

Investigation of Some Morphological Traits of Boer x Hair F1 Crossbred and Pure Hair Goat Kids Raised in Semi-Intensive Conditions

Investigación de Algunos Rasgos Morfológicos en Caprinos de Pelaje Natural Raza Boer x Cruzados y Criados en Condiciones Semi-Intensivas

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SUMMARY: The aim of the study was to determine various morphological characteristics from birth to the age of 150th day of Boer x Hair goat F1 crossbred (BH) kids and pure Hair goat (HG) kids raised in semi-intensive conditions and reveal factors such as the effects of genotype, dam age, dam's live weight, year, birth type and sex on this parameter. This study was applied between the years 2011-2012 in Çatak in the Van region and between the years 2013-2014 at the Yuzuncu Yil University Research and Practice Farm. Various body measurements; wither height, back height, rump height, sacrum height, body length, chest length, chest depth, chest circumference, circumference of leg, cannon bone circumference, chest width, front-rump width, mid-rump width were determined 29.8, 28.4, 28.7, 26.2, 28.7, 17.0, 13.3, 30.4, 26.9, 5.2, 5.9, 6.0, and 8.7 cm at birth, respectively; 43.8, 43.8, 44.6, 40.6, 43.6, 22.2, 19.3, 51.7, 41.4, 6.6, 9.2, 9.3, and 11.3 cm at 60th day, respectively; 56.1, 53.4, 54.4, 47.5, 53.3, 27.3, 24.1, 61.4, 49.6, 7.3, 10.6, 11.1, and 13.2 cm at 150th day, respectively for BH kids; 27.3, 25.9, 29.3, 25.3, 27.1, 15.9, 12.3, 29.0, 21.3, 5.1, 5.0, 5.6, and 7.4 cm at birth, respectively; 40.4, 40.1, 42.9, 37.6, 40.5, 22.3, 18.4, 48.1, 36.4, 6.0, 7.9, 9.1, and 10.8 cm at 60th day, respectively; 50.3, 49.2, 51.0, 45.7, 50.4, 27.5, 22.9, 57.3, 43.4, 6.5, 9.5, 10.7, and 11.9 cm at 150th day, respectively for HG kids. When all of the data was considered, it was concluded that the BH kids are much better than the HG kids for both morphological and zoometric values.

KEY WORDS: Boer x Hair goat F1 crossbred; Hair goat; Kids; Morphological traits.

INTRODUCTION

In recent years priority in demand to goat meat has shifted towards a meat quality. Therefore, high quality goat meat production has become an essential strategy for the meat industry to supply the demand. Goat meat producing developed countries are now looking at ways in which how genetically modified goats or different genotypes can improve the quality of meat production.

In general it is important to focus on the genotypes that have high reproductive rate, growth rate and excellent carcass characteristics (dressing percentage, muscle distribution and lean:fat:bone ratio). Although in this respect species like cattle, pig and sheep have been studied more frequently and new genotypes (breeding) from these species

have been developed, goat breeding for meat production have yet to be developed fully. Boer goats yield high carcass and hence used in the world for kids production as a means of increasing meat production.

According to 2014 statistics, there are 10.42 million goats in Turkey. This number puts Turkey 19th in goat production in the world (FAO, 2016; TUIK, 2016), which indicates importance of goat production. Widespread goat production is present in Turkey since its natural, economic, cultural and farming conditions are very much suitable for goat production. Among livestock farming sector, meat and milk production from goat is increasing each year. There are three types of goat production in Turkey: Hair goat,

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Angora goat and Milk goat. Hair goats constitute most of the goat population in Turkey. This is followed by pure or crossbred milk goats such as Saanen and Malta goats. In Turkey a region-wise number of goat population decreases as follows: the Mediterranean Region, the Southeastern Anatolia Region, the Eastern Anatolia Region, the Aegean Region, the Marmara Region, the Central Anatolia Region and the Black Sea Region (TUIK, 2016).

Production of goat meat and its products in Turkey is mainly based on a HG. According to the data of 2015, HG constitutes 98.02 of the presence of total goats (TUIK). Goat breeders under extensive conditions in Turkey have reared low-productive HG, as this breed have well adapted to the harsh environment (Daskiran *et al.*, 2010).

The Boer goat was bred during the start of the 20th century by a Dutch scientist in the South African Republic using the selection process. Boer goats were exported to countries as a means of increasing meat production. The Boer goat was exported to Australia in the 1990's and in 1993 to New Zealand. In the same year, it was exported from New Zealand to the United States of America where the American Boer Goat Association was formed. This association worked to improve the meat industry of the Boer goat and to form tangible standards for the Boer breed. As well as breeding a pure breed, a breed was crossbred for the general use of commercial meat production. In this context, Boer x Spanish, Boer x Ankara goat and Boer x Nubian were frequently crossbred (Malan, 2000; Urge *et al.*, 2004).

Today Boer goat is the best breed in the world for its outstanding carcass quality and its high growth rates (Devendra & Burns, 1984). The most important features of Boer goats are that it has a high genetic potential, an exceptional resistance to diseases, an excellent adaptation both to hot and dry climate and harsh environments (Malan). They also show distinguished morphological features of such, it has a white body with distinctive brown or brick red head and long, pendulous ears. In Turkey, although there are a number of crossbred and breeding programs developed towards Milk goats, programs (or studies) are limited or lacking for Meat goats.

To increase meat yield from domestic breeds requires genetic improvement of its live weight and body measurements. Body measurements are vital measurements for defining animals numerically, comparison of animals within the same breed following growth and development of animals, determining early selection criteria for certain production trait and the evaluation of animals for breeding. These measurements provide very important clues for traits affected by the environment and the nutrition during the development of breed. The physical measurements are important in studies

of genetic diversity for considering the variation existing among various breed groups and also allowing for breed identification (Epstein, 1953; Mason, 1988). Furthermore, body measurements are also useful for evaluating the results of genetic progress and selection. Moreover, some body measurements like chest girth are a useful tool in predicting weight of the goat. Additionally, some body measurements could create the fundamental for the assignment of performance recording to the farmers and allows a more impressive planning of the selection process and also allows an adequate economical qualification of the studied breeds. (Olatunji-Akioye & Adeyemo, 2009). Some environmental factors such as genotype, sex, birth type, nutrition, age and year of birth, mother's age have some impact on the body measurements (Mohammed & Amin, 1997; Riva *et al.*, 2004; Ugur *et al.*, 2004).

Some body measurements are used as criteria for classification of goats. At the same time, various body measurements help to determine quantitative characteristics and to develop proper selection criteria. Body measurements and other qualitative characters are also defining characters for a breed as well as economically important characters (Mohammed & Amin).

The most commonly used body measurements in small ruminants are; head length, head depth, width between shoulders, body length, wither height, sacrum height, chest length, chest circumference, cannon bone circumference and so on (Akçapınar & Özbeyaz, 1999; Yılmaz *et al.*, 2013). There is a positive correlation between milk and meat production of species or breed and body measurement (height, depth, length and width). The length and width of these values should be enough for animals used as stockers (Özcan, 1977).

For genetic improvement and to increase production in Hair goats, use of Boer goat, particularly in Turkey, and agro-ecological zones, is limited. The aim of this study was to determine various morphological characteristics from birth to the 150th day of Boer x Hair goat F1 crossbred and pure Hair goat kids raised in semi-intensive conditions and reveal factors such as the effects of genotype, dam age, dam's live weight, year, birth type and sex on this parameter.

MATERIAL AND METHOD

This experiment was carried out with a total of 125 kids, 49 in 2012 and 76 in 2014. The experiment was conducted at Çatak county of Van province with a Project supported financially by Yüzüncü Yıl University Office of Scientific Research Projects Grant (number 2011-VF-B035).

Kids were weighted and tagged with plastic tags within one day of birth. Tag number, birth weight, some body measurements, birth date, birth type, sex, tag number of mother, mother's live weight at birth and mother's age were recorded after birth of each kid. Kids were kept with their dame for three days after birth. Thus, they were kept with their dames at night and separated at morning. Kids were weaned at the age of 60th days. Kids were fed 100 gr/d/head of kids starter feed and ground alfalfa hay *ad libitum* level and also had free access to clean water during their suckling period. Kids grazed on pasture after weaning.

Body measurements were determined every 30 days from birth to the age of 150 days and thus, 30, 60, 90, 120, and 150th days body measurements were estimated via interpolation method. But in this study, only at birth, 60th (at weaning), and 150th days values of body measurements are given.

Following model was used for different body measurements during growth period. The model: $Y_{ijklm} = m + G_i + A_j + W_k + T_l + S_m + e_{ijklm}$ and where: m: mean of

population for examined trait, G_i : the effect of genotype (i: BH and HG), A_j : the effect of dame age (j: 2...≥6 year old), W_k : the effect of dame live weight (k: 30.00-35.00 kg, 35.01-40.00 kg, 40.01-45.00 kg, 45.01-50.00 kg and ≥50.01 dame live weight), T_l : the effect of birth type (l: single, twin and triplets), S_m : the effect of sex (m: male and female), e_{ijklm} : error term. It was assumed that there was no significant interaction among evaluated factors and the sum impact of factors on their sub-group was zero.

Different body measurements of kids at different periods were analyzed using the general linear model (GLM) procedure of the SAS (SAS, 2002). Duncan's multiple range tests was used for multiple comparisons in important subgroups.

RESULTS

The results are summarized in Tables I-VII. Specifically, the wither and the back heights at the Table I,

Table I. Least square means, significance and multiple comparison test results for wither and back height of goats at different periods (cm).

Factors	Wither Height						Back Height					
	Birth		60 th day (weaning)		150 th day		Birth		60 th day (weaning)		150 th day	
	n	Mean±SD	n	Mean±SD	n	Mean±SD	n	Mean±SD	n	Mean±SD	n	Mean±SD
<i>General</i>	125	29.2±0.37	107	43.3±0.57	104	54.1±0.53	125	28.0±0.32	107	43.4±0.49	104	52.4±0.48
<i>Genotype</i>		*		*		***		*		**		**
BH	80	29.8±0.59	68	43.8±0.84	66	56.1±0.84	80	28.4±0.55	68	43.8±0.71	66	53.4±0.76
HG	45	27.3±0.80	39	40.4±1.14	38	50.3±1.13	45	25.9±0.74	39	40.1±0.95	38	49.2±1.02
<i>Dame Age</i>		*		NS		NS		NS		*		NS
2	19	28.4±0.89 ^c	15	42.6±1.32	15	54.5±1.30	19	27.7±0.83	15	43.9±1.10 ^{b,c}	15	52.7±1.18
3	18	30.3±1.20 ^{ab}	13	43.9±1.66	12	54.9±1.64	18	28.5±1.13	13	42.6±1.38 ^{abc}	12	50.7±1.48
4	22	30.0±1.06 ^a	20	43.2±1.59	20	53.3±1.57	22	26.9±0.99	20	41.2±1.32 ^{ab}	20	51.4±1.42
5	35	27.6±0.73 ^{b,c}	31	40.0±1.08	30	50.8±1.07	35	26.5±0.69	31	39.6±0.90 ^c	30	50.3±0.96
≥6	31	26.5±0.99 ^{b,c}	28	40.8±1.48	27	52.4±1.46	31	26.0±0.92	28	42.4±1.23 ^a	27	51.6±1.32
<i>Dam's live weight, kg</i>		NS		NS		NS		NS		NS		NS
30.01-35.00	24	27.6±0.93	19	40.0±1.42	18	52.8±1.41	24	26.1±0.87	19	39.5±1.19	18	49.7±1.27
35.01-40.00	10	28.1±1.04	9	42.4±1.54	9	53.6±1.52	10	26.8±0.97	9	41.5±1.28	9	51.2±1.37
40.01-45.00	31	28.1±0.87	27	40.6±1.29	26	52.7±1.27	31	26.7±0.82	27	42.9±1.07	26	52.2±1.15
45.01-50.00	39	28.9±0.69	33	44.2±1.03	32	54.2±1.02	39	27.2±0.64	33	42.7±0.86	32	51.6±0.92
≥50.01	21	30.2±0.98	19	43.3±1.47	19	52.7±1.46	21	28.8±0.92	19	43.2±1.23	19	52.0±1.32
<i>Birth Type</i>		**		**		NS		**		***		NS
Single	73	30.0±0.49 ^a	67	44.5±0.72 ^a	66	54.3±0.71	73	28.6±0.46 ^a	67	44.9±0.60 ^a	66	53.0±0.64
Twin	42	29.3±0.62 ^{ab}	32	43.1±0.96 ^{ab}	30	53.4±0.94	42	28.1±0.58 ^a	32	42.1±0.80 ^a	30	51.0±0.86
≥ Triplets	10	26.3±1.04 ^b	8	38.7±1.61 ^a	8	52.0±1.59	10	24.6±0.98 ^b	8	38.9±1.34 ^b	8	50.0±1.44
<i>Sex</i>		NS		*		*		NS		NS		NS
Female	63	27.9±0.56	53	40.9±0.83	52	52.1±0.82	63	26.9±0.53	53	41.4±0.70	52	51.0±0.74
Male	62	29.2±0.60	54	43.3±0.89	52	54.3±0.88	62	27.4±0.56	54	42.4±0.74	52	51.7±0.80

NS: Non significant (P>0.05), *: P<0.05, **: P<0.01, ***: P<0.001.

a, b, c: Means within the same column with different superscript differ significantly (P<0.05).

the rump and the sacrum heights at the Table II, the body and the chest lengths at the Table III, the chest depth and the chest circumference at the Table IV, the circumference of leg and cannon bone circumference at the Table V, the chest width and the front-rump width at the Table VI, mid-rump width at the Table VII are presented.

In the experiment, the wither height, back height, rump height, sacrum height, body length, chest length, chest depth, chest circumference, circumference of leg, cannon bone circumference, chest width, front-rump width and mid-rump width at birth, the ages of 60th (weaning) and 150th days were 29.8, 43.8 and 56.1 cm; 28.4, 43.8 and 53.4 cm; 28.7, 44.6 and 54.4 cm; 26.2, 40.6 and 47.5 and; 28.7, 43.6 and 53.3 cm; 17.0, 22.2 and 27.3 cm; 13.3, 19.3 and 24.1 cm; 30.4, 51.7 and 61.4 cm; 26.9, 41.4 and 49.6 cm; 5.2, 6.6 and 7.3 cm; 5.9, 9.2 and 10.6 cm; 6.0, 9.3 and 11.1 cm; 8.7, 11.3 and 13.2 cm at BH kids; 27.3, 40.4 and 50.3 cm; 25.9, 40.1 and 49.2 cm; 29.3, 42.9 and 51.0 cm; 25.3, 37.6 and 45.7 cm; 27.1, 40.5 and 50.4 cm; 15.9, 22.3 and 27.5 cm; 12.3, 18.4 and 22.9 cm; 29.0, 48.1 and 57.3 cm; 21.3, 36.4 and 43.4 cm; 5.1, 6.0 and 6.5 cm; 5.0, 7.9 and 9.5 cm; 5.6, 9.1 and 10.7 cm; 7.4, 10.8 and 11.9 cm at pure HG kids.

In this research, the effect of the genotype, mother's age, mother's weight, birth type and sex on the withers height was examined at birth, weaning and the 150th day. At birth, while the mother's weight and sex had no impact on the withers height; genotype, the mother's age and birth type had various effects ($P < 0.05$, $P < 0.05$ and $P < 0.01$). At weaning, the mother's age and weight had no effect on the withers height. However, genotype, birth type and sex had various effects ($P < 0.05$, $P < 0.01$ and $P < 0.05$). At the 150th day, the mother's age and weight, and the birth type had no effect but the genotype and sex were effective on various levels ($P < 0.001$ and $P < 0.05$). At birth, while the mother's age, the mother's weight and sex had no impact on the back height; genotype and birth type had various effects ($P < 0.05$ and $P < 0.01$). At weaning, the weight of the mother and sex had no effect on the back height but genotype, the age of the mother and birth type had various effects ($P < 0.01$, $P < 0.05$ and $P < 0.001$). At the 150th day, only the genotype was effective on the back height ($P < 0.01$) (Table I).

In this study, at birth, while the genotype, the mother's age and sex had no impact on the rump height, the weight of the mother and birth type had various effects ($P < 0.05$ and

Table II. Least square means, significance and multiple comparison test results for rump and sacrum height of goats at different periods (cm).

Factors	Rump Height						Sacrum Height					
	Birth		60 th day (weaning)		150 th day		Birth		60 th day (weaning)		150 th day	
	n	Mean±SD	n	Mean±SD	n	Mean±SD	n	Mean±SD	n	Mean±SD	n	Mean±SD
<i>General</i>	125	29.2±0.42	107	45.2±0.58	104	51.1±0.59	125	26.3±0.35	107	39.9±0.47	104	46.9±0.43
<i>Genotype</i>	NS		NS		NS		NS		*		*	
BH	80	28.7±0.65	68	44.6±0.73	66	54.4±0.86	80	26.2±0.59	68	40.6±0.69	66	47.5±0.76
HG	45	29.3±0.89	39	42.9±0.98	38	51.0±1.15	45	25.3±0.80	39	37.6±0.93	38	45.7±1.03
<i>Dame Age</i>	NS		NS		NS		NS		NS		NS	
2	19	27.7±0.98	15	43.8±1.14	15	53.4±1.33	19	24.7±0.89	15	39.0±1.08	15	46.3±1.19
3	18	31.1±1.34	13	45.5±1.42	12	52.6±1.68	18	26.7±1.21	13	39.5±1.35	12	46.6±1.49
4	22	30.1±1.17	20	44.1±1.37	20	53.2±1.60	22	25.9±1.08	20	39.9±1.34	20	47.3±1.48
5	35	27.7±0.82	31	42.0±0.93	30	52.2±1.09	35	25.6±0.74	31	36.9±0.87	30	46.2±0.97
≥6	31	28.2±1.10	28	43.3±1.27	27	52.0±1.50	31	25.8±0.99	28	40.0±1.20	27	46.7±1.33
<i>Dam's live weight, kg</i>	*		*		NS		NS		NS		NS	
30.01-35.00	24	26.4±1.04 ^b	19	40.3±1.22 ^b	18	50.5±1.44	24	25.3±0.94	19	38.0±1.16	18	45.8±1.28
35.01-40.00	10	28.1±1.15 ^a	9	43.0±1.32 ^a	9	52.9±1.55	10	25.4±1.04	9	38.7±1.24	9	45.0±1.38
40.01-45.00	31	28.3±0.97 ^b	27	43.9±1.11 ^a	26	53.5±1.30	31	25.2±0.88	27	39.8±1.04	26	47.3±1.16
45.01-50.00	39	30.4±0.77 ^a	33	45.6±0.89 ^a	32	53.0±1.04	39	25.9±0.70	33	39.0±0.84	32	46.3±0.94
≥ 50.01	21	31.6±1.09 ^a	19	45.8±1.27 ^a	19	53.6±1.49	21	26.8±0.99	19	39.8±1.20	19	47.6±1.32
<i>Birth Type</i>	**		***		*		**		**		NS	
Single	73	30.8±0.55 ^a	67	47.6±0.62 ^a	66	54.8±0.72 ^a	73	27.6±0.49 ^a	67	41.3±0.58 ^a	66	47.6±0.64
Twin	42	29.6±0.69 ^{ab}	32	44.1±0.82 ^b	30	52.1±0.97 ^b	42	25.7±0.64 ^b	32	39.1±0.82 ^{ab}	30	45.7±0.90
≥ Triplets	10	26.5±1.16 ^b	8	39.4±1.38 ^c	8	51.2±1.63 ^b	10	23.9±1.05 ^b	8	36.9±1.31 ^b	8	46.4±1.44
<i>Sex</i>	NS		**		NS		NS		NS		NS	
Female	63	28.4±0.62	53	42.5±0.72	52	52.0±0.84	63	25.4±0.57	53	38.5±0.68	52	46.3±0.75
Male	62	29.4±0.66	54	44.9±0.77	52	53.4±0.90	62	26.1±0.60	54	39.6±0.73	52	46.9±0.80

NS: Non significant ($P > 0.05$), *: $P < 0.05$, **: $P < 0.01$, ***: $P < 0.001$.

a, b, c: Means within the same column with different superscript differ significantly ($P < 0.05$).

Table III. Least square means, significance and multiple comparison test results for body and chest length of goats at different periods (cm).

Factors	Body Length						Chest length					
	Birth		60 ^h day (weaning)		150 ^h day		Birth		60 ^h day (weaning)		150 ^h day	
	n	Mean±SD	n	Mean±SD	n	Mean±SD	n	Mean±SD	n	Mean±SD	n	Mean±SD
<i>General</i>	125	29.0±0.41	107	44.3±0.53	104	53.8±0.54	125	17.1±0.26	107	23.3±0.32	104	28.3±0.31
<i>Genotype</i>	NS		**		*		NS		NS		NS	
BH	80	28.7±0.59	68	43.6±0.64	66	53.3±0.81	80	17.0±0.44	68	22.2±0.47	66	27.3±0.44
HG	45	27.1±0.80	39	40.5±0.87	38	50.4±1.10	45	15.9±0.59	39	22.3±0.64	38	27.5±0.59
<i>Dame Age</i>	*		NS		NS		NS		NS		NS	
2	19	27.3±0.89 ^c	15	43.2±1.01	15	52.2±1.27	19	16.7±0.66	15	21.9±0.74	15	26.7±0.68
3	18	30.9±1.21 ^a	13	42.7±1.27	12	52.2±1.60	18	17.0±0.89	13	23.4±0.93	12	28.0±0.85
4	22	27.9±1.06 ^{a,b}	20	42.2±1.19	20	51.8±1.51	22	15.2±0.78	20	21.1±0.89	20	26.5±0.81
5	35	27.3±0.74 ^c	31	40.6±0.82	30	51.4±1.04	35	17.0±0.54	31	22.2±0.60	30	27.5±0.55
≥6	31	26.0±0.99 ^{abc}	28	41.6±1.12	27	51.4±1.42	31	16.4±0.74	28	22.6±0.83	27	28.4±0.76
<i>Dam's live weight, kg</i>	*		NS		NS		NS		NS		*	
30.01-35.00	24	26.3±0.93 ^b	19	40.4±1.09	18	50.5±1.37	24	15.7±0.69	19	21.0±0.80	18	26.2±0.73 ^c
35.01-40.00	10	27.2±1.04 ^{a,b}	9	40.2±1.17	9	49.7±1.48	10	17.8±0.77	9	21.4±0.86	9	26.4±0.79 ^{bc}
40.01-45.00	31	26.8±0.88 ^{a,b}	27	42.2±0.98	26	51.1±1.24	31	16.4±0.65	27	21.6±0.72	26	27.2±0.66 ^{a,bc}
45.01-50.00	39	28.9±0.69 ^b	33	43.9±0.77	32	53.7±0.98	39	16.5±0.51	33	23.6±0.58	32	29.2±0.53 ^a
≥ 50.01	21	30.3±0.99 ^a	19	43.6±1.12	19	54.1±1.42	21	16.0±0.73	19	23.6±0.83	19	28.2±0.76 ^{ab}
<i>Birth Type</i>	***		***		***		**		***		***	
Single	73	30.6±0.49 ^a	67	46.4±0.54 ^a	66	55.0±0.68 ^a	73	17.9±0.37 ^a	67	24.4±0.40 ^a	66	29.0±0.37 ^a
Twin	42	29.0±0.62 ^b	32	42.4±0.73 ^b	30	52.7±0.92 ^{ab}	42	16.2±0.46 ^b	32	22.9±0.54 ^a	30	28.3±0.49 ^a
≥ Triplets	10	24.1±1.04 ^c	8	37.4±1.23 ^c	8	47.7±1.54 ^b	10	15.3±0.78 ^b	8	19.4±0.90 ^b	8	25.0±0.82 ^b
<i>Sex</i>	NS		*		*		NS		NS		*	
Female	63	27.4±0.56	53	41.3±0.63	52	50.9±0.80	63	16.2±0.42	53	21.9±0.47	52	26.9±0.43
Male	62	28.4±0.60	54	42.8±0.68	52	52.7±0.86	62	16.8±0.44	54	22.6±0.50	52	28.0±0.46

NS: Non significant (P>0.05), *: P<0.05, **: P<0.01, ***: P<0.001.

a, b, c: Means within the same column with different superscript differ significantly (P<0.05).

P<0.01). At weaning, the genotype and age of the mother had no effect on the rump height however, the weight of the mother, birth type and sex had various effects (P<0.05, P<0.001 and P<0.01). At the 150th day, only the birth type was effective on the rump height (P<0.05). At birth, only the birth type was effective (P<0.01). At weaning, the age of the mother, the weight of the mother and the sex had no effect on the sacrum height. However, the genotype and birth type had various effects (P<0.05 and P<0.01). At the 150th day, only genotype was effective on the sacrum height (P<0.05) (Table II).

In this research, at birth, genotype and sex were ineffective on the body length. However, the age of the mother, the weight of the mother and the birth type had various effects (P<0.05, P<0.05 and P<0.001). At weaning, the age of the mother, the weight of the mother had no effect on the body length. However, the genotype, birth type and sex had various effects (P<0.01, P<0.001 and P<0.05). At the 180th day, the age of the mother and the weight of the mother were ineffective. However, the genotype, birth type and sex had various effects (P<0.05, P<0.05 and P<0.001). At birth and weaning, only the birth type was effective

(P<0.01 and P<0.001). At the 150th day, the genotype and the age of the mother had no effects. However, the weight of the mother, the birth type and the sex had various effects (P<0.05, P<0.001 and P<0.05) (Table III).

In this study, at birth, only the birth type was effective (P<0.05). At weaning, the genotype and the weight of the mother were ineffective. However, the weight of the mother, the birth type and the sex was effective on various levels (P<0.001, P<0.001 and P<0.05). At the 180th day, the genotype, the age and weight of the mother were ineffective. However, the birth type and sex had similar effects (P<0.01). At birth, the genotype, the mother's age and the weight of the mother had no impact on the heart girth. However, the birth type and sex were effective on various levels (P<0.001 and P<0.01). At weaning, the age of the mother was ineffective. However, the genotype, the weight of the mother, the birth type and sex had various effects (P<0.01, P<0.01, P<0.001 and P<0.05). At the 150th day, all of the factors were effective on various levels with the exception of the age of the mother (P<0.05 and P<0.01) (Table IV).

Table IV. Least square means, significance and multiple comparison test results for chest depth and chest circumference of goats at different periods (cm).

Factors	Chest depth						Chest circumference					
	Birth		60 ^h day (weaning)		150 ^h day		Birth		60 ^h day (weaning)		150 ^h day	
	n	Mean±SD	n	Mean±SD	n	Mean±SD	n	Mean±SD	n	Mean±SD	n	Mean±SD
<i>General</i>	125	13.2±0.17	107	19.7±0.23	104	24.2±0.23	125	31.1±0.49	107	52.3±0.60	104	61.3±0.63
<i>Genotype</i>		NS		NS		NS		NS		**		**
BH	80	13.3±0.29	68	19.3±0.28	66	24.1±0.34	80	30.4±0.70	68	51.7±0.70	66	61.4±0.88
HG	45	12.3±0.40	39	18.4±0.37	38	22.9±0.46	45	29.0±0.95	39	48.1±0.94	38	57.3±1.19
<i>Dame Age</i>		NS		NS		NS		NS		NS		NS
2	19	13.0±0.44	15	19.4±0.43	15	23.8±0.53	19	29.5±1.06	15	52.3±1.09	15	62.0±1.38
3	18	13.4±0.60	13	19.0±0.54	12	23.4±0.67	18	30.8±1.44	13	50.3±1.38	12	58.4±1.73
4	22	12.7±0.53	20	18.9±0.52	20	23.7±0.64	22	29.8±1.26	20	48.7±1.31	20	58.3±1.66
5	35	12.4±0.37	31	18.3±0.35	30	23.4±0.43	35	28.8±0.88	31	48.4±0.89	30	58.2±1.13
≥6	31	12.6±0.49	28	18.6±0.48	27	23.0±0.59	31	29.8±1.18	28	49.9±1.22	27	59.7±1.54
<i>Dam's live weight, kg</i>		NS		***		NS		NS		**		*
30.01-35.00	24	12.6±0.47	19	17.8±0.46 ^c	18	22.6±0.57	24	28.0±1.11	19	46.0±1.18 ^b	18	55.5±1.48 ^b
35.01-40.00	10	12.9±0.52	9	18.1±0.50 ^{a,bc}	9	24.0±0.62	10	29.2±1.24	9	49.3±1.27 ^a	9	59.0±1.60 ^a
40.01-45.00	31	12.7±0.44	27	18.4±0.42 ^{bc}	26	23.1±0.52	31	29.4±1.04	27	50.2±1.07 ^a	26	60.0±1.34 ^a
45.01-50.00	39	13.2±0.34	33	20.1±0.34 ^a	32	24.0±0.42	39	31.7±0.83	33	52.4±0.86 ^a	32	61.7±1.08 ^a
≥ 50.01	21	12.8±0.49	19	19.9±0.48 ^{ab}	19	23.9±0.59	21	30.4±1.18	19	51.7±1.22 ^a	19	60.4±1.54 ^a
<i>Birth Type</i>		*		***		**		***		***		**
Single	73	13.6±0.24 ^a	67	20.5±0.23 ^a	66	24.6±0.29 ^a	73	33.0±0.59 ^a	67	54.8±0.59 ^a	66	62.6±0.74 ^a
Twin	42	13.0±0.31 ^{a,b}	32	19.0±0.31 ^b	30	23.9±0.38 ^{ab}	42	30.0±0.74 ^b	32	49.7±0.79 ^b	30	58.7±1.00 ^b
≥ Triplets	10	11.9±0.52 ^b	8	17.1±0.52 ^b	8	21.9±0.64 ^b	10	26.2±1.25 ^b	8	45.3±1.33 ^b	8	56.7±1.68 ^b
<i>Sex</i>		NS		**		**		**		*		*
Female	63	12.6±0.28	55	18.3±0.27	52	22.8±0.33	63	28.6±0.67	53	48.8±0.69	52	58.1±0.87
Male	62	13.1±0.30	57	19.4±0.29	52	24.2±0.36	62	31.0±0.71	54	51.0±0.74	52	60.5±0.93

NS: Non significant (P>0.05), *: P<0.05, **: P<0.01, ***: P<0.001.

a, b, c: Means within the same column with different superscript differ significantly (P<0.05).

In this research, at birth, the mother's age and sex had no impact. However, the genotype, the weight of the mother and the birth type had various effects (P<0.001, P<0.05 and P<0.001). At weaning, all of the factors were effective on various levels with the exception of sex (P<0.05 and P<0.001). At the 150th day, the age of the mother, the weight of the mother and the sex had no impact. However, the genotype and birth type had various effects on the leg girth (P<0.01 and P<0.01). At birth, the genotype, the mother's age and the weight of the mother had no impact. However, the birth type and sex had various effects (P<0.001 and P<0.01). At weaning, the age of the mother and the weight of the mother had no effects. However, the genotype, birth type and sex had various effects (P<0.001, P<0.01 and P<0.01). At the 150th day, the age and weight of the mother were ineffective. However, the genotype, birth type and sex had various effects (P<0.001, P<0.05 and P<0.05) (Table V).

In this study, at birth, while the mother's age and the mother's weight had no impact, the genotype, birth type and sex had various effects (P<0.05, P<0.001 and P<0.05). At

weaning, only the genotype was effective (P<0.001). At the 150th day, the age of the mother, the weight of the mother and the sex were ineffective. However, the genotype and birth type had various effects (P<0.01 and P<0.001). At birth, the genotype, the mother's age and the mother weight had no impact. However, the birth type and sex had various effects (P<0.001 and P<0.05). At weaning, the genotype and age of the mother had no effect however, the weight of the mother, birth type and sex had various effects (P<0.01, P<0.001 and P<0.05). At the 150th day, only the birth type was effective (P<0.001) (Table VI).

In this research, at birth, the mother's age, the mother's weight and sex had no impact. However, the genotype and birth type had various effects (P<0.001 and P<0.05). At weaning, while the genotype and the age of the mother and the birth type had no effect. However, the weight of the mother, the birth type and sex had various effects (P<0.05, P<0.001 and P<0.05). At the 150th day, the genotype, the weight of the mother, the birth type and sex had various effects with the exception of the age of the mother (P<0.01, P<0.001, P<0.001 and P<0.05) (Table VII)

Table V. Least square means, significance and multiple comparison test results for circumference of leg and cannon bone circumference of goats at different periods (cm).

Factors	Circumference of leg						Cannon bone circumference					
	Birth		60 th day (weaning)		150 th day		Birth		60 th day (weaning)		150 th day	
	n	Mean±SD	n	Mean±SD	n	Mean±SD	n	Mean±SD	n	Mean±SD	n	Mean±SD
<i>General</i>	125	26.9±0.57	107	41.4±0.55	104	50.0±0.57	125	5.3±0.07	107	6.5±0.08	104	7.1±0.07
<i>Genotype</i>		***		***		**		NS		***		***
BH	80	26.9±0.76	68	41.4±0.64	66	49.6±0.84	80	5.2±0.11	68	6.6±0.10	66	7.3±0.09
HG	45	21.3±1.03	39	36.4±0.87	38	43.4±1.14	45	5.1±0.16	39	6.0±0.13	38	6.5±0.12
<i>Dame Age</i>		NS		*		NS		NS		NS		NS
2	19	25.2±1.14	15	41.4±1.00 ^{cd}	15	48.7±1.32	19	5.1±0.17	15	6.3±0.14	15	7.1±0.14
3	18	25.2±1.55	13	37.6±1.26 ^d	12	45.8±1.66	18	5.2±0.24	13	6.1±0.19	12	6.6±0.19
4	22	22.4±1.36	20	37.7±1.21 ^{ab}	20	48.6±1.59	22	5.3±0.21	20	6.4±0.18	20	6.9±0.18
5	35	23.7±0.94	31	37.6±0.82 ^{bc}	30	48.2±1.08	35	5.1±0.14	31	6.3±0.12	30	6.9±0.12
≥6	31	24.1±1.28	28	40.3±1.12 ^a	27	48.7±1.48	31	5.1±0.19	28	6.3±0.17	27	7.0±0.16
<i>Dam's live weight. kg</i>		*		*		NS		NS		NS		NS
30.01-35.00	24	21.6±1.20 ^b	19	36.4±1.08 ^c	18	46.1±1.42	24	5.0±0.18	19	6.2±0.16	18	6.8±0.16
35.01-40.00	10	24.5±1.34 ^a	9	36.8±1.17 ^{bc}	9	46.4±1.54	10	5.0±0.20	9	6.2±0.17	9	6.9±0.17
40.01-45.00	31	23.7±1.13 ^a	27	39.8±0.98 ^{ab}	26	48.7±1.29	31	5.0±0.17	27	6.2±0.14	26	6.8±0.14
45.01-50.00	39	26.0±0.89 ^a	33	40.9±0.79 ^a	32	48.7±1.03	39	5.3±0.14	33	6.3±0.12	32	6.8±0.12
≥ 50.01	21	24.7±1.27 ^a	19	40.8±1.12 ^a	19	50.1±1.47	21	5.4±0.19	19	6.6±0.17	19	7.1±0.16
<i>Birth Type</i>		***		***		**		***		**		*
Single	73	28.2±0.63 ^a	67	43.0±0.54 ^a	66	51.1±0.72 ^a	73	5.6±0.10 ^a	67	6.6±0.08 ^a	66	7.1±0.08 ^a
Twin	42	25.4±0.80 ^b	32	38.5±0.73 ^b	30	48.4±0.96 ^a	42	5.2±0.12 ^b	32	6.3±0.11 ^b	30	6.8±0.11 ^b
≥ Triplets	10	18.6±1.35 ^c	8	35.3±1.22 ^b	8	44.4±1.61 ^b	10	4.7±0.21 ^b	8	6.0±0.18 ^b	8	6.8±0.18 ^b
<i>Sex</i>		NS		NS		NS		**		**		*
Female	63	23.9±0.73	53	38.7±0.63	52	47.4±0.83	63	5.0±0.11	53	6.1±0.09	52	6.7±0.09
Male	62	24.2±0.77	54	39.2±0.68	52	48.6±0.89	62	5.3±0.12	54	6.4±0.10	52	7.0±0.10

NS: Non significant (P>0.05), *: P<0.05, **: P<0.01, ***: P<0.001.

a, b, c, d: Means within the same column with different superscript differ significantly (P<0.05).

DISCUSSION

In this study withers height (also known as cidago height) at birth, weaning and on the 150th day was determined as 29.2, 43.3 and 54.1 cm, respectively. Because there is limited study outcome in the same period for pure and crossbred hair goat, the morphological results of this research on the 150th day were discussed with different age finding. The value of withers height found at the weaning time was lower than from Simsek & Bayraktar (2006)'s Saanen x Hair Goat F1 crossbred (SHF1) and HG and also from Tozlu (2006)'s SHF1 crossbred and HG. However, it was similar to Yılmaz *et al.*'s SHF1 crossbred and HG. In addition to that the value of withers height found at the 180th day was also lower than Simsek & Bayraktar's SHF1 and HG. However, it was also similar to Yılmaz *et al.*'s SHF1 crossbred and HG. Surprisingly it was much lower in value in comparison to Khan *et al.* (2006)'s 04-12 month Beetal goat kids and Hirakawa *et al.* (2007)'s over 12 months Boer goat.

In search of the main affects that weaning had on the withers height, few parameters such as the age of the mother, sex, birth type, genotype and weight of the animal were all investigated. First of all, the age of the mother was investigated. It had no significant effect on the withers height and the results were compatible with the findings of Simsek & Bayraktar and Yılmaz *et al.*. Secondly the sex effect was investigated. It had significant effect on the withers height. The results were compatible with the findings of Simsek & Bayraktar and Yılmaz *et al.* Thirdly the birth type was examined. It had also significant effect on the withers height. The results were compatible with the findings of Simsek & Bayraktar but it was incompatible with the findings of Yılmaz *et al.* Fourthly, genotype was investigated. It had also significant effect on the withers height. The results were compatible with the findings of Tozlu and unfortunately it was incompatible with the findings of Simsek & Bayraktar and Yılmaz *et al.*

Table VI. Least square means, significance and multiple comparison test results for chest width and front-rump width of goats at different periods (cm).

Factors	Chest width						Front-rump width					
	Birth		60 th day (weaning)		150 th day		Birth		60 th day (weaning)		150 th day	
	n	Mean±SD	n	Mean±SD	n	Mean±SD	n	Mean±SD	n	Mean±SD	n	Mean±SD
<i>General</i>	125	5.9±0.14	107	9.0±0.14	104	10.4±0.14	125	6.1±0.12	107	9.4±0.12	104	11.3±0.12
<i>Genotype</i>		*		**		**		NS		NS		NS
BH	80	5.9±0.21	68	9.2±0.22	66	10.6±0.20	80	6.0±0.19	68	9.3±0.14	66	11.1±0.18
HG	45	5.0±0.28	39	7.9±0.30	38	9.5±0.27	45	5.6±0.26	39	9.1±0.20	38	10.7±0.24
<i>Dame Age</i>		NS		NS		NS		NS		NS		NS
2	19	5.1±0.31	15	8.8±0.34	15	10.3±0.31	19	5.9±0.29	15	9.3±0.23	15	11.1±0.28
3	18	5.6±0.43	13	8.5±0.43	12	9.6±0.40	18	6.3±0.39	13	9.4±0.29	12	11.0±0.35
4	22	5.5±0.38	20	8.3±0.41	20	10.2±0.38	22	5.8±0.34	20	9.2±0.28	20	11.2±0.34
5	35	5.4±0.26	31	8.4±0.28	30	9.7±0.26	35	5.6±0.24	31	8.7±0.19	30	10.7±0.22
≥6	31	5.6±0.35	28	8.7±0.38	27	10.6±0.35	31	5.4±0.32	28	9.0±0.26	27	10.8±0.31
<i>Dam's live weight, kg</i>		NS		NS		NS		NS		**		NS
30.01-35.00	24	5.4±0.33	19	7.8±0.37	18	9.7±0.34	24	5.6±0.30	19	8.5±0.25 ^c	18	10.6±0.30
35.01-40.00	10	5.3±0.37	9	8.7±0.40	9	10.1±0.37	10	5.1±0.33	9	8.4±0.27 ^{bc}	9	10.6±0.33
40.01-45.00	31	5.6±0.31	27	8.5±0.33	26	10.3±0.31	31	6.0±0.28	27	9.2±0.23 ^{abc}	26	10.8±0.27
45.01-50.00	39	5.5±0.24	33	8.8±0.27	32	10.3±0.24	39	6.2±0.22	33	9.7±0.18 ^{ab}	32	11.2±0.22
≥ 50.01	21	5.5±0.34	19	8.8±0.38	19	10.1±0.35	21	6.1±0.32	19	10.0±0.26 ^a	19	11.6±0.31
<i>Birth Type</i>		***		NS		**		***		***		***
Single	73	6.2±0.17 ^a	67	9.1±0.19	66	10.7±0.17 ^a	73	6.5±0.16 ^a	67	10.0±0.13 ^a	66	11.7±0.15 ^a
Twin	42	5.7±0.22 ^a	32	8.5±0.24	30	10.0±0.23 ^b	42	6.0±0.20 ^a	32	9.1±0.17 ^b	30	10.9±0.20 ^b
≥ Triplets	10	4.4±0.37 ^b	8	8.0±0.42	8	9.6±0.38 ^b	10	4.9±0.34 ^b	8	8.4±0.28 ^b	8	10.2±0.34 ^b
<i>Sex</i>		*		NS		NS		*		*		NS
Female	63	5.2±0.20	53	8.4±0.22	52	10.1±0.20	63	5.5±0.18	53	9.0±0.14	52	10.8±0.18
Male	62	5.7±0.21	54	8.6±0.23	52	10.0±0.21	62	6.1±0.19	54	9.4±0.16	52	11.0±0.19

NS: Non significant (P>0.05), *: P<0.05, **: P<0.01, ***: P<0.001.

a, b, c: Means within the same column with different superscript differ significantly (P<0.05).

Finally weight of the animal was investigated. The results were insignificant and it was compatible with the findings of Yılmaz *et al.*

In light of this study, the general body length at birth, weaning and the 150th day was 29.0, 44.3 and 53.8 cm, respectively. At weaning, the general body length value found was lower than those of values reported by Yılmaz *et al.* for SHF1 crossbred and HG. However, it was similar to the values reported by Yılmaz *et al.* and Tozlu for SHF1 crossbred and HG values. At the 150th day, the general body

length value found was similar to those of values reported by Yılmaz *et al.* for SHF1 crossbred and HG. However, it was higher than those values reported by Simsek & Bayraktar for SHF1 crossbred and HG. However, it was much lower in value in comparison to those values reported by Khan *et al.* for 04-12 month Beetal goat kids and Hirakawa *et al.* for over 12 months Boer goat.

First of all, our results indicated the significance of the genotype effect on the body length. This finding was incompatible with the finding of Simsek & Bayraktar and

Table VII. Least square means, significance and multiple comparison test results for mid-rump width of goats at different periods (cm).

Factors	Birth		60 th day (weaning)		150 th day	
	n	Mean±SD	n	Mean±SD	n	Mean±SD
<i>General</i>	125	8.3±0.13	107	11.6±0.13	104	13.4±0.13
<i>Genotype</i>		***		NS		**
BH	80	8.7±0.19	68	11.3±0.18	66	13.2±0.17
HG	45	7.4±0.26	39	10.8±0.24	38	11.9±0.23
<i>Dame Age</i>		NS		NS		NS
2	19	8.0±0.29	15	11.3±0.28	15	13.3±0.26
3	18	8.4±0.40	13	11.1±0.34	12	13.0±0.33
4	22	8.4±0.34	20	11.3±0.33	20	13.5±0.31
5	35	7.8±0.24	31	10.9±0.23	30	12.8±0.21
≥6	31	7.6±0.33	28	10.8±0.31	27	12.6±0.30
<i>Dam's live weight, kg</i>		NS		*		**
30.01-35.00	24	7.9±0.31	19	10.4±0.30 ^b	18	12.4±0.29 ^b
35.01-40.00	10	7.9±0.34	9	10.5±0.32 ^a	9	12.4±0.31 ^{ab}
40.01-45.00	31	8.1±0.29	27	11.1±0.27 ^a	26	12.9±0.26 ^{ab}
45.01-50.00	39	8.2±0.23	33	11.6±0.22 ^a	32	13.7±0.21 ^a
≥ 50.01	21	8.1±0.33	19	11.7±0.31 ^a	19	13.9±0.30 ^a
<i>Birth Type</i>		*		***		***
Single	73	8.5±0.16 ^a	67	12.0±0.15 ^a	66	14.0±0.14 ^a
Twin	42	8.1±0.20 ^b	32	11.2±0.20 ^b	30	13.1±0.19 ^b
≥ Triplets	10	7.5±0.34 ^b	8	9.9±0.34 ^c	8	12.1±0.32 ^b
<i>Sex</i>		NS		*		*
Female	63	7.9±0.19	53	10.9±0.18	52	12.9±0.17
Male	62	8.1±0.20	54	11.3±0.19	52	13.3±0.18

NS: Non significant (P>0.05), *: P<0.05, **: P<0.01, ***: P<0.001.

a, b, c: Means within the same column with different superscript differ significantly (P<0.05).

Yılmaz *et al.* Secondly, our results showed the ineffectiveness of the age of the mother. This finding was compatible with the finding of Simsek & Bayraktar and Yılmaz *et al.* Thirdly, our results depicted the insignificance of the mother's weight. This finding was compatible with the finding of Yılmaz *et al.* Fourthly, our results indicated the importance of the birth type effect. This finding was compatible with the results reported by Simsek & Bayraktar. However, it was incompatible with the findings of Yılmaz *et al.* Finally, our results showed the importance of sex effect. This finding was compatible with the results reported by Tozlu, but it was incompatible with the findings of Yılmaz *et al.*

In this research, the heart girth at birth, weaning and the 150th day was 31.1, 52.3 and 61.3 cm, respectively. At weaning, the heart girth value found was similar to those of the values reported by Yılmaz *et al.* and Simsek & Bayraktar for SHF1 crossbred and HG. However, the value was lower than those of the values reported by Tozlu for SHF1 crossbred and HG. At the 150th day, the heart girth was higher than the values found by Khan *et al.* for 04-12 month Beetal breed. This value was similar to the values of Simsek & Bayraktar

for SHF1 crossbred and HG and it was much lower than the values found by Yılmaz *et al.* for SHF1 crossbred and HG.

First of all, our results indicated the significance of the genotype effect on the heart girth. This finding was compatible with Tozlu's findings. However, it was incompatible with reported by Yılmaz *et al.* Secondly, the age of the mother was found to be ineffective on the heart girth. This finding was compatible with values reported by Simsek & Bayraktar, but was incompatible with Yılmaz *et al.* findings. Thirdly, our results depicted the significance of the animals' weight. This was also supported by Yılmaz *et al.* findings. Finally, our results indicated that both the effect of birth type and sex was compatible with values reported by Simsek & Bayraktar. Whereas it was incompatible with results reported by Yılmaz *et al.*

CONCLUSION

To conclude, although there is not much information on morphological parameters literature in Boer and Hair goat, in this study morphological parameters of the Boer x Hair Goat F1 crossbred and pure Hair Goat kids were compared. It was found that the Boer x Hair Goat F1 crossbred are much better than the Hair Goats kids for both morphological and zoometric values. Hence, the widespread crossbreeding of the Boer goat would result in an increase of profit in goat production and would greatly contribute to the countries' economic growth.

BOLACALI, M.; ÖZTÜRK, Y.; YILMAZ, O.; KÜÇÜK, M. & KARSLI, M. A. Investigación de algunos rasgos morfológicos en caprinos de pelaje natural raza boer x cruzados y criados en condiciones semi-intensivas. *Int. J. Morphol.*, 35(4):1502-1511, 2017.

RESUMEN: El objetivo del estudio fue determinar varias características morfológicas desde el nacimiento hasta la edad de 150 días en caprinos Boer x Hair goat F1 crossbred (BH) y Cabra pura (HG) criados en condiciones semi-intensivas y revelar factores tales como los efectos del genotipo, la edad, el peso vivo de la

el tipo de nacimiento y el sexo entre otros. Este estudio fue realizado entre los años 2011-2012 en Çatak, región de Van y entre los años 2013-2014 en la Granja de Investigación y Práctica de la Universidad Yuzuncu Yil. Se estudiaron diversas medidas corporales: Altura del talón, altura de la espalda, altura de la grupa, altura del sacro, longitud del cuerpo, longitud del pecho, profundidad del tórax, circunferencia del pecho, circunferencia de la pierna, circunferencia del hueso del cañón, ancho del pecho, ancho de la grupa delantera y anchura media de la grupa, así se determinaron 29.8, 28.4, 28.7, 26.2, 28.7, 17.0, 13.3, 30.4, 26.9, 5.2, 5.9, 6.0 y 8.7 cm al nacer, respectivamente; 43.8, 43.8, 44.6, 40.6, 43.6, 22.2, 19.3, 51.7, 41.4, 6.6, 9.2, 9.3 y 11.3 cm en el 60º día, respectivamente; 56.1, 53.4, 54.4, 47.5, 53.3, 27.3, 24.1, 61.4, 49.6, 7.3, 10.6, 11.1 y 13.2 cm en 150 días, respectivamente para niños BH; 27.3, 25.9, 29.3, 25.3, 27.1, 15.9, 12.3, 29.0, 21.3, 5.1, 5.0, 5.6 y 7.4 cm al nacimiento, respectivamente; 40.4, 40.1, 42.9, 37.6, 40.5, 22.3, 18.4, 48.1, 36.4, 6.0, 7.9, 9.1 y 10.8 cm en el 60º día, respectivamente; 50.3, 49.2, 51.0, 45.7, 50.4, 27.5, 22.9, 57.3, 43.4, 6.5, 9.5, 10.7 y 11.9 cm a los 150 días, respectivamente, para cabritos HG. Cuando se consideraron todos los datos, se concluyó que los cabritos BH son mucho mejores que los cabritos HG para los valores morfológicos y zoométricos.

PALABRAS CLAVE: Boer x Hair goat F1 crossbred; Cabra de pelo; Niños; Rasgos morfológicos.

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