

## Determination of Some Yield Characteristics of Hair Goats under Extensive Conditions

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### Abstract

This study was carried out to investigate the reproductive efficiency, milk yield and some developmental characteristics of kids in Hair goats reared under extensive conditions. The animal material of the study consisted of 214 Hair goats and 233 Hair goat kids. In order to determine the reproductive traits of the Hair goats, data on the number of goats under sire, pregnancy rate, birth rate, single birth rate, twin birth rate, number of kids per birth, kid yield, weaning period kid yield; lactation milk yield, lactation duration and daily average milk yield as milk yield traits and birth weight and weaning weight were used to determine the development traits of kids. Pregnancy rate was 95.8%, birth rate was 94.4%, single birth rate was 84.6%, twin birth rate was 15.3%, number of kids per birth was 1.15 and kid yield was 108.9. Among the milk yield characteristics of Hair goats, lactation milk yield was 124.26 kg, lactation period was 166.04 days and average daily milk yield was 0.750 kg. Birth weight and weaning (90th day) weights of Hair goat kids were determined as 3.09 and 13.11 kg, respectively. As a result, it was observed that fertility, milk yield and some developmental characteristics of kids obtained from Hair goats under extensive conditions were in accordance with the values reported in the literature.

**Keywords:** Hair goat, fertility, milk yield, growth characteristics

## 1. Introduction

Goat farming, which is an important livestock breeding area, helps to raise the living standards of small farmers, especially in rural areas, due to its meat, milk and other products and is popularly known as the "poor man's cow" (Ceyhan and Hassan, 2023; Mili and Tukheswar, 2021). Goats are considered to be a good animal model to cope with multiple environmental stressors and have a potential to qualify as the animal of the future, especially in arid and semi-arid regions (Aleena et al., 2018; Ramachandran et al., 2019; Ramachandran and Sejian, 2022). Moreover, goats have several anatomical advantages (salivary gland, rumen and kidney, osmoregulatory mechanisms) to cope with water scarcity (Simões and Pires, 2018) and goats can consume herbaceous plants as well as roughages (dry leaves, thorny plants, shrubs, woody plants, etc.) that are not preferred or less preferred by other ruminants (Decandia et al., 2008). Goat breeding has advantages such as high utilisation rate of goats from cellulose-rich feeds and the capital needed for the establishment of the enterprise and the provision of the necessary animal material is less than that calculated for other animal species, low maintenance costs, high fertility and short gestation period (Tüfekci, 2023). In goat breeding, it is seen that there have been significant developments in recent periods due to the successes achieved in low-income countries as well as middle and high-income countries (Baş et al., 2023). In Turkey, goat breeding is generally carried out in forest interior-edge regions, lands that are not suitable for crop production and other animal species and steep areas (Dellal and Dellal, 2005). Goat breeding is a branch of production that has been traditionally carried out in our country for many years, and it contributes significantly to the economy and socio-cultural structure of the region where they are raised (Bolacalı and Küçük, 2012). According to the latest data, the number of goats in Turkey is 11.577.862 heads, and

although goat breeding is carried out with different breeds according to the regions, the most widely grown domestic breed is the Hair goat (Anonymous, 2023). In goat breeding, as in other farm animals, the goal is to make profit (Erten and Yılmaz, 2013a). In this context, the first condition for efficient production in animal husbandry is to obtain regular offspring from existing animals. In addition, the continuity and reproduction of populations is also possible through fertility (Tüfekci, 2012). For economic breeding and selection in livestock, it is very important to consider and evaluate growth, yield and development characteristics for the selection of breeding animals (Yılmaz et al., 2021). This study was carried out to investigate the reproductive efficiency, milk yield and some developmental characteristics of kids in Hair goats reared under extensive conditions.

## 2. Materials and Methods

The animal material of the study consisted of a total of 214 head of Hair goats (2 years old 51, 3 years old 56, 4 years old 46 and 5 years old 61) and 233 head of Hair goat kids born in March-April 2022 in a private enterprise located in Akdağmadeni district of Yozgat province. In the study, in order to determine the reproductive characteristics of Hair goats, records such as number of goats under goat, pregnancy rate, birth rate, single birth rate, twin birth rate, number of kids per birth, kid yield, weaning period kid yield were kept. Data on reproductive traits were calculated according to the methods reported by Kaymakçı (2002). In the study, mating was carried out between October and November 2021 according to the free adjective method. Animals were given a supplementary feeding in accordance with special physiological conditions such as calving or pregnancy. Wheat straw and barley crumbs were given to the bucks during and after the calving period. Females were given concentrate feed and wheat straw from birth. The birth season took place in March and April. Birth weights of

the born kids were taken within the first 24 hours, ear numbers were shot and birth date, birth type and sex were recorded. Birth and weaning weights of the kids were determined individually by weighing up to 50 g with a precision balance. The average age of weaning of the kids was 90 days. Milking control in goats started one week after birth and was carried out in monthly periods until the end of lactation. Determination of milk yield was carried out once a month after birth, with one milking per day. The kids were separated from their mothers 12 hours before milking controls. When the daily milk yield of the goats fell below 100 g, milking was stopped. Lactation milk yield and lactation duration of goats were calculated according to the Mediterranean method (Kaymakçı and Sönmez, 1996). The obtained data were analysed using SPSS Statistical Package Program (SPSS, 2016). Kolmogorov-Smirnov test was applied for normality test in the evaluation of the data and it was determined that the factors were compatible with normal distribution. Age, type of birth and sex were included in the model as effective factors on live weight. In milk yield analysis, age and birth type were included in the model as effective factors. Duncan multiple comparison test was applied to compare the averages in groups with more than two differences.

### 3. Result and Discussion

Although Hair goats are spread all over Turkey, their meat and milk are consumed especially by the people in the region where they are raised. Fertility is an important characteristic in terms of continuity of the

herd, sustainability of production, profitability and productivity of commercial enterprises. In this respect, many criteria for determining the fertility were considered in this study. Fertility characteristics of Hair goats in the study are given in Table 1. When Table 1 is analysed, pregnancy rate was 95.8%, birth rate was 94.4%, single birth rate was 84.6%, twin birth rate was 15.3%, number of kids per birth was 1.15 and kid yield was 108.9. The effect of age on fertility traits was insignificant. The pregnancy rate obtained in the study was similar to the values obtained by Şimşek et al. (2006) and Atay et al. (2010) (96.0%; 95.0%), higher than the values reported by Tozlu (2006), Çam et al. (2003) and Erten and Yılmaz (2013a) (82.93%; 93.3%; 94.87%) and lower than the value reported by Oral Toplu and Altinel (2008) (97.81%). The birth rate determined in the study in Hair goats was higher than the rate reported by Erduran and Dağ (2015) (92.5%) and similar to the rate reported by Oral Toplu and Altinel (2008) (94.30%). The twin birth rate obtained in the study was higher than the value obtained by Kırk (2006) (12.3%) and lower than the values reported by Tozlu (2006) and Erten and Yılmaz (2013a) (17.65% and 17.91%), respectively. The number of kids per litter obtained in the study was similar to the values reported by Erten and Yılmaz (2013a) and Tozlu (2006) (1.18; 1.17), respectively. The differences between the literature reports on Hair goats in Turkey and the fertility traits obtained in this study may be due to factors such as genetic structure, maintenance, feeding practices and environmental conditions in the farm.

**Table 1.** Some fertility characteristics of Hair goats

Factors	Kids born per goat mated		Pregnancy rate		Birth rate		Single birth rate		Twin birth rate		The number of kids per goat		Kid yield	Kid yield at weaning
	n		n	%	n	%	n	%	n	%	n	%		
Age														
2	51	48	94.1	46	90.2	40	86.9	6	13.0	1.13	101.9	96.07		
3	56	52	92.8	53	94.6	47	88.7	6	11.3	1.11	105.3	101.7		
4	46	45	97.8	44	95.6	35	79.5	9	20.5	1.20	115.2	104.3		
5	61	60	98.3	59	96.7	49	83.1	10	16.9	1.17	113.1	108.1		
<b>Overall</b>	214	205	95.8	202	94.4	171	84.6	31	15.3	1.15	108.9	102.8		

Live weight can change in a wide range during the processes such as pregnancy, birth and lactation, which take place in the life cycle of the individual and have differences in terms of physiological conditions (Ortega-Jimenez et al., 2005). The genetic structure and feeding level of the animal have an important effect on the live weight gain during the growth period (Akçapınar, 2000). In addition, the effect of birth weight on the survival of kids is very important. In many studies, it has been reported that there is a linear relationship between birth weight, weaning weight and live weight of kids at later ages (Taşkın et al., 2000). The live weights of hair goat kids

at birth and weaning periods are given in Table 2. When Table 2 is examined, the birth weight of the kids was found to be 3.09 kg. The birth weight obtained in the study was similar to the results of Şimşek (2005), Erten and Yılmaz (2013b) (2.99; 3.01) and lower than the results of Daş and Savaş (2002) and Tozlu (2006) (3.8 kg; 3.7 kg). The weaning (90th day) live weight of the kids (13.11kg) was higher than the value (12.32) reported by Erten and Yılmaz (2013b). In the study, the effect of birth type on birth weight and weaning weight of kids was found to be statistically significant (P<0.001).

**Table 2.** Live weights of the kids at birth and weaning periods

Factors	n	Birth weight (kg) $\bar{X} \pm S \bar{x}$	n	Weaning weight (kg) $\bar{X} \pm S \bar{x}$
<b>Overall</b>	233	3.09 ± 0.36	220	13.11 ± 0.55
<b>Age</b>				
2	52	3.14 ± 0.30	49	12.56 ± 0.66
3	59	2.94 ± 0.21	53	12.65 ± 0.43
4	53	3.27 ± 0.44	52	13.50 ± 0.27
5	69	3.03 ± 0.52	66	13.72 ± 0.06
<b>p</b>		0.067		0.040
<b>Birth type</b>				
Single	171	3.15 ± 0.47 <sup>a</sup>	166	13.10 ± 0.37 <sup>a</sup>
Twin	62	2.52 ± 0.53 <sup>b</sup>	54	12.24 ± 0.33 <sup>b</sup>
<b>p</b>		<0.001		<0.001
<b>Sex</b>				
Female	120	2.70 ± 0.20	114	12.65 ± 0.65
Male	113	3.10 ± 0.12	106	13.00 ± 0.30
<b>p</b>		0.125		0.137

a,b: Values in the same column with different letters indicate statistical difference.

Goat milk is one of the animal products gaining importance all over the world (Tüfekci, 2023) and milk yield in goats is under the influence of environmental and genetic factors such as breed, genotype, feeding, lactation sequence, milking season

and milking frequency (Güney and Kaymakçı, 2006). Physiologically, milk yield in goats increases up to 4-5 lactation and tends to decrease in the following lactation periods (Kaymakçı, 2006). When the milk yield characteristics of Hair goats

are analysed in Table 3; lactation milk yield was 124.26 kg, lactation period was 166.04 days and average daily milk yield was 0.750 kg. In the study, the effect of age on lactation milk yield and daily average milk yield of Hair goats was found to be significant ( $P < 0.001$ ). The lactation period obtained in the study was similar to the results (163.26 days; 161.87 days) reported by Erten and Yılmaz (2013a) and Şimşek et al. (2006), but lower than the results (209.19

days; 216.15 days; 132.18 days) reported by Atay et al. (2010), Tozlu (2006) and Ata (2007). The milk yield of 124.26 kg obtained in the study was higher than the results (63.97 kg; 80.47 kg; 93.8 kg; 109.70 kg) reported by Ata (2007), Şengonca et al. (2003), Çam et al. (2003) and Erten and Yılmaz (2013a) and lower than the results (146.24 kg; 159.01 kg) reported by Şimşek et al. (2006) and Tozlu (2006).

**Table 3.** Milk yield characteristics in Hair goats

Factors	n	Lactation milk yield (kg)	Lactation period (day)	Average daily milk yield (kg)
		$\bar{X} \pm S \bar{x}$	$\bar{X} \pm S \bar{x}$	$\bar{X} \pm S \bar{x}$
<b>Overall</b>	202	124.26 $\pm$ 1.15	166.04 $\pm$ 2.57	0,750 $\pm$ 1.04
<b>Age</b>				
2	46	108.24 $\pm$ 1.15 <sup>b</sup>	162.78 $\pm$ 1.26	0.665 $\pm$ 0.22 <sup>b</sup>
3	53	121.61 $\pm$ 1.36 <sup>ab</sup>	164.33 $\pm$ 1.42	0.740 $\pm$ 1.08 <sup>ab</sup>
4	44	131.62 $\pm$ 0.95 <sup>a</sup>	166.60 $\pm$ 1.22	0.790 $\pm$ 1.34 <sup>a</sup>
5	59	135.60 $\pm$ 1.30 <sup>a</sup>	168.45 $\pm$ 1.35	0.805 $\pm$ 1.54 <sup>a</sup>
<b>p</b>		<0.001	0.032	<0.001
<b>Birth type</b>				
Single	171	123.56 $\pm$ 0.66	168.12 $\pm$ 1.05	0.735 $\pm$ 0.27
Twin	31	120.44 $\pm$ 0.57	167.28 $\pm$ 1.12	0.720 $\pm$ 0.32
<b>p</b>		0.027	0.040	0.095

a,b: Values in the same column with different letters indicate statistical difference.

#### 4. Conclusion

As a result, in this study, although there are some similarities with the literature reports in terms of fertility, milk yield and some developmental characteristics of kids in Hair goats reared under extensive conditions, there are some different literature reports. This situation is due to the factors such as different regions, breeding, feeding etc. and it is an indication that the yields obtained from animals can be increased by improving the conditions. In addition, considering the changing climatic conditions, the importance of our local breeds that are resistant to diseases, have good adaptability and can make the best use of the existing pastures is even more important.

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