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Influence of Year, Parity and Birth Type on Milk Yield and Milk Components of Bandırma Sheep (German Black Head Mutton x Kıvırcık)

Tamer SEZENLER[a], Ayhan CEYHAN[b], Mehmet Akif YÜKSEL[a], Seyrani KONCAGÜL[c], Deniz SOYSAL[a], Mesut YILDIRIR[a]

[a]*Bandırma Sheep Breeding Research Institute,, Bandırma, Balıkesir, TURKEY*
[b]*Niğde University, The Vocational School of Bor, Bor, Niğde, TURKEY*
[c]*Ankara University, Faculty of Agriculture, Department of Animal Science, Ankara, TURKEY*

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Corresponding Author: Tamer SEZENLER, E-mail: tsezenler@hotmail.com, Tel: +90 (266) 738 00 80
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ABSTRACT

This study was conducted to investigate the effects of year, parity and birth type (BT) on lactation milk yield (LMY), adjusted lactation milk yield based on 150 days lactation length (LMY150), lactation length (LL), average daily milk yield (ADMY) and milk components (MC) of Bandırma sheep. The study was carried out with 54 ewes in 2011 and 70 ewes in 2012 under semi-intensive conditions. LMY, LMY150, LL and ADMY of Bandırma sheep were determined as 70.31 kg, 73.29 kg, 142.02 days and 488.19 g, respectively. The effect of the year on LL was significant (P<0.01), but the effects of parity and BT were not significant. The effects of the year and parity were significant (P<0.01 and P<0.05, respectively) on LMY, LMY150 and ADMY, but the effect of BT was not significant. Fat, protein, lactose, total dry matter (DM) and non-fat dry matter (NFDM) were determined as 5.26%, 6.11%, 3.29%, 15.49% and 10.23%, respectively. Highly significant positive correlations were determined between fat content and DM (r= 0.998; P<0.01) and between fat content and NFDM (r= 0.949; P<0.01), whereas fat content was negatively correlated with ADMY (r= -0.992; P<0.01) and lactose content (r= -0.957; P<0.01). Significant negative correlations (P<0.01) were found between lactose content and other milk components except for protein content and ADMY. The results indicated that despite being a mutton type crossbred, lactation characteristics and MC of Bandırma sheep are also considerable.

Keywords: Mutton sheep; Synthetic breed; Lactation; Parity; Birth type

Bandırma Koyununun (Alman Siyah Başlı Et Koyunu x Kıvırcık) Süt Verimi ve Süt Bileşenlerine Yıl, Laktasyon Sırası ve Doğum Tipinin Etkisi

ESER BİLGİSİ
Araştırma Makalesi
Sorumlu Yazar: Tamer SEZENLER, E-posta: tsezenler@hotmail.com, Tel: +90 (266) 738 00 80
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ÖZET

Bu araştırma, Bandırma koyunlarının laktasyon süt verimi (LSV), 150 gün laktasyon uzunluğuna göre düzeltilmiş süt verimi (LSV150), laktasyon uzunluğu (LU), günlük ortalama süt verimi (GOSV) ve süt bileşenlerine (SB) yıl, laktasyon sırası ve doğum tipinin etkisini araştırmak için gerçekleştirilmiştir. Araştırma, 2011 ve 2012 yıllarında sırasıyla 54 ve 70 koyun ile yarı entansif koşullar altında yürütülmüştür. Bandırma koyunlarının LSV, LSV150, LU ve GOSV'i sırasıyla 70.31 kg, 73.29 kg, 142.02 gün ve 488.19 g olarak tespit edilmiştir. LS üzerine yılın etkisi önemli ($P<0.01$), laktasyon sırası ve doğum tipinin (DT) etkileri ise önemsiz bulunmuştur. LSV, LSV150 ve GOSV üzerine yıl ve laktasyon sırasının etkisi önemli (sırasıyla $P<0.01$ ve $P<0.05$), ancak DT'nin etkisi önemsiz bulunmuştur. Yağ, protein, laktoz, toplam kuru madde (KM) ve yağsız kuru madde (YKM) içerikleri sırasıyla % 5.26, % 6.11, % 3.29, % 15.49 ve % 10.23 olarak tespit edilmiştir. Sütteki yağ içeriğinin KM ve YKM ile korelasyonu önemli ($P<0.01$) ve pozitif (sırasıyla 0.998 ve 0.949), GOSV ve laktoz içeriği ile korelasyonu ise önemli ($P<0.01$) ve negatif (sırasıyla -0.992 ve -0.957) olarak tespit edilmiştir. Sütteki laktoz içeriği protein ve GOSV hariç diğer tüm süt bileşenleri ile önemli ($P<0.01$) ve negatif korelasyonlar göstermiştir. Etçi bir melez tip olmasına rağmen Bandırma koyununun laktasyon özellikleri ve süt bileşenleri bakımından da dikkate değer olduğu sonucuna varılmıştır.

Anahtar Kelimeler: Et koyunu; Sentetik ırk; Laktasyon; Laktasyon sırası; Doğum tipi

1. Introduction

Domestic sheep breeds in Turkey usually have low milk yield. Despite this fact, breeders have a tendency to milk the sheep even for a short time. Milk yield is important for both dairy products and rapid growth of the lambs during the suckling period in sheep breeding. Growth performance of the lambs is closely related to milk yield of the ewes. In mutton type sheep, fertility is as important as the milk yield. The ability of the lamb to reach slaughter age earlier is closely related to the amount of milk that the lamb receives from its mother for 2-3 months after birth. Sheep breeding in Turkey is practiced mainly in the form of pasture breeding. As a source of protein and calcium, milk is an important source of nutrition for societies with relatively lower income levels. Sheep milk and products are usually emphasized with their health benefits in industrialized countries.

In the Mediterranean, Balkan and Middle East countries, milk efficiency of sheep is utilized to a great extent. Especially in rural areas in Turkey, local or crossbred sheep breeds are mainly kept for milk and dairy product by local people (Ünal et al 2002). Sheep breeding is practiced mainly with local breeds and crossbred genotypes in Turkey. While meat, milk and wool efficiency vary depending on the breed, most of local breeds are not prolific. Only among them, Sakız (Chios) breed has high milk yield and reproductive ability, while Kıvırcık breed is raised for producing high quality lamb meat, and İvesi (Awassi) breed has high milk efficiency (Kaymakçı 2010).

The results of previous studies indicated that year (Özder et al 2004; Koncagül et al 2012a), birth type (Özder et al 2004), live weight and breed (Esen & Özbey 2002; Ceyhan et al 2007), lactation length (Kuchtik et al 2008) and parity (Koncagül et al 2012a) have significant effects on lactation milk yield (LMY). Moreover, year (Özder et al 2004), lactation period and length (Şahan et al 2005; Kuchtik et al 2008; Yılmaz et al 2011; Kralickova et al 2012) and nutrition (Morand-Fehr et al 2007; De Renobales et al 2012) are factors affecting the milk components as fat, protein and lactose.

Bandırma sheep is a synthetic breed originated from German Black Headed Mutton (GBM) rams and Kıvırcık (K) ewes. At first, K ewes were mated with GBM rams to obtain F_1 genotype. Then, F_1 ewes were divided in to two groups. The F_1 ewes in the first group were mated with GBM rams to obtain backcross offspring $GBMB_1$. Then, Bandırma-I genotype was obtained by pairing $GBMB_1$ ewes with $GBMB_1$ rams (Figure 1). The F_1 ewes in the second group were mated with $GBMB_1$ rams to obtain the backcross offspring ($GBMB_1F_1$). The ewes and rams from $GBMB_1F_1$ were mated to obtain Bandırma-IIgeno type (Figure 2). Then, all the ewes and rams in Bandırma-I and Bandırma-II genotypes were united as a single flock in the mating season of 2008. The mating of ewes and rams of this single flock were repeated to get synthetic flock named as Bandırma sheep (Ceyhan et al 2011).

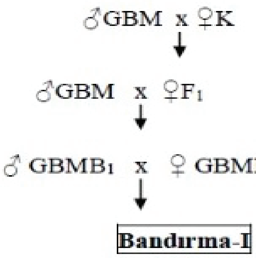

Figure 1- The breeding scheme to form Bandırma-I genotype

Şekil 1- Bandırma-I genotipini yetiştirme şeması

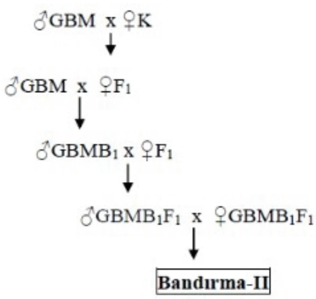

Figure 2- The breeding scheme to form Bandırma-II genotype

Şekil 2- Bandırma-II genotipini yetiştirme şeması

Fertility and growth performance (Ceyhan et al 2006a; Ceyhan et al 2011), fattening performance (Ceyhan et al 2008), primary reproductive characteristics (Sezenler et al 2009) and physiological reactions (Ceyhan et al 2006b) of Bandırma sheep in Marmara Region were investigated in details. But, not much literature is available on lactation characteristics and milk components of Bandırma sheep. Therefore, we aimed to investigate some lactation characteristics and milk components of Bandırma sheep that is a crossbred of German Black Head Mutton and Kıvırcık sheep.

2. Material and Methods

2.1. Animal material and management

The study was carried out with 54 and 70 ewes from Bandırma sheep flock kept in Bandırma Sheep Breeding Research Institute in 2011 and 2012. The Research Farm is located in Balıkesir province in Marmara region of Turkey at longitude of 40^0 21 E, the latitude of 27^0 52 N, and at altitude of 65 m. The mean relative humidity in the region ranges from 20% to 88% and the ambient temperature ranges from -14 to 42.4 ^{0}C. The annual rainfall in the region varies from 500 to 900 mm with an erratic distribution throughout the year (TSMS 2012).

Different feeding and management procedures were applied to the experimental sheep at two consecutive periods. The first period was from birth to the end of the second months of the lactation. During this period, care and feeding procedures of the sheep were carried out indoor. In addition to 1 kg concentrate feed per animal, 1 kg common vetch was given to each animal in two doses of 500 grams in the morning and 500 grams in the evening. The second period was from the beginning of the third month of the lactation to the end of the lactation. In this period, the sheep were kept mainly in the pasture. In addition to the pasture conditions, 1 kg common vetch was given to each animal.

The control day milk yield was taken by means of hand-milking (one day in the morning and the second day in the evening). The control day milk yields were measured every 14 days until the end of the lactation. The first control milk was measured within the first month of the lactation. The lambs were separated from their mothers in the evening and the ewes were milked in the next day morning for control milk. Then, the lambs were kept with their mothers until the morning of the following day and separated from each other, and then the ewes were milked in the evening. After weaning, morning and evening milking were done at 7 am and 7 pm, respectively in the same control day. The milk was weighed with a weighing instrument sensitive to 5 g. Milking was terminated, when daily milk yield of the sheep fell below 100 g. In every control milking, 50 mL milk sample was taken from each ewe and kept in +4 °C for fat, protein, lactose, dry matter (DM) and non-fat dry matter (NFDM) analyses. The analysis of milk components (MC) was carried out using MIRIS Dairy Milk Analyzer device.

Fleishmann method (Barillet et al 1992) was used to obtain lactation milk yield for each ewe, and the model described as in Equation 1.

$$Yield = Y_1 x T_1 + \sum_{i=2}^{n} \frac{Y_i + Y_{i-1}}{2} x T_i + Y_n x 15 \quad (1)$$

Where; Yield is the LMY or MC; T_1 is the interval (day) from lambing to first milk control-day; T_i is the interval (day) from the (i-1)th milk control day to (i)th milk control day; Y_i is the control day milk yield or MC in the (i)th milk control day, and the 15 is the number of days assumed to proceed from last milk control day to the end of the lactation for a ewe. After obtaining yields for each ewe, all yields and milk components were adjusted to 150 days lactation length.

2.2. Statistical analyses

A general linear model mode l (SAS 2000) was used for the analyses of LMY, LMY150, LL, ADMY and MC. Tukey-Kramer test was applied for *post hoc* analyses. In the analyses, the Equation 2 was used.

$$Y_{ijkl} = \mu + y_i + bt_j + p_k + e_{ijkl} \quad (2)$$

Where; Y_{ijkl}= LL, LMY, ADMY, LMY150 or MC (fat, protein, lactose, DM or NFDM); μ, expected mean of the trait in the analysis; y_i, effect of year (i= 2011, 2012); bt_j, effect of birth type (j= 1, 2; single or twin); p_k, effect of parity (k= 1st, 2nd, 3rd, 4th and 5th lactation); e_{ijkl}, random residual.

Pearson correlation coefficients between ADMY and MC were also calculated (SAS 2000).

3. Results

Least square means and standard errors of LL, ADMY, LMY and LMY150 of Bandırma sheep are given in Table 1. The mean LL, ADMY, LMY and LMY150 were found to be 142.02 day, 488.19 g, 70.31 kg and 73.29 kg, respectively. ADMY, LMY and LMY150 were significantly affected by both

Table 1- Least squares means and standard errors of LL, ADMY, LMY and LMY150 by year, BT and parity

Çizelge 1- LU, GOSV, LSV ve LSV150 özelliklerinin yıl, DT ve laktasyon sırasına göre en küçük kareler ortalamaları ve standart hataları

		LL (days)	ADMY (g)	LMY (kg)	LMY150 (kg)
Factors	n	$\bar{X} \pm S_{\bar{x}}$	$\bar{X} \pm S_{\bar{x}}$	$\bar{X} \pm S_{\bar{x}}$	$\bar{X} \pm S_{\bar{x}}$
Years		**	**	**	**
2011	54	149.82±1.446^{a}	557.17±17.414^{a}	83.63±2.757^{b}	83.57±2.612^{a}
2012	70	135.00±1.211^{b}	414.39±14.576^{b}	56.28±2.308^{a}	62.16±2.186^{b}
BT		ns	ns	ns	ns
Single	80	141.79±1.123	575.06±17.483	70.40±2.140	73.33±2.028
Twin	44	143.03±1.561	591.17±24.260	69.51±2.976	72.41±2.819
Parity		ns	*	*	*
1	22	138.44±2.177	396.05±26.217^{a}	55.45±4.151^{a}	59.41±3.933^{a}
2	27	141.68±1.992	476.43±23.985^{ab}	68.12±3.797^{ab}	71.47±3.598^{ab}
3	23	146.07±2.169	486.11±26.115^{ab}	71.28±4.134^{ab}	72.92±3.917^{ab}
4	26	144.14±1.982	514.94±23.864^{b}	75.42±3.778^{b}	77.24±3.580^{b}
5	26	141.71±1.934	555.38±23.284^{b}	79.51±3.686^{b}	83.31±3.493^{b}
Overall	124	142.02±2.043	488.19±24.516	70.31±3.790	73.29±3.747

$^{a, b}$, means within the levels of main factors with different letters differ significantly (*, P<0.05; **, P<0.01; ns, not significant); LL, lactation length; ADMY, average daily milk yield; LMY, lactation milk yield; LMY150, adjusted lactation milk yield according to 150 days lactation length; BT, birth type year (P<0.01) and parity (P<0.05). The effect of year on LL was also significant (P<0.01), whereas LL was not significantly affected by parity. It was observed that ADMY, LMY and LMY150 increased in relation to increasing number of lactations (parity). However, this increase from 2nd parity to 5th parity was not significant. BT did not significantly affect LL, ADMY, LMY and LMY150 of ewes.

The means of fat, protein, lactose, DM and NFDM content were 5.26%, 6.11%, 3.29%, 15.49% and 10.23%, respectively (Table 2). The effect of year on all MC was significant (P<0.01) except for NFDM, whereas parity and BT did not affect MC of ewes.

Control day curves of average MC (%), milk yield (g) and MC (g) during the lactation period were presented in Figure 3a, 3b and 3c, respectively. In Figure 3a, DM, NFDM and fat content were found to be lower at the beginning of lactation and then increased towards the end of lactation period. However, the lactose content was initially higher but decreased later on. Slight increase was observed in the protein content during lactation period. However, as light decrease in control day average milk yield (CDMY) was observed during the first two months of the lactation, and then the decrease was higher and steady until the end of the lactation (Figure 3b). Similarly, the amount of MC decreased also during the lactation (Figure 3c). On the other hand, the rate of decrease in MC was smaller in comparison to CDMY due possibly to the reason that total amount of MC in CDMY increased gradually during the lactation.

Table 2- Least squares means and standard errors of milk components (MC) by year, BT and parity

Çizelge 2- Süt bileşenlerinin (SB) yıl, DT ve laktasyon sırasına göre en küçük kareler ortalamaları ve standart hataları

		Fat (%)	*Protein (%)*	*Lactose (%)*	*DM (%)*	*NFDM (%)*
Factors	*n*	$\bar{X} \pm S_{\bar{x}}$	$\bar{X} \pm S_{\bar{x}}$	$\bar{X} \pm S_{\bar{x}}$	$\bar{X} \pm S_{\bar{x}}$	$\bar{X} \pm S_{\bar{x}}$
Years		**	**	**	**	ns
2011	54	5.77±0.123^a	6.40±0.097^a	3.63±0.031^a	16.03±0.157^a	10.26±0.052
2012	70	4.80±0.103^b	5.93±0.081^b	2.95±0.026^b	15.00±0.131^b	10.22±0.043
Parity		ns	ns	ns	ns	ns
1	22	5.32±0.186	6.20±0.147	3.29±0.047	15.54±0.236	10.14±0.078
2	26	5.08±0.170	6.26±0.134	3.27±0.043	15.43±0.216	10.37±0.071
3	23	5.32±0.185	6.22±0.146	3.22±0.047	15.60±0.235	10.29±0.078
4	26	5.35±0.169	6.07±0.133	3.34±0.043	15.62±0.215	10.30±0.071
5	27	5.37±0.165	6.09±0.130	3.32±0.042	15.39±0.210	10.11±0.069
BT		ns	ns	ns	ns	ns
Single	80	5.41±0.096	6.07±0.076	3.30±0.024	15.66±0.122	10.22±0.040
Twin	44	5.16±0.133	6.26±0.105	3.27±0.034	15.37±0.169	10.27±0.056
Overall	124	5.26±0.088	6.11±0.063	3.29±0.036	15.49±0.107	10.23±0.033

^{a,b}, means within the same column and factor with different letters differ significantly (*, P<0.05; **, P<0.01; ns, not significant); NFDM, non-fat dry matter; DM, total dry matter

CDMY and MC variation during lactation period with regard to year, parity and BT were presented in Figure 4. CDMY was higher for the first two months of the lactation and then a continuous decrease was observed until the end of the lactation regardless of year, parity and BT. Different lactation curves were observed for years and parities, but not for BT. On the other hand, increases or decreases in MC were very similar in years, parity or BT.

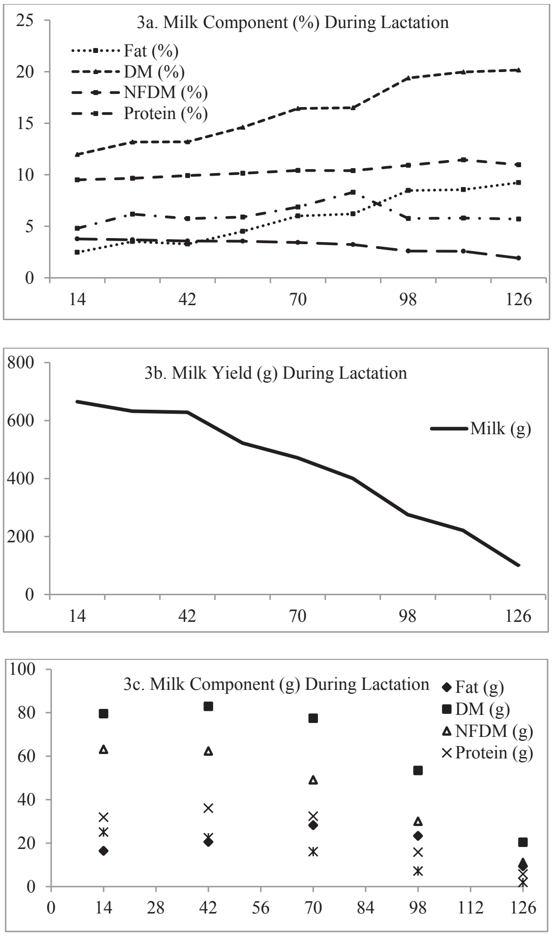

Figure 3- Control day average milk components (%, 3a), milk yield (g, 3b) and milk components (g, 3c) throughout the lactation

Şekil 3- Laktasyon süresince kontrol günü ortalama süt bileşenleri (%, 3a), süt verimi (g, 3b) ve süt bileşenleri (g, 3c)

Phenotypic correlations between ADMY and MC were given in Table 3. Negative and significant correlations were observed between ADMY with DM, NFDM and fat content (ranged from -0.927 to -0.992: P<0.01), while a high and positive correlation was found between ADMY and lactose content (0.965; P<0.01). Highly significant positive correlations were determined between fat content and DM (r= 0.998; P<0.01) and between fat content and NFDM (r= 0.949; P<0.01), whereas fat content was negatively correlated with ADMY (r= -0.992; P<0.01) and lactose content (r= -0.957; P<0.01). Significant negative correlations (P<0.01) were found between lactose content and other milk components except for protein content and ADMY.

4. Discussion

We determined higher LL, LMY and LMY150 incrossbred Bandırma sheep in comparison to LL, LMY and LMY150 values reported for Tuj (Karaoğlu et al 2001), Rambouillet (Ochoa-Cordero et al 2002), Kıvırcık, Gökçeada (Imroz) and Sakız (Ceyhan et al 2007), and for Awassi sheep (Iniguez & Hilali 2009). On the other hand, some authors reported longer LL, but lower LMY in Kıvırcık (Evrim et al 1992), Akkaraman and Hamdani-Akkaraman (F_1) crossbreds (Altın 2001), Akkaraman (Esen & Özbey 2002), Akkaraman, Sakız-Akkaraman (F_1), Kıvırcık-Akkaraman (F_1) and Sakız-Karayaka (B_1) crossbred ewes (Ünal et al 2002), Kıvırcık-Akkaraman (B_1), Akkaraman and Sakız-Akkaraman (B_1) sheep (Mundan & Özbeyaz 2004).The mean LMY and LL of Bandırma sheep in present study were lower than those of Sakız-

Table 3- Phenotypic correlation coefficients between ADMY (kg) and milk components (MC) throughout the lactation

Çizelge 3- Laktasyon süresince GOSV ve süt bileşenleri (SB%) arasındaki fenotipik korelasyon katsayıları

Parameters	*DM (%)*	*NFDM (%)*	*Fat (%)*	*Protein (%)*	*Lactose (%)*
ADMY	-0.986**	-0.927**	-0.992**	-0.254	0.965**
DM %		0.967**	0.998**	0.222	-0.945**
NFDM %			0.949**	0.203	-0.856**
Fat %				0.231	-0.957**
Protein %					-0.093

ADMY, average daily milk yield (kg); NFDM, non-fat dry matter; DM, total dry matter; **, P<0.01

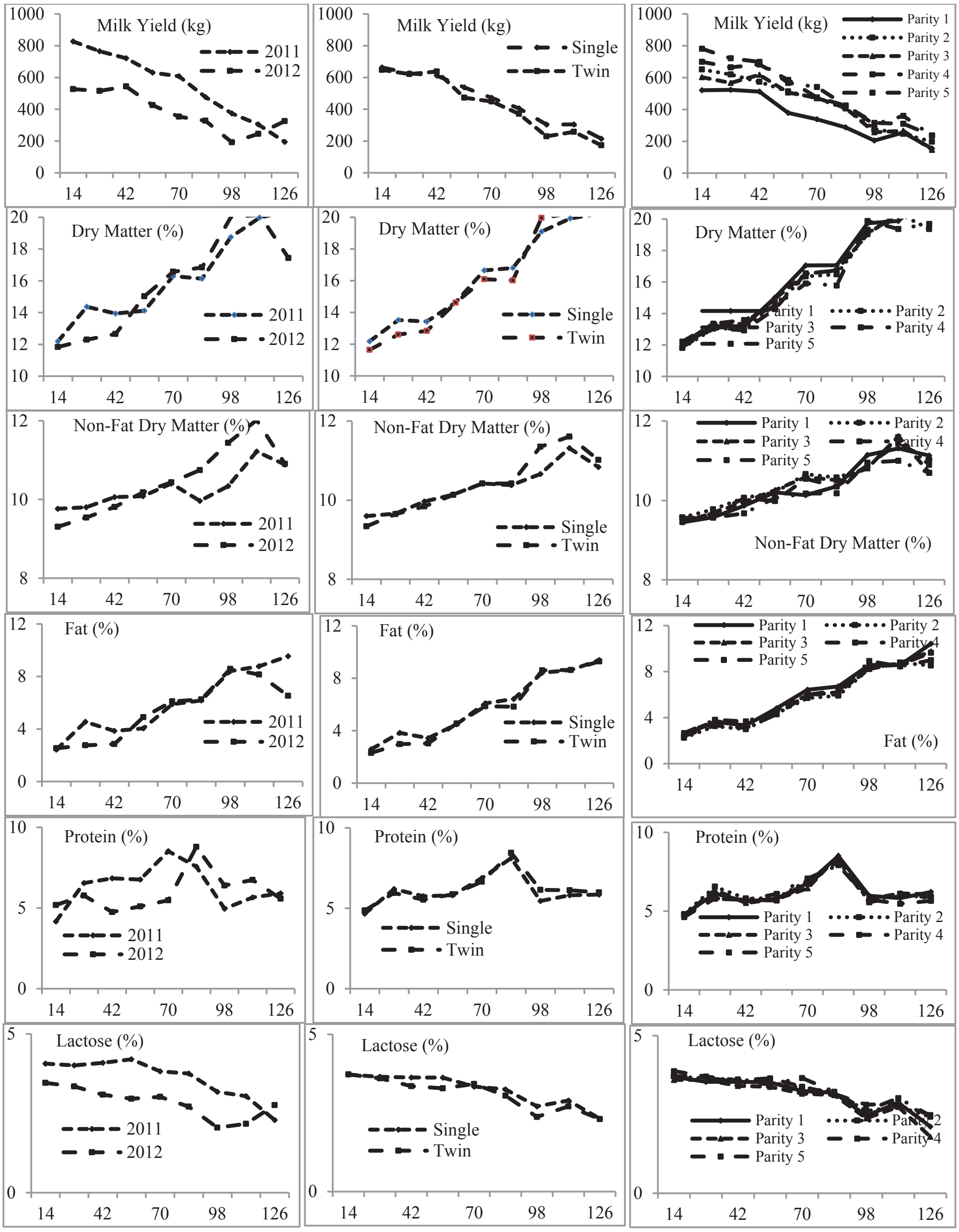

Figure 4- Control day average milk yields (g) and milk components (%) throughout the lactation by year, birth type and parity

Şekil 4- Kontrol günü ortalama süt verimi (g) ve süt bileşenlerinin (%) yıl, doğum tipi ve laktasyon sırası bakımından laktasyon süresince değişimi

Akkaraman (F_1) crossbreds (Esen & Özbey 2002), Sönmez (Kaymakçı et al 2002), Türkgeldi (Özder et al 2004), Awassi (Iniguez & Hilali 2009), Norduz (Ocak et al 2009; Koncagül et al 2012a), Zom sheep (Koncagül et al 2012b), Awassi, Gökçeada and Sakız (Kaymakçı et al 2005), Latxa sheep (Ruiz et al 2000), Awassi sheep (Pollott & Gootwine 2001) and Awassi sheep (Reidal et al 2010).

The previous studies demonstrated that LL depended on both the breed differences and the environmental conditions where sheep were raised. Thus, the lactation milk yield and length of Bandırma sheep raised in semi-intensive conditions were higher and longer than those of some mutton type and native breeds, while lower and shorter than those of milk type breeds and their crosses with native breeds.

The mean ADMY of Bandırma sheep in this study (488.19 g) was higher than those reported for Akkaraman and Hamdani-Akkaraman (F_1) crossbreds (Altın 2001), Tuj (Karaoğlu et al 2001), Akkaraman, Kıvırcık-Akkaraman and Sakız-Akkaraman (Mundan & Özbeyaz 2004), Kıvırcık and Gökçeada sheep (Ceyhan et al 2007). However, the mean ADMY was lower than the findings reported for Sönmez (Kaymakçı et al 2002), Sakız (Ceyhan et al 2007), Awassi (Al-Jundi 2010) and Zom sheep (Koncagül et al 2012b). Our results demonstrated that Bandırma sheep has higher milk yield and longer lactation period than Akkaraman breed and its crossbreds.

Main components of milk vary based on factors such as feeding and management, birth type, season, lactation period, breed and breast health (Park et al 2007). One of the most important components of milk is milk fat. In the current study, the mean fat content of Bandırma sheep milk (5.26%) was higher than those reported for Akkaraman (Esen & Özbey 2002), Rambouillet (Ochoa-Cordero et al 2002), Norduz (Ocak et al 2009) and Awassi sheep (Al-Jundi 2010). On the other hand, milk fat content found in the current study was lower than those reported for Tuj (Karaoğlu et al 2001), Karakaş (Karaca et al 2003) and Morkaraman sheep (Yılmaz et al 2011). Yılmaz et al (2011) reported that milk fat and protein contents were the lowest at the beginning of lactation (6.20% and 5.72%) and the highest at the end of the lactation (6.44% and 6.80%) in Morkaraman sheep (Yılmaz et al 2011). Our findings in this study are consistent with the findings of Yılmaz et al (2011). High or low fat content in the milk is closely related to the milk flavor and milk energy value. In particular, ewe producing milk with enough fat content is of great importance in fulfilling the energy needs of the lambs during the suckling period. From this perspective, it can be stated that Bandırma sheep is in desired level for milk fat content in comparison to mutton type Rambouillet, dual purpose (meat and milk) Akkaraman and Norduz, and milk type Awassi sheep breeds.

Protein content of milk determined in this study (6.11%) was higher than those reported for Rambouillet (Ochoa-Cordero et al 2002),but lower than those reported for Norduz (Ocak et al 2009), Morkaraman (Yılmaz et al 2011), Türkgeldi (Özder et al 2004) and Awassi (Şahan et al 2005; Murray et al 2009). The mean lactose content of Bandırma sheep milk (3.29%) determined in this study was lower than those of Ramboillet (5.5%; Ochoa-Cordero et al 2002), Awassi (4.34%; Şahan et al 2005, 5.01%; Al-Jundi 2010) and Morkaraman (5.12%; Yılmaz et al 2011). Protein is the most expensive part of a diet. Because the rumen manufactures protein from amino acids, the amount of protein is considerably more important than the quality of protein for lambs during suckling period due to the reason that the protein requirements are highest for growing lambs since they are building muscle. From the results of this study, it can conveniently be said that Bandırma sheep produce milk with sufficient protein content required for growth of their lambs.

High growth performance of lambs until weaning is desired in mutton type sheep. Growth and development of lamb during the suckling period depends greatly on the fattening method applied by the mother's milk yield. To reach the desired target body weight ina short period time as much as possible, pre-fattening developments of lambs must also be well besides the survival of each lamb born alive in order to make economic lamb fattening. The findings in this study showed that Bandırma sheep have sufficient milk production to ensure the growth and development of lambs until weaning. Bandırma sheep might also be advantageous for lamb fattening after weaning under extensive or semi-intensive conditions in Marmara region in addition to its being an alternative crossbred for sheep farms benefiting both from sheep milk and lamb meat.

5. Conclusions

Bandırma sheep can be considered sufficient in terms of LMY, LL and ADMY in addition to its mutton properties. On the other hand, except for lactose content Bandırma sheep has comparable MC values with other domestic breeds and crossbreds. It can also be concluded that this sheep has sufficient milk yield to suckle their lambs during pre-weaning growth period due to the reason that CDMY was the highest and stable during the first two months of lactation.

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