

The Live Weight after Shearing and the Greasy Wool Yield of Zom Ewes at Different Raising Conditions in Turkey

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Abstract—In this research, the live weight after shearing, the greasy fleece yield, and the clean fleece percentage of Zom ewes a variety of Akkaraman breed in different maintaining conditions were investigated. Animal material consisted of a total of 300 head of Zom ewes in different flocks raised in the villages of Avdalı (n= 60), Gözenek (n= 60), Alatosun (n= 60), Tezhırap (n= 60), and Ziyaret (n= 60) in Diyarbakır city. Effect of shearing age on greasy wool yield was not significant in Avdalı, Alatosun, Tezhırap, and Ziyaret, but it was significant ($p<0.05$) in Gözenek. Effect of body weight after shearing on greasy wool yield was significant at ($p<0.01$) level in Gözenek, ($p<0.05$) level in Alatosun and Ziyaret, but it was not significant in Avdalı and Tezhırap villages. When all the farms were generally evaluated, the effect of shearing age and the farm on greasy wool yield was found significant ($p<0.05$), the effect of live weight after shearing was statistically significant ($p<0.01$). Least-squares means for greasy wool yield of ewes raised at Avdalı, Gözenek, Alatosun, Tezhırap, and Ziyaret were 1.33 ± 0.04 , 1.48 ± 0.05 , 1.30 ± 0.03 , 1.35 ± 0.03 , and 1.39 ± 0.04 kg, respectively. When all the farms were generally evaluated, least-squares mean for greasy wool yield of ewes was 1.37 ± 0.02 kg. Effect of age on live weight after shearing in Tezhırap and Ziyaret was significant ($p<0.01$) but not significant in other farms. Average live weight after shearing in all the villages was found as 56.14 ± 0.32 kg. General mean for clean fleece percentage was found as $64.59\pm1.76\%$ in all the farms.

Index Terms—clean fleece percentage, greasy fleece yield, body weight, shearing, Zom ewes

I. INTRODUCTION

Turkey has an important field of sheep breeding but low yields per sheep taken from native breeds. Sheep breeding took place in the cultural life style, and belief values of societies. The geographical structure of Turkey has provided suitable ecological conditions for sheep husbandry. Sheep husbandry in Turkey has an important position in animal production.

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, Kıvrıkcık, and Karayaka among local sheep breeds of Turkey [1], [2].

One of the issues that should be emphasized in animal husbandry, which has contributed to the economies of countries in different ways, is to increase the products to be obtained per animal [3].

Diyarbakır city is located at South-East Anatolia region of Turkey is important for sheep production. The most of sheep production in Turkey are carried out in extensive or semi-intensive systems. The most of sheep breeds reared in Turkey are characterized as rough-mixed wool genotypes and their wools are usually used to carpet, blanket, quilt and weaving socks. Turkey has an important place in the production of fleece with carpet type in the world. However, the wool industry and production in Turkey have not developed and fluctuations of the wool prices negatively affected the wool of production. Recently, there has been an increase for sheep production in Turkey and for use of rough-mixed wool in the world [2], [4], [5].

Wool is the most important raw material of the textile industry. Wool is a valuable woven material that shows superior clothing physiology such as protection from cold, good heat holding, high humidity take-up, low wetting capability, and felting ability [6]. In recent years, the use of coarse wool in the world textile industry has increased. By reducing the amount of fine fleece in Turkey's textile industry, it should be emphasized coarse wool and the production of rough-mixed wool should be increased [7], [8]. The wool is still able to compete with many artificial fibers due to its unique properties.

Along with the effect of spreading of environmental awareness rapidly in the world, the demand for organic products in the textile sector has also increased and the use of natural fibers instead of synthetic fibers has gradually widespread [9].

Detailed descriptions regarding the overall performances of Turkey's native breeds in local conditions are not sufficient. However, the improvement programs should be efficiently developed in livestock at

direct breeders. Investigations should be conducted to identify the morphological and the physiological characteristics of native breeds under normal breeder conditions. By obtaining the more synthesis of this information, the more sensitive animal breeding programs and the policies can be developed [10]-[12]. In Turkey, the identification of information regarding the wool techniques in sheep is limited according to the regions and districts.

Akkaraman sheep breed approximately represents 50% of sheep breeds in Turkey. This breed is widely raised in the central and the east region of the country. Traits of Zom sheep breed such as the herd and the maternal instinct are good. They are resistant to cold. They have also the ability to adapt to living conditions and poor environmental conditions. Their tails are fatty. The fat tail is used as an energy source during the long and insufficient winter feeding period [4].

This research was carried out in order to determine the live weight after shearing, the greasy fleece yield and, the clean fleece percentage of Zom ewes a variety of Akkaraman sheep breed under different raising conditions in Diyarbakır province of Turkey.

II. MATERIALS AND METHODS

A. Animals and Research Area

The animal material consisted of a total of 300 head of Zom ewes including 60 head ewes in different flocks raised in the farms of Avdalı (farm 1; n= 60), Gözenek (farm 2; n= 60), Alatosun (farm 3; n= 60), Tezhırap (farm 4; n= 60), and Ziyaret (farm 5; n= 60) villages in Diyarbakır province, Turkey. Animals in this research were fed in forage during experiment.

Diyarbakır district is located on the South-East Anatolia region of Turkey. Its surface area is 15,355 km². Its sea level height (altitude) is about 675 meters. Average annual minimum and maximum temperatures of the region ranges from -24.2 °C to +46.2 °C. It snows low in the winter months in Diyarbakır province [5].

B. Shearing and Assay

Zom ewes were sheared using shearing scissors at the beginning of June and beginning of July. Each of body weight of ewes after shearing and ewes' greasy fleece was weighed using electronic digital weighing scale. Fleece samples were taken from area of the last rib on the right shoulder of 12 head of ewes in each flock according to the sampling technique. Then analysis of the clean fleece percentage was performed in the laboratory of Department of Animal Science, Agricultural Faculty at Van Yüzüncü Yıl University.

For analysis of the clean fleece percentage, a sample of approximately 25-30 g was taken. Samples were weighed on a precision scale sensitive to 0.01 g. Then, the samples were washed three times in warm water with 0.2% soapy. Subsequently, the samples within the aluminum foil were dried in stove with 105 °C until a constant weight. The samples were waited for 10 or 15 minutes and then their dry weights were determined [13]. The clean fleece

percentage (fleece yield) of samples with dry weights was calculated according to the following equation;

$$\text{Fleece yield (\%)} = \frac{\text{Dry weight} \times (\text{Dry weight} \times 0.14)}{\text{The greasy fleece weight}}$$

C. Statistical Analysis

The mathematical model included fixed effects due to farm and age and random effect due to residual error. The effect of farm and age on the live weight after shearing and the greasy fleece yield was analyzed. The significance of fixed effects for farm and age was tested on live weight after shearing by using the SAS GLM procedure [14].

The following model was used statistically to analyze the live weight after shearing of the ewes:

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

The following model was used statistically to analyze the fleece yield characteristics of the ewes:

$$Y_{ijk} = \mu + a_i + b_j + b_1(X_{ijk} - \bar{X}) + e_{ijk}$$

where is;

Y_{ijk} : The live weight after shearing and the greasy fleece yield associated to k . ewe with i . farm and j . age,

μ : Expected mean value,

a_i : The effect of i . farm (1, 2, 3, 4, and 5),

b_j : The effect of j . age (2, 3, 4, 5, and 6),

b_1 : The regression effect of the live weight after shearing on the greasy fleece yield,

X_{ijk} : Live weight associated to k . ewe with i farm and with j age,

\bar{X} : Average value of greasy fleece yield,

e_{ijk} : The random residual error normally distributed with mean 0 and variance σe^2 .

III. RESULTS AND DISCUSSION

A. The Greasy Fleece Yield and the Live Weight after Shearing of Zom Ewes

Least squares means of the greasy fleece weight and the live weight after shearing of Zom ewes are presented in the Table I.

As seen from Table I, the effect of shearing age ($p < 0.01$) and the farms ($p < 0.05$) on the greasy fleece weight was significant statistically. Also, the effect of live weight after shearing on the greasy fleece weight was significant ($p < 0.01$) when all the farms were generally evaluated in Zom ewes.

When all the farms were generally evaluated, least-squares mean for the greasy fleece weight of Zom ewes was 1.37 ± 0.02 kg. The means of greasy fleece weight of ewes with two, three, four, five, and six years of age were 1.49 ± 0.04 , 1.36 ± 0.03 , 1.38 ± 0.04 , 1.35 ± 0.05 , and 1.28 ± 0.05 kg, respectively. Least-squares means for greasy fleece weight of Zom ewes raised in Avdalı, Gözenek, Alatosun, Tezhırap, and Ziyaret farms were 1.33 ± 0.04 , 1.48 ± 0.05 , 1.30 ± 0.03 , 1.35 ± 0.03 , and 1.39 ± 0.04 kg, respectively (Table I).

TABLE I. LEAST SQUARES MEANS FOR THE GREASY FLEECE WEIGHT AND THE LIVE WEIGHT AFTER SHEARING OF ZOM EWES

Factors	n	Greasy Fleece Weight (kg)	Live Weight After Shearing (kg)
<i>General</i>	300	1.37±0.02	56.14±0.32
<i>Age</i>		**	**
2	60	1.49±0.04 ^a	54.37±0.65 ^c
3	60	1.36±0.03 ^{ab}	54.39±0.76 ^c
4	60	1.38±0.04 ^{ab}	56.08±0.73 ^{bc}
5	60	1.35±0.05 ^{ab}	58.89±0.67 ^a
6	60	1.28±0.05 ^b	57.27±0.75 ^{ab}
<i>Farms</i>		*	*
Avdali	60	1.33±0.04 ^b	54.84±0.78 ^b
Gözenek	60	1.48±0.05 ^a	56.45±0.87 ^{ab}
Alatosun	60	1.30±0.03 ^b	56.32±0.66 ^{ab}
Tezhirap	60	1.35±0.03 ^b	55.51±0.64 ^{ab}
Ziyaret	60	1.39±0.04 ^{ab}	57.59±0.71 ^a
<i>Regression (Linear)</i>			
-Live weight (kg)		0.0158±0.0033**	--

*: p<0.05; **: p<0.01; a, b, c: Values in same column not having a common superscript differ significantly (p<0.05).

When it was evaluated the literature studies on the greasy fleece yield of other sheep breeds, the average greasy fleece weight of 1.37 kg determined in Zom ewes at all the farms was found lower than the average values of 2.91 kg reported by Yılmaz and Denk [15], of 2.22 kg reported by Tuncer [16], of 1.96 kg reported by Karakuş *et al.* [17] for Norduz ewes, and 2.05 kg reported by Veziroğlu and Aygün [18] for Norduz ewes. But this result (1.37 kg) was similar to 1.41 kg reported by İnan and Aygün [1] for Morkaraman ewes.

The effect of the ewe's age (p<0.01) and the farms (p<0.05) on the live weight after shearing was statistically significant when all the farms were generally evaluated (Table I).

For Zom ewes, the average of body weight after shearing in all the farms was found as 56.14±0.32 kg. The means of body weights in Zom ewes were 54.37±0.65 kg in 2 years old ewes, 54.39±0.76 kg in 3 years old, 56.08±0.73 kg in 4 years old, 58.89±0.67 kg in 5 years old, and 57.27±0.75 kg in 6 years old. As a result, the highest average of the live weight after shearing was found in ewes with 5 years old. This find was same as result for Morkaraman ewes reported by İnan and Aygün [1]. The live weights of the Zom ewes in Avdali, Gözenek, Alatosun, Tezhirap, and Ziyaret farms were found as 54.84±0.78, 56.45±0.87, 56.32±0.66, 55.51±0.64, and 57.59±0.71 kg, respectively. According to this data, the highest body weight after shearing was in Ziyaret farm.

The general mean of the live weight after shearing of 56.14 kg found in Zom ewes at all the farms was higher than 53.80 kg reported by İnan and Aygün [1] for Morkaraman ewes, 53.76 kg reported for Norduz ewes [18] and 52.85 kg reported for Awassi ewes [19]. If other findings from the literature are considered together with the results of this research, it can be said that there is a significant relationship between the live weight after shearing and the ewes's age [18]-[22].

In general, compared to native sheep breeds in Turkey, it has been understood that average greasy wool yield of Zom sheep was similar to some breeds, higher than some breeds, and lower than some ones. In this study, the greasy fleece yield of Zom ewes was found to be lower than the means of the greasy fleece yield of Norduz,

Karakaş, Dağlıç, and Hamdani sheep breeds but to be higher than that of Kıvrıkcık and Sakız sheep breeds. The yield of fleece in Zom sheep was found to be lower than the crossbred genotypes reported in the literature in Turkey. The reasons for this difference between sheep breeds for fleece yield in Turkey may be the genotypic level observed in the herd, shelter conditions, structure of the farms, climate features, disease and internal-external parasites, region where fleece samples from animal were taken, level of knowledge on management, and planning of research and researcher factor.

In this research, for example, the live weight after shearing of Zom ewes was found to be higher than the live weight of Kangal genotype and than that of Akkaraman sheep breed. This difference may be due to the maintenance and the feeding, and the diversity in breeding conditions. When compared to native sheep breeds in Turkey, it was understood that average the live weight after shearing of Zom ewes was similar to some sheep breeds, higher than some breeds and, lower than some ones.

B. The Clean Fleece Percentage of Zom Ewes

Descriptive means of the clean fleece percentage of Zom ewes are presented in the Table II.

TABLE II. DESCRIPTIVE MEANS FOR THE FLEECE YIELD VALUE OF ZOM EWES

Factors	n	FYV (%)	Minimum (%)	Maximum (%)
<i>General</i>	60	64.59±1.76	50.18	78.09
<i>Farms</i>		NS		
Avdali	12	60.29±1.89	52.37	70.78
Gözenek	12	70.73±1.40	62.64	78.09
Alatosun	12	59.89±1.45	50.18	68.25
Tezhirap	12	66.62±1.84	53.36	74.72
Ziyaret	12	65.40±2.25	52.47	75.32

NS: No significant. FYV: Fleece Yield Value (%)

Average fleece yield value of Zom ewes in all farms was found as 64.59%. In the study conducted, the highest mean of fleece yield value was found in Gözenek farm (70.73%) while the lowest mean in Alatosun farm

(59.89%). This difference may be due to the maintenance, the feeding and the breeder conditions between the farms. In addition, the fleece yield values in Tezhırap and Ziyaret farms are close to each other.

Uzun [6] reported that the averages of fleece yield value in the breeds of Çine Çaparı, İmroz, İvesi, Karayaka, Kıvırcık, Karacabey Merino, Sakız, Menemen, Karakaş, Norduz, and Tahirova were 60.62, 59.46, 70.81, 68.57, 66.91, 51.91, 65.26, 62.90, 61.41, 66.08, and 66.44%, respectively. Yılmaz and Denk [15] found that the average fleece yield value in Norduz ewes was 68.25%. This average is higher than the average value found in this research. Tuncer [16] and Karakaş *et al.* [17] identified that the average yield of fleece in Norduz ewes was 60% and 55.76%. These averages were lower than the average in this study. Average of fleece yield value of 64.59% found in Zom ewes at all the farms is similar to 64.55% reported by İnan and Aygün [1] for Morkaraman ewes and 65.25% reported by Veziroğlu and Aygün [18] for Norduz ewes.

The average of fleece yield value obtained in this research is different to those reported for other literatures on Akkaraman sheep. The difference between fleece yield values can be explained by the diversity of conditions in farms. The fleece yield value is also influenced by shelter and pasture conditions as well as breed characteristics. In addition, it can be said that it is also affected from materials such as the greasy, the moisture, the fertilizer, the plant materials, the dust and, the soil. The fleece yield values may especially arise depending on the environmental conditions of animals.

IV. CONCLUSION

There are very few studies regarding Zom sheep breed in Turkey. Studies about Zom breed have been mostly performed in Diyarbakır province of Turkey. The results of this research would be the basis for the scientific studies taking into account the greasy fleece yield, the body weight after shearing, and the clean fleece percentage of Zom ewes and the wool problems in this region. Even so, in order to obtain a more definite conclusion is required to detailed works in local sheep populations in South Eastern Anatolia region of Turkey.

If the greasy fleece yield, the body weight after shearing, and the clean fleece percentage of Zom ewes are compared with the other domestic genotypes reported in the literature, it can be said that they were close to each other. It is concluded that the wool yield varies depending on many external factors such as maintenance, nutrition, business structure, reproductive activity, soil type, climate, disease and parasites. Especially, the differences in the yield value of wool due to the environmental conditions may occur.

The findings of this research have suggested that the ram factor used in farms can be significant. In particular, it can be said that the source of the observed variation for the greasy wool weight can change due to the genetic and the environmental factors in Zom sheep.

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