

## Full Length Research Paper

# Reproduction performance of Saanen goats raised under extensive conditions

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**This research was conducted to determine some reproductive characteristics and kids' growth characteristics of Saanen goats raised at Suleyman Demirel University Sheep and Goat Testing Facility. The animal materials of this research consisted of 91 female goats in different ages. Estrous cycle length, first mating age, kidding age and gestation length were found as 21 day, 12.9 month, 9.7 month and 150.1 day, respectively, while 2-5 age kidding rate, infertility and litter size were 81 and 81.3%, 11.5 and 0.09% and 1.13 and 1.47, respectively. The effects of mother age and birth type on birth weight for Saanen kids were significant ( $P < 0.01$ ,  $P < 0.05$ ). The effects of birth type and sex on weaning weight and survival rate were significant ( $P < 0.01$ ), but the age of dam was not significant ( $P > 0.05$ ). The average kids' birth weight, weaning weight and survival rate were found as 3.06 kg, 12.91 kg and 79%, respectively.**

**Key words:** Saanen goat, reproductive characteristics, survival rate.

## INTRODUCTION

Goat breeding is, economically and socially, important in Turkey. In our country, where hair goat breeding is common in highlands and forestland, goat breeding is done in about 500,000 farm business and this production branch contributes to the income of nearly 3 million people (Dellal and Dellal, 2005). The gradual increase seen in demand for goat products in the world in recent years has also shown its impact in Turkey. Particularly, the demand for goat milk led to intensive breeding in modern facilities instead of goat breeding done under completely extensive conditions. In Turkey, milk goats are raised mainly in Aegean region as well as Marmara and Thrace regions. In recent years, the demand for Saanen goats by hair goat breeders in Mediterranean region increased, as well. Mediterranean region is a leading area in the world in terms of goat milk and cheese production and as such, various kinds of traditional cheese are being produced in the region (Koyuncu, 2005). Saanen goats were brought to Turkey in 1959 and it is still being raised as pure and crosses.

Owing to its adaptability to different climatic conditions as one of the most significant characteristics of Saanen race, these goats can adapt to different places easily (Haris and Frederick, 1996; Keskin et al., 2004; Özder, 2006). Since their reproduction is high, they usually give birth to twins or triplets (Haris and Frederick, 1996;

Özder, 2006). Matured males weigh 70 kg, while females weigh 50 kg on average. Average milk production is 750 kg and lactation period is 280 days. Milk fat is almost 3.4 to 3.6% (Özder, 2006; Ceyhan and Karadağ, 2009). In general, gestation length is 150 days on average (Amoah et al., 1996), birth rate is 78 to 95%, infertility rate is 5 to 20%, number of kids per fertile goat is 1.2 to 2.14 (Taşkın et al., 2003; Göncü et al., 2005; Moaen-ud-Din et al., 2008), survival rate of kids till weaning is 82 to 98% (Taşkın et al., 2003; Simsek and Bayraktar, 2006; Moaen-ud-Din et al., 2008) birth weight of Saanen is 2.73 to 4.01 kg (Uğur et al., 2004; Lehloenya et al., 2005; Göncü et al., 2005; Ocak et al., 2006; Simsek and Bayraktar, 2006; Simsek et al., 2007) and weaning weight is 10.7 to 18.0 kg (Freitas et al., 2004; Ocak et al., 2006; Simsek and Bayraktar, 2006; Simsek et al., 2007).

The aim of this study is to determine some reproduction characteristics of Saanen goats, survivability of kids and their weaning weights, which have been raised at Süleyman Demirel University Sheep-Goat Testing Facility.

## MATERIALS AND METHODS

### Study area

This study was conducted at Süleyman Demirel University, Research

**Table 1.** Reproduction characteristics of Saanen goats.

Characteristics	N	Average	Minimum	Maximum
Estrous cycle (day)	84	21.0	18.0	27.0
First mating age (month)	69	9.7	6.6	12.2
Kidding age (month)	89	12.9	11.8	14.9
Gestation period (day)	74	150.1	140.5	156.9

**Table 2.** Reproductive properties of Saanen goats.

Property	Age groups			
	2 years		>5 years	
	N	%	N	%
Female goats	27	-	64	-
Goats in estrous	25	92.6	60	93.7
Kidding rate	24	81	58	81.3
Infertility rate	3	11.5	6	0.09
The goat's single birth	22	77.3	57	46.2
The goat's twin birth	5	22.7	22	42.3
The goat's triplet birth	-	-	6	11.5
Number of male kids	15	55.5	47	55.3
Number of female kids	12	44.4	38	44.7
Litter size	-	1.13	-	1.47

and Implementation Area, Province of Isparta in the Western Mediterranean region of Turkey. The study area is located between 37°83'50"-37°83'31"N latitude and 30°51'72"-30°51'94"E longitude, at an elevation of 1,250 m. Its aspect is towards the southwest. According to the data provided by the closest meteorology station and the Isparta meteorology station, the long-term average annual rainfall is 600.4 mm and the average air temperature is 12.1°C. During the winter (December to March) and summer (June to September) seasons, average air temperature ranges between 1.7 and 5.8 and 19.7 and 23.1°C, respectively and average rainfall ranges between 90.0, 100.0, 9.6 and 36.6 mm, respectively. The climate of the area is characterized as semi-arid with cold winters (SMSI, 2009).

#### Animal material

As animal material of this study, Saanen goats supplied from Çanakkale Sheep and Goat Breeders Association in 2008 were used. The animals studied included 91 female goats with two different ages. Saanen goat flock was sheltered in a semi-open pen and animals were reared on pasture. The new-born kids were weighed and numbered in 24 h.

#### Reproduction characteristics

Male goats were introduced into the female pen between September 15 and November 15. Estrous showed goats that were detected and mated every day. Birth rate, infertility rate, one, twin or triplet birth rate, sex of the kid, litter size and survival rate between birth and weaning period, as reproductive features, were all calculated by the method stated by Kaymakci and Sonmez (1996).

#### Estrous cycle (day)

Estrous cycle was calculated as the period between two copulations. The first mating age (month): the age at first copulation. The first kidding age (month): the period and gestation period passed since the birth of the mother goat. Gestation period (day): the period between mating date and goat's born date.

#### Weights

The birth weights were recorded within 24 hours right after birth. For kids, birth weight and weaning weight were measured with the same scale.

#### Statistical analysis

Data were analyzed with Statistical Package for the Social Sciences (SPSS) 17.0 statistical package program using Least Square Method (Özdamar, 2004).

## RESULTS AND DISCUSSION

Tables 1 and 2 show some reproductive characteristics about Saanen goats raised in Süleyman Demirel University Sheep-Goat Testing Facility. Estrous cycle of Saanen goats was 21.0 days on average, while their first mating age was 9.7 months. The age at their first use for breeding (kidding age) was 12.9 months and gestation

period was 150.1 days on average. Saanen goats showed estrous (92.6%) of two-year olds, 93.7% of five-year or an older group, 81% of two-year olds and 81.3% of five-year or an older group that were all kidding. Infertility rate was 11.5% in two-year old group and 0.09% in five-year or an older group. The rate of having twins was 22.7 and 42.3%, respectively, and 55 and 45% of the kids were male and female, respectively. Litter size was calculated as 1.13 for two-year old group and 1.47 for five-year old or an older group. The birth weight, weaning weight, survival rate to Saanen kids and standard errors are shown in Table 3. Mother age and birth type was found as important factors for birth weight ( $P < 0.05$ ,  $P < 0.01$ ), but sex is not a significant factor. The sex and birth type had remarkable impact on weaning weight and survivability ( $P < 0.01$ ), yet age of the mother is not important. Saanen kids' birth weight was 3.06 kg, weaning weight was 12.91 kg and survival rate was found as 79% (Table 3).

Reproduction efficiency in female goats is determined by many different processes including length of the breeding season, cyclic activity, ovulation rate, fertilization rate, the post-partum anestrus period and the growth and viability of the offspring. Reproductive efficiency as such can be measured and expressed as the kidding rate, weaning rate, kidding interval, live weight of kids born or weaned and the length of the reproductive cycle (Grayling, 1988; Kaymakçı and Aşkın, 1997; Moaen-ud-Din et al., 2008).

In this study, estrous cycle length for Saanen goats was 21 days. This is consistent with the value (21 days) found by Kaymakçı and Aşkın (1997) for milk goats, but it is higher than the other authors (Stüwe and Grodinsky, 1987; Lopes Júnior et al., 2001; Lehloenya et al., 2005; Moaen-ud-Din et al., 2008). Various physiological, as well as environmental factors have been reported to affect the gestation period in goats. Gestation length was found as 150.1 days. There was no consistent change in the mean gestation length in Saanen goats as compared to the findings of other authors (Amoah et al., 1996; Göncü et al., 2005; Moaen-ud-Din et al., 2008). Saanen goats' first mating age is detected as 9.7 months. However, when compared with the other breeds of goats, Saanen goats reached mating age with similar many goat breeds of the world (Ceyhan and Karadağ, 2009; Moaen-ud-Din et al., 2008).

The level of reproductive performance is dependent on the interaction of genetic and environmental factors, for example, the seasonal availability of nutrients can affect reproduction considerably, when we analyzed the reproduction performance, which was more or less same to the figure of other breeds of goat found in literature (Ceyhan, 2007; Moaen-ud-Din et al., 2008, Ceyhan and Karadağ, 2009). In this study, infertility rate was 11.5 and 0.09% for relevant age groups, respectively. These values are similar to the one found by Moaen-ud-Din et al. (2008) but lower than the ones detected by Taşkın et

al. (2003) and Ceyhan and Karadağ (2009). This difference might have arisen from different age groups and races. In the study, litter size for Saanen goats was 1.13 and 1.47 for two different age groups. Although this is similar to the values detected by other authors (Şengonca et al., 2003; Göncü et al., 2005; Ceyhan, 2007), it is lower than the values found by Amoah et al. (1996), Dorbinç et al. (1999), Taşkın et al. (2003), Moaen-ud-Din et al. (2008) and Ceyhan and Karadağ (2009). The litter size values found in this study are consistent with literature values in general, and the resulting differences might have arisen from the surrounding factors such as genotype, care and feeding.

The effects of mother age and birth type on birth weight for Saanen kids were significant ( $P < 0.01$ ;  $P < 0.05$ ). Twins or triplets tended to have lower birth weights. Curtis (1969) concluded that animals with low birth weights had lower energy reserves and were therefore less able to withstand harsh environments. Also, if the dam has a poor milk yield, she may be unable to provide adequate nutrition for twins. The effects of birth type and sex on weaning weight and survival rate were significant ( $P < 0.01$ ), but the age of dam was not significant ( $P > 0.05$ ). Survival rate may be attributed to the decreased rate of twinning due to the fact that the kids may be available with more milk from dams as kid survival has been shown to be dependent on birth mass (Moaen-ud-Din et al., 2008). The survival rate of Saanen kids was 79% in this study. This finding is in agreement with 78.61% expressed by Şengonca et al. (2003) for pure hair kids. However, it is lower than the values found by other authors (Şengonca et al., 2002; Taşkın et al., 2003; Şengonca et al., 2003; Şimşek and Bayraktar, 2006; Simsek et al., 2007).

Average birth weight of kids, according to the study, was 3.06 kg. This is higher than the birth weight stated by Şimşek et al. (2007) for Saanen x Hair goat crossbred  $F_1$  kids (2.18 kg) and  $G_1$  kids (2.82 kg). It is possible to claim that this weight is generally consistent with the birth weight values expressed by Göncü et al. (2005) for Turkish Saanen kids as 3.0 to 3.2 kg and Ceyhan (2007) for Toros Alaca kids as 3.1 kg. However, the values gathered by Amoah et al. (1996) for goats (3.6 kg), Şengonca et al. (2003) for Saanen x Hair goat crossbreds (3.7 kg) and Mavrogenis et al. (1984) for Damascus kids in Cyprus (4.35 kg) are all higher than the value gotten from this study. Average weaning weight of 90-day old kids was 12.91 kg. This is consistent with the value of 12.6 kg stated by Ceyhan and Karadağ (2009) for weaning weight of 70-day old kids. Moreover, this is lower than the value found by Şimşek and Bayraktar (2006) for Saanen x Hair ( $F_1$ ) crossbred kids (14.14 kg), Ceyhan (2007) for Toros Alaca kids (15 kg), Freitas et al. (2004) for Saanen kids (17.4 kg), Koşum et al. (2004) for Saanen, Bornova and Saanen x Kilis kids, Şengonca et al. (2002) for Bornova kids (14.38 kg), Mavrogenis et al. (1984) for Damascus kids (16.77 kg) and Simsek et al.

(2007) for Saanen x Hair goat crossbred F<sub>1</sub>s (14.07 kg) and G<sub>1</sub>s (15.62 kg). However, it is similar to the one stated by Uğur et al. (2004) for Turkish Saanen kids.

To conclude, it is possible to claim that litter size of Saanen goats and growth and developmental features of kids raised in Süleyman Demirel University Sheep-Goat Testing Facility are adequate, yet survivability of kids is low. These differences can stem from surrounding factors such as race, year, care and feeding. Saanen goat is a prolific breed and a trait of major economic importance. Kidding interval have not been investigated in the current study and as such should be studied in the future to provide the current information and meaningful decisions about breeding and management strategies, and also, because of higher twins and triplets birth rate in Saanen goat, this breed can be recommended to other parts of Turkey and the world having similar climatic conditions. This is so, as a result of the extremely low efficiency of the existing local breed (for example hair goat). However, this breed could not show features of high yield that are well known in Isparta region. Conclusively, performance of Saanen goats should be investigated, given the optimum conditions in the same research place.

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