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Araştırma Makalesi / Research Article

The growth and survival rate of hair goat kids raised by public in Karaman region

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ABSTRACT:

The objective of this research, which was based on the data obtained during a five-year period between 2011-2016 from the Hair goat herds in mountainous areas of Karaman within the National Sheep and Goat Improvement Project, was to investigate growth and survival rate of Hair goat kids between birth and weaning. The animal material of the study was consisted of total 25881 Hair goat kids. The goat kids were weighed at birth and on 120th day. According to the data obtained from these measurements, the growth and survival rate of the goat kids were calculated. For the statistical analysis of the data, general linear model was used for growth and Chi-square test was used for survival rate analysis. For general average of five years, birth weight average was 3.55 kg for male kids, and 3.40 kg for females; the average weight on 120th day was 23.57 kg for male kids and 21.72 kg for female kids; the daily live weight gain for male and female kids were found as 166.8 g and 151.4 g respectively. The survival rate of the goat kids showed changes according to years and the rate was generally found as 89.3%. Among the factors whose effects were analyzed, year, dam's age, birth type and sex had significant effect on analyzed features ($P < 0.001$). As a result, it was determined that growth rate was higher, while survival rate was consistent with the existing literature. It was also determined that the growth rate was higher in later years when compared to earlier years of the study.

Karaman bölgesinde halk elinde yetiştirilen kıl keçisi oğlaklarının büyüme ve yaşama gücü

ÖZET:

Bu çalışma, Halk Elinde Küçükbaş Hayvan Islahı Ülkesel Projesi kapsamında, Karaman merkeze bağlı dağlık köylerde Kıl Keçisi yetiştiriciliği yapan kişilerin sürülerinde, 5 yıl süre ile elde edilen verilere göre, doğum-sütten kesim arası büyüme ve yaşama gücü özelliklerini incelemek amacıyla yapılmıştır. Çalışmanın hayvan materyali 2011-2016 yılları arasında doğan toplam 25881 baş oğlaktan oluşmuştur. Oğlaklar doğumda ve 120. günlük yaş civarında olmak üzere iki defa tartılmıştır. Bu tartımlarda alınan kayıtlara göre oğlakların büyüme hızı ve yaşama gücü hesaplanmıştır. Verilerin istatistik analizinde, büyüme verileri için genel doğrusal model kullanılmış, yaşama gücü verileri için Chi-kare testi yapılmıştır. Beş yıllık genel ortalama olarak, oğlakların doğum ağırlığı ortalaması erkeklerde 3.55, dişilerde 3.40 kg; 120. gün ağırlığı ortalamaları erkeklerde 23.57, dişilerde 21.72 kg; günlük canlı ağırlık artışı erkeklerde 166.8, dişilerde 151.4 g bulunmuştur. Oğlakların yaşama gücü, yıllara göre değişmiş ve genel olarak %89.3 bulunmuştur. Etkisi incelenen faktörlerden yıl, ana yaşı, doğum tipi ve cinsiyetin bütün özellikler üzerine etkisi yüksek düzeyde ($P < 0.001$) önemli bulunmuştur. Sonuç olarak, büyüme verilerinin literatüre göre yüksek, yaşama gücünün ise literatür ile uyumlu olduğu tespit edilmiştir. İlk yıllara göre sonraki yıllardaki büyüme verilerinin nispeten daha yüksek olduğu belirlenmiştir.

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1. Introduction

Although Hair goat is found almost every region in Turkey, they are raised densely in mountainous, forestry, and moor regions, like the Taurus mountains because Hair goats are fed not only grassy pastures like sheep but also in-forest postures dense with plants in the form of thickets. Hair goats may maintain their lives productively even during the years with drought and lack of pastures. For that reason, Hair goat is the one of the most drought resistant animals. Hair goats contribute to the economy by utilizing the areas -forestry, thickets, rocky and stony areas- that sheep herds do not use.

When productivity of Hair goat is analyzed, it is found out that they contribute to the breeder and, therefore, to the economy with their meat, milk and relatively hair production.

Although its meat and milk are very valuable, it is possible to say that their importance is not discovered by people living in cities. It is relatively new to see goat milk and meat in supermarkets. Although goat cheese has been known for a long time, it is less consumed in our country when compared to other countries such as France and Spain. This fact highlights the need for advertising of Hair goat, yet Hair goat is one of the farm animals with the least research on them. According to latest statistics, the number of goats in Turkey is over 10 million. This number has increased with National Sheep and Goat Improvement Project supported by the Ministry of Food, Agriculture and Livestock.

When the results of researches on growth and survival rate in Hair goat and their crossbreeds were analyzed, in a study that investigated Hair goat and Saanen x Hair goat crossbred (F1) (6), the lowest birth weight value was found in twin female kids with 2.50 kg, while the highest value was in single male kids with 3.02 kg; the lowest weight in third month was in twin females with 11.33 kg, and the highest was in single males with 12.54 kg; the lowest daily live weight gain (DLWG) during the milk sucking period was 102 g for twin females, while the highest value was 113 g for single male kids. In another study (10), the survival rate of Hair goat kids until weaning was found as 88%.

In studies conducted on rural conditions of Hair goats, Şengonca et al. (7) found the birth weight as 2.63 kg, weaning weight as 12.12 kg, and the survival rate until weaning as 78.6%. In another study (5), birth rate was found as 2.58 kg, the weight on 120th day was found as 17.32 kg; yet in another study (2), the survival rate until weaning was found as 79.9%.

In a study on Hair goat and Saanen x hair goat (F1) crossbreeds conducted at Firat University Farm conditions, the birth weight in pure Hair goat kids was found as 2.77 kg, weaning weight as 16.05 kg, DLWG during sucking was 147 g, and survival rate was found as 82.5% (8). In a study, in Yuzuncu Yil University farm conditions, the birth weight for Hair goat kids was found as 3.15 kg, weaning weight as 11.90 kg, and survival rate at weaning (90th day) as 90.24%; the researchers have found that dam's age was effective at birth, ineffective at weaning; sex and birth type were ineffective at birth but effective at weaning (11).

It is acknowledged that Honamlı goats, a variety of Hair goats, are superior to pure Hair goat in terms of growth features. Within the project of Protecting Native Animal Genetic Resources, in a study carried out in Konya on 200 Honamlı goats (3), the birth and weaning weight of Honamlı goat kids were found as 4.9 kg and 25.1 kg for males, and 4.3 kg and 19.5 kg for females, respectively, and survival rate at weaning was found as 93.3%. In another study conducted on Hair goat kids obtained from public in Burdur and Antalya provinces, the birth weight was found as 3.90 kg and 3.04 kg, the weight on 120th day was found as 27.50 kg and 16.91 kg for males and females respectively; it was stated that sex and birth types were effective at birth and on 120th day weight, while dam's age was ineffective for both parameters (1).

In this study, the data on growth and survival rate, obtained from a study conducted between 2011 and 2016 in Hair Goat subproject in Karaman region within the National Sheep and Goat Improvement Project, was evaluated.

2. Material and Methods

The animal material of the study was consisted of 25881 Hair goat kids born between 2011 and 2016 from the Hair Goat subproject in Karaman within National Sheep and Goat Improvement Project supervised by Ministry of Food, Agriculture and Livestock.

Within the context of the project, the measurement of the birth weight of the goat kids were performed three hours after the birth and within 24 hours with digital scales. At the same time, the sex, birth type, and birth dates of the goat kids were also recorded. These measurements were performed by the breeders and were recorded by a project member after being checked.

In order to evaluate age factor, the age of the goats were recorded when they first entered the project and the breeder's declaration were accepted as basic information, then dam's age was determined by checking the records of the following years which was supported with teeth and horn ring examination.

Weaning weight of the goat kids was performed on approximately 120th day of age. The live weight of all goat kids on 120th day was calculated by interpolation or extrapolation methods by referencing the DLWG between the birth and second weighing. DLWG was found by dividing total weight gain between two weighing by age.

The survival rate of the goat kids until weaning was calculated by dividing the number of the goat kids at weaning to the number of those whose birth weight was measured and recorded at birth book.

In the statistical analysis of the growth data, the general linear modeling procedure of SPSS v21 was used according to the following models; Bonferroni multiple comparison test was used for years that have more than two subgroups and dam's age factors. Chi-square test was used for the analysis of survival rate (4, 9).

Model for the birth weight:

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

where,

Y_{ijklm} : The birth weight of a goat kid.

μ : Overall mean;

a_i : The effect of year

b_j : The effect of dam age

c_k : The effect of birth type

d_l : The effect of sex

e_{ijklm} : Error term

Model for 120th day weight and DLWG:

$$Y_{ijklm} = U + a_i + b_j + c_k + d_l + f_m(\bar{X} - X_{ijklm}) + e_{ijklm}$$

where,

Y_{ijklm} : The 120th day weight or DLWG of a goat kid

U : Intercept value used for the calculation of overall mean
($\mu = U + f_m(\bar{X} - X_{ijklm})$);

a_i : The effect of year

b_j : The effect of dam age;

c_k : The effect of birth type

d_l : The effect of sex

f_m : The effect of birth weight

\bar{X} : The average of birth weight

X_{ijklm} : Birth weight for each goat kid

e_{ijklm} : Error term

3. Results

Growth

Results regarding the growth of the goat kids, according to year, dam's age, birth type and sex are given at Table 1. As the Table indicates, the general average of birth weight was found as 3.48 kg. The year, dam's age, birth type and sex had significant effect on birth weight ($P < 0,001$). The highest values were obtained from single in birth type, male in sex, born in 2016 in year and whose mothers were 7+ years old. Table indicates that all the factors evaluated had significant effect ($P < 0,001$) on both 120th day weight and DLWG. The regression effect of birth weight, which was not given at Table 1 but included as a covariate to the statistical models, had a significant effect on 120th day weight and DLWG ($P < 0,001$). The general average of 120th day weight of the goat kids was found as 22.65 kg, while DLWG between birth and 120th day was found as 159.1 g. The highest values in both 120th day weight and DLWG were found as follows: In terms of years, 2014 and 2016; in terms of dam's age, those born to 6 years old dams, in terms of birth type singles, and finally in terms of sex, males had the highest values.

Table 1: Results on the growth characteristics of goat kids.

Tablo 1: Oğlakların büyüme özelliklerine ait sonuçlar

	Birth weight		120th day weight		DLWG
	n	Mean±SEM	n	Mean ± SEM	Mean ± SEM
Year		P=0.001		P=0.001	P=0.001
2012	3750	3.53±0.014 ^a	3714	21.06 ± 0.114 ^d	145.9 ± 0.95 ^d
2013	4645	3.50±0.012 ^b	4645	23.10 ± 0.095 ^b	162.9 ± 0.79 ^b
2014	5059	3.28±0.011 ^c	4605	23.61 ± 0.094 ^a	167.1 ± 0.78 ^a
2015	5128	3.50±0.011 ^b	5127	21.93 ± 0.089 ^c	153.1 ± 0.74 ^c
2016	4846	3.57±0.011 ^a	4846	23.54 ± 0.087 ^a	166.5 ± 0.73 ^a
Dam age		P=0.001		P= 0. 001	P= 0. 001
2	3175	3.30±0.014 ^d	3006	22.53 ± 0.114 ^b	158.2 ± 0.95 ^b
3	5642	3.41±0.011 ^c	5560	22.51 ± 0.089 ^b	158.0 ± 0.74 ^b
4	5983	3.51±0.010 ^b	5935	22.75 ± 0.083 ^{ab}	159.9 ± 0.69 ^{ab}
5	4575	3.52±0.011 ^b	4531	22.63 ± 0.089	158.9 ± 0.74 ^b
6	2486	3.55±0.015 ^a	2394	23.18 ± 0.124 ^a	163.5 ± 1.04 ^a
7+	1567	3.57±0.019 ^a	1511	22.29 ± 0.155 ^b	156.1 ± 1.30 ^b
Birth type		P=0. 001		P= 0. 001	P= 0. 001
Twin	4117	3.35±0.011	4061	22.43 ± 0.093	157.3 ± 0.78
Single	19311	3.60±0.006	18876	22.86 ± 0.047	160.9 ± 0.39
Sex		P=0. 001		P= 0. 001	P= 0. 001
Male	11714	3.40±0.008	11472	23.57 ± 0.066	166.8 ± 0.55
Female	11714	3.55±0.008	11465	21.72 ± 0.066	151.4 ± 0.55
Overall	23428	3.48±0.008	22937	22.65 ± 0.054	159.1 ± 0.45

^{a, b, c}: Means in the same column with different superscripts are statistically different ($P < 0.05$).

Survival Rate

The results on the survival rate of the goat kids born during these five years were given at Table 3 only according to the year factor independent of other factors. The table indicates that there were significant differences among the years, and the lowest value was found for 2012, while the highest was found for 2016 ($P < 0,001$). General average of five years was found as 89.27%.

Table 2: Results on survival rate of the goat kids according to years.**Tablo 2:** Yıllara göre oğlakların yaşama gücü sonuçları

Year	Number of kids at birth	Number of kids at weaning	Survival rate, %
2012	4864	3881	79.79 ^d
2013	5205	4646	89.26 ^c
2014	5059	4605	91.03 ^b
2015	5627	5127	91.11 ^b
2016	5126	4846	94.54 ^a
			P=0.001
Overall	25881	23105	89.27

a, b, c: Values in the same column with different superscripts are statistically different ($P < 0.05$).

4. Discussion and Conclusion

When the birth weight of the goat kids was taken as growth characteristic, there was a statistical difference between 2016 and the other years. Based on the purpose of this improvement project, this data leads to a question whether later years in the project are better than the first years. However, although the data on 2016 was better than that of the other years, the fact that the data was also high for 2012 and there was not a statistical difference between these two years, we cannot mention about a certain improvement according to years.

Expected results were obtained on dam's age; while the lowest value was found for 2 year-old dams, the highest value was found for 7+ years. It draws attraction that the dam's age factor, in fact, was not very important; the averages were close to each other, yet its effect was found significant due the higher data number.

In this study, birth weight value, 3.48 kg, which was found as general average of five years, was higher than that of many literature findings, which were between 2.50-3.15 kg, in pure Hair goat kids (1, 5-8). The birth weight was found lower than that of Honamlı goats, a variety of Hair goats (1, 3). The effect of year, birth type, and sex factors on birth weight was found significant, which is consistent with general information, expectations, and literature (1, 3, 6).

In this study, 120th day weight general average, found as 22.65 kg, was found higher from those studies with 11.33-17.32 kg weaning weight when compared to other studies on Hair goat kids (5-8, 11). This value was found lower only from the values of Honamlı goat kids (1, 3). However, it should be noticed that for some studies the weaning weight is the weight of 90th day instead of 120th day. The effect of sex and birth type on weaning weight was found significant, which is consistent with literature (1, 3, 6, 11). The effect of dam age which was found significant in this study was also reported as significant in some studies (11), while insignificant in others (1). Since there was not any study comparing the year factor, no literature comparison was made on this factor. Since this project is a selection project, the values of 2016 which were higher than other years can be considered significant, except 2014. However, the similarity between 2014 and 2016 makes it impossible to mention about an improvement in the following years of the project.

DLWG which was found as 159.1 g general average of all years and other factors was higher than the values of those studies conducted at university farms or in similar conditions, 102-147 g (6, 8). It may be an expected result that all of the factors evaluated in terms of DLWG were significant. However, the fact that the differences among dam's age groups were very little can be explained by the highness of the data number. Although the differences among groups were statistically meaningful, the 5.5 g difference between the highest and the lowest group was not practically significant at all.

When the five year average of survival rate 89.25% was compared to the literature results, it was found that it is higher than the rate found between 78% - 82.5% in different studies (2, 7, 8), and our result was similar to those values of 88% (10) and 90.24% (3) and lower than the rate of Honamlı goat kids which was recorded as 93.3%. To

our knowledge, there was no study comparing year factor in survival rate. The fact the difference among years was found as significant and the values for 2016 were higher than that of 2012 can be considered as a positive outcome of the study. It is possible that awareness gained through training given to the breeders on improving care and feeding conditions might have been effective.

As a result, with the project from which the data were taken, the goat breeders in the mountainous villages of Karaman were given the habit of keeping records. Feeders were provided with information on care - feeding. It was taught how to make the yield based selection to breeder. The information about the growth and survival of the hair goats raised by public was obtained and brought into the literature. The results obtained in the growth characteristics were higher than the literature reports, and the results related to survival were similar or higher.

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