

Birth and Various Period Live Weights of Hair Goat Kids

Ayhan YILMAZ^{1*}, Doğan DENİZ² Mehmet Emin VURAL³

¹ Bitlis Eren University, Faculty of Health Sciences, Department of Nutrition and Dietetics

² Diyarbakır Damızlık Koyun ve Keçi Yetiştiricileri Birliği, Diyarbakır

³ GAP Uluslararası Tarımsal Araştırma ve Eğitim Merkezi Müdürlüğü, Diyarbakır

(ORCID: [0000-0002-5990-7550](https://orcid.org/0000-0002-5990-7550)) (ORCID: [0000-0002-0404-2975](https://orcid.org/0000-0002-0404-2975)) (ORCID: [0000-0002-6831-5071](https://orcid.org/0000-0002-6831-5071))



Keywords: Live Weight, Goat, Hair Goat, Growth, Kid.

Abstract
The animal material of this study consisted of 6000 goats and 300 goats, which were supported within the scope of the "Animal Breeding in the Hands of the Public National Project" in the province of Diyarbakir of Turkey. Within the scope of the project in which the research was included, the animals were identified and their records were kept. The records of goats in 2019, 2020, 2021 and 2022 formed the data of this research. The weights of birth, 30th day, 60th day, 90th day were determined in goats born in the specified years. Live weight of hair goat kids at various periods (birth, 30th, 60th, 90th) and daily body weight gains up to 90th day (birth-30, 30-60, 90th days). Statistical analysis of the data was made in the SPSS package program.

In the study, birth weight of Hair goat kids was 2.84 ± 0.010 ; Body weight at day 30 was 6.97 ± 0.028 ; Body weight at day 60 was determined as 11.06 ± 0.065 and body weight at 90th day was determined as 14.49 ± 0.058 . In addition, daily live weight gains on the 30th day of birth in Hair goat kids was 136.84 ± 0.884 ; body weight gain at birth-60th day 136.41 ± 1.083 ; daily body weight gain at birth-90th day was determined as 129.08 ± 0.640 . When the effect of environmental factors examined in the study was evaluated, the effect of gender on live weights of all ages was found to be statistically significant. However, in the study, it was determined that the type of birth and the effect of birth month showed a difference only between birth and 30th day age. As a result, in the current thesis study, it was found that the findings obtained in terms of growth and development characteristics in Hair goat kids were compatible with the findings of other studies on the subject.

1. Introduction

Our country, both geographically and with its socio-economic characteristics, presents a suitable qualification for goat breeding. Goat breeding and production is suitable for breeders living in mountainous and rural areas. Goat raising is an important source of employment and livelihood. Periodic change in Turkey's goat population has a fluctuating structure. Social and economic problems in rural areas, migration, traditional agricultural production structure, lack of organization,

deficiencies in livestock support, low demand for goat products, difficulties in finding shepherds and reluctance of young people are some of the reasons for the decline in goat breeding. [1]. In recent years, some measures have been taken to prevent this decline. Apart from the economic characteristics of the production line, projects are carried out by the relevant ministry in order to protect our cultural animal genetic resources [2].

Sustainability in animal production is closely related to the farming economy. In other words, it does not seem possible for non-economic animal

*Corresponding author: ayilmaz1@beu.edu.tr

Received: 20.07.2023, Accepted: 20.09.2023

production to be sustainable. Reproductive characteristics, birth weight, viability, growth and development characteristics of goats are very important indicators in terms of farming economy [3]. The yield of animal production is closely related to healthy young animal and their growth-development characteristics. Birth weight of kids and live weight gains in the following periods are important growth and development criteria for economic goat breeding. As in other animal production lines, the basis of goat breeding and sustainability is its profitability. Especially due to the traditional structure of our animal production and the ever-changing characteristics of the economy, change is necessary in animal production. In other words, an animal production based only on self-consumption and cheap input costs loses its value in contemporary production systems. Various projects are carried out by the related ministry in our country. The Ministry also adopts various approaches to use animal resources effectively. In recent years, projects have been carried out with the participation and support of breeders and long-term production plans are envisaged. The aim of this study is to determine the birth weights and 30th, 60th and 90th day live weights of hair goat populations supported within the scope of the project in Diyarbakır in terms of various environmental factors.

2. Material and Method

The animal material of this study consisted of 6000 goats and 300 goats, which were supported within the scope of the "Animal Breeding in the Hands of the Public National Project" in the province of Diyarbakır of Turkey. Within the scope of the related project, the animals were given ear numbers and the animals were recorded. The records of hair goats for the years 2019, 2020, 2021 and 2022 formed the data of this research. Birth, 30th day, 60th day and 90th day live weights of kids obtained in the mentioned years were determined. Births were followed in the villages where the research was conducted. Birth weight of kids were determined by weighing in 24 hours with precision scales (sensitivity of 1 g). In addition, the type of birth, gender and date of birth were recorded. In order to determine the growth-development performance of the kids, their age-adjusted body weights were calculated in three different periods

(birth, 30th day, 60th day, 90th day) from birth to 3 months. Calculations were made separately for males and females and no adjustment was made for birth weight. Body weights of hair goat kids at various periods (birth, 30th, 60th, 90th day) and daily body weight gains to 90th day (birth-30th, 30-60th, 90th day) were analyzed using the following statistical model:

In order to determine the growth-development performance of kids, age-adjusted live weights were calculated in 4 different periods (birth, 30th, 60th, and 90th days) from birth to weaning (90th day) and no adjustment was made for birth weight.

Live weights of kids at various periods (birth, 30th, 60th and 90th days) and daily average body weight gains up to 90th day (birth-30th, 60th and 90th days) were analyzed using the following statistical model:

$$Y_{ijkl} = \mu + a_i + b_j + c_k + d_l + e_{ijkl} \quad (1)$$

Formulation;

Y_{ijkl} = i. year, j. gender, k. in the birth type, the analyzed live weight/live weight gain of the lamb born in the 1st month of birth

μ = population mean,

a_i = i. effect of year (i=2019, 2020, 2021, 2022),

b_j = j. effect of gender (j = 1, 2; erkek ve dişi),

c_k = k. effect of birth type (k = 1, 2; tek ve ikiz),

d_l = l. effect of 1st month of birth (l = 1 (january), 2 (february), 3 (march)), 4 (april), 5 (may),

e_{ijkl} = Indicates independent and random error.

The data obtained from the research were processed into Microsoft Excel program and statistical analyzes were made using SPSS package program (SPSS, 2012). More than two subgroups of the factors determined to be important as a result of the analysis of variance were compared with the Duncan test.

3. Results

Averages of live weights of hair goat kids in various periods are given in Table 1.

Table 1. Average of least squares of live weights at birth, 30th, 60th and 90th days of hair goat kids

Characteristics	Birth weight		Live weight in 30th		Live weight in 60th		Live weight in 90th	
	n	X±Sx	n	X±Sx	n	X±Sx	n	X±Sx
Year								
2019	4479	2,51+0,013	4127	6,94+0,034	4064	11,31+0,073	3569	14,79+0,069
2020	4490	2,83+0,013	4473	6,68+0,034	4427	10,82+0,071	4125	13,85+0,070
2021	5139	3,06+0,013	4555	7,61+0,034	4300	12,14+0,075	3234	16,62+0,081
2022	5697	2,97+0,012	4806	6,63+0,033	4514	9,95+0,072	3356	12,70+0,075
Gender								
		*		*		*		*
Female	10090	2,77+0,011 b	9074	6,76+0,030 b	8714	10,71+0,068 b	7214	13,99+0,063 b
Male	9715	2,92+0,011 a	8887	7,17+0,030 a	8591	11,41+0,068 a	7070	14,99+0,063 a
Birth type								
		*		**		**		**
Twin	3048	2,68+0,014 b	2710	6,77+0,037 b	2658	10,84+0,077 b	2340	14,30+0,079 b
Single	16757	3,01+0,009 a	15251	7,16+0,025 a	14647	11,27+0,062 a	11944	14,68+0,052 a
Month of birth								
		**		**		**		**
January	612	2,85+0,027 c	527	5,01+0,068	527	7,65+0,111	527	10,56+0,141
February	5962	2,81+0,009 b	5502	6,07+0,023	5502	9,69+0,038	5320	13,43+0,049
March	10109	2,91+0,008 a	9430	6,82+0,019	9302	10,91+0,031	7964	15,16+0,042
April	2708	2,85+0,014 a	2272	8,04+0,034	1900	12,60+0,060	473	18,81+0,144
May	414	2,81+0,032 a	230	8,90+0,099	74	14,44+0,284		
General	19805	2,84+0,010	17961	6,97+0,028	17305	11,06+0,065	14284	14,49+0,058

When the least squares averages of the birth, 30th, 60th and 90th day live weights of hair goat kids were evaluated, it was determined that the birth, 30th, 60th and 90th day live weights of the kids did not show a significant difference according to the year of birth ($p > 0,05$). On the other hand, when the comparisons made by gender are examined, it is seen that the weights of male kids at the 4 measurement times are significantly higher than female kids ($p < 0,05$). In the comparisons made according to the birth type, it was found that the weights of the single born kids at the time of 4 measurement were higher than the twin born kids ($p < 0,05$). Finally, when the weight values were compared according to the months of birth, significant differences were observed only

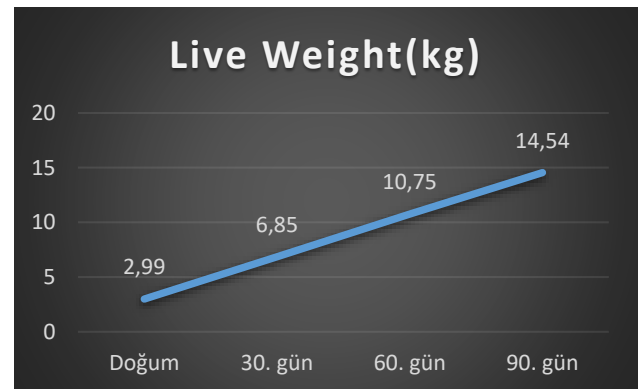
according to the birth weight ($p < 0,01$). Accordingly, it can be said that the birth weights of the kids born in March, April and May are higher than the birth weights of the kids born in January and February. On the other hand, it was determined that the 30th, 60th and 90th day live weights did not show a statistically significant difference according to the month of birth ($p < 0,05$).

The least squares averages of daily live weight gains on the 30th, 60th and 90th days of birth in Hair goat kids are given in Table 2.

Table 1. The least squares averages of daily live weight gains on the 30th, 60th and 90th days of birth in Hair goat kids

Characteristics	Birth-30th CAA		Birth-60th CAA		Birth-90th CAA	
	n	X±Sx	n	X±Sx	n	X±Sx
Year						
2019	4127	147,35+1,098	4064	146,37+1,218	3569	136,16+0,764
2020	4473	127,97+1,077	4427	132,88+1,188	4125	122,29+0,776
2021	4555	151,39+1,101	4300	151,16+1,245	3234	150,71+0,899
2022	4806	120,66+1,071	4514	115,25+1,203	3356	107,18+0,835
Gender						
		**		*		*
Female	9074	132,40+0,951 b	8714	131,78+1,126 b	7214	124,39+0,698 b
Male	8887	141,28+0,955 a	8591	141,05+1,125 a	7070	133,78+0,701 a
Birth type						
		***		***		***
İkiz	2710	135,80+1,192 b	2658	135,61+1,284 b	2340	128,84+0,882 b
Tek	15251	137,89+0,800 a	14647	137,22+1,032 a	11944	129,33+0,582 a
Month of birth						
January	527	70,71+2,178	527	79,44+1,852	527	85,28+1,570
February	5502	108,30+0,736	5502	114,63+0,627	5320	118,03+0,546
March	9430	130,24+0,596	9302	133,27+0,510	7964	135,96+0,466
April	2272	173,06+1,087	1900	162,09+1,002	473	177,07+1,606
May	230	201,90+3,169	74	192,63+4,713		
General	17961	136,84+0,884	17305	136,41+1,083	14284	129,08+0,640

The least squares averages of the birth-30th, 60th and 90th day live weight gains in hair goat kids were evaluated and the data on the birth-30th day, birth-60th day and birth-90th day live weight gains were compared statistically. According to the findings, it was determined that the 30-day, 60-day and 90-day live weight gains of the kids did not show a significant difference according to the year of birth ($p > 0,05$). On the other hand, it is seen that the 30-day, 60-day and 90-day live weight gains of male kids are significantly higher compared to female kids ($p < 0,05$). In the evaluation made according to the birth type, it was seen that the 30-day, 60-day and 90-day live weight gains of the single born kids were significantly higher than the live weights of the twin born kids ($p < 0,01$). Finally, when the weight values were compared according to the months of birth, it was determined that the 30-day, 60-day and 90-day live weight gains of the kids did not show a significant difference according to the birth month ($p > 0,05$).

**Figure 1.** Growth curve of kids for various periods of body weight

The average live weight of all kids examined in the study was 2.99 ± 0.005 kg at birth. On the 30th day, it was measured as 6.85 ± 0.013 kg on average. It is seen that it is 10.75 ± 0.021 kg on the 60th day and 14.54 ± 0.031 kg on the 90th day.

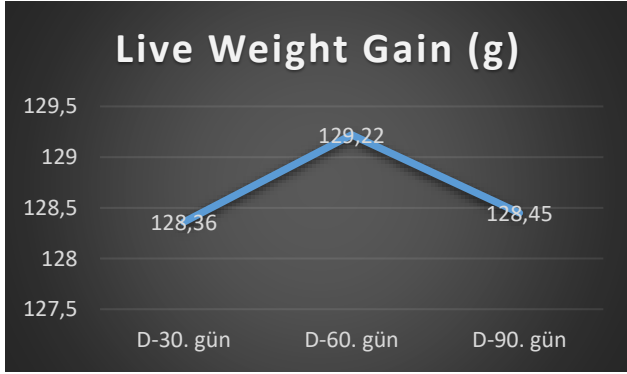


Figure 2. Growth curve of kids for live weight gains in various periods

The live weight gains of all kids examined in the study were 128.36 ± 0.408 g per day from birth to the 30th day. It was determined as 129.22 ± 0.353 g per day until the 60th day and 128.45 ± 0.340 .

4. Discussion, Conclusion and Suggestions

In this study, the birth weight of hair goat kids and the values related to hair goat live weights in various periods were determined. In the study, the birth weight of hair goat kids was measured as 2.84 ± 0.010 . On the 30th day, the live weight is 6.97 ± 0.028 . The live weight on the 60th day was 11.06 ± 0.065 and the live weight on the 90th day was determined as 14.49 ± 0.058 . In addition, daily live weight gain between birth and 30th days in hair goat kids is 136.84 ± 0.884 . Live weight gain at birth-60th day is 136.41 ± 1.083 and daily live weight gain at birth-90th day is 129.08 ± 0.640 . When the effect of environmental factors examined in the study was evaluated, the effect of gender on live weights of all ages was found to be statistically significant.

Growth and development characteristics of kids are important in terms of animal production economy. Growth is one of the important practical and economic physiological characteristics in livestock raising [4]. Birth weight in kids affects postnatal growth and viability characteristics of kids [3,5].

In the study, the average birth weight of hair goat kids was found to be 2.99 ± 0.005 kg and the minimum weight was 1.03 kg and the maximum weight was 4.97 kg. The coefficient of variation (%) was found to be 22.95%. This value, which was determined as 4.97, has a place between the values 2.85 kg reported by Kırk [6]; 2.58 kg reported by Oral and Altinel [7]; 2.6 kg reported by Öztürk [8];

reported 2.63 kg by Sengonca et al. [9]; 2.18 kg reported by Şimşek et al. [10]; 2.77 kg reported by Şimşek and Bayraktar [11]; 2.99 kg reported by Şimşek [12]; 3.89 kg reported by Darcan [13] (2000); 3.8 kg reported by Daş and Savaş [14]; 3.31 kg by Montenegro [15]; and 3.72 kg reported by Tozlu [16].

In the study, the weight of the hair goat kids on the 30th day was found to be 6.85 ± 0.013 kg. Compared to the studies conducted for this purpose, this value was reported as 6.29 kg in females and 6.89 kg in males for Angora goat kids [17]. In other studies, conducted for Angora goat kids, the 30th day live weight was reported as 9.669 kg [18] and 5.5 kg [19, 20]. In a study conducted for colored Angora goats, the live weight was found to be 4.34 kg on the 30th day [21]. In another study conducted for Angora goat and colored Angora goat hybrids, the live weight was 4.30 kg [21], 5.78 kg for Norduz goats [22], 6.36 kg for hair goats [7], 8.68 kg [23], 6.49 kg [24]. The value of 6.85 ± 0.013 kg, which was determined as the 30th day weight in hair goat kids in the study, is among the values reported especially for hair goats.

In this study, the average live weight of hair goat kids on the 60th day was found to be 10.75 ± 0.002 kg. In the researches, Öztekin and Akçapınar [17] determined the 60th day weight of Angora goats as 9.60 kg for females and 10.60 kg for males; Yurtseven et al. [18] 4,158 kg (overall average); Özdemir and Dellal [19] 8.2 kg; Yeni [20] 8.20 kg and Özel [22] 0.51 kg for Norduz Goats. In the research conducted for hair goats, Oral and Akinel [7] 9.75 kg; Şimşek and Bayraktar [11] 11.80 kg; Atay et al. [23] 13.98 kg; Erten and Yılmaz [24] 9.81 kg; Şimşek and Bayraktar [11] 11.04 kg in Saanen x hair goat hybrids; Şengonca et al. [25] 14.38 kg in Bornova goats; Salman [26] 9.86 kg in Kilis goats; Salman [26] determined 8.66 kg in Kilis x Saanen goat hybrids. In this study, the 90th day weight of hair goat kids was determined as 14.54 ± 0.0031 . In other studies, Öztekin and Akçapınar [6] found 10.4 kg in females and 13.1 kg in males in Angora goats; Yurtseven et al. [18] 19,647 kg; Özdemir and Dellal [19] 11.7 kg; Yeni [20] 11.70 kg; Özel [22] 14.82 kg for Norduz goats; Oral and Altinel [7] 13.58 kg for hair goats; Şimşek and Bayraktar [11] 16.05 kg; Atay et al. [23] 19.18 kg; Erten and Yılmaz [24] 12.32 kg; Şimşek and Bayraktar [11] 14.14 kg for Saanen x hair goat hybrids; Gök et al. [27] 24.1 kg for Honamlı goats. Keskin et al. (2016) 10.7 kg for Kilis x hair goat

hybrids; Salman (2009) 12.38 kg for Kilis x Saanen hybrids and Keskin et al. [28] 10.1 kg for Damascus goats.

In addition, daily live weight gain on the 30th day of birth in hair goat kids was 128.36 ± 0.408 ; daily live weight gain at birth-60th day was 129.22 ± 0.353 ; daily body weight gain on the 90th day of birth was determined as 128.45 ± 0.340 . When the effect of environmental factors examined in the study was evaluated, the effect of gender on live weights of all ages was found to be statistically significant. In research, Şimşek and Bayraktar [11] found live weight gain of birth-90th 147 g for hair goats; Erten and Yılmaz [24] 102.51 g; Şimşek and Bayraktar [11] 124 g for Saanen x Hair Goat hybrids; Salman [26] 125.6 g for Kilis Goats; Salman [26] 103.2 g for Kilis x Saanen hybrids; Gök et al. [27] 218g; Özel [22] 132.1 g for Norduz goats was reported.

As a result, live weights at birth, 30th, 60th and 90th days of hair goat kids supported within the scope of the project in this study are consistent with the findings in the literature. When the environmental factors examined were evaluated, it was revealed that gender had a statistically significant effect in all periods.

4.1. Suggestions

- 1) In order to get efficiency in goat breeding in Turkey, an effective improvement and breeding program should be implemented.
- 2) In Turkey, goat breeding studies were delayed and an effective model could not be developed in goat breeding. A breeding program involving hair goat and Angora goat breeder communities, relevant public institutions (TİGEM, Faculty of Veterinary Science and Faculty of Agriculture) and producers should be put into effect. These studies should be continued through a sustainable and auditable structure.
- 3) The breeding model should be applicable in the field. Different studies should be done for the most suitable breeding model. This model should cover all components of production.
- 4) Livestock support for small cattle breeding should be continued. Incentive programs should be developed.
- 5) Collaboration between research institutes, universities and small farmers is needed to increase

goat production and productivity. All stakeholders of goat development (national and international development organisations, research institutes and universities, the private sector, government agencies and smallholder farmers) should jointly meet the nutritional-income needs of small farmers in a public-private-producer-partnership model, while achieving higher production and creating sustainable goat markets.

6) The problem of insufficiency of pasture areas should be eliminated. This is one of the important studies to be done for the development of hair goat breeding. With the effective use of pasture areas, the problems in animal nutrition are eliminated, operating costs are reduced and the profit of the enterprise increases.

7) In goat breeding, support should be provided that will contribute to the growth of small-scale enterprises and to increase living standards.

8) Especially in Hair goat enterprises, the structure that offers the surplus to the market needs to be changed. The change of this structure is highly dependent on the integration of production and industry. In recent years, the increasing demand due to some characteristics of goat milk reveals that it would be beneficial for the dairy industry to take some initiatives to meet this demand.

9) For this purpose, an integration model should be established that will process goat milk and turn it into a product, and that will pay for the labor of the producer while doing this.

10) Hair goat breeding, which is the most done and inexpensive in Turkey, should be evaluated in the best way. Goat cheese and yogurt are also known to be delicious. Hair goats, which are the most common goat breeds, need to be supported in order to be effective in the country's economy and specially to reduce foreign dependency. The current structure and problems of manufacturers and enterprises should be determined. After these determinations, it will be useful to carry out the necessary studies.

11) Similar to the contract model applied in different livestock sectors, it can be considered as a practicable and beneficial experience for goat breeding. Increasing interest in organic products and widespread use will increase the demand for products made from hair and Angora goats in the near future.

With the steps and initiatives to be taken, goat breeding and goat products can be turned into an attractive production area again.

12) Although the intensification of agricultural production is the reason for feeding the increasing population, the demand for organic or ecological products has increased in parallel with the awareness of the society in recent years. In animal production branches where traditional production systems are applied, the transition to organic animal production can be easy.

13) In our country, classical methods are generally used in slaughterhouse and laniary. This type of businesses to be established for hair goat breeding regions can be established in accordance with the legislation. Thanks to the use of vehicles suitable for transporting animals and the training of butchers, slaughterhouses will meet the appropriate conditions. With the common facilities to be established in the region, long-term transportation of animals will be prevented.

Contributions of the authors

The authors confirm that the contribution is equally for this paper

Conflict of Interest Statement

There is no conflict of interest between the authors.

Statement of Research and Publication Ethics

The study is complied with research and publication ethics.

References

- [1] M. Ertuğrul, T. Savaş, G. Dellal, T. Taşkın, M. Koyuncu, F. Cengiz, B. Dağ, S. Koncagül, E. Pehlivan, "Improving small ruminant breeding in Turkey. In: Turkey" *Agricultural Engineering VII. Technical Congress*, Ankara, Turkey, pp. 667-685, 2010.
- [2] İ. Güngör, K. Alkoyak, S. Öz, S. Koncagül, "Growth, survival rate, and some reproductive characteristics of Hair goat under breeder conditions in Kahramanmaraş Province", *Turk J Vet Anim Sci*, vol. 45 no. 6, pp. 1022-1029, 2021
- [3] E. Demirören, T. Taşkın, A. Alçıçek, N. Koşum, "İnek sütü ile emiştirilen oğlaklarda gelişme", *Ege Üniversitesi Ziraat Fakültesi Dergisi*, vol. 36 no.1-2-3, pp. 89-96, 1999.
- [4] H. Akçapınar and C. Özbeyaz., *Hayvan Yetiştiriciliği Temel Bilgileri*, Kariyer Matbaacılık Ltd. Şti. 1. Baskı, Ankara, 1999.
- [5] S.S. Husain, P. Horst, A.B.M.M, Islam, "Effect of Different Factors on Prewaning Survivability of Black Engal Kids", *Small Rum Res*, vol. 18, no. 1, pp. 1-5, 1995.
- [6] K. Kırk, "Doğu Anadolu Bölgesi Yerli Keçi Irklarının Islahının Orman ve Korulukların Korunması ve Alternatif Hayvansal Üretim Modellerinin Geliştirilmesi Üzerine Etkileri", *GAP IV. Tarım Kongresi*, 21-23 Eylül 2005, Şanlıurfa, Türkiye, vol. 2, pp. 1253-1258.
- [7] D.H. Oral and A. Altinel, "The phenotypic correlations among some production traits of the Hair goats bred on the private farm conditions in Aydın province", *Journal of Veterinary Faculty of Istanbul University*, vol. 32 no. 3, pp. 41-52. 2006
- [8] D. Öztürk, "The characteristics of goat farming systems in Kahramanmaraş in the North Eastern Mediterranean region of Turkey", *7th International Conference on Goat*, France, 15-21 May, pp. 360-36, 2000.

- [9] M. Şengonca, T. Taşkın, N. Koşum, “A simultaneous study on the determination of some yield characteristics of Saanen x hair goat hybrids and pure hair goats”, *Turk J Vet Anim Sci.*, vol. 27 no. 6, pp. 1319-1325, 2003
- [10] Ü.G. Şimşek and M. Bayraktar, “Kıl keçisi ve Saanen x Kıl keçisi (F1) melezlerine ait büyüme ve yaşama gücü özelliklerinin araştırılması”, *F.Ü. Sağlık Bilimleri Veteriner Dergisi*, vol. 20 no. 3, pp. 229-238, 2006.
- [11] Ü.G. Şimşek, M. Bayraktar, M. Gürses, “Saanen x Kıl Keçisi F1 ve G1 melezlerinde büyüme ve yaşama gücü özelliklerinin araştırılması”, *F.Ü. Sağlık Bilimleri Veteriner Dergisi*, vol. 21 no. 1, pp. 21-26. 2007.
- [12] Ü.G. Şimşek, “Kıl keçisi ve Saanen x Kıl keçisi (F1) melezlerinde büyüme, besi performansı ve karkas özelliklerinin araştırılması”, Doktora Tezi, Fırat Üniversitesi Sağlık Bilimleri Enstitüsü Zootekni Anabilim Dalı, Elazığ, Türkiye, 2005.
- [13] N. Darcan, “Çukurova Bölgesi Subtropik İklim Koşullarında Geliştirilen Bazı Keçi Genotiplerinin Bu Koşullardaki Adaptasyon Mekanizmaları Üzerinde Karşılaştırmalı Araştırmalar”, Doktora Tezi, Çukurova Üniversitesi Fen Bilimleri Enstitüsü Zootekni Anabilim Dalı, Adana, Türkiye, 2000.
- [14] G. Daş, ve T. Savaş, “Keçilerde bir batında doğum ağırlığı ve varyasyonu seleksiyon ölçütü olarak kullanılabilir mi?” *Hay. Üret.*, vol. 43 no. 2, pp. 86-90, 2002.
- [15] H. Tozlu, “Amasya İli Kıl Keçisi Islah Projesi Kapsamında Elde Edilen Saanen X Kıl Keçisi (F1) Melezleri ile Saf Kıl Keçilerinin Büyüme ve Diğer Yetiştiricilik Özellikleri Bakımından Mukayesesi” Yüksek Lisans Tezi, Ondokuz Mayıs Üniversitesi, Fen Bilimleri Enstitüsü Zootekni Anabilim Dalı, Samsun, Türkiye, 2006.
- [16] R. Yurtseven, A. Öztürk, Ü. Köseoglu, B. Ankarali, “Farklı genotipteki Ankara keçisi oğlaklarının çeşitli verim özelliklerinin karşılaştırılması” *Lalahan Hay. Arast. Enst. Derg.*, vol. 38 no. 2 pp. 32-40, 1998.
- [17] H. Özdemir and G. Dellal, “Determination of growth curves in young Angora goats”, *Tarım Bilimleri Dergisi*, vol. 15, pp. 358–362, 2009.
- [18] H. Yeni, “Genç Ankara Keçilerinde Büyüme Fonksiyonunun Belirlenmesi”, Yüksek Lisans Tezi, Ankara Üniversitesi Fen Bilimleri Enstitüsü Zootekni Anabilim Dalı, Ankara, Türkiye, 2003.
- [19] F. Odabaşoğlu, M. Küçük, O. Yılmaz, “Renkli Tiftik Keçisi ve Ankara Keçisi x Renkli Tiftik Keçisi F1 Oğlaklarında Yaşama Gücü ve Büyüme Performanslarının Araştırılması”, *YYÜ Vet Fak. Derg.*, vol. 8 no. 1 pp. 29-36, 2007.
- [20] O.Atay, and O. Gokdal, “Some production traits and phenotypic relationships between udder and production traits of Hair goats”, *Indian J. Anim. Res.*, vol. 50 no. 6, 983-988, 2016.
- [21] Ö. Erten, and O. Yılmaz, “Investigation of Survival Rate and Growth Performances of Hair Goat Kids Raised Under Extensive Conditions”, *YYÜ Vet. Fak. Derg.*, vol. 24 no. 3, pp. 109-112, 2013.
- [22] M. Şengonca, T. Taşkın, N. Koşum “Saanen x Kıl keçi melezlerinin ve saf Kıl keçilerinin kimi verim özelliklerinin belirlenmesi üzerine eş zamanlı bir araştırma”, *Turk J Vet Anim Sci*, vol. 27 no. 6, pp. 1319-1325, 2003.
- [23] S. Salman,. “Saanen melezi ve Kilis Keçilerde Bazı Döl Verimi Özellikleri ile Oğlaklarda Büyüme ve Yaşama Gücü” Yüksek Lisans Tezi, KSÜ Fen Bilimleri Enstitüsü Zootekni Anabilim Dalı, Kahramanmaraş, Türkiye, 2009.
- [24] B. Gök, A.H. Aktaş, Ş. Dursun, “Honamlı Goat: rising star of the Taurus mountains”, *RBI 8th Global Conference on the Conservation of Animal Genetic Resources*, Tekirdağ, p. 65-72, 2011.
- [25] M. Keskin, S. Gül, E. Can, Z. Gündüz, “Yarı Entansif Koşullarda Yetiştirilen Şam Keçileri ile Kilis x Kıl Keçisi Melez Genotipinin Süt ve Döl Verim Özellikleri”. *Lalahan Hay. Araşt. Enst. Derg.*, vol. 56 no. 1 pp. 20-24, 2016.