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A DESCRIPTION OF GROWTH PERFORMANCES OF NORDUZ KIDS AND MILK YIELD OF NORDUZ GOAT

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Abstract

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In this research, growth performance of Norduz kids and milk yield of Norduz goats, a native gene resource in Turkey, were defined. The animals studied were brought from natural habitats to the animal research farm of Agricultural Faculty, Yuzuncu Yil University. Descriptive statistics for average birth, weaning, 30 th day, 60 th day, 90 th day, 120 th day, 150 th day and 180 th day weights of Norduz kids were found to be 2.98±0.07 , 13.37± 0.44 , 6.70±0.20, 10.88±0.34, 14.44±0.44, 17.92±0.48, 21.15±0.55 , and 23.09±0.65 kg respectively.

Least squares means of single kids and twin kids of Norduz were found to be 3.12±0.06 and 2.57±0.07 kg respectively. Least squares means of single male, single female, twin male and twin female kids of Norduz were found to be 3.23±0.08, 3.01±0.09, 2.81±0.09 and 2.33±0.10 kg respectively.

Least squares means of lactation length and lactation milk yield were 226.4±7.23 day and 347.2 ± 40.06 kg respectively.

Descriptive statistics of the growth of all kids revealed that in the time interval from birth to day 90 of age , birth to day 180 of age , birth to weaning (84 th day) and weaning to day 180 of age daily weight gain were 0.193± 0.005 , 0.145±0.004 , 0.129±0.005 and 0.323± 0.043 kg , respectively.

Key words: Norduz, goat, growth, performance, milk yield

Introduction

Goat and sheep production are integral components of animal production substructure in developing areas of Turkey. Goat take an important place in the economics of animal production of Turkey and in the nutrition of its population. Its have been known to contribute to the subsistence of small farmers in Eastern Anatolia by playing an important role in culture, income and employment as well as nutrition of household Gökdal (1998). Hair type goat (Black goat) is the major goat breed of Turkey and it is taking a important part for goat producers among EU countries because of it has 7.2 million heads goat and this value constitutes 47% of European goat population (Anonymous, 2012).

Norduz goat is native goat breed of Eastern Anatolia. Although no registered information on Norduz goat and its origin is available, there is a belief that this breed has been brought to Norduz area from Northern Iraq 250-300 years ago. This breed is actually distributed throughout 23 villages in Norduz area which is part of Gurpinar district situated between 38.2 N latitude and 43.25 E longtitude, 1745 m above sea level in Van province and area, called Norduz in Van province. Its principal coat color is black. The main color of Norduz goat is black but white, cream black-white pied, grey, ash, roan, brown and milky coffee colored animals may also be found. Males have robust, long and upward horns. They are gently curved to both side and back. Females are seldom polled. In females, horns are thinner relative to those in males. Sometimes horns are curved downward in spherical form (Daskiran et al., 2004).

The Norduz goats were prefered for supplying milk and meat for household for a long time periods, to make leadership in small ruminant flock and to enhance the movement capability of flock in pastures and plateaus. The hair of goats were used for make clothes, felt, saddlebag, hair tent and suitable

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socks and shawl for winter. The kidded doe provides a milk for the family after kids are weaned and the male kids are sold or slaughtered at the age of five to six months whereas females are maintained for up to four to six lactations. The milk of goats are consumed by household or processed into local herby cheese.

This study was carried out to identify growth performance of Norduz kids and milk yield of Norduz goats.

Material and Methods

This study was carried out on 39 Norduz goats and 53 Norduz kids kept at the Research Farm of Agricultural Faculty in Yüzüncü Yıl University of Van in Turkey. Animals were fed clover hay or straw in winter and a few concentrate mixture during the last days of gestation in late-winter. During the grazing season, animals were grazed on pasture and fed *ad-libitum* clover hay after the daily grazing. The kids were born from February to March. After the parturition, live weights of kids were recorded. Records were taken be weekly. The kids were kept with their dams for 15-20 days after which they were separated from their dams and suckled twice a day until the weaning. Kids were weaned at an average 84 days of age. After mid-April, does were grazed on pastures. Milk yield was individually recorded twice a daily (morning and evening) at fortnightly intervals until the end of the lactations. The first control day record was obtained within 7 days from kidding. The lactation milk yield and lactation length were estimated from data recorded two weekly intervals according to the procedure reported by Kaymakçı & Sönmez (1992) as follows;

$$\text{Lactation milk yield (l)} = a.\sum_{i=1}^{n} k_i - (a/2 - A).k_1$$

$$\text{Lactation length (day)} = n.a - (a/2-A),$$

Where:

a= control interval (day),

n = number of control,

k_i = milk yield at any control day (l),

A = period from kidding to first individual control (day),

k_1 = milk yield record at first individual control (l).

The data on body weights after parturition, lactation milk yield and lactation length were analysed for the effects of age, year and random effect due to residual error using least-squares procedures (SAS, 1998). Significant differences between means were detected by using Duncan's multiple range tests (Duncan, 1955).

Results

Descriptive statistics for some time interval live weight of Norduz kids are presented in Table 1. Average of birth weight, weaning weight, 30th day weight, 60th day weight, 90th day weight, 120th day weight, 150th day weight and 180th day weight of Norduz kids were 2.98±0.07, 13.37±0.44, 6.70±0.20, 10.88±0.34, 14.44±0.44, 17.92±0.48, 21.15±0.55 and 23.09±0.65 kg, respectively.

Least squares means for some time interval live weight of Norduz kids are presented in Table 2. The summary of variance analysis is shown in Table 1. There was a significant effect of dam age on the birth weight, 30th day weight, 60th day weight ($p \leq 0.01$) , 90th day weight and 120th day weight. While there was not effect of dam age the other live weight period. Sex and birth type were significant effect on all live weight period ($p < 0.01$). But year was significant effect only 30th day weight period. The mean birth weight (2.98±0.07 kg) in this study were higher than those found by Soysal (2010) for Anatolian Black goat (2.5-2.6 kg) and Alpine kids (2.84 kg) found by Mello et al. (1996). But for Alpine kids (3.65 kg) and for Toggenburg (3.38 kg) found by McManus et al. (2008) higher than found this research. Mean weights of animals born as singles were heavier (3.12 kg) than born as twins (2.57 kg). This is in agreement with Sousa et al. (1990), Silva et al. (1993, 1994) and Gebrulul et al. (1994). Males were significantly heavier (3.02 kg) than females (2.67 kg) at birth and this results similar with Silva et al. (1994) and Figueiredo et al. (1982). On the other hand same results coincide with those found by Medeiros et al. (1992) Khan and Sahni (1983) and they did not find differences between the sexes for birth weight in goats.

In the time period 90th day of age that important period of growth was found 14.44±0.44 kg. This value is lower than those found by Kutchtik and Sedlackova (2005) for Brown Short-haired breed (19.52 kg), for Saanen kids (17.4 kg) found by Freits et al. (2004). Otherwise same value higher and coincide with than those found by Şimşek and Bayraktar (2006) for pure Saanen and pure Saanen × Anatolian Black goat (9.87–15.83 kg).

Least squares means for some time interval live weight of Norduz kids are presented in Table 2. The summary of variance analysis is in the Table 1. There was a significant effect of dam age on the birth weight, 30th day weight, 60th day weight ($p \leq 0.01$), 90th day weight and 120th day weight. While there was not effect of dam age the other live weight period. Sex and birth type was significant effect on all live weight period ($p < 0.01$). But Year was significant effect only 30th day weight period.The mean birth weight (2.98±0.07 kg) in this study were higher than those found by Soysal (2010) for other Anatolian Black goat (2.5-2.6 kg) and for Alpine kids (2.84 kg) found by Mello et al. (1996) While for Saanen (3.02 kg) were similar to found in this study. However, for Alpine kids (3.65 kg) and for Toggenburg (3.38 kg) found by McManus et al. (2008) higher than found this research. Mean weights of

Table 1
Descriptive statistics for some time interval live weight of Norduz kids

Traits	Factors	n	X±Sx	Min	Max
Birth weight, kg	Sex				
	Male	27	3.22±0.09	2.32	3.92
	Female	26	2.74±0.09	2.00	3.80
	Birth type				
	Single	28	3.12±0.11	2.00	3.92
	Twin	25	2.84±0.09	2.11	3.58
Overall	-	53	2.98±0.07	2.00	3.92
Weaning weight, kg	Sex				
	Male	27	14.67±0.64	7.57	21.14
	Female	26	12.02±0.49	7.43	16.14
	Birth type				
	Single	28	15.01±0.45	11.30	21.14
	Twin	25	11.53±0.61	7.43	19.50
Overall	-	53	13.37±0.44	7.43	21.14
30^{th} day weight, kg	Sex				
	Male	27	7.20±0.30	4.84	10.80
	Female	26	6.18±0.24	4.57	9.26
	Birth type				
	Single	28	7.30±0.28	5.24	10.80
	Twin	25	6.03±0.22	4.57	8.51
Overall	-	53	6.70±0.20	4.57	10.80
60^{th} day weight, kg	Sex				
	Male	27	11.82±0.49	7.61	17.80
	Female	26	9.89±0.37	7.21	14.10
	Birth type				
	Single	28	12.11±0.43	9.10	17.80
	Twin	25	9.49±0.37	7.21	13.40
Overall	-	53	10.88±0.34	7.21	17.80
90^{th} day weight, kg	Sex				
	Male	27	15.87±0.61	9.60	23.00
	Female	26	12.97±0.48	9.04	17.10
	Birth type				
	Single	28	16.15±0.47	11.90	23.00
	Twin	25	12.53±0.56	9.04	18.60
Overall	-	53	14.44±0.44	9.04	23.00
120^{th} day weight, kg	Sex				
	Male	27	19.86±0.63	12.90	27.30
	Female	26	15.90±0.48	11.80	20.90
	Birth type				
	Single	28	19.34±0.60	14.00	27.30
	Twin	25	16.32±0.63	11.80	23.50
Overall	-	53	17.92±0.48	11.80	27.30
150^{th} day weight, kg	Sex				
	Male	26	23.54±0.69	13.90	32.30
	Female	26	18.76±0.55	11.80	23.90
	Birth type				
	Single	28	22.57±0.66	17.11	32.30
	Twin	24	19.49±0.80	11.80	26.10
Overall	-	52	21.15±0.55	11.80	32.30
180^{th} day weight, kg	Sex				
	Male	18	26.36±0.72	22.06	34.10
	Female	22	20.42±0.98	16.60	26.00
	Birth type				
	Single	23	24.16±0.81	18.20	34.10
	Twin	17	21.65±0.97	16.60	29.50
Overall	-	40	23.09±0.65	16.60	34.10

Table 2
Least squares- means and standart errors (L.S.M±S.E.M) of body weight (BW, in kg) according to age of dams, sex birth type and year of Norduz kids

Factors	n	Birth weight, kg	Weaning weight, kg	30th day weight, kg	60th day weight, kg	90th day weight, kg	120th day weight, kg	n	150th day weight, kg	n	180th day weight, kg
		X±Sx	X±Sx	X±Sx	X±Sx	X±Sx	X±Sx		X±Sx		X±Sx
Dam age		**		**	**	*	*				
1	6	2.12±0.13^{c}	12.09±1.06	4.78±0.42 ^{d}	8.17±0.69 ^{c}	12.18±0.89 ^{b}	15.10±1.00 ^{b}	6	18.87±1.18 ^{b}	6	20.37±1.12^{b}
2	4	2.66±0.15^{b}	13.43±1.20	6.82±0.48 ^{c}	9.86±0.78 ^{b}	14.14±1.01^{ab}	16.60±1.14^{ab}	4	20.05±1.34 ^{ab}	3	21.80±1.39^{ab}
3	7	2.86±0.11^{b}	13.35±0.88	6.90±0.35 ^{abc}	10.55±0.57^{ab}	13.67±0.75^{ab}	16.87±0.84^{ab}	7	20.13±0.99 ^{ab}	7	22.37±0.92^{ab}
4	10	2.83±0.09 ^{b}	12.32±0.73	6.20±0.29 ^{bc}	9.95±0.47 ^{b}	13.27±0.61^{ab}	16.95±0.69^{ab}	10	19.67±0.81 ^{ab}	8	23.74±0.85^{a}
5	15	3.25±0.08 ^{a}	12.82±0.60	7.16±0.24 ^{ab}	11.57±0.39^{ab}	15.04±0.50 ^{a}	18.77±0.56^{a}	14	21.76±0.69 ^{ab}	7	23.89±0.91^{a}
6	11	3.33±0.10 ^{a}	14.84±0.77	7.29±0.31 ^{a}	11.75±0.50 ^{a}	15.10±0.65 ^{a}	19.14±0.73^{a}	11	22.64±0.87 ^{a}	9	24.40±0.90^{a}
Sex		**	**	**	**	**	**		**		**
Male	27	3.02±0.06	14.46±0.48	6.74±0.19	11.17±0.31	15.30±0.41	19.08±0.46	26	22.82±0.55	18	25.73±0.60
Female	26	2.67±0.07	11.83±0.51	5.84±0.21	9.44±0.33	12.50±0.43	15.40±0.48	26	18.22±0.57	22	19.80±0.59
Birth type		**	**	**	**	**	**		**		**
Single	28	3.12±0.06	15.18±0.45	7.34±0.18	12.17±0.29	16.22±0.38	19.34±0.42	28	22.60±0.50	23	24.57±0.60
Twin	25	2.57±0.07	11.10±0.57	5.25±0.23	8.45±0.37	11.58±0.48	15.14±0.54	24	18.44±0.65	17	20.96±0.71
Birth type and sex											
Single male	14	3.23±0.08	16.20±0.65	7.60±0.26	12.81±0.42	17.37±0.55	20.97±0.61	14	24.57±0.73	11	26.97±0.85
Single female	14	3.01±0.09	14.17±0.69	7.08±0.28	11.52±0.45	15.07±0.58	17.70±0.65	14	20.63±0.77	12	22.17±0.81
Twin male	13	2.81±0.09	12.72±0.72	5.89±0.29	9.54±0.47	13.22±0.61	17.19±0.68	12	21.06±0.85	7	24.49±0.98
Twin female	12	2.33±0.10	9.48±0.75	4.61±0.30	7.36±0.49	9.93±0.64	13.09±0.71	12	15.81±0.84	10	17.42±0.88
Year				**							
1	21	2.84±0.08	12.93±0.60	5.84±0.24	9.84±0.39	13.25±0.51	16.83±0.57	20	19.95±0.69	17	21.96±0.75
2	32	2.84±0.06	13.58±0.45	6.74±0.18	10.78±0.29	14.55±0.38	17.65±0.43	32	21.09±0.50	23	23.57±0.59

*:P<0.05, **:P<0.01 Mean values with different letters are significantly different

animals born as singles were heavier (3.12 kg) than born as twins (2.57 kg). This is in agreement with Sousa et al. (1990), Silva et al. (1993, 1994) and Gebrulul et al. (1994). Males were significantly heavier (3.02 kg) than females (2.67 kg) at birth and this results similar with Silva et al. (1994) and Figueiredo et al. (1982). On the other hand, same results coincide with those found by Medeiros et al. (1992) Khan and Sahni (1983) and they did not find differences between the sexes for birth weight in goats.

In the period 90th day of age that important period of growth was found 14.44±0.44 kg. This value is lower than those found by Kutchtik and Sedlackova (2005) for Brown Short-haired breed (19.52 kg), for Saanen kids (17.4 kg) found by Freits at al. (2004). Otherwise, it value higher and coincide with than those found by Şimşek and Bayraktar (2006) for pure Saanen and pure Saanen × Anatolian Black goat (9.87 – 15.83 kg).

Descriptive statistics for some daily live weight gain of Norduz kids are presented in Table 3. Descriptive statistics of the growth of all kids revealed that in the time interval from birth to day 90 of age, birth to day 180 of age, birth to weaning and weaning to day 180 of age for daily weight gain were 0.193±0.005, 0.145±0.004, 0.129±0.005 and 0.323±0.043 kg, respectively.

Least squares means and standart errors of daily live weight gains of Norduz kids are presented in Table 4. The summary of variance analysis is shown in Table 4. There was a significant effect of dam age on birth – 30th day , birth – 60th day, birth – 90th day , birth – 120th day , birth – 150th day ($p< 0.01$), birth – 180th day ($p< 0.05$) except the birth – weaning and weaning – 180th day. There was a significant effect of sex on all time intervals. These conditions similar to birth type except the weaning -180th day period. The growth kids are incluenced by number of different factor. Year of kidding were significant in influencing growth rate for birth – 30th day ($p <0.05$) and weaning -180th day ($p < 0.01$). Month of kidding was a sinificant source of variation of growth rates before and after weaning. Preweaning growth rates were lower than postweaning. This

may be due to chances in feeding habits at this time of year, but also may be influenced by environmental temperatures and relative air humudity. Year of kidding effect s were ony significant for birth -30th day ($p<0.05$) and weaning – 180th day ($p< 0.01$). Some authors (Barbier et al., 1990; Silva and Araujo, 2000) attributed this to availability and quality of pasture ration, as well as nutritional and sanitary management.

Growth rates in the present study up to weaning (0.129 kg) were higher than for Saanen (0.119 kg), for Toggenburg (0.112), coincience with for Alpin (0.126) found McManus et al. (2008) and coincidence with lower than Saanen (0.136) found by Ceyhan and Karadağ (2009). The evaluation of the effect of sex on growth indicated that males showed the higher growth intensity than females in all time intervals under study. This corresponded with data published by Chavla et al. (1984), Mourad (1993), Ndlovu and Simela (1996), Mourad and Anous (1998) and Portolano et al. (2002). The evaluation of effect of sex on growth intensity in individual time intervals also revealed that the highest daily gain (males =0.402 kg and females =0.226 kg) were recorded in both sexes in time interval of weaning – 180th day; these results corresponded with data published by Mourad and Anous (1998). The analysis of the effect of birth type revealed that daily weight gain of single kids was higher than those of twins except the weaning – 180th day of period.

The evaluation of the effect of age of dams on the growth of kids indicated that , in contrast to results published by Mourad and Anous (1998), Portolano et al. (2002) and Al – Shorepy et al. (2002) , the effect of this factor on the level of daily live weight gain was statically significant in our experi-

Table 3
Descriptive static for some daily live weight gain of Norduz kids

Traits	Factors	N	X±Sx	Min	Max
Birth – 90th day daily live weight gain, kg	Sex				
	Male	27	0.212±0.007	0.138	0.298
	Female	26	0.174±0.006	0.124	0.227
	Birth type				
	Single	28	0.214±0.006	0.154	0.298
	Twin	25	0.171±0.007	0.124	0.240
Overall	-	53	0.193±0.005	0.124	0.298
Birth – 180th day daily live weight gain, kg	Sex				
	Male	19	0.165±0.004	0.139	0.211
	Female	22	0.128±0.004	0.108	0.165
	Birth type				
	Single	24	0.152±0.005	0.108	0.211
	Twin	17	0.135±0.006	0.108	0.183
Overall	-	41	0.145±0.004	0.108	0.211
Birth – Weaning (84th day) daily live weight gain, kg	Sex				
	Male	27	0.140±0.007	0.080	0.210
	Female	26	0.118±0.004	0.071	0.190
	Birth type				
	Single	28	0.145±0.005	0.111	0.210
	Twin	25	0.111±0.007	0.071	0.190
Overall	-	53	0.129±0.005	0.071	0.210
Weaning – 180th day daily live weight gain, kg	Sex				
	Male	18	0.333±0.083	0.080	1.032
	Female	22	0.314±0.038	0.059	0.701
	Birth type				
	Single	23	0.223±0.035	0.059	0.648
	Twin	17	0.457±0.078	0.080	1.032
Overall	-	40	0.323±0.043	0.059	1.032

ment. (p<0.01) except the weaning – 180th day period.The most uniform effect of mother's age on the intensity of kids growth was observed in the time interval from weaning to 180th day. The highest daily gain in this time interval was recorded in kids originating from three-year old dams. Kids born to six-year old dams showed the lowest daily live weight gain in all time intervals under study. As far as the effect of year of study on the growth of kids was concer, it was found out that this factor showed significantly effect on the level of daily live weight gain; ony was the interval birth – 30th day and weaning -180th day.

Milk Yields and Lactation Characteristics

Decriptive statistics and least square means for the lactation length and lactation milk yield of Norduz goats are presented in Table 5. Averages of lactation length and lactation milk yield of Norduz does were calculated as 227.4±2.67 day and 357.6±17.01 l, respectively. Milk production for Norduz does were extremely variable ranging from 241.6 to 395.4 litres among the age groups. Lactation length was less variable than lactation milk yield, ranging from 222.2 to 233.8 days. Lactation milk production for Norduz does were 341.4±17.42 and 373.0±27.27 litres for the two successive years.

Least square means of lactation length (day) and lactation milk yield (l) of Norduz goats were 226.4±7.23 day and 347.2±40.06 l, respectively. In the current study there were no differences (P > 0.05) in lactation length among the age groups (Table 3). These findings are consistent with the results of studies of Eker et al. (1976). In contrast, it has been reported in studies on other goat breeds that the lactation length was affected by age effects (Tuncel et al., 1976; Sönmez et al., 1974). The lactation milk yield of Norduz goats were lower (P<0.05) in does of one and two years old compared to other age groups. These observations agree with the findings of Mavrogenis and Papachristoforou (1990) on Damascus goats and Crepaldi et al. (1999) on Alphine goats. The

Table 4
Least squares - means and standart errors (L.S.M±S.E.M) of daily gains (DG in g) according to age of dams, sex birth type and year of Norduz kids

Factors	n	Birth - 30th day, kg	Birth - 60th day, kg	Birth - 90th day, kg	Birth - 120th day, kg	Birth – Weaning, kg	n	Birth - 150th day, kg	n	Birth - 180th day, kg	n	Weaning - 180th day, kg
		X±Sx	X±Sx	X±Sx	X±Sx	X±Sx		X±Sx		X±Sx		X±Sx
Dam age		**	**	**	**	n.s.		**		*		n.s.
1	6	0.230±0.017	0.167±0.013	0.159±0.010	0.144±0.009	0.110±0.012	6	0.135±0.010	6	0.124±0.007	6	0.300±0.079
2	4	0.289±0.019	0.210±0.014	0.187±0.012	0.158±0.010	0.131±0.014	4	0.126±0.011	3	0.135±0.008	3	0.344±0.097
3	7	0.305±0.014	0.233±0.011	0.183±0.009	0.163±0.007	0.119±0.010	7	0.153±0.008	7	0.140±0.005	7	0.389±0.064
4	10	0.301±0.011	0.212±0.009	0.179±0.007	0.165±0.006	0.119±0.008	10	0.154±0.007	8	0.148±0.005	8	0.357±0.060
5	15	0.347±0.009	0.247±0.007	0.203±0.006	0.186±0.005	0.136±0.007	14	0.168±0.006	8	0.151±0.005	7	0.319±0.064
6	11	0.354±0.012	0.254±0.009	0.204±0.008	0.185±0.006	0.134±0.009	11	0.174±0.007	9	0.154±0.005	9	0.173±0.063
Sex		**	**	**	**	*		**		**		**
Male	27	0.325±0.008	0.236±0.006	0.203±0.005	0.185±0.004	0.134±0.006	26	0.166±0.005	19	0.160±0.003	18	0.402±0.042
Female	26	0.283±0.008	0.205±0.006	0.168±0.005	0.149±0.004	0.115±0.006	26	0.137±0.005	22	0.124±0.003	22	0.226±0.041
Birth type		**	**	**	**	**		**		**		n.s.
Single	28	0.348±0.007	0.258±0.005	0.215±0.004	0.188±0.004	0.146±0.005	28	0.171±0.004	24	0.154±0.003	23	0.274±0.037
Twin	25	0.260±0.009	0.184±0.007	0.157±0.006	0.146±0.005	0.104±0.007	24	0.132±0.005	17	0.130±0.004	17	0.354±0.050
Birth type and sex		n.s.	n.s.	n.s.	n.s.	n.s.		n.s.		n.s.		n.s.
Single male	14	0.361±0.010	0.266±0.008	0.228±0.006	0.205±0.005	0.154±0.007	14	0.184±0.006	12	0.168±0.005	11	0.339±0.059
Sinle female	14	0.336±0.010	0.249±0.008	0.201±0.007	0.171±0.006	0.136±0.008	14	0.159±0.006	12	0.1309±0.005	12	0.209±0.056
Twin male	13	0.290±0.011	0.207±0.009	0.178±0.007	0.164±0.007	0.114±0.008	12	0.147±0.007	7	0.151±0.006	7	0.465±0.069
Twin female	12	0.231±0.011	0.161±0.009	0.136±0.007	0.127±0.006	0.094±0.009	12	0.116±0.007	10	0.109±0.005	10	0.242±0.061
Year		*	n.s.	n.s.	n.s.	n.s.		n.s.		n.s.		**
1	21	0.289±0.009	0.215±0.007	0.179±0.006	0.162±0.005	0.121±0.007	20	0.148±0.006	17	0.137±0.004	17	0.090±0.052
2	32	0.319±0.007	0.226±0.005	0.193±0.004	0.173±0.004	0.129±0.005	32	0.155±0.004	24	0.146±0.003	23	0.537±0.041

*: P<0.05, **: P<0.01 Mean values with different letters are significantly different

lactation milk yield of goats were tend to be higher (P>0.05) in the second year (Table 3). The higher milk yield in second year might be the indirect result of adaptation to the farm and climatic conditions.

Average lactation milk yield of Norduz goats were higher than some native goat breeds of Asia (Bhatnagar & Chawla, 1984; Rai et al., 2000; Rout et al., 2000; Tantia et al., 2001). Similar values to those of Norduz goats in this study have been reported by Keskin & Biçer (2002) on Damascus goats. The lactation milk yield and lactation length of Norduz goats were considerably higher than that of the Hair goats in Turkey (Şengonca et al., 2003). Average lactation milk yield and lactation length of Norduz goats were lower and shorter than in Alpine goats in Italy (Crepaldi et al., 1999), Taurus and Çukurova (Güney et al., 1992) goats in Turkey. Average lactation length of Norduz goats were longer than in some native goat breeds of Asia and Africa (Rai et al., 2000; Tantia et al., 2001).

Discussion

On the basis of the information obtained from the present study it could be concluded that: according to the body measurements and body weight, the Norduz goat is a large size type of goats, and it became clear that there were major differences between the milk yields of Norduz goats and those of other native hair goats in Turkey. Norduz goats have a higher lactation milk yield and longer lactation length than that of the Turkish native hair goats as reported in the literature.

The Norduz goats has the potential to meet and milk the nutritional as well as economic needs of the farmers living in this region. Presently, social and economical problems, involuntary migrations to the cities are of major concern to the sheep-goat breeders of the Norduz region. The role of the Government and policy towards animal genetic resources need to be critically evaluated for the conservation of this type of goat. It can be concluded that conservation of the Norduz goat is of paramount importance and efforts to conserve the breed in an integrated manner should be taken up. However much, this study were realized on the limited population, the Norduz goats could be considered a valuable genetic resource, thanks to their productive characteristics, social functions and rusticity, reasons which well justify their conservation. Finally, we consider it is important to highlight the importance of this type of hair goats, since it is a representation of a culture (historical, social and economic), as well as a valuable genetic resource for the future.

Conclusion

However, relatively small numbers of animals used in the study make it difficult to obtain reliable estimates pertaining to productive performance and body measurements of Norduz goats. Therefore, more detailed and larger scaled experiments are needed to confirm the results on body measurements and productive characteristics of Norduz goats under different farm conditions. Further studies on the Norduz goats' productive and morphological characteristics based on larger sample size under the different environmental conditions would be beneficial for developing conservating strategies. Growth traits and milk yeild in goats in confinement in the Norduz District in Turkey were affected by environmental factors and these should be considered when selecting

Table 5
Descriptive statistics and least square means (± standard errors) (kg) for lactation length (day) and lactation milk yield (l) of Norduz goats

Factors		Lactation length (day)				Lactation milk yield (l)			
	n	Average	Min.	Max.	Mean ± s.e.	Average	Min.	Max.	Mean ± s.e.
Age									
1	6	233.8±4.56	214.0	242.0	231.7±8.06	241.6±36.56	175.8	412.2	219.1±44.66^{b}
2	3	230.3±5.56	222.0	239.0	227.4±10.95	332.8±15.47	308.3	361.4	302.9±60.67^{ab}
3	5	227.2±6.11	203.0	235.0	227.3±8.34	354.3±39.34	258.9	454.7	354.2±46.20^{a}
4	5	225.6±2.73	220.0	234.0	225.7±8.34	380.7±69.32	225.4	636.3	380.7±46.20^{a}
5	11	222.2±4.98	202.0	256.0	221.8±5.42	395.4±30.01	290.8	629.7	391.3±30.04^{a}
6	9	229.4±8.77	183.0	275.0	227.9±6.42	386.0±26.85	284.9	529.8	371.1±35.57^{a}
Year									
1	19	225.1±3.13	202.0	242.0	224.7±5.15	341.4±17.42	197.2	467.5	314.2±28.51
2	20	229.5±4.07	183.0	275.0	229.3±4.76	373.0±27.27	175.8	636.3	358.9±26.35
Overall	39	227.4±2.67	183.0	275.0	226.4±7.23	357.6±17.01	175.8	636.3	347.2±40.06

*, P<0.05; a, b: Mean values with different letters are significantly different (P<0.05).

breeding seasons . Selection for growth rate should result in a reduction in age at marketing and an increase in body weight at maturity. Norduz goats were shown to be faster growing and higher milk yield than the many other breeds according to the alot of literature.

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