

## **INVESTIGATION OF SURVIVAL RATE, GROWTH PERFORMANCE AND SOME BODY MEASUREMENTS OF SAANEN X HAIR GOAT F<sub>1</sub> CROSSBRED AND PURE HAIR GOAT KIDS RAISED IN SEMI-INTENSIVE CONDITIONS**

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### **Abstract**

YILMAZ, O., M. KUCUK, M. BOLACALI and B. CAK, 2013. Investigation of survival rate, growth performance and some body measurements of Saanen X Hair Goat F<sub>1</sub> crossbred and pure Hair Goat kids raised in semi-intensive conditions. *Bulg. J. Agric. Sci.*, 19: 835-840

The goal of this study was to determine survival rate, growth performance and some body measurements of Saanen x Hair goat F<sub>1</sub> crossbred and pure Hair goat kids raised in semi-intensive conditions. The study was conducted at Research Farm of Yuzuncu Yil University in Van province, Turkey. Data were collected using 72 Saanen x Hair goats F<sub>1</sub> crossbred and 41 Hair goat kids born in February and April in 2011. The survival rates of Saanen x Hair goat F<sub>1</sub> crossbred and Hair goat kids at 90 (weaning) and 180 days of age were 90.28 and 90.24 %; 84.72 and 90.24 %, respectively. Effects of genotype, gender and birth type on survival rates of kids at 90 and 180 days of age were not significant ( $P>0.05$ ). Body weights at birth, weaning and 180 days of age of Saanen x Hair goat F<sub>1</sub> crossbred and Hair goat kids were 3.13 and 3.15 kg; 12.22 and 11.90 kg; 22.52 and 21.82 kg, respectively. Effects of dam's age ( $P<0.05$ ) and dam's live weight ( $P<0.01$ ) on birth weight of kids were significant; effects of gender, birth type ( $P<0.05$ ) and dam's live weight ( $P<0.01$ ) on live weight of kids at 90 days of age (weaning) were significant. The effect of only dam's live weight ( $P<0.01$ ) on live weight of kids at 180 days of age was significant. Withers heights, body lengths, chest circumferences, chest lengths and chest depths of Saanen x Hair goat F<sub>1</sub> crossbred and Hair goat kids at 180 days of age were 54.5 ve 52.3 cm; 56.1 ve 53.2; 64.3 ve 65.7 cm; 31.4 ve 30.4 cm; 25.7 ve 25.7 cm, respectively. The findings of the present study showed that survival rates and live weights in various growth periods of Saanen x Hair goat F<sub>1</sub> crossbred and Hair goat kids raised in semi-intensive conditions were similar. Furthermore, withers heights, chest circumference, chest lengths and chest depths of Saanen x Hair goat F<sub>1</sub> crossbred and Hair goat kids did not differ, however body length was significant in favour of Saanen x Hair goat F<sub>1</sub> crossbred kids.

*Key words:* hair goat, crossbred goat, survival rate, body weight, body measurement

### **Introduction**

Goat breeding has an important place in Anatolian cultural and social life since olden times. Most goat populations in Turkey subsist harsh environments that adversely affect plant and animal production. Goat breeding are concentrated in inner-forest and forest-side villages in Anatolia, contributing mainly to the livelihood of goat breeders. Goat keeping contributes to employment and nutrition of households in these areas (Gokdal, 2013).

Production of goat milk and its products in Turkey is carried out mainly based on hair goat. According to the data of 2011, there are 7.277.953 goats and Hair goat constitutes

97.92% of the presence of total goats (TUIK, 2013). Goat breeders under extensive conditions in Turkey have reared Low-productive Hair goat, as this breed have well adapted to the harsh environment (Daskiran et al., 2010).

In order to establish Saanen goat-farming enterprises based on Saanen in Turkey, it is very important in terms of raising goats that studies on Saanen breed, Saanen crossbreds should be done, and that findings obtained should be shared with the breeders.

Being the world's most well known breed of goat, Saanen goat breed, with the ability to comply with different climatic conditions, is a species that can be grown easily in the new environment where it is taken. Saanen goat, characteristics of

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dairy of which are usually at the forefront develops quite early and has high reproductive performance. Saanen goats were brought to Turkey in 1959 and were used in various breeding studies (Ozder, 2006).

The strategy or objective in cross-breeding should be clearly determined. In determining which breed or breeds to use as corrective in cross-breeding, change in the level of productivity (survival rate, growth and yield of milk, etc.) in the first crossbreeds is determined (Kaymakci, 2006). In determination of race or genotype characteristics, examination of growth is one of the important criteria. Body measurements are important in terms of providing information about the morphological structure and growth capacity of the animals (Akcapinar and Ozbeyaz, 1999).

For genetic improvement and to increase production in Hair goats, use of Saanen goat, particularly in Turkey, and agroecological zones, is limited. Therefore, the goal of this study was to determine survival rates, growth performance and some body measurements of Saanen x Hair goat (F<sub>1</sub>) crossbred and pure Hair goat kids raised in semi-intensive conditions.

## Materials and Methods

### Location of the study

The study was conducted at Research Farm of Yuzuncu Yil University in Van province, Turkey. Van is located between 42° 40'~ 44° 30' east longitudes and 37° 43'~ 39° 26' north latitudes.

### Animals, feeding and data collections

Data were collected using 72 Saanen x Hair goats F<sub>1</sub> crossbred and 41 Hair goat kids born in February and April in 2011. Kids were weighed on the first day after they were born and numbered with plastic earrings. After birth, date of birth, birth weight, type of birth, gender of the kids, dam's number, dam's age and dam's live weights were recorded into the registry, and preparations including vitamins and selenium were applied to each goat kid. The dams' live weights were determined with scales (Ten-brand) sensitive to 100 g within the first 24 hours after birth. The kids were kept with their mothers in the first 15 days, then, they were kept without the mothers during the day and were brought together with the mothers at night. The kids were weaned on the ninetyeth day. In the suckling period, the kids were given *ad libitum* alfalfa straw and lamb-kid grower feed (100 g per kid per day) from the fifteenth day during the period in which they were separate from their mothers, and the kids were allowed to constantly access drinking water. Furthermore, vitamin-mineral blocks were put into the feeders. The kids were given

concentrate feed (100 g per kid per day) in addition to natural pasture in the rangeland after the suckling period. The kids underwent internal and external parasite medication once a month. In addition, vaccinations required were applied.

To determine survival rate, the number of kids living on the 30<sup>th</sup>, 60<sup>th</sup>, 90<sup>th</sup> and 180<sup>th</sup> days was recorded, and survival rates of kids were obtained. Weighing the kids, scales sensitive to 5 grams (Hana-brand) was used between the day of birth and the 90<sup>th</sup> days, and scales sensitive to 100 grams (Ten-brand) was used between the 90<sup>th</sup> and 180<sup>th</sup> days. After the birth weights of the kids were detected, they were weighed every 15 days up to 180<sup>th</sup> days. For the detection of live weight, the kids were left hungry in the evening before the day of weighing. Body measurements of the kids (with height, body length, chest circumference, chest length and chest depth) were first determined at birth, and then they were identified monthly up to 180<sup>th</sup> day. Data on the live weight and body measurements of the goat kids on, 90<sup>th</sup> and 180<sup>th</sup> days were determined with interpolation method.

### Statistical analysis

The survival rates were analyzed by chi-square using the PROC FREQ of SAS, and the live weight and body measurements of the kids were analyzed by least squares means using General Linear Model procedure of SAS. The importance of control of the differences between averages of more than two groups was performed with Duncan test (SAS 1995).

## Results

Survival rates of Saanen x Hair goat F<sub>1</sub> crossbred and Hair goat kids on 30<sup>th</sup>, 60<sup>th</sup> and 90<sup>th</sup> (weaning) and 180<sup>th</sup> days are given in Table 1. During these periods, effects of genotype, gender and birth type on survival rates were not significant (P>0.05).

The least squares means of live weights of Saanen x Hair goat F<sub>1</sub> and Hair goat kids in various growth periods and multiple comparison test results were given in Table 2. When Table 2 is examined, effects of dam's age (P<0.05) and dam's live weight (P<0.01) on the birth weight of the kids were significant; and effects of gender, birth type (P<0.05) and dam's live weight (P<0.01) on live weight of kids at 90<sup>th</sup> day were significant; and effect of only dam's live body (P<0.01) on live weights of kids at 180 days was significant.

The least squares means of the body measurements of kids in various growth periods, and multiple comparison test results are given in Table 3. When Table 3 is examined, effects of genotype, birth type, gender, dam's age and dam's live weight on all body measurements of kids at birth were not significant (P>0.05). At weaning, effect of gender on wither

height was significant ( $P<0.05$ ) in favour of male kids; in addition, effect of dam's live weight on chest circumference and chest length was significant ( $P<0.05$ ). At 180 days of age, effects of dam's age and dam's live weight on wither height of

kids were significant ( $P<0.01$ ); effects of genotype and birth type on body length of kids were significant ( $P<0.05$ ); effects of gender ( $P<0.05$ ), dam's age and dam's live weight ( $P<0.01$ ) on chest circumference of kids were significant.

**Table 1**  
Survival rates of kids in various growth periods, %

Factors	Live born kid	Live kid (30 <sup>th</sup> day)		Live kid (60 <sup>th</sup> day)		Live kid (90 <sup>th</sup> day, weaning)		Live kid (180 <sup>th</sup> day)	
	n	n,	%	n,	%	n,	%	n,	%
<b>General</b>	113	109	96.46	102	90.27	102	90.27	98	86.73
<b>Genotype</b>		ns		ns		ns		ns	
Saanen x Hair F1	72	68	94.44	65	90.28	65	90.28	61	84.72
Hair	41	41	100	37	90.24	37	90.24	37	90.24
<b>Gender</b>		ns		ns		ns		ns	
Male	62	60	96.77	56	90.32	56	90.32	54	87.10
Female	51	49	96.08	46	90.20	46	90.20	44	86.27
<b>Birth type</b>		ns		ns		ns		ns	
Single	79	75	94.94	69	87.34	69	87.34	67	84.81
Twin	34	34	100	33	97.06	33	97.06	31	91.18

ns: non significant ( $P>0.05$ )

**Table 2**  
Least squares means (kg) for live weight of kids in various growth periods

Factors	Birth			90 <sup>th</sup> day			180 <sup>th</sup> day			
	n	$\bar{x}$	S $\bar{x}$	n	$\bar{x}$	S $\bar{x}$	n	$\bar{x}$	S $\bar{x}$	
<b>General</b>	113	3.14	0.06	102	12.06	0.29	98	22.17	0.37	
<b>Genotype</b>		ns			ns			ns		
SaanenxHair F1	72	3.13	0.06	65	12.22	0.39	61	22.52	0.44	
Hair	41	3.15	0.10	37	11.90	0.39	37	21.82	0.36	
<b>Gender</b>		ns			*			ns		
Male	62	3.22	0.07	56	12.44	0.13	54	22.54	0.39	
Female	51	3.05	0.08	46	11.68	0.27	44	21.80	0.41	
<b>Birth Type</b>		ns			*			ns		
Single	79	3.13	0.06	69	12.58	0.28	67	27.59	0.37	
Twin	34	3.15	0.11	33	11.54	0.17	31	21.75	0.31	
<b>Dam's age, year</b>		*			ns			ns		
2	30	3.01b	0.09	24	11.66	0.25	22	21.66	0.31	
3	11	3.06b	0.19	9	12.25	0.31	8	22.37	0.29	
$\geq 4$	72	3.36a	0.70	69	12.26	0.27	68	22.48	0.27	
<b>Dam's live weight, kg</b>		**			**			**		
25-30	11	2.86b	0.16	8	10.50b	0.46	7	19.02b	0.25	
30.1-35	17	3.21ab	0.12	16	13.44a	0.28	16	22.41a	0.37	
35.1-40	20	2.83b	0.12	16	11.96ab	0.39	14	23.82a	0.41	
$\geq 40.1$	65	3.66a	0.07	62	12.37a	0.31	61	23.43a	0.27	

ns: non significant ( $P>0.05$ ), \*:  $P<0.05$ , \*\*:  $P<0.01$

a, b: Values indicated with lowercase letters are different from other groups within the column

**Table 3**  
**Least squares means (cm) for body measurements of kids in various growth periods**

Factors	Birth						90 <sup>th</sup> day						180 <sup>th</sup> day																	
	WH	BL	CC	CL	CD	WH	BL	CC	CL	CD	WH	BL	CC	CL	CD															
	$\bar{x}$ S $\bar{x}$	$\bar{x}$ S $\bar{x}$	$\bar{x}$ S $\bar{x}$	$\bar{x}$ S $\bar{x}$	$\bar{x}$ S $\bar{x}$	$\bar{x}$ S $\bar{x}$	$\bar{x}$ S $\bar{x}$	$\bar{x}$ S $\bar{x}$	$\bar{x}$ S $\bar{x}$	$\bar{x}$ S $\bar{x}$	$\bar{x}$ S $\bar{x}$	$\bar{x}$ S $\bar{x}$	$\bar{x}$ S $\bar{x}$	$\bar{x}$ S $\bar{x}$	$\bar{x}$ S $\bar{x}$															
<b>General</b>	32.6	0.29	31.8	0.36	34.1	0.30	17.2	0.18	13.0	0.12	45.3	0.37	45.8	0.39	52.0	0.46	25.1	0.23	20.1	0.16	53.4	0.36	54.7	0.39	65.0	0.42	30.9	0.23	25.7	0.18
<b>Genotype</b>	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	*	ns	ns	ns	ns	ns	ns
SaanenxHair F1	32.7	0.32	32.3	0.43	34.3	0.36	17.5	0.23	13.1	0.15	45.9	0.38	45.8	0.52	51.8	0.63	25.4	0.33	20.1	0.22	54.5	0.34	56.1	0.54	64.3	0.54	31.4	0.29	25.7	0.23
Hair	32.4	0.29	31.3	0.47	33.8	0.54	16.8	0.27	12.9	0.18	44.7	0.36	45.1	0.48	52.2	0.64	24.8	0.29	20.1	0.23	52.3	0.33	53.2	0.48	65.7	0.64	30.4	0.33	25.7	0.25
<b>Gender</b>	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	*	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	*	ns	*	ns	ns	ns	ns
Male	32.9	0.34	31.9	0.47	34.5	0.37	17.1	0.27	13.2	0.16	46.1	0.32	45.5	0.54	52.6	0.64	25.5	0.33	20.4	0.20	54.6	0.31	55.2	0.51	65.1	0.47	31.4	0.30	25.9	0.25
Female	32.2	0.25	31.7	0.43	33.6	0.48	17.2	0.24	12.75	0.17	44.5	0.22	46.1	0.51	51.4	0.66	24.6	0.32	19.9	0.26	52.3	0.29	54.1	0.63	64.9	0.72	30.4	0.34	25.4	0.24
<b>Birth type</b>	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	*	ns	ns	ns	ns	ns	ns	ns
Single	32.5	0.29	32.1	0.39	34.3	0.38	17.2	0.23	13.1	0.14	45.7	0.29	46.3	0.42	52.7	0.55	25.4	0.28	20.3	0.20	53.8	0.36	55.7	0.49	65.8	0.49	31.1	0.26	26.0	0.22
Twin	32.6	0.29	31.6	0.57	33.8	0.47	17.1	0.29	12.9	0.18	44.9	0.33	45.3	0.72	51.3	0.76	24.8	0.43	19.9	0.26	53.0	0.35	53.7	0.64	64.2	0.76	30.7	0.45	25.4	0.23
<b>Dam's age, year</b>	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	**	ns	**	ns	ns	ns
2	31.8	0.33	31.2	0.51	33.1	0.59	17.4	0.36	12.4	0.20	45.7	0.39	45.4	0.51	50.4	0.72	24.5	0.43	19.7	0.38	53.3	0.38ab	54.1	0.43	62.0	0.74b	30.2	0.29	25.2	0.29
3	32.8	0.42	31.9	0.57	34.7	0.81	16.8	0.43	13.5	0.16	44.6	0.47	45.7	0.53	52.8	0.91	25.4	0.44	20.4	0.22	52.2	0.42b	54.3	0.51	67.4	0.88a	31.2	0.33	26.3	0.25
≥4	33.0	0.29	32.3	0.34	34.4	0.38	17.3	0.23	13.1	0.13	45.6	0.22	46.3	0.42	52.8	0.53	25.4	0.28	20.3	0.19	54.7	0.40a	55.6	0.42	65.6	0.45a	31.4	0.29	25.5	0.17
<b>Dam's live weight, kg</b>	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	*	*	*	*	ns	ns	**	ns	ns	**	ns	**	ns	ns	ns
25-30	31.1	0.39	31.3	0.61	33.7	0.94	17.0	0.32	12.7	0.29	42.9	0.45	45.1	0.49	51.3	0.96b	24.5	0.43b	19.9	0.33	51.5	0.36b	54.2	0.49	64.2	0.93b	30.3	0.45	25.5	0.43
30.1-35	32.2	0.36	32.2	0.58	33.8	0.78	17.3	0.26	12.9	0.31	46.1	0.42	45.6	0.55	53.2	0.81a	24.9	0.45b	20.2	0.31	53.6	0.37a	54.9	0.62	64.5	0.88b	30.8	0.41	25.7	0.32
35.1-40	32.2	0.37	31.7	0.55	33.3	0.55	16.9	0.42	13.2	0.25	46.1	0.43	46.1	0.57	50.8	0.77b	25.4	0.42a	20.4	0.36	53.7	0.47a	54.5	0.58	66.4	0.80a	31.5	0.47	25.8	0.31
≥40.1	34.7	0.27	32.0	0.43	35.4	0.39	17.5	0.24	13.1	0.16	46.1	0.31	46.2	0.42	52.7	0.47a	25.5	0.29a	20.0	0.19	54.8	0.36a	55.0	0.47	64.9	0.55a	31.1	0.30	25.7	0.17

ns: non significant ( $P>0.05$ ), \*:  $P<0.05$ , \*\*:  $P<0.01$

a, b: Values indicated with lowercase letters are different from other groups within the column  
 WH (Wither height); BL (Body length); CC (Chest circumference); CL (Chest length); CD (Chest depth)

## Discussion

Survival rates of Saanen x Hair goat  $F_1$  crossbred and Hair goat kids at 60 days of age in this study were found to be lower than the survival rate (95.76 %) reported for Saanen x Hair goat  $F_1$  goat kids and to be higher than the value (78.61 %) reported for Hair goat kids at 60 days of age (Sengonca et al., 2003). Sengonca et al. (2003) reported that effect of genotype on survival rate was significant ( $P < 0.01$ ), but effect of type of birth and gender was not significant ( $P > 0.05$ ). In this study, the effect of genotype on survival rate was not significant, and this finding is not coinciding with the finding reported by Sengonca et al. (2003). Reason of this difference may have resulted from climate of research area and genotypic structure and some environmental factors (maintenance, feeding etc.). Survival rates on the 90<sup>th</sup> day (weaning) of Saanen x Hair goat  $F_1$  crossbred and Hair goat kids were determined as 90.28 % and 90.24 %, respectively. Survival rates of Saanen x Hair goat  $F_1$  crossbred and Hair goat kids on the 90<sup>th</sup> day has been observed to be similar with the finding (90.62%) reported by Simsek and Bayraktar (2006) for Saanen x Hair goat  $F_1$  crossbred goat kids, but to be higher than the finding (82.50%) reported by the same researchers for Hair goat kids. Bolacali (2010) reported that survival rate of 94.46% of Saanen goat kids on the 90<sup>th</sup> day. The survival rates found for Saanen x Hair goat  $F_1$  crossbred and Hair goat kids on the 90<sup>th</sup> day in the present study were slightly higher compared with finding reported by Bolacali (2010) for Saanen kids. Tozlu (2006) made a research on Saanen x Hair goat  $F_1$  crossbred and Hair goat kids, reported that effects of genotype, birth type and gender on survival rate were not significant; and this research finding has been observed to be compatible with the findings of our research.

Birth weights of Saanen x Hair goat  $F_1$  crossbred and Hair goat kids (3.13 and 3.15 kg) was determined to be higher than the values reported by Simsek and Bayraktar (2006) for Saanen x Hair goat  $F_1$  crossbred and Hair goat kids (2.95 and 2.77 kg), and also than the value reported by Sengonca et al. (2002) for Hair goat kids (2.63 kg); however it was determined to be lower than the value reported by Sengonca et al. (2002) for Saanen x Hair  $F_1$  crossbred kids (3.7 kg), and also than the values reported by Tozlu (2006) for Saanen x Hair goat  $F_1$  crossbreds (3.59 kg) and Hair goat kids (3.72 kg). Bolacali (2010) reported that birth weight of 3.22 kg for Saanen goat kids (3.22 kg), this literature finding was found to be similar with birth weights detected in both genotypes in this study. In the present study, effect of gender and birth type on birth weight of kids were found insignificant ( $P > 0.005$ ), and these findings of the study have been found incompatible with the findings of Simsek and Bayraktar (2006) and Tozlu

(2006). In addition, in the current study, effect of dam's live weight on the kids' birth weight has been studied and effect of dam's live weight on the kids' birth weight has been found significant ( $P < 0.01$ ). This finding could not be discussed, as there is no literature investigating effect of dam's live weight on the kids' birth weight.

At 90 days of age, live weights were reported as 14.13 and 18.29 kg for Saanen and Saanen x Hair goat  $F_1$  crossbred kids (Akdag et al., 2011). Simsek et al. (2007) reported that 14.07 kg for Saanen x Hair goat  $F_1$  crossbred kids. Bolacali reported that 12.91 kg for Saanen kids. In this study, live weights of Saanen x Hair goat  $F_1$  crossbred (12.22 kg) and Hair goat kids (11.90 kg) detected have been found to be lower than the literature findings above; however, live weight of Saanen x Hair goat  $F_1$  crossbred (22.52 kg) and Hair goat kids (21.82 kg) at 180 days of age determined have been found to be higher than the values reported by Simsek and Bayraktar (2006) for Saanen x Hair goat  $F_1$  crossbred (17.24 kg) and Hair goat kids (18.86 kg), and higher than the value reported by Bolacali (2010) for Saanen goat kids (19.13 kg); and that they showed resemblance with the value (22.40 kg) reported by Oral and Altinel (2006) for Hair goat kids. In respect of these findings, the differences between literatures may have resulted from genotypic structure of the goat kids as well as from factors such as climatic differences of the research areas, maintenance etc.

Body lengths, chest circumference and wither heights of Saanen x Hair goat  $F_1$  crossbred kids at 90 and 180 days of age reported by Simsek and Bayraktar (2006) have been observed to be higher than the findings of this research. Wither heights and body lengths of Saanen x Hair goat  $F_1$  crossbred and Hair goat kids at 90 days of age in this study have been found to be higher than the findings reported by Bolacali (2010) for Saanen goat kids; however, chest length, chest depth and chest circumference have been found to be lower than the findings reported for Saanen goat kids in the same literature. In addition, wither height and body length of the body measurements reported for Saanen kids at 180 days of age by Bolacali (2010) have been found to be higher than the findings of both genotypes in this study; however, chest length, chest depth and chest circumference reported for Saanen goat kids have been observed to be lower than the findings of this study.

## Conclusion

The findings of the present study showed that survival rates and live weights in various growth periods of Saanen x Hair goat  $F_1$  crossbred and Hair goat kids raised in semi-intensive conditions were similar. Furthermore, wither heights, chest



circumference, chest lengths and chest depths of Saanen x Hair goat F<sub>1</sub> crossbred and Hair goat kids did not differ, however body length was significant in favour of Saanen x Hair goat F<sub>1</sub> crossbred kids.

### Acknowledgements

This research was supported financially by Yüzüncü Yıl University Scientific Research Project Commission, Project No: 2007-VF-B003.

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Received June, 22, 2012; accepted for printing February, 2, 2013.