*Saurida undosquamis*)	1.07-1.64	0.86-1.31	0.31-0.56	2.96-6.28	25.58-28.97	Ozogul et al. (2011 and 2012)
Waker (*Epinephelus auneus*)	0.69-0.76	0.28-1.10	0.15-0.39	4.07-5.10	28.52-29.99	Ozogul et al. (2011)
Red mullet (*Mullus barbatus*)	1.07-3.0	0.19-0.47	0.25-049	7.27-8.34	15.82-25.14	Ozogul et al. (2011)
Sardine (*Sardinella aurita*)	3.23-9.94	nd	nd	13.16-17.55	1.86-5.68	Ozogul et al. (2012) and Ozogul et al. (2007)
Common sole (*Solea solea*)	0.70-1.11	0.14-1.46	0.56-0.74	0.21-7.69	18.7-30.44	Ozogul et al. (2007 and 2011)
Bogue (*Boops boops*)	3.64	0.93	0.39	5.09	18.7	Ozogul et al. (2007)
Mullet (*Mugil cephalus*)	2.09	1.79	1.38	10.5	7.69	Ozogul et al. (2007)
Scad (*Trachurus mediterraneous*)	1.37	1.40	0.34	5.39	36.2	Ozogul et al. (2007)
Pandora (*Pagellus erythrinus*)	1.67	0.99	0.31	5.27	21.9	Ozogul et al. (2007)
Red scorpion fish (*Scorpaena scrofa*)	0.87	4.03	0.28	4.74	28	Ozogul et al. (2007)
Turbot (*Scopthalmus maeticus*)	1.30	1.87	0.46	5.25	30.3	Ozogul et al. (2007)
Mackerel (*Scomber scombrus*)	1.16	3.46	0.72	4.74	35.2	Ozogul et al. (2007)
Marbled spinefoot (*Siganus rivulatus*)	1.21	2.01	0.89	4.33	11.7	Ozogul et al. (2007)
Sea bass (*Dicentrarchus labrax*)	3.02	14.0	1.61	7.02	14.7	Ozogul et al. (2007)
Other aquatic organisms						
Cuttle fish (*Sepia officinalis*)	0.74-0-1.52	0.50-1.73	0.05-0.50	15.44-17.70	27-33	Ayas and Ozogul (2011) and Ozogul et al. (2008)
European squid (*Loligo vulgaris*)	1.34-1.92	0.17-1.33	0.05-0.06	12.05-14.31	36-39	Ozogul et al. (2008)
Common octopus (*Octopus vulgaris*)	0.54-0.94	0.4-1.95	0.11-0.18	12.23-16.97	25.54-29.57	Ozogul et al. (2008)
Musky octopus (*Eledone moschata*)	0.60-0.62	0.60-1.69	0.11-0.16	7.86-12.23	20.99-28.23	Ozogul et al. (2008)

nd:not determined

Compared to marine fish species, freshwater fish contain highlevels of C18 PUFA and low levels of the n3 EPA and DHA (Ackman, 1989). Freshwater fish are generally characterized by high levels of n6 PUFA, especially linoleic acid (18:2n6) and arachidonic acid (20:4n6). Since freshwater fish have lower levels of long-chain n3 PUFA than marine fish (Rahman, et al., 1995), the ratio of total n3 to n6 fatty acids is much higher for marine fish than freshwater fish, varying from 5 to 10 or more.

The fatty acid composition of marine fish oils are affected by the fatty acid composition of their natural foods (Grigorakis et al., 2002) based on their natural diet especially whether a species is herbivorous, omnivorous or carnivorous (Sargent, et al., 1995). In addition, the fatty acid composition of different individual fish of the same species can vary due to season,

diet, age, reproductive status of fish, location, gender and environmental conditions. It has been found that water temperature affects the fatty acid compositionof fish lipids. As the temperature decreases, the proportion of unsaturated fatty acids in phospholipids and neutral lipids increases (Farkas et al., 1980). Considerable amounts of research have been carried out on rearing conditions for their effects of diet on fatty acid profiles of fish flesh. The results showed that the fatty acid composition of fish reflects that of the diet (Watanabe, 1982; Suzuki et al., 1986).

Conclusion

Marine foods are an important part of the Mediterranean diet. The beneficial effect of seafood consumption on human health has been related to the high content of n-3 fatty acids (FAs), especially EPA and DHA. The n-3:n-6, polyunsaturated (PUFA)/saturated fatty acid (SFA) and EPA + DHA ratios are regarded as useful criteria for comparing relative nutritional and oxidation values of marine oils. Compared with freshwater fish, marine fish have higher levels of PUFAs, especially DHA and EPA. Although some EPA and DHA can be synthesised in vivo from α-linolenic acid, recent data indicate this source to be very limited, suggesting that EPA and DHA should be classified as dietary essentials. In many parts of Europe the daily intake of EPA+DHA by adults and especially young adults (18–24 years) is <100 mg/d, since many never eat oily fish (Givens and Gibbs, 2008). Nutritionists indicate that the desirable n-6 to n-3 fatty acid ratio should be 5. A very high n-6/n-3 ratio causes many diseases. Now, it is commonly recommended to increase the n-3 fatty acid content of the diet, mainly by consumption of fish at least two or three times a week (200+300 g fish per week), which may provide approximately 200+400 mg EPA and DHA a day.

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The Relationships Among Body Condition Score, Milk Yield, and Milk Composition in Holstein Cows

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Introduction

Lactation period and energy balance significantly lead to variation of milk fat percentage and change different milk composition (Nogalski et al., 2012). Researchers have started to study on the relationships between BCS and milk productivity. Lents et al. (1997) and Singh et al. (2009) observed that milk fat and solids-non-fat (SNF) were not affected by BCS in milk. Doreau et al. (1993) reported that fatty animals had the highest milk fat content. Mushtaq et al. (2012) determined that there was a negative correlation between BCS and milk yield and lactose, but a positive correlation between fat and protein in milk. Mishra et al. (2016) found that BCS had a linear and inverse correlation with fat yield and protein yield. Therefore, an ideal body condition BCS for dairy cattle during the lactation optimizes not only milk yield, but also milk quality (Singh et al., 2015).

BCS has been regularly used in dairy cattle management in several countries for a long time. In Turkey, on the other hand, it is a relatively new method and has been used mostly for research purposes so far. It has been suggested that there are no consistent results regarding the correlation of BCS with milk yield and milk composition (Roche et al., 2013). Further studies are needed to investigate milk parameters having an economic importance during early postpartum period for different environmental conditions. Therefore, the objective of the study was to estimate the relationships between BCS and milk yield and its composition in Holstein cows.

Material and Methods

The data were collected from 317 Holstein cows during the first 150 days in milk (DIM) of lactation between December 2014 and April 2016. This period was chosen to characterize energy balance throughout the duration of negative energy balance (NEB). There is the highest milk yield during early lactation (Jílek et al., 2008); therefore, it is very important to control BCS during this period. The cows were assigned to three groups in terms of parity; first lactation (n=107), second lactation (n=97), and third and older lactation (≥3, n=113).

Milk yield records were taken during each milking. Milk composition was determined by using a single milk sample collected monthly during a morning milking. For the analysis of milk composition, milk samples were taken during the morning milking for 30, 60, 90, 120 and 150 DIM (±15 days) on a monthly basis, and these cows were scored in terms of body condition score (BCS) on these days.

Fat, protein, solids-non-fat (SNF), and lactose in milk were recorded on the same day and were determined with an automatic milk analyzer (Funke-Gerber, Labortechnik, Article No 3510, Berlin, Germany). Fat yield (TDMY*fat) and protein yield (TDMY*protein) were calculated by the help of the values obtained as a result of the analyses.

Body condition was scored monthly by a single trained evaluator, using a 5-point scale (1-thin, 5-fat) with 0.25-point intervals (Edmonson et al., 1989).

In this study, statistical analysis of repeated measures data was performed using the general linear model (GLM) procedure in the SPSS (SPSS 17.0) statistical program.

Results

Parity affected BCS, SNF, protein, lactose, fat yield and protein yield (P<0.05); but did not affect fat. The highest BCS was determined in the first parity, but the lowest was observed in third parity. The highest TDMY, fat yield, and protein yield values were observed in the third parity. On the other hand, the lowest TDMY, fat yield, and protein yield were observed in the first parity. The highest SNF, protein, and lactose values were observed in the third parity compared to the first and second lactations (P<0.05).

The effects of DIM on BCS, TDMY, SNF, protein, lactose, fat yield, and protein yield were significantly important. Whereas, DIM had no significant effect on fat. BCS was the lowest in 30 DIM and increased linearly until 150 DIM (P<0.05). While the lowest TDMY, fat yield, and protein yield were observed in 150 DIM, the highest SNF, protein, and lactose were observed in 120 DIM and 150 DIM. In other words, as lactation progressed, TDMY, fat yield and protein yield increased, but BCS, SNF, protein, and lactose decreased.

Table 1 - Effects of body condition score on milk yield and composition

BCS groups		N	TDMY (kg)	Fat (%)	SNF (%)	Protein (%)	Lactose (%)	Fat Yield (kg)	Protein Yield (kg)
Low	(≤2.50)	374	38.21±0.388^{a}	3.27±0.041^{b}	8.83±0.021^{c}	3.23±0.009^{c}	4.80±0.012^{c}	1.24±0.019^{a}	1.24±0.013^{a}
Moderate	(2.75-3.00)	640	36.01±0.272^{b}	3.32±0.028^{b}	8.92±0.016^{b}	3.27±0.007^{b}	4.85±0.010^{b}	1.19±0.013^{b}	1.18±0.009^{b}
High	(≥3.25)	345	33.10±0.383^{c}	3.47±0.038^{a}	9.08±0.023^{a}	3.34±0.009^{a}	4.95±0.014^{a}	1.14±0.016^{c}	1.10±0.013^{c}

a,b,c – values within the same column with different letters are different at the level P<0.05

BCS: body condition score, TDMY: test day milk yield, SNF: solids-non-fat

Table 1 shows milk yield and its components affected by BCS groups (P<0.05). The highest TDMY, fat yield, and protein

yield were determined in cows with low BCS (BCS≤2.50) compared to the other BCS groups. The cows with high BCS (BCS≥3.25) had higher fat, SNF, protein, and lactose (P<0.05) than cows with low (BCS≤2.50) and moderate BCS (BCS=2.75-3.00) groups.

BCS had positive correlations (P<0.05) with fat (r=0.12), SNF (r=0.23), protein (r=0.22), and lactose (r=0.21), but negative correlations with TDMY (r=-0.27), fat yield (r=-0.11), and protein yield (r=-0.22). TDMY had negative correlations with fat (r=-0.17), SNF (r=-0.13), protein (r=-0.13) and lactose (r=-0.13) (P<0.05). Positive correlations were determined between TDMY and fat yield (r=0.61) and protein yield (r=0.97) (P<0.05).

Conclusions

In the present study, except for fat, the effects of parity and DIM on BCS, SNF, lactose, fat yield and protein yield were significantly important. TDMY, fat yield and protein yield usually increased; whereas, SNF, protein and lactose decreased with advancing parity. Also, BCS, SNF, protein, and lactose increased throughout the lactation, but TDMY, fat yield and protein yield decreased. TDMY, fat yield and protein yield were the highest in cows with low BCS (BCS≤2.50). However, the highest fat, SNF, protein and lactose were determined in cows with high BCS (BCS≥3.25). The correlations of BCS with TDMY, fat yield, and protein yield were negative, but its correlation with fat, SNF, protein, and lactose were positive. Consequently, BCS can be used as an indicator of milk yield and its composition in dairy cows.

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Sweat Odor Compound Properties of Holstein Cows

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Introduction

Sweating is one of the physiological (natural) functions to keep body temperature constant. Dowling (1958) reported that sweating in cattle is important for thermoregulation mechanism. Skin surface and its properties in cattle is one of the most studied subjects from different aspects. However, although regulation of sweating and body temperature is one of the main tasks, there are very few studies focusing on sweat glands or their biology.

Studies have shown that there are regional anatomical differences in sweat gland density (Findlay and Yang 1950). In addition, Berman (1971) in his research, suggests that the temperature of the skin is the main input that directs the rate of sweating. Sweating and inhalation are two of the main autonomic responses exhibited by animals under temperature stress. Sweating causes evaporative heat loss from the skin surface, while respiration is used to heat water vapor and to remove heat from the lungs in the form of vaporized moisture. Evaporative cooling at high temperatures in dairy cattle is the most important method of heat loss (Gebremedhin and Wu, 2001;2008). Cattle sweat is hypotonic, containing mostly potassium (K^+), along with sodium (Na^+) and chloride (Cl^-) (Johnson, 1970) In their study by Nascimento (2015), they stated that sweat glands are important in thermoregulation of cattle in hot environment and also help to dissipate heat. Studies on the histology of the gland are important to identify heat removal and perspiration capacity and secretory potential. Mochalski et al. (2015) stated that volatile organic compounds (VOCs) emitted by the human body can provide valuable information about a person's physiological state and thus create a chemical signature that can be seen to detect stress and disease states. For this study, they created a database of potential biological markers of human presence based on literature reports on human respiratory rate, skin emissions, and VOCs in blood and urine. They tried to determine the approximate proportions of these VOCs in the human body. Animals emit a range of molecules that are volatile and non-volatile, depending on their immune status, stress, nutrition, and genetic status. A large number of volatile compounds can be emitted from different parts of the body. SPME-GC / MS developed for the analysis of animal odor profiles allows identification of volatile organic compounds found in cow odor samples. By this method it is possible to determine the combination of the relative ratios of the common compounds and the presence of the different compounds. The secretion of sweat in temperature stress and disease states of animals may contain different substances as biological markers of particular disease or adverse events in the body. Volatile odor compounds (pheromones) emitted from feces, urine, saliva, milk, vaginal discharge and sweat of cows are composed of a combination of two or more chemicals that are spread at certain rates to be biologically active (Wyatt 2009 and 2010). Sweat is a dilute electrolyte solution excreted by the eccrine (sweat) glands in the skin of mammals. Although the main function of perspiration is to control body temperature by evaporative cooling, it has been proposed that certain components of sweating (eg androstadienone (4,16-androstadien-3-one)) can also be used as chemosignals that affect the hormonal balance and therefore behave as feromonal stimuli. The lack of a broad application of the term sweat in medicine and biology is explained by the difficulties sufficient for the analytical work of the sweating sample. Although the sweat composition is essentially water, previous studies have shown that various organic and inorganic compounds are also present. Volatile organic compounds (VOCs) emitted by an animal body can provide valuable information about the physiological state of the animal. Gas compounds [such as reduced sulfur compounds (RSC), organic acids, carbonyls and nitrogenous compounds (ammonia and trimethyl amine)] have been searched for the determination of volatile odor components (Wyatt, 2009). Since sweat glands are the most common in the neck region, sweat samples are taken from the neck region which is thought to be the most perspiration. GC-mass spectrometry (MS) was identified. The advancement of analytical methods such as GC, GC-MS and GC-MS-O provided the opportunity to identify VOCs for disease and disease-specific VOCs in research laboratories. Finally, it should be noted that odor information is useful in elucidating the cause of diseases. Some infectious or metabolic diseases will be possible by explaining the mechanisms underlying the production of specific odors. Microbial analysis of volatile organic compounds (VOCs) from biological samples and investigation of biosynthetic pathways that produce relevant VOCs from patients may help to better understand the pathophysiological mechanisms that cause a particular disease (Wyatt, 2010). The loss of evaporation depends on moisture and physiological factors, for example the activity and density of the sweat glands. In cattle, body cooling by cutaneous evaporation is the most effective way to dissipate heat, and so perspiration glands are the most important for adapting ruminants into the tropical environment. The hypothesis that volatile organic compounds (VOCs) emitted by the living body can provide valuable information about the physiological state of the organism and thus generate a chemical signature to detect stress and disease states has formed the starting point of this study. Because volatile organic compounds (VOCs) emitted by the body through sweat can provide valuable information about the physiological state of the organism and thus generate a chemical signature to identify stress and disease (Pandeyand Kim, 2010). In this study, it was aimed to determine sweat odor compound properties of Holstein cows.

Materials and methods

Animal material of this study 3-7 years old, the similar (physiologic stage, body weight, and milk production level) 6 Holstein cows were used. Sweat samples taken from the neck region of the animal where sweat glands are the mostly placed. The sample moved freely at the sampling site for 30 minutes before sampling. GasChromatography /

MassSpectrometry (GC / MS) method used to detect sweat chemical odor compounds in siliconized glass bottles. Samples from each animal were analyzed in 3 replicates using GasChromatography / MassSpectrometry (GC/MS) method . Data description were made using the SPSS 2019 program.

Results

Odour is a volatile chemical compound that animals perceive via the sense of smell or olfaction. The type of odor molecule is called an aroma compound or an odorant. These compounds have been studied widely in plants, bacteria and insects, and to a much lesser extent in vertebrates. Chemical odor compounds detected in the sweat of animals were given Table 1.

Table 1. Chemical odor compounds detected in the sweat of Holstein cows

Compund name	Rate (%)	Minimum	Maksimum
Butane,1-bromo-1,1,2,2,3,3,4,4,4-nonafluoro-	22,93±4,6	1,00	41,30
methyl 2-(3-phenylprop-2-enamido)acetate	5,34±1,66	,00	16,50
1H-Indole	14,99±2,1	3,00	29,30
benzoicacidethyl ester	3,04±,45	,00	4,80
1-Octanol, pentadecafluoro-	6,65±2,03	,00	20,20
Nonadecan-1-ol trimethylsilylether	10,93±1,72	,00	18,50
Perfluorotributylamine	47,18±6,69	7,00	89,10
Heptadecanoicacid	11,69±,97	7,30	18,00
1-Pyridineacetamide, 3-cyano-N-	9,38±2,83	,00	28,20
Phosphine, 1,2-ethanediylbis	11,94±,51	9,40	15,20
1-Propanamine, 3-dibenzo[b,e] thiepin	10,74±,54	7,20	13,10

Chemical odor compounds detected in the sweat of Holstein cows are Butane,1-bromo-1,1,2,2,3,3,4,4,4-nonafluoro, methyl 2-(3-phenylprop-2-enamido)acetate, 1H-Indole, benzoicacidethyl ester, 1-Octanol, pentadecafluoro, Nonadecan-1-ol trimethylsilylether, Perfluorotributylamine, Heptadecanoicacid, 1-Pyridineacetamide, 3-cyano-N, Phosphine, 1,2-ethanediylbis and 1-Propanamine, 3-dibenzo[b,e] thiepin. Minimum maximum values is very differ between the samples. When Chemical odor compounds results (Table 1) is examined, it is seen that the chemical odor compounds of the animals significantly varies between animals. This are very işnetersting copounds which can be used for cattle specific information. Organic odorants fall into several categories, including esters, terpenes, amines, aromatics, aldehydes, alcohols, thiols, ketones, and lactones (Helmestine, 2019). The molecular weights of these compounds less than 300 Daltons, and are readily dispersed in the air due to their high vapor pressure. Gebremedhin et al (2001) reported that the differences in sweating rates were statistically significant at $P < 0.05$ between breeds, between black and white hair coats, and changes in solar load, relative humidity, and air velocity. Also wetting the skin surface and increasing air velocity profoundly increased evaporation rate by converting sensible heat to latent heat. Other factors can be summarized as follows: hair coat physical and optical properties, coat density and thickness, hair length and color, and skin color.

Dowling (1958) was the first to clearly demonstrate that sweating in cattle is important for thermoregulation. In the 1950s, bovine sweat glands were found to be apocrine and associated with hair follicles. However, there is no comprehensive data on the activity and properties of sweat glands based on recent technology results. It has been proposed that volatile organic compounds (VOCs) emitted by the living body can provide valuable information about the physiological state of the organism and thus generate a chemical signature to detect stress and disease states. Schleger et al. (1971) in their work in the rate of sweating between the micro-areas of beef skin emerged significant differences and morphological differences between these areas were investigated. Among the characters most closely related to sweating performance, follicle percentage and sweat gland layer were applied. Neither sweat gland volume nor follicle density had a direct effect on sweating rate. The growth phase of the hair follicle has a strong effect on capillary feeding into the sweat gland, and this appears to be a critical factor in sweat gland performance. Blazquez et al. (1994) in their study in the lumbodorsal, perineal and scrotal regions of cattle moisture evaporation rates in the skin, thermoelectric and high ambient temperature was measured. Evaporation rates of heifers and bulls in perineal and scrotal regions were higher than lumbodorsal areas ($P <0.001$). When the cows and bulls were transferred from the thermoneutral to a warm environment, the lumbodorsal evaporation rate increased significantly ($P <0$ 001) and the evaporation rate in the bulls showed a similar increase; it was found that the rate of evaporation from the perineum of cows under the same conditions was lower ($P <0.05$). Nascimento (2015), stated that sweat glands are important in the thermoregulation of cattle and in addition they help to dissipate heat in the body. Studies on the histology of sweat glands are important in terms of heat removal and perspiration capacity and secretory potential, and the investigator has determined the glandular epithelial height, glandular length and sweat gland per cm2 of the three-year-old cattle by histomorphometry. Digital images were analyzed on a Trinocular BX40 Olympus microscope coupled with a connected Oly - 200 camera. Images were magnified with 2x, 4x, 10x and 40x magnification microscopes and measurements were evaluated using HL Image 97 program. Glandular epithelium height, depth of glands, length and density of glandular section per cm 2 were analyzed. Glandular epithelium of calves was higher than

heifers (P = 0.0024) and cows (P = 0.0191). The depth of the gland was not affected by age and the secretion rates of cows were higher than heifers (P = 0.0379) and calves (P = 0.0077). Heifers were more sweat glands per cm2 skin (P = 0.023). In cattle, glandular epithelial height and density decreased as animals grew. In their study by. Johnson (1970) reported that the sweating rate of cattle B. indicus cross-bred cows had higher sweating rates than B. taurus cows at high air temperatures but the difference between the groups was not significant statistically also were generally highest on the shoulder and lowest on the lumbar region. also researcher reported that the secretions from cattle skin at high ambient temperatures contained at least four to five times as much potassium as sodium and total sodium and potassium loss through the skin of these experimental animals at the highest ambient temperatures was estimated to be no more than 1–3 % of the sodium and potassium intake in the feed. Sweat also important criteria at hign temperature enviroment for heat stress combat. Sweating plays an important role in promoting heat loss from cattle under thermal stress. But Joshi et al (1970) reported that the low chloride secretion indicates that under hot conditions cattle do not have a need for large amounts of salt replacement in the diet. Atrian and Shahryar (2012), they stated that increased sweat is an important mechanism for reducing the body's excessive heat. They added that this mechanism leads to a decrease in body temperature, but this event causes many body electrolytes such as potassium to be ejected and acid-base imbalance of the body. They stated that water, sodium, potassium and chlorine are important elements of sweat and that sweating is the most important thermoregulation mechanism used to dissipate excess body temperature.

Conclusion

Animals emit a range of volatile and non-volatile molecules depending on their physiological state, ambient temperature, stress, diet and genetic conditions. A large number of volatile compounds can be emitted from different parts of the body. Limited study has been conducted to explain the mechanism of volatile odor compounds produced in the body, which is the most important compound for body odor. The sweat content of the cattle is capable of providing information on many physiological changes of the animal. However, there is a need for extensive studies on this subject in order to know what changes in sweat in which situation. The type of odor molecule have been studied widely in plants, bacteria and insects, and to a much lesser extent in vertebrates. But still detailed research required for more convenient aplication.

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Camel as a Last Resisting Livestock Face to Climate Change Catastrophes

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Introduction

Climate Change (CC) is the world's weather changes, generally by increasing or decreasing the average global temperature and particularly by the hotness induced by human activities that increase emissions of greenhouse gases. Globally, CC is a challenge on environmental, economic and social issues (Mendelsohn et al., 2006). CC is also seen as a life danger threatening most species in their ecosystems, even threatening the survey of livestock, their production and reproduction all over the world (Baumgard et al, 2012).

Emission of gases like carbon dioxide (CO_2), nitrous oxide (N_2O), vapors, hydrofluorocarbons, methane,… in the atmosphere induce the increase of the average Earth's surface heat, this may constitute an alarming issue worldwide especially when the emission of these gases (known as greenhouse gases) surpasses the threshold (Smit et al., 2014; Li et al., 2016) . That threshold is important because, according to some authors, greenhouse gases are very utile for the survey of animals and plants on the Earth. Those gases have the retention capacity of the heat atmosphere at the point that without them this Earth would really be hostile to the life.

Nonetheless, CC generally cause important catastrophes such as glaciers that melt and cause the increasing of precipitations, shifting of seasons, drought, floods, occurrence of some extreme weather events, etc. All these catastrophes, once associated with the increase of global population and the decrease of income growth, are accused to threaten food security worldwide (Gerald et al., 2009). The food security is related to crops and animal productions. Focusing on animal productions, the decrease of animal products (meat, milk, egg, honey…) quantity and quality is considered as the primary consequence of CC. To withstand these harsh conditions, agro-pastoralists from different countries, African countries included, shifted from cattle to small livestock and camel management.

As far as camel is concerned, it has been affected by the recent extreme climatic conditions that caused severe drought in recent years (Sejian and Jassim, 2015). Camel is also well known to possess adaptive capabilities to withstand extreme weather conditions whether very cold or very hot. According to its preference of deserted areas and harsh environmental conditions, Camel has been called a "ship of the desert" (Koç and Atasever, 2016).

The description of adaptive capabilities of Camels face to CC catastrophes is the main objective of this review. Readers and farmers will get some knowledge about distinctive characteristics of camels as the future insurance regarding animal products during CC scenario.

Climate Change-induced Catastrophes

CC is caused by human activities such as deforestation, industrialization, human-induced wild fires, petrol management, livestock management, etc. Those activities affect all sectors of life without excluding human life and animals. All those activities result in greenhouse gas (GHG) and methane emissions. Those gases warm the earth and cause some consequences such as increase of precipitations induced by melting of glaciers, extreme weather conditions causing season shifting, extreme rainfall, drought, floods, wild fires, cyclones, hurricanes, etc. It is also observed the lowering of continents' superficies induced by ocean's water level increased by melting glaciers. All those facts cause disequilibrium in natural resources and this leads to severe problems. They also result in natural invasion of insects, apparition of disease vectors, new pests and a series of zoonosis. Note also that CC causes a long period of extension of drought, floods, wildfires, cyclones and severe heat waves (IPCC, 2014).

As far as agriculture is concerned, a slight elevation of global temperature directly affects crop production and provokes apparition of weed, plant diseases and pest. Consequently, crop breeders shift to long-term plants as a consequence of failure due to short-term crops triggered by weather condition changes. For instance, the increase of 2°C of local temperature has negative effect on most agriculture products (IPCC, 2014). It was estimated at 25.5% the contribution of agricultural greenhouse gases emissions regarding the globally radioactive forcing (FAO, 2009). However, CC has generally a negative impact on agriculture.

Camel and Climate Change

As other livestock, camels are also affected by CC catastrophes but they can withstand those catastrophes better than any other livestock. Animals such as cattle, goats, sheep and camels are directly affected by those catastrophes but exceptionally camels are classified amongst the most drought-resilient animals. It is known that the shifting to extreme weather affects animal productions (milk, meat, egg... especially quality and quantity), reproduction, animal welfare, live weight and metabolism, hence the lost in general yield. In the same context, animals with high productivity rate are the most sensible to heat stress due to their high metabolic heat production as CC is sometimes taken as global warming that provokes heat stress in animals. Among livestock species, it was said that Pigs are most sensible to hot environment, the least being goats. Taking the example on cattle, it was estimated at 60% the loss in dairy farms due to heat stress in tropical region which is sheltering 50 % of the bovine population (Wolfenson et al. 2000).

Most of exotic diseases appear in camels as in other livestock due to the global warming events. Among those diseases it can be cited Camel pox, Babesiosis, Trypanosomiasis, Theileriosis and Peste des Petits Ruminants (PPR). Due to the

scarcity of water, Camel is infected by the above diseases when it comes into contact with other animals in search of water (Sejian et al., 2015). However, camels contribute to CC by emitting greenhouse gases and methane.
Generally, every livestock contributes to CC by emitting GHG indirectly via some activities such as feed production, conversion of forests into pasture, etc. Livestock (including camels) contribute also directly to CC by emitting gases from enteric fermentation and manure management (Hristov et al., 2013). Some activities are included in emission sources such as animal husbandry, enteric fermentation, biomass burning and manure management, cultivating the paddy rice, fossil fuel and waste management (Kumaraswamy et al., 2000; Mosier et al., 2004). Other sources of emission may be the natural sources such as wet and non-wetlands, oceans, freshwater bodies, wildfires, volcanos, termites, gas hydrates and permafrost (Breas et al., 2001).
As far as methane emission is concerned, researchers confirmed that camels emit less methane than other livestock even though the estimation of methane emission in camels has been extrapolated from cattle (Gibbs and Johnson, 1993) or from other ruminant having the similar digestive system and in similar diet and housing conditions (Al Jassim and Hogan, 2012; Dittmann et al., 2014; Guerouali and Laabouri, 2013). The results of a measurement done by Guerouali and Laabouri (2013) showed that methane emission from camels is 1/3 than methane emission from cattle (47.7 vs 138.7 g per day). That reduced methane emission in camelids than other livestock is explained by food and digestible fiber intake and their generally reduced metabolism (Sejian et al., 2015).

Adaptability of Camels to withstand Climate Change Catastrophes

Abstract on Camels

Camel is a livestock species that produce milk, meat, wool, hide. It is used for transportation, tourism, race and wrestling. Şenel (2009) and Çalışkan (2010) estimated the period of camel domestication at about 5000-6000 years ago in Arabian Sahara. The camelidae are nominated according to the Old-World and New-World genus. Gordon (1997) firstly distinguished the one-humped (*Camelus dromedarius*) and two-humped (*Camelus bactrianus*) camels according to the Old-World genus (about the difference between Dromedary and Bactrian camels, see Figure 1). He secondary distinguished two domestic (Llama-*Lama glama*, Alpaca-*Lama pacos*) and two wild (Guanaco-Lama guanicoe, Vicugna-Lama vicugna) species according the New-World genus.

Figure ***1. Difference between two humped (Bactrian) and one humped (Dromedary) camels*** (Source: animalwised.com)

The population of camels in the World has been estimated at 35.0 million heads distributed in 48 countries; with a big number (more than 1 million) found in Somalia (7.1), Sudan (4.8), Kenya (3.1), Niger (1.7), Chad (1.5), Mauritania (1.5) and Pakistan (1.0); the unit being 'million' (FAOSTAT, 2019). It was confirmed that there has been observed an increase of camel heads of about 3-fold during the last decade. The most camel production is observed in Africa (85.5% of global production) and in Asia (14.5%) and among producer countries, the top ten are Somalia, Sudan, South Sudan, Chad, Kenya, Niger, Mauritania, Ethiopia, Pakistan, and Mali (FAOSTAT, 2019).

Why Camels are preferable as livestock remedy during Climate Change Catastrophes?

Camel is really the ship of the desert. Camels are most kept in arid and semi-arid areas and continue to produce milk however harsh the environment may be (Field, 2005). They also have high tolerance to dehydration than any other livestock, with the capability of passing up to one week without water. They also survive in poor feed resource areas made only by shrubs and trees. Camels constitute a future insurance to incoming generation by maintaining food security

especially in hot, arid and semi-arid areas (Kagunyu and Wanjohi, 2014), conditions which cattle, sheep, goats and pigs cannot withstand.

Camel's capabilities to withstand Climate Change catastrophes

Camels are the most resistant to harsh environmental conditions. In case of seasonal variation and water deprivation for long time, camels show a better adaptability than sheep and goats when analyzed the blood biochemistry and body temperature (Abdoun et al., 2012; Samara et al., 2012).

Superior adaptive capabilities of camels have been reported by Wu et al. (2014) using comparative genomic analysis such as desert adaptations, stress response to heat, fat and water metabolism, choking dust and resistance to intense UV radiations. These facts are associated with the camel capability of conserving water of the body by reducing evaporative cooling means and keeping body temperature below their normal body temperature especially during the night (Schroter et al., 1987).

During respiration, camels maximize oxygen extraction from the exhaled air and desiccate it to maximize water retention until relative humidity of exhaled air is less than 100% (Schmidt-Nielsen et al., 1981; Schroter et al., 1987). Camels also produce highly concentrated urine and dry feces as a way of keeping water in their body. It was said that the fact of concentrating urine in order to compensate body water loss during hot periods is the adaptive fact of some breeds to desert regions (Chedid et al., 2014). Another adaptive characteristic of camels is that they are able to graze on a wider range far away from water resources and regions that are hostile to agriculture such as mountains, steep soils, arid regions, etc.

In the same context, Bactrian camel can ingest all types of plants, with the capability of ingesting the thorny ones that it tears with its leathery lips. In order to survive, the Bactrian camel also uses fats contained in the humps, and consumes salt which helps in water retention, case also observed in Dromedary camels. They both find salt in plants or by licking the salted rock, but can never drink salted water. It is even said that when necessary, Bactrians can ingest snow to hydrate themselves (https://www.futura-sciences.com).

All the adaptive characteristics of camels described above have been explained by some researchers as due to the Heat Shock Protein HSP70 found in camels. The HSP is defined as a response factor to heat stress in animals. It may be noticed that the reaction of livestock to heat stress depends on the animal species, its genetic potentialities, physiological stage, and nutritional status together with livestock management and production system (Das et al., 2016). Helen (2004) said that the synthesis of such proteins is triggered by stress factors limiting cell damages and helping in cell recovery. The presence of HSP70 family genes in camels and its role in adaptive mechanism control has been confirmed by Tariq and Hussain (2014). Defence activation of HSP70 in camels occurs in thermal conditions that affect protein homeostasis and its action is increased when camel is exposed to stress conditions or when cells are exposed to high temperature conditions.

Camel Production and Reproduction Adaptation face to Climate Change

Camels are adapted to arid and deserted regions; these facts make camels be referred to as a livestock management face to CC. Camels then can pass a long time without water and resist in drought and harsh environmental conditions. During those conditions, camels are reputed to maintain their milk production and the great advantage for agro-pastoralists and pastoralists is that this above beloved species produces more milk for a long time than other livestock even during drought environment.

Taking an abstract on the camel global production, FAO (2013) suggested that there has been observed an increase in milk and meat production from the year 1961 to 2012, that increase can be explained by the doubled number of camels worldwide during the last 50 years. It was also estimated at 4.0 million tons (IDF, 2018) and 630.000 tons respectively the production of milk and meat (Bülbül and Koç, 2018).

During the heat stress, if camels are totally deprived of water, it has been remarked a reduction of milk yield and that reduction have been found proportional to quantum of dehydration (Sejian et al., 2015). Parraguez et al. (2003) early suggested the effects of season on camel milk composition during heat stress. They added that feed quality and water affect generally all components of camel milk and particularly the total solids of milk.

With the same interest, Shuiep et al. (2008) further evoked the influence of location on camel milk composition. They attributed that influence to different management systems where the camel is sheltered and it could also be due to the variation of quality and quantity of food available between locations. It has also been reported by the above researchers that the summer heat stress has a negative impact on camel milk. According to them, season has a significant influence on camel milk composition. For more clearance, they said that the high-water content observed in summer milk samples has a negative effect on camel milk components when compared to winter samples, but the influence of season on camel milk differs for each component.

As details, it has been observed a significant lower milk fat in summer period, with the maximum proteins in February, the amount of protein contents falling to the minimum in October. In the same context, it has been observed a maximum lactose content in February falling to the minimum in September (Shuiep et al., 2008; Musaad et al., 2013).

As far as camel reproduction is concerned, it is affected by disturbance of ovarian function affecting also the embryo evolution by preventing the competence of oocyte to be fertilized. During heat conditions, the reproductive efficiency in livestock is compromised in both males and females, fact that also negatively affect animal production.

During heat stress, it can be observed the increase of adrenocorticotropin hormone secretion in animals, this can cause the blockage of estradiol induced estrus behavior. It is also observed an alteration of steroid metabolism and production especially progesterone concentration when the animal is exposed to heat stress conditions (Sejian, 2011).

In case of females, estrus cycle, embryo survival, follicles development in the ovary and other reproductive parameters are affected in hot environment, together with the decrease in milk composition and production. In case of males, there is

observed an elimination of spermatogonia germ cells present in the seminiferous tubules during heat stress, all that affecting spermatogenesis. Semen attributes, testicular and scrotal measurements are affected by the occurrence of degeneration of sertoli and leydig cells (Sejian et al. 2012).
However, it cannot be ignored all those above impacts caused by climate on camel production and reproduction, but their lower values when compared to those from other livestock make the camel be referred to as a future ensuring animal as long as the world is assisting to the changing climate scenario.

Conclusion

Camels constitute a future insurance for incoming generation by maintaining food security especially in hot, arid and semi-arid areas where there are harsh environment conditions, in which conditions cattle, sheep, goats, pigs and poultry cannot withstand. That is why camel management is of great importance and recently it has been observed an increase in camel number worldwide, fact which is followed by a significant increase in meat and milk production from camels. As CC is not promoting a good future by producing climate-induced catastrophes, the only one livestock that will withstand those catastrophes is camel as it is known to be a harsh environmental condition-resilient animal.

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Lactation milk yield and lactation lenght of Anatolian buffaloes in Tokat Province

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Introduction

The world's population is growing rapidly. In parallel with the population increase, the quantity and quality of animal products should be increased. Today, the importance of animal products in human nutrition is known by everyone. A healthy 70 kg person needs about 70 grams of protein per day. At least 40-50% of daily protein needs should be met from animal products. Approximately 51% of 26 grams of animal protein consumed daily should be supplied from milk and milk products. Demand for organic animal products is increasing day by day. The buffalo, which is generally grown in extensible conditions, has many advantages such as converting poor quality roughage into milk and meat, resistance to diseases compared to other livestock, and low cholesterol and fat content of milk and meat. Buffalo milk has a high level of protein, fat and minerals (especially calcium and phosphorus) compared to cow's milk and has superior feeding value (Damé et al., 2010).

Buffaloes are called Anatolian buffaloes in Turkey. Anatolian buffaloes in a subset of the river buffaloes are originated from the Mediterranean buffaloes (Soysal et al., 2005). Today, 178 397 head buffalo are grown in Turkey (Anonymous, 2019). Lactation milk yield and lactation lenght had informed as 925 kg and 232 days, respectively, by Soysal 2009, in Anatolian Buffaloes.

This research was conducted to determine the effects of district, calving season and calving year on some milk yield traits of Anatolian buffaloes reared in Tokat province in Turkey.

The aim of this study was to determine the effects of district, calving year, lactation number and calving season on some milk yield traits of Anatolian buffaloes.

Material and Methods

In this research, data were evaluated from Anatolian buffaloes raised in the year 2012 and 2015 in Tokat province. The following equation was used in all analyzes.

$Y_{ijklm} = \mu + a_i + b_j + ck + dl + e_{ijklm}$ ……..……..Model 2 (actual milk yield and lactation lenght)

In equation:

μ : herd mean

a_i : i the effect of the calving year (2012, 2013, 2014, 201 ve 2016)

b_j : j. The effect of the calvingg season (Winter, April, Summer and Autumn)

c_k : the effect of lactation number (1,2, 3, 4)

d_l : l. The effect of district (Erbaa, Turhal, Pazar, Almus, Zile, Merkez ilçe, Niksar and Almus)

e_{ijklm} : error

The SPSS (16.0) package program was used in the analysis. DUNCAN (1955) comparison test was used to compare the subgroup means.

Results

In this study, lactation lenght and lactation milk yield were determined as 229.94 ± 1.467 days and 916.83 ± 13.473 kg, respectively. The highest value for lactation lenght was observed in 2012 (263.06 ± 4.046 days) and the lowest value was observed in year 2015 (Table 1). Lactation milk yield and lactation duration in Anatolian buffaloes according to years of calving are summarized in Table 1.

Table 1. The least squares mean of lactation duration and lactation milk yield according to calving years

Calving year	N	LL (day)		LMY (kg)	
		$\bar{X}$	S_x	$\bar{X}$	S_x
2012	435	263.06	4.046	741.12	15.956
2013	342	249.25	1.965	810.51	17.819
2014	240	214.16	4.623	921.22	29.455
2015	685	204.80	0.888	1079.95	27.532
Total	1702	229.94	1.467	916.83	13.473

The changes in the lactation milk yield and lactation lenght were summarized in Table 2 according to the calving season. The lactation milk yield was higher in winter season than summer season. The lactation milk yield had calculated as 1030.99±60.74 kg for winter season, 925.97±35.460 kg for summer season, 906.28±93.44 kg for autumn season and 885,05±9,13 kg for April season.

The longest lactation period was determined as winter (245.66 ± 5.883 days) and autumn (245.91 ± 13,091 days), and the shortest lactation period was determined as spring (225.97 ± 1.343 days) and summer (227.15 ± 2.875 days).

Table 2. The least squares mean of lactation duration and lactation milk yield according to calving seasons

Calving Season	N	LL (day)		LMY (kg)	
		$\bar{X}$	S_x	$\bar{X}$	S_x
Winter	307	245.66	5.883	1030.99	60.74
April	1157	225.97	1.343	885.05	9.13
Summer	215	227.15	2.875	925.97	35.46
Autumn	23	245.91	13.091	906.28	93.44
Total	1702	229.94	1.467	916.83	13.47

The variation of lactation milk yield and lactation lenght according to lactation order is summarized in Table 3.The shortest lactation period was determined in 4th lactation (207.63 ± 3.222 days) and the longest lactation period was determined in 1st lactation (237.38 ± 1.457 days). Lactation milk yield was the lowest in the 1st lactation (857.47 ± 13.89, kg) and the highest value in the 4th lactation (1375.59 ± 96.82kg).

Table 3. The least squares mean of lactation duration and lactation milk yield according to lactation number

Lactation number	N	LL (day)		LMY (kg)	
		$\bar{X}$	S_x	$\bar{X}$	S_x
1	1029	237.38	1.457	857.47	13.893
2	461	222.46	4.160	954.07	19.158
3	163	210.87	2.774	1048.29	22.78
4	49	207.63	3.222	1375.59	916.82
Total	1702	229.94	1.467	916.83	13.473

The changes in lactation milk yield and lactation duration according to districts are given in Table 4.

Table 4. The least squares mean of lactation duration and lactation milk yield according to districts

Districts	N	LL (day)		LMY (kg)	
		$\overline{X}$	S_x	$\overline{X}$	S_x
Erbaa	405	225.28	2.507	868.45	20.216
Turhal	613	233.97	1.446	942.95	27.689
Pazar	355	228.37	3.21	871.34	18.78
Zile	75	214.95	2.883	1085.55	117.021
Merkez	205	231.91	3.067	910.56	21.129
Niksar	44	244.45	37.32	1104.31	117.756
Almus	5	229.75	4.049	950.94	28.489
Total	1702	229.91	1.467	916.84	13.481

The district with the shortest lactation period was Zile (214.95 ± 2.833 days) and the longest district was Niksar (244.45 ± 37.32 days). Niksar district (1104.31 ± 117.756 kg) has the highest lactation milk yield and Erbaa (868.45 ± 20.216 kg) has the lowest lactation milk yield.

Conclusion

Lactation milk yield increased according to calving years. This result shows that there is an improvement in milk yield of Anatolian buffaloes in Tokat province.

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Significance of Histamin to Human Health

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Introduction

Biogenic amines, low molecular weight organic bases, can be formed and degraded as a result of normal metabolic activity in animals, plants and micro-organisms. These amines occur in a wide variety of foods, such as fish products, meat, cheese, wine and other fermented foods (Halasz et al., 1994; Bermudez et al., 2012). The most significant biogenic amines occurring in foods are histamine (His), tyramine (Tyr), putrescine (Put), cadaverine (Cad), tryptamine (Try), and β-phenethylamine (Phe) and they are originated from the precursor amino acids histidine, tyrosine, ornithine, lysine, tryptophane, and phenylalanine, respectively. The demand for safer foods has lead more research into biogenic amines (BAs) over the last decades. The presence of biogenic amines in these foods is associated with toxicological reason and quality indicators (Linares et al., 2016; Mohammed et al., 2016).

BA have many important biological functions in human nervous system (e.g., as neurotransmitter) and cardiovascular system (controlling blood pressure), and play a significant role in regulation of body temperature and digestion (Shalaby, 1996; Bouchereau et al. 2000, Jansen et al. 2003). BA can be endogenous origin at low concentrations in fresh food products. However, BA presence in foods is closely associated with microbial activity. High level of BA in the food may be harmful to the nervous and cardiovascular systems of human and also change food flavour.

BA can be as spoilage indicators for different meat products. In particular, the biological amines index (BAI = histamine +putrescine+cadaverine+tyramine) and quality index(QI)= (histamine+putrescine+cadaverine)/(1+spermidine+spermine) have been used to evaluate the freshness of meat products (Veciana-Nogues et al., 1997; Mietz and Karmas, 1997). Cadaverine was reported to be a reliable spoilage indicator of poultry meat (Wojnowski et al., 2018) while histamine has been considered as an index of the fish quality, particularly dark-muscle fish (Prester 2011). Tyramine is reported to cause food intoxication commonly associated with ripened cheeses (Ščavničar et al., 2018; Mayer and Fiechter, 2018), affecting on health due to its capacity to potentiate sympathetic cardiovascular activity by releasing noradrenaline, called 'cheese reaction' (Youdim et al., 2006). Although putrescine and cadavarine have not been reported to be involved in scombroid poisoning, their presence has been found to potentiate histamine allergy.

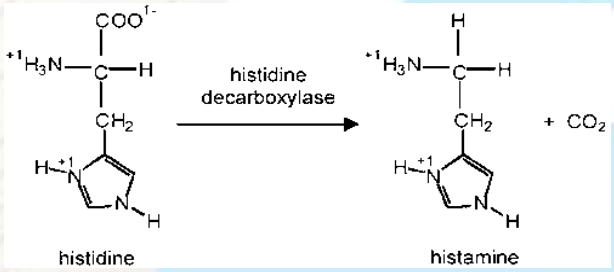

Figure 1. Formation of histamine

Histamine poisoning is a foodborne chemical intoxication resulted from by the ingestion of foods containing high levels of histamine. Histamine fish poisoning has been also known as scombroid poisoning. Histamine is produced in species of the Scombroidae family such as tuna and mackerel, mahimahi, blue fish and sardine (Morrow et al., 1991; Frank et al., 1985; Karolus et al., 1985; Ababouch et al., 1991). High histamine levels in these species have been reported by naturally high free histidine contents. The time of onset of scombroid poisoning ranges from several minutes to 3 h after ingestion of fish containing histamine at levels higher than 100 mg/100 g fish (Luten et al., 1992). The most common symptoms of this poisoning are dizziness, faintness, itching, a burning sensation in the mouth, and the inability to swallow.

Ohnuma et al. (2001) categorised the symptoms as follows;
-Skin; rash, urticaria, localized swelling, and erythema on one's face, neck, and trunk.
-Gastrointestinal system: nausea, vomiting, diarrhea, epigastric pain, and cramping.
-Circulatory system: conjunctival injection, hypotension or hypertension, tachycardia, and palpitations, up to shock
-Nervous system: headache, tingling, cramps, feeling of warmth around the mouth, and loss of sight.
-Respiratory system: bronchoconstriction and respiratory distress.

The onset of the symptoms generally occurs within a few minutes after ingestion of the implicated food, and the duration of symptoms ranges from a few hours to 24 h. More severe symptoms (e.g., respiratory distress, swelling of the tongue and throat, and blurred vision) can occur and require medical treatment with antihistamines. People with lack of natural mechanisms for detoxifying BAs caused by genetic reason and taking antidepressant medicines show that they are more sensitive to BAs poisoning (Prester 2011). The toxicological level of BAs is very difficult to set as it depends on individual

characteristics and the presence of other amines.

According to Bartholomew et al. (1987) values of histamine poisoning are as follows:

(1) < 5 mg of histamine/100 g of fish: safe,
(2) 5 - 10 mg of histamine/100 g of fish: possibly toxic,
(3) 20–100 mg of histamine/100 g of fish: probably toxic,
(4) > 100 mg of histamine/100 g of fish: toxic.

Materials and methods

This review has been developed with the aim of generating an updated information on biogenic amine formation in fish and their effects on health.

Results

Table 1 shows hisamine, cadaverine and putrecine content of fish and fish products in previous studies.

Fish species	Storage conditions	Histamine	Cadaverine	Putrecine	References
Anchovy	at 2 ± 1 °C for 11 days with or without lavender and lemon balm ethanol extracts	0.1-20.9 mg/100g	1.2-31.4 mg/100g	1-38.4 mg/100g	Ozogul et al. (2017)
Salted mackerel	at retail markets and supermarkets in both northern and southern Taiwan	ND-70.1 ppm	ND-26 ppm	ND-12.4 ppm	Tsai et al. (2005)
Vacuum-packed sardine	at 3 ± 1ºC for 21 days with or without mint and artemisia	0.46-33.86 mg/100g	1.86-175.15 mg/100g	0.56-204.70 mg/100g	Houicher et al. (2015)
Raw Atlantic bonito fillets and gravad	at 7 ± 1 °C for 42 days	41.4-355.3 mg/kg	0.9-9.6 mg/kg	ND-3.7 mg/kg	Rzepka et al. (2013)
Sardine	at chill storage for 15 days in ice with rosemary extract	2.36-17.68 mg/100g	5.76-22.07 mg/100g	2.35-26.11 mg/100g	Ozyurt et al. (2012)
Vacuum packaged sardine	at 4 ± 1°C for 19 days with or without clinoptilolite (zeolite)	0.73-27.18 mg/100g	5.99-59.85 mg/100g	5.62-44.11 mg/100g	Kuley et al. (2012)
Sardine	at 3 ± 1ºC for 20 days with or without rosemary and sage tea	2.05-28.77 mg/100g	1.03-191.79 mg/100g	0.69-148-76 mg/100g	Ozogul et al. (2011)
Atlantic herring	at 2 ± 2 ºC for 16 days	0.14-39.64 mg/100g	0.93-32.93 mg/100g	0-7.42 mg/100g	Ozogul et al. (2002a)
Atlantic herring in MAP	at 2 ± 2 ºC for 16 days	1.24-19.68 mg/100g	1.93-13.58 mg/100g	0.06-1.89 mg/100g	Ozogul et al. (2002b)
Vacuumed Atlantic herring	at 2 ± 2 °C for 16 days	0.93-28.42 mg/100g	1.47-22.81 mg/100g	0.19-3.03 mg/100g	Ozogul et al. (2002b)

ND: not detected.

Although the American Food and Drug Administration (FDA) has established 5 mg/100 g fish (FDA, 2001) as the maximum allowable limit, histamine at 67 and 180 mg has been given orally to volunteers without any sign of toxicity (Arnold and Brown, 1978). The degree of histamine toxicity appears to depend on the efficiency of detoxification system in the body (Halasz et al., 1994). In the case of the histamine alone, the detoxification system eliminates histamine by specific intestinal histamine the metabolizing enzymes such as diamine oxidase (Bodmer et al., 1999). However, in the presence of cadaverine and putrescine, histamine metabolizing enzymes are inhibited (Taylor, 1986; Stratton et al., 1991). The United States Federal Drug Administration (FDA, 2011) and European Union (EU) (EFSA, 2011) suggest that safe levels of histamine in fish meat should not exceed 50 ppm and 100 ppm, respectively. When histamine levels exceed these standards in fish or fish products before shipment or distribution, they are discarded.

The metabolism of histidine follows basically two ways: the major route of catabolism of histidine passes through its transformation to glutamic acid, which begins with the degradation of histidine to urocanic acid by action of the enzyme histidase. The glutamate product is converted to alpha-ketoglutarate, which is an intermediate in the citric acid cycle (Krebs cycle). The second is the decarboxylation (loss COO-) for action of the enzyme histidine decarboxylase with formation of histamine (Tortorella et al., 2014). The process of decarboxylation is initiated mainly by enzymes produced by gram negative enteric bacteria such as Morganella morganii, Escherichia coli, Klebsiella spp., and Pseudomonas aeruginosa which are found in the intestine and skin of the fish (Taylor et al., 1989). These bacteria are present in the marine environment and also in the intestine and gills of the fish, causing no disease. Bacteria capable of amine production include Escherichia, Enterobacter, Salmonella, Shigella, Streptococcus, Lactobacillus, and Leuconostoc spp., and Clostridium perfringens (Pinho et al., 2004). To prevent poisoning, the fish should be iced during food chain until consumption. If the preservation techniques are not good, the degradation of histidine to histamine can occur due to the bacteria that grow under the heat of the sun. Storage temperature is the most important factor controlling BAs formation (Chong et al., 2011). Other parameters such as pH, water activity, NaCl concentration, additives may affect microbiota composition and result in the differences in BAs content (Suzzi and Gardini, 2003).

Conclusion

The main aim of the guideline established by FDA (2011) is to inhibit the growth of spoilage bacteria which produce histamine during handling and chilling of fish. There are a number of factors for time required to decrease the internal

temperature of fish after capture, including the harvest and chilling methods, fish size. The scombrotoxin-forming fish should be stored as close as possible to the freezing point until it is consumed. The bacterial spoilage and the production of histamine can occur at any stage of the food chain such as fishing and fish landing, processing, distribution systems, as caterers or home. The rapid cooling of the fish and a maintenance of the cold chain until the consumption of the product are very important to avoid bacterial proliferation, activation of the enzyme histidine decarboxylase, the conversion of histidine to histamine. In future, scombroid outbreaks can be prevented if fishermen, public health officials, workers in restaurant, and medical professionals work together to set international safety standards and increase awareness of this poisoning.

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The Effects of Bio-Protective Cultures on Formation of Biogenic Amines by Foodborne Pathogens in Seafood

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Introduction

Foodborne pathogens (FBP) have a big health risk to human causing different foodborne illnesses such as diarrhea, vomiting, fever, weight loss, abdominal pain and other gastrointestinal manifestations (Lindsay, 1997). Foodborne diseases cause cost billions of dollars in terms of productivity lost and medical expenditures. (Institute of Medicine, 2012) Most of the bacteria are able to produce biogenic amines (BAs) through amino acid decarboxylation activity. Food especially seafood having high amounts of BAs are associated with numerous toxicological reactions which result in different types of foodborne poisoning including headaches, low blood pressure, heart palpitations, edema, vomiting, and diarrhea Moret, Smela, Populin, Conte, 2005; Maintz, Novak, 2007; Hungerford, 2010). Therefore, presence of BAs affect food quality and human health.

Bio-protective cultures (LAB) are able to convert amino acid into BAs via decarboxylase activity during fermentation processes (Coton et al., 2010; Spano et al., 2010). Regardless of their BAs formation, LAB are widely used in food industries to improve the flavor, texture, nutritional value and biopreservation of fermented foods (Settanni, Moschetti, 2010). Bio-protective cultures produces various biopreservative compounds including organic acids, diacetyl, reuterin, and bacteriocins. LAB are generally regarded as safe (GRAS) and thus are used in foods because of their inhibitory substances against foodborne pathogens and spoilage bacteria (Gálvez et al., 2010). LAB also has probiotic impacts and competes against pathogenic bacteria colonizing the gastrointestinal tracts (Ljungh, 2006). LAB have been studied by various researches for their antagonistic and stimulator impacts on food-related pathogens and their BAs formation (Ruiz Ruiz et al., 2011; Trias et al., 2010; Küley, Özogul, 2011; Küley et al., 2011; Özogul et al 2015; Toy et al., 2015). This paper focuses on the effects of bio-protective cultures on formation of biogenic amines by foodborne pathogens in seafood

Materials and methods

This review has an updated information on properties of bio-protective cultures and their metabolites.

Results

Table 1 shows histamine, putrescine and cadaverine and their corresponding producer microorganisms isolated from food while Table 2 shows the impact of bio-protective cultures on the production of biogenic amines by foodborne pathogens.

Properties of bio-protective cultures and their metabolites

Some of the microorganisms produces bioactive compounds as they create secondary metabolites as self-defense against other competitive microorganism. Bio-protective cultures produce various antimicrobial compounds including organic acids (lactic acid and acetic acid), diacetyl, ethanol, hydrogen peroxide, reuterin, acetaldehyde, acetoin, carbon dioxide, and bacteriocins (Figure 1). These bio-compounds could be utilised as biopreservative agents to inhibit pathogenic, non-pathogenic and spoilage microorganisms (Saranraj et al., 2014; Zbrun et al., 2013). Bacteriocins are proteinaceous substances with bacteriocidal activity. Various bacteriocins are generated by different LAB. Bacteriocins that is more favourable for consumers are considered safe additives (GRAS) which used to limit pathogens and spoiling microorganisms in food instead of using chemical preservatives (Parada et al. 2007). One of the most widely used bacteriocin is Nisin that has a wide spectrum of activity especially against Gram-positive bacteria. Thus it is used as food biopreservatives although it has a limited spectrum of activity against Gram negative bacteria or fungi Cheigh and Pyun, 2005; Tiwari et al. 2009).

Lactic, acetic, and propionic acids known as organic acids provides an acidic environment that is not favourable for the growth of many pathogenic bacteria that is responsible for food poisoning and diseases. Acids environment affect their antimicrobial properties by lowering the pH and inhibiting many metabolic functions (Gemechu, 2015). The bactericidal impact of hydrogen peroxide (H_2O_2) is related to its strong oxidizing effect on the bacterial cells, to its peroxidation of membrane lipids hence raising membrane permeability and to the damage of basic molecular structures of cell proteins (Zalán et al., 2005). Another metabolite produced by bio-protective cultures is Reuterin that has an antimicrobial activity against yeasts, molds, Gram-positive, and Gram-negative bacteria. Sharma et al. (2015) reported that reuterin is able to inhibit various spoilage and pathogenic microorganism including E. coli, Salmonella, Shigella, Clostridium and Candida. Diacetyl is an important volatile compound of bio-protective cultures, which is used as a flavoring compound since it is generally recognized as safe (GRAS) food ingredient Lanciotti et al., 2003; Langa, Langa et al. 2014)

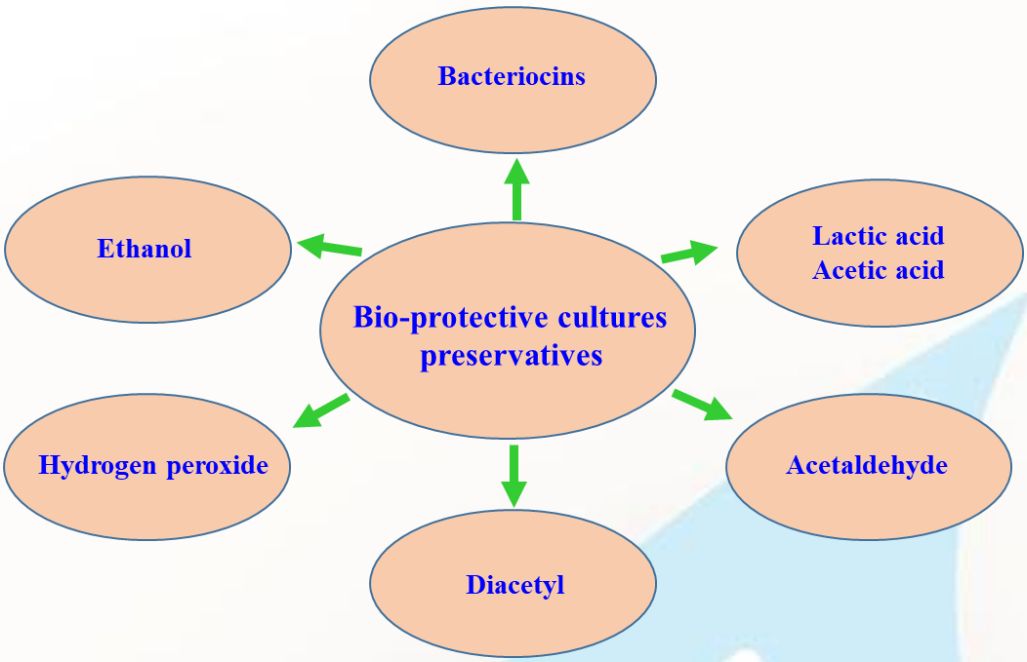

Figure 1. Some of the bio-protective cultures preservatives excreted from bio-protective cultures.

Biogenic amines formation by pathogenic bacteria

As Gram-negative genera, Pseudomonas, Moraxella, Acinetobacter, Shewanella, Flavobacterium, Vibrionaceae and Aeromonadaceae are common aquatic bacteria that are able to produce biogenic amines. Although Gram-negative bacteria are the main microorganisms in fish, Gram-positive bacteria such as Bacillus, Micrococcus, Clostridium, Lactobacillus, and coryneforms have also been formed the BAs at various levels (Visciano et al., 2012). Gokdogan et al. (2012) investigated the BAs formation by eight Gram negative and positive foodborne pathogens (FBP) in histidine decarboxylase broth. All the tested pathogens including S. aureus, E. coli, K. pneumoniae, E. faecalis, P. aeruginosa, L. monocytogenes, A. hydrophila and Salmonella Parathypi A were able to produce various BAs (PUT, CAD, SPD, TRP, PHEN, SPN, HIS, SER, TYR, TMA, DOP, and AGM). Other researchers observed the formation of BAs by different bacteria (Özogul et al., 2015; Özogul et al., 2016). Putrescine, cadaverine, spermidine, and spermine were found in sardines (Özogul and Özogul, 2006). The strongest histamine producers were Hafnia alvei, Morganella morganii, Klebsiella pneumonia in histidine decarboxylase broth (Özogul and Özogul, 2007). Histamine was found toward the end of cheese ripening process and cadaverine has been defined as the most abundant BA in Brazilian cheeses Russo et al., 2010). Certain LAB strains including Lb. brevis and Lb. hilgardii isolated from wine and Lb. curvatus, E. faecalis, Lb. fermentum, and Lb. paracasei isolated from cheese, meat and sausage are able to create putrescine Wunderlichová et al., 2014). Table 1 shows histamine, putrescine and cadaverine and their corresponding producer microorganisms isolated from food.

Table 1: Histamine, putrescine and cadaverine and their corresponding producer microorganisms isolated from food.

Biogenic amines	BAs-producing microorganisms	Source	References
Histamine	Morganella morganii, Klebsiella pneumonia , Hafnia alvei	Seafood	Özogul and Özogul, 2007
Putrescine	Lb. brevis, Lb. hilgardii, Lb. curvatus, E. faecalis, Lb. fermentum, Lb. paracasei, Proteus vulgaris, Aeromonas hydrophila	Wine, cheese, sausage, meat, poultry skin, salad, seafood	Ladero et al., 2010, Wunderlichova et al., 2014
Cadaverine	Lactococcus lactis subsp. cremoris, Lactococcus lactis subsp.lactis, Lactobacillus plantarum, Staphylococcus aureus, E. coli,	Seafood	Özogul and Özogul, 2006. Kuley et al., 2012

The influences of bio-protective cultures on BAs production by FBP

Table 2 shows the impact of bio-protective cultures on the production of biogenic amines by foodborne pathogens. Küley et al. (2013) studied eight LAB (Lactococcus lactis subsp. cremoris, Lactococcus lactis subsp. lactis, Lactobacillus plantarum, Streptococcus thermophilus, Leuconostoc mesenteroides subsp. cremoris, Lactobacillus acidophilus, Pediococcus acidophilus, Lactobacillus delbrueckii subsp. lactis) on five fish infusion broths (anchovy, mackerel, white shark, sardine, and gilthead seabream). All bio-protective cultures tested were able to decarboxylate the amino acids present in the fish broths and to form all the BAs with significance differences ($p<0.05$). Ped. acidophilus generated the most significant BA in sardine infusion broth (1157.25 mg/L of tyramine) concluding that the BAs formation was subject on two conditions that are the LAB strains and the fish species. These researchers suggested that the results could be used in food industry especially in fermented foods that use LAB as starter culture. The most important points are the lowest BAs formation to prevent any risk for consumers when the LAB and fish selected. Toy et al (2015) tested the impact of

four bio-protective cultures (Lactococcus lactis subsp. lactis, Leuconostoc mesenteroides subsp. cremoris, Pediococcus acidophilus and S. thermophilus) on BAs produced by four FBP (S. aureus, E. coli, L. monocytogenes and S. Paratyphi A) in vitro in a tyrosine decarboxylase broth. LAB showed also a stimulation influence on the BAs formation. These results led to the conclusion that LAB could be used as biopreservative to prevent these undesirable effects on the seafood. The inhibitory and stimulation impacts was related to the strains that should be chosen carefully to ensure the food safety. Küley and Özogul (2011) looked into the impacts of bio-protective cultures on the BAs production by eight FBP in tyrosine decarboxylase broth had also same conclusion. The results indicated that it was better not to combine LAB and FBP since higher amounts of BAs were noticed. However a drop of the BAs production was also found, which means that the stimulator or inhibitory influences were strains depended. Özogul (2011) showed that there was also a stimulation impact when LAB was related to FBP in histidine decarboxylase broth. Özogul et al. (2015) found that LAB strains with non-decarboxylase activity are capable of inhibiting biogenic amine production by FBP. The tested bio-protective cultures were Leuconostoc mesenterodies subsp. cremoris, Pediococcus acidilactici, Lactococcus lactis subsp. lactis, Streptococcus thermophilus and the amines producers were Salmonella Paratyphi A, Listeria monocytogenes, Staphylococcus aureus, and Escherichia coli. The most impoartant amine formation was PUT and SPD. All of the cell free supernatants (CFS) lessened the formation of PUT by ≥65%.

It has been proven that LAB in certain cases is able to inhibit food spoilage compounds such as biogenic amines. Nevertheless the prevention action depends on the selected strains since LAB could have a synergistic effect by increasing the BAs formation. In the food sector the inhibition of such spoilage compounds is desirable to enhance the shelf life of food. Thus the bio-protective strains selection is very significant to have the desired effect.

Table 2. Impact of bio-protective cultures on the production of biogenic amines by foodborne pathogens.

LAB	HIS	PUT	CAD	Unit	Pathogens	Broth/Food	References
Control	20.32	638.68	48.37	mg/L	E. coli	Tyrosine decarboxylase broth	Toy et al., 2015
Pediococcus acidophilus	11.16^{I}	192.07^{I}	27.12^{I}				
Control	0.00	35.33	185.87	mg/L	S. Paratyphi A	Lysine decarboxylase broth	Kuley et al., 2012
Lactobacillus plantarum	1.10^{S}	31.10^{I}	433.98^{S}				
Control	673.9	-	-	mg/L	L. monocytogenes	Ornithine decarboxylase broth	Özogul et al., 2015
Streptococcus thermophilus	37.8^{I}	-	-				
Control	0.90	-	-	mg/100g	pathogen	Tuna (Euthinus affinis)	Thiruneelakandan et al., 2014
Lactobacillus plantarum	0.60^{I}	-	-				
Control	0.57	10.05	0.78	mg/L	S. aureus	Histidine decarboxylase broth	Özogul, 2011
Lactococcus lactis	5.79^{S}	61.95^{S}	7.60^{S}				
Control	1.00	11.6	7.59	mg/kg	pathogen	Spanish Type Culture Collection (CECT, Valencia, Spain)	Penas et al., 2010
Leuconostoc mesenteroides	2.14^{S}	32.1^{S}	19.1^{S}				

Conclusion

Foodborne illnesses have become a major public health problem in worldwide because they cost billions of dollars in health care. To make sure food safety, it is important to detect foodborne pathogens to decrease the emergence of foodborne illness. Inhibiting and eliminating the pathogens from contaminating the foodstuff, a desirable impacts would be on the food quality and safety leading to shelf-life extension. Also the use of bio-protective cultures could help to lessen the FBP growth leading consequently in a decreasing in their biogenic amines production. Consequently, bio-protective strains should be selected with care to have inhibitory impact on the growth of FBP and their BAs formation because some of the LAB is able to increase the formation of the BAs especially when combined with other food spoilage bacteria or FBP.

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Functional Food of Seafood Origin and Their Health Benefits

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Introduction

In the last decades consumer demands that foods contribute directly to their health (Mollet & Rowland, 2002). Today foods are not intended to only satisfy hunger and to provide essential nutrients for humans but also to prevent nutrition-related diseases and improve physical and mental well-being of the consumers (Menrad, 2003). In this regard, functional foods play an important role. The term "functional food" was first used in Japan, in the 1980s, for food products fortified with special compounds having beneficial physiological impacts (Stanton et al., 2005). Functional foods can improve body conditions with prebiotics and probiotics, decline the risk of some diseases with cholesterol-lowering products, and could even cure some diseases. The term "functional food" has already been defined several times and definitions for functional foods ranges from the very simple to the more complex; "Foods that may provide health benefits beyond basic nutrition" and "Food similar in appearance to conventional food that is intended to be consumed as part of a normal diet, but has been modified to subserve physiological roles beyond the provision of simple nutrient requirements" are examples for the two approaches (Bech-Larsen and Grunert, 2003). Another term often used interchangeably with functional foods, although it is less favored by consumers, is "nutraceuticals," a term coined in 1991 by the Foundation for Innovation in Medicine to refer to nearly any bioactive component that delivers a health benefit.

Early developments of functional foods were those of fortified with vitamins and/or minerals (i.e. vitamin C, vitamin E, folic acid, zinc, iron, and calcium). After that, the focus moved to foods fortified with various micronutrients such as omega-3 fatty acid, phytosterol, and soluble fiber to promote good health or to prevent diseases such as cancers. More recently, food companies have taken further steps to develop food products that offer multiple health benefits in a single food (Sloan, 2004).

Materials and methods

This review has an updated information on functional foods of seafood origin and their beneficial effects on health.

Results

Functional foods of seafood origin

Marine bioresources produce a great variety of specific and potent bioactive molecules including natural organic compounds such as fatty acids, polysaccharides, polyether, peptides, proteins, enzymes and lectins. Modern food production generates a large quantity of byproducts most of which are still underutilized. For example, the seafood processing industry produces a large quantity of byproducts and discards (heads, tails, skins, scales, viscera, backbones, and shells). These residual materials may be an excellent source of proteins, lipids, pigments, and small molecules (Imen et al., 2016).

Table 1. Functional ingredients, source and health benefit of seafood

Category	Functional ingredients	Source	Health benefits
Proteins	Chrysophsins	*Chrysophrys (pagrus) major*	Antimicrobial
	Peptides	Bonito	ACE inhibitor
	Peptides	Sardine	ACE inhibitory Antioxidant
	Peptides	Cuttelfish	Antihypertensive Antioxidant
	Peptides	Shrimp	ACE inhibitor Calcium-binding
	Protein hydrolysates	*Porphyra tenera*	ACE inhibitor, Antioxidant Antitumor
	Protein hydrolysates	Prawn	Antioxidant
Lipids	Omega-3 PUFAs (DHA and EPA)	Herring	Anti-cardiovascular Anti-obesity, Anti-tumor
	Omega-3 PUFAs (DHA and EPA)	Sardine	Anti-cardiovascular Anti-obesity
	Omega-3 PUFAs (DHA and EPA)	Tuna	Anti-cardiovascular Anti-tumor
	Omega-3 PUFAs (DHA and EPA)	Mackerel	Anti-cardiovascular Anti-dementia, Anti-obesity
	Omega-3 PUFAs (DHA and EPA)	krill (*Euphausia superba*)	Anti-cardiovascular reducing cholesterol
Polysaccharides	Polysaccharide	Cuttlefish (Sepiella maindroni, *Euprymna*	Antimutagenic Antimicrobial

		berryi)	
	Chitin and chitosan	Crustaceans (Shrimp, crab, Crayfish)	Antimicrobial, Anticaner Anti-inflammatory Hypocholesterolemic
	Fucoidan	*Laminaria japonica*	Anticoagulant, Antioxidant
	Galactan	*Codium fragile*	Antiviral, Immunostimulating
Minerals	Calcium	*Ulva pertusa,* *Scytosiphon lomentaria,* *Chaetomorpha crassa,* Fish bones	Strengthening of teeth and bone Anti-osteoporosis
	Iron	*Spirulina,* *Gelidium amansii* *Acanthopeltis japonicus* *Carpopeltis flabellata* *Gloiopeltis tenax*	Antianemia
	Magnesium	*Ascophyllum nodosum* *Laminaria digitata* *Himanthalia elongata*	Neuroprotective Antidepressant Antiasmatic
Vitamins	Vitamin E	*Ascophyllum nodosum* *Porphyra umbilicalis* *Laminaria digitata* *Undaria pinnatifida* *Palmaria palmata*	Antioxidant Prevention of CVD
	Vitamin C	*Gelidiella acerosa* *Padina pavonica* *Ulva reticulata,* *Laminaria digitata* *Porphyra umbilicalis* *Palmaria palmata*	Antioxidant Strengthening of the immune system
	Vitamin B_{12}	*Porphyra tenera* *Sargassum fulvellum*	Anti aginging Antianemia
Photosynthetic pigments	Chlorophylls	All classes of algae and cyanobacteria	Anticancer
	Carotenoids: β-carotene,astaxanthin, zeaxanthin and lutein	*Dunaliella salina* Haematococcus pluvialis *Nannochloropsis oculata* Chlorella sorokiniana	Skin health benefits Antioxidant Protect against eye diseases (cataract and macular degeneration)Anticancer

Protein

Proteins from marine sources show promise as functional ingredients in foods because they possess numerous important and unique properties such as film and foaming capacity, gel forming ability and antimicrobial activity (Khora, 2013). Bioactive peptides are reported to be involved in various biological functions such as antihypertension, immunomodulatory, antithrombotic, antioxidant, anticancer and antimicrobial activities (Kim, 2010). Fish is a rich source of easily digestible protein. Fish proteins are highly sensitivity to proteolytic digestion, with a digestibility of more than 90%. The *in vivo* digestibility of proteins of raw fish meat is in the range of 90 and 98%. The high digestibility is mainly due to the absence of strong collagenous fibers and tendons in fish muscle, which are common in land animals.

Fish proteins are rich in all the essential amino acids (particularly methionine and lysine) in contrast to proteins from plant sources, which lack adequate amounts of one or more essential amino acids. The nutritive value of marine fish proteins is equal to or better than that of casein and red meat proteins because of their favorable essential amino acid pattern. There are no significant differences in the amino acid composition of freshwater and marine fish. However, certain marine fish such as mackerel and tuna may be exceptionally rich in the amino acid histidine. With the increasing knowledge of the functional properties of fish protein hydrolysates, there are many researchers are conducting studies on the developments and applications of fish-derived functional foods and nutraceuticals.

Fatty acids

Probably the most intensively investigated class of physiologically-active components derived from seafood products are the (n-3) fatty acids, predominantly found in fatty fish such as salmon, tuna, mackerel, sardines and herring (Kris-Etherton et al., 2000). The two primary (n-3) fatty acids are eicosapentaenoic acid (EPA; C20:5) and docosahexaenoic acid (DHA; C22:6). EPA and DHA are synthesized by both unicellular and multicellular marine plants such as phytoplankton and algae. They are eventually transferred through the food web and are incorporated into lipids of aquatic species such as fish and marine mammals. It was reported that n3 fatty acids affect blood lipid profiles, cardiovascular health, membrane lipid composition, eicosanoid biosynthesis, cell signalling cascades, and gene expression. Findings from epidemiological studies suggest that the intake of n3 fatty acids from natural sources or supplements may influence the onset and

progression of several disease states, including cardiovascular disease, cancer, autoimmune diseases and mental health (Hoffmann et al., 2009).

Clinical studies have been conducted to investigate the physiologic effects of (n-3) fatty acids in cancer, rheumatoid arthritis, psoriasis, Crohn's disease, cognitive dysfunction and cardiovascular disease, with the best-documented health benefit being their role in heart health (Rice, 1999). The mechanisms for these potential benefits are complex and not well defined (Duda et al., 2009). However, it is well established that fish oil supplementation lowers plasma triglyceride levels. Wang et al. (2018) also reported that hyperlipidemia is one of the most important risk factors leading to cardiovascular disease. It is characterized by the increase of total cholesterol (TC), triglyceride (TG) and low-density lipoprotein cholesterol (LDL-C), as well as low levels of high-density lipoprotein cholesterol (HDL-C) (De Sousa et al., 2017). At present, the development of natural active substances with lipid-lowering activity is popular in the field of medicine and functional foods in the world. The marine lipid-lowering active ingredients have been paid attention due to their rich sources, low toxicity, high efficiency, and little side effects, which are widely used in the fields of food, medicine and chemical industry, therefore the focus of research and development.

Marine algal polyphenols

Polyphenols are a highly heterogeneous group of compounds are synthesized in terrestrial plants and marine algae. A variety of polyphenols, including catechins, flavonols, and phlorotannins, can all be found in marine macroalgae (Murugan, 2015). Polyphenols are the predominant bioactive compound in brown algae and are accountable for the majority of its biological activity. Phlorotannins are a type of polyphenol that are unique to marine sources and have exhibited protective effects against hyperglycemia, hyperlipidemia, inflammation and oxidative stress, known risk factors for cardiovascular disease and diabetic complications, in cell culture, animal studies and some human studies (Murray et al., 2018).

K-Carrageenan from marine red algae

Carrageenans, as natural polysaccharides, are sulphatedgalactans extracted from edible red marine algae (Class: Rhodophyta). Carrageenan with its high-molecular-weight and strongly anionic polymeric nature is used for texture stabilization, binding, emulsifying, thickening and gelling in the food industry (Laurienzo, 2010). Recently, carra-geenans have attracted a lot of attention due to their nontoxic, biocompatible and health benefits. Low molecular weight κ- and λ-carrageenan has promising anticancer and antitumour activities possibly due to their antiviral and antioxidant properties, and stimulation of antitumour immunity (Sun et al., 2014). Raman and Doble (2015) suggested an alternative approach to metastatic human colon cancer therapy by using soluble dietary fibre fractions of marine red algae, κ-carrageenan.

Carotenoids and xanthophylls

Carotenoids give to the yellow, orange, and red colors of the skin, shell, or exoskeleton of aquatic animals. They are also found in algal species. One of the most important physiological functions of carotenoids (mainly β-carotene) is their action as vitamin A precursors in animals. Vitamin A activity of α-carotene, cryptoxanthin, 3,4-dehydro-β-carotene, and β-apo-8′-carotenoic acid ethyl ester as well as astaxanthin, canthaxanthin, and echinenone, have also been reported. Marine carotenoids have been shown to inhibit lipase activity in the gastrointestinal lumen and suppress triacylglycerol absorption (Matsumoto et al., 2010). Fucoxanthin, a major marine carotenoids present in brown seaweeds has been shown to improve insulin resistance and decreases blood glucose levels through the regulation of cytokine secretions from white adipose tissue (Miyashita et al., 2011). In addition, marine fucoxanthin have been shown to fight against obesity and related metabolic disorders (Miyashita, 2014) and to inhibit the growth of human leukemia cells (HL-60), human breast cancer cells (MCF-7), and Caco-2 human colon cancer cells (Miyashita et al., 2011).

Chitin and chitosan

Chitin is the second most available polysaccharide after cellulose. Chitin is obtained from crustaceans' exoskeletons after demineralization and deproteinisation treatments. However, one of the limitations in the use of this biopolymer on a large-scale is its water insolubility. Therefore, water-soluble derivatives have been produced. Chitosan is the most important of these. Chitin and its derivatives are renewable, biocompatible, biodegradable, and non-toxic compounds that have many biological properties such as: anti-cancer antioxidant antimicrobial and anti-coagulant properties (Salah et al., 2013; Yen et al., 2008; Goy et al., 2009; Vongchan et al., 2003). In addition, they are used as biomaterials in a wide range of applications: for biomedical purposes such as for artificial skin, bones, and cartilage regeneration (Dash et al., 2011; Parvez et al., 2012), for food preservation such as for edible films (Muzzarelli and Muzzarelli, 2005), and for pharmaceutical purposes such as drug delivery (Riva et al., 2011).

Squalene

Squalene is a physiological substance present in nature both in plant as well as in animal food resources. It is especially concentrated in olive oil and shark liver oil. Squalene is one of the examples of functional food factors which protects humans from coronary heart diseases and is also used to maintain skin health. Thus, the use of squalene as functional

food is increasing worldwide. Squalene has also wide spectra of physiological functions such as antioxidant, anti-inflammatory, anticancer, antimetabolic syndromes and membrane stabilizing properties (Narayan Bhilvade et al., 2010). In addition, Narayan Bhilvade et al. (2019) reported that squalene, as an active ingredient of functional food, presents a marked analgesic, anti-inflammatory, and enhances antitumor activity of doxorubicin confirming its beneficial effects which supports its use in traditional and self-medication as a novel agent in combination with chemotherapy.

Enzymes

Marine enzymes provide a wide range of applications, including deskinning of fish and squid and purification and cleaning of fish roe for caviar production. In addition, descaling of fish, extraction of carotenoproteins from shellfish processing discards, use of gastric enzymes of fish as a rennet substitute in cheese manufacturing, ripening of fish and production of fish sauce, and production of fish protein hydrolysates and concentrates are among other ways of using marine enzymes (Shahidi and Ambigaipalan, 2015). A number of enzymes from fish and shellfish processing discards such as alkaline phosphatase, hyaluronidase, acetylglucosaminidase, chitinase and protease have been isolated. Alkaline phosphatase obtained from frozen shrimp waste thaw water could be used as clinical diagnostic tools for some diseases such as hypophosphatasia (bone disorder), lesions (including tumors), liver disease and vitamin D deficiency (Hayet et al., 2011).

Conclusion

Marine resources provide a rich reservoir of bioactives and nutraceuticals. Marine nutraceuticals are both a coherent and attractive option for the food industry as there are a multitude of functional food ingredients that can be derived from marine sources. Consequently, ongoing efforts should be made into the research and development of marine functional foods with prospect that, in the future, their consumption could lead to a reduction in the prevalence and severity of chronic diseases. Despite the vast possibilities for use of marine bioactives in food, more multidisciplinary research is needed. Food products, supplements or natural health products containing marine bioactives are expected to command a huge market due to their many potential health benefits.

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Definition and Advance of some Performance Characteristics of Akkaraman Sheep in Grower Conditions in Bor District in Nigde Province

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Introduction

Studies that define the morphological and physiological characteristics of Akkaraman sheep are insufficient as in the other native breeds in Turkey.

Lambing rate of Akkaraman sheep is 4-5%, mating season is 229- 283 days, duration of estrus is 35.16 hours (Kaymakçı, 2004; Yalçın, 1979; Kaymakçı et al., 2001; Kaymakçı et al., 1989; Akbulut, 1986; Akçapınar et al. 1982; Akmaz et al., 1992; Colakoglu and Ozbeyaz, 1999; Dellal, 2002; Esen and Ozbey, 2002; Kaymakci et al., 1999; Sandikcioglu, 1960; Pekel and Guney, 1974); birth weight 4.0-4.9 kg, weaning weight 25.02-26.38 kg, live weight of sheep 35-40 kg, live weight of rams 56-60 kg (Kaymakci, 2004; Kaymakci and Taskin, 2008; Yalcin, 1979; Kaymakci et al. 1989; Kaymakçı et al., 2005; Çolakoğlu and Özbeyaz, 1999; Esen and Özbey, 2002; Esenbuğa and Dayıoğlu, 2002; Akçapınar, 1983; Akmaz and Akçapınar, 1989; Ertuğrul et al., 1989; Ünal, 2002).

In addition, the geographic distribution of this breed and the structural characteristics of the enterprises are not well known. The breeding of the herd in these enterprises is carried out in the form of selection and mating based on the knowledge of the breeder.

With this research, breeding organization of Akkaraman sheep reared in public hand in Bor district of Niğde province was carried out with the participation of breeders. With the selection made on the basis of performance records of sheep in the enterprises registered in the study, it was aimed to increase the live weight of akkaraman sheep in the hands of the breeders and to preserve the morphological characteristics of the breed.

Materials and methods

In order to increase the live weight of Akkaraman sheep, studies have been carried out on elite and base flocks in the Bor district of Niğde province. In the project controlled mating was done to elite herds while the free mating was applied to the base herd. Birth weight and weaning weight (90^{th} day) of elite and base herds were taken as data. The data obtained in the weighing were re-standardized according to birth and weaning weight by 90 days. Breed selection was made considering the morphological characteristics of the breed and standardized 90^{th} day live weight of the lambs in the herd. In the first years of the project, breeding selection was made with more emphasis on breed morphological characteristics.

Results

The birth weight of the elite herd increased from 4.17 kg to 4.40 kg between 2013 to 2017 respectively. Weaning (90^{th} day) live weight decreased from 21.82 kg to 21.25 kg. The decrease in live weight in this study is due to the high level of merino blood in the herd. Because in this period, selection was made according to the breed characteristics of Akkaraman. Therefore, as the merino effect of the herd decreases, live weight has started to decrease. The morphological breed characteristics of the flocks in the study were tried to be fixed.

In 2013 and 2017 birth weight of the herd was found to be 4.14 kg from 4.36 kg respectively. Weaning (90.day) live weight was 24.36 kg and 22.30 kg. The number of lambs born per sheep increased from 1.02 to 1.14**.**

Conclusion

In the first (2013-2017) period of the project, the herds was mixed with other breeds esipecially merino sheeps . For this reason, the breeding selection was made with emphasis on the morphological characteristics of the race. There was an increase in the number of lambs per sheep. However, in this period, twin selection was not taken as the selection criteria. Similarly, partial improvements in survival were achieved. As a result; The number of sheep per project should be increased in the second period of the project.

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Dry matter content of different feed grains germinated by hydroponics method

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Introduction

In ruminant nutrition, insufficiency of high quality roughage sources and insufficient roughage at all times of the year cause the animals in our country not to be fed enough and this prevents economic livestock. Supply Hydroponic farming systems have been started to be used as an alternative method to eliminate the need for roughage of ruminant animals (Karaşahin, 2017).

Hydroponic green feed production system; it consists of providing conditions such as humidity, heat and light which are necessary for germination and growth of cereal grains in soilless environment. Hydroponic aquaculture has important advantages such as; eliminates the need for soil disinfection, provides plants to be fed in a controlled way, increases the efficiency of water and fertilizer use, provides homogeneous and high quality high efficiency, reduces the workforce with automation, eliminates soil-borne problems, the soil is found to be insufficient or not enough for the production of aquaculture It has important advantages such as preventing soil and groundwater pollution (Sevgican, 1989; Öztekin, 2002).

Compared to traditional green feed production and hydroponic green feed production; it ensures uninterrupted green feed production all year in much smaller areas, ıt has richer fiber, protein, vitamin and mineral content. The grass water in it improves the performance of animals. Increasing the digestibility of grains, such as hydroponic green feed production is spread throughout the world. A number of chemical and physical changes occur in the grain grain during the hydroponic green feed production process. Protein, carbohydrates and fats are separated into simple compounds by the activation of enzymes in the grains as a result of hydrolysis, and the amount of amino acids, soluble sugar and fatty acids increase in grains and shoots (Dung et al., 2010; Al-Karaki and Al-Hashimi, 2012; Karaşahin, 2014).

This study was carried out to determine the hydroponic cultivation, productivity and changes in dry matter contents of different feed cereals. In this part of the study; 12-day weight changes, plant height, paste thickness and dry matter analysis were carried out.

Materials and methods

Hydroponic germination study was established in Ahi Evran University Faculty of Agriculture in a suitable indoor environment with controlled lighting and heating. The material of the study was obtained from a commercial company operating in Kırşehir, which consists of cereals (barley, wheat, oats, rye and triticale). Seeds were sown in 19x9 cm disposable plastic containers with 3 replicates of each grain. The daily weight gain of these grains was weighed with precision scales before each irrigation. Plant height and paste thickness were measured at the end of the day starting from the 4th day with digital caliper. Irrigation method was provided with mains water 3 times a day, lighting time and color in the first 3 days dark from the 4th day 8 hours dark 16 hours light 60x60 cm 54 watt day light (yellow light) led panel luminaire was provided. Statistical analysis of the data obtained from the study was performed by using SPSS 15.0 package program.

Results

As a result of the study, daily gain of different cereal seeds in hidroponic production are given in Table 1.

Table 1. Daily gain of different cereal seeds in hidroponic production (g/germination plate)

Days	Grains					SEM	P
	Barley	Wheat	Oat	Rye	Triticale		
0. day	40,12	40,11	40,12	40,11	40,12	0,01	0,1
1.day	68,75^{b}	70,27^{b}	73,19^{a}	72,80^{a}	70,06^{b}	0,35	0,00
2. day	77,29^{bc}	76,92^{c}	80,37^{ab}	82,77^{a}	81,47^{a}	0,58	0,00
3. day	88,72^{bc}	85,56^{cd}	85,13^{d}	90,98^{b}	100,1^{a}	0,95	0,00
4. day	103,28^{b}	96,02^{c}	89,08^{d}	90,66^{d}	128,12^{a}	2,24	0,00
5. day	120,03^{b}	107,53^{c}	100,31^{d}	96,64^{d}	159,14^{a}	4,32	0,00
6. day	142,36^{b}	131,40^{c}	113,07^{d}	105,93^{d}	196,39^{a}	6,11	0,00
7. day	160,93^{b}	147,09^{c}	120,18^{d}	111,57^{d}	233,94^{a}	8,24	0,00
8. day	168,12^{b}	157,58^{b}	120,42^{c}	110,73^{c}	243,85^{a}	9,07	0,00
9. day	173,79^{b}	138,55^{c}	120,18^{d}	111,25^{d}	241,35^{a}	12,80	0,00
10. day	185,35^{b}	143,50^{c}	122,77^{d}	112,20^{d}	254,44^{a}	13,98	0,00
11. day	171,68^{b}	142,27^{c}	120,45^{d}	107,08^{e}	248,55^{a}	13,50	0,00
12. day	194,58^{b}	161,53^{c}	128,36^{d}	112,80^{d}	286,66^{a}	16,69	0,00

a, b, c, d, e: The differences between the means indicated by different letters in the same rows are significant (P <0.05)

When Table 1 is examined, it is seen that there are statistically significant increases in plant weights after 12 days of germination (P <0.01). The best weight gain is triticale followed by barley, wheat, oats and rye, respectively. This increase in triticale is thought to be high because it is a hybrid plant.

In the study, pastry (white carpety part of the seeds and roots under the green parts of the plants) was measured in the germinated plants from the 4th day. The data for these measurements are given in Table 2.

Table 2. Thickness of plant paste (mm)

Days	Grains					SEM	P
	Barley	Wheat	Oat	Rye	Triticale		
4. day	2,5[b]	2,89[b]	1,4[c]	1,5[c]	11,41[a]	0,5	0,00
5. day	5,07[b]	5,7[b]	3,08[c]	2,57[c]	17,36[a]	0,73	0,00
6. day	10,08[b]	8,35[c]	5,34[d]	4,97[d]	20,01[a]	0,75	0,00
7. day	11,47[b]	10,23[b]	6,55[c]	6,2[c]	21,44[a]	0,76	0,00
8. day	13,6[b]	12,04[b]	7,38[c]	8,81[c]	22,03[a]	0,79	0,00
9. day	15,74[b]	14,35[b]	8,18[c]	9,51[c]	26,46[a]	0,96	0,00
10. day	18,34[b]	15,74[b]	8,87[c]	9,98[c]	27,38[a]	0,96	0,00
11. day	21,92[b]	18,78[b]	9,56c	11,16[c]	31,08[a]	1,15	0,00
12. day	23,38[b]	18,84[c]	10,25[d]	12,17[d]	35,58[a]	1,32	0,00

a, b, c, d, e: The differences between the means indicated by different letters on the same rows are significant (P <0.05)

When the data in Table 2 were examined, since the darkness was applied in the first three days, the data obtained from day 4 could be evaluated. Significant differences were found between cereals in terms of paste thickness (P <0.05). The best pastry formations were observed in triticale as in weight. Formation of paste in oats was found to be much lower than other plants.

Plant lengths of the grains during germination process are given in Table 3.

Table 3. Daily height of plants (mm)

Days	Grains					SEM	P
	Barley	Wheat	Oat	Rye	Triticale		
4. day	131,32[a]	101,71[b]	100,11[b]	85,23[c]	125,72[a]	3,15	0,00
5. day	145,50[a]	115,83[b]	105,34[b]	79,40[a]	137,05[a]	3,77	0,00
6. day	159,70[a]	134,22[b]	126,49[b]	110,67[c]	152,20[a]	3,23	0,00
7. day	164,76[a]	136,31[b]	128,77[b]	112,69[c]	153,4[a]	3,26	0,00
8. day	174,77[a]	142,15[b]	139,05[b]	116,78[c]	160,85[a]	3,57	0,00
9. day	194,74[a]	153,68[c]	134,50[d]	118,33e	179,81[b]	4,26	0,00
10. day	216,37[a]	169,73[b]	149,32[c]	111,68[d]	213,29[a]	5,59	0,00
11. day	244,06[a]	203,23[b]	152,80[c]	114,99[d]	239,55[a]	6,87	0,00
12. day	278,65[a]	227,97[c]	156,11[d]	116,66[e]	259,11[b]	8,32	0,00

a, b, c, d, e: The differences between the means indicated by different letters on the same rows are significant (P <0.05)

When the data in the table of plant height were examined, it was found that there were statistically significant differences between cereals in terms of plant height development (P <0.05). The highest plant height was observed in barley and triticale. These were followed by wheat, oats and rye, respectively.

The data of the dry matter analyzes performed on different days (0., 1. ,4. , 8. and 12. days) during the trial period are given in Table 4.

Table 4. Dry matter content of germineated cereal mass harvested on different days

Grain	0. day		1. day		4. day		8. day		12.day	
	Air Dry (%)	Dry Matter (%)	Air Dry (%)	Dry Matter (%)	Air Dry (%)	Dry Matter (%)	Air Dry (%)	Dry Matter (%)	Air Dry (%)	Dry Matter (%)
Barley	98,27	99,26	52,78[a]	51,67[a]	33,44[b]	32,86[b]	18,73[c]	18,28[c]	14,46[c]	14,12[c]
Wheat	97,02	99,09	50,26[b]	49,58[ab]	34,86[b]	34,30[b]	17,69[c]	17,25[c]	16,63[bc]	16,17[bc]
Oat	95,5	99,00	49,04[bc]	48,52[bc]	39,14[a]	38,68[a]	27,02[a]	26,65[a]	24,39[a]	24,00[a]
Rye	92,55	99,02	48,13[c]	46,36[c]	34,63[b]	33,94[b]	23,16[b]	22,12[b]	17,60[b]	17,21[b]
Triticale	94,48	99,12	48,34[bc]	47,85[bc]	25,61[c]	24,97[c]	11,25[d]	10,96[d]	7,76[d]	7,55[d]
SEM	1,02	0,45	0,51	0,54	1,20	1,21	1,44	1,42	1,47	1,45
P	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00

a, b, c, d, e: The differences between the means indicated by different letters in the same column are significant (P <0.05)

When the data in Table 4 were examined, it was found that there were statistically significant differences between the dry matter ratios of the plants obtained on different days (P <0.05). The highest dry matter content was found in barley in the 1st day analysis, while the highest values were found in the oat in the 12th day analysis.

Conclusion

In our study, triticale was the best grain in hydroponic germination in many findings. This is thought to be due to the fact that it is a hybrid plant. The advantage of being hybrid is due to durum wheat parent, cold resistance and rye growing properties in acidic soils.

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Determination and Relationship of Some Molecular Marker Polymorphisms Affecting Production Traits in Cattle Breed

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Introduction

Scientists have been trying to develop new genetic markers that can be used in indirect selection to increase the yield of livestock in terms of quality and quantity. The HRM represents the easiest method of genotyping and mutation detection since it is performed in the same tube and just after the PCR procedure (Montgomery et al., 2007). In the present study, we aimed to determined molecular marker polymorphism in the ELF5 (E74-Like Factor 5), BMP2 (Bone Morphogenetic Protein2) and FGF21 (Fibroblast Growth Factor 21) which effected the performance traits of cattle. We are used as material the Brown Swiss breed DNA samples. PCR analysis were made for the three different genes and then DNA samples were clustered by High Resolution Melting Analysis (HRM) method and sequence analysis were applied to some of the samples in each different cluster and were defined its polymorphic regions.

Material and Methods

Blood samples of 96 Brown Swiss cows reared in the private dairy cow farms region of Erzurum in Turkey were used as material. Genomic DNA was extracted from the whole blood samples using a Purgene kit (Gentra Systems, Plymouth, MN, USA). Four pairs of primers were designed for the *ELF5* (NCBI Reference Sequence: AC_000172.1), BMP2 (NCBI Reference Sequence: AC_000170.1) and *FGF21* (NCBI Reference Sequence: AC_000175.1) genes that were used in the present study using Primer 3 Software (Rozen and Skaletsky, 2000). PCR was performed to replicate the related gene region of the obtained DNA, the qualitative and quantitative controls of the analysis results were carried out by 1% agarose gel electrophoresis. Amplifications were performed on the Rotor gene Q Real-time PCR. The amplification program consisted of an initial denaturation of 95°C for 5 min followed by 40 cycles of 95°C, 56°C-58°C, and 72°C (25 s each) and a final extension for 5 min at 72°C. After amplification, the melting analysis was immediately performed. Based on the normalized Tm curves, the samples were clustered according to the Principal Component Analysis (Reja *et al.,* 2010) in the unsupervised mode using the Rotor-Gene ScreenClust HRM Software program in order to determine differences between the samples. A total of 96 PCR samples were separated into clusters by the HRM method, and randomly 4 samples from each cluster were selected for the DNA sequence analysis and sent to the company that performs commercial DNA sequencing to obtain a DNA base sequence of each sample. Subsequently, the genotype differences of the samples according to the DNA sequence results were compared with the help of Mega 7.0 (Kumar *et al.,* 2016) and BioEdit 7.2.6 (Hall, 2005) programs.

Results

As a result of the clustering analysis of the 96 DNA samples of Brown Swiss cattle, of which HRM-PCR analysis was performed, they were clustered according to their melting curve differences. The data evaluated on the ScreenClust HRM software were collected in different clusters for each region according to the three-dimensional principal component analysis (PCA). As a result of the HRM-PCR analyses, in the 96 samples belonging to Brown Swiss cattle, the number of different clusters formed was 8 for the *FGF21* gene 1st exon and 6 3rd exon for the 2nd exon 8 clusters, for the *BMP2* gene 2nd exon 5, 3rd exon; 1st region 6, 2nd region, 5 for the *ELF5* 2nd intron 8, 5th exon 6 and 5 for the 6th exon region.
Sequence analyses were obtained by randomly taking 4-6 samples from each of these clusters with more than 5 samples and taking all samples from the clusters with less than 5 samples. DNA sequence analysis results were evaluated to identify the regions showing polymorphism in the *GF21, ELF5* and *BMP2* gene regions in Brown Swiss cattle, and the results are presented in images and graphs. Alleles of the polymorphic regions, amino acid substitutions and genotype frequencies are presented in Table 1.

Conclusion

In the study, in order to determine new molecular marker polymorphisms on the ELF5 (E74-Like Factor 5), BMP2 (Bone Morphogenetic Protein2) and FGF21 (Fibroblast Growth Factor 21) genes, the RT-PCR and HRM analyses were performed, and new polymorphisms in the genes and gene regions determined by DNA sequence analyses were investigated. As a result of the analyses, a total of 13 polymorphic regions were identified, including 11 different polymorphic regions for the *ELF5* gene 1st İntron 3, exon 5th 5, for FGF21 gene 1st exon 1, 3rd exon 2 and for the *BMP2* gene 2nd exon region 1, exon 3rd region 1st 5 and total 17 polymorphic region determined. Exept for *ELF5* exon 5rd g.65826134 C>T (ID-15:g65826134 C>T (RefSNP-rs444548435)) and BMP2 exon 3th g.49551405 G/T (ID-Chr13:g.49551407 (RefSNP-rs470388497)) SNPs other polymorphic regions (SNPs) were identified for the first time in this study. The HRM analysis described in this report provides an alternative approach to traditional genotyping for SNPs/polymorphism in the improvement of bovine production traits, and it has many advantages, including speed, expense, and accuracy. There was non-significant as statistically the relationship between the polymorphic regions determined for the ELF5, BMP2 and FGF21 gene and lactation milk yields, 305-days milk yields, daily milk yields, lactation times, peak milk yields, peak day yields and average peak milk yields of Brown Swiss breed (P>0.05). However, it is suggested to investigate the marker ability of polymorphic regions determined for future studies in the animal

breeding. This method can also be very useful in assessing the efficiency of nuclear transfer as well as in studies of nuclear-cytoplasm interactions and maternal effects on cloned embryos.

Table 1. Polymorphic regions and marker positions in the FGF21, ELF5 and BMP2 genes, the amino acid substitution and genotype frequencies
(*Note: Genotype counts were calculated based only on the DNA sequencing results, the symbols here are representative).

Region	**Marker Position**	**Amino acid substitution**	**Genotype Counts** (AA:AB:BB)*
ELF5 intron 2	g.65825359 C/T	-	4:17:2
	g.65825499 G/A	-	5:17:1
	g.65825371 delusion A (-/A)	-	A^+:5 A^-:13
ELF5 exon 5	g.65825909 T/C	Ala782Ala	6:11:5
	g.65826062 G/A	Gly833Gly	5:16:1
	g.65826123 A/C	Ser854Arg	16:3:3
	g.65826134 C/T	His857His	16:5:1
	g. 65826138 T/C	Trp859Arg	17:5:0
FGF21 exon1	g.55834828 C/G	His400Leu	9:3:10
FGF21 exon 3	g.55836007 C>A	Arg793Arg	6:6:0
	g.55836088 G>T	Val820Leu	8:4:0
BMP2 exon 2	g.49551963 T/C	Phe638Xaa	7:0:2
BMP2 exon 3-region 2th	49551337 G/A	Thr3429Thr	3:20:0
	g.49551405 G/T	Ser3452Ile	2:21:0
	g.49551428 G/C	Pro3460Ala	2:21:0
	g.49551433 A/C	Pro3461Pro	3:20:0
	g.49551449 T/G	Trp3467Gly	4:19:0

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The Influence of Hoof Overgrowth and Pastern Angle on Delivery Duration in Goats

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Introduction

Due to its biological nature, goat is capable of grazing on rocks and rough mountainous areas. It is a livestock species, which is farmed under pasture based-extensive, semi-extensive or semi-intensive conditions. Hoof health is therefore one of the most important health parameters in pasture-based goat farming. Hoof care is a crucial practice in terms of management conditions, which directly affect animal production. Animals that are exposed to inadequate husbandry conditions can become susceptible to diseases even if they are high yielding ones. Animal welfare can also be adversely influenced by all these poor husbandry conditions. Tse (2014) reported that herd size has an important role on hoof care. Direk and Konyalı (2016) reported that farmers focus on yield but they neglect the hoof care. Excessive overgrowth hoof reveals a negative impact on animal welfare (Leite et al, 2017). Zobel et al (2016) stated that, hoof overgrowth affected lying behavior of dairy goats near parturition. Excessive prolonged hoof caused an increase of lying behavior on the day of parturition.

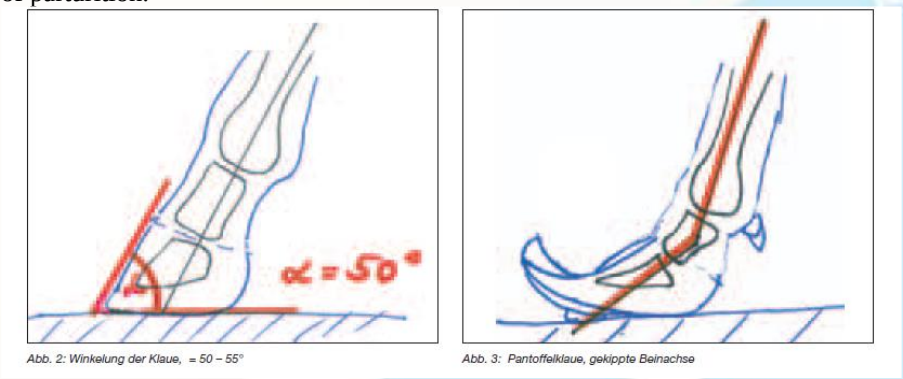

Figure 1. Pastern angle in a healthy goat and joint displacement of center of gravity caused by overgrown hoof (Deinhofer, 2008).

This study aimed at investigating the influence of toe length and pastern angel (metacarpophalangeal (MCP)/metatarsophalangeal (MTP) joint angle) on delivery duration in different ages of Turkish Saanen goats exposed to no hoof care throughout a year.

Materials and Methods

In this study, a total of 22 Turkish Saanen goats with different ages at the Unit of Animal Production and Research, Farm of Faculty of Agriculture, Çanakkale Onsekiz Mart University were used. The births of 22 goats were monitored in the framework of the study. The first delivery was considered in multiple births. The time starting from the water breaking until the full expelling of the fetus was taken as the delivery duration.

The data related to the hoof measurements of the goats were taken from the data collected in another study and evaluated (Bağcı, 2017). In the previous study, monthly measurements of toe parameters were carried out throughout a year. Measurements taken in the month of births were used for this study. In this regard, front left toe and rear left toe were photographed for the determination of the lengths of front left and rear left hooves along with of the front and rear pasterns' angles. In the analysis of the photos, an 8 x 8 cm reference object (a paper in this study) was placed by the toe and photographed and then transferred to the computer, which enabled the image analysis by Image J Programme (Anonymous, 2016).

Determination of Hoof Parameters Used in Image Processing

During the course of the study, following the determination of body weight, goats were taken on a stand and images were taken by a camera. The stand enabled both the fastening up of animal and image taking on a smooth ground. Front and rear toes were photographed from front, side or below directions and 6 images were taken for each individual.

Figure 2. Left front and rear hooves in goats and photographing of left front and right front toes

Table 1. Schematic Illustration of Collection of Parameters Used for Image Processing

Pastern Angle		Angle between Toes	
Toe Length			

Descriptive information on schematic illustration of hoof measurements and methods are present in Figures 2, Tables 1 and 2.

Table 2. Hoof Parameters Used in Image Processing

Parameter	**Description**
Toe front right length	Length from the end of front right hoof to the alignment of front corona band,
Toe front left length	Length from the end of front left hoof to the alignment of front corona band,
Hoof rear right length	Length from the end of rear right hoof to the alignment of front corona band,
Hoof rear left length	Length from the end of rear left hoof to the alignment of front corona band,
Front left hoof angle	Angle between two hooves in front left foot,
Rear left hoof angle	Angle between two hooves in rear left foot,
Front left pastern (MCP) angle	Metacarpaphalengeal joint angle, which placed between metacarpal bones and phalangeal bones,
Rear left pastern (MTP) angle	Metatarsophalengeal joint angle, which placed between metatarsals and phalenges angle,

0.03.2. Statistical Analyses

In the analysis of "duration of birth" trait, a linear model employing mother age, birth type*sex as fixed factor and birth weight of newborn as covariant was used. Adjustments were made based on these factors (SAS, 2002).

The age of mother and body weight of individual were taken as fixed factors in the analyses of toe lengths and MCP/MTP angles and adjustments were carried out according to these factors.

As stated by Bağcı (2017), proportional lengths were obtained by subtracting last control measurement length for that month from the length taken in the previous control and the difference was divided by the length taken in the previous control. Since fluctuations in -/+ direction took place in the differences in length due to growth and wearing, a very high variation coefficient was detected. Proportional lengths were used to resolve this problem. Since the values were so small, 3 were added to each parameter.

Relative Growth=$(\frac{C2-C1}{C1})+3$

In the assessment of the values, Wearing<3<Growth was accepted. In light of the findings in this study, lack of growth or wearing in hooves is regarded as "short hoof"; on the other hand, the growth of toe is regarded as "overgrown hoof".

Results

As presented in Table 3, significant differences in the delivery durations of goats with short and overgrown hooves were found. Longer occurrence of birth in overgrown hooved goats implies the importance of lying-standing up frequencies of the pregnant animal before delivery.

Table 3. Least square means ($\bar{X}$) of the effect of hoof length on delivery duration and standard error (SE), P=0.0378

	Short Hoof		Overgrown Hoof	
Delivery Duration	$\bar{X}$	SE	$\bar{X}$	SE
	12.55	5.27	29.60	5.53

On the other hand, the length of front right hoof, rear right hoof and rear left hoof significantly influenced delivery duration

(Table 4). Body weight was found as a significant factor for rear pastern angle.

Table 4. Correlation coefficients I with P-values of delivery duration and hoof & toe parameters

Delivery duration	r	P
Front right toe length, cm	0.56	0.0112
Front left toe length, cm	0.36	0.1281
Rear right toe length, cm	0.57	0.0108
Rear left toe length, cm	0.59	0.0084
MCP angle, °	0.01	0.9618
MTP angle, °	-0.49	0.0346

Along with the overgrown hoofs, reaching point of pressure put by the body weight to the ground changes from hoof area to MCP/MTP joints. This causes the strain of the joints and pain, thereby limping. The softer the floor the less goats use their hooves, indicating that hoof care should be done more often during the wet seasons with high humidity (Deinhofer, 2008).

In spite of a lack of significance between the overgrown and short hooved goats, numerical differences indicates that the pressure of body weight is likely given more on the joints than on the floor in the overgrown hooved goats and this effect is more apparent in MTP angle (Table 5).

Table 5. Least square means ($\overline{X}$), standard error (SE) with P-values of the influence of toe length on pasterns' angles

	Short Hoof		Overgrown Hoof		
	$\overline{X}$	SE	$\overline{X}$	SE	P
MCP Angle, °	140.06	1.38	139.57	1.51	0.8105
MTP Angle, °	141.03	1.30	137.68	1.43	0.0985

Conclusion

Age was found to be an important factor in the elongation of hoof. Hoof care is a crucial practice to minimize toe problems especially in intensive dairy goat farming. Hoof health directly influence animal health and welfare as well as productivity. Decrease in rear pastern angle (MTP) is important in prolongation of delivery and should be considered in management practices. Decrease in rear pastern angle (MTP) causes difficulties to the pregnant goat in lying and standing up, which restrain the expelling of fetus.

As a consequence of overgrowth of hoof, the highest increases in pastern angles occurred in January-February period, which resulted in the pressure of body weight on pasterns rather than hooves. Hoof care of goats especially before birth season is highly recommended to the farmers. This study provides interesting findings on goat management from the data of only 22 goats. Further studies using more animals are warranted to elucidate crucial aspects of this topic.

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Effect of Forage: Concentrate Ratio on Abnormal Stereotypic Behaviors in Lambs

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Introduction

Behaviors which are regularly repeated without obvious function defined as abnormal stereotypies (Odberg, 1978). Environmental frustration might result in development of different kind of abnormal stereotypic behaviors in all farm animals. However it was reported that such behavior pattern more frequently seen in animals managed under intensive production systems (Mason, 1991). Thus abnormal stereotypic behaviors would also be used as an indicator of the welfare status of the animals. It is known that restriction in nutritional environment with respect to providing of energy or forage sources might result in development of abnormal oral stereotypic behavior such as bar biting, wool biting, chain licking or chewing in ruminant animals (Cooper et al., 1994; Redbo and Nordblad, 1997; Yurtman et al., 2002; Mialon et al., 2008). However importance of forage: concentrate ratio (F:C) of the daily ration for physiological needs and health of animal is frequently disregarded in intensive animal production systems. In this study effects of differences in F:C ratio of daily ration prepared for growing female lambs were evaluated with it is possible effects on the development of stereotypic behaviors.

Materials and methods

This experimental study was conducted in Animal Production and Research Unit of Agricultural Faculty Farm of Çanakkale Onsekiz Mart University. Eighteen head of Tahirova weaned female lambs (30-35 kg LW; 110-123 days of age) were allocated to 3 treatment groups (n=6) according to F:C ratio of daily ration that given to animals. F:C ratio of the daily ration were determined as 20:80; 60:40 and 80:20. The lambs were randomly allocated to individual pens according to birth type, weaning weight and also live weight at the beginning of the study. The study was lasted to 5 weeks and lambs penned individually (1.20 x 1.50 x 1.50 m) throughout the study. There were individual feeder and bucket in each pen, and pens had a wooden grating as a floor type. Daily nutrient requirements of lambs were estimated for 30 kg LW and 250-300 g/day live weight gain according to NRC (2007) recommendation. Alfalfa hay (91,8% DM; 19,3% CP) and industrial mixture of concentrate (91,4% DM; 17.5% CP) were used as forage and concentrate part of daily ration, respectively. Lambs were fed twice a day (07:30 a.m. and 16:30 p.m.) and water was supplied in *ad libitum* condition. Feed and water intake of animals were recorded daily.

Nutrient intake behavior such as forage intake, concentrate intake and drinking, rumination, lying and standing behavior were the main groups of behavior in addition to abnormal stereotypic behaviors which included bar biting, crib biting, bucket biting, chain chewing and floor manipulation in the study. Locomotion, interaction, scratching, bleating, floor pawing and bipedal stance behavior were also recorded during the observations. Behavioral observations were made weekly in the study that lasted for 5 weeks. Behaviors were recorded by three observers from 08:30 a.m. to 04:30 p.m. Two kind of direct observation methods were used in the study; time sampling and continuous recording. Observation on forage intake, concentrate intake, lying, standing, rumination, locomotion and stereotypic behaviors were done every 10 minutes during the eight hours of observational periods according to time sampling methods. Stereotypic behaviors with the some other groups of behavior selected for the study (bleating, floor pawing, interaction, bipedal stance, scratching, drinking and lying) were also recorded in continuous manner during the each observational period.

In the analysis of the data showing binomial distribution, generalized estimation equations (GEE) were used for repeated measurements. Treatment (20:80, 60:40, 80:20), observation day (1, 2, 3, 4, 5) and interactions were included as fixed factors in the model which used in the analyses of data recorded as time sampling. WALD chi-square test was used in *post hoc* analysis.

A linear model which were include treatment, observation day, observation hour (1,..,8) and treatment x observation day as fixed factors was used in the repeated measurement of variance analyses for all behavioral characteristics observed continuously. The square root $\left(\sqrt{(y+10)}\right)$ transformation was applied to provide the prerequisites of analysis of variance. Tukey test was utilized in the *post-hoc* analyses. Statistical analyzes were carried out with the package program (SAS, 1999).

Results

At the beginning of the study, daily ration for treatment groups were arranged to provide same energy and protein consumption even under the different F:C ratio of treatments. Actual F:C ratio of the daily ration consumed by the animal calculated as 21:79, 56:44 and 78:22 for the treatment groups of 20:80, 60:40 and 80:20, respectively at the end of the study. Thus it is possible to assume that daily energy and protein consumption of the treatments were nearly equal throughout the study, and all animals in treatment groups were managed under the same condition that known to be a stressor such as penning condition and human x animal interaction except the F:C ratio of the daily ration.

There were significant differences between some treatment groups with regard to observation ratio of forage intake behavior, concentrate intake behavior, rumination and lying behavior ($P \leq 0.05$), although differences in the observation ratios of standing, locomotion and total stereotypic behavior of the treatments were found to be not significant ($P \geq 0.05$; Figure 1).

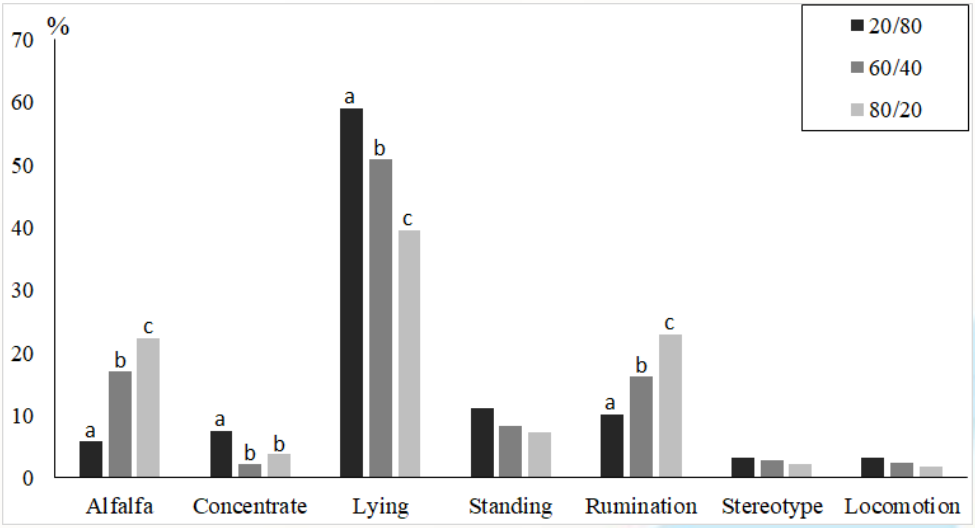

Figure 1. Observation ratio of some behaviors in the study (Differences between means indicated with different letters for each behavior are significant, P≤0.05).

Frequency of the oral activities which could be called as abnormal stereotypic behavior and also some of other behaviors observed in the groups were given in Table 1. Among the oral stereotypic behaviors bar biting, crib biting and wool biting behaviors showed significant differences between the treatments (P≤0.05), although oral activity of the animals toward to water bucket in stereotypic manner did not (P>0.05; Table 1).

Results from the experiments in the literature indicated that stereotypic behaviors may occur in some extend even under the optimum conditions of F:C rates applied in the feeding management (Uğur et al., 2003; Atalay et al., 2016). Redbo and Nordblad (1997) reported that lacking in the provision of forage source resulted in higher frequencies in stereotypic behaviors. Yurtman et al. (2002) also reported that restriction in daily energy intake while using increasing amount of protein in the fattening ration of lambs resulted in occurrence of oral stereotypic behaviors. Daily forage provision level which was controlled by the F:C ratio of daily ration among the groups in this study showed important effects on developing pattern of some stereotypic behaviors. Abnormal oral stereotypic behaviors such as bar biting, crib biting and wool biting were significantly affected by decreasing in the forage percentage in daily ration as reported by previous experiments. Differences in nutrient intake behaviors (forage intake, concentrate intake and drinking), rumination and lying behaviors among the treatments found to be explainable with possible physiological effects of F:C ratio of the daily rations.

Table 1. Means, standard errors ($\bar{x} \pm$ SE) and P* values of some behaviors of treatments, times/lamb/day.

Group	T			P		
Behavior	20:80	60:40	80:20	T	OD	TXOD
Bar biting	5.96±1.35^{a}	3.06±0.57^{b}	2.73±0.84^{b}	0.0348	0.2022	0.7173
Crib biting	**1.53±0.35^{a}**	**0.80±0.25^{ab}**	**0.63±0.18^{b}**	**0.0535**	0.3099	0.7335
Bucket biting	2.86±0.83	2.36±0.54	2.30±0.62	0.8326	0.0026	0.6019
Wool-biting	2.76±1.01^{a}	1.03±0.51^{ab}	0.30±0.14^{b}	0.0278	0.2385	0.6925
Chain chewing	0.93±0.63	0.16±0.08	0.06±0.06	0.2178	0.5694	0.6715
Floor manipulation	**5.43±0.98**	**6.83±1.41**	**8.40±1.35**	**0.2486**	**0.1216**	**0.7516**
Pawing	**2.46±0.97**	**1.50±0.50**	**1.63±0.80**	**0.6353**	**0.0136**	**0.4738**
Rumination	21.90±2.00^{a}	29.60±3.44^{ab}	36.33±3.62^{b}	0.0042	0.0011	0.1957
Drinking	6.23±0.97^{a}	3.13±0.54^{b}	3.83±0.71^{b}	0.0095	0.1399	0.9301
Lying	9.40±0.63^{a}	7.80±0.54^{ab}	6.70±0.64^{b}	0.0075	0.3203	0.5228
Bleating	9.70±4.36	1.30±0.29	9.00±4.29	0.1648	0.9353	0.6899
Interaction	**2.50±0.59**	**2.03±0.37**	**1.66±0.48**	**0.4124**	**0.0005**	**0.8749**
Bipedal stance	1.36±0.49	1.20±0.33	2.43±0.83	0.3423	0.2136	0.9416
Scratching	12.06±1.44	8.96±1.11	9.13±1.26	0.1439	0.0048	0.9523

* Square root $\left(\sqrt{(y+10)}\right)$ transformed data. Differences between means indicated with different letters in the same line for each behavior are significant (P≤0.05).

Conclusion

Under the condition of this study frequency of abnormal oral stereotypic behaviors were affected by the F:C ratio of daily ration. Abnormal oral stereotypic behaviors examined in this study were increased with the concentrate usage ratio except for bucket biting. It was concluded that forage presentation and F:C ratio are important factors for the development of

stereotypic behavior which are also indicator of welfare status of animals. Although knowledge on the relationship between F:C ratio of the ration and physiologic and metabolic health of animals are extensively studied in scientific literature, biological basis of the relationship between F:C ratio and stereotypic behavior need to be evaluated. Such efforts will also be contribute to understanding of welfare effects of such management practices in the future.

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The amino acid content of apilarnil which is effective in reproduction

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Introduction

There are three different bee castes in the honeybee colony. All of the inside and outside hives are done by worker bees and they are infertile. The bees that are effective in breeding are drones and queen bees. The continuity and reproductive function of the colony is realized by these two classes of bees. However, worker bees have an indirect effect on reproductive function; queen and drones care and feeding, such as the allocation of honeycomb cells where the eggs are placed. The number of drones increases during the mating period. The most powerful drones from different colonies fertilize the queen. Therefore, muscles and flying ability of drones should be good, sperm count and motility should be high. Apilarnil is obtained by collecting drones together with food during the larval period and lyophilizing them under appropriate conditions. To date, studies have shown the effectiveness of apilarnil on reproduction, especially in farm animals (Yücel et al., 2011, Altan et al. 2013; Balkanska et al., 2014)

Apilarnil is one of the newly discovered products among bee products. Its superior and specific activities have accelerated the studies on this subject in recent years. Especially the effect on reproduction is remarkable. In this study, the amino acid content of apilarnil was determined by HPLC-UV. According to the results, glutamic acid, aspartic acid, proline, leucine and arginine were the most abundant amino acids in apilarnil. Given the effects of amino acids on reproduction, it is not surprising that apilarnil is effective. Apilarnil is thought to be effective on reproduction especially in farm animals or extinct animals.

Materials and methods

Apilarnil sample was obtained from Nutral Terapi Besinsel Tedavi Ar-Ge Ltd. Company at Erciyes University Technopark.

The analyses were carried out using a series 4 liquid chromatograph (Perkin_Elmer Corp. Norwalk, USA), equipped with a UV detector. Seperation was carried out using a 5 um LiChrosolv C-18 column (250X4.5 mm i.d.). Th mobile phase was prepared from methanol and 12 mM Na-Phosphate buffer wirh 5.5 or from Na-acetate buffer with pH 5.0, CH3CN and dichloroethane. The derivative reagent was freshly prepared before use from phenylisothiocianate, water, ethanol and triethylamine (1:1:7:1). The dervatization of 0.4 mmol from each amino acid was performed 15 min at room temperature and the solvent was removed by freze-drying. HPLC analysis was developed on the basis of a standard mixture of 18 proteinogenic amino acids.

Results

The amino acids detected in apilarnil are shown in Table 1. According to these results, glutamic acid, aspartic acid, proline, leucine and arginine are the most common amino acids. Methionine and histidine were found to be the lowest amino acids.

Table 1. Amino acid anlysis of apilarnil

Amino acid	**mg/100g**	**Amino acid**	**mg/100g**
L-Alanine (Ala)	1826	Glisin (Gly)	1663
L-Aspartic acid (Asp)	3571	L-Valine (Val)	2269
L-Metionine (Met)	500	L-Leucine (Leu)	3258
L-Glutamic acid (Glu)	5625	L-Isooleucine(Ile)	2016
L-Phenylalanine (Phe)	1844	L-Threonine (Thr)	1303
L-Lysine (Lys)	7198	L-Serin (Ser)	1610
L-Histidine (His)	990	L-Prolin (Pro)	3918
L-Tyrozine (Tyr)	2021	L-Arginine (Arg)	3005

Conclusion

The most commonly identified components in drone homogenates are free amino acids. Since drone larvae are a new product in the field of animal husbandry, the number of studies on this subject is negligible. In a study examining the anabolic and androgenic effects of aplarnil, 4 g/broiler/day apilarnil was given daily in broiler chickens at 22 and 42 days and affected the crotch length and beard width in broiler chickens. The results obtained in this study showed the androgenic effect of apilanril (Yücel et al. 2011). Apilarnil extract has been reported to regulate sexual dysfunctions of wild boars (Bolatovna et al., 2015).

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Examination of Some Queen Quality Characteristics in Sanliurfa Local Honey Bees (A. mellifera L.)

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Introduction

Queen is the most important individual of honey bee colonies for both genetic and social reasons. The queen bee morphological, reproductive and metabolic characteristics that determine the performance of managed colonies. The survival of the honey bee colony depends on the queen, due to its ability to mating and lays fertilized eggs. Studies to determine the reproductive potential and quality of queens have shown that the quality of the queens are affected by genotype, rearing methods, rearing season, nutrition, age of larvae and the number of grafting larvae. In order to express queen quality, morphological characteristics such as thorax width, head width, and wing lengths, at the same time, some characteristics of the ovaries and spermatheca were investigated (Woyke 1967, 1971; Dedej et al., 1998; Hatch et al., 1999; Tarpy et al., 2000; Gilley et al., 2003; Delaney et al., 2011; Tarpy et al., 2011; Amiri et al., 2017). In this study; it was aimed to examination of quality characteristics of queens in Sanliurfa local honey bees (*A. mellifera* L.).

Materials and methods

Study was conducted in May 2019 at Sanliurfa. The live material of the study is local honey bees of Sanliurfa. Standard queen rearing process was followed according to Laidlaw and Page (1997). One days old larvae were obtained from a source colony that the queen was confined with an empty honeycomb for grafting. One strong, queenless starter colony was prepared and total of 30 workers larvae were transferred for queen rearing. Emergence, mating and oviposition of queens were followed in the same colonies that prepared for this purpose. The newly emerged queens were weighed (mg) (Radwag PS 750.R2), and released back to own colonies. After starting to lay eggs, the queens were anesthetized one by one at -20 °C (3-4 minutes) and they were dissected under stereomicroscope (Leica S8 APO). First of all, external organs of queens were dissected and mounted on microscope slides. Morphological characteristics; head width (mm), thorax width (mm), right forewings length (mm), and forewings width (mm), right hind wings length (mm) and hind wings width (mm), right hind legs length (femur+tibia+basitarsus length) (mm), and hamuli numbers were measured with Leica LAS according to Ruttner (1988). The wet ovary weight (mg) was firstly weighed in dissection process and placed in the physiological fluid. The spermatheca diameter was measured without tracheal net. The numbers of ovarioles were determined by real-time counting method under microscope. The queens were divided into two groups according to their weight at emergence, the differences between the groups averages were determined by t-test. Statistical analysis was performed using SPSS v.21 package program.

Results

The larva acceptance rate was 93.33%. Eight days after grafting, 28 pupae were transferred to colonies prepared as queenless. After emergence and mating losses, the remaining 25 queens were followed for oviposition. Pre- oviposition periods of queens ranged between 10-13 days. 5 queens that did not lay eggs or lay fertilized eggs were identified. It was thought that these queens were not eliminated by the workers since there was no open brood in the colony. In order to determine some quality characteristics of queens, two groups were formed according to their weights as heavy and light. For this purpose, under 170 mg as 'light', above 170 mg were determined as 'heavy' (Table 1). The queen quality characteristics are presented in Figure 1.

Table 1. Queen groups by weight at emergence (mg)

Group	n	Minimum weight at emergence (mg)	Maximum weight at emergence (mg)
Light	11	150	166
Heavy	14	173	213

The mean weight of the heavy group was 188 mg and the light group was 159 mg ($P < 0.05$). Since queens cannot be dissected at the same time after oviposition, their weights were also determined before dissection. There was no change in the order of queens per group according to weight at dissection. The correlation between weight at emergence and weight at dissection was found $r=0.995$; $P<0.01$. Therewithal, the correlations were found significant between weight at emergence and head width, and forewing length, and hind wing length, and femur length, and tibia length, hindleg length, wet ovary weight (Table 4).

Figure 1. Morphological and reproductive organ characteristics of queens

There was a difference between the groups of queens in terms of wet ovary weight (P<0.05). When the ovary development of 4 queen bees in the light group was examined, it was observed that some of the ovaries were atrophied, did not develop, and the spermathecae were empty. In a queen in the heavy group, the numbers of ovaries were determined, but no mature eggs were observed and the spermatheca was empty (Figure 2). There was a difference between the groups of queens in terms of the number of ovarioles (P<0.05). The correlations between number of ovarioles and weight at emergence, and weight at dissection, and wet ovary weight were found statistically important.

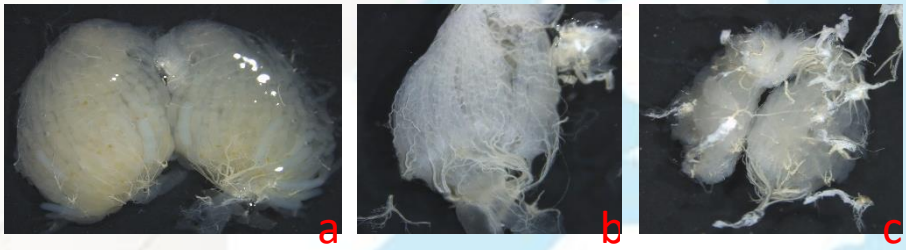

Figure 2. Fully developed ovary (a), undeveloped ovary (b, c)

The average of spermatheca diameter of the heavy group is higher than the light group. But, there was no difference between the groups in terms of spermatheca diameter. However, the correlation between the spermatheca diameter and head widht was found r=0.62; P<0.01. The correlation between the spermatheca diameter and wet ovary weight r=0.53; P<0.05. Similarly, the correlation between the thorax widht and the diameter of spermatheca was found r=0.46; P<0.05.

Table 2. Some quality characteristics of queens

Group/Characters	n	Heavy Queens	n	Light Queens	n	Total	P
Weight at emergence (mg)	14	188±4.3	11	159±1.7	25	175±3.9	**
Weight at dissection (mg)	14	212±4.0	11	180±2.3	25	198±4.0	*
Wet ovary weight (mg)	14	48±3.9	11	25±6.3	25	38±4.2	*
Numbers of ovarioles	14	326±10.3	7	298±4.75	21	317±7.5	*
Diameter of spermatheca (mm)	13	1.126±0.0177	8	1.085±0.0233	21	1.110±0.0144	NS

According to the morphological characteristics, only head width and hind leg I were found significant between queen groups (P<0.05). In terms of other morphological characters of queens, the heavy queen group had higher means than the light group, but the differences were insignificant (Table 3). The correlation between the head widht and thorax widht was found r=0.54; P<0.01.

Table 3. Morphological characters of queens

Group/Characters	n	Heavy Queens	n	Light Queens	n	Total	P
Head width (mm)	14	2.389±0.0101	11	2.296±0.0205	25	2.348±0.0140	*
Thorax width (mm)	14	3.417±0.0461	11	3,351±0.0582	25	3.388±0.0362	NS
Forewing length (mm)	14	9.314±0.0620	11	9.137±0.0921	25	9.236±0.0552	NS
Forewing width (mm)	14	3.097±0.0174	11	3.095±0.0411	25	3.097±0.0200	NS
Hind wing length (mm)	14	7.098±0.0530	11	6.679±0.1441	25	6.914±0.0803	NS
Hind wing width (mm)	14	2.133±0.0112	11	2.085±0.0485	25	2.112±0.0222	NS
Hamuli number	14	16.928±0.3049	11	16.090±0.5126	25	16.560±0.2891	NS
Hind leg length (mm)	14	9.235±0.0876	11	8.821±0.1252	25	9.053±0.0834	*

Conclusion

The local honey bee source colony used in the study is unselected material. Since the nutritional sources are sufficient, no additional feed was given. It was also observed in this study that even queens reared from the same source colony were subjected to different genetic and environmental conditions in the starter and mating colonies. Local honeybees of Sanliurfa and their queens have low values in terms of morphological features. Since it is a hot climate honey bee, its genetic potential and lack of diversity of food sources may affect morphological and reproductive characteristics.

Table 4. Pearson correlations between characters

Characters		WE	WD	HW	FWL	FWW	HWL	HWW	HN	TW	FeL	TiL	BaL	BaW	HiLL	WOv	DSp	NOv
WE	Pearson Corr	1	,955**	,411*	,399*	,265	,546**	,285	,436*	,014	,618**	,462*	,390	-,215	,592**	,542**	-,104	,506*
	Sig. (2-tailed)		,000	,041	,048	,200	,005	,167	,029	,946	,001	,020	,054	,301	,002	,005	,654	,019
WD	Pearson Corr	,955**	1	,442*	,372	,230	,476*	,222	,347	-,038	,565**	,368	,392	-,242	,546**	,547**	-,026	,495*
	Sig. (2-tailed)	,000		,027	,067	,269	,016	,285	,090	,858	,003	,070	,053	,244	,005	,005	,912	,022
HW	Pearson Corr	,411*	,442*	1	,339	,004	,365	,005	,006	,541*	,372	,347	,154	,042	,329	,451*	,620*	,361
	Sig. (2-tailed)	,041	,027		,098	,983	,073	,983	,977	,005	,067	,089	,461	,842	,108	,023	,003	,108
FWL	Pearson Corr	,399*	,372	,339	1	,657**	,332	,105	,197	-,148	,762**	,715**	,411*	-,147	,732**	-,051	-,207	-,159
	Sig. (2-tailed)	,048	,067	,098		,000	,105	,618	,344	,481	,000	,000	,041	,482	,000	,810	,368	,490
FWW	Pearson Corr	,265	,230	,004	,657**	1	,414*	,374	,295	-,123	,606**	,419*	,074	,041	,385	-,173	-,301	-,070
	Sig. (2-tailed)	,200	,269	,983	,000		,039	,065	,152	,559	,001	,037	,724	,846	,057	,409	,184	,762
HWL	Pearson Corr	,546**	,476*	,365	,332	,414*	1	,786**	,481*	,361	,330	,238	,224	-,062	,323	,369	,040	,350
	Sig. (2-tailed)	,005	,016	,073	,105	,039		,000	,015	,076	,107	,251	,283	,767	,116	,069	,863	,119
HWW	Pearson Corr	,285	,222	,005	,105	,374	,786**	1	,265	,069	,073	,160	,152	-,091	,166	,350	-,118	-,105
	Sig. (2-tailed)	,167	,285	,983	,618	,065	,000		,200	,743	,730	,445	,467	,667	,429	,086	,609	,651
HN	Pearson Corr	,436*	,347	,006	,197	,295	,481*	,265	1	,025	,293	,043	,035	-,039	,137	,052	-,079	,267
	Sig. (2-tailed)	,029	,090	,977	,344	,152	,015	,200		,906	,155	,840	,868	,855	,514	,805	,735	,241
TW	Pearson Corr	,014	-,038	,541**	-,148	-,123	,361	,069	,025	1	-,082	-,052	-,356	,435*	-,259	,416*	,463*	,350
	Sig. (2-tailed)	,946	,858	,005	,481	,559	,076	,743	,906		,697	,803	,081	,030	,212	,038	,034	,120
FeL	Pearson Corr	,618**	,565**	,372	,762**	,606**	,330	,073	,293	-,082	1	,765**	,252	,028	,735**	,035	-,123	-,004
	Sig. (2-tailed)	,001	,003	,067	,000	,001	,107	,730	,155	,697		,000	,225	,894	,000	,868	,597	,988
TiL	Pearson Corr	,462*	,368	,347	,715**	,419*	,238	,160	,043	-,052	,765**	1	,419*	-,070	,825**	,077	-,188	-,255
	Sig. (2-tailed)	,020	,070	,089	,000	,037	,251	,445	,840	,803	,000		,037	,741	,000	,714	,414	,265
BaL	Pearson Corr	,390	,392	,154	,411*	,074	,224	,152	,035	-,356	,252	,419*	1	-,886**	,817**	-,065	-,339	-,071
	Sig. (2-tailed)	,054	,053	,461	,041	,724	,283	,467	,868	,081	,225	,037		,000	,000	,758	,133	,761
BaW	Pearson Corr	-,215	-,242	,042	-,147	,041	-,062	-,091	-,039	,435*	,028	-,070	-,886**	1	-,544**	,057	,303	-,052
	Sig. (2-tailed)	,301	,244	,842	,482	,846	,767	,667	,855	,030	,894	,741	,000		,005	,787	,181	,823
HiLL	Pearson Corr	,592**	,546**	,329	,732**	,385	,323	,166	,137	-,259	,735**	,825**	,817**	-,544**	1	-,003	-,316	-,119
	Sig. (2-tailed)	,002	,005	,108	,000	,057	,116	,429	,514	,212	,000	,000	,000	,005		,988	,164	,608
WOv	Pearson Corr	,542**	,547**	,451*	-,051	-,173	,369	,350	,052	,416*	,035	,077	-,065	,057	-,003	1	,534*	,646**
	Sig. (2-tailed)	,005	,005	,023	,810	,409	,069	,086	,805	,038	,868	,714	,758	,787	,988		,013	,002
DSp	Pearson Corr	-,104	-,026	,620**	-,207	-,301	,040	-,118	-,079	,463*	-,123	-,188	-,339	,303	-,316	,534*	1	,233
	Sig. (2-tailed)	,654	,912	,003	,368	,184	,863	,609	,735	,034	,597	,414	,133	,181	,164	,013		,338
NOv	Pearson Corr	,506*	,495*	,361	-,159	-,070	,350	-,105	,267	,350	-,004	-,255	-,071	-,052	-,119	,646**	,233	1
	Sig. (2-tailed)	,019	,022	,108	,490	,762	,119	,651	,241	,120	,988	,265	,761	,823	,608	,002	,338	

**. Correlation is significant at the 0.01 level (2-tailed). *. Correlation is significant at the 0.05 level (2-tailed).

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Vitamin content of probiotic bee product perga

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Introduction

The main nutritional needs of honey bee (*Apis mellifera* L.) are nectar, pollen, and water. Nectar is a source of carbohydrates for honey bees, while pollen is a source of lipid and vitamins. A worker bee needs about 120-145 mg of pollen to grow from larva to adult, and a colony collects an average of 20-57 kg of pollen per year. Honey bee secretions are added to the pollen collected by food collecting worker bees and brought to the hive by pressing the pollen basket on the hind legs. With the help of other young bees in the hive, the bee bread is poured into the honeycomb chamber and covered with a small amount of honey and wax mixture by the bees to prevent spoilage. This mixture is subjected to chemical changes under the influence of different enzymes, microorganisms, humidity and temperature (35-36°C). This stored pollen which undergoes chemical change is called bee bread. Bee bread is consumed by adult bees and their larvae are fed.

Bee bread contains approximately 20% protein, 3% lipid, 24-35% carbohydrate, 3% vitamins and minerals. All of the essential amino acids that the human body cannot biosynthesize include vitamins such as protein, C, B, B2, E, H, P, nicotinic acid, folic acid, pantothenic acid, pigments, enzymes such as saccharose, amylase, phosphatase, flavonoids, 219talian219219ds and hormones. The composition of bee bread is different from pollen. The high biological activity of the bee bread inhibits the growth of mold and fungus and thus provides better protection of the bee bread. Bee bread contains more reduced sugar, vitamin K and microorganism digesting enzyme than pollen of the same plant. The conversion of pollen into bee bread and biochemical changes are the result of microbial activity with mainly lactic acid fermentation caused by bacteria and yeasts (Bogdanov, 2011; Kaplan et al., 2016; Konar et al., 2010).

Materials and methods

Perga (bee bread) sample was obtained from Nutral Terapi Besinsel Tedavi Ar-Ge Ltd. Company at Erciyes University Technopark.The HPLC equipment consisted of a Series 200 binary pump, a sampling valve, a 20 □L sample loop and a Series 200 UV–vis variable wavelength detector, all from PerkinElmer, Milan Italy. Separation was performed on an Alltima C18 column 250 mm × 4.6 mm, 5 um particle size (Alltech, Sedriano, Italy) fit- ted with a guard cartridge packed with the same stationary phase. Data were elaborated using Turbochrom Workstation Software (PerkinElmer, Milan, Italy). Each sample was prepared and injected in triplicate.

Results

Vitamin C, vitamin E, folic acid, vitamins B1, B2 and B12 were detected in Perga. According to the results, it was found that pergals contain higher amounts of vitamin C and E than vitamin B.

Table 1. Vitamin content of perga

Vitamin	Content	Vitamin	Content
Vitamin C	15.61 mg/100g	Vitamine K1	Not detected
Vitamin E	13.28 mg/100g	Vitamine B1 (Tiamine)	0.24 mg/100g
Folic acid	85 ug/100g	Vitamine B2 Riboflavin)	1.19 mg/100g
Vit D3 (kolekalsiferol)	Not detected	Vitamine B12 Coabalamin	0.51 ug/100g

Conclusion

The literature on bee bread is scarce and is rapidly increasing. In one study, antibacterial activity of bee bread and bee pollen samples collected from Morocco region was investigated. In the study, pollen samples were used both dried and fresh and antibacterial activity test was performed against bacteria which are among E. coli, Staphylococcus aureus, Bacillus cereus bacteria. As a result, it was reported that fresh bee pollen and bee bread showed higher antibacterial activity than dried pollen samples. In another study, hot water, water and ethanol extracts of bee bread samples were extracted and functional properties of these extracts were determined. The authors stated that antioxidant activity was high in the samples where water was used as a solvent and that this antioxidative effect of bee bread could be utilized. As a result, bee bread (perga) is an important product that will serve human health as an important probiotic (Almedia-Muradian et al., 2007; Abouda et al., 2011; Vasquez and Olofsson, 2009.)

Since almost all bee products have antioxidant effects, they are oxidized when they come into contact with air and their antioxidant capacity decreases when they see sunlight. It is therefore important to encapsulate the bee bread in powder form and in an appropriate dose to prevent contact with the air in order to prevent oxidation

Nowadays, people take nutritional activity in a multi-faceted way, and they perform it for prevention and/or treatment.

Considering that today's natural life and natural nutrition are at the forefront, the size of bee products in this area will be understood. However, the benefits of bee products in Turkey are mentioned by ear-to-ear information and studies on the subject are quite limited. Bee pollen and bee bread are important nutrients with their nutrients. Studies on these products will both ensure the recognition of the products and increase consumption rates.

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Estimating Nutritive Values of Jasminum fruticans L. in Different Seasons

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Introduction

Good-quality roughage is produced from two important sources in our country; pastures and agriculture of forage crops (Alçiçek et al., 2010). Pasture areas have been destroyed and lost their efficiency because of reasons such as overgrazing and lack of maintenance. Moreover, forage crop cultivation has not become sufficiently widespread. One of the leading problems faced in animal production is roughage, especially the deficit in good-quality roughage (Hanoğlu, 2014). Many studies have revealed that there is a serious deficit of roughage for animal husbandry in our country (Açıkgöz, 2018). Therefore, it is necessary to find alternative feed source that can meet the roughage needs of the increasing number of animals and several shrub species have been identified as being an important alternative feed source for ruminants (Temel and Kır, 2015). This study was carried out to determine the changes in the seasonal nutrient contents of leaves and stems of the shrubby jasmine (*Jasminum fruticans* L.) plant species, which is widely grown under the ecological conditions of the Saricakaya Valley of Eskisehir Province.

Materials and methods

This study was conducted on 12 selected specimens in 2010 from *Jasminum fruticans* plants. All browse samples were been harvested from plantations in the Transitional Zone Agricultural Research Institute in Eskisehir. Plant samples were collected from three different periods as spring, summer and autumn. All of the leaves of the sample plant were collected by hand peeling and then the yearly offshoots were collected by separating from the stem. The plant leaves and stems samples were oven-dried at 48°C for 72 hours, and then analysed for chemical composition. All chemical analyses were carried out in triplicate. Dry matter (DM) was determined by drying the samples at 105 °C for 4 h while total ash was determined by igniting the samples in muffle furnace at 550 °C for 4 h. Nitrogen (N) content was measured by the Kjeldahl method (AOAC,1990). Crude protein (CP) of samples was calculated as N x 6.25. Crude fat (CF) levels were determined by the AOAC (1990) methods. Cell wall contents (NDF and ADF) of samples were determined using the method described by Van Soest et al., 1991. Condensed tannin of samples was determined by butanol-HCl method as described by Makkar et al., 1995. The samples were exposed to *in vitro* digestion using ANKOM DAISY^{II} incubator (Ankom Technology Corporation, Fairport, NY, USA) using the method outlined by Goering and Van Soest (1970). *In vitro* fermentation was carried out for 48 h. Macronutrients (P, K, Ca, Mg, S) were determined by using an inductively coupled plasma atomic emission spectrometer ICP-AES (Varian Vista, USA) device. As micronutrients, Fe, Mn, Cu, B, Na and Zn contents of samples were determined by using ICPOES (Inductively Coupled Plasma-Optical Emission Spectrometer) device. Data for nutrient content were analysed using the General Linear Model (GLM) procedures based on a 3×2 factorial arrangement of season, plant parts and their respective interactions. Duncan's multiple range test was used to evaluate the significance of the difference.

Results

Nutritional values varied among seasons *(P<0.01).* The CP, NDF, ADF and CT contents of *Jasminum fruticans* L, were found to be 141,6, 483.3, 361,1 and 31,3 g kg-^{1} DM for spring period. Also, *in vitro* true digestibility of dry matter (IVTDDM) was found to be 715.5 g kg-^{1} DM for spring samples. Results showed that the mean CP of *Jasminum fruticans* L was higher at spring (141.6 g kg^{-1} DM) than at summer and autumn respectively (110.6 and 98.5 g kg^{-1} DM). The CP, CA, Ca, P, and EE parameters of the leaves were higher compared to those of the stems *(P<0.01).* Also stems had higher NDF and ADF (412.2, 314.4 g kg^{-1} DM) than leaves. The lowest of these parameters were estimated for the spring leaves with 340.0% and 178.8 g kg^{-1} DM respectively. *Jasminum fruticans* L had lower CT contents than 5% of DM.

Conclusion

The nutritional content of spring period samples were found to be higher than those of autumn and summer period samples *(P< 0.01).* Also, nutritive values differed significantly (P<0.01) between different plant parts. This result is similar to that of Hendrickson et al. (1981) who stated intake stem is less by livestock due to high cell wall content. Results showed that the IVTDDM in *Jasminum fruticans L* decreased depending on maturity, and NDF, ADF and ADL contents increased. CP content of *J. fruticans* leaves was more than that of *D. glomerata,* and less than that of T. repens (Heshmati et. Al, 2007). Results also indicated that *Jasminum fruticans L* due to its high CP content is a valuable source of forage for livestock.

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Estimation of Lactation Curve Parameters by Using Ali and Schaeffer's Model in Three and Four Year Old Anatolian Buffaloes

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Introduction

There are about 200 million buffaloes in the world and about 97% of them are in Asia. It is estimated that milk production of world buffaloes is 120 million tons (of 66 million female buffaloes) and it produces 1.810 kg on average per lactation (Anonymous, 2017). Research shows that buffalo herds contribute 13% of total world milk production with a profit of $ 564 million in 2016 (Anonymous, 2016). The commercial use of buffalo milk has increased over the last few decades and has contributed to the increase in the number of buffalo farms. Some countries, such as Turkey, Egypt, Germany and Italy have shown an increase in buffalo population, due to high demand for buffalo dairy food (Niozas et al., 2019).

Water buffalo are bred 178 397 head according to the Turkey Statistics Institute in Turkey (Anonymous, 2019). Water buffalo is one of Turkey as well as in world dairy production resources. The period after the birth of the animals, starting with the secretion of milk and the reaching of the cow to dry period is called the lactation cycle. During a normal lactation of the dairy cow, the milk yield starts out at a high level, peaks 3 to 6 weeks after calving, and then gradually declines toward the end of lactation (Lombaard, 2006).

Changes in milk yield during the milking period are expressed as the lactation curve. Lactation curves are formed by plotting the milk yields according to the test intervals (Sahoo et al. 2015; Singh et al. 2017). Several studies have been conducted using different lactation curve models in order to calculate the lactation curve parameters of dairy cattle and buffaloes from past to present and to determine the best model defining lactation curves. The polynomial regression model developed by Ali and Schaeffer in 1978 is one of these models. In this study, polynomial regression model which is the lactation curve parameters of Anatolian buffaloes aged 3 and 4 was determined.

Material and methods

In this study, milk yield records of 780 test days belonging to 145 buffalo cows that were reared between 2013-2014 in Tokat province were used. Data of buffaloes with at least five test days were evaluated in determining lactation curve parameters. The STATISTICA 5.0 program was used to determine the lactation curve parameters (a, b, and c).

In this study, the data of buffaloes with milk data of at least five test-days were evaluated (Cruz et all, 2009).

The following equation was used in all analyses (Ali and Schaeffer, 1987);

Polynomial Regression (AS),: $Y_{(t)} = a + bt + ct + d \log t + e \log t^2$

In this equation;

Yt, milk yield obtained daily; Y_t is the observed milk yield at day ; a: milk yield at the beginning of lactation

b: the rate of rise of the curve at the beginning of lactation; c: the rate of the decreasing the curve

d: characterize the shape of the curve; e: natural logarithm, base

Results and discussion

In this study, Polynomial regression model of 780 test days milk yield records of Anatolian dairy buffaloes reared in Tokat province and districts between 2013 and 2014 were analyzed and lactation curve parameters were calculated. Thereafter lactation curves were obtained by graphing the milk yields obtained in real and models according to test days. The lactation curve parameters summarized in Table 1.

Table 1. Lactation curve parameters according to age groups

Ages Groups	a	$S_{\bar{x}}$	b	$S_{\bar{x}}$	c	$S_{\bar{x}}$	d	$S_{\bar{x}}$	e	$S_{\bar{x}}$
3	6.44	0.140	1,39	0.205	0.11	0.075	4.28	1.616	3.19	1.726
4	4.37	0.129	0.57	0.135	0.10	0.005	0.01	0.097	0.03	0.0104

Table 2. The coefficient of determination and mean square errors according to age groups

Ages Groups	The coefficient of determination (R^2)	Mean Square Error
3	98.17	0.032
4	98.29	0.025

The Ali and Schaeffer's model was used to calculate the lactation curve parameters. According to the age of calving, the test day milk yields were categorized. Lactation curve parameters (a, b, c, d and e) were determined as 6.44±0.140, 1,39±0.205, 0.11±0.075, 4.28±1.616 and 3.19±1.726 respectively for three year old. The coefficient of determination and mean square error were estimated 98.17 and 0.032, respectively for three year old. Lactation curve parameters (a, b, c, d and e) were determined as 4.37±0.129, 0.57±0.135, 0.10±0.005, 0.01±0.097 and 0.03±0.0104 respectively for four year old. The coefficient of determination and mean square error were estimated 98.29 and 0.025, respectively for four year old. The shape of the lactation curve for three years old was shown in Figure 1.

Catillo et al. (2002) showed that the milk production of Italian dairy buffaloes increased with aging in almost all phases of lactation, especially at peak time, so that the lowest and highest daily milk production were found in the youngest and oldest buffaloes, respectively.

In this study, the determination coefficients determined by the polynomial regression model for Anatolian buffaloes aged three and four are similar to the previous reported by Catillo et al. (2002)

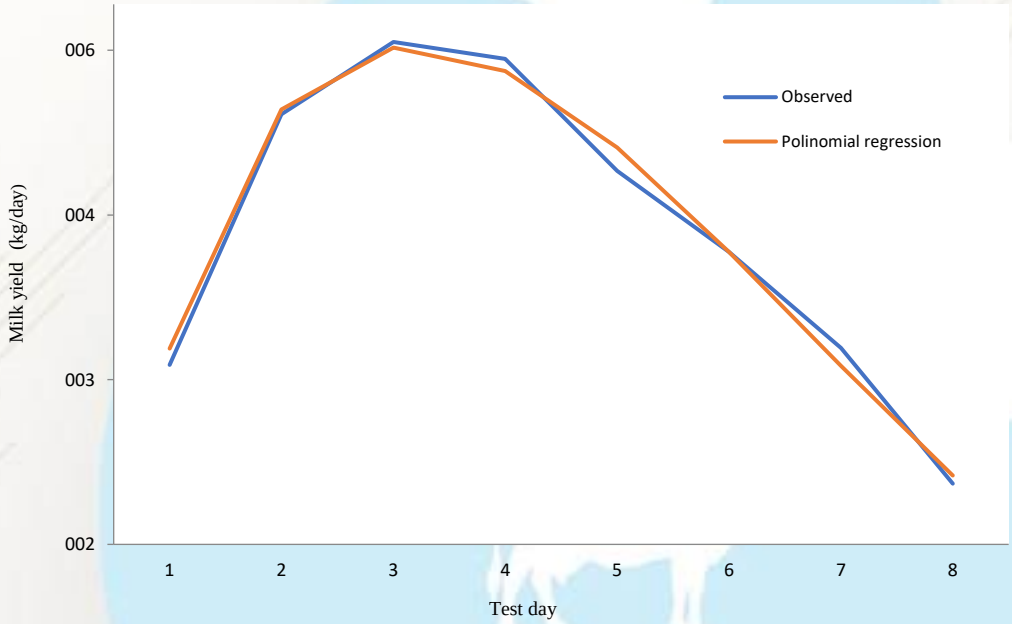

Figure 1. The shape of lactation curve for thrre years old

The shape of the lactation curve of the four-year-old Anatolian buffaloes is shown in Figure 2.

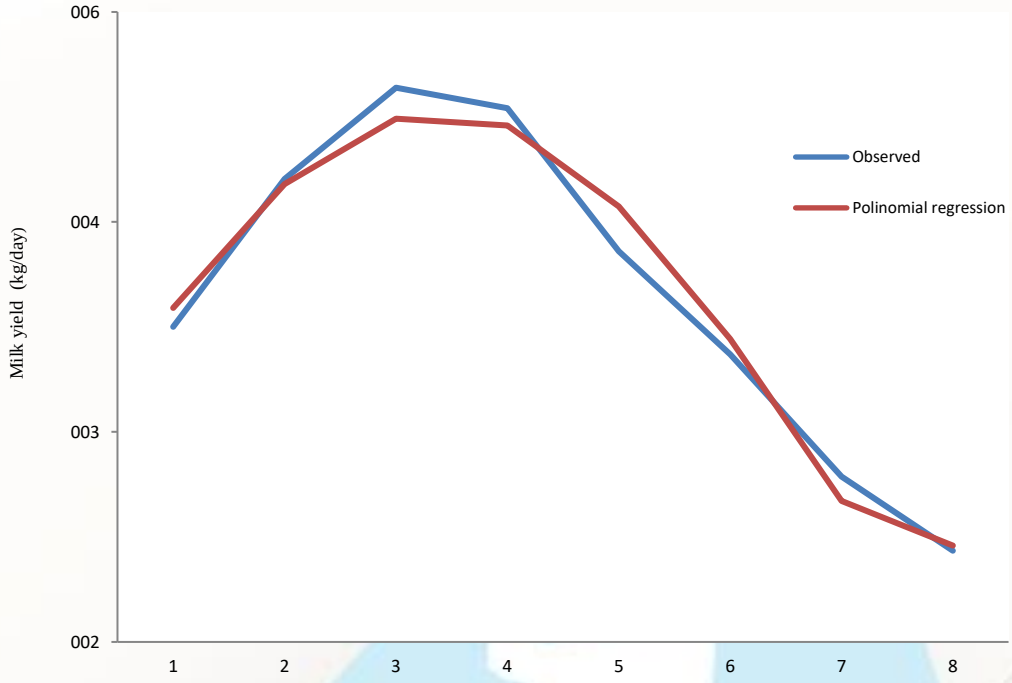

Figure 2. The shape of lactation curve for four years old

Conclusion

The parameters obtained in this study in breeding studies to be applied in these herds can used as criteria.

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Teat Profile and Its Importance in Dairy Cows

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Introduction

Teats are located on the udder and constitute the outer door through which milk discharge occurs in lactating animals. In dairy cows, a teat is usually 5-6 cm long but its length can vary between 3 to 12 cm, and have a diameter of 20-30 mm wide and it is know that in cows posterior teats are shorter than anterior teats (Boudry, 2005). Teat skin, teat end and teat canal constitute the important part of a teat. Those three components sometimes undergo short-term, medium to long term changes and those changes are induced by some factors such as milking management and milking machine-induced changes, environmentally-induced changes and infectious-induced changes.

The teat skin experiences some changes such as discoloration, firmness, petechial haemorrhages and various lesions caused by trauma, milking machines and infectious microorganisms. The teat end experience also a series of changes short-term and long-term expressed by ringing, wedging, roughness and hyperkeratosis. Teat end hyperkeratosis is mainly caused by machine-induced, milking management and environmental condition factors.

As far as teat canal is concerned, it is almost 10-12 mm long. Generally, teat canal is a door of milk discharge but it is also the entrance door of microorganisms colonizing the mammary gland and cause mastitis. During dry period or inter-milking, teat canal is almost closed and is lined by an epithelium that protect the canal against the entrance of harmful microorganisms. When the canal is not well or completely sealed by the keratin, the teat is exposed to high infection risk (Willamson et al, 1995). During and after milking time, that canal is open and its circumference turns around 6 mm. So, the openness of the teat canal is influenced by the flow of milk that passes through it and the risk of infection is elevated when the canal is widely open (Dodd and Neave, 1951).

The control of these three components can play a great role in leading a dairy herd and thus can help in earlier identifying the emerging problem. This will help to resolve the current problem that can threaten milk production and milk quality. Farmers may regularly control the score profile of all milking dairy cows in order to get good quality products.

Defense mechanisms of the teat canal

The teat canal is an entrance to the mammary gland through the teats. That canal can constitute an entrance of microorganisms into the udder. Once those microorganisms enter the mammary gland, they can cause mastitis or other complications that usually affect the teats and teat ends. Teat end and teat canal have their own mechanism for defense against the harmful microorganisms. Firstly, between milkings, the teat canal is tightly closed and effectively sealed. Secondary, teat canal allows the adherence of bacteria on the keratin lining it. Thirdly, when milk is flowing, the keratin is sheared. Finally, during the earlier post-milking, the canal lumen dries and is re-sealed. Teat canal plays a great role of providing a barrier to microorganisms that enter the udder. When the teat canal is widely open, the risk of invasion by bacteria increases, especially during the high peak milk flow. Dodd and Neave (1951) said that during dry period, higher infection rates are observed in teat canal that had high milk flow rates. That infection rate can also be increased when teat canal is relatively short (Grindal and Hillerton, 1991; Lacy-Hulbert and Hillerton, 1995). Indeed, when the keratin filling the teat canal lumen does not seal it effectively, especially during the dry period or enter-milking, there is a risk of high infection rate (Williamson et al, 1995).

The natural defense mechanism of the teat canal can be summarized as follows: During milking or suckling, the opening or cleaning of the teat canal is allowed by a lipid film that is formed in mature keratin layers and when milking or suckling cease, teat canal is effectively re-sealed. With this mechanism, high proportion of mature keratin cells and adherent bacteria are washed away by the flow of milk during milking and thus the teat canal surface is cleaned. After milking, there is occurrence of muscle waves in the teat especially when teat cups are taken off. Then, the movement of bacteria by capillarity is inhibited by the absence of a continuous milk column in the canal, the migration of bacteria from the teat to the udder is then stopped. This defense mechanism is finalized by the ambient air that assists the dryness of the external teat orifice. Note that all these mechanisms are physical and constitute a natural defense mechanism.

Causes of the teat skin and teat end changes

Teat skin, teat end and teat canal changes result in alteration of defense system of the mammary gland as stated above. That is why a simple and easy evaluation method of teat health might be established in milking cows. Most of these changes are generally caused by:

- Non-infectious factors: milking-induced (machines, milking and farm management),
- Environmental conditions,
- Infectious: bacteria, viruses, etc.

The control of these agents can help in amelioration of the milking dairy cow health and the amelioration of product quality especially milk.

Change types of the teat end

Teat skin and teat end changes can be classified in 3 types as stated at the previous title.

1. Milk-induced, Short-term teat condition changes

These types of changes appear in case of faults in milking machines or milking management. These changes generally occur in a single milking. It is said that even in good milking conditions, teat generally takes some hours to reestablish its

full integrity (Neijenhuis et al, 2001b). The following changes are classified as the short-term effects of milking management and milking machines:

Discoloration of the teat skin after milking

The teat skin can be reddish, bluish, purplish or whitish according to the correspondent cause of discoloration. When the cow has been over-milked, usage of heavy cluster or high milking vacuum, faulty pulsation or the mismatch of the used liner and the mean teat size within cows, teats become reddish, and a reddish discoloration indicates congestion. The use of liners with a small mouthpiece diameter results in bluish discoloration (Cyanosis). It can be due to the internal barrel diameter or when the liners are connected to the high-tension current. Black or pigmented teats are not classified among color-based discolorations. After cluster removal, teats are normal (with pink color), red (part or the entire teat) and blue or purple.

Teat end firmness or wedging

Normally, after milking, teat ends feel soft and pliant but some teats may feel swollen or firm even hard, cold and insensible to touch. Causes of these issues maybe: use of high vacuum, an over-milking, failure or insufficient rest phase of pulsation and a wide-bore liners' usage. After milking, teats can also look flat or wedge-shaped. This wedging can be caused by: high tension in liners, hard liners, a long d-phase and the liners' failure full openness.

Swelling or ringing around the teat base

A visible line, swelling with a palpable thickened ring caused by the contact of the liner mouthpiece lips and the teat are visible after milking. An attention is necessary to avoid the confusion of this case with physiological swelling of udder and teats caused by udder edema in cows that calved within one week. Causes of swelling around the teat end are milking-induced such as: over-milking (case of wide-bore liners or tapered liners provided with wide upper barrels), mouthpiece vacuum with wide-bore liners, large mouthpiece chamber liners, the liner mouthpiece lips not suitable regarding the teat size and teat cup crawling.

Wide openness of the teat orifice

The external teat orifice can appear closed, slightly open or with a funnel-shaped openness after milking. These factors can be resulted in over-milking, use of heavy cluster, high milking vacuum or liner mounting tension.

Make sure all these changes can disappear within a day or more. The suitable issue can be a good milking management by preventing all what can disrupt the teat healthiness.

2. Milking management, environmental induced medium to long-term teat changes

When teat skin changes last for few days or weeks to be noticeable, it is said of medium-term changes. These changes generally take longer to be solved than short-term changes. Note that the great solution is to eliminate the cause. The following changes are taken as medium to long-term changes:

Petechial hemorrhages on teat skin

Petechial hemorrhages on teats indicate the presence and extent of vascular damage. The vascular damage can be caused by pulsation failure, shortened d-phase often linked to the use of high vacuum and prolonged over-milking. Note that chronic damage can result from prolonged over-milking. This case can be improved by few milking but it may take more than 4 weeks of correction once the fault is identified. Here, the great solution is the elimination of the cause. The close examination of the teats help to classify petechial hemorrhages. Teats are said **normal** when there are no evidence of petechial hemorrhages; **mild** when there are pin-prick red spots across the teat end; **moderate** when a discrete area is affected by dense red spots and **severe** when there are spots or red marks that coalesce in a sore or bruise with lesions.

Environmental-induced teat skin condition changes

Environmental conditions play a great importance on health conditions of the teat. Normally, a mantle of fatty acid covers a healthy teat skin and plays the protective role by slowing the growth of bacterial pathogens. The harsh environmental conditions act on that protecting surface and as consequence, pathogens like *Staphylococcus aureus* colonize the teat. Machine-milked teat skin becomes dry, scaly or rough during bad weather such as cold, wet or windy weather which cause the teat skin to be irritated and chapped with the result of cracks formation. Timms (2004) suggested that under severe weather changes, there can be a direct teat skin roughness which can result in teat skin and teat end cracks within 1-2 days. Rasmussen and Hemling (2002) said that the shifting to moderate temperature (-3 to +24° C) significantly improves the teat skin condition over 4 weeks by applying teat splays (8% emollient) in comparison with 2% emollient spray usage sprayed automatically.

Other risk factors are: coldness, wetness or muddy conditions causing teat skin hardening or thickening induced by the reduction of blood flow through tissues, these conditions can even result in teat end hyperkeratosis**.**

Chemical-induced teat skin changes

Effects caused by harsh weather conditions once associated with chemicals such as disinfectants and emollients may cause teat chapping. These products one applied on teats reduce skin evaporation and act as humectants to maintaining teat skin condition (Hemling, 2002). Severe teat skin and teat end damage can progressively be healed within 3-5 weeks with the possibility of healing within 10-14 days for the more typical degree of irritation (Rasmussen, 2003). Note that disinfectants usually act on the teat barrel skin and the milking management generally affects the teat end. Chemical irritation is caused by the use of inappropriate chemical while disinfecting teats and the use of an approved teat disinfectant at a high concentration.

Photosensitization of teat skin condition

This kind of changes are caused by the sun-light that cause the damages or lesions at the non-pigmented hairless areas. This phenomenon occurs when photodynamic agents from plants once retained in the bloodstream or excreted in the bile,

cause teat damages. Here the case of spring eczema, occurring in case of lush spring pasture grazing, can be given as an example of primary photosensitization. The case of hepatogenous photosensitization (resulting in liver damage) limiting the use of photodynamic chlorophyll break-down products from the bloodstream is taken as the secondary photosensitization. Main causes: ingestion of eczema spores, blue-green algae, grazing of lantana, ragwort and lupins plants, etc.

Symptoms: Restlessness and kicking at the udder and abdomen, red and edematous of affected skin areas, hardness and dryness of the affected part. The treatment consists of removing dead sheets of the skin and application of suitable products (sun-block, zinc oxide cream, oral zinc oxide, etc).

Teat end hyperkeratosis and its risk factors

Teat end hyperkeratosis is observable mainly on the teat end and slightly on the teat skin. It is a kind of roughness, thickness, rings at the teat end and fronds. It is said that teat end hyperkeratosis can be observed in heifers (before calving) but it is mainly observed in animals milked by milking machines (Sieber and Farnsworth, 1981; Shearn and Hillerton, 1995; Neijenhuis et al., 2000). Even though genetic influences cannot be excluded, degree and extension of hyperkeratosis is said to be related to the teat shape, seasonal weather conditions (especially wet and cold), force applied on teats while milking and the increased total time of milking, irritation caused by the application of some disinfectants on teats. In summary, three major factors are said to cause teat end hyperkeratosis. These are: Machine-induced, milking management and seasonal weather factors. As cited by Neijenhuis et al. (2001a), the Teat Club International confirmed that some cases of teat end hyperkeratosis are taken to be a physiological response to milking machines but an observed high degree of roughness may reveal a risk of new intramammary infection.

Scoring system of the teat end hyperkeratosis

Teat-end scores are evaluated as follows: N for no ring, S for smooth or slightly rough ring, R for rough ring and VR for very rough ring (Mein et al., 2001).

3. Teat conditions changes caused by infectious factors

Most infectious agents that affect teat skin, teat end and teat canal are of three kinds: Bacteria, viruses and fungi. These agents cause different types of lesions that threaten the health of the animal. They even colonize the udder and sometimes result in complication such as mastitis.

As for bacterial infections of the teat skin, the most frequent bacteria are *Staphylococcus aureus*, *Streptococcus dysgalactiae* and *Arcanobacterium pyogenes* and are said to be the cause of primarily lesions or can colonize lesions caused by viral infections, milking machine environmental damages. Teat shape can also be a vulnerable cause to bacterial infections as suggested by Dodd Neave (1970) who said that *Staph. Aureus* and *Strep. Dysgalactiae* are likely to infect chapped teats and such infections were explained by the high rate to new infection of teat and some cases of clinical mastitis (Dodd and Neave, 1970). It is recommended to use suitable disinfectants to prevent bacterial infections and lesions of the teats in dairy cows.

The secondary infection of teat end is manifested by blackspot. It is caused by an anaerobe bacteria *Fusiformis necrophorum* that colonize teat lesion in case of poor hygiene, resulting in the blockage of the teat orifice, fact that causes very low or incomplete milking. Other causes of blackspot maybe short teat cup liners, over milking/excessive vacuum and failure of pulsation. Blackspot is prevented by hygiene and milking management on a dairy farm.

For viral infection damages, these kinds of lesions are frequent in farms where hygiene conditions are not well-managed and where post-milking disinfection is not correctly applied. The multi-use ointments are also said to cause new viral infections. Hillerton et al. (2001) and Parkinson et al. (2010) suggested that teat's lesions can also be caused by exotic diseases such as Foot and Mouth Diseases, Ringworm, Bovine herpes mamillitis and Vesicular stomatis.

About fungal infections, most lesions are caused by Trichophyton spp. That affect the teat skin keratin. The presence of grey-white and ash-like encrustations on the teat skin and udder indicate the contagious infection of the fungus. Even though some countries developed for calves in some countries, it is said that few treatments are available for the kind of infection and the disease its evolution is self-limited after a few months of infestation.

Teat scoring and milk quality

Evaluation of teat status can help in controlling the health of dairy cows. As seen above, any teat skin or teat end change is an indicator of an emerging problem in a dairy herd. Non-infectious-induced changes are easy to be resolved and symptoms disappear after a certain time as long as the cause disappeared. However short they can last, those changes have an impact on animal health and welfare. Consequences may be worse when teat condition changes are induced by infectious agents, knowing that microorganisms enter the teat canal, colonize the udder and are spread to the whole organism of the animal. Whenever the health and welfare are affected, the production is also affected and here, milk production is focussed on. Whenever production is affected, the quality of the product is concerned. It was said by the Teat Club International that milk quality, safety and udder health are influenced by any deterioration of teat skin condition. Thus, the good teat score is an indicator of a healthy dairy cow. A healthy cow may produce good quality milk. It is then advised to score the teats routinely after 6 months or annually or sometimes when milking management or milk staff is changed.

Teat score determination as proposed by Teat Club International:

Evaluation Method A: Quarter-level record

- Examination of all teats of the selected cows
- Scoring of exceptions (abnormal) at a cow and a quarter-level
- Recording of the cow and quarter details regarding each issue.

Evaluation Method B: Cow-level record

- Examination of all teats of selected cows. Only the worst teat is scored
- Assigning of that score to the cow
- Recording of the score (Cow and quarter details are not necessary)
- Knowing patterns of damage in certain location of the udder helps to diagnose the problem.

Conclusion and Recommendations

Teat conditions are of great importance for a dairy cow. They give an idea about the general health and physical conditions of teats are joined with environmental quality conditions which are associated with milking system and the milking management in milking cows. The control of teat conditions helps in the reducing risks of intra-mammary infections leading to clinical mastitis and other complications that decrease the udder's healthiness and, as consequence, all the health of the cow is affected. These changes bring consequences regarding milk production and milk quality, threatening then the main objective of farmers, whose objective is to produce milk of good quality. Farmers may proceed to regular teat scoring and control especially the routine scoring which is done within 6 months or one year and have to sometimes score the teat conditions in any case of staff change, milking system and new parlour changes in order to get informed of an earlier emerging problem on a farm. About machine-induced changes, farmers may control the status of the equipment like teat cups and the current on which machines are mounted and must avoid over-milking. The control of milking time is also as good as important.

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Estimation of genetic parameters for embryonic mortality and hatching weight in Japanese Quails (Coturnix coturnix japonica)

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Introduction

The profitability on poultry is related to the number of chicks to be obtained from hatching eggs. Hatchability and embryo mortality are influenced by breeding age, breeding nutrition, male/female ratio, egg weight, storage and hatching conditions. Known lethal genes in chickens cause embryonic mortality during incubation (Eransayın, 2000). The genetic background of embryonic mortality can be examined in cases where the breeding and incubation conditions are optimal. The viability of embryos is influenced by appropriate transcription and translation of genetic information. It was reported that the embryo mortality was found 33% in fertile eggs (Hockings et al., 2007). The heritability of embryo mortality on early, middle and late stages were 0.09-0.25, 0.07-0.20 and 0.05-0.18, respectively, according to their dam and sire components (Beaumont et al., 1997). It was reported that the hatch weight of quails had effect on live weight, live weight increase rate, feed consumption and feed conversation rate in the next living period (İpek et al., 2003). Sarı et al. (2010) reported that the heritability of hatch weight was 0.74±0.07 in Japanese quails. The aim of this study was to estimate the heritability and genetic relationships of characteristics of traits belonging to embryo losses and hatch weights at different periods in Japanese quails.

Materials and methods

The animals were housed in individual cages with 1 male and 3 females. Totally 849 hatching quail eggs were obtained by 14 sires and 42 dams in this experiment. Hatching eggs were stored at 18ºC for 7 days. The temperature and relative humidity of the incubator was 37.7ºC and 55%, respectively. For the rest period of incubation, the temperature was 37.2°C and the humidity was 75% in the hatching. The hatched chicks were weighted individually on an electronic balance with 0.01 g precision. Unhatched eggs were broken and embryo death periods were determined. Hatchability of fertile eggs, early embryo mortality (EEM), mid-term embryo mortality (MEM), late embryo mortality (LEM) rates were calculated with the following equations:

Hatchability of Fertile Eggs (%)= (Number of Chicks Hatched)/(Number of Fertilized Eggs)∗100
EEM Rates (%)= (Number of Embryo Dead on Days 0 and 7.)/(Number of Fertilized Eggs)*100
MEM Rates (%)= (Number of Embryo Dead on Days 8. And 14.)/(Number of Fertilized Eggs)*100
LEM Rates (%)= (Number of Embryo Dead on Days 15. And 17.)/(Number of Fertilized Eggs)*100

The THRGIBBS3F90 program developed by Mistzal et al. (2015) using Gibbs sampling based on Bayesian statistics, was used to estimate variance components. Statistical mathematical models used in analysis:

For hatching weight: $y_{ijkl} = \mu + Sire_i + Dam_{ij} + Gender_k + Hatch\ Party_l + e_{ijkl}$
For other features: $y_{ijkl} = \mu + Sire_i + Dam_{ij} + Hatch\ Party_l + e_{ijkl}$.

The mean of the posterior variance-covariance components obtained as a result of 100,000 iterations in the first Gibbs chain were taken as the initial values for the second «start». A further gibbs chain of 100,000 replicates was formed to yield a result every 10 replicates. The results were subjected to Geweke analysis and the first 50,000 values were taken as "burn-in". In the study, the heritability (h^2) and genetic correlations (r_g) of the traits were estimated by the following equations:

$h^2=(4.\sigma^2_{sire})/(\sigma^2_{sire}+ \sigma^2_{dam} +\sigma^2_e)$,
$r_g= cov_{xy}/(\sigma_x * \sigma_y)$.

Results

The heritability, genetic correlations and standard errors of the characteristics were shown in Table 1. The heritability estimates for hatching weight, hatchability of fertile eggs and total embryo death were ranged from 0.43-0.53. While the genetic correlation coefficient between hatching weight and hatchability of fertile eggs was $r_g=1$, the genetic correlation coefficients between hatching weight and hatchability of fertile eggs and total embryo mortality were $r_{g=}$ -0.93; r_g=-0.91. In general, these genetic correlation coefficients were found to be quite high. The low degree of heritability of LEMs (h^2=0.03) indicates that it is due to disruptions during incubation.

Table 1. In diagonal, there are heritability and above the diagonal, there are genetic correlation coefficients (the values in parentheses are standard errors)

	Hatching Weight	HFE	TEM	EEM	MEM	LEM
Hatching Weight	0.43 (0.153)	1.00 (0.005)	-0.93 (0.043)	-0.60 (0.158)	-0.51 (0.217)	-0.17 (0.222)
HFE		0.53 (0.176)	-0.91 (0.062)	-0.62 (0.156)	-0.45 (0.241)	-0.22 (0.212)
TEM			0.44 (0.127)	0.69 (0.106)	0.60 (0.174)	-0.12 (0.234)
EEM				0.29 (0.071)	-0.10 (0.247)	-0.12 (0.201)
MEM					0.28 (0.064)	-0.29 (0.184)
LEM						0.03 (0.008)

HFE: Hatchability of Fertile Eggs, TEM: Total Embryonal Mortality, EEM: Early Embryo Mortality, MEM: Mid-term Embryo Mortality, LEM: Late Embryo Mortality

Conclusion

It was seen that the genetic basis for determining the hatching weight and hatchability of fertile eggs was the same (r_g=1.00). Genetic relationship between the hatching weight and total embryo mortality was found to be high. Therefore, it shows that hatchability of fertile eggs reflects genetic embryo deaths. Early embryo deaths (EEM) during the first 6 days of incubation are usually caused by genetic abnormalities, the presence of autosomal or sex-dependent recessive lethal genes and chromosomal abnormalities resulting from premature division in meiosis (Gwaza et al., 2016). Considering the heritability of EEM and LEMs, reducing embryo mortalities during these periods will increase hatchability. In our study, it is seen that different genes are responsible for EEM and MEM (r_g=-0.10). Deaths at different stages of embryonic development should be considered as different characteristics. It is thought that it is more appropriate to make a selection against periodic embryo losses by estimating higher heritability levels of these periods. It is clear that hatching weight, hatchability of fertile eggs and embryonic losses are the characteristics to be considered in the incubation performance. In the poultry sector, breeding programs for genetic improvement should include these features.

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Estimates of variance components for growth traits of Saanen Kids

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Introduction

Important factors affecting sustainable and profitability for goat farms are growth traits. The body weight and number of kids at birth are determined by their not only genetic performance but also environment factors (Zhang et al. 2008; Onder et al. 2015). Growth characteristics may be an important and useful parameter in the selection of breeding goats (Ocak et al. 2006; Zhang et al. 2009). Growth traits also are economically important for using early breeding of young animals.The potential genetic changes in the economic traits are depending on the genetic variance, the heritability of the traits measured and its relationship with others. Breeding programs depend on the identification of various useful traits of high heritability and ease to measure for breeding improvement (Sonja et al. 2017). Estimation of heritability for early growth traits including birth weight and their linking to each other is hugely base for the selection progress, which is ultimately dependent on maternal influences besides the additive genetic variance effects (Al-Shorepy et al. 2002; Mandal et al. 2015). Goats do not make us forget the importance of environmental factors representing the identification of the genetic differences is realistic and truth between individual animals within herd (Taskin et al. 2000; Samson and Olajumoke, 2017). So, such traits are considered as an early indicator for the late growth of economic interest (Portolano et al. 2002; Boujenane and El Hazzab, 2008). Therefore this study aimed to determine the variance components for the growth traits of Saanen goats and compare them with other native and foreign goat breeds.

Materials and Methods

The material of this study were Saanen kids raised at Ege University Faculty of Agricultural Animal Science Experimental farm, in Bornova-İzmir, Turkey. The pedigree information for total of 726 Saanen kids 18 with sire, 141 dam in a single, birth and weaning weights of kids were collected from 2011 to 2017 years. The variance components and heritabilty analysis were carried out with birth and weaning weight records. For this purpose sex was included in the model as a fixed effect, dam's weight for birth weight and birth weight for weaning weights of as covariates and animals' additive genetic variances and errors as random effects.

Birth type was also wanted to be added to the model as fixed effect. However, it was determined that the numbers of records in the subgroups according to the sex and birth type effects were not sufficient for reliable estimation. Thus, kids were separated according to birth type. In the first group, twin kids are placed and the other group consist of triplet and more than birth types. Therefore, birth type effect was taken into consideration through two main groups.

(Co)variance components for the traits were estimated using average information restricted maximum likelihood (AIREML) (Meyer, 1989). The linear model used in a single trait and single record animal model was:

$Y = Xb + Za + e$ where, Y: A vector of birth weight and weaning weight, b: A vector of sex fixed effect and dam's weight as a covariate for birth weight and birth weight as a covariate for weaning weights, a: direct additive genetic effects, e:residual effect, X and Z are incidence matrices relating observations to b and a, respectively. The estimates of variance components for each trait were obtained by WOMBAT (Meyer, 2011). The model fit statistics were taken Maximum log likelihood (Max. Log L) and Akaike information criterions (AIC).

Results and Discussion

Estimated variance components for kids birth and weaning weights were given in Table 1. As a result of the analysis, direct additive genetic variance of birth weights were obtained between 2011 and 2017 years for twins 0.12-0.38; 0.09-0.69 for more than twins. The phenotypic variances were found to be as 0.41-0.78 for twins and 0.20-0.89 for more than twins.The heritabilities (h^2) also were calculated as 0.31-0.65 for twins; 0.15-0.63 for more than twins.

As a result of the analysis, direct additive genetic variance of weaning were obtained between 2011 nad 2017 years for twins 0.51-11.06; 0.64-29.64 for more than twins. The phenotypic variances were found to be as 1.63-12.87 for twins and 2.26-34.25 for more than twins.The heritabilities (h^2) also were calculated as 0.16-0.86 for twins; 0.23-0.78 for more than twins.

Table 1. Estimates of variance components and heritabilities (h^2) for birth weight

Birth Weight	**2011**		**2012**		**2013**		**2014**		**2015**		**2016**		**2017**	
	Twin	***Triplet ad more***	***Twin***	***Triplet ad more***	***Twin***	***Triplet ad more***	***Twin***	***Triplet ad more***	***Twin***	***Triplet ad more***	***Twin***	***Triplet ad more***	***Twin***	***Triplet ad more***
Additive Genetic variance	0.38	0.17	0.36	0.09	0.12	0.33	0.16	0.20	0.31	0.69	0.26	0.103	0.27	0.27
Phenotypic variance	0.78	0.68	0.74	0.64	0.56	0.58	0.53	0.89	0.46	0.47	0.48	0.20	0.41	0.56
Heritability	0.50±0.10	0.20±0.16	0.49±0.26	0.15±0.05	0.21±0.04	0.58±0.1	0.31±0.1	0.22±0.1	0.67±0.1	0.63±0.4	0.54±0.17	0.53±0.51	0.65±0.19	0.49±0.18
Residual variance	0.19	0.10	0.13	0.31	0.16	0.11	0.30	0.67	0.06	0.17	0.14	0.08	0.10	0.25

Table 2. Estimates of variance components and heritabilities (h^2) for weaning weight

Weaning weight	**2011**		**2012**		**2013**		**2014**		**2015**		**2016**		**2017**	
	Twin	***Triplet ad more***	***Twin***	***Triplet ad more***	***Twin***	***Triplet ad more***	***Twin***	***Triplet ad more***	***Twin***	***Triplet ad more***	***Twin***	***Triplet ad more***	***Twin***	***Triplet ad more***
Additive Genetic variance	1.17	1.34	11.06	2.15	8.59	6.31	17.66	1.08	0.51	7.57	1.39	26.64	4.14	0.64
Phenotypic Variance	1.63	2.26	12.87	8.48	10.03	11.833	23.33	4.68	1.27	23.65	8.84	34.25	8.40	2.56
Heritability	0.72±0.16	0.59±0.42	0.86±0.31	0.25±0.10	0.86±0.29	0.53±0.32	0.76±0.24	0.23±0.17	0.41±0.18	0.32±0.21	0.16±0.26	0.78±0.10	0.49±0.13	0.25±0.10
Residual variance	0.40	0.01	0.17	4.48	0.40	0.44	0.01	2.12	0.32	11.77	6.82	4.92	3.44	0.95

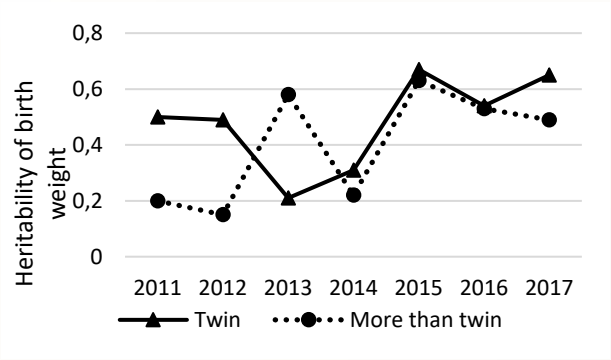

Figure 1a. The heritability values for birth wegiht

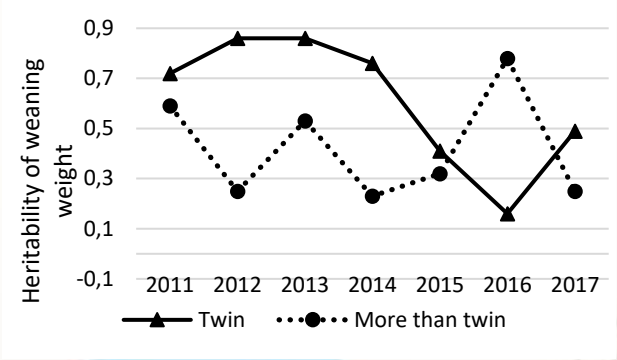

Figure 1b. The heritability values for weaning weight

Birth weight

The present findings were in line with those reported by Baneh *et al.* (2012) in Naeini goats in Iran (0.25 ± 0.05), Singh *et al.* (2005d) in Barbari (0.27) Kenneth *et al*. (2016) in meat goats in USA (0.27%±0.081) and Shafiq and Sharif (1996) in Teddy goats. A low heritability estimate (0.048 and 0.04) for birth weight in Teddy goat breed has been reported by Tahir *et al.* (1995) and Hyder (2000), while Shafiq *et al.* (1994) documented heritability estimates of 0.31 in Teddy goats. Lower estimates of heritability than the present findings were reported in different goat breeds by (Ali and Khan 2008; Roy *et al.* 2008; Zhang *et al.* 2008; Maghsoudi *et al.* 2009; Ekambaram *et al.* 2010; Roy *et al.* 2011); while heritability estimates for the trait by many workers (Singh *et al.* 2005a; Singh *et al.* 2005c; Rashidi *et al.* 2008; Kantanamalakul *et al.* 2008; Zhang *et al.* 2009; Alade *et al.* 2010; Gowane *et al.* 2011) from different parts of the world in different goat breeds were higher than the present findings. Bhattarai *et al*. (2017) in a study on Khari goat kids from Nepal reported that heritability estimates for the birth weight was 0.37±0.12. In other study on Hainan Black goats in China Zhou *et al.* (2015) reported that estimates for heritability for the traits were 0.45± 0.03. Menezes *et al*. (2016) reported a very low heritability 0.08± 0.07 for birth weight in Boer goats in Brazil Kheirabadi and Rashidi (2016) reported that heritability estimates for the birth weight was 0.17 in Markhoz goats.

Weaning weight

The present estimates were in close agreement with Baneh *et al.* (2012) in Naeini goats in Iran 0.16 ±0.06 and Menezes *et al*. (2016) in Boer goats in Brazil 0.23± 0.13. Lower estimates (0.10±0.012, 0.18±0.09 and 0.12) in the same breed were reported by (Tahir *et al.* 1995; Shafiq and Sharif 1996; Hyder *et al.* 2002). Lower heritability estimates then the present study were reported in literature (Ali and Khan 2008; Boujenane and El Hazzab 2008; Rashidi *et al.* 2008; Roy *et al.* 2008; Maghsoudi *et al.* 2009). Many scientists (Singh et al. 2005a; Singh et al. 2005b; Singh et al. 2005c; Singh et al. 2005d) reported higher estimates than the present study. In two different studies Baneh *et al.* (2012) in Naeini goats in Iran and Menezes *et al*. (2016) in Boer goats in Brazil reported heritability estimates for the trait as 0.16 ± 0.06 and 0.23± 0.13, respectively. Kenneth *e al*. (2016) also reported higher estimates of heritability (0.33±0.078) for the trait in meat goats in USA. Bhattarai *et al.* (2017) in a study on Khari goat kids from Nepal reported that heritability estimates for the trait was 0.42±0.13.

There was a wide variation in the heritability estimates of weaning weight in different goat breeds in the world. The differences in present findings and those of the many others reported earlier seem mainly due to breed and environmental conditions under which various flocks were maintained. The method of estimation of heritability also may lead to variation in estimates. The numbers of observations in most of the studies are smaller than the present study, which also causes differences in the estimates. The heritability estimates of weaning weight in present study are medium, which points out a greater influence of environmental factors like year, season and other factors like feeding and management. Therefore, there is a greater scope of improvement in this trait by improving the environmental conditions.

Conclusion

High heritability of birth and weaning weight in goat kids as revealed by in this study indicate selection must be based on genotypic superiority rather than environmental superiority in order to improve breeding value. Thus, variation due to definable environmental effects must be removed by use of suitable adjustment factors. The overall impact of any selection program will depend on the direct and correlated responses that result from selection on the selection criterion. These responses can be predicted by using estimates of genetic and phenotypic relationships between all traits of economic importance. It is necessary that all known sources of variation influencing the traits of importance be included in the model of analysis. It is concluded that the effect of environmental factors should be taken care off while formulating the selection and breeding program for increasing the birth weight in goats.

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Estimation of Mortality Rates at Different Periods in Artificial Neural Networks in Saanen Kids

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Introduction

Reducing production costs for economic gain in small livestock enterprises engaged in intensive farming, the number of kids should be increased; kid's deaths at birth and in the growing period should be reduced. Mortality in goat is greatly affected by the applied feeding conditions. Therefore, applications such as care-feeding and health protection of newborns should be performed correctly (Rattner et al., 1994; Hailu et al., 2006).

In this study, artificial neural networks estimated mortality rates in Turkish Saanen kids. The age, gender, type of birth, season, birth weight and death weights of Turkish Saanen goats were taken into account for their effects on mortalities.

Materials and methods

In this research, the data set obtained from Saanen Goat, subproject in İzmir region within the National Sheep and Goat Improvement Project. The kids who died in the first week following birth, between the first week and 30 days, between day 30 and day 60, and more than day 60 were determined. The effect of age, gender, type of birth, season, birth weight and death weights of 546 Turkish Saanen goats were analyzed. Different artificial neural networks were modeled with different number of hidden layers and neurons training algorithms on (n=382) training and (n=163) test sets.

In this study, feed-forward backpropagation algorithm was used for estimating mortality with MATLAB (R2018b) program. 2000 iterations were performed for the training of artificial neural network. The learning rate, the momentum coefficient and convergence criterion were accepted as 0.5, 0.9 and 1e-05, respectively. For the comparison of estimation performance for training and test sets, the coefficient of determination (R^2), the square root of mean square error (RMSE) and the mean absolute percentage error (Mean Absolute Percentage Error, MAPE) criteria were used. Lewis (1982), was classified the models based on their MAPE performance under 10% as "very good", between 10% and 20% as "good", between %20 and %50 as "acceptable" and over 50% as "false and faulty". Therefore, high R^2 and low RMSE and MAPE values determine the model that fits well. These equations and the terms in the equations are given below:

Where; y_t = Observed data, $\hat{y}_t$ = Predicted data and T= Number of observation

$$RMSE = \sqrt{\frac{\sum (y_t - \hat{y}_t)^2}{T}} \qquad MAPE = \frac{1}{T}\sum \left| \frac{y_t - \hat{y}_t}{y_t} \right| \times 100$$

Results

The artificial neural network model showed the best performance with the numbers of 3 hidden layers and the number of neurons 10. The According to the results of the analysis, the coefficients of determination for training and test sets were found to be 0.92 and 0.90, respectively.

Table 1. Parameter estimates from the best model for each trait

	Training	**Test**
RMSE	0.61	0.60
MAPE	23.60	44.52
R^2	0.92	0.90

In this study, the RMSE value was estimated as 0.61 for the training set and 0.60 for the test set. MAPE value was 23.6% for the training set and 44.5% for the test set. R^2 values were estimated as 0.92 and 0.90 for training and test sets, respectively.

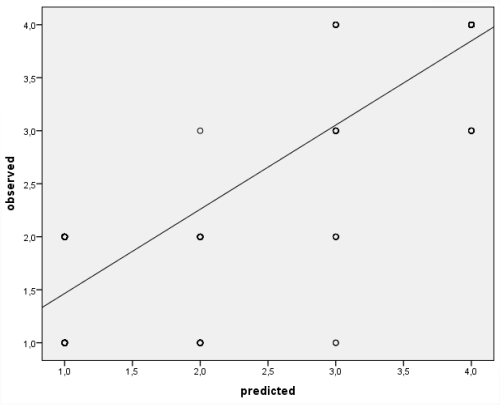

Figure 1. Observed versus predicted values

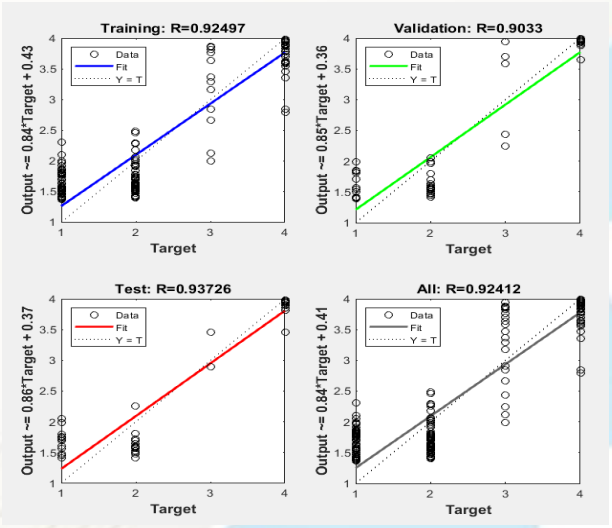

Figure 2. The coefficient of determination values for training and test set

Conclusion

In our country, there are few studies about the use of artificial neural networks in small ruminants. In this study mortality rates in Turkish Saanen kids were estimated with artificial neural networks.

In this study, the 23.60% MAPE value obtained for the training set shows that the predictions of artificial neural networks are in the acceptable predictions class. Similarly, the MAPE value obtained for the test set at 44.52% is considered acceptable. High R^2 and low MAPE values indicate that artificial neural networks can be used safely in mortality estimation in livestock. Reducing mortality is an economic importance for profitable and sustainable livestock. Therefore, it is possible to estimate the factors affecting mortality by artificial neural networks. With this study, it is thought that it will serve as an example for later studies and will contribute to the literature.

Acknowledgement

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Growth and Reproduction Performance of Bafra Sheep in the Elmalı Village in Nigde

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Introduction

This study was carried research material 140 farmers (134 sheep and 6 rams) were distributed to 5 farmers in Elmalı village of Niğde Center. 225 lambs were prepared in 2018 from Bafra breed sheep. In the study, Bafra lambs have a birth weight in lambs as well as 56 day and 140 day live weights with the aim of growth and priority adjustment.

Materials and methods

Reproductive traits; birth rate, infertility rate, stillbirth rate, singularity rate, twins ratio, number of lambs born per ram sheep and number of lambs born per sheep (Kaymakçı ve Sönmez 1996). The survival of Bafra lambs up to the 56th day and 140th day was emphasized. The viability of lambs was calculated as the ratio of the number of lambs living up to the age of 56th and 140th days, according to the sex and birth type, to the number of live-born lambs. EXCEL (Office, 2007) and MINITAB (Version 12) were used to evaluate the data. The effects of environmental factors (gender, type of birth) on live weight of lambs were determined in the study. Live weights obtained at various periods were corrected according to age. In the correction, live weights at various periods were calculated with the following formulas.
Adjusted Weight = CA- (b1 * (MY-HY)

Table 1. Some fertility characteristics of Bafra sheep

Reproductive Characteristics	Number (N) and Ratios (%)
Per ram sheep number	134
Number of sheep	116
Number of ınfertility sheep	10
Number of stillbirths	2
Number of puppy	4
Number of sheep that died before birth	2
Number of single sheep	40
Number of sheep twins	51
Number of sheep giving birth to triplets	17
Number of sheep giving birth to quadruplet	8
Birth rate (lambing rate) (%)	86,57
Infertility rate (%)	7,46
Stillbirth rate (%)	1,72
Feeding rate (%)	2,98
Single birth rate (%)	34,48
Twin birth rate (%)	43,96
Triplet birth rate (%)	14,65
Quadruple birth rate (%)	6,90
Number of lambs per sheep (KAKBDKS)	1,68
Number of lambs born per sheep (DKBDKS)	1,94

Conclusion

Investigation of growth and reproductive performance of Bafra sheep grown in Elmali village of Nigde province Bafra lambs average birth 3.17 kg, 56. day average (weaning) 12.71 kg and 140. Compliance to the region Bafra sheep live weight is seen to be in good condition. The birth rate of Bafra sheep is 86.57%, infertility rate is 7.46%, stillbirth rate is 1.72%, offspring rate is 2.98%, singleton birth rate is 34.48%, twin birth rate is 43.96%, triplet birth 14.65%, quadruple birth rate 6.90%, the number of lambs per six ram sheep (KAKBDKS) was 1.68 and the number of lambs per sheep (DKBDKS) was 1.94.

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Genetics Of Ovine Footrot In Hair and Wool Sheep

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Introduction

Ovine footrot is an infectious, contagious disease of sheep that causes severe lameness and economic loss from decreased flock production. Ovine foot rot is caused by an interaction of two anaerobic (without oxygen), Gram- bacteria, *Dichelobacter nodosus* in association with other bacteria, particularly *Fusobacterium necrophorum*. Affected sheep frequently experience pain, discomfort and reduced mobility; these conditions affect their ability to access feed lambs with footrot reached slaughter weight 31.9 days later than lambs without footrot. Susceptibility to footrot in sheep determined by genetic makeup therefore the use of breeding as part of a control strategy could be effective in flocks to control the disease (Bennet and Hickford, 2011; Zingg et al. 2017).

Materials and methods

Footrot condition scores (no footrot, intermediate and footrot disease) were collected from 251 U.S. sheep including Katahdin, Blackbelly, and European-influenced crossbred sheep with direct and imputed genotypes at OvineHD array (>500,000 SNP) density. Genome-wide association was performed with a mixed model accounting for farm and principal components derived from animal genotypes, as well as a random term for the genomic relationship matrix.

Results

We identified three genome-wide significant associations, including SNPs in or near *GBP6* and *TCHH*. We also identified 33 additional associated SNPs with genome-wide suggestive evidence, including a cluster of 6 SNPs in a peak near the genome-wide significance threshold located near the glutamine transporter gene *SLC38A1*.

Conclusion

In particular, both genome-wide significant and genome-wide suggestive associations exhibited of immune function, nutrient availability, and hoof formation and integrity. After functional mutations have been validated and examined for potential correlated responses to selection, sheep production can benefit from reliable, predictive genetic tests for selecting animals against ovine footrot susceptibility.

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Effect of Treating Maize Cobs With Urea and Wood Ash on Gas Production Substrates

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Introduction

The popular method of crop residue treatment is either use of urea (Sundstol and Coxworth, 1984) or wood ash (WA) which is freely available (Solomon et al., 2012) and not combinations of both. The objective of this study was to investigate the effect of treating maize cobs with urea and WA on gas production truly degraded substrate (TDS).

Materials and methods

Maize cobs were sourced after harvest and ground (4 mm sieve used) in preparation for treatments. In all cases, 5g urea and 30g wood ash (WA) dissolved in 100ml of water/200g ground maize cobs (w/v) (Nolte et al., 1987) was used as a standard for the treatments. The treatments were: 100U (100% urea +0% WA), 75U25WA (75% urea +25% WA), 50U50WA (50% urea +50% WA), 25U75WA (25 % urea + 75% WA) and 0U0WA (Untreated maize cobs). After treatment, samples were stored in air-tight plastic bags for 7 days then incubated *in vitro* for 6, 12, 24, 48 and 72, their DM degradation kinetics were then described using the equation $y = a + b (1- e^{-ct})$. Gas production (GP) TDS was determined as described by Makkar (2010).

Results

Treatment 25U75WA had the highest TDS (70.53%), microbial mass protein (MMP) (53.55 mg), efficiency of microbial mass protein (EMMP) (23.68) and partitioning factor (PF) (2.88). Treatment 0U0WA had the least TDS, MMP, EMMP and PF (Table 1). Effect of treatments was not observed on GP at 24 hrs of incubation.

Table 1. *In vitro* truly degraded substrate parameters of treated and untreated maize cobs

Parameters	Types of treatment					SE	P value
	100U	75U25WA	50U50WA	25U75WA	0U0WA		
TDS (%)	55.62^{bc}	59.84^{b}	63.89^{ab}	70.53^{a}	45.65^{c}	2.933	0.0110
GP (ml/24hrs)	77.00	77.50	80.50	78.50	84.00	1.447	0.6470
MMP(mg)	43.10^{b}	45.75^{ab}	44.15^{ab}	53.55^{a}	25.20^{c}	3.221	0.0040
EMMP	20.32^{b}	21.13^{b}	19.92^{b}	23.68^{a}	12.00^{c}	1.329	0.0005
PF	2.761^{b}	2.790^{b}	2.748^{b}	2.883^{a}	2.500^{c}	0.1682	0.0005

Conclusion

It was concluded that, combinations of 25% urea and 75% WA in the treatment of maize cobs could improve its nutritive value compared to treating it with urea alone. This strategy will reduce cost of treatment and also incorporate minerals present in ash into the maize cobs.

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Comparison of the Toxic Effects of Different Concentration of AFB1 on Ovine Oocyte Maturation

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Introduction

Fertility has a crucial role among livestock animals to achieve maximum production so dissolving infertility issues in farms is essential for a sustainable and economically viable animal industry (O P Verma et al., 2011). Aflatoxin (AF) is a type of mycotoxins that are secondary metabolites produced by the species of Aspergillus. Aflatoxin B 1(AFB1) is the most toxic aflatoxin among The great family of aflatoxins (y. Daia et al., 2017). Oocyte maturation is an essential step for successful fertilization and embryo development that depended on meiotic maturation and cytoplasmic maturation. exposure to AF effects on growth and maturation of the follicles, levels and embryo development (M. Sirard et al., 2006).

Materials and methods

Ovaries were collected from adult ewes at a local slaughterhouse and transported to the laboratory. Cumulus oocyte complexes (COCs) were aspirated from follicles Then selected them with more than two layers of cumulus were matured for 24 h under increasing concentrations of AFB1(Sigma Aldrich Inc.) (control, 10, 50 and100 µM). Following IVM, a number of matured oocytes were denuded and stained with cell tracker blue and Hoechst 33258 to measure the intracellular glutathione (GSH) content and evaluate nuclear maturation respectively. All fluorescent images from GSH are recorded as graphic files and were analysed by Image J software. The meiotic stages of the oocytes are evaluated under an epifluorescence microscope and each oocyte is classified and analysed by the R Statistical Programming Language to evaluate MII stage.

Result

According to our findings, a significant demotion of GSH content was observed in 50/100 µM treated oocytes compare to the control (42.66, 40.40, 36.68 and 34.96 of oocyte GSH content respectively for control, 10, 50 and 100 µM/ml of AFB1; $P < 0.001$). the percentage of oocytes that reached the MII stage significantly decreased in the 100 and 50µM group ($P<0.001$) (table 1). our results showed that different concentration of AFB1 can reduce oocyte maturation.

Table1. The effect of LPS treatment on the proportion of MII oocytes during maturation.

	NO. Cultured	NO. MII	lsmeans ± SE	P value	Odd ratio
Control	124	106 (85.48%)	1.77 ± 0.254	_	_
10	123	95 (77.23%)	0.55 ± 0.334	0.098	0.5761
50	121	79 (65.28%)	1.141 ± 0.318	0.0003***	0.3194
100	120	58(48.33%)	1.839 ± 0.313	0.00009***	0.1589

Lsmeans: Least square means OR: odds ratio

Conclusion

AF display cytotoxicity due to the excessive production of reactive oxygen species (ROS) that result in oxidative stress. Reactive AF adducts with DNA and causes DNA damage that associate with oocyte maturation (Kyung-Tae Shin.2018; Jun Liu et al., 2015) In addition, Cytoskeleton is one of the factors that regulate oocyte maturation which consist of microtubules and microfilaments. They play a vital role in the extrusion of the polar body. It has been postulated that exposure to AFB1 could change spindles normal morphology that principle the failure of polar body extrusion (Yan-Jun Hou et al., 2014). In conclusion, the present study shows that treatment of AFB1 at different concentrations during IVM of oocytes reduced the potential maturation of oocytes. This reduction is due to decreased amount of intracellular GSH and MII stage and AFB1 in 50 and 100 µM/mL concentration may have deleterious effect on oocyte developmental competence in ovine.

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Effect of substituting corn with cobs treated with urea and wood ash on chemical composition and gas production substrate

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Abstract
Effect of substituting corn with cobs treated with 25% urea plus 75% WA on chemical composition and gas production substrate was determined. Corn was substituted with graded levels of treated cobs in the dietary ingredients and the treatments were: 100C = 100% corn, 66C34TC = 66% corn plus 34% treated cobs, 34C66TC = 34% corn plus 66% treated cobs and 100C = 100% treated cobs. Samples were analyzed for dry matter (DM), organic matter (OM), ash, crude protein (CP), neutral detergent fibre (NDF), acid detergent fibre (ADF) and acid detergent lignin (ADL); they were then incubated *in vitro* for 6, 12, 24, 48 and 72 hrs. Results indicated that as corn is substituted with treated cobs, NDF, ADF and ADL also increased, however only the NDS for treatment 100C was reduced. Result of the truly degraded substrate (TDS) parameters also indicated that treatment 34C66TC had the highest truly degraded substrate (TDS), gas production (GP), microbial mass production (MMP), efficiency of microbial mass production (EMMP) and partitioning factor (PF). It was concluded that corn cobs treated with combinations of urea and WA could substitute 66% of corn without negatively affecting chemical composition and gas production substrate parameters.

Introduction

Domestic ash left after burning of wood for cooking is alkaline, can improve the digestibility of crop residues the same way as urea and is available at household level at no cost to the farmer. Most researches have centered investigations on use of either urea (Sundstol, 1985; Preston, 1985; Chenost, 1995; Fall *et al*., 1989) or wood ash (Adebowale *et al*., 1991; Ramirez *et al*., 1991; Nolte *et al*., 1987; Solomon *et al*., 2012) as source of crop residue treatments but not their combinations. The combination is expected to reduce cost of treatment, improve digestibility at the same time incorporating both nitrogen and minerals into the crop residue.

After corn harvest and shelling of the grains, the cobs are left in the homestead as waste and in some cases burnt. Meanwhile livestock compete with man for grain, therefore there is need to conserve grains for human consumption by either partially or completely replacing it with treated cobs which are rich in energy, nitrogen and minerals.

Feed quality characterization and predictions of intake, digestibility and performance were mostly from *in vitro* gas production parameters only (Menke and Steingass, 1988; Blummel and Orskov, 1993; Khazaal *et al*., 1993) which may be misleading and unreliable. Therefore feed quality characterization and predictions of intake, digestibility and performance from *in vitro* gas production in conjunction with its truly degraded substrate parameters - truly degraded substrate (TDS), gas production (GP), microbial mass production (MMP), efficiency of microbial mass production (EMMP) and partitioning factor (PF) - would give a more reliable result. The objective of this study was to investigate the effect of substituting corn with cobs treated with urea and wood ash on chemical composition and gas production substrate.

Material and Methods

The study was conducted at the Botswana University of Agriculture and Natural Resources, Content Farm located 10 km north of Gaborone in South Eastern Botswana. Corn cobs treated with a combination of 25% urea and 75% wood ash described in a previous study were used to substitute graded level of corn in a complete diet as shown in Table 1.

Laboratory Analysis

Dry matter (DM, ID number 930.15) for all samples were determined by drying in forced air oven at 60° C for 24 hr. Organic matter (OM, ID number 942.05) and ash were obtained by difference in weight after ignition at 550° C in a muffle furnace (Muffle Furnace Size 3, Gallenkamp, UK). The NDF, ADF and ADL were determined with ANKOM fiber analyzer (Ankom Technology Corporation, Fairport, NY, USA) according to the procedure of Van Soest *et al*, (1991). In the analysis of NDF, sodium sulphite and alpha amylase were also added. Nitrogen was determined by the Kjeldahl method (ID number 955.04) according to AOAC (1999) and CP determined as N*6.25 (ID number 954.01).

In vitro Gas Production

The various feed samples were milled through a 1mm sieve and incubated in rumen fluid in calibrated glass syringes following the procedure of Menke and Steingass (1988). Rumen fluid was obtained from fistulated steers. The steers were fed commercial concentrate combined with crushed corn cobs. The liquor was collected in a flask flushed with carbon dioxide to maintain anaerobic environment for survival of rumen microbes. Five hundred milligrams of sample were weighed in triplicates for each treatment into calibrated glass syringes of 100ml. The syringes were pre warmed at 39°C followed by injection of 30ml rumen fluid-buffer (2:1 v/v) mixture into each syringe under continuous flushing with CO_2, then incubated in a water bath at 39°C. The buffer was made up of (A) $MgSO_4.H_2O$+ NaCl + KH_2SO_4 + $CaCl_2.H_2O$ +

Urea and (B) $NaSO_4.9H_2O$ + $NaCO_3$. Gas production was recorded at 6, 12, 24, 48 and 72 hours after incubation. Three runs were carried out and means for each run were used as replicates.

Truly degraded substrate (TDS) was determined according to the procedure outlined by Makkar (2010). Residues from *in vitro* gas production were treated with NDF solution in a beaker for one hour then filtered into a crucible, washed with hot water and finally oven dried at 100^0C overnight. The weight of the undegraded feed was then determined by subtracting weight of the empty crucible from weight of crucible plus undegraded feed residue. The undegraded residue was then transferred to the muffle furnace and ashed at 550^0C. *In vitro* truly degraded substrate (TDS) parameters were then determined according to the procedure outlined by Makkar, 2010.

Statistical Analysis

Data generated from TDS and chemical composition were analyzed using the general linear models (GLM) procedure of SAS (2002) and means separated using Duncan's multiple range test (Steel and Torrie, 1984).

The following model was used in the statistical analysis

$Y_i = \mu + T_i + e_i$

where: Y_i = measured parameters, μ = general mean T_i = types of treatment (1 – 4) e_i = residual error

Results

Table 1. Ingredients and chemical composition (g/kg) of experimental diet

	Types of treatment				
Ingredients (%)	100C	66C34TC	34C66TC	100TC	
Treated cob	0	15	30	45	
Maize grain	45	30	15	0	
Lucerne	39	36	32.5	29.5	
Wheat bran	10	10	10	10	
Sun Flower Cake	5	8	11.5	14.5	
Salt	0.5	0.5	0.5	0.5	
DCP	0.5	0.5	0.5	0.5	
Chemical composition (g/kg)					SD±
DM	945.0	950.0	950.0	955.0	4.630
ASH	82.01	100.0	107.9	175.4	38.68
OM	918.0	900.0	892.1	824.6	38.68
CP	134.3	131.0	133.5	133.5	3.740
NDF	470.0	470.0	480.0	570.0	54.97
ADF	160.0	220.0	250.0	360.0	78.51
ADL	53.20	63.20	85.20	114.4	28.61
HC	310.0	250.0	230.0	210.0	53.45
NDS	530.0	530.0	520.0	430.0	54.97
ME MJ/kg	18.94	19.19	19.28	17.24	0.938

DM= dry matter, OM=organic matter, CP=crude protein, NDF=neutral detergent fibre, ADF=acid detergent fibre, ADL=acid detergent lignin, HC= hemicellulose, NDS=neutral detergent soluble, ME= metabolizable energy, DCP= Di calcium phosphate. 100C= 100% corn, 66C34TC= 66% corn 34% treated cobs, 34C66TC=34% corn 66% treated cobs, 100TC= 100% treated cobs.

Ingredients and chemical composition of experimental diet are shown in Table 1. It was observed that the NDF, ADF and ADL of the experimental diets increased as corn was substituted with treated cobs; however, treatment 100C had the lowest NDS. Truly degraded substrate (TDS) (mg), gas production (GP ml), microbial mass production (MMP mg), efficiency of microbial mass production (EMMP) and partitioning factor (PF) of experimental feeds are shown in Table 2. There was effect ($P<0.0001$) of treatments on TDS (mg). Treatments 100C, 66C34TC and 34C66TC had similar TDS (mg) (353.7, 352.5 and 363.7 mg respectively) while treatment 100C recorded the least (288.7 mg). Effect ($P <0.0001$) of treatment was observed on TDS (%). There was effect ($P<0.0001$) of treatment on GP at 24 hours of incubation. Treatment 100C had the lowest gas production (105.0 ml) while treatment 36C64TC had the highest (120.0 ml) but similar to those of treatments 100C and 66C34TC (117.5 and 119.5 ml). Effect ($P<0.0001$) of treatment was observed on MMP. Treatment 34C66TC had the highest MMP (99.75 mg) but similar to those of treatments 100C and 66C34TC (95.25 and 89.60 mg) while treatment 100C had the least (57.75 mg). Effect ($P <0.001$) of treatment was also observed on EMMP and followed the same trend as in MMP. Treatment 34C66TC had the highest efficiency (27.42) but similar to those of treatments 100C and 33C64TC (26.91 and 25.40) while treatment 100C had the least efficiency (19.96). Effect ($P<0.0001$) of treatments was observed on PF. Treatment 34C66TC had the highest PF (3.301) and similar to those of treatments 100C and 34C66TC (3.012 and 2.949). Treatment 100TC also had the least PF (2.749).

Table 2. *In vitro* truly degraded substrate parameters of experimental diets

In vitro truly degraded substrate parameters	Types of treatment				SE	P value
	100C	66C34TC	34C66TC	100TC		
TDS (mg)	353.7[a]	352.5[a]	363.7[a]	288.7[b]	7.842	<0.0001
GP (ml)	117.5[a]	119.5[a]	120.0[a]	105.0[b]	1.663	<0.0001
MMP (mg)	95.25[ab]	89.60[b]	99,75[a]	57.75[c]	4.413	<0.0001
EMMP	26.91[ab]	25.40[b]	27.42[a]	19.96[c]	0.8126	<0.0001
PF	3.012[ab]	2.949[b]	3.031[a]	2.749[c]	0.0309	<0.0001

TDS= truly degraded substrate, GP= gas production at 24 hours, MMP= microbial mass production, EMMP= efficiency of microbial mass production, PF= partitioning factor.

Discussion

In a previous study corn cobs treated with 25% urea combined with 75% wood ash gave better results in terms of reducing NDF, ADF and improving NDS, TDS and the PF compared to the rest of the treatments. Based on the results, corn cobs treated with 25% urea combined with 75% wood ash was used to substitute graded level of corn in a complete diet

It was observed that the more the substitutions of corn with treated maize cobs, the more the ash content of the feed. The high amount of ash in the feed may supply more minerals to the animals and rumen microbes (Imbeah, 1999; Ramirez *et al*., 1991; Nolte *et al*., 1987). However the substitution also led to increase in NDF, ADF and ADL and reduction in NDS of treatment 100TC. The higher NDS content of treatments 100C, 66C34TC and 34C66TC could be attributed to their corn contents that were mostly cell soluble compared to treatment 100TC that was characterized by higher contents of NDF, ADF and ADL which can negatively affect digestibility. Various authors have also reported increases in NDF, ADF and ADL contents of feeds when energy source is substituted with corn cobs (Khan *et al*., 2006; Wanapat *et al*., 2012). The reason for the high NDF and ADF contents of treatment 100TC based diet was because of its high crude fibre content. Treatment 100TC had the highest gas production at 72 hours of incubation however gas production alone cannot be used to characterize quality of feed since gases from bicarbonate buffer may also contribute to the gas production which may be misleading (Blummel *et al*., 2005; Makkar, 2010). Gas production alone may also imply fermented waste products from microbial lyses to VFAs and gases including methane that pollutes the environment (Blummel and Orskov, 1993). In order to overcome these problems associated with gas production technique, concomitant determination of TDS of incubated substrate is therefore necessary for a reliable result.

The fact that treatment 34C66TC had the highest percent TDS may imply that it was more digestible compared to the rest of the treatments. This may be attributed to its low grain contents that were favorable to the rumen microbes. Higher contents of dietary grain are rapidly fermented leading to low ruminal pH which inactivate cellulolytic bacteria that digest fibre with a resultant effect of low DM intake. This problem can be addressed by reducing the amount of grain in feed in order to promote the activities of cellulolytic bacteria that degrade fibre to reduce rumen fill and promote voluntary feed intake (VFI) (Allen and Oba, 1996).

Even though treatment 100C had similar TDS (mg), GP, MMP, EMMP and PF with 34C66TC, its higher grain contents may have a negative impact on voluntary DM intake since high grain contents lead to low pH and digestibility. The advantage of treatment 34C64TC, however, is that it may produce better results than the rest of the treatments when fed to ruminants due to its low corn content. The treatment will also reduce cost of feed since corn cobs are almost available freely. Another advantage associated with treatment 34C66TC is that, it has high ash content which is also a valuable source of minerals to the animals and rumen microbes (Nolte *et al*., 1987; Ramirez *et al*., 1991; Imbeah, 1999). Feed with higher PF implied that the degraded organic matter may be incorporated into microbial mass that would be digested post ruminally which is an indication that it has higher efficiency of microbial synthesis. It has been established that feeds with higher PF also have higher excretion of purine derivatives, higher DMI and lower methane production (Blummel *et al*., 2005; Makkar, 2010). It therefore implies that treatment 34C66TC would translate to excretion of more purine derivatives, more DMI and lower methane emission as compared to the other treatments.

Conclusion

It was established from all parameters considered that treatment 34C66TC gave a better result compared to the other treatments. It was therefore concluded that 66% of treated corn cobs could replace 34% of corn in ruminants' diets.

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Effect of dietary crude fibre level on performance and carcass characteristics of male Ross 308 broiler and Venda chickens aged 1 to 42 days

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Introduction

Diets high in crude fibre (CF) are poorly digested by broiler chickens because they don't produce enough fibre digesting enzymes (NRC, 1994). Crude fibre levels of 2 to 4% optimize production parameters in broiler chickens (Hetland et al., 2005; Jiménez-Moreno et al., 2013) compared to 5-6% in slow-growing indigenous Venda chickens in South Africa (Mbajiorgu et al., 2011). An understanding of factors promoting higher CF digestibilities in slow-growing chickens is important when trying to increase fibre digestion in broiler chickens. The objective of this study was to determine dietary CF levels for optimal productivity of Ross 308 broiler and Venda chickens aged one to 21 days.

Materials and Methods

This study was conducted at the University of Limpopo in South Africa (latitude 27.55˚S and longitude 24.77˚E). A total of 320 day-old male chicks (160 Ross 308 broiler and 160 Venda chicks) were randomly allocated to a 2 (breeds) x 4 (diets with CF levels of 3, 4, 5 and 7%) factorial arrangement in a completely randomised design, replicated 4 times with 10 chicks per replicate. The chickens were offered experimental diets for 21 days. The diets were isocaloric (16MJ energy/kg DM) and isonitrogenous (230g CP/kg DM). The chickens were offered feed and water *ad libitum.* Light was provided 24 hours per day. Data collected included feed intake and digestibility, N-retention and live weight of the chickens. Nutrient contents of feeds and faeces were determined as described by AOAC (2008). All data were analysed using the General Linear Model procedures of SAS (2014). Fisher's least significant difference (LSD) test was applied for mean separation where there were significant differences ($P<0.05$). The responses in production performance to dietary CF level were modelled using the following quadratic equation: $Y = a + b_1x + b_2x^2 + e$ (SAS, 2014). The quadratic model was fitted to the experimental data by means of the NLIN procedure of SAS (SAS, 2014). The linear relationships between dietary CF level and responses in production performance were modelled using the following linear equation: $Y = a + bx + e$ (SAS, 2014).

Results

Dietary CF levels used in the present study affected ($P<0.05$) diet intake, growth rate and live weight of both Ross 308 broiler and indigenous Venda chickens aged one to 21 days (Table 1). Feed intake, growth rate and live weights of broiler chickens were optimized at different CF levels of 3.9, 4.5 and 4.5%, respectively. Similarly, feed intake, growth rate and live weights of Venda chickens were optimized at different CF levels of 4.4, 4.8 and 5.0%, respectively (Table 2). Increasing dietary CF levels decreased ($P<0.05$) NDF and ADF digestibilities in Ross broiler chickens ($r = -0.934$ and -0.925, respectively) and Venda chickens ($r = -0.837$ and -0.987, respectively) (Table 2). Slow growing indigenous male Venda chickens digested NDF and ADF digestibilities better ($P<0.05$) than Ross 308 broiler chickens (Table 2).

Table 1. Effect of dietary CF level on production parameters and nutrient digestibility of male Ross 308 broiler and indigenous Venda chickens aged one to 21 days*

Treatment	CF (%)	Variable						
		Feed intake (g/b/day)	Growth (g/b/day)	N-retention (g/b/day)	ME intake (MJ/kg DM)	Live weight (g)	NDFD (%)	ADFD (%)
Ross 308 broiler chickens	3	$46^{a} \pm 0.41$	$29.0^{a} \pm 0.51$	$1.62^{a} \pm 0.07$	$12.1^{a} \pm 0.65$	$650^{a} \pm 24.0$	$33^{a} \pm 4.1$	$26^{a} \pm 2.13$
	4	$46^{a} \pm 0.52$	$30.2^{a} \pm 0.41$	$1.7^{a} \pm 0.04$	$12.2^{a} \pm 0.85$	$675^{a} \pm 25.1$	$33^{a} \pm 4.5$	$26^{a} \pm 1.31$
	5	$46^{a} \pm 0.61$	$30.3^{a} \pm 0.32$	$1.6^{a} \pm 0.08$	$11.9^{a} \pm 0.50$	$678^{a} \pm 23.0$	$28^{a} \pm 1.6$	$20^{b} \pm 2.32$
	7	$39^{b} \pm 0.82$	$26.7^{b} \pm 0.52$	$1.3^{b} \pm 0.13$	$10.5^{b} \pm 0.45$	$600^{b} \pm 17.2$	$25^{b} \pm 0.3$	$18^{b} \pm 2.41$
Venda chickens	3	$26^{b} \pm 0.41$	$6.9^{b} \pm 0.34$	$0.4^{a} \pm 0.04$	$9.4^{a} \pm 0.17$	$375^{b} \pm 20.4$	$36^{b} \pm 1.0$	$27^{a} \pm 0.61$
	4	$29^{a} \pm 0.51$	$9.8^{a} \pm 0.31$	$0.5^{a} \pm 0.05$	$9.7^{a} \pm 0.30$	$517^{a} \pm 100.3$	$39^{a} \pm 0.8$	$27^{a} \pm 0.41$
	5	$26^{b} \pm 0.32$	$7.5^{b} \pm 0.42$	$0.4^{a} \pm 0.04$	$8.8^{ab} \pm 0.70$	$395^{b} \pm 18.5$	$35^{bc} \pm 0.6$	$24^{b} \pm 0.67$
	7	$25^{b} \pm 0.91$	$6.9^{b} \pm 0.33$	$0.3^{b} \pm 0.04$	$7.2^{b} \pm 0.95$	$374^{b} \pm 26.1$	$32^{c} \pm 2.7$	$19^{c} \pm 0.97$
Breed								
Ross 308		$44^{a} \pm 0.61$	$29.1^{a} \pm 0.41$	$1.6^{a} \pm 0.08$	$11.7^{a} \pm 0.40$	$651^{a} \pm 24.3$	$30^{a} \pm 3.2$	$23^{a} \pm 1.98$
Venda		$27^{b} \pm 0.51$	$7.8^{b} \pm 0.52$	$0.4^{b} \pm 0.04$	$8.8^{b} \pm 0.64$	$415^{b} \pm 50.1$	$35^{b} \pm 1.2$	$24^{b} \pm 0.84$
Probabilities								
CF level		0.0350	0.0419	0.0013	0.0501	0.0312	0.0407	0.0149
Breed		0.0010	0.0017	0.0342	0.0243	0.0017	0.0041	0.0415
CF x breed interactions		0.0783	0.1326	0.2671	0.1741	0.0722	0.0561	0.0428

a, b, c: means in columns having different superscript are significantly different;*:Mean standard error; CF: Crude fibre

Table 2. Dietary crude fibre levels for optimal production performance of male Ross 308 broiler and indigenous Venda chickens aged one to 21 days

Variable	CF levels for optimal performance (%)	
	Ross 308 broiler chicken	Venda chicken
Feed intake	3.9	4.4
Growth rate	4.5	4.8
Live weight at 21 days	4.5	5.0
Metabolisable intake	3.7	3.3
Nitrogen retention	4.1	4.1

Table 3. Relationships between dietary crude fibre level (%) and nutrient digestibility (%) in male Ross 308 broiler and indigenous Venda chickens aged one to 21 days

	Relationship (r)	
	Ross 308 broiler chickens	Venda chickens
NDF digestibility	-0.934	-0.837
ADF digestibility	-0.925	-0.987
CP digestibility	-0.984	-

Conclusion

In a diet of 16MJ of energy and 230g of CP/kg DM, crude fibre levels used affected feed intake, growth rate, live weight, ME intake and N-retention of male Ross 304 broiler and Venda chickens aged one to 21 days. However, these production variables were optimized at different dietary CF levels, ranging from 3.7 to 5%. Dietary CF levels for optimal productivity tended to be higher in Venda chickens than Ross 308 broiler chickens. The implication of these results is that dietary CF levels for optimal productivity will depend on the particular variable in question and breed of the chicken. These findings have a lot of implications on ration formulation for both slow-growing Venda chickens and fast-growing Ross 308 broiler chickens. However, more studies should be done to ascertain these responses and determine reasons for the differences.

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Study of Bio-ecological Characteristics of Dicrocoelium Lanceatum Helmintin in Sheep in Azerbaijan

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Introduction

Dicrocoelium lanceatum is a trematod species. The dwarves are more mysterious than the front, back and forth. Height 4-12mm, width 5mm. The eggs are transparent. The eggs are small, lid and thick. The mouth and the abdomen are close together. Owners: last-wild nail animals, rodents, predators, primates, including humans; Intermediate-dry snail. In Azerbaijan, Helicella derbeutina, Buliminus tridens, Zebrina (Buliminus) hohenackeri, Helix lucorum and several other species have been identified as intermediate hosts; these are the ant species of the genus Formica, Proformica. In Azerbaijan, Formica rufibarbis, Formica catagluphis bicolae and other species have been identified as intermediate hosts of dicroseliosis. Localization: sexually mature individuals parasitize the liver's gall ducts. It is often found in the gall bladder itself. From the larvae, the serpents develop in the middle intestine of the snails, and the metasperms develop in the ant's body. Spreading: is a very common type (Papadopoulos E., Sotiraki S., 2004).

Materials and methods

Studies were conducted in the Absheron Peninsula and the neighboring Khizi region (Figure 1). Dicrocoelium lanceatum species was 14-51 individuals in 17 (21,5%) out of 79 sheep approved in the Zira village in the Absheron peninsula, and 12-27 individuals in 7 (24,1%) out of 29 sheep in Mammadli village; In Z.Tagiyev settlement, 16 out of 69 sheep (23,2%) were 5-17 individuals, in Fatmai village 17 out of 48 sheep (35, 4%) were 14-32 individuals and 6 out of 20 sheep in Mehdiabad village (30,0%) 2-19 individuals, 3-8 out of 36 sheep (30, 6%) in Gobu village, 5-37 individuals and 7 out of 20 sheep (35,0%) in Mushvigabad village and surveyed in Khirdalan 6 of 17 sheep (35,3%) were found in 29-39 individuals. 18 out of 43 sheep (41,9%), 11-35 individuals were In the village of Altiagaj of Khizi region, 24 out of 62 sheep (38,7%) 13-55 individuals were in the village of Gizildara, 19 of the 48 sheep (39,6%) 14-63 individuals in the Tudar village, 4 out of 12 sheep (33,3%) 2-9 individuals were in Shurabad village (Figure 2).

Figure 1. Absheron area where the investigations are conducted

Figure 1. Collected helmintler

Result

The survey results show that the highest incidence of infection in the Absheron peninsula is in Fatmai (35,4%), Khirdalan (35,3%), Mushvigabad (35,0%), helminths were recorded in relatively less Zire (22.0%) and Z. Tagiyev (23.2%) regions. Dicrocoelium lanceatum species was found to be more active and more intensified in the villages of Altiagac (41,9%), Tudar (39,6%) and Qizildare (38,7%) in Khizi district adjacent to the Absheron peninsula.

The distribution of the Dicrocoelium lanceatum species was studied in environmental zones and is presented in Table 1.

Table 1. Distribution of Dicrocoelium lanceatum by zones (over altitudes) in the Absheron Peninsula and adjacent Khizi region.

Ecological zones	Investigated	Infected	Extremity of infection	Intensity of infection
Plain Zone	303	40	13,2	5-37
Sloping zone	315	71	22,5	3-41
Zone of humiliation	153	61	39,9	11-63
Total	771	172	22,3	3-63

As shown in the tables, the Dicrocoelium lanceatum is the most abundant species of sheep, as it rises to the lowland areas in the Khizi region, at an altitude of 350-2200-2250m, adjacent to the Absheron peninsula, between the plains 28-100m above the Absheron peninsula.

In the plain, Zira, Z. Taghiev, Mammadli and other villages where the invasions are recorded with low rates, as well as the lands of Mashtaga, Hovsan and other villages where the species of D. lanceatum is not registered, are used for the cultivation of melons and vegetables. In many parts of the plain, groundwater is found. Due to these and other similar factors, it is not suitable for the proliferation of dry snails, which are intermediate owners of dicrosoelosis. One of the factors contributing to the low availability of dicroseliosis in these areas is the lower number of sheep stored in farms and private farms, and the lower end of the dicroseliosis, the other major owners (Maharramov S.H., 2011).

The Khizi district is located in lowland areas, where the vegetation richness of the area, as well as the vast expanse of pasture areas, abiotic factors (vegetation and ground cover, temperature, etc.) in the area contribute to the increased number and intensity of land snails. caused by. In addition, a large number of sheep and other livestock farms have been established in these areas, where the number of animals in these farms is quite high compared to the farms in the Absheron peninsula. All these factors have contributed to the increase and spread of dicroseliosis generators in the area (Mammadov E.N, Mammadov I.B., 2011)

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Milk Fatty Acid Composition of Anatolian Water Buffalo (*Bubalus bubalis*) from Different Provinces

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Introduction

Milk fat contains ~400 different fatty acids (FA), which make it the most complex among natural fats. The milk FA are produced almost equally from two sources, first in the rumen as a feed and the microbial activity and secondly in the mammary gland as *de novo* synthesis in animals. For FA in milk, SCFA (4 to 8 carbons) and MCFA (10 to 14 carbons) derived almost exclusively from *de novo* synthesis, and LCFA (>16 carbons) are produced from the uptake of circulating lipids, while FA with 16 carbons originate from both sources (Liu *et al.* 2016). The present study was undertaken to characterize the FA composition of Anatolian water buffalo milk from six different provinces in Turkey.

Materials and methods

Water buffalo milks corresponded to individual milks taken from 57 buffalos of Mediterranean breed of *Bubalus bubalis* from six different provinces where most intensive water buffalo breeding present in Turkey. Forty ml of fresh milk was then drawn and released into 50 ml falcon tube where they were preserved with antibiotic tablet (Bronolab Broad Spectrum Microtabs, 18 mg tablet: comprises 8 mg Bronopol and 0.30 mg Natamycin) and transferred via insulated foam containers with cooling cassettes. Milk samples were stored 4°C until portions were analyzed the following day. Prior to analysis of FA content, water buffalo milk samples were stored at -20°C. Milk fat extraction was prepared according to Gerber method (James, 1995). One-step extraction-transesterification process (Sukhija and Palmquist, 1988) was used to prepare fatty acid methyl esters (FAME). The FAME profile for a 0.6-µl sample at a split ratio of 1:50 was generated using a Schimadzu, GC 2010 plus gas chromatography equipped with a flame ionization detector (Schimadzu, Kyoto, Japan), a capillary column (60 m × 0.25 mm ID × 0.250 µm (cat. # 13199)) and H_2 as the carrier gas.

Results

Milk FA was quantified by gas chromatography fitted with a flame-ionization detector and a FA standard mix (contain 37 FA). Nineteen FA could not be detected with enough accuracy thus they were excluded in the statistical analysis. Those FA have been indicated as unknown followed by their retention time (in minutes) in the chromatographic run. In present study, the major FA (expressed as mean ± SEM in g / 100 g fat) were C16:0 (palmitic acid, 34.90±0.5), *cis*-9 C18:1 (oleic acid, 25.97±0.74), C18:0 (stearic acid, 14.33±0.48), and C14:0 (myristic acid, 11.13±0.27) accounting for approximately 86% of the total milk fat. C4:0 (butyric acid, 2.66±0.08), C12:0 (lauric acid, 2.09±0.07), C15:0 (pentadecanoic acid, 1.54±0.13) and C10:0 (capric acid, 1.52±0.07) were also relatively abundant in water buffalo milk samples which was approximately 7.5% of the total milk FA.

Conclusion

We confirmed Anatolian water buffalo milk samples showed variation in the FA profile due to the specific FA origin and metabolic pathway most probably related with their environmental conditions. Generally, Anatolian water buffalos were poor in terms polyunsaturated FA compared to other water buffalos from different countries. Therefore, these results may provide useful information about the nutrient composition of buffalo milk and further studies are warranted to improve the technological and nutritional characteristics of Anatolian buffalo milk.

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Effect of Egg Position and Pipping Location on Hatchability and Broiler Performance

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Introduction

It is well known that hatchability was reduced by 16-27% when position of eggs were Small End Up (SEU) during incubation due higher percentage of malposition embryos (Oluyemi and George, 1972; Benoff and Renden, 1980; Bauer et al., 1990; Fasenko et al., 2000; Wilson et al., 2003). However there was limited studies on the effect of SEU on broiler performance.

This study was carried out to determine the effects of egg position and chick pipping location on hatchability and broiler performance.

Material and Method

A total of 1350 eggs collected from the Ross 308 broiler breeder flock at 38 wk of age. Before the incubation, the location of the air space of each egg was controlled and divided into two groups, where the eggs incubated either with their large ends (LEU) or small ends up (SEU). On the 18.5 d of incubation, the eggs were transferred to the hatcher trays, and the air space area was checked and marked on the egg surface, so chick pip location was determined. The locations identified such as; air space (AS), middle (ML), and small ends (SE) of the eggs.

Hatchability, embryonic mortality, and malpositioned embryo of fertile eggs were calculated, and hatching time of groups was determined.

A total of 864 feather-sexed chicks were pulled, weighed and transferred to floor pens. Body weight, feed conversion ratio, livability, and European Production Efficiency Index (EPEI) were evaluated. Chicks were individually weighed at 0, 7 and 35 d. Feed conversion ratio and livability were calculated for 0-7 d and 0-35 d period.

Results

In LEU treatment, air cell was found by all embryos and the chicks had pipped at the AS location, but 10.3, 20.9, and 68.8% of embryos had pipped at AS, ML, and SE location in SEU treatment, respectively.

As expected, Fertile hatchability was significantly decreased by setting SEU position due to higher late embryonic mortality and especially malpositioned embryo ($P<0.05$). SEU position and SE location group had a significantly longer hatching time ($P<0.05$).

It was determined that chick BW was significantly affected by egg position and pipping location ($P<0.05$). The highest BW was observed in LEU, while SE had the lowest BW. At 35, BW, FCR, and livability were lower in SEU groups especially in SE location but the differences was not significant. On the other hand EPEI was significantly decreased due to SEU egg position ($P<0.05$).

Conclusion

As a result, it was determined that the SEU placement caused a negative effect on hatchability and broiler performance.

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The Effect of Thyme (Thymus vulgaris L.) Essential Oil on the Performance of Broilers

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Introduction

Thyme is a highly antimicrobial, characteristic plant (Baydar et al., 2004; Ucar et al., 2015). The main components of oregano oil, carvacrol and thymol, are highly effective on many bacteria (Dorman and Deans, 2000). It also contains antioxidant flavonoids and phenolic acids such as caffeic acid, rosmaric acid, hispidulin, apigenin (Zheng and Wang, 2001). Because of these properties, thyme has been considered by researchers to be the first alternative plant instead of antibiotics used for many years as performance enhancers. Many researchers have reported that oregano oil has a positive effect on animals (Jang et al., 2007; Parlat et al., 2005; Hashemipour et al., 2013; Hack and Alagawany 2015). In this study, it was aimed to investigate the effect of thyme essential oil on performance of broiler chickens.

Materials and methods

The study was carried out with 18 a day-old broiler chicks (Ross 308) and at 42-day period. The chicks were divided into two groups as a control group and an experimental group. However, the groups were fed with basal feed without additives for a week. At the beginning of the second week, the animals were taken to individual cages and the control group received basal feed and the other group received 1000 mg / kg oregano essential oil. Live weight (LW) and feed consumption (FC) were determined by weekly and then, live weight gain (LWG) and feed conversion rates (FCR) were calculated. At the end of the feeding process, chickens were slaughtered. Carcass characteristic of broilers were determined.

Results

Mean weekly live weight changes are shown in Table 1. In the second and third weeks, live weights decreased significantly in the group consuming thyme oil (P <0.05). But, mean live weight of chicks were similar at the end of the experiment (P >0.05). At the end of the second week, LWG in the group consuming thyme oil decreased significantly compared to the control group, but increased significantly at the end of the sixth week (P <0.05). FC was similar between groups. However, FCR decreased significantly in the sixth week in the control group, since the LWG was significantly lower in the sixth week. There was no significant difference between the groups in terms of carcass characteristic and some internal organ weights (P >0.05).

Table 1. Average live weight changes of broilers supplemented of thyme oil

	Treatment Groups (g)		
Age (Week	Control	Thyme	P-value
1st day	38.38	38,45	0.938
1.	141.11	140.33	0.911
2.	325.00 a	296.11 b	0.020*
3.	838.33 a	768.33 b	0.033*
4.	1505.00	1418.88	0.154
5.	2252.22	2145.00	0.331
6.	2757.21	2917.78	0.332

[a,b] Row means with different superscripts differ significantly at P <0.05

Conclusion

The results of many studies investigating the effects of thyme oil on growth performance in poultry are inconsistent. These results were similar to finding of Botsoglou et al. (2002) dietary supplementation of oregano essential oil to broilers had no beneficial effect on growth performance. Lee et al. (2003), and pointed out of thymol in diet did not affect the BW gain, feed intake, and FCR of broilers. Hack and Alagawany (2015), no significant differences were observed among the dietary treatments in body weight change, feed consumption, or feed conversion ratio of laying hens. In contrast with this study, dietary supplementation of thyme essential oil to broilers. Thyme oil, or its major components, are reported to improve performance (Cross et al., 2007; Lee et al., 2003; Hashemipour et al., 2013)

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Independent Analysis of Two Proportions Power Analysis

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Introduction

In this study, power analysis, which has almost become necessary before conducting scientific studies is examined. Power analysis is not only an analysis to check the reliability and precision of the decisions made based on the results of the study, but also a statistical method used to determine experimental unit number to increase the success of the research. Thus in this study, optimum number of experimental units are found and given as tables for two proportions tests and 5% increment between power of 70-95% under different circumstances are presented.

Materials and methods

Statistical analysis serves two purposes. The first one is to descriptively show what is obtained from the study, and the second is to make inferences from the results by performing statistical tests. However, the most important factor here is not knowing whether the findings obtained from the sample are suitable for the whole population or not. A low power value in the work leads to misinterpretations. The results of such research may also contain false information for the population (Murphy and Myors 2004). Power analysis can be performed either at the beginning of the study or at the end of the study. The power analysis performed at the beginning of the study is used to obtain the aimed power and to estimate the required sample size. With the power analysis performed at the end of the study, the actual power of the study can be calculated.

Statistical power is the probability of rejecting the H_0 hypothesis and finding the difference in the population. Type II error is the probability of not finding difference even though there is a difference (Newman and Kohn 2009). In case a significant difference is detected among groups, then statistical power is the probability of this difference to occur (Goodwin, 2010).

To give an example, if the difference between two groups mean is detected as significant, in other words, H_0 hypothesis is rejected and H_1 hypothesis is accepted and concluded that there is a difference between the groups, then probability of this result to be true gives the power of the test.

If a researcher does not work with large enough samples to reveal the difference between the groups, he would not be able to find the actual difference between the groups and this would indicate that the power of the test is low. Power, just like p value, is a conditional probability (Dorey, 2011). Which factors and how these factors affect statistical power is an important issue. Low or high test power is an important factor in these effects. Power varies greatly depending on α, impact size and sample size (Cohen, 1992).

There are two types of errors in hypothesis controls when the control hypothesis is tested against the opposite hypothesis. When the control hypothesis (H_0) is rejected even though it is valid then this is considered type I error. The probability of type I error is shown as α. Type II error happens when control hypothesis H_0 is accepted even though opposite hypothesis H_1 is valid. The probability of type II error is shown as β. The accurate or false decisions made during the hypothesis controls depend on the probability of α and β (Kocabaş and Kesici 1998). In practice, the aim in many cases; is the comparison of difference between the two proportions. For example, comparison of men and women in terms of smoking status, or comparison of two sheep breeds in terms of twinning etc. can be given as an example of z test (Mendeş, 2012).

Conducting the test;

Hypotheses are established

H_0: $\pi_1=\pi_2=0$

H_1: $\pi_1-\pi_2 \neq 0$

H_0: $\pi_1=\pi_2=0$

H_1: $\pi_1-\pi_2 <0$

H_0: $\pi_1=\pi_2=0$

H_1: $\pi_1-\pi_2 >0$

Table value of Zt is determined.

The test statistics for

$Z_t = Z_{\square}$ for one-way hypothesis

$Z_t = Z_{\square/2}$ for two-way hypothesis

are calculated.

$$Z_h = (\hat{p}_1-\hat{p}_2)-0/\sqrt{\hat{p}(1-\hat{p})(\frac{1}{n_1}+\frac{1}{n_2})}$$

Finally, a comparison is completed.

If the calculated z value is greater than table value of z, then H_0 is rejected.
If the calculated z value is less than table value of z, then H_0 is accepted. (Yıldız et al., 2002).

Results

When the two independent proportions are calculated, the number of test units required for each group to be statistically significant is calculated in different power proportions and are presented in the tables below.

Table 1. Calculated sample size in the Z test when comparing two proportions (P_1 = 0.1)

P_1	P_2	1-β	N
0.1	0.2	0.70	157
		0.75	177
		0.80	199
		0.85	228
		0.90	266
		0.95	329
0.1	03	0.70	49
		0.75	55
		0.80	62
		0.85	71
		0.90	82
		0.95	101
0.1	0.4	0.70	26
		0.75	29
		0.80	32
		0.85	36
		0.90	42
		0.95	52
0.1	0.5	0.70	16
		0.75	18
		0.80	20
		0.85	22
		0.90	26
		0.95	32
0.1	0.6	0.70	11
		0.75	12
		0.80	14
		0.85	15
		0.90	17
		0.95	21
0.1	0.7	0.70	8
		0.75	9
		0.80	10
		0.85	11
		0.90	12
		0.95	15
0.1	0.8	0.70	6
		0.75	7
		0.80	7
		0.85	8
		0.90	9
		0.95	10
0.1	0.9	0.70	5
		0.75	5
		0.80	5
		0.85	6
		0.90	6
		0.95	7

Table 2. Calculated sample size in the Z test when comparing two proportions ($P_1 = 0.2$)

P_1	P_2	1-β	N
0.2	0.3	0.70	231
		0.75	260
		0.80	294
		0.85	336
		0.90	392
		0.95	485
0.2	0.4	0.70	65
		0.75	72
		0.80	82
		0.85	93
		0.90	109
		0.95	134
0.2	0.5	0.70	31
		0.75	35
		0.80	39
		0.85	44
		0.90	52
		0.95	63
0.2	0.6	0.70	18
		0.75	20
		0.80	23
		0.85	26
		0.90	30
		0.95	36
0.2	0.7	0.70	12
		0.75	13
		0.80	15
		0.85	17
		0.90	19
		0.95	23
0.2	0.8	0.70	8
		0.75	9
		0.80	10
		0.85	11
		0.90	13
		0.95	15
0.2	0.9	0.70	6
		0.75	7
		0.80	7
		0.85	8
		0.90	9
		0.95	10

Table 3. Calculated sample size in the Z test when comparing two proportions ($P_1 = 0.3$)

P_1	P_2	1-β	N
0.3	0.4	0.70	281
		0.75	315
		0.80	356
		0.85	407
		0.90	477
		0.95	589
0.3	0.5	0.70	74
		0.75	83
		0.80	93
		0.85	107
		0.90	124
		0.95	153
0.3	0.6	0.70	34
		0.75	38
		0.80	42
		0.85	48
		0.90	56
		0.95	69
0.3	0.7	0.70	19
		0.75	21
		0.80	24
		0.85	27
		0.90	31
		0.95	38
0.3	0.8	0.70	12
		0.75	13
		0.80	15
		0.85	17
		0.90	19
		0.95	23
0.3	0.9	0.70	8
		0.75	9
		0.80	10
		0.85	11
		0.90	12
		0.95	15

Table 4. Calculated sample size in the Z test when comparing two proportions (P_1 = 0.4)

P_1	P_2	1-β	N
0.4	0.5	0.70	305
		0.75	343
		0.80	383
		0.85	443
		0.90	519
		0.95	641
0.4	0.6	0.70	77
		0.75	86
		0.80	97
		0.85	111
		0.90	130
		0.95	160
0.4	0.7	0.70	34
		0.75	38
		0.80	42
		0.85	48
		0.90	56
		0.95	69
0.4	0.8	0.70	18
		0.75	20
		0.80	23
		0.85	26
		0.90	30
		0.95	36
0.4	0.9	0.70	11
		0.75	12
		0.80	14
		0.85	15
		0.90	17
		0.95	21

Table 5. Calculated sample size in the Z test when comparing two proportions (P1 = 0.5)

P_1	P_2	1-β	N
0.5	0.6	0.70	305
		0.75	343
		0.80	388
		0.85	443
		0.90	519
		0.95	641
0.5	0.7	0.70	74
		0.75	83
		0.80	93
		0.85	107
		0.90	124
		0.95	153
0.5	0.8	0.70	31
		0.75	35
		0.80	39
		0.85	44
		0.90	52
		0.95	63
0.5	0.9	0.70	16
		0.75	18
		0.80	20
		0.85	22
		0.90	26
		0.95	32

Table 6. Calculated sample size in the Z test when comparing two proportions (P_1 = 0.6)

P_1	P_2	1-β	N
0.6	0.7	0.70	281
		0.75	315
		0.80	356
		0.85	407
		0.90	477
		0.95	589
0.6	0.8	0.70	65
		0.75	72
		0.80	82
		0.85	93
		0.90	109
		0.95	134
0.6	0.9	0.70	26
		0.75	29
		0.80	32
		0.85	36
		0.90	42
		0.95	52

Table 7. Calculated sample size in the Z test when comparing two proportions (P1 = 0.7)

P_1	P_2	1-β	n
0.7	0.8	0.70	231
		0.75	260
		0.80	294
		0.85	336
		0.90	392
		0.95	485
0.7	0.9	0.70	49
		0.75	55
		0.80	62
		0.85	71
		0.90	82
		0.95	101

Table 8. Calculated sample size in the Z test when comparing two proportions (P1 = 0.8)

P_1	P_2	1-β	N
0.8	0.9	0.70	157
		0.75	177
		0.80	199
		0.85	228
		0.90	266
		0.95	329

When the above tables are examined, in order to find 10-20 % differences as significant in animal husbandry, large number of animals have to be raised. Thus it is found that in order to find statistical significance in properties that have more than 30 % or more discrepancy, less number of animals are required.

Conclusion

In the Z test used in two proportion comparisons, when one of the proportion is 0.1 and the others range from 0.2 to 0.9, the sample size required for 95% power varies between 329 and 7. In the Z test used in two proportion comparisons, when one of the proportion is 0.2 and the others range from 0.3 to 0.9, the sample size required for 95% power varies between 485 and 10. In the Z test used in two proportion comparisons, when one of the proportion is 0.3 and the others range from 0.4 to 0.9, the sample size required for 95% power varies between 589 and 10. In the Z test used in two proportion comparisons, when one of the proportion is 0.4 and the others range from 0.5 to 0.9, the sample size required for 95% power varies between 641 and 21. In the Z test used in two proportion comparisons, when one of the proportion is 0.6 and the others range from 0.7 to 0.9, the sample size required for 95% power varies between 589 and 52. In the Z test

used in two proportion comparisons, when one of the proportion is 0.7 and the others range from 0.8 to 0.9, the sample size required for 95% power varies between 485 and 101. In the Z test used in two proportion comparisons, when one of the proportion is 0.8 and the others range from 0.9, the sample size required for 95% power varies 329.

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Genetic polymorphism in growth hormone gene among indigenous chicken strains of Pakistan

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Introduction

The main challenge in raising indigenous chicken is its low growth rate and egg production as compared to commercial chicken. Chicken growth hormone gene has shown polymorphisms which revealed significant association with chicken growth and production traits (Amills *et al*., 2003). DNA polymorphism is a identification tool for genetic varients, marker and used for marker assisted selection as well as to study the genetic relationship between and within chicken populations (Ibrahim *et al*., 2006). Current study was a key step to improve the production potential of four Pakistani indigenous strains through RFLP polymorphism of growth hormone gene.

Materials and methods

Four Pakistani chicken strains; Unigold Barred (A), Unigold Non-barred (B), Desi (D) and Unigold Naked neck (N) were raised in three replicates (Thirty birds/replicate) under similar managemental and feeding conditions.Growth parameters; Day old body weight, weekly body weight, feed intake, shank length, body length and weight at 16th week of age were recorded. The blood samples from four birds (2 male and 2 female) of each replicate were collected at the age of 8 weeks. Thermo Scientific GeneJET Whole Blood Genomic DNA Purification Mini Kit was used to extract the DNA from whole blood samples. After amplification of desied gene product, digestion of growth hormone gene fragments was carried out with *EcoR*-V, *Sac*I and *Hind*III endonuclease enzymes.

Results

Data recored is summerised in Table 1. Four primer products show similar pattern under restriction analysis but restriction of primer II product with *EcoR*-V restriction enzyme shows 50bp fragment in only Unigold Barred.

Table 1. Average trends of growth parameters in indignous chicken strains.

Parameter	A	B	D	N
Day old weight (g)	22±4	21±3	21±3	20±3
8st week weight (g)	580±85	543±84	581±79	544±86
16th week weight (g)	1122±196	1063±204	1062±190	1058±223
8th week Feed Intake (g)	32.63±12.42	33±12.04	33.13±12.37	31.81±11.58
16th week Feed Intake (g)	46±1.72	45±0.83	46±0.78	44±1.72
8th week Shank length (cm)	6.47±0.77	6.39±0.43	6.24±0.40	6.33±0.38
16th week Shank length (cm)	9.35±0.90	9.81±0.92	9.23±0.97	9.61±0.89
8th week Body length (cm)	46.04±2.49	47.27±2.79	46.24±2.61	46.23±2.53
16th week Body length (cm)	60.94±3.96	62.59±4.26	60.32±4.13	61.31±4.06

Conclusion

The results of this study showing differences in body weight in different indigenous strains of Pakistan during different age are lower as compared to the earlier findings of Singh *et al*. (1999) who reported higher weights at day-old in Aseel (33±0.30g) and Naked neck (34±0.36g) chicks under farm conditions, whereas, Chatterjee *et al*. (2002) reported lower body weights in Nicobari fowl at 4 weeks of age under backyard (53±1.41g) and intensive system (74±2.32g). The weekly average feed intake (g) were in line with those of Mahmood *et al*. (1984) who reported in Fayoumi birds. Indigenous chicken strains of Pakistan have lack of similarity with White Leghorn strain S (Nie *et al*., 2005), White Recessive Rock and two Chinese breeds Taihe Silkies and Xinghua (Ibrahim *et al*., 2006) in the structure of chicken growth hormone gene that showed different polymorphic pattern while restricted with *Eco*-R co, *Sac*I and *Hind*III. 50bp polymorphic fragment observed in Unigold Barred is a 50bp deletion already reported in Taihe Silkies breed of China (Nie Q. *et al*., 2005).

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Determination of Consumption Habits of Goat Milk and Products in Cukurova University Students

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Introduction

Every human has to feed to survive (Çalıştır et al., 2005). Nutrition is to take and use nutrient that will provide necessary energy and nutritional elements to live long periods of time in a growth, development, healthy and efficient way (Tanır et al., 2001). When any of these nutritional elements are not received or when received more or less than necessary, it has been scientifically demonstrated that growth and development are hindered and health is impaired (Baysal, 1993). Milk is the first food that enters their body after the birth of humans. Milk is an invaluable food that contains sufficient nutrients to meet the daily needs of humans except iron and vitamin C. In adequate and balanced nutrition of people; milk and milk products are important because they are rich in nutrients such as calcium, phosphorus, Protein, vitamins and minerals (Miller ve ark., 2000; Kırdar, 2001). Therefore, in order to ensure adequate and balanced food substance and energy intake, health professionals recommended to increase consumption of milk and milk products (Heaney ve ark., 1999). There are mainly four animal species raised for milk production in the world. The odors and tastes of milk and milk products of these four species are different differ from each other and caters to consumers that have different palatal delight (Akbay ve Boz, 2005). Most consumed milk and milk products in Turkey is obtained from cow's milk. In addition to cow's milk, goat milk is another type of milk whose production and consumption in the world increases with each passing day. Goat milk produced in Turkey is generally processed into cheese by mixing with sheep and/or cow milk or used directly in ice cream production. Goat rearing is becoming increasingly important due to low input costs, ease of care and feeding, and healthy of goat milk and products (Kılıç ve ark., 2002; Kesenkaş ve ark., 2010). In addition, goat milk generally contains less microorganisms and pesticides than other milk, fat and protein of goat milk can be more easily digested and and its composition is increasing its importance due to being closest milk to breast milk (Güney ve Kaymakçı 1997). Turkey is very suitable for goat breeding when considered its natural vegetation, soil structure, ecology and socioeconomic structure. Therefore, goat keeping should be encouraged in order to increase the role of goat milk and products in human nutrition and that consumers can access goat milk and products more easily. The present study was conducted to determine of consumption habits of goat milk and its products of students at the Çukurova University campus.

Materials and Methods

The study consisted of data obtained from face to face committed surveys with students who are studying at Çukurova University campus. Also in the study, was used books, articles and statistics published by various institutions and organizations studying on the topic as secondary data. In order to obtain the data used in the research, a survey was conducted with 140 students randomly selected from a total of 27,101 1th education students. All student were enrolled at Çukurova University during the 2018-2019 academic year. Applied survey to students was applied equal number in terms of the region factor and completely randomly selected for other factors. In the survey, 10 questions were asked on consumption habits of goat milk and its products based on the age of the students, their region, income level and place of residence. The results of the research were summarized in the tables and interpreted by giving frequency and percentage values. In addition, the statistical calculation of the data was calculated by the chi-square analysis method with the help of SPSS program.

Results and Conclision

The frequency and percentage values on demographics characteristics (gender, marital status, age, region, income level, place of residence) of the 140 students who made up the data of the current study were given in Table 1.

Table 1. Demographical characteristics of the surveyed students

Gender	**Frequency**	**%**
Woman	58	41.43
Man	82	58.57
Total	**140**	**100**
Marital Status	**Frequency**	**%**
Married	6	4.29
Single	134	95.71
Total	**140**	**100**
Place of Residence	**Frequency**	**%**
Dorm	73	52.14
Family	29	20.71
Your own house	15	10.71
Friend	23	16.43
Total	**140**	**100**
Region	**Frequency**	**%**
Mediterranean	20	14.29
Black Sea	20	14.29
Aegean	20	14.29
Marmara	20	14.29
Eastern Anatolia	20	14.29
Southeastern Anatolia	20	14.29
Central Anatolia	20	14.29
Total	**140**	**100**
Household Income	**Frequency**	**%**
0-1000 £	3	2.14
1001-2500 £	25	17.90
2501-3500 £	49	35.00
3501-4500 £	33	23.57
4501£ and Over	30	21.43
Total	**140**	**100**
Age Limits	**Frequency**	**%**
18-21 Age	53	37.86
22-24 Age	65	46.43
25 Age and Older	22	15.71
Total	**140**	**100**
Average Age of Respondents	**22.54**	
Average Number of Individuals in	**4.4**	

Milk consumption habits were evaluated considering age, income level, region and place of residence of the students whose demographic characteristics (Table 1). As shown in Table 1, 58.57% of the surveyed students were male and 41.43% were female. The average age of students was 22.54. Due to the fact that the survey was conducted in a university environment, the majority of the respondents constituted from students residing in dormitory, single and having family income (2501-3500 TL) slightly above the minimum wage. It is seen in Table 2 that 77.14% of the surveyed students did not have enough information about the benefits of goat milk and its products. As shown in table 2, it was found that the region, place of residence income level and age factors did not significantly affect the question measuring the level of knowledge about the benefits of goat milk and its products ($p>0.05$).

Table 2. Do you know about the benefits of goat milk and its products

Information Status	**Frequency**	**%**	**Chi-Square Analysis (P)**	
I don't have information	22	15,71		
I have some information	75	53,57	**Region**	0.524
I'm undecided	11	7,86	**Place of Residence**	0.942
I have information	27	19,29		
I have very information	5	3,57	**Income**	0.150
Total	**140**	**100**	**Age**	0.432

*: P<0,05, **: P<0,01, ***: P<0,001

As seen in Table 3, 57.86% of the surveyed students reported not consuming goat milk and its products. In this case, the low consumption rate of goat milk and its products can be explained by insufficient knowledge of surveyed students about

the benefits of these products. The consumption of goat milk and its products was found to be the least in the Black Sea region, although it was mostly in the Eastern Anatolia and Southeastern Anatolia regions. The main reason for this result is that most of the goat breeding in our country is carried out in the eastern and south-eastern Anatolian regions. Therefore, people living in these regions have a habit of consuming to obtained products from goat species in food consumption of animal origin.

Table 3. Do you consume goat milk and its products

Yes/No	**Frequency**	**%**
Yes (B, C, D, E, F)	59	42.14
No (A)	81	57.86
Total	**140**	**100**

Consumption of goat milk and products varied depending on many factors. Among these factors, taste, smell, habit, price and accessibility were the most important ones. According to given the answers by students who do not consume goat milk and its products, Table 3.1 showed that smell, accessibility and taste were among the leading reasons for not consuming of goat milk and its products. However, according to statistical calculations the region, place of residence, income level and age factors did not significantly affect the reasons for not consuming of goat milk and its products ($p>0.05$).

Table 3.1. What are the reasons why you do not consume goat milk and its products

Ranking Criteria	Importance Level										Total		Chi-Square Analysis (P)			
	Strongly Disagree		Disagree		Undecided		Agree		Strongly Agree		Frequency	%				
	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%			Region	Place of Residence	Income	Age
I don't like tasting	5	6.17	5	6.17	26	32.10	32	39.51	13	16.05	**81**	**100**	0.946	0.732	0.977	0.194
High price	9	11.11	13	16.05	19	23.46	31	38.27	9	11.11	**81**	**100**	0.999	0.235	0.259	0.179
Availability shortage	9	11.11	9	11.11	13	16.05	34	41.98	16	19.75	**81**	**100**	0.762	0.569	0.178	0.435
Not easy to drink	5	6.17	12	14.81	28	34.57	23	28.40	13	16.05	**81**	**100**	0.890	0.568	0.730	0.904
smell	4	4.94	4	4.94	26	32.10	25	30.86	22	27.16	**81**	**100**	0.224	0.722	0.739	0.145
I have no habit	3	3.70	1	1.23	7	8.64	24	29.63	46	8.64	**81**	**100**	0.451	0.164	0.436	0.439
Allergic causes	40	49.38	17	20.99	16	19.75	7	8.64	1	1.23	**81**	**100**	0.137	0.068	0.179	0.872

*: P<0,05, **: P<0,01, ***: P<0,001

According to surveyed students, consumption rate of goat milk and its products was determined as 42.14%. When taking into consideration given the answers by students who consume goat milk and its products, As seen table 3.2, more nutritious than other milks and its products, more natural nutrition than other animal species and nutrient content close to breast milk were among the leading reasons for consuming of goat milk and its products. According to the statistical analysis of the study, it was determined that the income level were important at the level of 5% on low lactose intolerance among the leading causes for consumption of goat milk and its products.

Table 3.2. What are the reasons why you do consume goat milk and its products

Ranking Criteria	Importance Level										Total		Chi-Square Analysis (P)			
	Very Unimportant		Unimportant		Undecided		İmportant		Very İmportant		Frequency	%				
	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%			Region	Place of Residence	Income	Age
I like the smell and taste	1	1.69	2	3.39	8	13.56	30	50.85	18	30.51	**59**	**100**	0.226	0.484	0.231	0.334
Ease of access	1	1.69	4	6.78	20	33.90	21	35.59	13	22.03	**59**	**100**	0.218	0.887	0.162	0.260
More nutritious than other milk and dairy products	0	0.00	1	1.69	1	1.69	32	54.24	25	42.37	**59**	**100**	0.744	0.625	0.099	0.690
More natural nutrition than other animal species	1	1.69	1	1.69	8	13.56	25	42.37	24	40.68	**59**	**100**	0.892	0.930	0.661	0.525
Consumption habit of goat milk and products	1	1.69	6	10.17	14	23.73	24	40.68	14	23.73	**59**	**100**	0.742	0.485	0.730	0.441
Nutrient content close to breast milk	0	0.00	2	3.39	5	8.47	24	40.68	28	47.46	**59**	**100**	0.203	0.547	0.727	0.616
Low lactose intolerance	2	3.39	2	3.39	13	22.03	26	44.07	16	27.12	**59**	**100**	0.312	0.898	**0.016***	0.748

*: P<0,05, **: P<0,01, ***: P<0,001

Goat milk contains high levels of small-diameter fat globules and low levels of as1-casein compared to other types of milk, and with these properties it is easier to digest and absorb. It helps to maintain gastrointestinal health with its high buffering capacity due to its high content of protein, non-protein nitrogen (carnitine) and phosphate content. Goat milk is the closest milk to breast milk in terms of nutrient content, so it is the most suitable milk to be given after breast milk in terms of healthy development of babies. In addition goat milk contains more calcium, potassium, vitamin A and vitamin

B6 than cow's milk. Therefore, goat milk and its products are of great importance for human health and their place in human nutrition should be increased as the frequency and amount of consumption. According to given the answers by students who consume goat milk and its products, goat milk ice cream and goat cheese consumption frequency were determined to be higher consumption than other products (Table 3.3). According to the statistical analysis of the study, it was determined that the income level were important at the level of 5% on goat yogurt consumption in terms of consumption frequency of goat milk and its products.

Table 3.3. How often do you consume goat milk and its products

Ranking Criteria	Importance Level										Total		Chi-Square Analysis (P)			
	Never		Rarely		Sometimes		Mostly		Always		Frequency	%	Region	Place of Residence	Income	Age
	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%						
Pasteurized goat milk	9	15.25	12	20.34	19	32.20	17	28.81	2	3.39	**59**	**100**	0.636	0.617	0.713	0.114
UHT goat milk	9	15.25	12	20.34	18	30.51	18	30.51	2	3.39	**59**	**100**	0.236	0.235	0.884	0.130
Goat cheese	3	5.08	6	10.17	18	30.51	23	38.98	9	15,3	**59**	**100**	0.765	0.426	0.128	0.444
Goat yogurt	9	15.25	7	11.86	13	22.03	22	37.29	8	13.56	**59**	**100**	0.223	0.302	**0.050***	0.195
Goat milk ice cream	4	6.78	6	10.17	15	25.42	23	38.98	11	18.64	**59**	**100**	0.650	0.819	0.097	0.092
Goat milk butter	8	13.56	9	15.25	16	27.12	18	20.51	8	13.56	**59**	**100**	0.205	0.553	0.105	0.091

*: P<0,05, **: P<0,01, ***: P<0,001

According to given the answers by students who consume goat milk and its products, Monthly consumption amount of goat milk was found to be highest with 38.98% of students among 501-1000gr. As benefits to human health of goat milk were revealed, it is observed that increased as consumption amount for every passing year of goat milk and its products. However, as indicated in Table 3.4, goats milk consumption amount is observed to be low. In addition, according to statistical calculations, the region, place of residence, income level and age factors did have not significant effect on goat milk consumption amount (p>0.05).

Table 3.4. How much do you consume goat milk monthly

Consumption Quantity	**Frequency**	**%**	**Chi-Square Analysis (P)**	
1-500 gr	14	23,73		
501-1000 gr	23	38,98	**Region**	0.700
1001-3000 gr	11	18,64	**Place of Residence**	0.959
3001-5000 gr	8	13,56		
5001 gr and above	3	5,08	**Income**	0.464
Total	**59**	**100**	**Age**	0.899

*: P<0,05, **: P<0,01, ***: P<0,001

In Turkey, it is processed to various products in order to increase the added value of obtained milk from goats and to extend shelf life. The most important of these products are cheese, yogurt and ice cream. According to given the answers by students who consume goat milk and its products, goat milk has been found to be the most preferred for the purpose of nutrition of children, cheese making and drinking milk (Table 3.5.). According to the statistical analysis of the study, it was determined that the region were important at the level of 5% on Ice cream making from goat milk consumption forms. In addition, the income level was found to be significant at 5% level on bakery products and cheese making.

Table 3.5. What are your goat milk consumption form

Ranking Criteria	Importance Level										Total		Chi-Square Analysis (P)			
	Never		Rarely		Sometimes		Mostly		Always		Frequency	%	Region	Place of Residence	Income	Age
	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%						
Drinking milk	3	5.08	3	5.08	6	10.17	33	55.93	14	23.73	**59**	**100**	0.257	0.789	0.882	0.683
Cheese making	2	3.39	4	6.78	5	8.47	31	52.54	17	28.81	**59**	**100**	0.082	0.471	**0.042***	0.230
Nutrition of children	2	3.39	1	1.69	4	6.78	26	44.07	26	44.07	**59**	**100**	0.791	0.633	0.333	0.598
Yogurt making	2	3.39	5	8.47	8	13.56	23	38.98	21	35.59	**59**	**100**	0.997	0.085	0.152	0.396
Ice cream making	5	8.47	6	10.17	9	15.25	14	23.73	25	42.37	**59**	**100**	**0.025***	0.648	0.159	0.504
Bakery products	9	15.25	8	13.56	17	28.81	15	25.42	10	16.95	**59**	**100**	0.644	0.090	**0.018***	0.316

*: P<0,05, **: P<0,01, ***: P<0,001

Where goat milk and its products were supplied and their accessibility may vary depending on many factors. Surveyed

the students stated that they preferred to buy goat milk and its products mostly from supermarkets, but did not use the internet much to buy these products. As shown in table 3.6, the place of residence was found important at the level of 5% on internet from supplied places of goat milk and its products. In addition, the income level was determined to be significant at 1% level on district market and internet.

Table 3.6. Where do you supply goat milk and its products

Ranking Criteria	Importance Level										Total		Chi-Square Analysis (P)			
	Never		Rarely		Sometimes		Mostly		Always		Frequency	%	Region	Place of Residence	Income	Age
	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%						
District market	35	59.32	12	20.34	9	15.25	3	5.08	0	0.00	**59**	**100**	0.540	0.158	**0.008****	0.669
Neighborhood grocery	27	45.76	14	23.73	9	15.25	7	11.86	2	3.39	**59**	**100**	0.606	0.971	0.812	0.699
Supermarket	11	18.64	9	15.25	13	22.03	23	38.98	3	5.08	**59**	**100**	0.210	0.425	0.695	0.717
Dairy	12	20.34	6	10.17	19	32.20	15	25.42	7	11.86	**59**	**100**	0.751	0.666	0.075	0.671
Delicatessen	10	16.95	9	15.25	14	23.73	21	35.59	5	8.47	**59**	**100**	0.319	0.879	0.727	0.521
Internet	39	66.10	6	10.17	11	18.64	3	5.08	0	0.00	**59**	**100**	0.241	**0.032***	**0.003****	0.567

*: P<0,05, **: P<0,01, ***: P<0,001

Many criteria positively or negatively affected consumption of goat milk and its products. Some of these criteria, which were effective on milk consumption, were asked to the students who participated in the survey. According to the answers of surveyed students, smell and taste, health and nutritional value were the most important within criteria affecting consumption of goat milk and products (Table 4). According to the statistical analysis of the study, it was determined that the region, place of residence, income level and age factors did have not significant effect on the factors affecting the consumption of goat milk and its products.

Table 4. What are the factors affecting the consumption of goat milk and its products

Ranking Criteria	Importance Level										Total		Chi-Square Analysis (P)			
	Very Unimportant		Unimportant		Undecided		İmportant		Very İmportant		Frequency	%	Region	Place of Residence	Income	Age
	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%						
Price	7	5.00	20	14.29	15	10.71	67	47.86	31	22.14	**140**	**100**	0.571	0.306	0.559	0.314
Taste / Flavor	2	1.43	2	1.43	9	6.43	75	53.57	52	37.14	**140**	**100**	0.615	0.601	0.250	0.177
Health	2	1.43	1	0.71	11	7.86	72	51.43	54	38.57	**140**	**100**	0.791	0.208	0.788	0.751
Habit	4	2.86	14	10.00	27	19.29	57	40.71	38	27.14	**140**	**100**	0.635	0.793	0.557	0.497
Lifestyle	4	2.86	21	15.00	41	29.29	44	31.43	30	21.43	**140**	**100**	0.715	0.377	0.148	0.889
Nutritive value	2	1.43	7	5.00	11	7.86	66	47.14	54	38.57	**140**	**100**	0.314	0.265	0.119	0.819
Fat rate	8	5.71	9	6.43	26	18.57	68	48.57	29	20.71	**140**	**100**	0.105	0.454	0.065	0.413
Easy digestion	2	1.43	9	6.43	29	20.71	61	43.57	39	27.86	**140**	**100**	0.179	0.331	0.214	0.574
Low allergic effects	9	6.43	10	7.14	30	21.43	53	37.86	38	27.14	**140**	**100**	0.615	0.198	0.193	0.348

*: P<0,05, **: P<0,01, ***: P<0,001

There were effective many factors in the purchase of goat milk and its products. Some of these criteria, which were effective on the purchase of goat milk and its products, were asked to the students who participated in the survey. According to the answers of surveyed students, expiry date, accessibility and smell were determined as the most important among criteria affecting the purchase of goat milk and its products. As shown in table 5, the region was found important at the level of 5% on all other factors except price and colour among effective factors in the purchase of goat milk and its products. In addition, the income level was determined to be significant at 5% level on brand.

Table 5. What are the effective factors in buying of goat milk and its products

Ranking Criteria	Importance Level										Total		Chi-Square Analysis (P)			
	Very Unimportant		Unimportant		Undecided		İmportant		Very İmportant		Frequency	%	Region	Place of Residence	Income	Age
	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%						
Price	10	7.14	12	8.57	18	12.86	72	51.43	28	20.00	**140**	**100**	0.744	0.981	0.759	0.135
Smell	4	2.86	10	7.14	15	10.71	67	47.86	44	31.43	**140**	**100**	**0.043***	0.292	0.194	0.212
Color	4	2.86	14	10.00	27	19.29	61	43.57	34	24.29	**140**	**100**	0.237	0.090	0.168	0.167
Shelf life	2	1.43	11	7.86	22	15.71	56	40.00	49	35.00	**140**	**100**	**0.033***	0.604	0.726	0.418
Brand	4	2.86	13	9.29	28	20.00	65	46.43	30	21.43	**140**	**100**	**0.032***	0.095	**0.048***	0.887
Advertising	10	7.14	25	17.86	39	27.86	49	35.00	17	12.14	**140**	**100**	**0.008***	0.171	0.154	0.081
Packaging type	6	4.29	10	7.14	27	19.29	68	48.57	29	20.71	**140**	**100**	**0.006***	0.896	0.068	0.241
Expiry date	2	1.43	6	4.29	10	7.14	45	32.14	77	55.00	**140**	**100**	**0.005***	0.770	0.147	0.239
Processing Type	5	3.57	7	5.00	24	17.14	56	40.00	48	34.29	**140**	**100**	**0.049***	0.338	0.090	0.820
Accessibility	3	2.14	4	2.86	15	10.71	63	45.00	55	39.29	**140**	**100**	**0.018***	0.262	0.451	0.544

*: P<0,05, **: P<0,01, ***: P<0,001

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Effects of some environmental factors on somatic cell count and milk chemical composition in cow bulk tank milk

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Introduction

Milk is a unique biological fluid with high nutritional value. The quality of dairy products largely depends on the composition of raw milk. Therefore, the factors responsible for the variations in the composition and physico-chemical properties of raw milk are of paramount importance for milk processors (Ivanov *et al*., 2017). The recording of milk composition is essential for the dairy industry and the management of dairy farms (Najafi *et al*., 2009). Composition refers to the milk´s content of major nutrients suh as fat, protein, lactose and total solids and somatic cell count (SCC) which is an indicator of udder health status (Guo *et al*., 2010) and milk quality (Sert *et al*., 2016).

Milk composition is affected by breed, age, number of lactations, the phase of lactation and other environmental factors. Therefore, all factors should be considered when we search the reasons for changes in milk composition. The season and feeding, among the environmental factors, have a considerable influence on basic milk components. The effects of the season have been differently evaluated by many authors because geographic and climate conditions that cannot be influenced should be considered (Rajčevič *et al*., 2003). Temperatures between 5–25°C are so cold comfort zone for the animals and have no effect on the milk production (Ivanov *et al*., 2017).

Accurate estimates of changes in milk composition due to increase in SCC can be an incentive for breeders to consider the effects of such disorders in selection index by allocating appropriate economic weights. At this context, controlling mammary infections in dairy cows may be seen to be essential to achieve quality milk. In Turkey, the effect of different factors affecting the composition and quality of bulk tank milk have not been detailed investigated. Therefore, the aim of this study was to determine the influence of some environmental factors on SCC and the composition of bulk tank cow's milk.

Materials and Methods

The milk samples were collected four times with three-month intervals during morning milking between January and October 2016 from Brown Swiss cows raised at family dairy farms in stuated central of Kırşehir province.

The dairy cows in studied area were mainly fed roughages-dry straw and silage and drank ground water. All animals received the total mixed ration (TMR) and the herds were milked twice a day. In this study, cows were housed in tie stall. Additionally, farms had a mobile milking machine. In farms, cows had access to pasture during summer.

Daily raw bulk milk was measured with electronic flow milk meters. The samples were collected in sterile bottles of 50 mL without preservative and kept in +4ºC until transported to the laboratory, then analyzed within 5–6 h of collection. The SCC was performed with the portable DeLaval Cell Counter DCC (DeLaval, Tumba, Sweden). The bulk milk components (fat, solids non-fat (SNF), density, protein, lactose, ash, density, freezing point, and conductivity) were determined by using the Lactostar auto milk analyzer (Funke-Gerber, Labortechnik, Article No 3510, Berlin, Germany). A total of 428 raw milk samples were analyzed. The actual SCC was transformed by using a log10 transformation to ensure homogeneity and normality of the variance.

The fixed effects of the model were samlpling season, farm scale and SCC level. Sampling procedure was repeated four times in same condition at four sesons. Four sampling season subgroups were formed according to test date: 1=Autumn (October); 2= Winter (January); 3= Spring (April); 4= Summer (July). The dairy farm scale on SCC and milk components in experimental days were investigated by categorizing daily total bulk tank milk production into three groups; small: <20 kg/d; medium: 20-40 kg/d and large: >40 kg/d. Milk samples were assessed into three groups according to their average SCC values: low (<200x103 cells/ml), medium (200-500x103 cells/ml) and high SCC (>500x103 cells/ml).

Data were analyzed by using SPSS 17 packet program. Differences among the subgroups were performed using Duncan's Multiple Range Test.

Results

In this study, logSCC was the highest in summer and the lowest in winter (Table 1).

In the present study, fat content of bulk tank milk was significantly higher in autumn and the lowest in spring and summer, as might be expected from the present findings. Significantly higher protein content was observed in spring and winter compared with autumn and summer ($P<0.05$).

Duncan's multiple comparisons of farm scales (Table 1) indicated that logSCC in the bulk tank milk obtained from in large-scale farms was lower than in small-scale farms.

In present study, fat content was determined to be higher in small-scale farms than medium and large-scale farms ($P<0.01$). pH was the lowest in large-scale farms. No statistically significant difference was found in SNF, protein and lactose contents in the bulk tank milk obtained from different scale farms.

In the current study, both SNF and lactose were the highest in spring, but the lowest in summer. pH was significantly different between the sesons ($P<0.001$). The highest pH was determined in winter, and the lowest pH was in spring.

Table 1. Effects of samling season and farm scale on somatic cell count and milk composition

Season	n	LogSCC	Fat	SNF	Protein	Lactose	Ph
Winter	108	5.38^{c}	3.67^{ab}	8.96^{ab}	3.29^{a}	4.87^{ab}	6.76^{a}
Spring	123	5.50^{b}	3.61^{b}	8.99^{a}	3.31^{a}	4.90^{a}	6.33^{c}
Summer	90	5.77^{a}	3.63^{b}	8.77^{c}	3.22^{b}	4.77^{c}	6.73^{ab}
Autumn	107	5.50^{b}	3.83^{a}	8.85^{bc}	3.24^{b}	4.81^{bc}	6.71^{b}
Farm scale							
Small	139	5.45^{b}	3.84^{a}	8.89	3.26	4.83	6.66^{a}
Medium	166	5.52^{b}	3.66^{b}	8.91	3.27	4.84	6.67^{a}
Large	123	5.63^{a}	3.53^{b}	8.91	3.27	4.85	6.54^{b}

$^{a-c}$ Differences between different superscript in the same column is significant.
LogSCC: logarithmic somatic cell count, SNF: solids-not-fat
Small: <20 kg/d; Medium: 20-40 kg/d and Large: >40 kg/d

SCC had a significant effect on milk fat content (P<0.05). Fat content decreased with increasing, and the lowest fat content was observed in bulk tank milk with SCC>500x10^{3}. However, there was no significant difference among pH, SNF, protein and lactose content with different SCC (Table 2). When the SCC increased, it was seen that fat content decreased (P<0.05), whereas pH, SNF, protein and lactose milk protein, milk fat and total solids decreased, though this differences were not significant.

Table 2. Effects of SCC levels on milk composition

SCC levels	n	Fat	SNF	Protein	Lactose	Ph
Low	131	3.66^{ab}	8.91	3.27	4.85	6.61
Medium	151	3.78^{a}	8.92	3.27	4.84	6.65
High	146	3.60^{b}	8.88	3.26	4.83	6.63

$^{a-b}$ Differences between different superscript in the same column is significant; SCC: somatic cell count; SNF: solids-not-fat; low: SCC<200x10^{3} cells/ml, medium: SCC=200-500x10^{3} cells/ml, high: SCC>500x10^{3} cells/ml.

Conclusion

The results showed that the season had a significant effects on SCC and bulk tank milk composition. The present study has strongly indicated that logSCC was higher in summer, fat content was higher in autumn, pH was higher in winter, and SNF, protein and lactose content showed the highest in spring. The highest logSCC was determined in the bulk tank milk obtained from small-scale farms, while the lowest fat content and pH values were found in large-scale farms. High SCC was negatively affected only milk fat content. The lowest fat content was determined in bulk tank milk with SCC higher than 500x10^{3} cells/ml. It was concluded that season is primarily responsible among the evaluated environmental factors to increase bulk tank milk quality.

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Effect of Plumage Color Mutation on Growth in Japanese Quail

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Introduction

Japanese quail are used both in commercial production and as a model animal due to their important advantages. In the studies about Japanese quail, the subjects of rearing and flock management, feeding and genetics are emphasized. The Japanese quail used in these studies are generally described as "wild type". Besides, there are many plumage color mutations in the Japanese quails. There are studies indicating that the high egg yield in white genotype, and high body weight on the Golden and Italian genotypes. The growth performance and other economically traits of color mutations reported in quail are very limited. The aim of this study is to analyze the growth data of the quail plumage color mutants (Golden, Italian, Black, White and Wild) with the Gompertz growth function.

Materials and methods

This study was performed in the Poultry Research Unit of Namık Kemal University, Turkey. Japanese quail (*Coturnix coturnix japonica*) were used as animal material. A total of 100 birds from plumage color mutants (Golden, Italian, Wild, White, Black) with mixed sexes were used in the study. All chicks were wing banded and then weighted weekly hatching to six weeks of age. Chicks were housed in heated brooding cages (82.56 cm^2/quail) for first three weeks. Then, they were transferred to grower cages (150 cm^2/quail). The diet was supplied containing 24% CP and 2900 kcal of ME/kg and ad libitum feeding and a 23 h lighting program were applied from hatch to the end of the experiment (Narinç et al. 2016). In determination of the difference between genotypes in terms of body weight measurements at a time point, profile analysis method was utilized (Alkan et al. 2012; Narinç et al. 2010). The Gompertz growth function was used to compare the growth samples of genotypes which is known the best fitted model (Aggrey 2002; Korkmaz & Üçkardeş 2013; Üçkardeş et al. 2013). Expression, growth rate and inflection point coordinates of Gompertz function is presented in Table 1. β_0 parameter is the asymptotic (mature) weight, β_1 is a shape paremeter, β_2 is growth rate parameter. Model parameters were analyzed using with SAS 9.3 software NLIN procedure Levenberg-Marquardt iteration method (Karaman et al. 2013).

Table 1. Gompertz model expression and coordinates of inflection point

Model	Gompertz
Y_T	$\beta_0 e^{-\beta_1 e^{-\beta_2 t}}$
IP_T	$ln(\beta_1)/\beta_2$
IP_W	β_0/e

Results

The results of variance analyses and mean values of weekly body weights of genotypes are presented in Table 2. As can be seen from Table 2, the highest live weight on day 42 is in quail with the golden color mutation ($P<0.05$). There was no statistical difference between the live weight values of other genotypes.

Table 2. The mean values of weekly body weights by genotypes

Genotype	Hatch Weight	BW 7	BW 14	BW 21	BW 28	BW35	BW 42
Golden	8.24	24.60	57.39^{a}	94.06^{a}	135.58^{a}	171.42^{a}	197.64^{a}
Italian	7.84	23.17	53.41^{ab}	87.97^{ab}	123.69^{b}	160.30^{ab}	177.31^{b}
Wild	7.86	22.89	49.33^{b}	76.61^{c}	117.36^{b}	155.23^{b}	175.25^{b}
White	7.73	22.81	50.73^{b}	82.17^{bc}	119.24^{b}	147.70^{b}	163.33^{b}
Black	8.06	23.20	51.22^{b}	83.02^{bc}	121.52^{b}	152.72^{b}	171.90^{b}
SEM	0.08	0.43	0.85	1.36	1.77	1.94	2.16
P Value	0.278	0.659	0.034	0.002	0.013	0.002	0.000

The results of the profile analysis carried out to determine the effects of the plumage color mutation are presented in Table 3. According to the MANOVA test statistic (Wilks' Lambda) in the corresponding chart, genotype profiles do not show parallelism ($P<0.05$). As a result of the analyzes carried out, it was determined that the difference in body weight between plumage color mutation groups first appeared between the 14-21st days and continued to exist until the end of the trial.

Non-linear regression parameters of Gompertz function were presented in Table 4. The actual and estimated growth

curves of plumage color mutant genotypes are shown in Figure 1.

Table 3. Profile analysis results for quail with different plumage color

Time (day)	P value
1-7	0.2780
7-14	0.6592
14-21	0.0343
21-28	0.0023
28-35	0.0132
35-42	0.0020
Wilks' Lambda	0.0052

Table 4. The parameter estimations of Gompertz growth curve model and the coordinates of inflection point

Genotype	β_0	β_1	β_2	IP_t	IP_w
Golden	279.53^{a}	3.77	0.06	22.22	102.83^{a}
Italian	237.51^{bc}	3.68	0.06	20.68	87.38^{bc}
Wild	264.54^{ab}	3.73	0.06	24.00	97.32^{ab}
White	220.67^{c}	3.69	0.07	20.46	81.18^{c}
Black	243.14^{abc}	3.69	0.06	22.07	89.45^{abc}
SEM	6.03	0.03	0.00	0.54	2.22
P Value	0.021	0.879	0.272	0.285	0.021

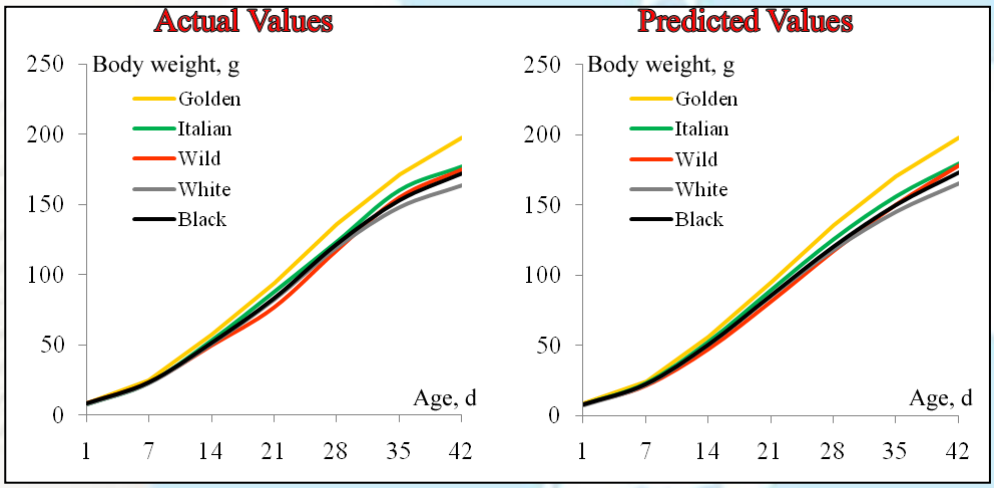

Figure 1. The actual weekly body weight graph and Gompertz growth curves

Conclusion

In studies on live weight in Japanese quail with different plumage color, very different results have been obtained. Minvielle et al. (1999), Genchev et al. (2008), Oguz and Minvielle (2001), and Marks (1990) reported that the difference in quail plumage color had a significant effect on live weight and the wild-type quail had a higher body weight. Tarhyel et al. (2012) determined that the white-colored group had a lower body weight while Nasr et al. (2017) notified that the white-colored group had a higher body weight. In our study, the quail with Golden feather color has a higher live weight. In terms of parameter β_0, the Golden genotype has a higher mean than others. The most of the studies in which the growth of Japanese quail was examined by Gompertz model, estimates of the mature weight parameter (β_0) were found from 204 to 281 g (Akbaş & Oğuz 1998; Kızılkaya et al. 2005; Narinç et al. 2009; Alkan et al. 2009; Narinç et al. 2010b). Our results are in agreement with the results of these studies.

In Gompertz model, β_1 and β_2 are constants related to the shape of the growth curves were in the range of 3.69 to 3.77, and 0.06 to 0.07, respectively. In current study, age and weight at point of inflection of Gompertz model were determined to be from 20.46 to 24.00 day and 81.18 to 102.83 g for different plumage color grups. Similar results reported by Alkan et al. (2009) who estimated ages and weights at point of inflection using Gompertz model for selected and control lines. They reported that the mentioned parameters in selection line were found 113 g for female, and 108 g for male. Also, 82.3 g for female quail, and 75 g for male were found for control line. However, Kızılkaya et al. (2005) reported that

ages and weights at point of inflections of Gompertz model were found between 16.19 and 17.05 day, and from 81.57 to 82.96 g respectively. As shown here, growth curve parameters of quail can be affected from both the selection and environmental conditions. As a result, it was determined that Japanese quails with different feather colors differed in terms of their growth characteristics.

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Fatty Acids Total and Index Value Changes of Different Poultry Species

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Abstract
This study aimed to determine the fatty acids total and index values of partridge, pheasant and guinea fowl. Contrary to usual animal protein consumption, there is an increase in the consumption of alternative poultry species such as quail, pheasant, partridge, guinea fowl and ostrich. Production of these species increased in the last decades. Pheasant, partridge and Guinea fowl are also the game birds that are intensively breeding by people. However, there is a lack in studies about the meat quality of these species. Total and index fatty acid values of skinless breast and thigh meat of birds reared in intensive and free-range systems and slaughtered at 16 weeks were investigated in the study. The study was organized in randomized block design (3 species, 2 production systems, 2 body parts, 2 replicates). Data of species, production systems and body parts were analyzed according to variance analyze. Duncan multiple comparison test was used for determining the mean values of species. SFA and n-3 were found lower in partridges, whereas, PUFA and n-6 was lower in pheasants. Similarly, MUFA, n-9, MUFA/SFA and nutritive value were found lower in guinea fowl meat. Fatty acid total and index values were significantly differed between body parts, but production system did not significantly affect these values.
Keywords: Pheasant, partridge, guinea fowl, carcass traits, production systems

Introduction

Recent years have seen growing interest in highly nutritious safe food products, which include game bird meat. Consumers prefer wild animals' meat for dietary reasons because they feed on native vegetation (Nuernberg et al., 2011). Game birds raised commercially around the world for meat production include quail, partridge, and pheasant (Hayes, 2008). On the other hand, Guinea fowl production for meat is a potentially advantageous enterprise in many parts of the world (Nahashon et al., 2005; Tufarelli et al., 2007). Guinea fowl meat, as alternative meat to chicken, has already proven to be a profitable activity in United States, Canada and in European markets such as France and Italy (Tufarelli et al., 2007; Laudadio et al., 2012). The meat of partridge, especially breast muscles, are characterized by high protein content and low-fat content (Hašcik et al. 2008, Suchý et al. 2009, Sedlanic et al. 2007). Partridge meat is considered healthy. In partridges, the energy content of breast muscles is lower than in quail, like that in pheasants, and higher than in guinea fowl (Vitula et al. 2011). Partridges are characterized by a high dressing percentage.
There is currently a lack of studies investigating the growth traits of pheasants reared in both completely confined and in semi-intensive conditions. Therefore, this study aims to investigate the growth and carcass traits of common pheasants (Phasianus colchicus) in free-range and intensive conditions at different slaughter ages.

Material and methods

The experiment was conducted between May and August 2015 at the Ondokuz Mayis University Agricultural Faculty's Research Farm, Turkey. All eggs were collected and transferred to the farm's hatchery on the same day. Following the incubation period, 200-day-old chicks were randomly selected for use in the experiment. Chicks were randomly allocated to pens belonging to either an intensive or free-range production system that interspersed within windowed houses. Each pen contained 1 round feeder and 1 round drinker. The intensive pen also contained an 8 cm layer of wood shavings used as litter. Heating was provided by infrared heaters, and economic white bulbs were used for lighting. A 24 h/daylight regime was applied during the first 3 days. The light was incrementally decreased to 20 h/day over days 3 to 14 and then remained constant until 6 weeks, after which natural lighting (approximately 14 h/day) was applied until slaughter. After 6 weeks of age, birds in the free-range system were provided 24-hour access to outdoor. All birds were fed ad libitum using the same commercial layer chicken diet based on corn and soybean meal until 12 weeks of age, and with layer chicken developer diet from 12 weeks until the end of the experiment. Water was also provided ad libitum.
Carcass traits were evaluated by randomly selecting and slaughtering four (two male and two female) every bird species per replication at 14, 16, and 18 weeks. Carcasses were weighed after these operations and the ratio to body weight was used as hot dressing percentage. Carcasses were weighed again after stored 24 hours at 4 ºC and the ratio to body weight was used as cold dressing percentage. Abdominal fat was measured by weighing the fat surrounding abdominal muscles, cloaca, and inner organs after carcasses were chilled. Carcasses were cut into parts according to standard methods, and leg (thigh and drumstick), breast, wing, back, neck, and total edible inner organ (heart, liver and gizzard) weights were recorded as percentages of cold-carcass weights (Sarica et al., 2011).
Statistical analysis was performed using SPSS software (Version 16). Analysis of variance with a factorial arrangement (production system and age) was used to test the effects of production system, age and interaction for the feed consumption, feed conversion ratios and body weight measurement (for first 6 weeks). Production system, age and gender interactions were used for all slaughter and carcass traits and body weight after 8 weeks of age. Data was subjected to

arc-sine transformation. Duncan's multiple range test was used to compare means. A level of P<0.05 was considered statistically significant.

Results and discussion

In the intensive system generally were found better for pheasant carcass part weights and ratios, when intensive and free-range systems compare with each other. Especially back, wing and neck ratios were higher in intensive systems.

Previous studies have highlighted that in most poultry species including turkey (Kaiser et al., 2012), partridge (Yamak et al., 2016), guinea fowl (Yamak et al., 2018), intensive birds exhibit higher body weights than free-range birds. In this regard, pheasants are different from these poultry species because they were not domesticated for commercial production. In guinea fowl, Production system had a significant effect on breast weights and ratios, both of which were higher for guinea fowl reared indoors ($P < 0.05$). Weights of all carcass parts increased significantly with age ($P < 0.05$) but increases in ratios were significant only for breast and back.

In free-range conditions, birds had more space for physical conditioning, social interaction, and had were exposed to natural weather conditions. Therefore, improved living conditions for free-range birds could have resulted in higher body weights. Previously reported body weight values for pheasant are in line with our findings.

Table 1. Guinea fowl, pheasant, partridge, total fatty acid and index values.

Species	PS	BP	SFA	MUFA	PUFA	TUFA	n-3	n-6	n-9
Partridge	FR	Breast	54,30	24,62	21,08	45,70	0,73	19,87	20,85
	FR	Thigh	35,70	33,95	30,35	64,30	1,04	28,97	30,74
	I	Breast	45,58	30,55	23,87	54,41	0,61	22,89	27,44
	I	Thigh	35,36	33,98	30,65	64,64	0,70	29,73	30,80
Total			42,74^{a}	30,77^{ab}	26,49^{b}	57,26^{b}	0,77^{a}	25,36^{c}	27,46^{b}
Pheasant	FR	Breast	56,66	27,41	15,92	43,33	0,83	14,08	22,72
	FR	Thigh	41,84	35,68	22,48	58,16	1,32	20,31	31,06
	I	Breast	51,83	32,35	15,81	48,16	0,76	14,11	27,31
	I	Thigh	43,03	36,09	20,88	56,97	1,32	19,15	32,36
Total			48,34^{b}	32,88^{b}	18,77^{a}	51,66^{a}	1,06^{b}	16,91^{a}	28,36^{b}
Guinea fowl	FR	Breast	56,59	25,43	17,97	43,40	0,68	16,13	19,75
	FR	Thigh	42,17	31,15	26,67	57,82	0,96	24,84	28,30
	I	Breast	48,32	30,52	21,16	51,68	0,54	18,73	19,85
	I	Thigh	45,38	24,84	29,77	54,62	1,40	27,19	22,91
Total			48,12^{b}	27,99^{a}	23,89^{b}	51,88^{a}	0,90^{b}	21,72^{b}	22,70^{a}
SEM			*1.4967*	*0.8459*	*1.0312*	*1.4967*	*0.0536*	*1.0576*	*0.8805*
					Effects				
Species			*	*	**	*	*	**	*
Production System			NS	NS	NS	NS	NS	NS	NS
Body part			**	*	**	**	**	**	**
S x PS			NS	NS	NS	NS	*	NS	*
S x BP			NS	NS	NS	NS	*	NS	NS
PS x BP			*	*	NS	*		NS	*
S x PS x BP			NS	NS	NS	NS	*	NS	NS

PS: Production system, FR:Free-range, I: Intensive, SEM :Standard error of means, S:Species, BP: Body part, NS: Insignificant, *P<0.05, **P<0.01

Table 2. Fatty acid index values of partridge, pheasant and guinea fowl.

Species	PS	BP	M/S	P/S	T/S	NV	AI	TI	h/H	DFA
Partridge	FR	Breast	0,46	0,39	0,85	1,39	0,74	2,11	1,37	66,01
	FR	Thigh	0,95	0,86	1,81	1,84	0,39	1,01	2,57	76,44
	I	Breast	0,69	0,54	1,23	1,61	0,56	1,58	1,83	71,01
	I	Thigh	0,98	0,88	1,86	1,83	0,39	1,02	2,61	76,05
Total			$0,77^{b}$	$0,67^{b}$	$1,44^{b}$	$1,67^{b}$	0,52	1,43	$2,09^{b}$	72,38
Pheasant	FR	Breast	0,49	0,29	0,78	1,52	0,80	2,41	1,17	67,39
	FR	Thigh	0,85	0,54	1,39	1,80	0,47	1,27	1,96	74,09
	I	Breast	0,62	0,30	0,93	1,54	0,69	1,98	1,31	68,51
	I	Thigh	0,84	0,49	1,33	1,85	0,49	1,33	1,94	73,74
Total			$0,70^{ab}$	$0,40^{a}$	$1,11^{a}$	$1,68^{b}$	0,61	1,75	$1,59^{a}$	70,93
Guinea fowl	FR	Breast	0,45	0,32	0,77	1,30	0,80	2,42	1,05	66,67
	FR	Thigh	0,74	0,64	1,38	1,67	0,49	1,33	2,02	73,37
	I	Breast	0,66	0,45	1,11	1,29	0,66	1,85	1,29	69,66
	I	Thigh	0,55	0,66	1,20	1,48	0,52	1,44	1,82	72,50
Total			$0,60^{a}$	$0,52^{a}$	$1,11^{a}$	$1,44^{a}$	0,62	1,76	$1,55^{a}$	70,55
SEM			*0.0391*	*0.0411*	*0.0759*	*0.0425*	*0.0309*	*0.1012*	*0.1066*	*0.7493*
					Effects					
Species			*	**	*	*	NS	NS	*	NS
Production System			NS	NS	NS	NS	NS	NS	NS	NS
Body parts			**	**	**	**	*	**	**	**
S x PS			NS	NS	NS	NS	NS	NS	NS	NS
S x BP			*	NS	NS	NS	NS	*	NS	NS
PS x BP			*	NS	NS	NS	NS	NS	NS	NS
S x PS x BP			NS	NS	NS	NS	NS	NS	NS	NS

PS: Production system, FR:Free-range, I: Intensive, SEM :Standard error of means, S:Species, BP: Body part, NS: Insignificant, *P<0.05, **P<0.01

Conclusion

As a result, it was determined that partridge had significantly lower saturated fatty acids in thigh and breast meat than pheasant and guinea fowl. But conversely, unsaturated fatty acid was significantly higher.

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Effects of Carbohydrate Source Supplementation On Sunflower Silage Quality In Different Varieties

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Introduction

Sunflower is one of the most important oil seed plants in the world and in our country. World sunflower production in recent years has been around 23 million tons, Turkey is among the top ten countries in the production and acreage. Oilseed sunflower production in our country is generally concentrated in the Marmara Region, while confectionery production is mostly cultivated in the Central and Eastern Anatolia regions and in other regions (Anonim, 2015). Grains, molasses, whey, sugar, beet, turnip, potato and various cereal flours are frequently used as a carbohydrate source for silage making process, especially for poorly digestible carbohydrate sources. In this way, fermentation events in the silage are regulated and better quality silage can be obtained.

Materials and methods

The plant material sunflower (Helianthus annuus L.) were harvested with a silage machine and chopped 1.5-3 cm. Fresh silage material ensiled with vacuum polyethylene bags with 6 repetitions in one kg vacuum bags and stored at 20-26 °C room temperature for 90 days. Treatment groups; 1) control (no supplementation), 2) %2.5 grinded barley supplementation, 3) %5 grinded barley supplementation 4) %2.5 molasses supplementation and 5) %5 molasses supplementation. After 90 days of fermentation; the pH analyzes in silage samples were made according to Akyıldız (1984). Dry matter (DM), crude protein (CP), organic matter (OM) analyses were done according to AOAC (1989). Neutral detergent fiber (NDF), acid detergent fiber (ADF) and acid detergent lignin (ADL) analyses were made according to Van Soest et al. (1991). Fleig score (FP) = 220 + (2 × DM% - 15) - 40 × pH.

The data were analyzed by using GLM procedure and Duncan test was applied to determine the differences between the means. The significance level was P <0.05. Means and standard error of means (SEM) are given in the tables.

Results

In the study, the effect of carbohydrate source supplementation to sunflower silage on CP and NDF contents was insignificant (P> 0.05). However, DM content of silages increased with the supplementation of barley as a carbohydrate source (P <0.05). The dry matter content was higher in the confectionery variety (P <0.01). In addition, the variety and treatment interaction was significant in the dry matter content of the silages (P <0.5). While the effect of treatment groups on pH was insignificant (P> 0.05), pH was higher in confectionery variety and interaction was insignificant (P <0.05). ADF and ADL contents were higher in confectionery sunflower varieties (P <0.05). There was no difference between the varieties in terms of organic matter (P> 0.05). Fleig score was higher in the oilseed variety (P <0.05). While ADF contents of silages decreased with barley and molasses supplementation, OM contents increased with barley and molasses supplementation (P <0.05). The effect of the additives was insignificant for ADL and FP (P> 0.05).

Table 1. Effects of carbohydrate source supplementation on sunflower silage quality in different varieties

Treatment groups	Sunflower seed groups	DM, %	pH	CP, %DM	ADF, %DM	NDF, % DM	ADL, % DM	OM, % DM	FP
Control	Oilseed	29.6	3.7	7.8	29.9	36.7	5.7	87.2	114.5
	Confectionery	27.9	3.6	6.8	33.7	39.8	8.1	87.3	118.8
	SEM	1.2	0.5	0.5	2.2	2.5	1.4	1.0	18.8
Barley, 2.5%	Oilseed	29.0	3.2	7.2	28.6	35.8	6.6	87.7	136.9
	Confectionery	31.3	3.3	7.4	30.8	37.8	6.4	88.4	135.0
	SEM	1.3	0.3	0.5	2.2	1.6	0.5	0.5	10.2
Barley, 5%	Oilseed	31.1	3.3	7.3	25.9	35.4	6.1	88.2	134.5
	Confectionery	33.4	3.9	7.7	30.1	34.9	6.6	88.3	114.8
	SEM	1.8	0.5	0.9	2.6	2.0	0.7	0.4	17.5
Molasses, 2.5%	Oilseed	27.4	3.2	6.8	29.5	36.1	6.5	88.0	132.1
	Confectionery	29.2	3.9	7.8	28.7	35.7	6.5	86.7	107.8
	SEM	1.0	0.4	0.7	1.6	1.0	0.3	1.3	15.3
Molasses, 5%	Oilseed	28.6	3.0	7.0	28.7	34.7	6.1	86.4	141.4
	Confectionery	29.7	3.8	7.4	29.9	35.9	6.9	87.0	112.8
	SEM	1.2	0.4	0.4	2.1	2.2	0.6	0.4	16.3
Total	Oilseed	29.1	3.3	7.2	28.5	35.7	6.2	87.5	131.9
	Confectionery	30.3	3.7	7.4	30.6	36.8	6.9	87.5	117.9
	SEM	1.9	0.4	0.6	2.4	2.1	0.8	0.9	16.2
	P, seed group	0.004	0.004	0.297	0.003	0.133	0.003	0.843	0,010
P, treatment group		0.000	0.233	0.935	0.017	0.057	0.561	0.021	0.162
P, seed*treatment		0.009	0.109	0.082	0.128	0.419	0.006	0.269	0.184

SEM, standart error of means; P, level of significance

Conclusion

In this study, it was determined that the variety had important effects in terms of parameters examined in sunflower silage and that silage production should be considered. In addition, it was determined that the supplementation of barley and molasses, which are among the most easily accessible sources in terms of feed materials, which are described as difficult to silo, such as sunflower, increases the quality. When it is evaluated according to fleig point which is a widely used parameter in determination of silage quality, it can be suggested that oilseed variety is more suitable for silage. In addition, it was shown that barley and molasses supplemented to sunflower silage at 2.5 and 5% level could be used to increase fleig point.

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Assessment of Retinal Recognition Technology as A Biometric Identification Method in Norduz Sheep

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Introduction

Biometric methods provide fast and secure solutions that meet the demands of a reliable animal identification system to ensure traceability from farm to fork. Retinal imaging is a biometric identification method that utilizes patterns of retinal blood vessels that have existed since the birth of the animal and do not change throughout life (Marchant, 2002). The retinal vascular pattern is unique in twins, clones and even between eyes of the same animal (Caja ve ark., 2004). The aim of this study was to evaluate the utility of retinal imaging technology, a biometric identification method, to verify the identity of Norduz sheep.

Materials and methods

Retinal images of 60 adult sheep were obtained from both eyes using the Optireader device (Optibrand Ltd., CO, USA). The head of the sheep were restrained to capture images and retina images were taken by the same operator in daylight in the barn. The reference retinal images of the animals were first taken and then the second and third images were obtained at 15 day intervals to be used for identity verification. A total of 360 retinal images obtained during the study were used for identification purposes. The retinal images transferred to the database were then used for comparison and the correct match score of a pair of retinal images was determined to verify the claimed identity of the animals. The matching of a pair of retinal images was carried out by using the pattern matching capability of the Optibrand software. A matching score (a measure of similarity of vascular patterns expressed from non-match to perfect match on a scale of 0–100) was used for every pair of retinal images. The claimed identity of the animal was accepted when the match score was 70 or higher, but was rejected when it was below 70 (Barry et al., 2008). Pearson's correlation analysis was used to determine the relationships between matching scores.

Results

The matching scores of the retinal images obtained in the study according to the control times were 75.46, 78.93 and 79.97 for the right eyes; 89.28, 89.10 and 89.74 for the left eyes, respectively. In correlations of matching scores, it was found the significant ($p<0.01$) relationships between 1.-2. and 1.-3. control times in both right and left eyes.

Table 1. Descriptive statistics of matching scores of retinal vessel patterns according to different eyes and control times

Eyes and control times	$\bar{x} \pm S_{\bar{x}}$	Minimum	Maximum
Right - Right			
1.-2. Control times	75.46 ± 25.26	18.98	100
1.-3. Control times	78.93 ± 23.16	24.23	100
2.-3. Control times	79.97 ± 19.92	29.39	100
Left -Left			
1.-2. Control times	89.28 ± 14.68	36.34	100
1.-3. Control times	89.10 ± 13.73	23.19	100
2.-3. Control times	89.74 ± 13.20	39.58	100

Table 2. Correlation analysis of matching scores of retinal vessel patterns according to different eyes and control times

		Right - Right			Left - Left		
		1.-2. Control times	1.-3. Control times	2.-3. Control times	1.-2. Control times	1.-3. Control times	2.-3. Control times
Right - Right	1.-2. Control times	1					
	1.-3. Control times	0.356**	1				
	2.-3. Control times	0.039	0.024	1			
Left - Left	1.-2. Control times	0.114	0.016	0.032	1		
	1.-3. Control times	0.089	0.067	-0.082	0.608**	1	
	2.-3. Control times	-0.093	0.035	0.042	0.148	0.131	1

**: $p<0.01$

Conclusion

As a result, retinal imaging technology was found to be a reliable biometric method to verify the identity of animals. However, in order to verify the identity of the animals at a higher rate, the operator should be trained, the head of the animals should be kept immobile and in-barn light conditions must be taken into consideration in order not to affect the

eye opening.

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The Effect of Harvest Time and Number of Queen Cell on 10-HDA and Total Protein Content in Royal Jelly

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Introduction

Royal jelly (RJ), is one of the most important products of the honey bee colony. It is secreted from the hypo-pharyngeal and mandibular glands of young worker bees at the age of 5-15 days. The queen honeybee consumes throughout the life of him and workers and drones consumes at the larvae period of their life. RJ plays a central role in caste determination of honeybees. It is creamy, sticky and has a sour taste. In the structure of RJ which dissolves in water and has a pH of 3.4 - 4.5; water (60-70%), protein (9-18%), lipid (3-8%), carbohydrate (7-18%), ash (0.8-3%), 10-Hydroxy-2-Decenoic acid (HDA) (> 1.4%) (Sabatini et al., 2009). RJ is one of the most important functional products in the regulation of diets and in the cosmetic industry. Studies have been conducted on the pharmacological effects of RJ in humans and animals. RJ is a bee product which regulates the internal secretion system, improves the immune mechanism, is effective against stress, lowering cholesterol, preventing vascularity and improving wound healing (Chen et al., 2002; Kohno, 2004; Temamoğulları et al., 2006; El Nekeety et al., 2007; Cavusoglu, 2009; Kanbur et al., 2009; Mannoor et al., 2009; Ramadana and Ghamdi, 2012; Wytrychowski et al., 2013; Wang et al., 2015; Xin et al., 2016).

In commercial RJ production, usually larvae aged 24 hours are grafted into artificial queen cell and RJ is harvested after 72 hours. The RJ harvested 24 or 48 hours after larval transfer is known as early harvest RJ. Early harvest RJ has been reported to vary in content and amount, as it remains shorter in the hive temperature (Liu et al., 2008; Zheng et al., 2010; Kosoglu et al., 2013). Therefore, in recent years some beekeepers in China are selling early harvest RJ. There is little information on the composition of RJ harvested before 72 hours. National and international standards are also formed according to the RJ qualities harvested in 72 hours. The number of queen cell cup given to the colonies is among the factors affecting the yield and content of RJ. Although the number of larvae grafted among the factors affecting RJ qualities is ignored in commercial production and scientific studies, the results (colonies obtained from different number of queen cell cup) are evaluated regardless of number of queen cell cup. In this study, total protein and 10-HDA ratios were determined in RJ of different number of larvae transferred (30, 60, 120) and harvest time (24, 48, 72 hours) to Aegean bee colonies.

Materials and methods

This study was carried out at Honeybee and Silkworm Research Unit of Adnan Menderes University Faculty of Agriculture in Aydin. In this study, colonies of Aegean Ecotype of Anatolian honeybee were used. Larvae of different numbers were transferred (grafting) into queen cell cups on the frames, and frames contained 30, 60 and 120 queen cups. The frames were transferred into bee hives and the RJ was collected 24, 48 and 72 h after transferring the larvae. Each subgroup had 4 colonies and total 36 colonies (4x3x3) formed research material. The RJ collected from each production colony was weighed and the RJ yield was determined. The collected RJ samples were kept at -20 °C until further analysis. Total protein and 10-HDA analyzes were performed in the RJ. Total protein were made according to the Bradford method (Bradford, 1976). 10-HDA were determined according to Caparica et al., 2007, Kim et al., 2010 and Hagerty, 2014 methods.

Results

In this study, the effect of queen cell cup number and harvest time on HDA values and the queen cell cup number * harvest time interaction is important ($P < 0.01$). According to the multiple comparison test, RJ harvested at 24, 48 and 72 hours was found to be different and significant in terms of the amount of 10 HDA ($P < 0.01$). 10 HDA values decreased (3.2%, 2.8% and 2.2%) as the number of queen cell cups increased (30, 60 and 120), (Table 1). Similarly, as the RJ harvest time increased (24, 48 and 72 h), 10 HDA values decreased (3.3%, 2.7% and 2.2%). According to the analysis of variance, the number of cell cup ($P < 0.05$) and the effect of harvest time and the number of cell cup count * harvest time interaction were significant ($P < 0.01$) on total protein content in RJ. The highest total protein content was obtained in RJ harvested 24 hours at 30 cell cups (22.06%). Total protein ratios were different and significant ($P < 0.05$) in RJ obtained from 60 and 120 cell cups, whereas total protein content was similar in both groups. When the total protein content of RJ was examined in terms of harvest time (Table 1), the RJ harvested at 24 hours was different and important than the RJ harvested at 48 and 72 hours ($P<0.01$). Zheng et al. (2011), which is similar to this study, has grafted 132 larvae into the RJ production colony and the researchers determined 10 HDA content, 24, 48 and 72 hours after grafting harvested RJ respectively; 2.5 ± 0.4, 2.0 ± 0.3, 2.1 ± 0.2%. Similarly, Liu et al. (2008), grafted 30 larvae each RJ production colony and stated 10 HDA rates 24, 48 and 72 hours after grafting harvested RJ respectively;1.97 ± 0.07, 2.05 ± 0.04, 1.60 ± 0.04%. We stated 10 HDA rates, especially in 24 h RJ (3.25%), higher than Zheng et al., (2011) and Liu et al., (2008). Flanjak et al., (2017) found 10 HDA rates in Croatian RJ in the range of 1.56-3.78%. These variables can explain geographical or genetic differences between honeybee populations, using different device and method, different applications etc. In this

study, total protein ratios decreased due to prolonged harvest time. Also, protein contents (16.1-19.6%; excluding highest protein content 22%) in RJ is similar to Liu et al., (2008) (16.5 ± 0.2) and Zheng et al. (2011) (19.6 ± 1.4).

Table 1. Total Protein and 10-HDA contents of RJ

	Time of harvest (after the larval transfer)							
	10-HDA contents (%)				**Total protein contents (%)**			
QCC*	**24 h**	**48 h**	**72 h**	General	**24 h**	**48 h**	**72 h**	General
30	3.9±0.09	3.0±0.09	2.6±0.05	3.2±0.19 ^{A}	22.0±0.8	16.1±0.11	16.5±0.11	17.8±1.11^{ab}
60	3.3±0.05	2.9±0.05	2.3±0.06	2.8±0.15 ^{B}	17.6±0.5	16.9±0.20	16.5±0.61	17.0±0.35 ^{a}
120	2.5±0.09	2.2±0.03	1.8±0.05	2.2±0.12 ^{C}	19.2±0.3	18.5±0.60	17.3±0.49	18.3±0.33 ^{b}
General	3.3±0.21 ^{A}	2.7±0.14 ^{B}	2.2±0.13 ^{C}		19.6±0.71 ^{a}	16.8±0.57 ^{b}	16.8±0.27 ^{b}	

*QCC: Queen cell cup A, B, C; P<0.01 a,b; P<0.05

Conclusion

The major oil acid 10-HDA and major royal jelly proteins (apisin, royalisin ect.) are the two most important quality criteria that make RJ functional. Physiological actions of 10 HDA and MRJP in RJ includes cell proliferation, cytokine suppression, and antimicrobial activity (Fujiwara et al., 1990; Kamakura, et al., 2001; Majtan et al., 2010; Oka, et al., 2001; Okamoto, 2003; Shen et al., 2010). This study showed that 10 HDA and total protein levels decrease as the number of larvae increases and the harvest time increases from 24 hours to 72 hours. Briefly, we can say early harvest RJ (24 and 48 hours) has more 10 HDA and protein contents. 10 HDA values decreased as the number of queen cell cups increased. According to Turkish Standard TS 6666, in the description of RJ, it is stated that "collected with suitable tools within 36-48 hours, in addition, the protein content should be max 14.5%". However, generally RJ harvested in 72 hours has produced in our country. In this and other studies the protein content is higher than 14.5%. It is pointless to limit the protein content in RJ to max 14.5%. So RJ standard should be rearranged.

Acknowledgements

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High Yield and Its Effects in Dairy Cattle

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Introduction

Selection studies in dairy cattle started in the 1800s and were aimed onlyto increase milk yield. In today's modern dairy cattle production, it is possible to obtain 10,000 kg of milk yield per animal per year, with a good herd management and feeding of animals with optimum rations and improving the genotypic values by using the preferred bulls as breeder. It has been reported that there is a significant decrease in reproductive performance in Holstein-Friesian cows whose milk yield has been increased as a result of long-term selection. In addition, cows of this breed have significant problems due to fitness and longevity, metabolic stress, udder diseases and locomotion disorders. The use of a small number of bulls with high genetic potential to increase milk yield has had negative effects on animal health and welfare, as well as reproduction, and as a result the ethical and economic sustainability of modern dairy cattle has been compromised (Rodriguez-Martinez, et al., 2008).

Animals have limited resources for adaptation. Rolf Beilharz proposed the “Resource Allocation Theory” (Goddard and Beilharz, 1977; Beilharz et al., 1993). According to this theory, the resources of the animals are limited and, as a result, if the production is increased by a biological process such as producing more milk, the fertility, maintenance, movement, immune system etc. are taken into consideration. Increased fitness characteristics mean reallocation of resources and thus altering other reactions such as disease resistance or behavior (Beilharz et al., 1993). Rauw et al. (1998) examined the negative side effects of selection on high yield. “When a population is generally directed to high yields, less resources will be left to adequately respond to other demands (such as fertility, yield, fitness, etc.), such as dealing with stress factors”. As Rauw (2008) states, the basic problem is it may mean that there is insufficient prosperity in livestock if there is inadequate resources for high yields and therefore resources are limited. In this study, the effects of high yields obtained from selection on dairy cattle on metabolic stress, foot and leg problems, mastitis, fertility, herd life, body structure, inbreeding and animal welfare will be emphasized.

High yield and selection

The aim of the dairy industry has always been to produce quality milk for the consumer market. In many countries, yield per cow has more than doubled in the last 40 years. This dramatic increase in yield per cow is due to rapid progress in genetic improvement and management. Average energy corrected milk yield (ECM) for Swedish dairy cattle (Figures 1 and 2) increased from 4,200 kg to 9,000 kg between 1957 and 2003 (SHS Annual Reports, 2003; Oltenacu and Algers, 2005). Data from the National Milk Registeration in the UK show that from 1996 to 2002 there was an increase in the average yield of dairy cattle by about 200 kg and that 50% of the progress in milk yield was attributed to genetics (Pryce and Veerkamp, 2001). This is similar to the case in the USA, with an increase in average milk yield per cow of 5,997 kg between 1957 and 2007, with a genetically related increase (or 56%) of 3,390 kg (Van Raden, 2004).

By the mid-1980s, most of the increase in milk yield was eliminated as a result of adequate and balanced feeding, in particular better application of feed standards and better roughage quality. Since then, the effective use of artificial insemination (AI) has become the main genetic factor due to the intensive selection of bulls based on reproductive control and the spread of semen from bulls with high genetic value for yield. Today, dairy cattle produce much more milk than their ancestors. However, daily energy output and lactation period are quite high. As can be predicted by the resource allocation theory, long-term problems are likely to occur in highly productive animals (Broom, 1995; 2001; Nielsen, 1998).

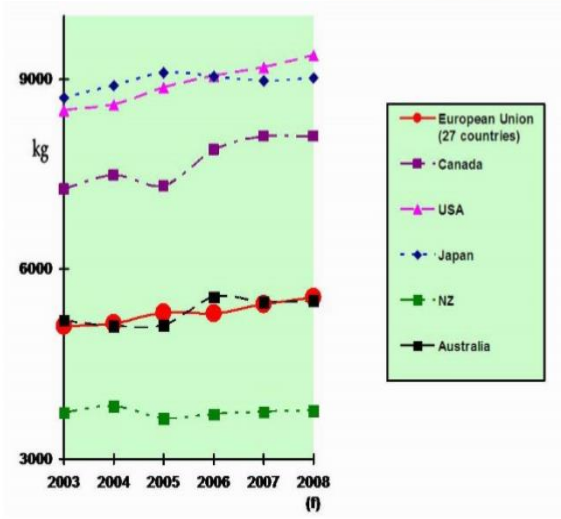


Figure 1. Global trends in milk yield per cow-year (kg) in selected countries/regions for the period 2003–2008 (f=forecast) (Swedish Dairy Association 2008).

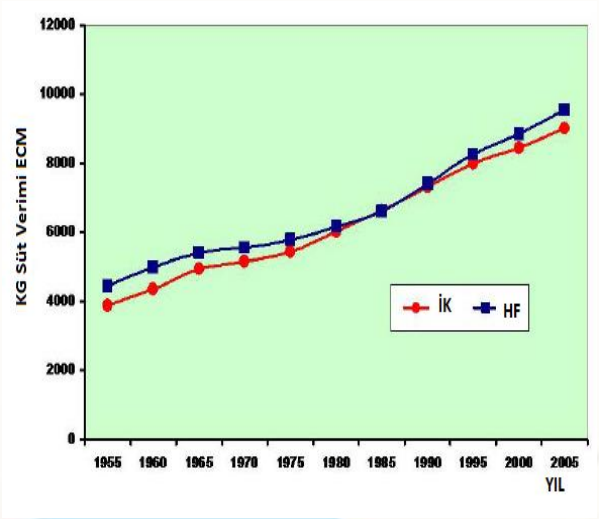


Figure 1. Average annual milk production (kg energy-corrected milk, ECM) for cows of the Swedish Red (SR) and Swedish Holstein (SH) breeds, period 1955–2005 (Swedish Dairy Association 2008)

High yield and metabolic stress

As milk yield is genetically increased, more dairy cows have yield-related diseases. In order to emphasize the perception that studies on continuous increase in milk yield harm animal welfare. Ingvartsen et al. (2003) suggested that mobilization of body reserves could be a key factor by linking cow's genotype, feeding environment and management with its metabolic status and susceptibility to reproductive performance and disease. High-yielding dairy cows have a greater demand for energy and need to mobilize their body reserves to support this demand. In the early stages of lactation, cows enter a negative energy balance state because they do not respond to energy intake requirements, mobilizing their body reserves and losing excessive body condition. In this case, the terms "metabolic load" and "metabolic stress" are used to describe the effects of high yields on lactating dairy cows. Metabolic load, the load imposed by the synthesis and secretion of milk and metabolic stress are the amount of unprotected metabolic load. In cases of negative energy balance, if there is not enough body reserve, the cow starts to mobilize functional body tissue such as muscle. Mobilization of functional tissue is considered to be an indicator of hunger and the extent to which a high-yielding cow is exposed to starvation can be assessed by determining combinations of metabolites (Agenäs et al., 2006).

High yield and lameness

Foot and udder health problems are generally seen more in high-yielding animals and there is a relationship between milk yield and lameness (Rushen, 2001). Metabolic stress has been reported to have an effect on lameness. In another study about lameness and high yield, it was found that high efficiency increased the probability of lameness and foot diseases (Kocak and İkiz, 2006). In the UK, it was estimated that lameness in dairy cattle in 1980 was less than 10% per lactation (Russell et al., 1982), but it was more than 20% by 1990 (Clarkson et al., 1996). For the US, Guard (1999) reported a rate of 38%, Espejo et al. (2006) reported an average prevalence of 25% in the country. Lameness reduces milk yield and is also an important cause of culling (Rajala-Schultz et al., 1999). Guard (1999) estimated that the direct cost arising from the lameness of a herd of 100 cows was US $ 7600.

High yield and mastitis and somatic cell score (SCS)

Mastitis in dairy cattle; milk yield and quality are adversely affected, and milk is discarded, treatment costs, the reformed of animals from the herd, such as the loss of breeding value of the animal occurs (Heringstad et al., 2000). High milk yield poses a higher risk for mastitis. This risk is exacerbated by the stress caused by high milk yield as well as by the problems in the maintenance, feeding and herd management system (Van Werven et al., 1992).

Genetic antagonism between mastitis resistance and yield characteristics is well known. Mrode and Swanson (1996), in their study, reported that there was an average of 0.14 genetic correlation between Somatic Cell Score (SCS) and milk yield at first lactation. Pryce and Brotherstone (1999) and Rupp and Boichard (1999) reported similar results. Genetic antagonism between yield and clinical mastitis is more pronounced. Scandinavian countries have made selection based on broader breeding targets, which include many functional features and in particular mastitis resistance, and the inclusion of mastitis resistance in selection targets has proven to be effective (Heringstad et al., 2000). In Norway, clinical mastitis events increased from 0.15 per cow in 1975 to 0.44 in 1994 and then decreased to 0.23 in 2002 (Osteras et al., 2007). Mastitis events are increasing in parallel with the increase in the presence of high-yielding cattle in our country and it has been reported that 15% of the reason for reformed in dairy cattle is mastitis (Alpan, 1992). With this effect of mastitis over the past five years (2005-2010), the constant and negative tendency towards fertility and mastitis sensitivity has led most European dairy cattle populations to update their breeding targets and to increase the weight of non-yield

characteristics according to the yield characteristics in the selection indices.

High yield and fertility, herd life

Most reproductive problems in high-yielding dairy cattle are caused by diseases such as uterus infections or other disorders (Bell and Roberts, 2007; Dobson et al., 2007; Sheldon et al., 2008) or metabolic stress associated with milk production. In the USA, the calving interval increased from 13.0 months to 14.5 months in 143 commercial herds, and the number of insemination per pregnancy increased from 2.0 to 3.5 between 1980 and 2000 (Lucy, 2001). Between 1975 and 1997, pregnancy rate in the US was reported to decrease 0.5% per year in the first insemination (Beam and Butler 1999). In the UK (Royal et al. 2000), the pregnancy rate at first insemination decreased from 56% in 1975-1982 to approximately 40% in 1995-1998, decreasing by about 1% per year (Figure 3).

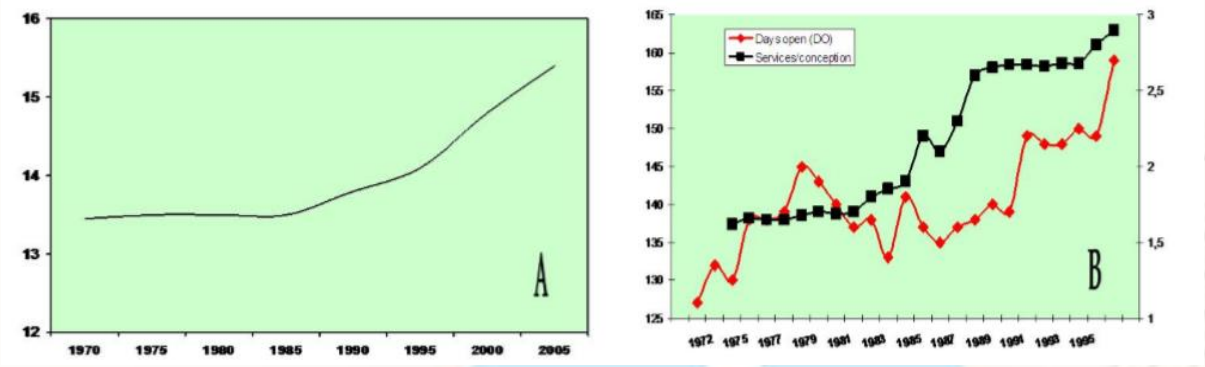


Figure 3. Average calving interval (CI, months) in American Holstein cows for the period 1970–2005 (Oltenacu & Algers, 2005)

In addition, behavior may play a critical role in decreasing reproductive performance in genetically high-yielding cattle. In a study of 17 commercial herds using electronic estrus monitoring systems, Dransfield et al. (1998) reported that a higher proportion of cows yielding above the herd average showed only low-intensity and short-term heat compared to low-yielding cows (24% correspond to 16%). Lopez et al. (2004) also found that there was an inverse relationship between milk yield and estrus behavior and that in high milk yielding cows (> 40 kg), the duration of heat (5.5 - 11.1 hours) was shorter than in low milk yielding cows (<30 kg). Emanuelson and Oltenacu (1998) reported that after calving, the first insemination interval was extended due to the determination of low estrus (Figure 4).

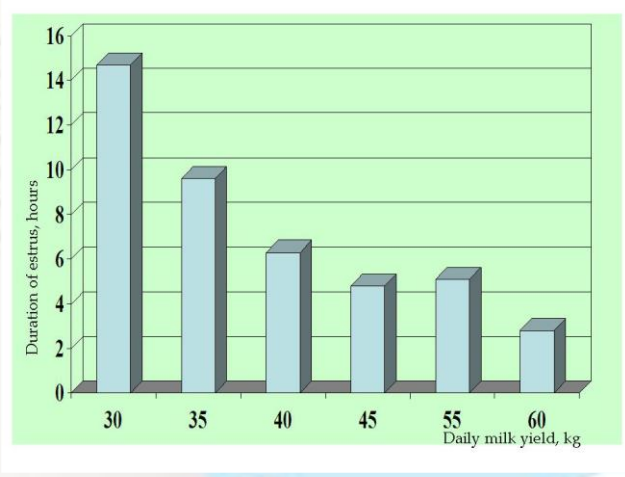
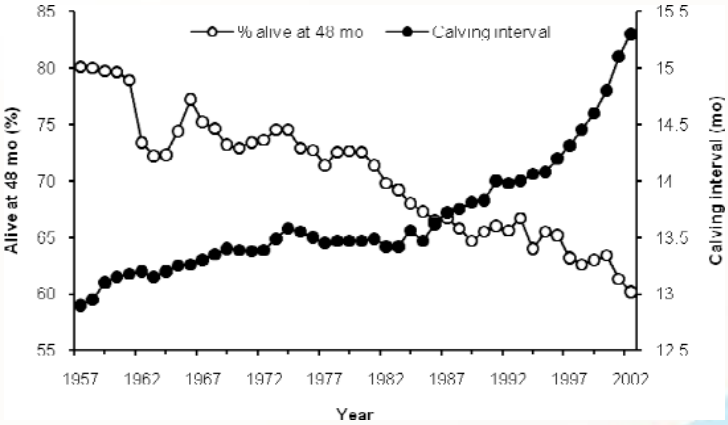


Figure 2. Duration of standing estrus (h) with different milk yield (Lopez et al, 2004)

Poor reproductive performance often leads to early culling from the herd and shortening the herd life of dairy cow. The decrease in fertility, the increased calving interval, is indicative of this, and the relationship between longevity reflects

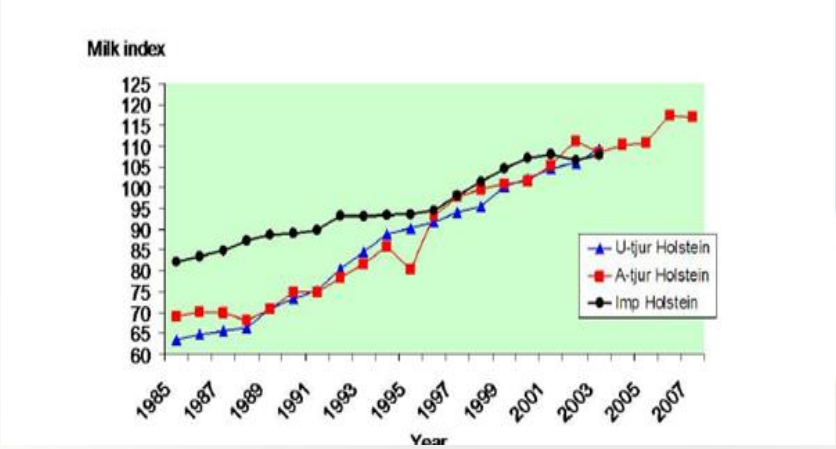


(measured) the proportion of cows that still survive at 48 months in the Northeast US from 1957 to 2002 (Figure 5).
Figure 5. Holstein-Friesian cows in the North-East United States live at 48 months of age and change in average calving interval (Oltenacu ve Algers, 2005).

Although the pregnancy rate also had high milk production potential and similar milk yield, it did not significantly reduce fertility. The average annual milk production for Swedish Red (SR) and Holstein (SH) breeds since 1955 and their tendency to conceive since 1955 are shown in Figure 6.

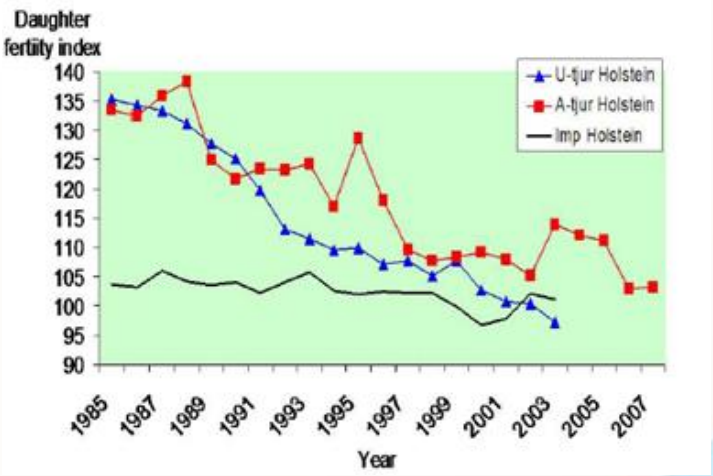
Figure 6. Relationship between increased milk yield and pregnancy rate in Holstein and Swedish Red cattle (Swedish Dairy Association 2008).

Figure 7 shows the increasing trend with genetic progress to Swedish Holstein-Friesian (SH) bulls (both for proven bulls, both unproven bulls and imported semen from different sources). In dairy cattle, yield is negatively related with fertility and increased mastitis. The bull breeding values for female fertility in Holstein-Friesian have decreased by more than two standard deviations over the past 20 years (Figure 8). Twenty years ago, 50% of the Holstein-Friesian bulls had a medium or higher reproductive value, whereas less than 2% of the bulls today have the same quality. In addition, Holstein-Friesian showed a decrease in reproductive performance or reproductive performance by ~ 1.2 index units / year (~ 0.25% units / year) compared to the Swedish Red breed (Rodriguez-Martinez et al. 2008).



Şekil 7. Milk index for AI Holstein sires in Sweden, as young (U), progeny-tested (A) or imported (Imp) for the period

1985-2007 (http://www.vikinggenetics.com)



Şekil 8. Daughter fertility index for AI Holstein sires in Sweden, as young (U), progenytested (A) or imported for the period 1985-2007(http://www.vikinggenetics.com)

High yield and body conformation

Although genetic improvement in yield characteristics has gained primary importance in the selection targets of dairy cattle, other features other than yeld have been given great importance, especially in North America. Many of these inefficient properties relate to the general appearance of cows such as general compatibility or "type", udder type characteristics, body size (including height, chest width and body depth), and dairy type (Figure 9). As a result, increased milk production increased body size and weight, although smaller cows proved to have advantages for longevity and animal welfare (Hansen, 2000). Emphasis on milk type also contributed to increased metabolic stress, especially in early lactation, leading to the emergence of cows more tend to metabolic problems. In the Dutch-origin Holstein-Fresian dairy cattle population, the average rump height of heifers increased from 130 cm in 1981 to 144 cm in 2007, while the 305-day milk yield of cows in the same population increased from 5,765 kg in 1985 to 8,720 kg in 2007 (NRS Statistics, 2007).

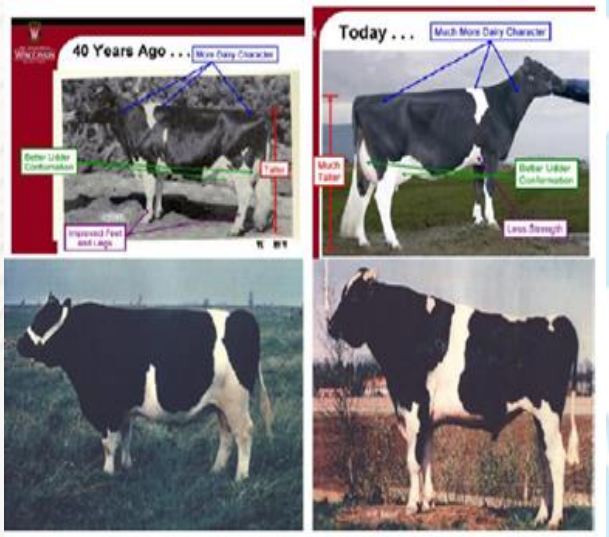


Figure 9. Changes in body conformation in American Holstein cows (upper) and bulls (below) (Wiegel, 2006; Lindhé, 2007).

High yield and genotype environment interaction

Since animals tend to adapt to the environment in which they are selected, selection for higher yield is also likely to cause environmental sensitivity. Castillo-Juarez et al. (2000) and Kearney et al. (2004), the relationship between milk yield and somatic cell score and the relationship between the milk yield and pregnancy rate of the magnitude of the negative relationship between the environment is higher than the good environment.

The increase in negative genetic correlation between yield and fitness features in poorer environments is indicative of a decrease in selection-related compatibility for increased yield in modern dairy cows. In addition, sensitivity to environmental conditions was increased as a result of yield-based selection in cattle, and environmental requirements of animals changed under the environmental conditions required for animal welfare.

High yield and inbreeding

Inbreeding due to the mating of relatives is also increasing. Inbreeding has a direct negative impact on animal welfare. For example, inbreeding increases the non-discard rate of placenta in cattle and the risk of difficult birth (Adamec et al., 2006). Smith et al. (1998) reported 177 kg decrease in lifetime milk yield per 1% increase in inbreeding. In England, inbreeding in dairy cattle is currently around 3% and increases by 0.17% per year (Brotherstone and Goddard, 2005).

Rodriguez-Martinez et al. (2008) stated that breeding organizations should implement new strategies designed to preserve genetic diversity and prevent inbreeding growth in dairy cattle populations. These can be achieved by:

(i) Expand genetic improvement targets to include health, fertility and other fitness features as well as yield characteristics;

(ii) Evaluating the genotype with environmental interactions;

(iii) Apply selection strategies to minimize the average inbreeding of selected individuals with the rest of the breeding population,

(iv) to make use of molecular genetic tools currently or in development.

High yield and improvement of animal welfare

It means developing and adopting a selection index in which the most effective way to stop and reduce animal welfare and improve animal welfare due to the negative genetic relationship between milk yield and animal welfare indicators is included and appropriately concentrated. With such an index, the genetic progress for any of the characteristics considered is smaller than when selection is considered for a single trait, but greater than for selection of a single trait as a general economic response (Rodriguez-Martinez et al., 2008). The average calving interval of the two major Swedish dairy breeds in the period from 1987 to 2003 in Sweden and other Scandinavian countries is shown in Figure 10, as an example of successful multi-feature selection, including fertility and animal health as well as milk yield.

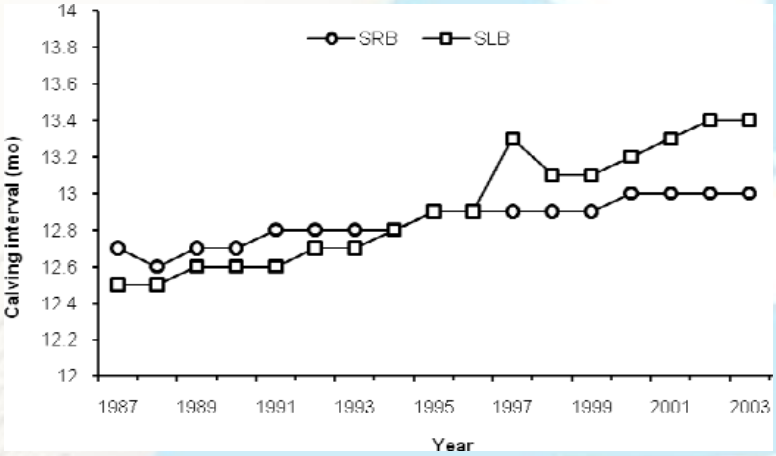


Figure 10. Change of calving interval for Swedish Red-White and Swedish Hosltein-Friesian from 1987 to 2003 (Philipsson ve Lindhe, 2003).

For the Hosltein-Friesian (Van Arendonk and Liinamo, 2003), which is the dominant dairy breed in the world and constitutes approximately 80% of all dairy cattle in Europe, the importance given to selection of fitness features has increased. Many breeding organizations in Europe and North America, which have dominated the international gene pool market in all countries since the mid-1990s, have included reproductive and animal health (at least mastitis) in breeding targets

High yield and sustainability of dairy isndustry

Stating that the success of dairy cattle industry depends on the perception of dairy products by the society and production methods. It was stated that animal welfare and community worries may risk the sustainability of the dairy cattle industry (Oltenacu, 2009; Koç, 2017). The other two important factors in the sustainability of the dairy cattle industry are the efficiency of production related to human food requirement and production of greenhouse gas.

Dairy cattle use pasture plants, a resource that people cannot access as nutrients, can be considered as a long-term advantage for the sector. However, most dairy cattle feed on raw materials used as human food. About half of the rations of high-yielding cattle consist of intensive feed and the majority of the proteins in these feed sources are also used by humans. This can be considered a loss of food for humans. In this sense, considering the increasing world population, a pasture-based animal feeding will be desirable in the future.

Dairy cattle also produce a greenhouse gas, methane (CH4). Although there are efforts to reduce greenhouse gas emissions, it is necessary to take advantage of pasture areas that cannot be used for various reasons. Greenhouse gas production of cows should be expressed per unit milk production and strategies to increase productivity and animal

welfare should be adopted without increasing environmental factors and increase in herd lifetime and lifetime yield (Rodriguez-Martinez et al., 2008).
One of the important factors in the sustainability of the dairy industry is the increase in the rate of vegetarianism worldwide, especially in western societies. A 5% increase in vegetation worldwide or consumers who stop buying milk and products will have a significant impact on the sustainability of the industry. At this point, it can be said that the importance given to animal welfare should be increased and the image of the industry should be improved Rodriguez-Martinez et al. (2008).

Conclusion

Traditionally, livestock improvement programs have focused on the genetically improvement of economically important traits. How this is done, the yield in livestock has clearly increased in the second half of the twentieth century, and effective selection programs have played an important role in this. In addition to this, focusing on the improvement of yield characteristics of in dairy cattle narrowly and the intensification of the animal production system, the "Theory of Allocation of Resources" resulted in a decrease in the welfare of animals by causing behavioral, physiological and immunological disorders in these animals (Rodriguez-Martinez et al., 2008).
There is evidence that many aspects of prosperity have a genetic basis and that breeding for better animal welfare can be successful, with or without selection for yield. In some dairy cattle breeding programs, wider selection targets have been applied. Dairy cattle breeding programs in Scandinavian countries best combine production, health, fertility and longevity in the "total utility index. More generally, it is clear that many breeding organizations are working to develop more balanced breeding goals by incorporating functional characteristics (Rodriguez-Martinez, et al., 2008).
Collaboration of breeding specialists, geneticists, epidemiologists, nutritionists, ethologists and other people involved in animal welfare problems is necessary to improve the welfare and adaptation of dairy cattle through genetic selection for a long time. Sustainable breeding goals, aimed at increasing fitness and resistance, are necessary to prevent and perhaps improve the quality of life of animals. If selection affects not only the symptoms but also directly the causes of poor welfare, the effectiveness of the selection program in increasing the level of prosperity should be increased. To implement such a program, further research is needed to clarify the relationship between yield, negative energy balance, metabolic stress and animal welfare indicators, and to develop practical methods for measuring negative energy balance and metabolic stress. These investigations should identify features that are directly related to animal welfare status, such as negative energy balance, body condition score, initiation of post-calving estrus cycle, and ultimately provide more effective selection tools to improve welfare status in dairy cattle.

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Gestation Length, Birth Weight and Body Measurements of Bactrian X Dromedary F1 Calves

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Introduction

Camel, known as "ship of desert", is a multipurpose animal and used for milk, meat, wool, hair and hides production especially in North African countries and Asia, and is also used in entertainment activities like racing in some Middle East countries and wrestling like in Turkey. Number of camels decreased dramatically in the world due to development of fossil fuels and motor vehicles, and losing its traditional function like transportation, warfare and non-monetary exchange. The population is over 35 m with about 4.0 m ton milk (IDF, 2018) and 0.63 m ton meat (Bülbül and Koç, 2018) production. However, due to the large number of unregistered animals in many countries, it can be said that camel meat and milk production is higher than reported in the statistics.

The people in affluent societies, where the racing and wrestling taking place, aspire to have camel because of having a respectable position in some societies (Koç and Atasever, 2016). After a dramatic decrease between 1960 and 1990, an increase is seen in the population in Turkey due to increasing popularity of camel wrestling.

Camel wrestling is one of the most important social activities of people living in cities and also rural areas in winter in western coastal region of Turkey. It is believed that a good wrestling camel should be Bactrian sire x Dromedary cow F1 hybrid (Tülü). For wrestling purposes, a lot of male Tülü have been brought to Turkey, especially from Iran. There are also a few cameleers aiming to produce wrestling camels in Turkey. In these farms some camel milk is also produced and sold. Camel milk is used as therapeutic purposes and used to cure certain diseases (Singh et al., 2017).

There are many factors affecting birth weight (BW) and body measurements (BM) at birth in camel, like genetical factors, age, weight, parity, health and nutrition status of mother, calf sex, season and geographical region (Koç et al., 2018; Harmas et al., 1990; Mutairi et al., 1999). The heritability of camel BW is high and the variation seen in BW is due to mother (20%), fetus (17%), parity (7%), nutrition (6%), sex (2%) and mother age (1%) (Kadim and Mahgoub, 2014). It should be emphasized that maternal uterine conditions have also a significant effect on BW of camel. Twining rate in camel is very low and due to insufficient nutrition and management, death rates in camel sometimes increases to 30-50% (Koç et al., 2016). In this study, gestation length (GL), BW and BM of Tülü calves born in Aydın in 2017-2019 were determined in addition to the development of the equations to estimate BW from BM. The correlations among BW and BM and the first month live weight (LW1) and BM were also estimated.

Material and Methods

In the study, 18 heads calves born between 2017 and 2019 in three different farms in Aydın, Turkey were used to determine BW and BM in 24 hours after birth (Koç and Akman, 2007; Chniter et al., 2009; Abdallah and Faye, 2012), and also the LW1 and BM were also determined with a weighbridge and a measure meter. Because of some calves died and sold to some other cameleers, LW and BM were taken only for 5 heads calves. Data were analyzed and the equations to estimate BW from BM were developed by using stepwise-regression in MINITAB 13.0.

Results and Discussion

The GL was estimated from the natural mating of 10 heads camels and the average was 380.4±3.63 day, by changing from 366 days to 399 days. Birth year and sex of calf did not affect GL (Table 1). Like other livestock species, duration in the uterus in male calves is longer than that of female calves.

Table 1. Gestation length (day) of camel cows

Factor	n	Mean	Min	Max
Birth year		NS		
2017	6	378.0±5.70	366	399
2018	4	384.0±3.27	376	392
Sex of calf		NS		
M	6	382.50±4.57	372	399
F	4	377.25±6.42	366	392
Overall	**10**	**380.4±3.63**	**366**	**399**

NS: not significant

The means of BW and BM at birth of Tülü, with changing between 26 kg and 51 kg, are given in Table 2. The sire, sex and birth year did not have any significant effect on BW and BM, except a significant effect of sire on abdominal girth (AG; $P<0.05$). BW, wither height (WH), rump height (RH), hearth girth (HG) and neck length (NL) means were 35.79±1.13 kg, 104.28±1.36 cm, 100.81±1.41 cm 78.67±1.23 cm and 36.33±0.94 cm, respectively. BW mean found in this study is in agreement with the literature (Merkt et al., 1990; Harmas et al., 1990; Mutairi, 1999).

It is also possible to estimate BW from BM and the equation developed were given in Table 3. Like other livestock

species, in camel, HG can only be used to estimate the BW, but SW and NL are also important traits to affect BW in camels. Besides HG, Koç et al. (2018) reported AL is also important to estimate BW from BM in Tülü. Due to having a long neck, in live weight estimation NL should be taken into account in live weight estimation in camel, too.

Table 2. Birth weight and body measurements of Tülü (Bactrian x Dromedary F1) calves at birth

Factor	n	BW, kg	WH, cm	RH, cm	AH, cm	AG, cm	BL, cm
Sire		NS	NS	NS	NS	*	NS
1	6	32.85±1.10	101.67±1.18	99.17±2.07	102.17±1.45	73.33±2.74	57.50±1.28
2	14	37.27±1.97	105.58±1.88	101.63±1.86	106.42±1.83	79.67±1.50	60.92±1.05
Sex		NS	NS	NS	NS	NS	NS
M	10	36.94±2.20	103.50±2.15	99.45±2.34	103.50±1.99	76.60±2.41	59.40±1.37
F	8	34.36±1.71	105.15±1.54	102.50±1.18	106.88±1.74	78.75±1.58	60.25±1.13
Birthyear		NS	NS	NS	NS	NS	NS
2017	8	36.33±2.61	102.38±2.21	99.06±2.55	103.13±2.14	77.00±3.01	59.38±1.22
2018	5	34.14±1.78	103.80±1.66	101.60±2.11	105.20±1.96	78.40±2.77	59.40±2.38
2019	5	36.60±2.87	107.80±2.69	102.80±2.35	107.80±2.96	77.60±0.93	60.80±1.39
Overall	**18**	**35.79±1.43**	**104.28±1.36**	**100.81±1.41**	**105.00±1.37**	**77.56±1.50**	**59.78±0.89**

Table 2. continued.

Factor	n	NL, cm	HG, cm	SW, cm	AL, cm	RW, cm	TL, cm
Sire		NS	NS	NS	NS	NS	NS
1	6	35.50±1.38	77.67±1.58	12.0±1.06	82.25±1.30	9.50±0.43	30.17±1.19
2	14	36.75±1.25	79.17±1.69	13.0±0.85	87.25±1.87	8.92±0.45	30.50±0.79
Sex		NS	NS	NS	NS	NS	NS
M	10	35.80±1.37	78.70±1.94	12.20±0.88	84.50±2.21	8.80±0.49	30.30±0.96
F	8	37.00±1.30	78.63±1.46	13.63±1.02	87.00±1.60	9.50±0.42	30.75±0.86
Birth year		NS	NS	NS	NS	NS	NS
2017	8	35.63±1.34	78.38±2.15	11.63±0.93	83.44±2.62	8.63±0.46	30.63±0.93
2018	5	35.40±1.44	78.40±1.50	12.20±0.80	86.20±1.83	9.20±0.49	30.20±1.71
2019	5	38.40±2.23	79.40±2.77	15.40±1.21	88.40±2.04	9.80±0.80	30.60±0.93
Overall	**18**	**36.33±0.94**	**78.67±1.23**	**12.83±0.67**	**85.58±1.42**	**9.11±0.33**	**30.50±0.64**

*: P<0.05; BW: Birth weight, WH: Wither height, RH. Rump height, AH. Abdominal height, AG: Abdominal girth, BL: Body length, NL: Neck length, HG: Hearth girth, SW: Shoulder width, AL: Arm length, RW: Rump width, TL: Tail length.

It is also possible to estimate BW from BM and the equation developed were given in Table 3. Like other livestock species, in camel, HG can only be used to estimate the BW, but SW and NL are also important traits to affect the BW in camels. Besides HG, Koç et al. (2018) reported the AL to estimate BW from BM in Tülü. Due to having a long neck, in live weight estimation NL should be taken into account in live weight estimation in camel.
BW has higher positive correlations with WH, RH, AH, AG, BL, NL, HG and AL (r=0.501-0.712; P<0.05) as seen in Table 4.

Table 3. Equations developed to estimate birth weight from body measurements in Tülü (Bactrian x Dromedary F1) calves

	Equations	R^2
1	=-29.66+0.83*HG	50.74
2	=-36.52+1.06*HG-0.85*SW	62.84
3	=-36.5+0.79*HG-1.01*SW+0.63*NL	72.24
4	=-47.20+0.64HG-0.79*SW+0.63*NL+0.25*AG	77.92

AG: Abdominal girth, NL: Neck length, HG: Hearth girth, SW: Shoulder width

Table 4. Correlation between birth weight and body measurements in Tülü (Bactrian x Dromedary F1) camel

	BW	WH	RH	AH	AG	BL	NL	HG	SW	AL	RW
WH	0.502*										
RH	0.502*	0.869**									
AH	0.501*	0.892**	0.939**								
AG	0.532*	0.309	0.188	0.298							
BL	0.550*	0.553*	0.501*	0.460	0.506*						
NL	0.635**	0.674**	0.691**	0.690**	0.127	0.454					
HG	0.712**	0.709**	0.611**	0.622**	0.282	0.343	0.647**				
SW	0.043	0.629**	0.441	0.560*	-0.158	0.112	0.453	0.487*			
AL	0.587*	0.752**	0.746**	0.784**	0.527*	0.524*	0.490*	0.524*	0.196		
RW	0.134	0.097	0.236	0.179	-0.093	-0.116	0.538*	0.166	0.255	0.023	
TL	0.394	0.256	0.348	0.193	0.201	0.388	0.139	0.274	-0.240	0.473*	0.184

*: P<0.05; **: P<0.01; BW: Birth weight, WH: Wither height, RH: Rump height, AH: Abdominal height, AG: Abdominal girth, BL: Body length, NL: Neck length, HG: Hearth girth, SW: Shoulder width, AL: Arm length, RW: Rump width, TL: Tail length.

LW and BM and average daily gain (DWG) means at the first month were given in Table 5. LW1 and DWG means were 64.30±3.73 kg and 0.839±0.108 kg, respectively. LW1 of calves were between 51 and 72 kg and DGW of them were 0.471 kg and 1.048 kg.

Conclusion

The variation in GL and BW are very high. Similar to other livestock species in camel, male calves had longer gestation and heavier BW than those of female calves. HG can be used to estimate the body weight from BM in camel. In addition to NL, hump weight should be taken into account in the estimation of body weight in camel.

Table 5. Live weight, daily weight gain and body measurements of Tülü (Bactrian x Dromedary F1) calves at the first month of age (n= 3 male and 2 female)

Trait	n	$\overline{X} \pm S_{\overline{X}}$	Min	Max
LW1	5	64.30±3.79	51	72
DWG1	5	0.839±0.108	0.471	1.048
WH1	5	113.80±3.23	106	122
RH1	5	110.20±1.88	106	116
AH1	5	122.70±2.31	116	129
AG1	5	109.40±2.94	102	117
BL1	5	78.20±5.52	70	99
NL1	5	44.00±1.26	41	47
HG1	5	101.20±2.52	92	106
SW1	5	17.00±1.30	12	19
AL1	5	94.80±2.45	85	98
RW1	5	13.00±1.00	10	16
TL1	5	37.40±0.68	35	39

BW1: Birth weight, DWG1: Daily weight gain, WH1: Wither height, RH1: Rump height, AH1: Abdominal height, AG1: Abdominal girth, BL1: Body length, NL1: Neck length, HG1: Hearth girth, SW1: Shoulder width, AL1: Arm length, RW1: Rump width, TL1: Tail length

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Region Influence on some Reproduction Parameters in Ouled Djellal Ewes'

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Introduction

In Biskra, sheep farming is one of the main activities of the district, and the fact that Ouled Djellal breed constitutes the majority of the herds in the region; Ouled Djellal sheep has been the subject of several studies relating to production and reproduction performances. The latter is perfectly adapted to the extreme conditions of the arid environment.Thus, the objective of this study is to update and to evaluate the reproductive performance of Ouled Djellal sheep in different regions of Biskra, namely: El Hadjeb, Sidi Okba, Ouled Djellal and Chaiba, and to calculate fertility, prolificacy and fecundity rates in order to deduce the effect of the region on these parameters.

Materials and methods

In this present study 226 Ouled Djellal ewes', clinically healthy and non-pregnant, have been used. The mate was free; it was conducted during two months May and June 2015 (61 days) for all herds. During the period of lambing and in all flocks we identified: The total number of lambing ewes, and the total number of lambs.

Statistical analysis of the reproductive variables was determined using the software "IBM SPSS Statistics 20" SPSS Inc, Chicago, Illinois, USA. We compared the fertility , fecundity and prolificacy rates. We used $\chi 2$ test to verify the link between the measured rates and the four sites. As well as, multiple comparisons that revealed sites of significant differences.

Results

The analyzed variables were: fertility, prolificacy and fecundity, and their overall averages were 78%, 117% and 92% respectively, which are well below the averages in flocks reared in intensive mode. However, the lowest rate is recorded at site 4 (Chaiba) with 65%, 109% and 71% respectively.

Table 1. Averages of fertility, prolificacy and fertility of Ouled djellal ewes.

Sites		Fertility	Prolificacy	Fecundity
Site1		0.7	1.19	0.83
Site2		0.9	1.18	1.06
Site3		0.87	1.23	1.07
Site 4		0.65	1.09	0.71
Mean ± Standard deviation		0.78 ±0.12	1.17 ±0.06	0.92 ±0.18
Pearson's Khi-square		22,829	6,933	29,963
	Site 1vs2vs3vs4	0.001	0.074	0.0001
	Site1vs site 2	0.016	/	0,056
	Site 1vs site 3	0.041	/	0,116
p value	Site 1vs site 4	0.589	/	0,341
	Site 2vs site 3	0 ,611	/	0,741
	Site 2vs site 4	0.0001	/	0,0001
	Site 3vs site 4	0.0001	/	0,0001

Conclusion

The results of this study indicate clearly that the region has an impact on fertility ($p = 0.001 << 0.05$),on fecundity ($p = 0.0001 <<< 0.05$), and no influence on prolificacy ($p = 0.074 >> 0.05$).

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Importance of Kilis Goat Breeding in Turkey

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Introduction

According to data from the Statistical Institute of Turkey in 2018, Turkey has approximately 11 million goats. In this current statistics, 98% of these goats are Hair goats and 2% of them are Ankara (Angora) goats (Tuik, 2019). As is well known by the goat breeding sectors' stakeholders there are different breeds such as Kilis goat, Damascus goat, Honamlı goat, Norduz goat, Abaza goat except of these two breeds in Turkey (Anonymous, 2018).

Population size of Kilis goat that is one of these breeds is estimated about 500 thousand heads. Kilis goats have 316-376 liters milk yield per lactation and multiple birth rate of 32-36% under semi-intensive breeding conditions (Keskin et al., 2017). These goats can be raised in different geographical areas from mountainous, rugged, shrub-type pastures to hot plain areas due to the strong hoof structure and udder type that does not sag too much towards the ground. Different studies have been done for many years for goat breeding in Turkey. Dairy goat breeds imported from other countries have been used especially in crossbreeding studies,.

In this study usage possibilities of Kilis goats in the goat breeding in Turkey were evaluated.

1. Breeding of Kilis goat by selection
2. Kilis goat usage in genetically improvement of Hair goat
3. Usage of Damascus goat and Kilis goat crossbreds to meet breeding stock material needs in hot and humid areas

Breeding of Kilis goat by selection

In order to genetic improvement of Kilis goat with high variation in milk yield, a project has been prepared in cooperation with the Ministry of Agriculture and Forestry, universities and sheep and goat breeders associations. It was informed that Kilis goats had 347 liters milk yield per lactation and the highest and lowest group average was 223.6 liters and 477.9 liters, respectively in an article carried out with 1953 head goats from this project (Keskin et al., 2017). High quality breeding materials should be produced and distributed to the breeders within the scope of this project.

Although high quality goats have been identified within the scope of the project, the success of elite herd has not been achieved yet. In order to solve this problem and achieve permanent successes in goat breeding, a state farm within the General Directorate of Agricultural Enterprises (TIGEM) should be established in Kilis. In this farm, elite goat flocks should be formed with animals selected from the best individuals of Kilis goats in the region. Breeding stocks to be raised should be distributed to breeders in the region. In the next stage, semen should be collected from progeny tested bucks and artificial insemination stage should be started.

Kilis goat usage in genetically improvement of Hair goat

Hair goat is known for its milk and fertility in low quantities (Özcan, 1989; Ataç, 2014). Many studies have been carried out for improvement of milk yield by crossbreeding with different breeds, which are generally grown in mountainous, rugged and high altitude areas, in or near forestland (Özcan, 1989). In these studies, Saanen and Alpine goats, which have high milk yield and litter size under intensive conditions, were generally used as sire stock. The genotypes obtained at the end of these studies were able to achieve the desired yield under semi-intensive or intensive conditions. On the other hand, Hair goat breeders in Turkey don't give additional feed to animals as a requirement of livestock cultures. In other words, Hair goat breeding is done extensively. Under these conditions, Kilis goats should be recommended as sire material in crossbreeding studies for Hair goats. Kilis goat and Hair goat crossbreeding studies should be done with different blood rates in different regions and studies with positive results should be recommended to breeders.

Usage of Damascus goat and Kilis goat crossbreds to meet breeding stock material needs in hot and humid areas

Damascus (Shami) goats are known with high milk yield and litter size in the Eastern Mediterranean Part of Turkey (Keskin and Biçer, 2003). Damascus goats are adaptable to high temperatures and are reared in plain areas (lowlands). The breed are also capable of benefiting from pastures in arid areas (Tatar et al., 2019). In order to meet the breeding material needs of goat breeders in hot and humid or arid regions, Damascus and Kilis goat crossbreds in different blood grades can be used. In this context, projects should be prepared and financially supported by the relevant units of the state.

Conclusion

Kilis goat is an important genetic material for Turkey. In the regions where goat breeding is carried out in our country, it would be appropriate to use this breed as pure breed or in crossbreeding studies.

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The Effect of PMSG Hormone Application on Reproductive Efficiency in Different Periods in Kilis Goats together with PGF2α

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Abstract: A total of 120 does were separated into the designated groups according to the administration of PMSG prior to the second PGF2-alpha ($PGF_{2\alpha}$) injection to obtain an alternative hormone protocol in order to increase oestrous control and reproductive efficiency in Kilis goats. Goats in control group were managed under the breeder's conditions from mating to weaning after birth. Prostaglandin F2-alpha was primed twice with interval of 11-days (on August 11 and August 22, 2017) at 12:00 pm. Pregnant mare serum gonadotropin (PMSG, 500 IU) was injected at 24, 18, 12, 6 and 0-hours prior to the injection of $PGF_{2\alpha}$ to the groups. After the second $PGF_{2\alpha}$ administration, goats in heat were detected by a teaser buck and mated in 12 and 24-hours. The highest twinning rate was obtained in the 12-hour group.
Keywords: PGF2α, Fertility, Kilis goat

Introduction

The proportion of the goat population in ruminant animals is growing from day to day when compared to other animal species (1987-2017). Growing world population and the importance of the nutritional value of goat products are the main reasons in this increase. It is also claimed that goats may have advantages over sheep and cattle in the next years considering global climate changes (Koluman and Silanikove, 2018).

The number of goat breeders tended to increase and many goat farms were established in recent years in Turkey in line with the worldwide trends. Kilis goat is an important gene source of Turkey that adopted to extensive conditions. A major problem of this system is that bucks are kept in the flock throughout the year in lack of a mating program (Amaranditiz et al., 2004; Rahman et al., 2008; Doğan et al., 2008; Karaca et al., 2009; Alexander et al., 2010; Gökdal et al., 2011; Romano et al., 2017). It is possible to synchronize the oestrus with the buck effect and the use of hormones during normal mating season. Various hormones ($PGF_{2\alpha}$, PMSG, eCG, FSH-P etc.) used together or separately for synchronisation in practice for this purpose (Fonseca et al., 2005; İbiş and Ağaoğlu; 2016; Omontese et al., 2016). However, no such practices commonly used in goat breeding in Turkey under conditions of extensive breeding system.

This study was carried out on Kilis goats using PGF2α and PMSG combination in order to synchronize oestrus and increase litter size.

Material Method

A total of 120 heads of Kilis goats were divided into 6 groups. The first group was Control, did not receive any hormone, and raised under the traditional mating system. $PGF_{2\alpha}$ (Dinoprost trometamin, 5 mg, IM, Dinolytic, Pfizer) was applied two times to the goats with 11 days interval (day 0 and 11. days) for the rest without considering the groups. PMSG (500 IU) was introduced 24 h (PM24), 18 h (PM18), 12 h (PM12), 6 h (PM6) before second injection of $PGF_{2\alpha}$ and at the same time with the second injection of $PGF_{2\alpha}$ (PM0) in experimental groups (Figure 1).

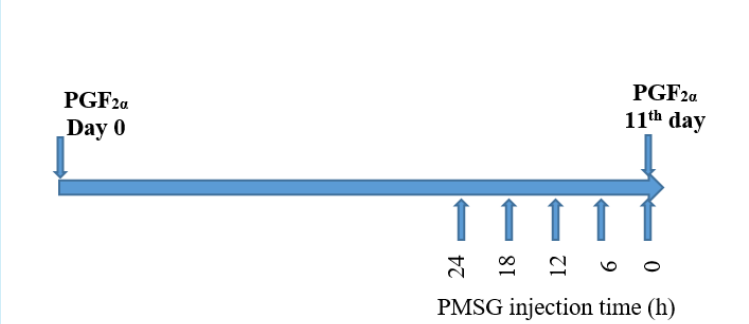

Figure 1. Hormone administration protocol

Teaser buck was left in the flock for the detection of does in heat after second injection of $PGF_{2\alpha}$. The goats in heat were observed at least twice a day, and were considered to be in heat when they mated by the buck. Oestrus date and times were recorded for each doe in all groups and one buck was allowed to mate with a maximum of 5 does during joining.

The goats were grazed as a flock during day time and fed with concentrated feed containing 16-18% crude protein and 2600 kcal metabolic energy (ME) in addition to pasture (500 g/day per animal). Water was available before and after the grazing period. Kids were weaned on day 60 and fed with concentrated feed containing 16-18% crude protein and 2600 kcal ME as from two-week age. Data obtained from experiment was analysed using SPSS 22.0 for windows.

Results

The effects of hormone administration protocols on estrus synchronisation in experimental groups was shown in Table 1.

Table 1. Average estrus time in hormone treatment groups (hour)

Groups	n	X̄±Se	Min.	Max.
Control	20	126.9 ± 14.3^{b}	50.5	300.0
24 h	20	104.2 ± 8.35^{ab}	30.0	154.5
18 h	19	76.9 ± 8.52^{a}	10.0	144.0
12 h	19	98.7 ±11.43^{ab}	12.0	176.0
6 h	19	74.9 ± 10.34^{a}	12.0	178.0
0 h	20	100.9 ± 11.00^{ab}	11.0	173.5
P		**<0.05**		
Control	20	126.9 ± 14.3	50.5	300.0
$PGF_{2\alpha}$	97	91.4 ± 4.56	10.0	178.0
P		**<0.01**		
Overall	117	99.1 ± 4.70	10.0	300.0

The very first average heat was observed in the PM18 group (76.9 hours) and the latest in the PM24 group (104.2 hours) (Table 1). This value was higher in the control than those in the hormone groups (126.9 hours). The earliest time to the first estrus was observed in PM18 (10 hours) and the latest was in PM24 (30 hours) group. The early first estrus time was 50.5 h in Control group ($P<0.05$).

Single, twin and triplet birth rates were calculated according to birth and shown Table 2.

$PGF_{2\alpha}$ and its analogues are available for corpus luteum (CL) regression and estrous synchronization only in breeding season in small ruminants due to their luteolytic properties (İbiş and Ağaoğlu, 2016; Romano et al., 2017; Meidan et al., 2017). Our findings in this study are similar to Greyling and Van Niekerk (1991) and Keskin (2003) findings.

Table 2. Some reproductive characteristics and effects of hormone protocol on birth type (%)

Characteristics	Control	24 h	18 h	12 h	6 h	0 h	P
Infertility	24.0	28.0	32.0	28.0	40.0	36.0	>0.05
Survival	95.5	95.5	100.0	92.0	100.0	94.4	>0.05
Single	64.3	53.7	66.7	46.2	50.0	63.6	>0.05
Twin	28.6	38.5	25.0	53.8	50.0	27.4	>0.05
Triplet	7.1	7.8	8.3	0.0	0.0	0.0	>0.05

The highest infertility rate was determined in the PM6 and PM0 (40 h and 36 h, respectively), the lowest in the control group ($P>0.05$) and the highest rate of twins was obtained in the PM12 whereas the lowest was in PM0 group ($P>0.05$). When we investigate the effects of hormone protocols on birth type, PM12 group exhibited the highest twin rate (53.8%) and PM0 had the lowest (27.4 %). Triple birth was occurred only in PM24 and PM18 groups, no triplets were yielded in the PM0, PM6 and PM12 groups ($P>0.05$). Survival rate from birth to weaning was shown in Table 2. According to the table, the best survival rate was observed in PM6 group (100%) whereas the worst was in PM12 (92%) group.

PMSG hormone stimulates high expression of FSH and low LH surges in the estrous cycle (Hancı, 2006). With the beginning of the CL regression towards the end of diestrus period, a new graaf follicle begins to form and by the end of this period, the oestrogen released from the developing follicle stimulates the expression of PGF2α and provides regression of corpus luteum (Titi et al., 2010; Saleh, 2011). It is well known that the effects of PMSG hormone on reproductive characteristics in goats. In addition, it has been stated that PMSG administration together with $PGF_{2\alpha}$ increases the yield in different studies. Our data obtained from this study in accordance with the other researchers (Öztürkler et al., 2003; Sözbilir et al., 2006; Ocak, 2007; Yadi et al., 2011; Elmarimi et al., 2015)

Conclusion

As a consequence, the most intensive synchronization obtained from the hormone protocols was in the PM18 and PM6 groups, which followed by the PM12 and PM0. Infertility rate was high. Therefore, authors claim that the infertile goats should be serviced again to prevent infertility.

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Hatay Goat

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Introduction

Goat breeding has always been an important and basic source of production as an alternative to income in difficult crop production and hard climatic conditions in our country. The goats can be easily convert even low quality plant resources into protein with its morphological and physiological characteristics. With the developing technology in the world, the existing of a new gene source is determined day by day. Damascus, Kilis and Hair (Kıl) goats are grown intensively in Hatay province. However, in the Yayladağı district of Hatay, there is a Kilis x Hair crossbreed variety apart from these breeds (Keskin and Biçer, 1997). The academicians working in the department of sheep breeding and animal nutrition in Hatay Mustafa Kemal University Agricultural Faculty, Department of Animal Science in the region have carried out different studies on this breed since 1995 and they continue to do so.These studies on Hatay goat were evalauted in this review.

Reproduction and growth characteristic of Hatay goat

The studies on reproductive characteristics of Hatay goats were given in Table 1, which is studied by the academicians, who are active working on small ruminant and animal nutrition section in the Hatay Mustafa Kemal University.

Table 1. Some reproductive charactersitics of Hatay Goats in different farms (%)

Charactersitics	Keskin and Biçer (1997)		Kaya (1999)	Gül (2008)	Keskin et al., (2016)
	Yalaz	Sungur	Sungur	Şenköy	Yalaz
Fertility	96.7	97.6	100	100	---
Kidding rate	113.3	112.9	---	131.17	120
Survival rate	97.1	97.9	---	97.61	92.3
Single birth	82.8	84.3	53.84	73.20	50
Multiple birth	17.2	15.7	46.16	26.80	50

It can be seen in Table 1, according to different farm (Yalaz, Sungur, Şenköy), four different studies have showed similar results with regard to reproductive characteristics. A remarkable point of the study is the multiple birth rates are at satisfactory levels. The situation is an important feature in terms of income of farm economy. In addition, the high survival rate of the kids at weaning accept as an indication to high and sufficient milk yield of goats. Our findings are in accordance with statements of Karakuş (2016) for Saanen ve Kıl goats, Ünalan ve Ceyhan (2017), Daşkıran and Yılmaz (2018) and Özdemir ve Keskin (2018) for Kilis goats.

Average birth and weaning weight in Hatay goats kids were given Table 2.

Table 2. Growth performance of kids (kg)

Charactersitics	Kaya (1999)	Gül (2008)	Keskin ve ark., (2016)
Birth weight	3.1	2.9	3.5
Weaning wweight	10.6	11.3	10.7

When evaluated the researcher's reports for Hatay goat kids in terms of birth weight and weaning weight, it was seen similar with other reports (Özdemir and Keskin, 2018; Erten ve Yılmaz, 2013).

Morphological and physiological characteristics

It were reported that according to the Keskin and Biçer (1997)'s Yalaz and Sungur, Gül (2008)'s Şenköy in Yayladağı district of Hatay, the body colors of Hatay goats were black, brown, gray and they have different tones, medium and long ears, male and females can be horn and hornless.

Body measurement results obtained from same studies are given in Table 3. According to the this table, it is seen that Hatay goats has similar body measurements with Hair and Kilis goats (Keskin, 2010; Özdemir ve Keskin, 2018), but smaller than Damascus goats (Keskin, 2000). In terms of live weight, it is stated similar with the Kaya (1999)'s study.

Table 3. Body measurements in Hatay goats (cm)

Measurements	**Yalaz**	**Sungur**	**Şenköy**
Body weight	---	---	39.3*
Withers height	69.14	68.50	73.2
Rump height	69.50	69.66	73.3
Body lenth	63.57	64.83	66.2

Hearth depth	30.71	28.50	29.0
Hearth width	14.43	14.66	14.8
Hearth circumference	90.38	90.33	81.1

* 1st parity

In addition to fertility criteria in goats, milk yields are important in terms of production and profitability. The values of milk yields in the studies conducted by the same researchers in the region are given in Table 4.

Table 4. Lactation period and marketable milk yield.

Characteristics	Keskin ve Biçer (1997)	Kaya (1999)	Biçer ve ark., (2005)	Gül (2008)	Keskin ve ark., (2016)
Lactation period (day)	163.3	217.6	210	209.7	180*
Marketable milk yield (kg)	116.8**	134.9**	151.1*	212.1*	298.6*

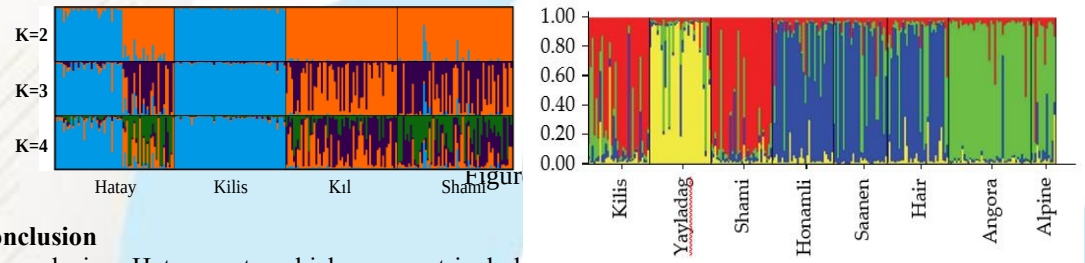
*weaning weight at 90 days; **weaning weight at 75 days

Milking in goats starts at 75-90 days after weaning in Hatay and surrounding provinces. As can be seen in the table 4, marketable milk yield in Hatay goats can reach up to 300 liters, according to researchers. This value is satisfactory in indigenous goat breeds. Because, marketable goat milk was determined that between 315-375 kg for Kilis goats (Keskin et al., 2016; 2017), 315-375 kg for Damascus goats (Keskin, 2000), 109 between 109-146 l for Hair goat (Erten and Yılmaz, 2013b; Şimşek et al., 2006). Hatay goats have higher milk yields than hair goats and close with Kilis goats and Damascus goats.

Genetic studies

The faculty members of the Mustafa Kemal University Agricultural Faculty, Department of Animal Science, who are active working in the field of Hatay goats, have demonstrated the morphological and physiological characteristics of this breed with different studies. (Keskin and Biçer, 1997; Kaya, 1999; Biçer et al., 2005; Gül, 2008; Keskin et al., 2016; Keskin et al., 2017). The same study team started to work on the underinvestigated genetic characteristics of the breed as from 2017 and showed the difference apart from the Damascus, Hair and Kilis goats in the region (Gul et al., 2019). This results are revealed by Gul et al., (2019) in good agreement with reports of Bulut et al., (2016) (Figure 1).

Gul at al., (2019) Bulut et al., (2016)



Figur

Conclusion

In conclusion, Hatay goats, which were not includ ene pool for our country. Because, Hatay goats can give higher milk yield and offspring more than Hair goat under extensive conditions. For this reason, this breed should be considered as a gene source and studied for in breeding goat breeds in our country. At the same time, the adaptation and yield characteristics of this breed should be investigated in different region and be informed interanationally.

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Comparison of Fattening and Carcass Characteristics of Different Sheep Breeds under the Conditions of Eastern Mediterranean Region

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Introduction

As can be seen from the red meat crisis that is being experienced in recent years, Sheep farming is indispensable and not neglected for Turkey. Both climate and geographical conditions indicate that sheep breeding should be expanded. While doing this expendation, different breeds should be used for different regions to increase milk yield, fattening performance and litter size of local breeds.

Sheep farming in the province of Hatay located in Turkey's eastern Mediterranean region is usually done by Awassi (İvesi) and White karaman (Akkaraman) sheep. Awassi sheep had a twining rate of 10-20% (Özcan, 1989; Gül and Keskin, 2010), milk yield of 116.5 kg during the 150-day milking period (Biçer et al., 2019) and a daily weight gain of 213-232 g (Şahin et al., 2003). While Merino crossbreds which are reared in Central Anatolia and Marmara region are known with their good fattening performance, Kıvırcık sheep which are reared in the Marmara region are known with their high meat quality in Turkey (Özcan, 1989).

In this study, fattening performance and some carcass characteristics of Kıvırcık, MeriosxWhite Karaman Corssbreds and Awassi sheep each of which are breeds of different regions were compared in Hatay region.

Material and Methods

This study was carried out at Livestock Research and Training Farm of Mustafa Kemal University. Animal material of the study, which are 12 heads and males from each breed group, were consisted of Awassi lambs, Konya Merino lambs (Merino x White Karaman) obtained from Konya and Kıvırcık lambs obtained from Çanakkale. Ration containing 15.04% of crude protein and 2481 kcal ME per kg dry matter was consumed individually and ad libitumly by the lambs. The fattening lasted for 9 weeks (63 days). The animals were weighed for three days at the same time and on a full stomach to determine the initial live weigh. The animals were weighed once a week on the same day and hour with 100 g precision weigher in order to follow the development during the fattening period. Live weight changes and daily live weight gains were calculated weekly and throughout the whole fattening period by using these values,. For the determination of feed consumption, feed was weighed at the same time daily and given to animals. Before the new feed was given, the remaining feed in the feeder was weighed and the daily feed consumption of each animal was determined from the difference between the feed given and the feed left in the feeder. During the study, the interior of the pen was continuously illuminated. Lambs were allowed to reach the water whenever they wanted. At the end of fattening, in order to determine the carcass composition and carcass characteristics of the groups, 3 lambs in each group close to the average of live weight were slaughtered. The animals were fasted during approximately 12 hours before slaughtering and slaughter weights were determined. Carcasses were stored at +4 °C for 24 hours. At the end of this period, cold carcass weights and different carcass measurements were taken by Standard Method developed for Mediterranean Countries in reported by Güney et al., (1990).

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Results and Discussions

In the experiment; Kıvırcık lambs from Marmara region and Merino x Akkaraman crossbreds from Central Anatolia region were brought to Amik plain which is the normal breeding area of Awassi and fed under the same conditions. Since the breeding periods of these breeds were different in the original breeding area, the weights of lambs in the groups were different at the beginning of fattening. For this reason, fattening performances of the breeds were determined in Amik plain conditions. No comparison was made among breeds.

Some fattening properties in the experiment are given in Table 1. As seen in Table 1, In terms of live weight gain during the fattening, Kıvırcık, Merino crossbreds and Awassi lambs gained 15.1 kg, 15.6 kg and 17 kg live weight respectively. Awassi lambs gained more live weight than other groups with the affect of that it is an animal of the region. Daily live weight gain values in fattening were consistent with those reported for Kıvırcık, Awassi and Merino crossbred lambs by different researchers (Eliçin et al., 1984; Torun et al., 1992; Şahin et al., 2003; Altın et al., 2005). Feed conversion ratio for all groups was calculated as similar.

Table 1. Some fattening characteristics for breed groups (mean ± standard error).

Items	Kıvırcık	Merino crossbreds	Awassi
Initial weight (kg)	22.6 ± 0.73	33.7 ± 1.06	25.5 ± 0.66
Final weight (kg)	37.7 ± 0.88	49.3 ± 1.67	42.5 ± 1.00
Avarage daily gain (g)	240.5 ± 8.32	246.9 ± 8.60	269.8 ± 9.19
Feed conversion ratio	5.7 ± 0.27	5.6 ± 0.24	5.4 ± 0.23

As seen in Table 2, that shows some slaughter and carcass characteristics of the groups, hot dressing percentage was

calculated as %50.5, %49.5 and %50.3 for Kıvırcık, Merino crossbreds and Awassi lambs, respectively. It is seen that the characteristics given in the Table regarding the carcass are consistent with the results reported by various Researchers (Güney and Özcan, 1982; Güney and Biçer, 1985; Akgündüz et al., 1993; Demir, 2001; Keskin et al., 2007). The highest muscle ratio was determineded for the Merino crossbreds and the highest fat ratio was found in Awassi lambs.

Table 2. Some slaughter and carcass characteristics for breeds groups (mean ± standard error).

	Kıvırcık	Merino crossbredss	Awassi
Slaughter weight (kg)	35.9 ± 0.23	46.7 ± 0.95	38.9 ± 0.71
Hot carcass weight (kg)	18.2 ± 0.31	23.1 ± 0.35	19.6 ± 0.46
Hot dressing percentage (%)	50.6 ± 1.14	49.5 ± 0.82	50.3 ± 0.53
Cold carcass weight (kg)	18.0 ± 0.30	22.8 ± 0.36	19.3 ± 0.15
Cold dressing percentage (%)	50.1 ± 1.13	48.9 ± 0.90	49.6 ± 0.53
Bone (%)	20.3 ± 1.12	18.8 ± 1.06	16.5 ± 0.93
Muscle (%)*	44.6 ± 2.29[a]	48.6 ± 2.33[b]	44.9 ± 2.48[a]
Sub cutaneus fat (%) *	16.9 ± 1.10[a]	15.9 ± 1.01[a]	19.5 ± 0.73[b]
Intramuscular fat (%)	14.5 ± 0.50[a]	13.4 ± 1.49[a]	11.7 ± 1.03[b]
waste (%)*	2.9 ± 0.33[a]	2.7 ± 0.22[a]	3.7 ± 0.42[b]
Evaporation loss (%)	0.7 ± 0.14	0.6 ± 0.10	0.7 ± 0.16

*P<0.05

Conclusion

It will be beneficial for the breeders who make lamb fattening in Amik plain to benefit from different breeds besides Awassi. Yavuz et al. (2019) published the adaptation part of this study. In this publication, it was stated that Kıvırcık and Merino crossbredss do not have any adaptation problems in the region. The fattening performances of the breeds identified in the current study indicate that they can be reared in the region. As conclusion, Kıvırcık which is the best native sheep breed in terms of meat quailty and the Merino crossbred lambs which have higher muscle proportion in carcass could be recommended to breeders in Amik plain for fattening in addition to Awassi lambs.

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Sex discrimination in budgerigars (*Melopsittacus undulates*)

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Introduction

The budgerigar (Melopsittacus undulatus), a member of the parrot family, is native to Australia. Due to their appearance, they are fed intensively as a pet animal (Wyndham, 1980). The original colors are light green. It was first domesticated in England in 1850 and then scattered throughout the world. The variety of colors in budgerigars is composed of two basic color series, blue and green. In budgerigars, all colors and patterns are occured by the change of these two series. Birds are sexually divided into two classes as dimorphism and monomonophysm. Sexual dimorphism; The difference between the male and female individuals of a species in terms of body size and shape and color or pattern. Therefore, the gender of dimorphic birds can be determined by morphometric analysis (factors such as height, weight and feather coloration) (Cerit and Avanus, 2007). Morphometric analysis method has many advantages such as being fast, cheap and can be applied outside the reproductive season (Nugroho and Zein, 2015). However, it is not advantageous to use morphometric analysis method for sex determination in monomorphic birds. Because the morphometric differences in monomorphic birds are negligible. External morphological structures can be used to determine the sex of budgerigars (Mischler et al., 2015).

In budgerigars, gender can be determined by looking at cere color, sound, behavioral characteristics and foot and leg color. In addition, gender is determined with the help of bird's DNA and endoscopic surgery (Cerit and Avanus, 2007).

The sex of the budgerigar can be estimated by looking at the cere color. It is known that the color change on the cere found in these birds is caused by testosterone in the bird's structure (Lahaye et al., 2014). Cere is located better upper beak and nostrils, as coverage (Adajar et al., 2011).

Budgerigar breeding is crucial for the effort to maintain the needs of pet ownership and to compensate their presense in the wild. Breeding of domestic budgerigars is a promising sector due to ease of care and high commercial value of birds. Identifying gender is crucial for efforts to increase the population (Yakubu, 2011). In addition, gender determination eliminates the risk of commercial disputes, contamination due to unnecessary animal movement and transport of diseases between businesses.

Ornamental animals are of great importance in their countries in terms of their number and economic potential. In developed and developing countries, it is observed that with the increase in the level of living and prosperity, the animal ownership rate of people has also increased. In our country, it has been determined that the rate of pet ownership has increased in the last seven years 25% (Anonymous, 2019). The trade of ornamental animals, which has contributed greatly to the economy of the country, also manifests itself in international trade. When the import figures are examined in our country in the last year, the size of the pet import figures is not overlooked.

In this context, the number of pets cared for in our country; 12 million birds (65-70% budgerigar), 3 million fish, 3 million cats, 1.5 million dogs and other animal species are around 500 thousand (Anonymous, 2019). Budgerigars are among the most preferred pets because of their easy maintenance and bright and attractive color.

In this study, it is aimed to determine the most common and the least error method of sex determination in budgerigars in Kırşehir. In this way, it is thought that in budgerigar breeding, it will make positive contributions in solving problems that may arise due to gender, eliminating disputes arising from trade, and combating animal diseases and pests. In addition, the size of the budgerigar population, economic value, and because of the small number of academic studies on this subject is thought to contribute to the relevant field.

Materials and methods

The material of this research consists of Home and Ornamental Animals Sales Offices licensed by the Ministry of Agriculture and Forestry in Kırşehir. As research phases; Firstly, literature information was collected. Then, the sales places to be visited were determined and visits were made to the sales places. Information about the methods and techniques used to determine the sex of budgerigars was obtained and photographs were taken to be used in the study. Within this scope, sales places were visited. The information provided by the sales place owners about the methods and techniques were collected.

Results

In this study, it was determined that sex determination methods are widely used in Kırşehir by looking at Cere color, sound feature and behavioral characteristics. These methods are widely used worldwide.

Gender determination based on cere color is the most commonly used method in Kırşehir sales points. It is determined that this method has similarities with the method used in the world. Gender determination is based on color differences in cere. Cere; is the anatomical structure of the birds' beak, which has a different color than the beak, in which the nostrils are opened. Adolescent budgerigars usually appear as cere blue and shades, yellow, white and shades.

In male budgerigars, the cere color is usually blue and navy blue (Picture 1). In male birds, cere colors do not change much after reaching adulthood, and generally remain the same. As shown in Picture 2, cere is generally yellow and white in female budgerigars.

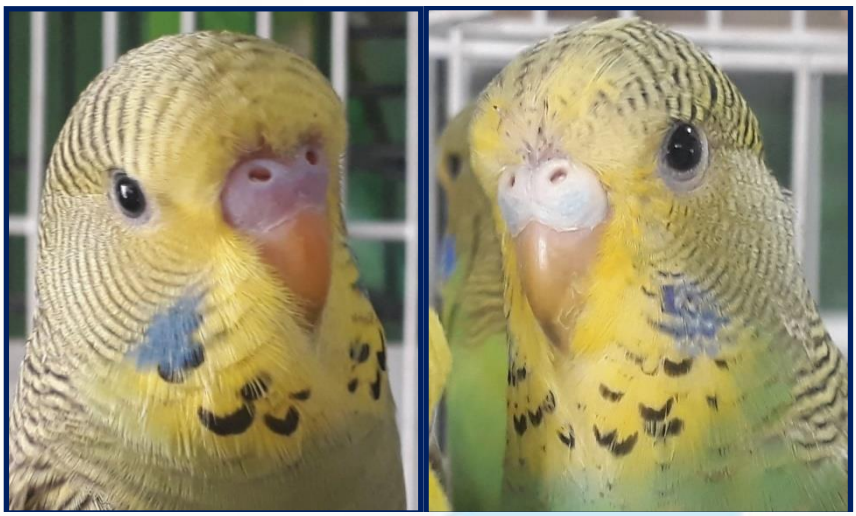
Picture 1. Cere colour in males

Picture 2. Cere colour in females

Female budgerigar's cere color is reddish dark brownish in appearance. It is seen that this color gradually turns on and returns to its original state after the anger period has passed (Picture 3). Gender determination in adolescent budgerigars is made by looking at the color differences in cere.

Picture 3. The changes of cere colour in females

Until 4-6 months old, all the budgerigar's cere colors are similar. However, if the nostrils of the young budgerigars are examined carefully, the sex of even the ten-day-old offspring can be distinguished. As shown in Picture 4, although all pups are purple or pink in color, there is a white ring around the nostrils of the female pups. The presence of this ring is used to determine the gender of baby birds.



Picture 4. Cere colour changes in baby chicks

In addition, sex determination in albino, lutino and some recessive-pied, clear and spotted budgerigars is made by looking at the pink or purple cere color in males and white cere color in females (Picture 6). It has been determined that the owners of Home and Ornamental Animals Sales Places licensed by the Ministry of Agriculture and Forestry in Kırşehir perform gender determination by looking at similar characteristics.

Picture 6. Lutino and Albino birds

Gender determination according to voice; it is known that male budgerigars sing and talk more, whereas females are silent. Because of this feature, it is seen that those who speak and speak much are considered male, and those who speak little are considered female. Because of the high error rate when using this feature alone, it was found that this method is used mostly in cere color hesitations in addition to cere color to increase the accuracy rate.

Gender determination based on behavioral characteristics**,** male birds are more mobile, females are more calm. This is the least used method. It was found to be used to support other methods.

At the end of our research; They use the methods of gender determination based on Cere color, Sound and behavioral characteristics of the bird, which is widely used in the World of Home and Ornamental Animals Sales Offices licensed by the Ministry of Agriculture and Forestry in Kırşehir. Although they knew the method of gender determination by looking at the color of foot and leg, it was determined that they did not use this method. The other two methods, bird DNA, and endoscopic surgery were not known and not used.

To conclude, the production and breeding of budgerigars should be taken under control because of the contribution of budgerigars to the national economy, causing animal love in humans, and communication and sharing in young children positively. In addition, it was considered that updating existing legislation and increasing its applicability, to investigate the feasibility of early detection of gender determination which is important for bird breeding, ensuring the training and education of the people engaged in production and cultivation and putting them as an elective course in zootechnical curriculum.

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Age Determination in Budgerigars (*Melopsittacus undulatus*)

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Introduction

The outer appearance of the budgerigars (Melopsittacus undulatus), the smallest member of the parrot family, is remarkable. These features are the most preferred reason (Wyndham, 1980). It was domesticated in England in 1850. Budgerigars are 18 cm tall and their beak is short and thick. They make 4-6 eggs in each breeding season. The incubation period is 18-21 days. The pups leave the nest after 30-35 days. During this period, they are fed with crop milk by the mother until they become self-sufficient. They reach maturity in about 6 months (Petek, 2004).

Budgerigar breeding is crucial for the effort to meet the needs of pet ownership and to reduce supplies in the wild. Breeding of domestic budgerigars is a promising sector due to ease of care and high commercial value of birds. Determination of bird age is very important for increasing the population (Yakubu, 2011). In addition, age determination eliminates the risk of commercial disputes, contamination due to unnecessary animal movement and transport of diseases between businesses.

Budgerigars, which have an average life of 8-10 years, have no significant differences in their physical appearance, except minor differences (Skinner et al., 1997). This demonstrates the partial utility of morphometric properties in determining the age of budgerigars. In this context, age-dependent changing anatomical and morphometric characteristics are used in age determination of budgerigars. In general, features such as forehead lines, eye, cere color and cheek spots are evaluated in budgerigars.

It was reported that the color of feathers in budgerigars may be caused by melanin and carotenoids in the feathers due to growth (Griggio et al., 2009). Budgerigars are hairless when they hatch. At 7 or 8 days, pubescence begins and on day 10, the color of the bird becomes clear (Wyndham, 1980). There are forehead lines in the young budgerigars. These lines, as the age progresses, the lines are replaced by forehead hairs. It takes about 1 year. These changes in forehead lines give periodic information about the age of the bird. In addition, as the bird's age progresses, the spot and marks on the cheek grow as field and its visibility increases.

It was reported that the changes in the eyes of budgerigars are a reproductive indicator reflecting the age of the birds (Lind et al., 2013). In the budgerigar, the iris layer in the eye is initially large and covered in the eye, but as the age progresses, it shrinks into a gray and white ring towards the center. This difference is used in age determination in budgerigars.

The sex of the budgerigar can be estimated by looking at the cere color. Furthermore, differences in cere periodically help to determine age. Cere of budgerigars are covered the upper beak and nostrils (Adajar et al., 2011). In these birds, color change occurs on cere due to testosterone released with puberty (Lahaye, 2014).

Budgerigars are of the great importance in terms of their numbers and economic potential. It increases the interest in the budgerigar in order to meet the desire for animal ownership which is formed with the increase in welfare level (Anonymous, 2019). Ornamental animals, which contribute to the economy of the country, also show themselves in international trade. When the import figures are examined in our country in the last year, the size of the pet import figures is not overlooked. In this context, the number of pets cared for in our country; 12 million birds (65-70% budgerigar), 3 million fish, 3 million cats, 1.5 million dogs and other animal species are around 500 thousand (Anonymous, 2019). Budgerigars are among the most preferred pets because of their easy maintenance and bright and attractive color.

The aim of this study was to determine the most commonly used age determination methods in budgerigars in Kırşehir. In this way, it was thought that it will make positive contributions to the solution of problems such as feeding, breeding selection and sifting that may arise in budgerigar breeding, elimination of disputes arising from trade and combating animal diseases and pests. In addition, the size of the budgerigar population, economic value, and because of the small number of academic studies on this subject is thought to contribute to the relevant field.

Materials and methods

Before technical visit, the information on age determination was collected. Selling places to visit later were determined. Within this scope, technical visits was made to Home and Ornamental Animals Sales Offices licensed by the Ministry of Agriculture and Forestry in Kırşehir. Information was obtained about the methods and techniques used by budgerigars for age determination and photographs were taken to be used in the study. For age determination, birds were observed by looking at features such as forehead lines, eye, cere color and cheek spots.

Results

In this study, it was determined that sex determination methods are widely used in Kırşehir by looking at cere color, sound feature and behavioral characteristics. These methods are widely used worldwide.

Gender determination based on cere color is the most commonly used method in Kırşehir sales points. It is determined that this method has similarities with the method used in the world. Gender determination is based on color differences in cere. Cere is the anatomical structure of the birds' beak, which has a different color than the beak, in which the nostrils are opened. Adolescent budgerigars usually appear as cere blue and shades, yellow, white and shades.

In male budgerigars, the cere color is usually blue and navy blue (Picture 1). In male birds, cere colors do not change much after reaching adulthood, and generally remain the same. As shown in Picture 2, cere is generally yellow and white in female budgerigars.
The age determination based on the forehead lines is a commonly used method in Kırşehir sales points. Age detection is the method indexed to the change in birds' forehead lines. Provides periodic information. In budgerigars, forehead lines start after the first 10th day and as the age progresses, the lines are replaced by forehead hairs. Forehead feathers are white in blue birds and yellow in green birds (Picture 1).

1-2 months 3-4 months 5-6 months 8-9 months 1-+ adolescents
Picture 1. Age-related forehead line changes in budgerigars

The age determination method by eye was found to be as widespread as the age determination by looking at the forehead lines in Kırşehir. Depending on the age of the budgerigar, some changes occur in the iris layer of the eye. In the first 6 months, the eye is covered by the iris. As the age progresses, the iris withdraws towards the centre. Initially, the color of the ring formed around the iris is grey, but it turns white as the age progresses (Picture 2).

0-6 months 8-12 months 1-2 months 2-3 years old
Picture 2. Age-related iris change in budgerigars

Determining age by looking at the color of the cere, is used in the separation of juvenile and adolescent birds in Kirsehir. Cere colors of all baby budgerigars are similar until they are 4-6 months old. The cere color of the baby birds is purple or pink. However, as the age progresses, depending on puberty, male birds have a blue-navy blue color, while females have a white, yellow color (Picture 3). Determination of age by looking at cheek spots is the least used method in Kırşehir. The budgerigars have an equal number of spots on the left and right cheeks. In young budgerigars, these spots are very small and faint, but with the age of the bird, they become larger and more pronounced (Picture 4).

Picture 3. Chicks and juvenile

Picture 4. The changes in cere color and cheek spots

Ornamental Animals Sales Locations licensed by the Ministry of Agriculture and Forestry Home were not used any registration or identification system. It was determined that age was determined by evaluating features such as forehead lines, eye, cere color and cheek spots.

Since animal registration systems and identification processes are widely used in developed countries, the age of the pets is learned by looking at their identity. However, such applications have been not widely used in our country. This causes various problems. Age determination of budgerigars in Kırşehir region is made by looking at features such as eye, cere color and cheek spots. It has been determined that the methods applied do not cause any harm to the bird and they have some disadvantages as well as being easy. There are drawbacks that forehead lines and changes in the eye cannot be present in albino and lutinos. Cere color is limited to adolescent for offspring, and may cause confusion in female birds. The disadvantage is that the cheek spots are also based on estimation.

To conclude, the production and breeding of budgerigars should be taken under control because of the contribution of budgerigars to the national economy, causing animal love in humans, and communication and sharing in young children positively. In addition, it was considered that updating existing legislation and increasing its applicability, keeping the records which is important for bird breeding, identification of birds and if necessary, establishing a foot number system containing the information of birds, ensuring the training and education of the people engaged in production and breeding and putting them as an elective course in zootechnical curriculum.

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SECTION III

POSTER PRESENTATIONS

Birth and Neonate Behaviors in Tahirova Sheep and Turkish Saanen Goats Treated with Melatonin

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Introduction

In small ruminant exogenous hormones implementation are performed more often in order to produce offspring in out off-season. Melatonin is one of the hormones used for this purpose (Kaçar et al., 2016). In the present study, the effects of melatonin implants before the breeding season on some birth behaviors of Tahirova sheep and Turkish Saanen goats were investigated.

Materials and methods

70 Tahirova sheep aged 2-5 years and 50 Turkish Saanen goats aged 2-8 years were used, kept under an intensive production system. Animals divided into two groups as melatonin and control. The study started in June. 18 mg of melatonin was implanted to each sheep and goat. 36 days after the melatonin implantation, teaser rams and bucks were introduced to the female flocks in morning and evening for 45 minute. The females diagnosed with estrus were naturally mated individually. According to mating dates, pregnant animals were brought to individual birthing-stall. The animals accommodated in individual boxes were directly monitored 24 hours. Birth pains and leakage of amniotic fluid were considered to be beginning of the birth. 24 sheep from melatonin group and 31 sheep from control group were observed. These numbers were 23 and 15 for the goats. The observation was performed 60 minutes after the birth. However, if the offspring did not start to suck within this time then were 30 minutes added. Birth behavior characteristics were analyzed in SAS (1999) statistical package program. Behavior data recorded as shown or not shown were analyzed by the Generalized Equation Estimation (GEE) method under binomial distribution. On the other hand, the behavioral data registered as the performed number were logarithmically transformed (log n + 10) to approach them to the normal distribution assumptions. This data were analyzed with ANOVA. Both statistical models included group (Melatonin, Control), age (2, 3, 4, 5≤), type of birth (single, multiple) and, offspring gender (female, male).

Results

While in control sheep the most births took place in daytime (68%), it was in melatonin sheep approximately the half (46% daytime and 54% night) (Fig. 1). However, the most goats give birth in daytime, in which a slightly difference between the groups show by pm and am.

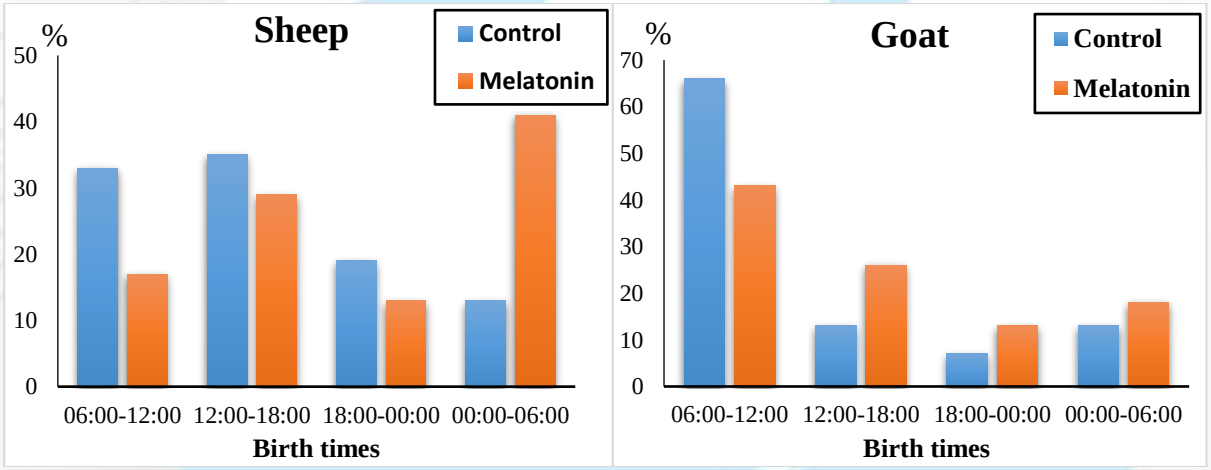

Figure 3. Distribition of birth times of the groups in sheep and goats, %

Most sheep gave birth easily or with little help. Birthing difficulties did not differ between the groups, the types of birth and the genders (Table 1). In sheep, which 50% of the birth position was in standing, the birth positions were similar in terms of the groups, the types of birth and the genders. Approximately three quarters of the lambs had sucking success during the observation period and the suckling success was similar between the levels of effective factors. The most births were also easy or with little help in goats. However, while birth difficulties were similar between groups, birth types and kid genders, differed significantly by doe ages (P=0.0025; Table 1). In single kid births used more aid than the multiple kid births. 80-85% of the goats gave birth by standing. The positions of the births were similar according to group, type of birth and gender in goats. Ratio of suckling success were between 57-65% and similar by groups, type of birth and kid genders, but differed significantly by ages (P=0.0266).

Table 1. Means ± standard errors and P* values of birth difficulty, birth type and suckling success of groups in sheep and goats

Sheep					
	Group			Birth type	Gender
Traits	Melatonin	Control	P	P	P
Birth difficulty	1.15±0.08	1.10±0.04	0.3184	0.1819	0.5303
Birth position	1.50±0.53	1.53±0.50	0.9165	0.3277	0.0832
Suckling success	0.75±0.43	0.73±0.44	0.9285	0.8218	0.1801
Goat					
Birth difficulty	1.16±0.37	1.11±0.32	0.5590	0.0025	0.6758
Birth position	1.19±0.39	1.14±0.35	0.7611	0.9364	0.2948
Suckling success	0.57±0.50	0.65±0.48	0.5697	0.0266	0.1330

* Statistical analyzes were performed according to multinomial distribution. Birth difficulty: Easy, Little assistance, Much assistance; Position of birth: Standing, Lying; Suckling success: Suckled, Non-suckled.

Table 2. Means ± standard errors and P values of treated traits by groups and other factors

	Groups			Age	Birth type	Offspring gender
Sheep						
Traits	Melatonin	Control	P	P	P	P
Duration of birth*, min	24.8±5.43	24.1±4.40	0.6977	0.2142	0.0563	0.3851
Lying before post-partum*, times	5.8±0.97	7.3±1.25	0.1361	0.2140	0.0078	0.9157
Bleating before lambing*, times	79.6±23.47	44.3±7.93	0.6235	0.1316	0.5512	0.7402
Bleating after lambing *, times	108.3±17.11	126.7±17.42	0.1519	0.0070	0.8503	0.6320
Bleating of lamb before sucking * times	34.02±5.81	23.58±3.91	0.0244	0.8983	0.6796	0.0660
Duration between birth and stand up of lamb, min.	24.4±2.07	22.1±2.31	0.3323	0.8544	0.2224	0.0309
Attempts to stand up of lamb before sucking, times	10.4±1.35	12.9±1.14	0.2055	0.9526	0.7802	0.0589
Duration of sucking, min.	45.6±2.84	42.5±2.56	0.2154	0.7751	0.8750	0.5752
Licking before suckle, times	33.6±4.15	48.5±6.10	0.0614	0.3573	0.3545	0.2053
Licking after suckle*, times	11.2±2.29	10.8±2.04	0.5272	0.0533	0.1359	0.9766
Bleating of ewe after suckle *	30.3±9.99	31.0±7.83	0.7345	0.4693	0.1484	0.6913
Bleating of lamb after sucking *, times	3.9±0.76	8.6±1.75	0.0511	0.6536	0.9496	0.6670
Frequency of sucking, times	5.2±0.85	5.8±0.70	0.3764	0.8382	0.6846	0.9823
		Goat				
Duration of birth *, min.	26.4±6.36	30.0±9.50	0.4669	0.0983	0.0485	0.4666
Lying before post-partum*, times	3.5±1.00	3.8±1.36	0.7406	0.6394	0.7039	0.4079
Bleating before kidding*, times	20.4±6.29	73.9±31.97	0.0712	0.9310	0.1695	0.7955
Bleating after kidding*, times	37.8±17.13	27.7±7.05	0.4544	0.8161	0.0036	0.8674
Bleating of kids before suckling*, times	77.02±14.47	67.8±16.57	0.8003	0.4177	0.5129	0.9305
Duration between birth and stand up of kid*, min.	26.8±3.00	18.7±1.79	0.4732	0.8306	0.0044	0.8722
Attempts to stand up of kids before sucking*, times	24.1±2.12	20.1±1.36	0.5394	0.7077	0.3008	0.2898
Duration of sucking*, min.	46.2±4.01	45.6±3.53	0.6422	0.6708	0.0189	0.2540
Licking before suckle*, times	34.8±3.22	39.4±3.95	0.7115	0.5767	0.0540	0.2697
Licking after suckle*, times	9.9±3.03	10.8±2.67	0.1462	0.3924	0.0013	0.8505
Bleating of does after suckle *, times	12.3±10.16	6.8±2.44	0.2743	0.4012	0.0157	0.0887
Bleating of kids after sucking*, times	16.8±5.27	19.7±9.45	0.7537	0.1910	0.0160	0.1136
Frequency of sucking, times	9.6±1.66	9.4±1.59	0.8941	0.5655	0.0594	0.5924

*Logarithmic (y + 10) transformation was applied to the data. Licking frequency before sucking: in 1 hour until suckling; Licking frequency after suckling: in only suckling offspring.

The birth traits of sheep were similar in groups, with the exception of the bleating behavior until sucking of its lambs, where the melatonin sheep bleat significantly higher than the control sheep (P=0.0244; Table 2). Furthermore, the difference between groups for the frequency of lambs bleating after sucking is also showy, where was higher in the control group than in the melatonin group (P=0.0511). The gender of the lambs was effective on the duration between birth and standing up of lamb (P=0.0309). Male lambs stood up later than female lambs. Birth traits of the goats were similar in groups (P>0.05). Duration between birth and stand up of the kids can be changed depending on the type of birth (P=0.0044). Duration of sucking, licking after suckle, bleating of does after suckle and bleating of kids after sucking were changed according to birth type (P≤0.0189).

Conclusion

Especially in sheep, the unexpected difference between the groups in terms of birth time is difficult to explain under the study conditions. Further studies, including hormonal analyzes are needed. The distribution of birth times in goats was similar to previous studies (Konyalı et al., 2004; Tölü and Savaş, 2012). Bleating behavior is important for the formation of the mother-offspring bond immediately after birth (Nowak, 1990; Dwyer et al., 1998). The frequency of bleating behavior of lambs before and after sucking were different by groups. However, it seems difficult to say how melatonin treatment affects the differentiation of bleating behavior in lambs.

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Risk factors of Brucellosis in sheep and goat herds

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Introduction

According to the Food and Agriculture Organization (FAO), the World Health Organization (WHO) and the Office International des Epizooties (OIE), brucellosis is still one of the most important and widespread zoonoses in the world (Lopes et al., 2010). Brucellosis is a source of economic concern in many parts of the world due to reduced productivity, abortions, weak offspring and significant barriers to livestock trade and exports (Bano and Lone, 2015).

Brucellosis is a highly infectious, chronic disease in livestock and humans caused by Brucella bacteria (FAO, 2018). Brucellosis is caused by bacteria of the genus Brucella. *Brucella melitensis, B. abortus, B. suis* and *B. ovis* infect small ruminants, cattle, pigs and sheep, respectively (Franc et al., 2018). Except for *B. ovis*, all of *Brucella spp.* has zoonotic potential, with *B. melitensis* being the most pathogenic for humans (Poester et al., 2013). Small ruminants are considered the main source of human infection (Primatika et al., 2016). The true incidence of human brucellosis is not easy to estimate globally, but an estimated 500.000 persons are newly infected every year (Nofal et al., 2017).

Brucellosis in livestock and humans is still common in the Middle East, Asia, Africa, South and Central America, the Mediterranean Basin and the Caribbean. Brucella melitensis is particularly common in the Mediterranean Basin, and it has also been reported from Africa, India and Mexico (Sintayehu et al., 2015). The aim of this study was to identify possible risk factors for brucella in sheep and goat herds.

Potential risk factors

Brucellosis is associated with large herd size. Herd size has a great risk due to the introduction of pathogens from outside the herd, the contamination of pathogens within and among herds, and the impact of management and environmental factors related to herd size. Production type has an impact on brucellosis seroprevalence (Coelho et al., 2008). Animals that originate from outside the herds are an important source of Brucella infection and highlight the role of animal movement in the epidemiology of brucellosis (Sharifi et al., 2015).

Risk factors for brucellosis seroprevalence of sheep and goat flocks were reported as breed, contact with other animals (cattle, sheep, goats, others), frequency of disinfecting practices (per year), animals incorporated to the flock during the previous year, membership in a farmers animal-health organisation, feeding, type of grazing, mate control, origin of the farm, and trashumance (Reviriego et al., 2000). Species, sex, and age of the animals were proved to influence the occurrence of brucellosis among small ruminants (Dabassa et al., 2013). Primatika et al. (2016) reported that some risk factors for Brucella infection of small ruminants included large herd size, high animal density, lack of corral hygiene, keeping sheep in addition to goats, uncontrolled animal movements, shared communal pastures, and intermingling of herds.

Conclusion

Brucellosis is a significant productivity and reproductivity problem in small ruminants. It is useful to improve the control and prevention methods by considering the possible risk factors to reduce economic losses occuring due to brucellosis in sheep and goat herds.

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Effects of increasing concentrations of LPS on In vitro ovine oocyte developmental competence and transcriptome of MII oocyte

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Introduction

Increasing low fiber high fermentable carbohydrate diets increase the ruminal lipopolysaccharide (LPS) derived from gram negative bacteria cell walls. LPS was detected in plasma and follicular fluid of ruminants with endometritis and mastitis and disturbed the reproduction performance. Although considerable number of researches investigated the effects of LPS on reproductive performance of dairy cows, the response of sheep to the increasing concentrations of environmental LPS is not defined. Also, limited knowledge is available on potential effect of LPS on transcript abundance of ovine oocytes.

Materials and methods

Ewes ovary were collected from slaughterhouse, sliced and the oocytes with more than three layers After in vitro maturation, a number of matured oocytes were fertilized using frozen ram semen. Then, the rate of oocytes reached to the blastocyst stage were recorded at day 8 postinsemination. Three biological replicates of 36 oocytes cultured in 1 µg/mL LPS and controls were subjected to 3'tag digital gene expression profiling. Data was performed using the R Statistical Programming Language. Table 1. The effect of LPS treatment on the proportion of oocytes reaching the blastocyst stage during maturation.

	NO. Cultured	NO. Cleaved	NO. Blastocyst	lsmeans ± SE	P value	Odd ratio
Control	109	103 (94.49%)	40 (36.69%)	0.545 ± 0.199	_	_
0.01	114	110 (96.49%)	39 (34.21%)	0.654 ± 0.197	0.6979	0.897
0.1	112	104 (92.85%)	34 (30.35%)	0.830 ± 0.206	0.3185	0.7519
1	110	101(91.81%)	19 (17.27%)	1.566 ± 0.252	0.0014**	0.3602
10	114	103 (90.35%)	16 (14.03%)	1.812 ± 0.270	0.00015***	0.2816

Lsmeans: Least square means OR: odds ratio

Results

Addition of LPS reduced the number of fertilized oocytes reached to blastocyst stage in a dose dependent manner ($P<0.05$)(table 1). Also after culturing, a mong of 7887 gene transcripts were detected, seven genes such as (Tripartite motif containing 25 (TRIM25), Tripartite motif containing 26 (TRIM26), Zona Pellucida glycoprotein 3(ZP3), Family with sequence similarity 50-member A (FAM50), Glyoxalate and hydroxy pyruvate reductase (GRHPR), cornichon family AMPA receptor auxiliary protein 4 (CNIH4) and NADH ubiquinase oxireductase subunit A8 (NDUFA) were down-regulated in LPS-treated group ($p< 0.05$).

Conclusion

LPS induces the production of pre-inflammatory from variety of cells. In mammals, transcription factors such as NF-κB and IFN are activated after recognition of LPS by Toll like receptor (TLR-4) (Bromfield & Sheldon 2011). Functional analysis show some of genes were significantly enriched in immune response, oxidation-reduction process as well as oocyte development. ZP3 is well known as a positive regulator of inflammation, interferon gamma and interleukin 4 production, oocyte and blastocyst development. In conclusion, LPS in 1 µg/mL concentrations may have detrimental effects on oocyte developmental competence and genes transcribed in ovine that can shed light on molecular mechanisms of LPS-induced infertility in ruminants.

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Relations between melatonin implants and hematological values of Tahirova sheep and Turkish Saanen goats

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Introduction

Species, breeds, gender, age, diseases and stress change blood values significantly (Tölü et al., 2007; Abdal-Fattah et al., 2013). Health is a prerequisite for the pregnancy of an animal. Hematology is a good tool for health monitoring. Tölü et al. (2007) reported a relationship between some hematological parameters of mating season and conception rate in goats. It has been reported that external melatonin, which is used in synchronizing estrus in sheep, affects some hematological parameters (Arushanian et al. 2006; Ahmed et al., 2011). This study investigated the effect of melatonin implants on hematological values of Tahirova ewes and rams and Turkish Saanen dairy goats and bucks before of the breeding season.

Materials and methods

The study was conducted in the farm of Animal Production Research and Application Unit of Çanakkale Onsekiz Mart University Faculty of Agriculture. Seventy-six sheep and 54 goats (including 6 rams and 4 bucks) were used in the research. The ewes were between 2.5 and 5.5 years old, rams and bucks 1.5-2.5 years old, while does were 2-8 years old. In half of the animals, 18 mg melatonin in females and 54 mg in males were applied. 15 days after implantation, a flushing feeding were applied with barley for 60 days; females in the milking unit and males in groups (530 g/sheep, 430 g/goats, 660 g/rams and 560 g/bucks). 36 days after the melatonin implantation, the rams and bucks were introduced to the female flocks in the morning and evening. 8-12 hours after observation of estrus, females were mated. The blood was collected from all animals in 6 periods: 18 and 1 day before melatonin implant, 21, 42, 64 and 157 days after melatonin implant. Hematological parameters were determined in blood samples from *Vena jugularis*. Hematologic parameters examined were red blood cell (RBC, 10^6/mm^3), white blood cell (WBC, 10^3/mm^3), percentage of neutrophils (%), lymphocyte (%), monocytes (%), eosinophils (%), basophils (%), hemoglobin (Hb, g/dl), hematocrit (HCT, %), platelet/thrombocyte count (PLT, 10^3/mm^3) and mean corpuscular volume (MCV, fL). Hematological analysis were made in an automatic blood counting machine (CELL-DYN 3700). A linear model including group (Melatonin, Control), age, observation day and group X age interaction was utilized in the repeated measurement variance analyses for all traits. Tukey test was utilized in the *post-hoc* analyses. The analyzes were carried out with the program package SAS (1999).

Results

It was determined that melatonin implants significantly affected eosinophil and basophil values before breeding season Tahirova ewe and did not have a significant effect on other hematological parameters (Table 1). The eosinophil value was higher in the control group, whereas the basophil value was higher in the melatonin group (P≤0.05). The values of WBC, monocyte and MVC were non-significant for ewe age, while other hematological parameters differed significantly (P≤0.05). While neutrophil, lymphocyte and basophil values were not affected by the observation days, other parameters showed significant changes (P≤0.05). WBC, basophil and HCT values changed significantly according to group X age interaction (P≤0.05).

Table 1. Mean ± standard error and P values of some hematological parameters of treatment groups in ewes

Hematological traits	Group			Age	Day	Group x Age
	Melatonin	Control	P	P	P	P
RBC,10^6/mm^3	13.08±0.22	13.29±0.11	0.5953	0.0004	0.0005	0.5818
WBC*,10^3/mm^3	7.42±0.19	7.24±0.14	0.6270	0.0625	<0.0001	0.0098
Neutrophil*, %	45.71±0.96	47.30±0.82	0.4918	<0.0001	0.7827	0.0594
Lymphocyte %	44.10±0.98	42.20±0.82	0.3503	<0.0001	0.5794	0.1096
Monocyte*, %	8.04±0.33	8.14±0.32	0.7131	0.1370	0.0542	0.4259
Eosinophil, %	1.89±0.06	2.05±0.05	0.0394	0.0138	<0.0001	0.6870
Basophil[1], %	0.07±0.01	0.03±0.00	0.0017	0.0189	0.4076	0.0063
Hb*, g/dl	13.15±0.17	13.23±0.16	0.9773	0.0547	<0.0001	0.1133
HCT*, %	41.05±0.61	41.64±0.61	0.6327	0.0516	<0.0001	0.0063
PLT, 10^3/mm^3	498.86±21.89	472.73±21.11	0.2277	0.0190	<0.0001	0.5490
MCV, fL	31.55±0.08	31.52±0.09	0.9642	0.3958	<0.0001	0.5288

* Square root $(\sqrt{(y+1)})$transformation was applied to the data. RBC: Red blood cell; WBC: White blood cell; Hb; Hemoglobin; HCT: Hematocrit; PLT: Platelets/thrombocyte; MCV: Mean corpuscular volume. Differences between means indicated with different letters in the same line for each factor are significant (P≤0.05).

The values of RBC, neutrophil, lymphocyte, monocyte, basophil, and MCV were significantly affected by melatonin treatment in rams (Table 2). RBC, neutrophil and MCV values were higher in melatonin group, whereas lymphocyte, monocyte and basophil values were higher in control group (P≤0.05). While the age of rams significantly affected

eosinophil value, it had no significant effect on other hematological values. Neutrophil, lymphocyte, Hb, HCT, PLT and MCV values in the rams showed significant variations according to the observation days (P≤0.05). The interactions of group X age did not show significant effects on hematological parameters in rams (P>0.05).

Table 2. Mean ± standard error and P values of some hematological parameters of treatment groups in rams

Hematological traits	Group			Age	Day	Group x Age
	Melatonin	Control	P	P	P	P
RBC,10^6/mm^3	15.58±0.86	12.71±1.24	0.0312	0.1670	0.6135	0.3182
WBC*,10^3/mm^3	8.62±0.75	7.50±0.50	0.6087	0.9322	0.8543	0.6504
Neutrophil*, %	61.71±2.11	47.25±2.97	0.0005	0.2196	0.0375	0.9208
Lymphocyte %	29.16±2.15	36.76±2.97	0.0243	0.1384	0.0232	0.6696
Monocyte*, %	7.30±0.59	13.68±1.29	0.0006	0.3487	0.2828	0.3670
Eosinophil, %	1.79±0.28	2.27±0.23	0.2568	0.0456	0.0627	0.2454
Basophil[1], %	0.02±0.00	0.04±0.00	0.0233	0.9110	0.1340	0.9287
Hb*, g/dl	15.20±0.39	14.71±0.41	0.3337	0.6665	0.0008	0.2740
HCT*, %	48.37±2.12	44.01±2.68	0.0786	0.4501	0.0002	0.7288
PLT, 10^3/mm^3	476.54±71.47	566.41±74.92	0.2246	0.4453	0.0102	0.1832
MCV, fL	31.23±0.37	30.82±0.29	0.0551	0.2474	<0.0001	0.8272

* Square root $\left(\sqrt{(y+1)}\right)$ transformation was applied to the data. RBC: Red blood cell; WBC: White blood cell; Hb; Hemoglobin; HCT: Hematocrit; PLT: Platelets/thrombocyte; MCV: Mean corpuscular volume. Differences between means indicated with different letters in the same line for each factor are significant (P≤0.05).

Only WBC was significantly affected by the treatment of melatonin in does (Table 3). WBC was 9.29±0.25·10^3/mm^3 in the melatonin group and 10.48±0.29·10^3/mm^3 in the control group (P<0.0001). RBC, neutrophil, lymphocyte, monocyte, eosinophil and HCT values changed significantly according to doe ages (P≤0.05). The observation days affected significantly the RBC, neutrophil, lymphocyte, monocyte, Hb, HCT, PLT values in does (P≤0.05). Group X age interactions influenced significantly on WBC and monocyte values.

Table 3. Mean ± standard error and P values of some hematological parameters of treatment groups in does

Hematological traits	Group			Age	Day	Group x Age
	Melatonin	Control	P	P	P	P
RBC,10^6/mm^3	12.54±0.18	12.30±0.21	0.0821	0.0002	<0.0001	0.5234
WBC*,10^3/mm^3	9.29±0.25	10.48±0.29	<0.0001	0.1288	0.3410	0.0308
Neutrophil*, %	46.52±1.15	47.37±1.02	0.6981	<0.0001	0.0012	0.4652
Lymphocyte %	45.18±1.21	45.10±1.04	0.9913	<0.0001	<0.0001	0.0902
Monocyte*, %	6.67±0.33	6.71±0.47	0.8311	0.0030	0.0376	0.0248
Eosinophil, %	1.25±0.04	1.30±0.06	0.4337	0.0121	0.2866	0.0845
Basophil[1], %	0.04±0.00	0.05±0.01	0.9729	0.3794	0.2068	0.5509
Hb*, g/dl	10.16±0.16	10.17±0.18	0.5191	0.4237	<0.0001	0.1038
HCT*, %	31.93±0.52	31.40±0.61	0.1466	0.0036	<0.0001	0.6080
PLT, 10^3/mm^3	405.11±21.03	407.56±22.45	0.9827	0.6281	<0.0001	0.3097
MCV, fL	25.42±0.05	27.30±1.97	0.4539	0.4291	0.6298	0.4668

* Square root $\left(\sqrt{(y+1)}\right)$ transformation was applied to the data. RBC: Red blood cell; WBC: White blood cell; Hb; Hemoglobin; HCT: Hematocrit; PLT: Platelets/thrombocyte; MCV: Mean corpuscular volume. Differences between means indicated with different letters in the same line for each factor are significant (P≤0.05).

WBC, neutrophil and lymphocyte values differed significantly from melatonin implant in bucks (Table 4). WBC and neutrophil levels were higher in the melatonin group than control group, whereas lymphocyte value was higher in the control group (P≤0.05). While the age of the bucks had no significant effect on the hematological values, Hb and PLT values were significantly altered according to the test day (P≤0.05). The values of only WBC was affected by interaction of group X age interaction (P=0.0363).

Table 4. Mean ± standard error and P values of some hematological parameters of treatment groups in bucks

Hematological traits	Group			Age	Day	Group x Age
	Melatonin	Control	P	P	P	P
RBC,10^6/mm^3	12.27±1.20	12.12±0.45	0.9475	0.2344	0.1458	0.1265
WBC*,10^3/mm^3	9.54±0.79	12.10±0.80	0.0420	0.7367	0.3461	0.0363
Neutrophil*, %	43.17±4.23	66.93±2.03	<0.0001	0.2711	0.0381	0.0903
Lymphocyte %	50.51±4.31	27.78±2.48	0.0007	0.6444	0.1625	0.5927
Monocyte*, %	5.33±0.89	4.35±1.12	0.6460	0.3353	0.8327	0.0574
Eosinophil, %	0.96±0.22	0.90±0.30	0.9309	0.3607	0.7275	0.0639
Basophil[1], %	0.03±0.01	0.08±0.04	0.3248	0.6204	0.3661	0.2291
Hb*, g/dl	11.82±0.88	11.57±0.76	0.8163	0.1266	0.0468	0.6057

HCT*, %	31.98±4.16	29.85±1.11	0.6201	0.1829	0.2110	0.2097
PLT, $10^3/mm^3$	263.57±25.32	335.62±65.81	0.5224	0.6293	0.0013	0.3731
MCV, fL	25.68±0.57	25.20±0.16	0.5100	0.2121	0.6587	0.3814

* Square root $\left(\sqrt{(y+1)}\right)$ transformation was applied to the data. RBC: Red blood cell; WBC: White blood cell; Hb; Hemoglobin; HCT: Hematocrit; PLT: Platelets/thrombocyte; MCV: mean corpuscular volume. Differences between means indicated with different letters in the same line for each factor are significant (P≤0.05).

Conclusion

According to Durotoye and Rodway (1996), the external melatonin application reduces the RBC and HCT values in sheep, which was not verify in our study. In the study conducted in male goats, it was determined that application of melatonin had no significant effects on the values of erythrocytes, leukocytes, Hb and HCT, which also resulted in our study, except leukocytes (Dönmez et al., 2004). Finally, it was concluded that no health differences to view between applied or non-applied external melatonin groups, in terms of haematological values.

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The determination of egg quality parameters and some yield traits during one production period in laying hens reared in the organic production systems

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Introduction

Organic egg production is based on specific and precise standards. Organic eggs can be defined as the product of a rearing system which avoids conventionally grown feedstuffs including synthetic additives; only organically grown cereals, oilseeds, and with roughage is fed (Ferrante et al.,2009). The birds are given free access to outdoor areas, which lower rearing intensity. Egg nutritional composition and internal-external quality of eggs are affected not only by the rearing system but also breed and age of the hen, feed ingredient composition, and nutrient density of the diet (Sarica et al., 2010; Minelli et al.,2007). Consumers believe organic eggs to be tastier, more nutritious than conventionally produced eggs, even though there is no accurate evidence available in the scientific literature (Rakonjac et al,2014). Considering the consumer's demands for the egg with high-quality standards, organic systems of laying hens have been adopted to better welfare condition of birds (Küçükyılmaz et al., 2012). In this study, it is aimed to determine egg quality parameters and some yield traits of laying hens reared in the organic production systems and to contribute to the scientific literature on the subject.

Material and Methods

A total of 660 eggs were collected from two Brown Lohman Brown flocks in the same rearing conditions, between 25 and 72 weeks old. The study started on flocks at 25 weeks old and feed consumption and water consumption, % mortality, and egg yields of these flocks were recorded per-day until 72 weeks old. A total of 660 eggs were collected from two Brown Lohman Brown flocks in the same rearing conditions, between 25 and 72 weeks old. The study started on flocks at 25 weeks old and feed consumption and water consumption, % mortality, and egg yields of these flocks were recorded per-day until 72 weeks old. Every 5 of weeks, a total of 60 eggs laid on the same day were individually numbered, weighed, and measured egg width and length with a caliper gauge. First, eggshell breaking strength was determined, and these eggs were broken on a flat surface, albumen width and length, yolk diameter and highnesses were measured with a caliper gauge. And then Yolk color was measured by Roche color scale, meat and blood spots were determined numerically. Finally, eggshell was weighed, and eggshell thickness was measured with a precision caliper.

Results

The yolk and egg weight generally increased with the hen ageing whereas eggshell weight, shape index, and Haugh unit decreased until 72 weeks old (Table 1).
The yolk color showed higher lightness and yellowness in organic eggs but a significantly lower redness.

Table 1. Effect of age on some egg quality parameters.

Week	Egg Weight	Eggshell weight	Yolk weight	Shape index	Haugh unit
25	58,13 ± 0,65c	60 ± 0,54f	12,02 ± 0,15f	77,87 ± 0,3cb	98,19 ± 0,91a
30	63,31±0,52b	58 ± 0,56de	14,63 ± 0,14e	78,54 ± 0,29c	92,68 ± 0,93b
35	65,44±0,52a	59 ± 0,69bc	15,58 ± 0,25bc	78,04 ± 0,36cb	86,44 ± 0,82c
40	64,29±0,69ab	57 ± 0,85ab	16,21 ± 0,24a	77,19 ± 0,35b	82,67 ± 1,17d
45	62,76±0,52b	59 ± 0,88a	14,95 ± 0,17de	77,03 ± 0,35b	80,47 ± 1,08de
50	64,45±0,59ab	56 ± 0,61e	16,67 ± 0,21a	76,9 ± 0,49b	78,25 ± 1,16ef
55	62,71±0,77b	58 ± 0,55e	16,09 ± 0,18ab	74,59 ± 0,36a	76,57 ± 1,18fg
60	62,66±0,49b	57 ± 0,76ab	15,41 ± 0,15cd	75,09 ± 0,34a	74,06 ± 1,75gh
65	62,76±0,71b	57 ± 0,83e	15,54 ± 0,20bc	74,44 ± 0,35a	71,14 ± 1,69h
70	63,85±0,67ab	56 ± 0,53cd	16,53 ± 0,23a	75,1 ± 0,42a	74,15 ± 1,67gh
72	63,19±0,64b	57 ± 0,82ab	16,59 ± 0,19a	74,95 ± 0,45a	69,65 ± 1,58ı

The egg shape is critical for the eggshell breaking strength, but it is a hereditary trait that is associated mainly with hen genotype and age (Minelli et al.,2007). İn this study egg width, egg length and eggshell breaking strength values is approximate between 25 and 72 weeks (Figure1).

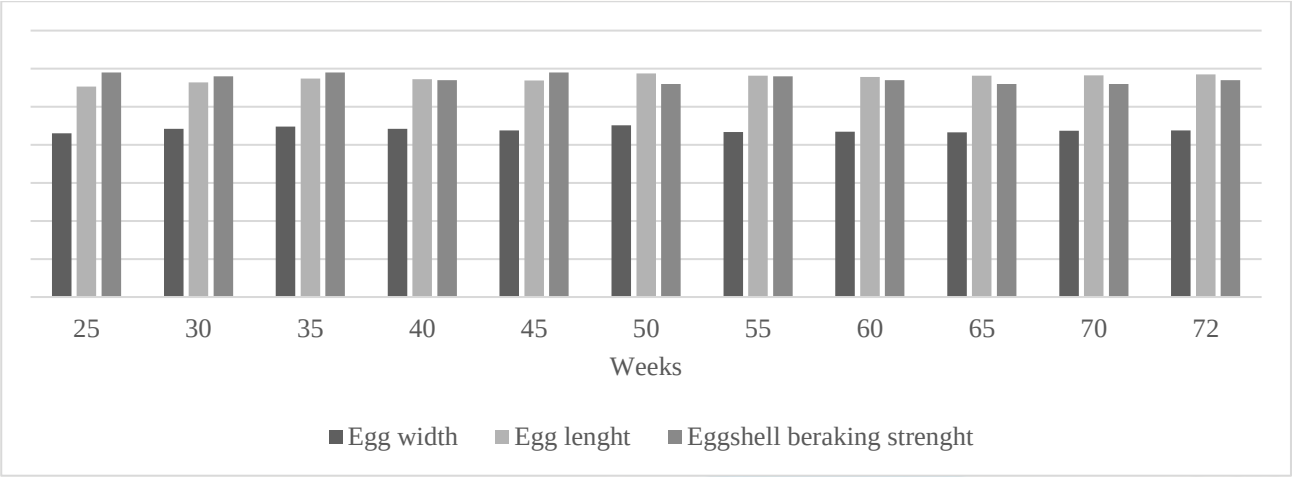

Figure 1. Effects of age for egg width, egg length, and eggshell breaking strength.

As the hens grew older, the number of eggs with blood and meat spots increased considerably. In our study, we were determined the number of these spots increased, which is not consistent with generally accepted standards. Verheyen and Decuypere (1987) suggested that this type of egg defect is most common in brown-shelled eggs.

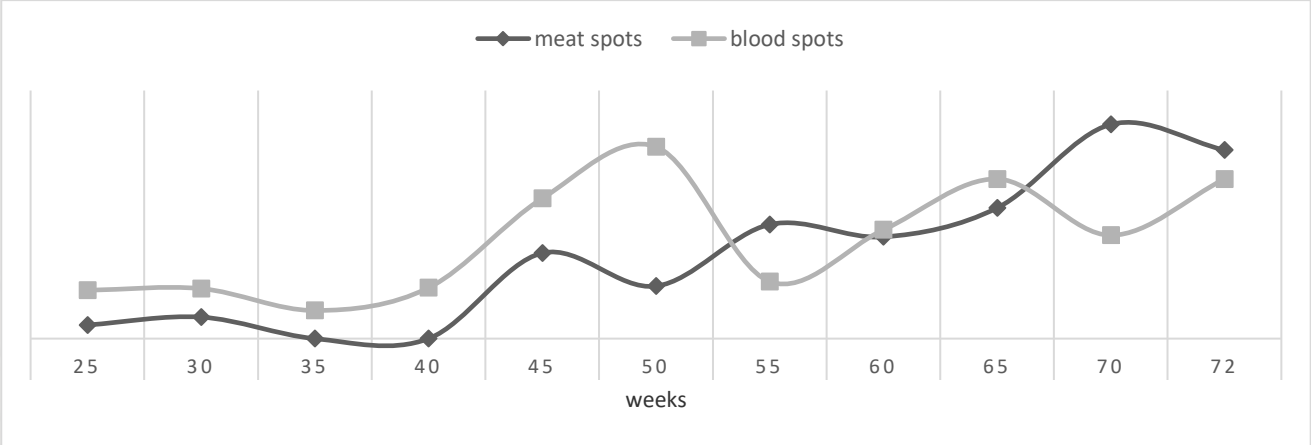

Figure 2. Effects of age amount of meat and blood spots.

Conclusion

In conclusion, both organic rearing system and flocks age had considerable effects on some of the performance parameters and egg quality characteristics examined in this study.

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Summarized from the first author's master thesis

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The effects of order of lactation on milk components in Water Buffalo raised in Sheep Breeding Research Instıtute

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Introduction

Buffalo milk differs from cow's milk in terms of component ratio. Therefore component ratio makes buffalo milk valuable and makes buffalo a preferred animal species (Akoz ve ark., 2017). But Milk composition is also affected by various factors such as lactation stage, nutrition and season (Şekerden ve ark., 1999). This study was make in order to determine according to the order of lactation, composition of raw milk content, milk density and freezing point, Murrah X Anatolian Water Buffaloes (M X A) crossbreds raised in Institute conditions

Material and methods

Animal material consisted of total 47 heads M X A crossbreeds cows. The data of study included between february 2016 and january 2018. Actual milk yield was used to determine average lactation length and lactation milk yield. Milk samples were taken to specify the milk components. The nonfat dry matter ,fat , protein,freezing point milk density and lactose contents of water buffalo milk samples were determined by using a Funke Gerber milk analyzer.Data were analyzed using SPSS.

Results

The results of this study shown that Lactation length and lactation milk yielg have shown inTable 1., Means of milk yield and milk components by order of lactation have shown in Table 2.

Table 1. Lactation length and lactation milk yield

Order of Lactation	Lactation length (Day)		Milk yield (Litres)
	n	Mean	Mean± SE
1	9	277	1255.33 ± 133.88
2	18	248	1489.13 ± 74.852
3	8	267	1315.18±110.272
4	12	251	1208.66 ± 68.639
Genel	47	259	1343.14 ± 48.014

Table 2. Means of milk yield and milk components by order of lactation

Order of Lactation	Fat (%)		Nonfat Dry Matter (%)		Protein (%)		Lactose (%)	
	n	Mean± SE	n	Mean± SE	n	Mean± SE	n	Mean± SE
1	9	7.01±0,288	9	10.61±0,111	9	3.96±0,43	9	5.81±0,58
2	17	7.11±0,234	18	10.70±0,106	18	4.02±0,45	18	5.90±0,61
3	8	7.18±0,349	8	10.43±0,190	8	3.94±0,79	8	5.82±0,117
4	12	7.49±0,149	12	10.79±0,117	12	4.05±0,47	12	5.96±0,65
Genel	46	7.20±0,124	47	10.66±0,064	47	4.00±0,26	47	5.88±0,036

Conclusion

Lactation length and lacation milk yield were found to be 259 days and 1343.14 litres respectively. The milk yield in the first and second lactations of G_2 (M X A) crossbreeds and Murah genotype were higher than others in the present study. It has been observed that the lactation components have no effect on the milk components. Negative correlation between milk yield and milk fat is expected. Although not statistically significant, a negative correlation was determined as expected.

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Association of MC4R, FABP3 and DGAT1 Gene Polymorphisms in Two Domestic Pig Lines

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Introduction

The selection of animals with desirable alleles and the identification of genes that act on these traits at birth can lead to higher genetic gains by decreasing the generation interval (Goddard and Hayes, 2009). Several SNPs in the melanocortin 4 receptor (MC4R), the fatty acid, muscle and heart binding protein (FABP3) gene and the gene encoding the enzyme acyl-CoA: diacylglycerol acyltransferase (DGAT1) are related to meat quality traits in pigs (Cui et al.,2011; Zhang et al., 2014), but no records exist of studies with SNPs in these genes in swine in relation to reproductive traits.

Materials and methods

Two commercial lineages were chosen, with the Large White x Landrace Danish (European line -LWLD) being the female of the most commercialized Danish commercial line in Brazil. While the other female lineage chosen has two Chinese breeds in its composition, in addition to the Large White and Landrace races. Blood from live animals was collected by puncturing the upper part of the ear onto sterile filter paper - FTA (Whatman, 55 mm) of two genetic groups (GG) of swine formed by commercial maternal lines as follows: LWLD with 113 animals, resulting from the crossing of Large White and Danish Landrace and LLJM with 114 animals from two European breeds (Large White and Landrace) crossed with two Chinese breeds (Jiaxing and Meishan). DNA was extracted from 227 blood samples in FTA cards and manipulated using the WhatmanTM FTATM for blood DNA (2015) protocol, which was modified by the MEDGEN. The quality of the genomic DNA was verified using agarose gel electrophoresis, and the concentration of DNA was determined using a NanoDrop spectrophotometer and adjusted to 20 ng/µL. The primers used for amplification were designed using the DNA sequences deposited in the GenBank database (http://www.ncbi.nlm.nih.gov/genbank/) for each of the genes: MC4R (GenBank accession No.AF087937), FABP3 (GenBank accession No. JN646857) and DGAT1 (GenBank accession no.GI47522917). To amplify the fragments of interest of the genes under study, the extracted DNA samples were subjected to the ARMS-PCR technique. The amplified fragments were analyzed with the GeneMaker® software (SoftGenetics LLC®genotyping version 3.0) for data acquisition and the nucleotide characterization of each marker, providing a genetic profile of each animal.

The phenotypic measurements of mean birth weight (MBW), mean weight at weaning (MWW), total litter weight at birth (TWLB), total litter weight at weaning (TWLW) were evaluated in a mixed model by applying a repeated measures analysis in terms of time. In this case, the MIXED procedure of SAS (Statistical Analysis System, v.9.3, Cary, NC). The order of parity was considered a repeated measure. The data were analyzed with the following generalized linear model:

$$Y_{ijkl} = \mu + (gen) + NB + OP + NWP + AFM + PI + e$$

In which:
Y = dependent variable (MBW, MWW, TWLB, TWLW);
µ = the general average of the population for the trait;
(gen) = random effect of the individual, nested in the genotype (AA, AB, BB);
NB = fixed effect of the number of live births;
OP = fixed effect of the order of parity (1, 2, 3 and 4);
NWP = fixed effect of the number of weaning piglets;
AFM = fixed effect of age at first mating;
PI = fixed effect of the parity interval;
e = random error.

Table 1. Descriptive statistics of the productivity data of female swine for two genetic groups (Large White x Landrace -LWLD and Large White x Landrace x Jiaxing and Meishan -LLJM) of pigs.

Parameters					
Traits*	Number of observations	Mean	Standard deviation	Minimum Value	Maximun value
	LWLD*				
MBW (kg)	437	1,49	0,06	1,21	1,70
MWW (kg)	442	5,56	0,78	3,87	8,19
TWLB (kg)	441	19,33	5,14	7,00	33,00
TWLW (kg)	451	60,95	24,81	45.00	138,07
	LLJM**				
MBW (kg)	438	1,48	0,08	1,20	2,11
MWW (kg)	445	5,78	0,66	3,87	8,19
TWLB (kg)	445	19,22	4,18	5,908	28,80
TWLW (kg)	445	66,11	21,28	10,44	128,30

*MBW = mean birth weight; MWW = mean weight at weanin; TWLB = total litter weight at birth; TWLW = total litter weight at weaning. *LWLD = Large White and Landrace; **LLJM = Large White, Landrace, Jiaxing and Meishan.

Results

The productivity data were obtained between the years 2012 and 2014 until the fourth parity of 227 female pigs. The descriptive statistics of the data evaluated are shown in Table 1. The results indicates that the SNPg.1,578C>T of the MC4R gene is in equilibrium in the LWLD population studied. The mean values of traits evaluated with SNPg.1,578C>T were significant in the LWLD and LLJM genetic groups; the number of weaned piglets (MWP) was only significant in the LLJM genetic group (Table 2). The amplified region of the FABP3 gene has 183 bp and composes part of the 5'UTR (5 'Untranslated Region). No significant association ($P>0.05$) between the SNPg-240T>C and all traits in two genetic groups (Table 2). For the DGAT1 gene, the mean weaning weight (MWW), total litter weight at weaning (TWLW), traits were significantly different only in the LWLD genetic group ($P<0.05$) among the genotypes, whereas homozygous animals for the T allele showed the highest averages (Table 2).

In the association analysis performed by Houston et al. (2004), the MC4R gene was significantly associated with mean daily gain, daily feed intake and backfat thickness. Hirose et al. (2014), by evaluating the effects of candidate genes on production traits in Duroc pigs, detected positive correlations between the mean daily weight gain and backfat thickness of SNPs in the LEPR (c.2002T), MC4R (c.1426G) and PIK3C3 (c.2604C) genes.

The FABP3 gene is associated with fat content in the carcass, intramuscular fat and meat quality, and its main functions are the regulation of fatty acid uptake and intracellular transport (Chmurzyńska, 2006; Hong et al., 2015). Adipose tissue may influence reproductive traits because it plays an endocrine role, such as the metabolism of sex hormones (Pinto, 2014). It is likely that variants closely linked to the FABP3 gene facilitate the transport of lipids from the diet to the metabolic processes involved in these two traits, contributing to a satisfactory body condition.

The DGAT1 gene acts on the metabolism of diacylglycerol and is involved in the synthesis of triglycerides, the intestinal absorption of fat by the small intestine and the physiological process of lactation (Li et al., 2012). Because of these physiological functions, several studies have linked polymorphisms in the DGAT1 gene with milk production and composition traits in dairy cattle (Grisart et al., 2004), meat quality in commercial pigs (Zhang et al., 2014) and fat content in beef cattle (Thaller et al., 2003).

Table 2 -Least Square Means (LSMEANS) and standard deviation for the mean birth weight (MBW), mean piglet weaning weight (MWW), total litter weight at birth (TWLB), and total litter weight at weaning (TWLW), piglet weaning number (NWP), as well as the MC4R (SNPg.1,578C>T), FABP3 (SNPg-240T>C), and DGAT1 (SNPg. 9,422C>T) genes, in the LWLD (Large White x Landrace) and LLJM (Large White x Landrace x Jiaxing and Meishan) genetic groups of pigs.

Gene	Genotype	Trait			
LWLD					
		MBW	**MWW**	**TWLB**	**TWLW**
MC4R	CC (8)	1.47±0.01	5.27±0.33	18.01±0.16	56.87±2.04
	CT (56)	1.49±0.01	5.33±0.27	17.97±0.08	58.34±0.86
	TT (46)	1.48±0.01	5.33±0.30	17.88±0.09	57.99±0.95
FABP3	TT (3)	1.50±0.02	5.39±0.36	18.01±0.25	54.26±4.73
	TC (39)	1.48±0.01	5.35±0.28	17.92±0.14	53.37±3.85
	CC (71)	1.49±0.01	5.35±0.27	17.99±0.13	52.76±3.74
DGAT1	CC (94)	1.48±0.01	5.20±0.27a	18.16±0.19	47.11±4.47a
	CT (10)	1.48±0.01	5.39±0.26ab	17.92±0.19	50.64±4.24ab
	TT (9)	1.50±0.01	5.55±0.27b	18.21±0.20	52.75±4.47b
LLJM					
MC4R	CC (13)	1.51±0.02	5.86±0.28	18.73±0.46	61.78±2.21
	CT (60)	1.49±0.01	6.09±0.24	18.35±0.28	62.85±1.74
	TT (30)	1.48±0.02	6.18±0.26	18.01±0.35	62.60±1.91
FABP3	TT (2)	1.52±0.04	6.29±0.35	17.93±1.34	71.55±6.14
	TC (21)	1.49±0.02	5.94±0.15	17.74±0.37	63.72±2.94
	CC (85)	1.50±0.01	5.98±0.15	18.46±0.25	63.04±2.91
DGAT1	CC (112)	1.48±0.01	5.88±0.11	18.19±0.25	63.82±1.85
	TT (2)	1.46±0.03	5.99±0.27	19.01±0.98	66.69±3.93

a, b different letters in the same column, within each gene, indicate statistically significant differences (P <0.05) by the Tukey-Kramer test.

Conclusion

The DGAT1 gene was significantly associated only in the LWLD genetic group with the MWW and TWLW production traits. This fact may have occurred due to the genetic selection for lean meat, since the reduction of backfat thickness and low consumption during lactation can affect reproduction and weaning, decreasing the reproductive indexes.

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Protection of newborn calves from diarrhea with a novel probiotic candidate and Lactobacterin-TK2

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Introduction

Calf diarrhea is an important problem that can result in death and which leads to economic losses. Probiotics are of importance in terms of protection from diarrhea. This study aimed to establish probiotics to prevent diarrhea in calves. Accordingly, some properties of strains isolated from various samples were investigated and compared with Lactobacterin TK[2]. Superior strains were selected as probiotic candidates.

Materials and methods

Lactobacterin-TK[2] used in this study is an animal probiotic whose properties were determined by previous studies of the faculty members of the Faculty of Veterinary Science, Department of the Biological Safety and Department of Microbiology and Virology of the Kazakh National Agrarian University (Tulemissova et al., 2016). Acid and bile tolerance, antimicrobial susceptibility, hydrophobicity and antagonistic properties against *Salmonella typhimurium, E. coli* and *Staphylococcus aureus* were determined using a total of 124 strains isolated from fecal samples taken from dairy cattle, from traditional fermented dairy products shubat and kumiss –all from Kazakhstan. Isolates consists of lactic acid bacteria (LAB), yeasts and Bacilli. Genotypic identification of probiotic candidate yeast and bacterial strains found to have superior probiotic properties was carried out (Kılıç and Karahan, 2010).

Results

Most of the isolates and Lactobacterin-TK[2] were similar in terms of maintaining viability under acidic conditions studied at pH 2.0 and 4.0. Most of the isolates were adversely affected by pH 2.0; however, they maintained their viability at pH 4.0. In the bile salt (0.3%), all isolates maintained their viability. The most effective antifungal yeast strains were nystatin (98%), voriconazole (90%) and ketocanazole (74%). Of these strains, 51% were found to be resistant to itracanozole and 49% to amphotericin B. The majority of LAB strains were susceptible to penicillin and tetracycline, whereas they were resistant to trimethoprim-sulfamethoxazole. In addition, enterococci were resistant to enrofloxacine, lactobacilli gentamicin and vancomycin. Lactobacterin-TK[2] was found to be susceptible to tetracycline, erythromycin, enrofloxacin and penicillin, but resistant to trimethoprim-sulfamethoxazole, gentamicin and vancomycin. *Bacillus* sp. strains were susceptible to enrofloxacin, trimethoprim-sulfamethoxazole and gentamicin, but resistant to penicillin. Bacilli do not have hydrophobicity, whereas hydrophobicity is low in the majority of cocci LAB and yeast strains. In addition, 71% of lactobacilli have high hydrophobicity. Ten LAB and two yeast strains, which were determined to be superior in terms of these properties, were selected, and their antagonistic properties against *Salmonella typhimurium, E. coli* and *Staphylococcus aureus* were examined. All of the LABs inhibited at least one pathogen. The inhibitory effect of yeast strains on pathogens could not be determined by the method used. Genotypic identification was carried out for 6 LAB and 2 yeast strains selected in accordance with their properties. Five of the LAB strains were identified as *Enterococcus faecium*, 1 as *Lactobacillus casei*, and the yeast strains were identified as *Saccharomyces cerevisiae* and *Clavispora lusitaniae*. *L. casei* K2 and *S. cerevisiae* S430b were selected as superior strains because of their probiotic properties. The virulence characteristics of *Ent. faecium* strains will be determined by further studies. These strains are capable of being used as new probiotic candidate strains after *in vivo* trials.

Conclusion

Acid and bile tolerance and resistance to antimicrobials are not sufficient to select strains to produce probiotic mixtures against calf diarrhea. Strains should also be examined for hydrophobicity and pathogen inhibition. The investigation of *Ent. faecium*, which is included in commercial probiotics, in terms of virulence genes is important for the protection of animal and human health. Lactobacilli and *Bacillus* sp. strains should be investigated to find out whether their antibiotic resistance genes can be transferred. The assays can be varied to select strains to be included in probiotics in accordance with their intended use. It will be possible to verify *in vitro* results by examining the effect of the probiotic to be developed against calf diarrhea in *in vivo* models. The difference in probiotics produced in this study from many commercial products is the combination of yeast and LAB strains.

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Effects of Dried Distilled Grains with Soluble (DDGS) and Essential Oil and Vitamin E Supplementation on Gut Microflora and Short Chain Fatty Acids in Broilers

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Abstract
The present study was carried out to determine the effects of addition of distiller's dried grain with solubles (DDGS), vitamin E and oregano essential oil (KEY) on broiler intestinal microflora and organic acids. Atotal of 640 1-day-old broiler chicks were divided into 8 treatment groups with 5 replicate and 16 chicks each (80 chick/each group) and continued for 42 days. Treatment groups were as follows: 1: Control (C, a corn and soybeans based diet, no DDGS and vit E, KEY), 2: C +300 mg / kg vitamin E, 3: C + 30 mg / kg KEY, 4: K+ 300 mg/kg vitamin E + 30 mg/kg KEY, 5: 25% DDGS, 6: 25% DDGS + 300 mg / kg vitamin E, 7: 25% DDGS + 30 mg / kg KEY and 8: 25 DDGS + 300 mg / kg vitamin E + 30 mg / kg KEY supplemented groups. The addition of DDGS did not affect intestinal microflora and acetic, butyric and propionic acid levels. At the end of the study, microbiological analyzes and short-chain fatty acids were performed in the intestinal contents. Addition of DDGS to ration did not significantly affect the number of *Escherichia coli, Staphylococcus aureus, Enterococcus faecium*, Total Gram negative (-) and positive (+) bacteria count in the ileum and caecum. The rates of acetic, butyric and propionic acid determined in the contents of the caecum were not significantly affected by the addition of DDGS to the diet and the addition of oregano essential fatty acid and vitamin E.
Keywords: DDGS, broiler, intestinal microflora, short chain fatty acids

Introduction

In recent years, ethanol production from starch sources such as corn, wheat and barley has been developed, and a significant amount of Distiller's Dried Grains with Solubles (DDGS) is emerging as a by-product after fermentation. The most commonly used grain in the production of DDGS is corn. The DDGS contains approximately 26-28% crude protein and 2850 kcal ME / kg of energy, and it seems a good potential feed source in animal feeds (Lumpkins et al., 2004). However, studies (Wang et al., 2007) have shown that high levels of DDGS (15% and more) in broiler rations may cause a decrease performance and carcass yield. Although one reason for this decline in performance and carcass parameters is due to low lisin amino acid digestibility (Lumpkins et al., 2004), it is also possible that DDGS is contaminated with high amounts of mycotoxins in the production stage (Wu et al., 2008) may be among the factors that increase these negative effects. In addition, DDGS sometimes contains as high as 8-10% of unsaturated fats and this oil is rich in unsaturated fatty acids (Salim et al., 2010) as a result of oxidation tendency of oil.

The aim of this study was to investigate the effects of vitamin E and oregano essential oil supplementation on intestinal microflora and organic acid composition.

Materials and Methods

Animal material

A total of 640 Ross-308 male commercial Ross 308 broiler chicks were used as animal material. The chicks were housed in 8 treatment groups, each with 16 chicks in 5 replicates of 1,50x1,50 cm wire sections. For the first 3 days 24 hours lighting, and 4 to 42 days 23 hours lighting and 1 h ligh turn off. Coarse wood shavings were used as litter.

Feed material

In the study, two different feed were prepared; a starter feed from 1 until 21 days and finishing period for 22 to 42 days in accordance with the recommendations stated in NRC (1994). The energy and protein contents of the diets were similar. Two main feed mixes with and without DDGS were prepared and 300 mg / kg vitamin E and 30 mg / kg oregano essential oil (KEY, Botanica Ltd. Antalya) were used for diets. An imported (US origin) source of corn DDGS was used. Free access to feed and water was provided.

Determination of intestinal microflora

At the end of the experiment (day 42), total gram negative and total gram positive bacteria counts were determined with E.coli, Staphylococcus aureus, Enterococcus faecium in the samples taken from ileum and caecum of intestine (Konca et al., 2009).

Determination of organic acids in intestinal contents

The contents of the ileum of the small intestine were determined by centrifugation and the acetic, butyric and propionic acid analyzes of the liquid were determined according to the guideline specified in Shimadzu CS 2010 catalog on gas chromatography apparatus.

Statistical analysis

The study was planned as two feed types (with and without DDGS) and 4 types of additives (without additives, vit. E, essential oil and vit. E + essential oil together) and carried out in a 2x4 factorial trial plan. The data obtained were analyzed in factorial experiment plan in SPSS 17 statistical program and main effects and interactions were calculated. Statistical significance level was accepted as $P < 0.05$.

Results and Discussion

The effects of DDGS, vitamin E and oregano essential oil supplementation on numbers of small and caecal intestine microorganisms in broilers are given in Table 1. Ration and additive types and interactions did not significantly affect total gram negative (-) and total gram positive (+) absolute number values with Escherichia coli, Staphylococcus aureus, Enterococcus faecium detected in intestinal microflora ($P > 0.05$).

There is no sufficient literature on the effects of DDGS addition on intestinal microflora. Alteration of ration compositions may affect intestinal microflora, particularly structural and easily soluble carbohydrate ratio. In addition, during the fermentation process in ethanol production, some intermediate metabolits may occur and thay may cause growth of microorganisms. On the other hand, intestinal microflora may change in favor of lactic acid due to antimicrobial effects and pH-lowering effects reported especially for KEY. However, this study, ration type and additives did not have a significant effect on the number of E. coli, S.aureus, E. Faceum and total gram negative and gram positive bacteria counts as intestinal microflora. In a study (Coetzee and Hoffman, 2001) addition of vitamin E (0-200 mg / kg) to broiler diets have no effect on intestinal microorganisms. Again n another stdudy (Hong et al., 2012) oregano, anise, citrus peel essential oils (125 ppm) and antibiotics (oxytetracycline 100 ppm) addition were not significantly inluenced of ileum microorganisms in broilers. On the other hand, Basmacioğlu-Malayoğlu et al. (2016) reported that the addition of essential oil (300 mg / kg), organic acid (2g / kg) to broiler rations decreased the number of E. coli microorganisms compared to the control group. Khaksar et al. (2012) reported that the addition of KEY (1 g / kg) to Japanese quail rations has been found to stimulate secretions of endogenous digestive enzymes and improve the microbial ecosystem.

Table 1. Effects of the addition of vitamin E and oregano essential oil to broiler rations containing dried soluble distilled cereal grains (DDGS) on the numbers of small and caecum microorganisms

	Escherichia coli	***Staphylococcus aureus***	***Enterococcus faecium***	**Total Gram (-)**	**Total Gram (+)**
Control-DDGS					
Control	97729,3	8926,71	1496,47	125039,1	14628,0
DDGS	96607,1	8577,76	183,39	104339,9	15395,6
Additive					
No additive	97500,0	11700,4	2892,9	122750,0	20606,3
Vit-E	97000,0	5934,2	16,39	110805,6	10408,0
KEY	95259,7	8912,0	139,61	106156,2	13992,2
Vit-E+KEY	98913,0	8462,4	310,870	119046,3	15040,9
SEM					
C- DDGS	1212,2	1573,1	626,8	7237,9	2354,8
C- additive	1758,35	2281,7	909,15	10498,8	3415,74
P					
C- DDGS	0,542	0,884	0,169	0,061	0,830
C- additive	0,563	0,411	0,120	0,711	0,257
C*DDGS	0,065	0,935	0,081	0,522	0,918

DDGS: dried distiller grain with solubles, C: Control, Vit-E: E vitamin, KEY: oregano essential oil, SEM: standart errof of means, P: significance level.

The effects of DDGS, vitamin E and oregano essential oil supplementation on organic acid levels in ileum and caecum in broiler diets are given in Table 2. Ration type and feed additives and interactions did not significantly affect the amounts

of acetic, propionic and butyric acid in the small intestine (ileum) and caecum (P <0.05). In poultry, various microorganisms live in various parts of the digestive system, but there are significant amount of microorganisms lives in the caecum and the secretion of enzymes for the digestion of cellulose and the secretion of some B complex vitamins (Aksoy et al., 1981). Increased lactobacilli in the digestive tract and consequently a decrease in the pH of the intestinal contents decrease the chance of survival for pathogenic microorganisms. There are also some positive effects, including the use of butyric acid directly as a source of energy in the liver. The fact that the feed source is rich in easily soluble carbohydrates can increase the amount of propionic and acetic acid, and these organic acids may have a prebiotic effect. As a result, 25% DDGS, Vit. E and and KEY addition may be used without significant effect on the intestinal microflora and short-chain fatty acids.

Table 2. Effects of vitamin E and oregano essential oil on organic acid levels in small and blind intestines in broiler diets containing DDGS.

	Ileum			**Caecum**		
	Acetic asid (ppm)	**Propionic acid (ppm)**	**Butyric acid (ppm)**	**Acetic asid (ppm)**	**Propionic acid (ppm)**	**Butyric acid (ppm)**
Control-DDGS						
Control	26,735	1,421	1,113	158,41	55,41	77,53
DDGS	31,163	1,546	1,040	169,97	57,77	81,62
Additive						
No additive	27,851	1,447	1,070	165,92	60,32	87,90
Vit-E	28,689	1,619	1,098	142,85	38,88	55,42
KEY	28,760	1,546	1,032	174,39	62,71	80,98
Vit-E+KEY	30,496	1,324	1,105	173,61	64,46	94,01
SEM						
C- DDGS	2,71	0,17	0,15	12,12	6,04	6,54
C- additive	3,80	0,24	0,22	16,91	8,43	9,12
P						
C- DDGS	0,250	0,600	0,738	0,517	0,790	0,670
C- additive	0,963	0,831	0,994	0,668	0,273	0,073
C*DDGS	0,303	0,987	0,353	0,963	0,422	0,211

DDGS: dried distiller grain with solubles, C: Control, Vit-E: E vitamin, KEY: oregano essential oil, SEM: standart errof of means, P: significance level.

Acknowledgements

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ABSTRACT SECTION

(This section will be re-arranged after full texts completing)

Effect of Selenium *In Ovo* Injection on hatching Mortality and Selenium Supplementation to Feed on Chick Mortality of Chukar Partridge (*Alectoris Chukar)*

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Abstract

The chukar partridge (*Alectoris chukar*) is a popular game bird which is native bird from Balkans to eastern Asia Currently, nothing is known concerning Se level of required for hatchlings of chukar partridges raised in farm conditions. Therefore, in this study, the effects of enrichment eggs by *in ovo* selenium injection on hatchery mortality rate (%) and supplement of selenium to diet after post hatch on chick mortality rate (%) were investigated. For this study, 560 fertilized chukar partridge eggs were obtained from Ministry of Forest and Water Affairs, Afyon chukar partridge breeder unit. Eggs were divided into 4 groups [control (not *in ovo* injection), saline (30 µl 5 % saline solution), Se 0.4 (0.4 µg Se addition in 5 % saline solution / 30 µl injection/ egg), Se 0.8 (0.8 µg Se addition in 5 % saline solution /30 µl injection /egg)] for *in ovo* injection. *In ovo* injection were conducted on the 21st day of the incubation in these groups and after post hatch chicks were fed by adding control diet and control + 0.4 and 0.8 mg/kg Selenium in feed, for 5 weeks.

At the end of the research; 0.4 µg of selenium injection into eggs have positive effects on incubation parameters but 0.8 µg of selenium injection was not as effective as 0.4 µg injected group ($p<0.05$). Injection effects on mortality results of hatchery are presented in Table 1.

Table 1. *In ovo* Selenium injection on hatching results, (%).

Treatments	Hatchability	Fertility	Output	Early mortality	Midterm mortality	External Pip	Total mortality
Control	74.29	82.86^{b}	89.66^{b}	6.03^{a}	0	4.31	10.34^{a}
Salin	82.54	88.89^{ab}	92.86^{ab}	1.79^{ab}	0	5.35	7.14^{ab}
In ovo Se 0.4	81.43	84.29^{ab}	96.61^{a}	0^{b}	0	3.39	3.39^{b}
In ovo Se 0.8	80.00	90.71^{a}	88.19^{b}	3.94^{a}	0.79	7.09	11.81^{a}

$^{a-b}$ Means within a coloumn with different superscripts were significantly different ($P < 0.05$).

As seen in Table 1. Hatchability were improved by *in ovo* injected treatments but not significantly, therefore further investigation needs to be done in this area. *In ovo* injection of 0.4 µg Se treatment showed better results in term of output compare control and 0.8 µg Se injected treatments. Early, midterm and total mortality results has been recorded that compare to control and 0.8 injected treatments 0.4 selenium in hatchery had significantly better results ($p<0.05$).

Table 2. Mortality Percentage (%) per treatments

Treatments	**Mortality (%)**
Control	10.00^{abc}
Control+0.4 Se	0^{a}
Control +0.8 Se	3.33^{ab}
Salin	23.66^{d}
Se 0.4+ Control	18.00^{cd}
Se 0.4+0.4 Se	1.39^{a}
Se 0.8+ Control	14.00^{bcd}
Se 0.8+0.8 Se	11.32^{bc}

$^{a-d}$ Means within a coloumn with different superscripts were significantly different ($P < 0.05$).

After post-hatch, chicks were feed by control (no any supplement) and two different level of Se (0.4 and 0.8 mg/kg) for 5 weeks to compare effects of feed supplement or *in ovo* injection on mortality were investigated (Table 2). Results showed that the higher mortality 23.66 % was recorded in salin injected treatments while low mortality rate was recorded in non-injected but 0.4 mg/kg Se supplemented feed treatment. Among injected groups low mortality recorded in treatment of Se 0.4+0.4 Se. As a result of this research showed that *in ovo* injection of 0.4 µg Se seems give better results in term of mortality % results of hatchery. Selenium in ovo injection and feed supplementation for 5 weeks feeding period results confirmed that compare to *in ovo* injection supplement of selenium to diet give better results in term of mortality rate. But compare to control *in ovo* injection of 0.4 µg /30 µl treatment showed better hatchery mortality results. Therefore according to results of this experiment Se 0.4 inova injection and after posthach feed injected +0.4 mg/kg Se contained feed give promising results.

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Toxic effects of lead and cadmium in ewes following subchronic and sublethal exposure

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Abstract
Lead (Pb) and Cadmium (Cd) are widely distributed in the environment. These heavy metals are known for their toxic effects in humans and animals, for their cumulative properties and their co-existence.
We have designed our experimental conditions in order to simulate a repeated low oral exposure and to highlight the toxic effects, after lead and lead-cadmium exposure for 9 weeks in ewes. The experiment was conducted using "Ouled Djellal" ewes during two periods: before exposure and during exposure. Ten ewes were randomly divided in two groups of five; the lead group received lead nitrate at 2.5 mg.Pb/kg/day and the lead-cadmium group received lead nitrate at 2.5 mg.Pb/kg/day + cadmium chloride at 2 mg Cd/kg/day. Both groups were tested for their blood lead levels and hematological and biochemical parameters before and after receiving the treatment. Clinical signs were taken into account. Before exposure, blood lead levels were below the detection limit of 4 µg/l. During the exposure, the levels varied from 135±57µg/l to 356±147µg/l for the lead group and from 192±75µg/l to 445±294µg/l for the co-exposed group. Mean blood lead levels of co-exposed group were more elevated than the ones of the lead group. The transaminases (ALT, AST) and total proteins are high for the Pb-Cd group during the two last weeks of exposure. The ratio albumin/globulin is low. The rates of hematocrit and hemoglobin decreased for the Pb-Cd group to reach a value of 24% and 7.9±0.6mg/100ml, respectively. The co-administration of Pb and Cd resulted a low increase of serum creatinine and a significant reduction in zinc and copper plasma contents. Toxicokinetic analysis showed a greater systemic exposure. Concentrations of lead and cadmium were determined in organs. Histopathologic lesions occurred in liver and kidney. ANOVA was used for statistical analysis.
Key words: Cadmium – Lead - Subchronic oral toxicity - Ewe – Co-exposure

Database Usage and Its Importance in Livestock

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Abstract

A database is a regular collection of structured information or data that is stored electronically in a computer system. For this purpose, as a result of various processes, businesses record all kinds of information, whether digital or not. Businesses need this kind of data and records to make accurate and healthy decisions. At the same time, companies must record this information for a long time in order to compete. Since it is possible to quickly access the data stored on the computer, it should be preferred. However, the data should be kept in the form of a database file, not a conventional filing system. In this method, the data can be filtered according to all kinds of criteria and the desired data can be reached quickly. With the data stored in animal husbandry enterprises for a long time, increasing the productivity in animal production, meeting the breeding needs of the desired characteristics, making efficient breeding organizations, and obtaining high income as a result of identifying the animals to be extracted from the herd will be made easier. As important technical data in livestock enterprises; breeding ram / bull / goat records and related reproduction, growth-development, yield records, fertility records, slaughter and carcass characteristics and meat quality records, animal diseases and vaccine applications can be shown. Long term preservation of the records is being made compulsory within the framework of EU harmonization program. At the same time, with the data stored for a long time, the legislation will be fulfilled in addition to quality and safe food monitoring from farm to table. Database software for storing technical data in animal husbandry; MySQL, Microsoft SQL, Microsoft Access, Postrage SQL, Oracle, Firebird, IBM DB2 are some of them. In this study, it is aimed to give information about the usage possibilities of databases in animal husbandry, the value and importance it will add to animal husbandry enterprise.

Keywords: Livestock enterprises, Database, Record keeping

Preparation of a Computer Package Program for the Recording System in Cattle and Buffalo Husbandry *

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Abstract

Abstract: In this study, a computer packet program for recording the information on the small ruminants was prepared. This program is a program that can save the 581 different pieces of data for cattle in the works of the animal breeding work of small ruminants. The program was written in Visual Basic. The files of Microsoft Access were used as a database. Microsoft Excel was used for the reporting processes. In general, records kept in the computer software package are the breeding, the care, the feeding, the feed, the data before and after slaughtering, the illness, the herd management, the pedigree and so on. Through this study, by transferred to computer the records of small ruminants in the small and the medium-sized firms can be stored in databases for a long time. Also, when needed, the desired data can be reached quickly. It is one of the first and the most important stages of animal breeding studies to keep the yield records. Using this kind of computer package programs prepared for this purpose, the efficiency recording having an important place in animal husbandry can be recorded.

Keywords: Cattle, Computer software program, Database, Recording

Acknowledgement

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Determination of Lokal Wintering Areas In Honey Bee-Cizre Example*

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Abstract

The present study was conducted to determine the significance of Cizre district which is used in wintering in beekeeping. In the present study, the actual data collected in face to face interviews conducted with 30 migratory beekeepers that arrived to Cizre district from the province or from other provinces were analyzed. In the first section of the survey form that included three sections, the socio-economic properties of beekeepers and their employments were discussed, colony movements were addressed in the second section, and the problems experienced during migratory beekeeping activities were discussed in the third section.

The study findings demonstrated that participating beekeepers were mostly within the 41-50 age range (33.3%) and they were primary school graduates (40.0%). In the study, it was revealed that the district was used for wintering by beekeepers from Şırnak province, as well as beekeepers from Siirt Van and Hakkari provinces, 76.7% of 30 beekeepers considered Cizre as a good wintering region and 19 stated that they would remain in the region for 6-7 months to conduct maintenance feeding after wintering.

Increased number of beehives, colony movements that are difficult to manage during the season, the problem of accommodation in winter areas, the possibility of diseases and pests, the damages caused by chemicals used in agriculture and socio-economic difficulties pose various problems for beekeepers. To remove the negative conditions in wintering areas, it would be beneficial and important to consider local wintering areas with microclimatic conditions.

Keywords: Survey, Beekeeping, Cizre, Migratory beekeeping, Wintering, Problems.

* "Bal arısı yetiştiriciliğinde yerel kışlatma alanlarının belirlenmesi - Cizre örneği" başlıklı Yüksek Lisans Tezi'nden derlenmiştir.

Effect of Season on Progesterone Hormone Secretion in Male and Female Hair Goats

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Abstract

In this research, seasonal changes of progesterone hormone were investigated on 12 heads (5 male and 7 female) of 1.5 years old Hair goat. To determine the progesterone concentration, blood samples of 10 mL were regularly taken from jugular vein of each goat, then centrifuged at 4000 rpm for 10 min at 4 °C and the sera were kept in sterile tubes in the deep-freeze (-20 °C) until used. Hormone analysis in the samples were performed by enzyme immunoassay (EIA) method at the Animal Physiology and Endocrinology Laboratory of the Department of Animal Science, Faculty of Agriculture in Erciyes University. The average progesterone hormone levels of male and female Hair goats were 7.40±1.34, 2.24±0.46, 1.22±0.07, 1.18±0.08 ng/ml and 13.46±1.41, 12.78±1.36, 1.17±0.11, 1.49±0.10 ng/ml for autumn, winter, spring and summer, respectively. The results of our research indicate that with regard to the seasonal averages of the blood serum progesterone hormone levels observed in Hair goats, the differences among seasons in a period of one year were statistically significant ($P<0.01$). According the results of this study, it can be concluded that the releases of progesterone hormone was seasonally dependent in male and female Hair goats.

Keywords: Hair goat, reproduction, progesterone, seasonal change

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Changes of Serum Calcium (Ca), Magnesium (Mg) and Phosphorus (P) Levels in Hair Goats

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Abstract

In this study, annual changes of serum calcium (Ca), magnesium (Mg) and phosphorus (P) levels were studied on 13 heads of 1.5 years old (at the beginning of the experiment) Hair goat (7 heads of female and 6 heads of male). For this purpose, blood samples were taken from *vena jugularis* of each goat in every month for one year. The blood samples were centrifugated at 4000 r/min for 5 min and the serums were stored at -20 °C until the laboratory analyses were performed. The general aveage of the serum Ca, Mg and P levels of male and female Hair goats for the months from September to August were found to be, 11.46, 11.63, 10.41, 12.41, 10.72, 10.19, 10.37, 10.52, 9.95, 10.12, 9.92, 9.76 mg/dl; 2.30, 2.44, 2.96, 2.17, 2.30, 2.09, 2.10, 2.50, 2.66, 2.92, 2.69, 2.42 mg/dl and 5.48, 6.69, 6.50, 6.46, 5.22, 5.69, 6.23, 6.28, 7.11, 7.06, 7.12 and 6.35 mg/dl, respectively. As a result of statistical analysis, significant differences ($p<0.01$) were found among the months for all of the experimental parameters. Also, it was determined that the serum Ca, Mg and P levels in Hair goats are under the influence of the environmental temperature changes.

Keywords: Hair goat, mineral profile, calcium, magnesium, phosphorus

Acknowledgements: This work is supported by the Scientific Research Projects Department of Erciyes University, Turkey (Project number: FBA-2016-6872).

Analysing Pedigree for Preserving Genetic Diversity in Animal Breeding

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Abstract:
Genetic diversity is defined as the diversity of alleles and genotypes in a population. It is a common measure of genetic variation, meaning expected heterozygosity. High genetic diversity is advantageous in terms of a species' sustainability. The information pedigree analysis provides can be used for determining genetic diversity and monitoring variation across generations. Analysing the pedigree allows to evaluate population structure and inbreeding levels and many other parameters such as inbreeding coefficient, average relatedness, effective number of founders, effective number of ancestors, number of founder genome equivalents, effective population size, genetic conservation index, loss of genetic diversity, the equivalent number of complete generations, generation interval, rate of inbreeding per year, rate of inbreeding per generation, and etc..
Animal breeding methods have been used for a long time. Even if no selection has been made for any breeding programme, the farmers choose some animals as breeders. Thus, there is a possibility that genotypic differences between previously selected parents may be reduced. As a result, a reduction in genetic diversity could occur. The parameters mentioned above should be calculated annually and kept under control with specific mating programmes in order to preserve genetic diversity in livestock. In this article, it is aimed to introduce these parameters.

Key words: inbreeding, average

Ultrasonic Loin Eye Muscle Characteristics of Eşme Kıvırcık Lambs at Weaning and Six Months of Age

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Summary

The experiment was conducted to determine the loin eye muscle characteristics of Eşme Kıvırcık lambs at weaning and age of six months by ultrasonic measurement. Ultrasonic data (n=1122) were collected from 833 lambs at weaning (at the age of 98.9 days) and 289 lambs at nearly six months of age (at the age of 191.2 days). Live weights of lambs at weaning and six months of age were 30.60 and 45.94 kg, respectively. In same periods means for backfat thickness were 0.332 and 0.392 cm, and means for muscle depth were 1.837 and 2.060 cm, respectively. In the period from weaning to 6 months of age, live weight increased significantly, but this increase was not reflected in fat thickness and muscle depth. This is due to weaning of the lambs and subsequent grazing in the pasture without feeding. Although growth continues and weights increase after weaning, the contribution of this change is limited in terms of meat yield and quality. These results prove that weaning and marketing practices at the age of about three months, implemented by breeders in the region, are optimal.

Key words:

The Effects of Nettle Seed Meal Addition to Quail Diets on Performance and Carcass Traits

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Abstract

This study was conducted to determine the effects of nettle seed meal (NSM) addition to quail diets on performance and carcass traits. A total of 255 quail chicks 7 days old were distributed to 3 treatment groups. The treatment groups were: 1) Control group (C, there is no nettle seed meal, soybean and corn based diet), 2) 7,5% nettle seed meal addition to diet (7,5%NSM) and 3) 7,5% nettle addition to diet (15%NSM). The quail fed with treatment diets from 11th to 39th day. End of the experiment 2 quail in each replicate were slaughtered for a carcass and internal organ weight were determined. The body weight of quail at 18 to 25 d of age were decreased by 15% NSM supplementation than C and 7,5%NSM groups and 32 and 39 d decreased by 7,5 and 15% NSM supplementation than C group. There was similar trend in the body weight gain of quail. Average feed intake did not affect, however, average feed conversion ratio was increased by nettle supplementation. There were no significant differences in carcass, heart and liver yield and its breast color (lightness, redness and yellowness). Gastrointestinal tract and gizzard yield were increased by the 15% NSM supplementation. In conclusion, higher percentage of NSM supplementation to quail diets has negative effect on performance traits. Also, there was some negative effect trends at 7,5% NSM ratio. Therefore, NSM should be used a lower ratio than 7,5% or not much this amount.

Key words: nettle seed meal, quail, performance, carcass

Investigation of The Relationship Between FABP4, NR1H3 And SCD Genes And Some Milk Yield Traits In Holstein Cattle

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Abstract

Aims of the present study were to identify allelic and genotypic structure fatty acid-binding protein 4 (*FABP4*), nuclear receptor subfamily 1, group H, member 3, (*NR1H3*) and stearoyl-CoA desaturase (*SCD*) genes and to investigate association of these genotypes with some milk traits in Holstein cattle. In total 166 Holstein dairy cows were used for the study. Genotyping was performed by polymerase chain reaction and restriction length polymorphism (PCR-RFLP) method. The frequencies of *FABP4*-G (0.82), *NR1H3*-G (0.96) and *SCD*-C (0.73) alleles were found to be high in the examined Holstein cows. According to chi-square test results, the investigated Holstein cows were in Hardy-Weinberg (HW) equilibrium for the *FABP4* and *SCD* genes while significant deviation was observed from HW equilibrium for the *NR1H3* gene. *FABP4*-AA genotype was found associated with milk density. As a result, it has been thought that larger study which comprises higher number of animals could be planned to investigate association of different polimorphisms in these genes with milk yield traits.

Keywords: Genotype frequency, Holstein, milk yield traits, polymorphism

Effect of Supplementing Condensed Tannin Sources in Concentrate on Ration Quality and Growth of Sheep Fed Elephant Grass (*Pennisetum Purpureum*) Based Diet

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Abstract

The study aiming for evaluating effect of adding condensed tannins (CTs) extracts from shrub and tree leaves on performance of sheep was done in two consecutive trials, namely: [1] in vitro trial to evaluate effects of adding CT sources on gas production (GP) and efficiency of microbial protein synthesis (EMPS), and [2] in vivo trial to evaluate effects of adding CT extracts on feed consumptin, digestibility, N retention, body weight gain. Ten shrub and tree leaves were used in this study, namely leaves of wild sunflower (*Tithonia diversifolia*, mulberry (*Morus macroura*), cassava (*Manihot utilissima*), api-api (*Avicennia marina*), caliandra (*Calliandra calothyrsus*), sesbania (*Sesbania grandiflora*), acacia (*acacia vilosa*), glyricidia (*Glyricidia sepium*), jackfruit (*Artocarpus heterophyllus*), moringa (*Moringa oleifera*), elephant grass (*Pennisetum purpureum*) and concentrates composed of wheat pollard, rice bran, coconut cake meal, kapok seed meal, molasses, urea and mineral. In the study of *in vivo* 18 growing sheep aging of 8-9 months and weighing of 23.67kg ± 1.23 were used. The treatments applied were: T0=Elephant grass (60%)+concentrate (40%); T1 = T0 + CT (3% DM); T2= T1 + PEG; T3 = T0 + CT (3,5% DM); T4 = T3 + PEG; T5 = T0 + CT (4% DM) and T6 = T5 + PEG. The treatmets applied for in vivo trial were: P0 = Elephant grass (60%) + concentrate (40%); P1 = P0 + cassava leave extract (equiivalent to 3,5% CT); P2 = P1 + PEG. Data obtained were analysed using Randomized Block Design. Statistical analyses showed that treatment significanty affected ($P<0.05$) values of total GP and EMPS. The lowest values of total gas production (45.9 ml/500 mg DM) and EMPS (64.6 g/kg BOTR) were observed in the treatment T3 (3.5% CT from cassava leave meal). Based on this result it was concluded that this treatment was the best and was chosen for further investigation using *in vivo* method. Results of *in vivo* showed that adding cassava leave meal equivalent to 3.5% CT significanty increased ($P<0.05$) dry matter intake (76.3 g/kg $BW^{0,75}$), organic matter intake (66.5 g/kg $BW^{0,75}$), and crude protein intake (7.0 g/kg $BW^{0,75}$). Digestibility values of DM, OM and CP increased significantly ($P<0,05$) due to treatment, except for CP digestibility. However, N retention for sheep receiving treatment T2 were significantly higher ($P<0,05$; 15.6 g/d) than T0 (9.1 g/d) and T2 (8.53 g/d). Similar results were obtained for daily weight gain where P2 were the highest (62.8 g/d) than P0 (51.9 g/d) and P2 (53.1 g/d). It can be concluded that adding CT sources from cassava leaves at 3.5% DM reduced gas production (45.9 ml/500 mg BK), but achieved highest value of efficiency of microbial protein synthesis (64.6 g/kg BOTR). Furhter, in vivo trial resulted that adding the same amount of cassava leave meal did not reduce palatability, but rather increased OM digestibility and hence feed consumption was improved. N retention was increased due to CT in the cassava leave meal and this may have explained a higher input of N into duodenum which was further led to higer daily weight gain and dressing percentage.

Improvement of Cryosurvivability of Ovine Spermatozoa by Nigella sativa Oil

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Abstract

The study was designed with three experiments to evaluate the effects of pre-freeze supplementation of *Nigella sativa* oil (NSO) and thymoquinone (TQ) on total motility, progressive motility, bio-kinetic characteristics, acrosomal integrity and DNA integrity of cryopreserved ovine spermatozoa. Semen samples collected from three proven fertile Merino rams were diluted with a Tris-based cryomedia containing different levels of NSO (*Experiment I*: 0, 10, 100 and 1000 μg/ml), TQ (*Experiment II*: 0, 1, 10 and 20 μg/ml) and their optimum levels (*Experiment III*: 100 μg/ml of NSO, 10 μg/ml of TQ and 1 mM of α-tocopherol and cryopreserved as pellet (200 μl) and subsequently evaluated at different post-thaw incubation periods (0, 2 and 4 h). The results revealed that the percentage of total motility, progressive motility and bio-kinetic characteristics such as average path velocity, curvilinear velocity and straight-line velocity were higher ($P < 0.05$) in the sperm aliquots cryopreserved with 100 μg/ml NSO or 10 μg/ml TQ than in the sperm aliquots cryopreserved without supplementation just after thawing and 2 hours of post-thaw incubation. Among the supplements, NSO (100 μg/ml) showed higher values of the total motility, progressive motility, bio-kinetic characteristics specially, average path velocity, curvilinear velocity and strait-line velocity, acrosome integrity and DNA integrity compared with the spermatozoa frozen without supplementation. Therefore, the results suggest that NSO may be added to the cryomedium to improve the cryosurvival of ovine spermatozoa.

Keywords: *Nigella sativa* oil, cryosurvival, ovine spermatozoa

The Spermatological characteristics of hair goats on farmers conditions

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Abstract

In this study, the spermatological characteristics of 9 head hair goats in the hands of the people of Muradiye District of Van Province were determined. According to this, fresh spermatological properties of semen ejaculates taken from monsters were as follows; sperm color opaque, sperm amount 2.23 ml, sperm activity (mass movement) 4.33, spermatozoa motility 88.59%, spermatozoa density $1.96\pm0.8X10^{9}$/ml, abnormal spermatozoa rate 6.1% and the rate of dead-live spermatozoa was determined as 5.7% and pH 6.72 spermatological characteristics respectively.

Key words: Hair Goat, spermatological characteristics

The Prosess of Using Pollen in Human Health

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Abstract

In the middle of the flowers that bloom before the seeds are formed in the plant, in the head part of the male reproductive organs, there are dusts composed of small cells bearing all the hereditary characteristics of the plant. These flower reproductive cells are called "pollen". Pollen is male sex cells of flowering plants, pollination of the female organ provides. Pollen, also called flower powder, can be seen during flowering periods of plants and can be in different colors ranging from cream to black. The first use of pollen by humans was in ancient China, Persia, Egypt and Greece. Pollen, which the ancient Egyptians described as 'life-giving dust günümüzde, is still known as an excellent complete nutrient. The earliest sources of medical use of pollen are found in books written by Arab and Jewish physicians living in the Islamic region of Spain. It is recommended to use pollen as a bleeding stopper. Due to the fact that pollen is a natural food source, its use in human nutrition is increasing rapidly in Europe. Scientific studies and clinical test results in the last 30 years in European countries have focused on the effects of pollen on prostate, allergic diseases and cancer types. The moisture content of pollen is an important quality parameter for pollen in that it directly affects the basic properties of the product. These characteristics include the storage quality of the product, its aroma with its typical taste and smell. High moisture content increases the activity of microorganisms and enzymes as well as affect the sensory properties of the product. On the other hand, the low moisture content causes rapid rancidity in the product. Pollen can be used directly by people on a daily basis to meet the needs of protein, vitamins and minerals. There is a positive correlation between pollen color and nutritional value. Since pollen is a very rich nutrient, its amount should be increased slowly. You should start by taking half a teaspoon and then gradually increase 1-2 tablespoons a day. The majority of the major biological components of bee pollen are phenolic acid derivatives, including flavonoid glycosides, and polyphenolic compounds. Flavonoids are also called secondary plant compounds with different and important physiological and pharmacological activities. Flavonoids have different biological properties such as antioxidant, anticarcinogen, antiinflammatory, antiatherosclerotic, cardioprotective and improving endothelial function. Many of these biological effects are attributed to their intrinsic reduction ability. Flavonoids also provide indirect protection by activating endogenous defense systems and regulating different biological processes.

Keywords: Pollen, Apitherapy, Nutrient, Bee Pollen

Estimation of Genetic Parameters for Litter Size of Karya Ewes

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Abstract

The aim of this study was to estimate phenotypic and genetic parameters of litter size in ewes of Karya sheep which is an important sheep breed widely raised in Aegean region. Litter size of ewes at 1 to 7 ≥ years of age (n= 89967) were recorded in base (n= 78738) and middle tier flocks (n=10929) during the 6-year period, 2011 to 2016. Least square means for litter size of ewes were found as 1.38 and 1.50 for base and middle tier flocks, respectively. The difference between base and middle tier flocks for litter size is notable. In this study, heritability and repeatability estimations were also estimated using 13602 observations obtained from 2267 ewes giving birth in all years between 2011-2016. Heritability and repeatability estimates for litter size was 0.12 and 0.327, respectively. These estimations within the expected limits indicate that the selection programs to increase prolificacy in the Karya population will be successful.

Keywords: Reproduction, sheep, heritability, repeatability

Evaluation of therapy horses welfare in animal-assisted interventions from anthrozoological perspective

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Abstract

Anthrozoology deals with interactions between humans and other animals. It is an interdisciplinary field with other disciplines including veterinary medicine, ethology, zoology, anthropology, and psychology. While the humans and nonhuman animals have always been intertwined, became the focus of systematic study only in the late 20th century. Besides, no research has been reported in Turkey to provide scientific data in the field so far. The development of anthrozoology as an academic discipline has been influenced by human health and psychological, emotional, social and physical benefits as a result of human interaction with animals. Researchers evaluated human-animal interaction only in terms of humans. By means of the science of anthrozoology, it will be possible to increase animal welfare by evaluating this interaction for animals. Anthrozoology has focused on those types of animals that serve widely as companions: horses, dogs, cats, lamas and so on. Positive human animal interaction, which is the main subject of Anthrozoology, has been successfully applied in horse-assisted therapy applications. It is important for welfare that horses are trained for human therapeutic use using ethology-based training methods based on the natural behavior of animals. This review aims to survey the various aspects of anthrozoology, such as basic definitions, historical background, current practices around the World, and importance in animal-assisted interventions for the researchers.

Keywords: Animal Assisted Interventions, Antrozoology, Behavior, Horse Training, Welfare

A Trademark Value as a "Van Fish" – scientific and cultural problem as a " Pearl Mullet"

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Abstract

Nowadays, intensive studies in the matter of producing regional trademark are often being conducted either in countries or among cities and different regions of the countries. Product/Products identified in a particular region have become an important factor by taking a geographical sign on the advertising of the region. However, in order for these products to become at the agenda, to be accepted, and to appear at the geographical signs they should be based on scientific roots as well as social and cultural ones.

Van Fish, living in Van Lake, is an endemic species which has qualities to survive in the intense alkaline Van Lake. Images obtained the reproduction migration draws attention of both local and foreign tourists and the media as a visual feast. In the process of knowing and being spotlighted of Van fish as an endemic species , it is well known as "pearl mullet" rather than "Van fish". Although the nomenclature of the fish has been generally accepted and approved by the number of people who are not from Van community, the nomenclature of pearl mullet does not have a scientific base. Van fish was identifed in the scientific literature as a species of cyprinus in the early 1800s and there have been no debates neither in Turkish nor in any other language so far.

In this study, the necessity to quit the insistence to call this species, endemic in Van lake and which is as a scientific fact obviously a species of cyprinus, a mullet in unethical way scientifically has been discussed with reasons; besides, it has been tried to state that at the academic level the most accurate approach will be to call it Van Fish in foreign literature and Van Balığı in Turkish literatüre.

Keywords: Pearl Mullet, Van Fish, Cyprinus, Darex, Tarex

Environmental Effects on Milk and Fertility Yield of Anatolian Water Buffaloes Reared in Istanbul

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Abstract

In this study, environmental factors milk and fertility yield of Anatolian Buffaloes reared in Istanbul province and district were determined. The records of lactation milk yield (LMY), lactation length (LL), dry period (DP), service period (SP) and calving range (CR) of the 1300 Anatolian Buffaloes registered to Anatolian Water Buffalo Breeding Association were used. The effects of farm size (FS), calving season (CS), calving year (CY) and lactation number (LM) on LMY, LL, DP, SP and CR were researched. The average of LMY, LL, DP, SP and CR were calculated as 1314.7 kg, 236.7 days, 147.4 days, 74.1 days and 384.13 days, respectively. The analysis of variance showed that the effects of FS, CY and LM on LMY and DP were statistically significant ($P \leq 0.05$). The effect of CS, CY and FS on LL were significant ($P \leq 0.05$). The effect of CS on SP and CR were statistically significant ($P \leq 0.05$). To conclude, it can be believed that milk yield traits or first calving age calculated for Anatolian Water Buffalo raised in Istanbul were important for selection studies in future.

Keywords: Anatolian Water Buffalo, environmental factors, lactation milk yield, lactation length dry period , service period, calving range

The Effect of Substituting Dwarf Elephant Grass (Pennisetum purpureum cv. Mott) with Dried Cassava Peel on In Vitro Gas Production, Digestibility, Ammonia, Microbial Biomass and Efficiency of Microbial Protein Synthesis

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Abstract

Grass and legumes are the main source of feed for ruminants. However, there is often a lack of those forages especially during the dry seasons. Therefore an alternative feed that is good in quality and cheap is needed. Cassava peel is a waste of cassava that is abundantly available and has a good quality. The purpose of this research was to evaluate the effect of substituting dwarf elephant grass (*Pennisetum Purpureum cv Mott*) with dried cassava peel (*Manihot utilissima*) on in vitro gas production, dry matter digestibility (DMD), organic matter digestibility (OMD, ammonia production, and efficiency of microbial protein synthesis (EMPS). Materials used were dried cassava peel, dwarf elephant grass and gliricidia leaves (*gliricidia sepium*). The method used was experimental using a randomized block design arrangement with 4 treatments and 3 replications. The treatments were T_0= 70% dwarf elephant grass + 30 % gliricidia, T_1= 65% dwarf elephant grass + 5% cassava peel + 30 % gliricidia, T_2= 60% dwarf elephant grass + 10% cassava peel + 30 % gliricidia, T_3= 55% dwarf elephant grass + 15% cassava peel + 30 % gliricidia. Data were analyzed using analysis of variance (ANOVA) and if there was significant effect between treatments, it will be continued with least significant different (LSD). The results showed that substituting dried cassava peel had significant effects ($P<0.05$) on b value, DMD, OMD, MB, EMPS and ammonia production ,but it had no significant effect ($P>0.05$) on gas production, values of c, ME and NE. Treatment T_0 was slightly higher for all parameters measured compared to T_1, T_2, and T_3. However, mostly of the parameters measured among treatments T_1, T_2, and T_3 were not statistically different. It can be concluded that substituting dwarf elephant grass with dried cassava peel up to 15% was considered feasible to be implemented.

Keywords: Cassava peel, gas production, digestibility, ammonia, microbial biomass, EMPS

Investigation of Factors Affecting Race Performance in Equestrian Competitions

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Abstract

The Equestrian Challenge is a competition that tests the competitor's ability to manage the endurance and form of a Horse Endurance Course in a competition run against the track, distance, climate, ground and stopwatch. All members of the "Genus Equus" family can compete in a Horse Endurance competition. The competition consists of several stages. Competitions consist of 10 to 139 km. Factors affecting race performance; gender, age, race, horse and rider training, horse equipment, rider experience, impact of care and feeding, track plan and weather conditions. Equestrian endurance competition results are calculated according to average speed, pulse per minute (58 / min-64 / min). As a result of the research; In order to achieve success in national and international competitions, it is observed that training is given more or less importance and other factors are generally ignored. In order to achieve high performance and international achievements from horses, besides breeding good horses with genetic capacity, it is necessary to optimize the factors affecting performance.

Keywords: Equestrian, Endurance, Factors, Performance

Response of supplementing varying levels and types of cassava leaves (Cassava esculenta L) on growth of sheep fed on maize stover based diet

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Abstract

This study aimed to evaluate effect of applying different strategy of cassava leaves supplementation on fat-tailed sheep production fed on maize stover based diet. 35 fat-tailed sheep aging of 6-12 months old and weighing of 11-17 kg were used and they were subjected to the following treatments T1: maize stover *ad lib* + cassava meal (0.5 g) + urea (1% of DM intake), T2: maize stover *ad lib* + cassava meal (0.5 g) + cassava leaves silage (1.0 g CP/kg BW), T3: maize stover *ad lib* + cassava meal (0.5 g) + cassava leaves silage (1.5 g CP/kg BW), T4: maize stover *ad lib* + ground cassava chips (0.5 g) + cassava leaves silage (2.0 g CP/kg BW), T5: maize stover *ad lib* + cassava meal (0.5 g) + dried cassava leaves (1.0 g CP/kg BW), T6: maize stover *ad lib* + cassava meal (0.5 g) + dried cassava leaves (1.5 g CP/kg BW), and T7: maize stover *ad lib* + cassava meal (0.5 g) + dried cassava leaves (2.0 g CP/kg BW). A Randomized Block Design was used and variables measured were feed intake, intake behavior, digestibility, ammonia, VFA and blood urea concentrations , nitrogen retention, number of eggs count and body weight gain. The results showed that supplementing cassava leaves had no significant effect ($P>0.05$) on DM, OM intakes, DM and OM digestibilities, but significantly affected ($P<0.01$) feeding behavior, CP intake and digestibility, N-retention and body weight gain. Supplementation of cassava leaves silage and dried cassava leaves at the level of 2.0 g CP / kg BW reduced the number of egg counts by 47.7 and 44.2% respectively. It can be concluded that supplementation of dried cassava leaves on the level of 2.0 g CP/kg BW (T7) achieved highest body weight gain (81.21 g/d).

Key words:

In ovo injection of L-Glutamine in broiler eggs1: Embryonic development and hatchability characteristic

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Abstract

In this study, the effects on embryonic development and the hatchability characteristics of the *in ovo* L-glutamine injection in broiler hatching eggs (hatchability, yolk free hatching weight) and the relative total digestive system weight (GIT), yolk weight (YW) and muscle (thigh and breast muscle) weights. For this purpose, 960 broiler hatching eggs (Ross 308) were randomly distributed into 4 groups with 6 replicates. According to this; group 1 *in ovo* salt injection (0.9%; positive control, PC); group 2 negative control group (without injection, NC); group 3 *in ovo* L-Glutamine injection (1%; Q); group 4 eggs were subjected to standard hatching procedure (SH). On the 18th day of the incubation, *in ovo* L-Glutamine injection decreased the hatchability compared to the NC group and increased the yolk free hatching weight compared to the SH group. Embryonic period weight change (Hatchability-18E) was increased with *in ovo* L-Glutamine injection compared to PC group. While yolk, GIT and muscle weights were not affected by the embryonic period, yolk weight of the Q group chicks was higher than the SH group, GIT higher than all groups and breast muscle weight were higher than the SH and PC groups. The results of the present study showed that feeding with *in ovo* 1% L-Glutamine increased yolk use efficiency and breast muscle weight by increasing chick digestive system development, excluding hatchability. In addition, it was shown that there is no need for negative control groups and standard incubation procedures are sufficient in *in ovo* studies.

Keywords: L-Glutamine, broiler, *in ovo,* yolk sac, digestive system

Summarized from 1Şeyma Karamık's Master Thesis.

Effect of dietary supplementation with Rosmary oil on blood, rumen parameters, feedlot performance and meat quality of fattening lambs

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Abstract

In this study, it was aimed to determine the effects of the use of rosemary (Rosmarinus officinalis) essential oil in lamb fattening on blood, rumen parameters, fattening performance and meat quality. For this purpose, two different rosemary essential oil doses (250 mg/kg, 500 mg/kg) were added to lamb fattening ration. The animal material of the study consisted of 30 Norduz male lambs weaned at 4 months of age. Lambs were divided into 3 groups as follows; R0: fed with no rosemary (control) to ration, R250: fed with 250 mg/kg DM rosemary oil added ration, R500: fed with 500 mg/kg DM rosemary oil added ration, fed for 70 days. Each group was housed in a total of 6 separate paddoct, with 2 replications/repetitions (2 paddock/group; 5 lambs/paddock). The daily feed intake of B500 lambs with the addition of rosemary oil doses to ration were more limited according to other groups. Rumen pH was higher than control with rosemary oil ($p < 0.014$), propionic acid levels increased with the addition of both doses of rosemary oil ($p<0.005$). While serum glucose levels increased with additive doses, serum BUN, insulin, triglyceride concentration were not affected by the addition of rosemary oil ($p<0.002$). Results concerning the main slaughter and carcass properties such as the carcass weight, the ratio of the internal organs to the carcass weight, performance, carcass fatness and conformation obtained in parallel with the performance of fattening and the effects of rosemary addition were determined to be limited. It also showed that post-mortem glycolysis maintained its normal course for all groups and that the final pH was within the accepted range. In this study, the results obtained in the sensory panel test were in parallel with the physical and chemical properties of the meat and the effect of rosemary on the sensory properties of meat was not significant. According to the results obtained from the study, it is possible to say that two different dose of rosemary oil additive to lamb ration did not contribute positively to methanogenic bacteria density, fattening and carcass characteristics in lambs.

Key words: Rosemary extract, rumen fermentation, lamb beef, meat quality

Effects of adding essential oil to alfalfa silage with different levels of apple pulp on gas production and fermentation characteristics

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Abstract

This study was conducted to document the effects of supplementation of alfalfa silage with fresh apple pulp and essential oil on gas production, dry matter, organic matter and crude protein degradabilities by *in vitro* method. The treatments included: alfalfa silage (control treatment), alfalfa silage processed with 500 mg essential oil/kg, alfalfa(75%)+apple pulp (25%) silage, alfalfa (75%) + apple pulp (25%) silage + 500 mg essential oil/kg, alfalfa (50%) + apple pulp (50%) silage, alfalfa(50%)+apple pulp (50%) silage+500 mg essential oil/kg, alfalfa(25%)+ apple pulp (75%) silage, alfalfa(25%)+apple pulp (75%) silage+500 mg essential oil/kg that was ensiled for 90 days. The results showed that 72 h after incubation, the highest gas production volume was for treatment include alfalfa silage (25%) with alfalfa pomace (75%) processed with essential oil (189.64 ml/g DM) and the lowest gas production amount was for treatment include alfalfa silage (50%) with alfalfa pomace (50%) processed with essential oil (141.07 ml/g DM). Supplementation silage with apple pomace at levels 50 and 75 percent increased gas production parameters ($p<0.01$). DM effective degradability increased with adding essential oil and apple pomace at level 75% ($p<0.01$). It can be concluded that essential oil has the potential to affect ruminal fermentation efficiency.

Keywords: Alfalfa silage, Apple pulp, Degradability, Essential oil, *in vitro* gas production.

Süt Koyunculuğu için İşletme Modeli

M. Soysal

Ülkemizde koyun işletmelerinin çoğunda geleneksel usulde koyunculuk yapılır. Asıl hedef kuzu üretimidir. Doğan kuzular 2-3 ay boyunca annelerini emerler. Bir kısım üretici kuzuları sütten hiç kesmezler, anneleriyle birlikte meraya salarlar, bir taraftan ot yiyen kuzular 4-5 aylık olmalarına rağmen hala annelerinin süt bitmiş memelerini emmeye çalışırlar. Bir kısım üretici de 2-3 aylık sütten kestikleri erkek kuzularını içerde yoğun besiye tabi tutup kasaplık olarak hazırlarlar. Bu arada bazı üreticiler sütü iyice azalmış koyunlarını birkaç ay daha sağarlar. Elde edilen çok az miktardaki süt, miktar azlığından dolayı ticari değeri olmadığından genellikle aile ihtiyaçları için kullanılır.

Bazı bölgelerimizde koyun sütü işleyen mandıralarımız mevcuttur. Bunlar üreticiden küçük parçalar halinde topladıkları koyun sütünü birleştirip peynir yapımında kullanırlar. Koyun sütü çok değerlidir, piyasada inek sütünün 2-3 katı fiyatla satılır. Koyun sütünün ticari olarak kullanıldığı bölgelerde, örneğin Çanakkale'de Ezine tipi peynirler, Elazığ ve Erzincan'da tulum peyniri, Orta Anadolu'da daha çok yoğurt olarak değerlendirilir.

Ülkemizde yıllık koyun sütü üretimi 1 milyon ton civarındadır ve inek sütünün 1/20 si kadardır. Koyun sütünden çok değerli ürünler yapılabildiğine göre daha çok koyun sütü üretmemiz lazımdır. Koyun sütü büyük bir değer olmasına karşılık ülke ekonomisine katkısı çok azdır. Bugün Türkiye'de üretilen sütün ancak %6.3 ü koyun sütüdür.

Koyun sütünün piyasada kıt olmasını, aynı zamanda çok değerli olmasını keşfettikten sonra, koyun sütü açığı ve gelişen pazarın farkına varan firmamız yeni bir model geliştirerek süt koyunculuğu yapmak ve günde tonlarca koyun sütü üretmek için çalışmalara başlamıştır. Kurmaya başladığımız işletme modeli aslında yeni olmayıp İsrail, Fransa, İspanya, İtalya ve Yunanistan'da yapılagelen bir modeldir ve üretilen koyun sütü yüzlerce çeşit peynir yapımında hammadde olarak kullanılır. Ülkemizde de bu model bazı devlet kurumlarıyla devletten özelleşen eski Tigem'lerde yapılmaya çalışılır. Ancak bunların sayıları ve birim hayvan başına ürettikleri süt miktarı çok azdır. Bizim kurmaya çalıştığımız modelin iki önemli farkı vardır. Birincisi hayvan başına üretilen sütün fazla olması, ikincisi üretilen koyun sütünün mevsimsel olmaması.

İşletme Modeli

Süt koyunculuğunda kullanılacak koyun ırkı, bol süt vermeye yatkın ve laktasyon süresi uzun olmalıdır. Yerli sütçü koyunlarımız maalesef bu amaca hizmet etmemekte, pratikte sadece kuzunun emdiği ile birlikte 150-200 lt süt vermektedir. Süt koyunculuğu modelinin karlı olarak yapılabilmesi için bir koyunun laktasyon süresi en az 200 gün, süt verimi en az 400 lt, anaç başına yılda verdiği kuzu 1.5-2 adet olmalıdır. Böyle olduğu takdirde süt verimi bütün işletme masraflarını karşıladığı gibi sütün %20 si de kar olarak kalmaktadır. Bunun yanında işletmede elde edilen erkek ve dişi kuzular komple kar olarak kalmaktadır.

Süt koyunculuğu dünyada entansif yapılan bir işletme şeklidir. Koyunlar tamamen kapalı işletmelerde barındırılır ve gezinme ihtiyaçları padoklarla karşılanır. Sabah akşam günde 2 kez sağılırlar. Şimdi günde 3 kez sağım uygulamaları başlatılmıştır.

Süt koyunları yılda bir kez mi, yoksa 2 yılda üç kez mi doğurmalı sorusu hala tartışma konusudur. Süt koyunlarının laktasyon sürelerinin 7-9 ay gibi uzun olması, 8 ayda bir doğurmalarına engeldir. Süt veriminin bir kısmından vazgeçerek 8 ayda bir doğurmalarını sağlamak ve bu sayede daha fazla kuzu elde etmek düşünülebilir, ancak bu seferde fazla yıpranan koyunun daha az süt üretmesi ve daha erken yaşta damızlıktan çıkmasının ekonomik analizi yapılmalıdır.

Süt koyunculuğu işletme modelinde süt üretimi mevsimsel olmaktan çıkmalı ve yılın her mevsiminde yapılabilmelidir. Firmamız bu işe bu iddia ile başlamıştır, yani koyun sütü her mevsim üretilecek. Tüketici %100 koyun sütünden elde edilen peynir ve yoğurda en yakın marketten ulaşabilecektir. Bu gerçekleştirilmesi zor bir iddiadır, ancak uzun da sürse bir gün gerçekleşecektir.

Koyun Sütünün Değerlendirilmesi

Koyun sütü içerdiği kuru maddenin fazlalığı yüzünden peynir yapımında çok önemlidir. Koyun sütünden en çok yapılan klasik beyaz peynir, tulum ve kaşar peyniri yanında bir çok yöresel peynirler yapılabilmektedir. Çok meşhur ezine tipi peynir yapımında koyun sütü, keçi ve inek sütüyle karıştırılarak kullanılır. Ezine koyun peyniri %45 koyun, %40 keçi ve %15 inek sütü karıştırılarak yapılır. Bunun böyle yapılmasının iki nedeni vardır. Birincisi maliyeti düşürmek, ikincisi koyun ürünlerinde bulunan ağır lezzet ve kokuyu elemine etmektir. Ancak otomatik sağım sistemiyle elde edilen koyun sütünde kesinlikle koku yoktur. Biz üreticilerin görevi, koyun sütü üretiminin artırılması yanında, koyun sütünün kokmadığına tüketicileri inandırmaktır. Ezine koyun peynirinin karışık sütten yapılması, keçi ve inek sütünün de pazar değerini artırmaktadır. Öyle ki birçok mandıra koyun sütünün bittiği dönemlerde keçi ve inek sütü alımını azaltmakta veya durdurmaktadır. Böylece koyun sütünün önemi ve değeri bir kez daha anlaşılmaktadır.

Süt Koyunculuğu İşletme Modelinin Yayginlaştirilmasi

Geliştirdiğimiz model karlı, dolayısıyla cazip olduğundan yatırımcıların ilgisini çekmektedir. Bu yıl Çanakkale'de bir işletme faaliyete geçmiş, 2019 sonbaharında ve 2020 başında Konya, Çankırı, Bursa ve Niğde'de 5 işletme daha faaliyete geçecektir. Amacımız sütçü koyun işletmelerini yurt sathına yaymaktır.

Use of cannabis seeds in poultry nutrition and its effects on meat and egg quality

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Abstract

Cannabis sativa L. is used for drug purposes in our country and in many countries. However, in some EU countries, Canada, China and the Philippines, some countries are free to produce. Hemp contains delta-9-tetrahydrocannabinoid (THC) as a physicoactive substance. In recent years, new commercial varieties have been produced that are extremely low (0.3% or less) in terms of THC, and these varieties are called “industrial cannabis.. Hemp varieties with low THC content are increasing day by day for both natural fiber and seed production. Hemp seeds contain 95% dry matter, 21.5% crude protein, 31.45% crude oil and 35.8% carbohydrate. Hemp protein is stable in amino acids and has high digestibility. Hemp oil is also rich in omega-3 fatty acids. When hemp is added to poultry feeds, it is possible to significantly change the omega-3 content in eggs and meat. Omega-3 fatty acids need to be consumed on a daily basis for growth and health reasons. If the eggs obtained from chickens fed with cannabis seeds are consumed by humans, a certain part of the daily omega-3 requirement can be met.

In this review, the nutrient content of cannabis seeds and the effects of the use of cannabis seeds in poultry nutrition on performance and product quality are discussed.

Key words: hempseed, broiler, layer, meat, egg

Poster Presentation

Fear Behavior in Japanese Quail: Genetic and Environmental Factors

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Abstract

In recent years, as a result of the sensitivity observed in societies for animal welfare, the alternative poultry rearing models have been developed in which take into account animal welfare. In this case, animal welfare measures need to be constructed in a better and understandable way. The tonic immobility is a catatonic-like, death feigning, anti-predator response present in many species throughout animals. The variable duration of tonic immobility is considered to be a measure of the animal's innate fearfulness. Stress and fear are important factors that affect animal welfare, and when they are intense and long-term, the egg yield, egg quality, feed efficiency, and development decline, carcass yield and reproductive performance decrease. Fear is an important component of stress, and tonic immobility is used as a reliable criterion for determining fear response of a bird. Many factors such as genetic structure, social factors, housing system, and flock management practices affect the tonic immobility duration. In this paper, it was aimed to review the studies that included tonic immobility measurements in Japanese quail.

Keywords: Animal welfare, Fearfulness Tonic immobility, Behavior, Japanese quail

Poster Presentation

Alternative Rearing Systems in Japanese Quail

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Abstract

In recent years, as a result of the sensitivity observed in societies for animal welfare, the alternative poultry rearing models have been developed in which take into account animal welfare. Poultry production represents an enormous industry and gaining much concern about the performance and welfare of livestock. Animal welfare is an important factor in animal health and food safety. In poultry, considering the health and welfare of birds, sustainable production with the aim of less harm to the environment, production types are called alternative rearing systems. In alternative rearing systems, the final product residual level is low and the products have a special flavor. In these systems, it is aimed that consumers who are conscious and have high economic level to consume poultry products more easily. Alternative rearing systems used in birds are called extensive indoor, free range, red label, enriched cages, perchary, aviary and organic. This study was conducted to review the effects of alternative rearing systems on performance, reproductive traits, and behavior characteristics.

Keywords: Alternative rearing, welfare, cage systems, behavior, Japanese quail

Poster Presentation

Cellular Agriculture

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Abstract

Recent scientific studies were conducted by leading companies and non-profit organizations from many years to culture meat to serve for human beings. Their aim is to feed people safely and eliminate the negative consequences of modern agriculture. There has been a debate on its consumption regarding religious and legislation matters to be concluded. Cellular agriculture is a multi-disciplinary production method encompassing animal agriculture, tissue engineering, biotechnology, medicine, and material sciences. In this method, meat and other agricultural products are cultured from cells within a bioreactor rather than in animal farm. Cellular agriculture can be applied on producing eggs, leather, milk, fragrances, gelatin and silk as well. In cellular agriculture, instead of feeds for animal, nutrients such as amino acids, fatty acids, sugars, ions, vitamins, cofactors, inorganic salts, and other substances are provided for the cells either in natural or synthetic media. The cells to be used for cellular agriculture must be proliferative nature, immortality, and ability to grow independent of any surface and serum and tissue forming ability. Cells like myoblasts are more ideal for differentiation and division. In conclusion, some leading companies are going to produce animal products in vitro, suggesting that our next generation agricultural engineers, zootechnicians must be aware about cellular agriculture with respect to its technologies such as nutritional formulation of serum or media, bioreactor engineering, and in vitro nutritionist.

Keywords: in vitro cell culture, bioreactor, meat production, agriculture

Poster Presentation

Alternative Raising Systems in Broiler

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Abstract
The poultry sector has become an industry chain with the influence of areas where it is as relevant as production to consumption. The world population is growing rapidly and significant developments have been made in the poultry industry in the last half-century with the use of intensive production techniques in order to obtain the highest level of yield from the animal to meet the animal protein requirement of the rapidly increasing world population. In the studies made for this purpose, it was aimed to reach the product with higher quality and more quantity in a shorter period of time and conventional production appeared. However, there is a need for the development and dissemination of human and environmentally friendly practices, as in the case of poultry farming where conventional production is most intensively used in other agricultural activities. So many countries of the world, new raising systems have been developed for broiler and layer chickens. In this article, information was given about alternative raising systems in broiler.

Key words:

Poster Presentation

Reproductive Performances of Kıl Goats Raised in Aydın and Denizli Provinces

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Abstract

Indigenous Kıl (hair) goat is Turkey's main goat breed and raised many parts of the country. This study based on field records was conducted to determine main reproductive characteristics of Kıl goat populations raised in two different provinces of Aegean region of Turkey. Detailed birth data that kept in all herds between years 2013 to 2017 in Aydın province (n=25583) and between years 2011 to 2015 in Denizli province (n=24718), were evaluated. In both provinces, it was determined that the matings are between August-November and therefore births took place from January to April. The twinning rate was 8% in Aydın and 7% in Denizli. Least square means for litter size of goats for base and middle tier flocks were found as 1.05 and 1.11 for Aydın and 1.05 and 1.09 in Denizli province, respectively. In this context, it can be said that the goats in middle tier flocks in Aydın province have some high value in terms of litter size. These findings show that the multiple births are rare in Kıl goats.

Keywords: Kids, fertility, litter size

Poster Presentation

Monochromatic Lighting Applications in Incubation and Broiler Rearing

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Abstract

Lighting plays a key role in the occurrence of various physiological events in poultry. While prolongation or shortening of the lighting duration regulates hormones related to reproduction, light intensity and wavelength are also effective on endocrine metabolism. For many years, scientists interested in poultry have been working on lighting duration, light intensity and color of light. These studies can be examined in two parts as incubation duration and post-hatch. Through long ages it was believed that the lighting in incubation has shorten the incubation period. However, it has been shown that this is due to the heat emitted by the lighting material used. For this reason, led lamps which do not emit heat and enable monochromatic lighting have been used in recent years. Poultry sense infrared and ultraviolet colors that the human eye cannot see. The results of studies based on the effects of light wavelength on the endocrine system shown that the effects of different wavelength lighting applied on both the incubation and post-hatch periods have different effects on the yield characteristics.

Keywords: Poultry, Monochromatic lighting, Incubation, Post-hatch, Broiler

Poster Presentation

Probiotics and Synbiotics Application on Poultry Feeding. An Review

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Abstract
This review was conducted to evaluate the overtime effect of adding microorganism with probiotic importance to animal feeding. Prebiotics, probiotics and symbiotic have been one of the extensive research in the past. This study reports the effect of prebiotics, probiotics and symbiotic in broiler nutrition and welfare applications (growth promoter, preventing common diseases, and maintain the health general status). Literature research was carried out by a study selection design including randomised, controlled *in vivo* trials on broiler chicks published on data bases (Google Scholar, PubMed and Elseviwer). Searching strategy was based on narrowing the subject of interest by using selection criteria: English language and time period: 2000-2019 and keywords used were: probiotic, symbiotic and broiler. Data extraction was based on inclusion and exclusion criteria, intervention type, duration of experimental research and trial results. In summary, this paper suggests that exploiting this valuable resource rises with the demand of animal products in conditions of banning antibiotic growth promoters and the availability of ideal feed resources that tend to become hard to reach. Therefore it is expected that the associacion of microorganisms with potential probiotic status and the specific and balaced dietary would be the path to this demand.

Key words: probiotic, synbiotic, broiler nutrition, welfare, health.

Poster Presentation

Expression of melatonin receptor subtype genes and its impact on reproductive traits in Japanese Quail in different lighting systems

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Abstract
Melatonin receptors are G-protein coupled receptors which mediate the action of melatonin hormone. In this study, we investigated the effects of two different lighting systems, 23 h L: 1 h D (group I) and 12 h L: 12 h D (group II), on reproductive traits in Japanese quail (*Coturnix coturnix japonica*). As well as the expression pattern of three melatonin receptor subtypes, mRNA in ovaries and testes were analyzed using quantitative real-time PCR. The results revealed the expression of all three subtypes of melatonin receptors (*MNTR1A*, *MNTR1B* and *MNTR1C*) in ovaries and *MNTR1B*, *MNTR1C* in testes in both groups. Further, the expression of melatonin receptors was significantly higher in group II relative to group I. The fold change level of *MNTR1C* was 6.7 in ovaries and 3.1 in testes in short daylight. Altered expression pattern of these genes associated with changes in Japanese Quail reproductive traits, while, Japanese Quail exposed to long daylight started egg-laying earlier than those in short daylight. Egg weight and egg percentage increased significantly in group I compared to group II. The average of relative ovary and testis weight at six weeks of age were declined by 1.72 and 1.64 g, respectively, in group II. It was concluded that different lighting system-induced different expression levels of melatonin receptor genes accompanied with changes in reproductive traits in both sexes of Japanese quail.

Key words:

Poster Presentation

Fallopian tubes lesions in non pregnant ewes in Mosul

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Abstract

This study aimed detection and identification of the lesions in the oviducts of ewes and determination of their percentages in Mosul region. For that purpose oviducts from 180 genital systems were randomly collected from slaughtered ewes at Mosul slaughter house and private butcheries for a period extended from 1/11/2012 to 1/5/2013. samples from 72 ewes were excluded for containing graved uteri, the other 108 non graved samples were elected for the study , all of them were grossly and histologically examined. The result showed that the most observed lesions in oviducts were fibrotic stenosis , mucosal hyperplasia , epithelial degeneration and desquamation at incidence rates 6.94% , 5.55% and 4.16% respectively, also inflammations including acute and chronic salpingitis were noticed at incidence rates 1.85% and 0.93% respectively .

Key words:

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