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Some production traits of indigenous Hair goats bred under extensive conditions in Turkey. 2nd communication: viability and growth performances of kids

Abstract

In this study, it was studied that viability in preweaning period and growth performance in the period from birth to 8 months of age of Hair kids (Anatolian Black Goat). A total data of 439 kids in 2003 and 2004 years were used in the study. Survival rates of kids at 1st, 2nd and 3rd months were 98.86%, 96.81% and 95.44%, respectively. The effects of year, farm and age of dam on this trait were statistically insignificant, although the effect of birth type on only the survival rate at 3rd month was significant ($p < 0.05$). The body weights of kids at birth, 1st, 2nd, 3rd, 4th, 5th, 6th, 7th and 8th months were 2.19 kg, 6.19 kg, 9.70 kg, 13.08 kg, 16.31 kg, 18.77 kg, 20.25 kg, 25.38 kg and 23.32 kg, respectively. The effects of sex and age of dam on body weights in all growth periods, the effect of year on weights in growth periods except for 7th and 8th months, the effect of farm on weights in growth periods except for 6th and 8th months and the effect of birth type on birth weight and weights at 4th and 5th months were statistically significant ($p < 0.05$). In the result of this study, it was determined that Hair kids reared under extensive conditions had high performance especially in terms of viability.

Keywords: Hair goat, kid, viability, growth

Zusammenfassung

Titel der Arbeit: Leistungen einheimischer Haarziegen, gehalten unter extensiven Bedingungen in der Türkei. 2. Mitteilung: Aufzucht- und Wachstumsergebnisse der Ziegenkitzen

Untersucht wurden die Überlebensrate und das Wachstum von Kitzen der Anatolischen Schwarzen Haarziegen bis zum Alter von acht Monaten. Die Daten umfassen zweijährige Ergebnisse von 439 Kitzen. Die Überlebensrate der Kitzen vom 1. bis 3. Lebensmonat betrug 98,86, 96,81 bzw. 95,44%. Die untersuchten Einflüsse von Jahr, Alter der Mütter und Aufzuchtbetrieb auf dieses Ergebnis waren mit Ausnahme des Geburtstyps auf die Werte im 3. Monat nicht signifikant. Die Körpergewichte betrugen bei Geburt und vom 1. bis 8. Monat in kg: 2,19, 6,19, 9,70, 13,08, 16,31, 18,77, 20,25, 25,38 bzw. 23,32. Überwiegend konnte ein signifikante Einfluss von Jahr, Aufzuchtbetrieb, Geschlecht und Alter der Mütter auf die Gewichtsentwicklung nachgewiesen werden. Der Geburtstyp hatte nur Einfluss auf das Geburtsgewicht. Im Ergebnis der Studie zeigte sich, dass Haarziegen, welche unter extensiven Bedingungen aufgezogen wurden, besonders hinsichtlich der Überlebensrate gute Ergebnisse erreichten.

Schlüsselwörter: Haarziege, Anatolische Schwarze Ziege, Kitze, Überlebensrate, Wachstum

Introduction

The Hair goat is an indigenous breed generally reared in mountainous and forestry regions of Turkey, constituting approximately 96% of total goat population of 6.5 million in Turkey (ANONYMOUS, 2005). They provide a major source of animal protein and household cash income for smallholder farmers in this regions. The economic importance of these goats depends largely on viability and growth performance of kids.

Viability and growth of kids are important determinants of productivity in goat breeding (LAES-FETTBACK and PETERS, 1995; LANARI et al., 2003). In tropical and subtropical regions, kid mortality rate is considered one of the major contributory factors adversely affecting goat production enterprises. Fertility and a high level of kid mortality represents a significant barrier to increased productivity (HUSAIN et al., 1995; NIZNIKOWSKI et al., 2006). The growth determines the meat producing ability of kids up marketable age (RINGDORFER, 2001). Rapid growth during the preweaning period minimizes the cost of rearing and thus provides more profit to the farmer (AL-SHOREPY et al., 2002).

Information on growth and viability of the Hair goats is very limited, although this goat is the most common goat breed in Turkey. The aim of this study is to determine viability and growth performances of kids of Hair goat under extensive conditions.

Materials and methods

This study was carried out at two private farms in Aydın province of Aegean region in Turkey. The material of the study was formed the data of 439 kids born from Hair goats (Anatolian Black Goat) of which the ages are between two and seven in breeding periods of two years. The goats were fed by depending on completely pasture conditions in the period of the study and any extra feed wasn't given to its. The births occurred between January and April months. All the kids were identified with ear tags applied at birth. The kids were weaned approximately at 3 months of age. Before weaning, kids were fed by suckling their mother twice a day and they were kept in the pen in all days. After weaning, kids were taken to pasture separately from their mothers and they were completely fed depending on pasture conditions.

In order to determine viability of kids, dead kids were recorded every day and the number of kids, the number of mother and death date were recorded. Data were analysed and presented as percentages survival. Survival rates of kids at 1st, 2nd, 3rd months were calculated as total number of alive kids at these months per total number of born kids.

The kids were weighed at birth and afterwards once every months up to 8 months of age to be determined their growth performances. The body weights of kids at 1st, 2nd, 3rd, 4th, 5th, 6th, 7th and 8th months were calculated by interpolation.

The effects of birth year, farm, age of dam, type of birth and sex on the growth and viability were investigated in this study.

Growth performance of kids was analysed by linear models of statistical analysis as shown below:

$$Y_{ijklm} = \bar{\mu} + a_i + b_j + c_k + d_l + s_m + e_{ijklmn}$$

where: Y_{ijklm} = the body weight of any individual in studied period, μ = the expected mean, a_i = the effect of birth year (i : 2003 and 2004), b_j = the effect of farm (j : 1 and 2), c_k = the effect of dam's age (k : 2, 3, 4, 5, 6 and 7 years), d_l = the effect of type of birth (l : single and twin), s_m = the effect of sex (m : male and female) and e_{ijklmn} = the random error.

In this study, chi square test was performed for the statistical analysis of survival rates (STEEL and TORRIE, 1980). The effects of year, farm, age of dam, type of birth and sex on growth were analysed by using least squares method (HARVEY, 1975). Significant differences between least square means were assessed using the contrast-

test (SEARLE, 1971). It was assumed that there was no significant interaction between factors under investigation. The data were analysed with general linear models (GLM) procedure of the SPSS programme package (OZDAMAR, 1999).

Results

Table 1 shows the survival rates of kids in the periods from birth to 1, 2 and 3 months of age. The overall survival rates for the above mentioned periods were 98.86%, 96.81% and 95.44%, respectively. For whole periods, it was found that the effects of year, farm, age of dam and sex were statistically insignificant, although the effect of birth type was significant only for survival rate in the period from birth to 3 months of age ($p < 0.05$).

Table 1

The survival rates of kids at different growth periods (%) (Überlebensrate der Kitzen bis zum 3. Lebensmonat [%])

Studied factors	Number of born kids	Birth-1 month		Birth-2 months		Birth-3 months	
		n	%	n	%	n	%
<i>Overall</i>	439	434	98.86	425	96.81	419	95.44
<i>Year</i>							
2003	226	225	99.56	218	96.46	213	94.25
2004	213	209	98.12	207	97.18	206	96.71
<i>Farm</i>							
1	225	222	98.67	220	97.78	219	97.33
2	214	212	99.07	205	95.79	200	93.46
<i>Type of birth</i>							
Single	421	416	98.81	409	97.15	405	96.20 ^a
Twin	18	18	100.00	16	88.89	14	77.78 ^b
<i>Sex</i>							
Male	218	217	99.54	211	96.79	207	94.95
Female	221	217	98.19	214	96.83	212	95.93
<i>Age of dam</i>							
2	67	65	97.01	65	97.01	65	97.01
3	66	65	98.48	63	95.45	62	93.94
4	97	96	98.97	93	95.88	91	93.81
5	106	106	100.00	104	98.11	103	97.17
6	59	58	98.31	58	98.31	56	94.92
7	44	44	100.00	42	95.45	42	95.45

a, b = type of birth is statically significant on viability at 3th month ($p < 0.05$)

The body weights of kids at birth, 3rd and 6th months are presented on Table 2, although the body weights of kids between birth and 8th month are presented on Figure 1.

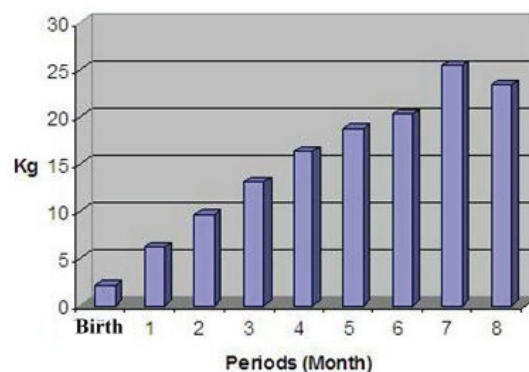


Fig. 1: Body weight of kids on different growth periods (kg)
(Körpergewicht der Kitzen in den einzelnen Lebensmonaten bis zum Monat [kg])

As shown on Graphic, body weight of kids increased gradually between birth and 5th month and increasing of body weight between 6th and 7th months was more than that between 5th and 6th months. Although the body weight of kids decreased at 8th month. The body weights of kids at 1st, 2nd, 3rd, 4th, 5th, 6th, 7th and 8th months were 2.19 kg, 6.19 kg, 9.70 kg, 13.08 kg, 16.31 kg, 18.77 kg, 20.25 kg, 25.38 kg and 23.32 kg, respectively.

Table 2

Least squares means and standard errors of body weight of kids on different growth periods (kg).
(Kleinste Quadratmittel und Standardfehler des Körpergewichtes bis zum 6. Lebensmonat [kg])

Factors	Birth weight			3 th Month			6 th Month		
	n	\bar{x}	$S_{\bar{x}}$	n	\bar{x}	$S_{\bar{x}}$	n	\bar{x}	$S_{\bar{x}}$
<i>Expected mean</i>	439	2.19	0.05	419	13.08	0.40	166	20.25	0.76
<i>Year</i>		***			***			*	
2003	226	2.05 ^b	0.05	213	14.12 ^a	0.41	24	19.37 ^b	0.92
2004	213	2.33 ^a	0.05	206	12.04 ^b	0.43	142	21.14 ^a	0.76
<i>Farm</i>		***			***			n.s.	
1	225	2.36 ^a	0.05	219	14.85 ^a	0.41	91	20.41 ^a	0.80
2	214	2.02 ^b	0.05	200	11.31 ^b	0.43	75	20.10 ^a	0.79
<i>Sex</i>		***			***			***	
Male	218	2.46 ^a	0.05	207	13.70 ^a	0.40	91	21.60 ^a	0.74
Female	221	1.92 ^b	0.05	212	12.46 ^b	0.44	75	18.91 ^b	0.85
<i>Type of birth</i>		***			n.s.			n.s.	
Single	421	2.60 ^a	0.02	405	13.51 ^a	0.14	161	21.45 ^a	0.38
Twin	18	1.78 ^b	0.09	14	12.65 ^a	0.78	5	19.06 ^a	1.43
<i>Age of dam</i>		***			***			*	
2	67	2.05 ^c	0.06	65	11.95 ^b	0.53	17	19.19 ^b	1.05
3	66	2.11 ^{bc}	0.06	62	12.13 ^b	0.53	30	19.79 ^b	0.93
4	97	2.30 ^a	0.06	91	13.32 ^a	0.48	35	21.38 ^a	0.83
5	106	2.28 ^a	0.05	103	13.42 ^a	0.44	44	21.27 ^a	0.84
6	59	2.20 ^{ab}	0.06	56	14.10 ^a	0.48	19	19.83 ^{ab}	1.00
7	44	2.19 ^{ab}	0.07	42	13.57 ^a	0.59	21	20.08 ^{ab}	1.02

a, b, c, d = differences between values with different letter in subgroups in every column are statically significant ($P < 0.05$); n.s. = $p > 0.05$; *** $p < 0.001$; * $p < 0.05$

Birth weight of male kids was higher than that female kids and also birth weight of single kids was higher than that twin kids. Birth weights of male, female, single and twin kids were 2.46 kg, 1.92 kg, 2.60 kg and 1.78 kg, respectively. The kids, age of dam was 4 years, had the highest birth weight, with a trend towards increased birth weight from 2 to 4 years old.

The effect of sex on the body weights in all growth periods was statistically significant and the body weight of male kids was higher than that female kids. Significant levels were $p < 0.001$ for all growth periods except for 2th and 8th months, it was $p < 0.01$ for 2th and 8th months.

The effect of age of dam on body weights in all growth periods, the effect of type of birth on body weights at birth, 4th and 5th months, the effect of birth year on body weights in the periods except for 7th and 8th months and the effect of farm on body weights in the periods except for 6th and 8th were statistically significant ($p < 0.05$).

Discussion

The survival rate of kids in preweaning period was rather high in this study. It is contrary to the results of SONMEZ et al. (1971) who reported that the mortality rate of Hair goat kids were very high in the period of first 12 week after birth and this quantity increase more in years when the winter season was hard. The survival rate in the period from birth to 3 months of age determined in this study (95.44%) is higher than the result of ESER (1998), although it is similar to the result of FERIK (1995) for the survival rate of Hair goat kids in same period.

The effect of birth type on survival rate was statistically insignificant ($p>0.05$) for birth-1 and birth-2 months of age, whereas it was significant for the period from birth to 3 months of age ($p<0.05$) and in this period, the survival rate of single kids was higher than that twin kids, as expected and described by PETERS and LAES-FETTBACK, (1995). The significant effect of birth type on survival rate in the period from birth to 3 months of age is similar to the results of ALEXANDRE et al. (1999) and AWEMU et al. (1999). It is also differ from the results of HUSAIN et al. (1995), IKWUEGBU et al. (1995), MARZOUK et al. (2000) and TURKSON (2003). The effect of sex on survival rate was statistically insignificant for all stages ($p>0.05$). This result is similar with the results of MARZOUK et al. (2000), SENGONCA et al. (2003), TURKSON (2003) who have studied this trait on different goat breeds, although this result is differ from the results of LAES-FETTBACK and PETERS (1995), ALEXANDRE et al. (1999), TURKSON et al. (2004) and NIZNIKOWSKI et al. (2006) who have determined that the mortality rate of male kids is higher than that female kids.

The effect of dam age on survival rate of kids was insignificant for all the studied periods. It is contrast to general inform which the survival rates of the kids of young does is the lower than that older goats because of the low birth weight of the kids of young does and low milk yield of young does. This result could be related to be provided the good management conditions to the kids of which the body weight is low and the mother's milk is inadequate for its feeding. In this study, the insignificant effect of dam age on survival rate of kids is similar to the results of HUSAIN et al. (1995), IKWUEGBU et al. (1995) and MARZOUK et al. (2000), although it is differ from the results of ALEXANDRE et al. (1999) and AWEMU et al. (1999) who studied this trait on different goat breeds.

Body weight of kids in goat rearing is very important because it has positive bearings on their survival rate, adult body weight and later productivity. The mean values of birth weight of kids in this study (2.19 kg) is lower than the values reported in other studies of Hair goats (FERIK, 1995; ESER, 1998; SENGONCA et al., 2003). The presumptive reason for the low birth weight in this study could be feeding of the goats depending on completely pasture conditions and also the pregnancy period of goats meeting the winter season when the pasture conditions were inadequate for feeding of goats.

It was determined that the effects of all the environmental factors on the birth weight were statistically significant ($p<0.001$). The significant effects of sex and dam age on the birth weight lasted up 8th months. The body weight of male kids was more high than that female kids and the body weight of single kids was more high than that twin kids in all growth periods. This results are in accordance with the other reports (ODABASIOGLU and ALTIN, 1992; IKWUEGBU et al., 1995; LAES-FETTBACK

and PETERS, 1995; MOURAD and ANOUS, 1998; ALEXANDRE et al., 1999; TOUKOUROU and PETERS 1999; MARZOUK et al., 2000; MOURAD et al., 2000; UNALAN and CEBECI, 2001; AL-SHOREPY et al., 2002; SENGONCA et al., 2003; TODARO et al., 2004; TURKSON et al., 2004; and NIZNIKOWSKI et al., 2006). The increasing of the birth weight with increasing of dam age and having the lower body weight of kids of young goats could be explained with high reproductive performance of goats in mature age. This result is in accordance with the results of VERMA et al. (1991), FERIK (1995), ESER (1998), ALEXANDRE et al. (1999), MARZOUK et al. (2000) and MOURAD et al. (2000) who studied this issue on different goat breeds.

The body weights of kids at 3th and 6th months were 13.08 kg and 20.25 kg, respectively. This results obtained are differ from the other results on Hair goats. FERIK (1995) reported the body weights of Hair kids at 3th and 6th months as 16.17 kg and 22.96 kg, respectively. Although ESER (1998) reported this values as 13.75 kg and 19.33 kg, respectively. This differences among values could be related to management conditions.

It was thought that while the body weights of kids increased gradually up to 6th month, increasing of the body weight between 6th and 7th months was more than the other growth periods and the mean of body weight at 8th month was lower than that 7th month depended on decreasing the numbers of kids in this periods in result of selling of kids.

In this study, the significant effect of sex on the body weights in the periods between 1th and 8th months is similar to the results of MOURAD and ANOUS (1998), AL-SHOREPY et al. (2002), SENGONCA et al. (2003) and MAHGOUF et al. (2005). Although this result is differ from the results of NDLOVU and SIMELA (1996) and MOURAD et al. (2000) who reported that the effect of sex was insignificant on the body weights in different growth periods for different goat breeds.

The insignificant effect of birth type on the body weights in growth periods after birth can be explained with good management and feeding conditions provided to twin kids. In the study, it was determined that the effect of birth type was significant on the body weights at only 4th and 5th months. It was most possible that the number of twin kids is few and the herd composition is different in result of selling the kids. The differences among the production years in terms of the body weights of kids in different growth periods could be explained with the climate and pasture conditions, and also the difference among farms is explained with the differences on the management conditions.

In the result of this study which was studied the viability and growth performances of Hair kids bred on private farm conditions, although the feeding of kids depended on the completely pasture conditions on postweaning period and any breeding technique wasn't applied in the farms, it was determined that the kids had high performance especially in terms of viability. The birth weights of kids in this study were lower than traditional birth weight of Hair goats. It was possible that the feeding of does depended on completely pasture conditions and the pregnancy period of does met to winter season when the pasture conditions were inadequate for the feeding of does. It concluded that if appropriate breeding techniques are used and the management conditions are improved the production levels of the kids can increase.

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References

- ALEXANDRE, G.; AUMONT, G.; MAINAUD, J.C.; FLEURY, J.; NAVES, M.:
Productive performances of Guadeloupean Creole goats during the suckling period. *Small Rumin. Res.* **34** (1999), 155-160
- AL-SHOREPY, S.A.; ALHADRAMI, G.A.; ABDULWAHAB, K.:
Genetic and phenotypic parameters for early growth traits in Emirati goat. *Small Rumin. Res.* **45** (2002), 217-223
- ANONYMOUS:
Republic of Turkey, Prime Ministry Turkish Statistical Institute (TURKSTAT) 2005, <http://www.turkstat.gov.tr>
- AWEMU, E.M.; NWAKALOR, L.N.; ABUBAKAR, B.Y.:
Environmental influences on preweaning mortality and reproductive performance of Red Sokoto does. *Small Rumin. Res.* **34** (1999), 161-165
- ESER, M.:
The investigation on some production traits of Hair goats bred village conditions. The University of Ondokuz Mayıs, Thesis of Master, Samsun (1998) [in Turkish]
- FERIK, A.:
Investigation on some traits of milk yield, reproduction, hair production of Hair goat bred village conditions. The University of Uludag, Thesis of Master, Bursa (1995) [in Turkish]
- HARVEY, W.R.:
Least-squares analysis of data with unequal sub-class numbers. US Department of Agriculture, Report of Agricultural Research Service (1975), H-4
- HUSAIN, S.S.; HORST, P.; ISLAM, A.B.M.M.:
Effect of different factors on pre-weaning survivability of Black Bengal kids. *Small Rumin. Res.* **18** (1995), 1-5
- IKWUEGBU, O.A.; TARAWALI, G.; REGE, J.E.O.:
Effects of fodder banks on growth and survival of West African Dwarf goats under village conditions in subhumid Nigeria. *Small Rumin. Res.* **17** (1995), 101-109
- LAES-FETTBACK, C.; PETERS, K.-J.:
A comparative study of performance of Egyptian goat breeds II. Growth performance and productivity. *Arch. Tierz.* **38** (1995), 563-575
- LANARI, M.R.; TADDEO, H.; DOMINGO, E.; CENTENO, M.P.; GALLO, L.:
Phenotypic differentiation of exterior traits in local Criollo goat population in Patagonia (Argentina). *Arch. Tierz.* **46** (2003), 347-356
- MAHGOUN, O.; KADIM, I.T.; AL-SAQRY, N.M.; AL-BUSAIDI, R.M.:
Potential of Omani Jabel Akhdar goat for meat production under feedlot conditions. *Small Rumin. Res.* **56** (2005), 223-230
- MARZOUK, K.M.; EL FEEL, F.M.R.; HASSAN, H.A.; SALLAM, M.T.:
Evaluation of French Alpine goats under Egyptian conditions. 7th International Conference on Goats, France (2000)
- MOURAD, M.; ANOUS, M.R.:
Estimates of genetic and phenotypic parameters of some growth traits in Common African and Alpine crossbred goats. *Small Rumin. Res.* **27** (1998), 197-202
- MOURAD, M.; GBANAMOU, G.; BALDE, I.B.:
Performance of West African dwarf goats under the extensive system of production in Faranah, Guinea. 7th International Conference on Goats, France (2000)
- NDLOVU, L.R.; SIMELA, L.:
Effect of season of birth and sex of kid on the production of live weaned single born kids in smallholder East African goat flocks in North East Zimbabwe. *Small Rumin. Res.* **22** (1996), 1-6
- NIZNIKOWSKI, R.; STRZELEC, E.; POPIELLARCZYK, D.:
Comparison on the reproduction traits and body weight at birth of the Polish White improved goat to its crossbreds with Boer goat bucks. *Arch. Tierz.* **49** (2006) Special issue, 332-336

- ODABAŞIOĞLU, F.; ALTIN, T.:
A study on viability and growth traits of Walliser-Schwarzahls × Hair goat crossbreeds. *J. Selcuk University Veterinary Faculty* **8** (1992), 51-54 [in Turkish]
- OZDAMAR, K.:
The Statical Data Analysis by The Packet Programs. *Eskisehir* (1999), 317-340 [in Turkish]
- PETERS, K.-J.; LAES-FETTBACK, C.:
A comparative study of performance of Egyptian goat breeds I. Reproductive and dairy performance. *Arch. Tierz.* **38** (1995), 93-102
- RINGDORFER, F.:
Einfluss von Genotyp, Geschlecht und Endgewicht auf die Schlachtleistung von Ziegenkitzen. *Arch. Tierz.* **44** (2001), 385-390
- SEARLE, S.R.:
Linear Models. New York (1971), 87 pp.
- SENGONCA, M.; TASKIN, T.; KOSUM, N.:
Simultaneous comparison of various production traits of Saanen × Hair crossbred and pure Hair goats. *Turk. J. Vet. Anim. Sci.* **27** (2003), 1319-1325 [in Turkish]
- SONMEZ, R.; SENGONCA, M.; ALPBAZ, A.G.:
A study on various traits and productions of Maltase goats bred in Universty of Ege, Faculty of Agriculture. *Publications of Ege University, Faculty of Agriculture. Bornova, Izmir* **8** (1971), 57-72 [in Turkish]
- STEEL, R.G.D.; TORRIE, J.H.:
Principles and Procedures of Statistics: A Biometrical Approach, 2nd Ed. New York (1980)
- TODARO, M.; CORRAO, A.; ALICATA, M.L.; SCHINELLI, R.; GIACCONE, P.; PRIOLO, A.:
Effects of litter size and sex on meat quality traits of kid meat. *Small Rumin. Res.* **54** (2004), 191-196
- TURKSON, P.K.:
Lamb and kid mortality in village flocks in the coastal savanna zone of Ghana. *Tropical Animal Health and Production* **35** (2003), 477-490
- TURKSON, P.K.; ANTIRI, Y.K.; BAFFUOR-AWUAH, O.:
Risk factors for kid mortality in West African dwarf goats under an intensive management system in Ghana. *Tropical Animal Health and Production* **36** (2004), 353-364
- TOUKOUUROU, Y.; PETERS, K.-J.:
Auswirkungen restriktiver Ernährung auf die Wachstumsleistung von Ziegenlämmern. *Arch. Tierz.* **42** (1999), 281-293
- UNALAN, A.; CEBECI, Z.:
A study on genetic parameter estimates of German variegated × Hair goat crossbreeds. *Turk. J. Vet. Anim. Sci.* **25** (2001), 527-531 [in Turkish]
- VERMA, R.R.P.; SINGH, B.K.; SINGH, M.P.; SINGH, B.:
Factors affecting reproductive performance in Black Bengal goats. *Indian Vet. J.* **68** (1991), 235-239

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