Mustafa Kemal Üniversitesi Tarım Bilimleri Dergisi 27 (1):109-114, 2022
(*Mustafa Kemal University Journal of Agricultural Sciences* 27 (1):109-114, 2022)
e-ISSN: 2667-7733
http://dergipark.org.tr/mkutbd

ARAŞTIRMA MAKALESİ **RESEARCH ARTICLE**

Lamb development traits and phenotypic correlations between different body measurements and fattening performance characteristics in Awassi sheep

İvesi koyunlarında kuzu gelişme özellikleri ve farklı vücut ölçüleri ile besi performansı özellikleri arasındaki fenotipik korelasyonlar

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MAKALE BİLGİSİ / ARTICLE INFO

Makale tarihçesi / Article history:
DOI: 10.37908/mkutbd.1064499
Geliş tarihi /Received:28.01.2022
Kabul tarihi/Accepted:28.02.2022

Keywords:
Live weight, measurements, fattening.

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Ö Z E T / A B S T R A C T

Aims: The aim of this study was to investigate lamb growth from birth to weaning and the relationships between different body measurements with fattening characteristics for Awassi sheep lambs.
Methods and Results: This study was carried out with Awassi sheep lambs reared in Kilis province of Türkiye. Lambs are weaned at 60 days of age. Twenty head of male lambs, with similar weaning weights and approximately 3 months of age (between 80-95 days) were selected in order to determine the fattening performance of the lambs born in the flock. The lambs were weighed at 14-day intervals in the fattening period, which continued for 70 days. The lambs consumed the concentrate containing 16% crude protein and 2600 kcal ME and alfalfa hay as ad lib. Birth and weaning weights of the lambs were determined as 4.29±0.061 kg and 12.93±0.209 kg, respectively. The daily weight gain and feed conversion ratio were calculated as 241.0±9.83 g and 5.4, which continued for 70 days of fattening period.
Conclusions: Positive and significant phenotypic correlations were determined between the live weights of the dams and the birth weights of the lambs. In addition, a positive and high phenotypic correlation was determined between body length and live weight at the end of the fattening for the lambs.
Significance and Impact of the Study: At the end of the study, it was determined that the birth season affects the development of the lambs, there is a positive relationship between body length and final fattening weight for the lambs. For this reason, spring births in Awassi sheep production can be recommended to the breeders. In addition, it may be recommended to consider body length for choosing fattening material.

Atıf / Citation: Kutan P, Keskin M (2022) Lamb development traits and phenotypic correlations between different body measurements and fattening performance characteristics in Awassi sheep. *MKU. J. Agric. Sci.* 27(1) : 109-114. DOI: 10.37908/mkutbd.1064499

INTRODUCTION

Selection of breeding stocks according to objective criteria, unfortunately, is not be done except for state enterprises in sheep rearing in Türkiye. Likewise, people who want to invest in sheep breeding have to visually, that is, subjectively, evaluate the animals that can be select in order to form a new flock. The knowledge of people who are believed to be experienced in animal husbandry comes to the fore in this evaluation.

In this regard, different information about the subjective evaluation of dairy or beef animals has been

shared among people for many years. There are even different book chapters written about what to pay attention to in this regard. In these chapters, there are different details such as that the dairy animal had a smaller and delicate head, its neck should be longer, the features of the rib angles, and the side view of the body being more triangular etc. (Özcan, 1992; Bıyıkoğlu, 2009).

One of the animals that should be evaluated in this context and which is important in sheep breeding is Awassi sheep. Awassi sheep is a breed known for its high milk yield, reared in Şanlıurfa, Gaziantep, Kilis, Hatay and Adana provinces. Although the fertility of this breed is not high, its fattening characteristics are at acceptable levels when compared with other indigenous sheep breeds. There are many studies on the different yield characteristics of this breed, whose homeland is the Mesopotamian region (Şahin et al., 2003: Kaya et al., 2006; Keskin et al., 2007; Tekel et al., 2007; Gül et al., 2010; Keskin et al., 2010; Gül et al., 2019; Gül et al., 2020).

In Awassi sheep rearing, subjective criteria rather than objective criteria are taken into consideration in selection of breeding stocks. The aims of this article were (a) determined the effects of some environmental factors on the birth and weaning weight, (b) determined the phenotypic correlations between lamb development characteristics, different body measurements and fattening performance characteristics for Awassi sheep.

MATERIALS and METHODS

The animal material of the study consisted of lambs born in a flock of Awassi sheep reared in Kilis province of Türkiye. The lambs were weaned at 60 days of age. Twenty head of male and single born lambs, with similar weaning weights and approximately 3 months of age (between 80-95 days) were selected in order to determine the fattening performance of the lambs born in the flock. Birth and weaning weights of the lambs were determined by weighing with a scale.

Body weight, withers height, rump height, body length, anterior chest width, chest depth, chest circumference, leg height measurements were determined in the lambs after weaning. Body measurements were taken with a measuring tape, measuring compass and tape.

The lambs were given an adaptation period of 7 days to observe the metabolic consequences of the feed ingredients. They were weighed for three days at the same time without starving in order to determine the beginning weight for fattening. The lambs were weighed at 14-days intervals in the fattening period, which continued for 70 days. The weights at the beginning and end of the fattening, feed conversion rates and daily live weight gain were determined for the lambs. Vitamins A, D and E (ADEMIN®), antiparasitic injection and enterotoxaemia vaccine were applied to the lambs at the beginning of the fattening. The lambs consumed the concentrate containing 16% crude protein and 2600 kcal ME and alfalfa hay as ad-libitum. The ration contained 80% of the concentrate and 20% of the hay. The feed was given by weighing daily, and the remaining feed was taken by weighing from the feeders the next day for the determination of feed consumption during the fattening period. From this difference, firstly the daily feed consumption of the 20 lambs was calculated as a group, and then individual consumption was calculated by dividing this amount by 20.

The means, standard errors and correlations between different traits were calculated by the obtained data with the SPSS package program (Version 22.00, SPSS, IBM, NY, USA).

RESULTS and DISCUSSION

Variation of birth weight and weaning weight in lambs depending on different environmental factors were given in Table 1.

As can be seen from Table 1, the mean birth weight for single born lambs from the experimental ewes was calculated to be higher than that for twin born lambs ($P<0.01$). This difference decreased in the suckling period and was statistically not significant at weaning ($P>0.05$). This result is remarkable in that it shows that the milk yield of the dams is sufficient for twin lambs. On the other hand, lambs born in the spring period were heavier both at birth ($P<0.01$) and at weaning ($P<0.05$) than those born in the autumn period. This may be due to the management of the animals in semi-intensive conditions and the better pasture conditions in the spring. As stated by Görgülü (2009), in addition to other factors, birth weight is closely related to the feeding during pregnancy and weaning weight is closely related to the nutrition of both dams and lambs during the suckling period. Contrary to what is generally known the difference between male and female lambs for birth weight and weaning weight were found to be statistically not significant. But, there are studies showing that birth weight in Awassi lambs is affected by gender (Yakan et al., 2012; Juengel et al., 2018; Al-Momani et al., 2020), as well as studies showing that it is not (Şireli et al., 2015; Boran, 2018; Gül et al., 2020;

Gül and Oflaz, 2021). In the studies conducted by different researchers (Kul and Akcan, 2002; Boran, 2018) the birth weight of Awassi lambs was reported as close to the results obtained in the current study. In the study of Kul and Akcan (2002), they reported that the weaning weight in the 105-day period was 15.39 kg. The difference between weaning weights in our current study and in the study by Kul and Akcan (2002) may be due to the difference in suckling time. Kul et al. (2006) reported in another study that the birth weight (4.06 kg) for Awassi lambs was similar to the present study, while the weaning weight on the 105th day was different (14.56 kg). It is seen that the birth weight values determined in the current study are also similar to the values reported by Tekel et al. (2007) and Şireli and Tekel (2013).

Table 1. Variation of birth weight and weaning weight in lambs depending on different environmental factors

	Birth weight	Weaning weight
	Birth season	
Spring	4.73±0.113	15.46±0.388
	(20)	(20)
Autumn	4.22±0.067	11.48±0.215
	(91)	(89)
	P<0.01	P< 0.05
	Birth type	
Single	4.36±0.064	13.22±0.209
	(89)	(88)
Twin	3.91±0.163	11.60±0.611
	(22)	(21)
	P<0.01	P> 0.05
	Gender	
Male	4.34±0.074	13.05±0.297
	(57)	(56)
Female	4.24±0.099	12.80±0.296
	(54)	(53)
	P> 0.05	P> 0.05
Total	4.29±0.061	12.93±0.209
	(111)	(109)

Table 2. Correlations between dams' live weights and birth and weaning weights of the lambs

	Dams' live weight	Birth weight	Weaning weight
Dams live weight	1	0.214*	0.162
Birth weight		1	0.413**
Weaning weight			1

* P< 0.05; **. P< 0.01.

As can be seen in Table 2, significant correlations were calculated between the live weights of the dams and the birth weights of the lambs, and between the birth weights and the weaning weights of lambs. The average live weight of the dams was calculated as 45.19±0.99 kg in the study. Koyuncu et al., (2018) reported that in their study with Kıvırcık lambs, lambs of heavier mothers were also heavier, but the difference was statistically not significant and there was a significant correlation between birth weight and weaning weight.

Different body measurements were determined before the fattening study performed after weaning in the lambs used as fattening material in the experiment. Means and standard errors calculated using these data are given in Table 3. As can be seen from this Table, the mean body length, withers height, rump height, chest depth, chest circumference, anterior chest width and leg height values were calculated as 49.10 cm, 52.83 cm, 53.56 cm, 21.53 cm, 60.10 cm, 13.88 cm and 36.80 cm, respectively for the lambs.

Table 3. Different body measurements in experimental fattening lambs

	n	mean	Standard error	Minimum	Maximum
Body length	20	49.10	0.628	44.00	56.00
Withers height	20	52.83	0.396	50.00	57.00
Rump height	20	53.56	0.420	50.00	57.50
Chest depth	20	21.53	0.219	20.00	23.50
Chest circumference	20	60.10	0.486	56.00	64.00
Anterior chest width	20	13.88	0.214	13.00	17.00
Leg height	20	36.80	0.304	34.00	40.00
Daily weight gain	20	241.00	9.831	154.29	307.14

The lambs were taken to fattening with an average of 22 kg live weight (Table 4). During the seventy-day fattening period, the average daily live weight gain and the feed conversion ratio were calculated as 241.0 g and 5.4 in lambs consuming an average of 1304.2 g/day feed. It is seen that the fattening performance values obtained in the present study are compatible with the values reported by Tekel et al., (2007). They reported the values of initial and finishing live weights, daily live weight gains and daily feed consumption as 20.75 kg, 36.07 kg, 255 g and 1382 g, respectively for Awassi lambs during the 60-day fattening period. These values also show similarities with the fattening performance values reported for Awassi lambs by different researcher (Şireli and Tekel, 2013; Khadle and Karabacak, 2018).

Table 4. Different fattening performance characteristics in lambs (mean±standard error)

Live Weights (kg)					
Initial	14th day	28th day	42nd day	56th day	70th day
22.0±0.45	26.6±0.59	29.4±0.63	31.4±0.76	34.5±0.79	38.9±0.81
Average Daily Feed Consumption (g)					
1-14 days	15-28 days	29-42 days	43-56 days	57-70 days	Overall
1020.9	1175.4	1317.1	1477.9	1529.3	1304.2
Daily Weight Gain (g)					
1-14 days	15-28 days	29-42 days	43-56 days	57-70 days	Overall
325.4±25.13	202.1±22.11	150.0±15.77	212.3±19.35	315.2±19.30	241.0±9.83
Feed Conversion Ratio					
1-14 days	15-28 days	29-42 days	43-56 days	57-70 days	Overall
3.1	5.8	8.8	7.0	7.9	5.4

Table 5. Phenotypic correlations between body measurements and daily live weight gain in fattening and body weight at the end of fattening

	BL	WH	RH	CD	CC	ACW	LH	DWG	FW
BL	1	0.136	0.432	0.477*	0.740**	0.210	0.474*	0.346	0.639**
WH		1	0.510*	0.215	0.053	0.467*	0.629**	0.109	0.190
RH			1	0.549*	0.533*	0.451*	0.695**	0.023	0.380
CD				1	0.444	0.214	0.497*	-0075	0.218
CC					1	0.057	0.434	0.083	0.522
ACW						1	0.585**	0.155	0.245
LH							1	-0.124	0.566

BL, body length; WH, withers height; RH, rump height; CD, chest depth; CC, chest circumference; ACW, anterior chest width; LH, leg height; DWG, daily weight gain; FW, final weight.

The correlation coefficients between body measurements, daily live weight gain and final body weight values at the fattening are given in Table 5. As can be seen from this table, significant and positive phenotypic correlations have been identified between different body measurements ($P<0.05$ and $P<0.01$). However, phenotypic correlation ($r = 0.639$) between body weight and body length at the end of fattening is

important in terms of the advantage it will provide in the selection of animals to be fattened (P<0.01). Eken (2019) also stated that there are significant phenotypic correlations between live weight and different body measurements in lambs. Similarly, in a study conducted by Taşkın et al. (1999) with a crossbred genotype, it was reported that there was a positive relationship between live weight at the end of fattening and body length, chest width and rump width.

In conclusion, positive and significant phenotypic correlations were determined (a) between the live weights of the dams and the birth weights of the lambs, (b) between the birth and weaning weights of the lambs, (c) between body length and live weight at the end of fattening for the lambs. It was also stated that the birth season affects the development of the lambs. For these reason, spring births can be recommended to the breeders in Awassi sheep production. In addition, it may be recommended to consider body length when choosing fattening material.

ÖZET

Amaç: Amaç, İvesi koyunlarında doğumdan sütten kesime kadar kuzu büyümesini ve farklı vücut ölçüleri ile besi özellikleri arasındaki ilişkileri araştırmaktı.

Yöntem ve Bulgular: Bu çalışma, Türkiye'nin Kilis ilinde yetiştirilen İvesi koyun kuzuları ile yürütülmüştür. Kuzular 60 günlükken sütten kesilir. Sürüden doğan kuzuların besi performansını belirlemek için yaklaşık 3 aylık (80-95 gün arası) benzer sütten kesim ağırlıklarına sahip 20 baş erkek kuzu seçilmiştir. Yetmiş gün devam eden besi döneminde kuzular 14 gün aralıklarla tartılmıştır. Kuzular ad lib olarak %16 ham protein ve 2600 kcal ME içeren konsantreyi ve yonca kurusunu tüketmiştir. Kuzuların doğum ağırlıkları 4,29±0,061 kg ve sütten kesim ağırlıkları 12,93±0,209 kg olarak belirlendi. Yetmiş günlük besi dönemi boyunca günlük ağırlık artışı ve yemden yararlanma oranı 241.0±9.83 g ve 5.4 olarak hesaplanmıştır.

Genel Yorum: Çalışmanın sonuçları olarak; Anaların canlı ağırlıkları ile kuzuların doğum ağırlıkları arasında pozitif ve anlamlı fenotipik korelasyonlar belirlendi. Ayrıca kuzularda besi sonunda vücut uzunluğu ile canlı ağırlık arasında pozitif ve yüksek bir fenotipik korelasyon tespit edilmiştir.

Çalışmanın Önemi ve Etkisi: Araştırma sonucunda, doğum mevsiminin kuzuların gelişimini etkilediği, kuzularda vücut uzunluğu ile son besi ağırlığı arasında pozitif bir ilişki olduğu belirlenmiştir. Bu nedenle yetiştiricilere, İvesi koyunu yetiştiriciliğinde bahar doğumları önerilebilir. Ayrıca besi materyali seçiminde vücut uzunluğunun da dikkate alınması önerilebilir.

Anahtar Kelimeler: Canlı ağırlık, ölçüler, besi.

ACKNOWLEDGEMENTS

This manuscript is part of an MSc thesis titled "Relationships between Different Body Characteristics and Yield Characteristics in Awassi Sheep". The authors would like to thank HMKU Coordinatorship of Scientific Research Projects (Project No: 19.YL.015) for financial support to the study.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest in the study.

AUTHOR'S CONTRIBUTIONS

The contribution of the authors is equal.

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