CORRELATION ANALISIS OF PRODUCTION TRAITS OF DOMESTIC BALKAN GOAT [**]

N. Memiši[1*], M. Žujović[2], V. Bogdanović[3], M. P. Petrović[2]

[1] AD Mlekara – Subotica; [2] Institut za stočarstvo, Beograd-Zemun; [3] Poljoprivredni fakultet, Zemun
[*] Corresponding author: memisin@mlekara.co.yu
[**] Original scientific paper

Abstract: The paper presents results of investigations of the domestic Balcan goat reared in the Sharplanina mounteinous region pertaining to phenotypic correlations between the most important production traits (milk production traits for 578 goats), and growth traits of kids (for 710 kids in the suckling period). Research was done in herds of Balkan goats belonging to private farmers, during a two-year period. Simple correlation between mentioned traits were calculated using a PC and the LSMLMW program (*Harvey,* 1990). Data pertaining to correlation coefficients established between investigated milk production traits of the domestic Balkan goat, reflect existing correlations, which in most cases, were positive and statistically significant (P<0,01). Very strong correlations were established between the 1st and 2nd milk production control, as well as between the daily milk yield and the 2nd milk production control (0.796), as well as the total milk yield (0.870). Established coefficient were also statistically significant (P<0,01). Correlation between birth weight and the weight at specific ages (30, 60 and 90 days) were strong and very strong, while correlations between birth weight and average daily weight gain established by individual months (0.526, 0.553 and 0.384) varied between weak and strong, with an established weakening of correlations with advancing age.

Key words: domestic Balkan goats, correlation, milk production traits, growth of kids

Introduction

It is very well known that a lot of different relationships and connections exist among certain traits in domestic animals. The nature of these relationships is influenced by various genetic and non-genetic factors. In according to importance, the phenotypic relationships among various traits in goats were investigated by numerous researchers.

Grossman et al. (1986) found out that correlation between milk yield and length of lactation was in range from 0.55 (Toggenburg breed) to 0.64 (Sannen breed). Authors also investigated phenotypic correlations among successive lactations and the findings were: between first and second lactation coefficient of correlation was 0.42, between second and third 0.50, between third and fourth 0.49. It should be noted that coefficient of correlation decreased from first to last lactation. Correlation between first and third was around 0.37, between first and fourth 0.33, and between first and fifth -0.01.

Phenotypic relationship between milk yield and body weight in different goat breeds also was investigated by several researchers. *Iloeje and Van Vleck, (1978)* found that correlation between mentioned traits was 0.39 and 0.132 in Don and in German improvement goat, respectively. On the other hand, *Gall (1980)* found correlation of 0.36 between milk yield and body weight in German improvement goat.

Kennedy et al. (1982) reported that correlation between milk yield and age at kidding was low and around 0.2 in different goat breeds (Alpine, Nubian, Saanen and Toggenburg).

It is known that positive correlation among birth weight and successive growth traits until weaning exists in kids. *Malika et al.* (1986) obtained correlations of 0.33, 0.23 and 0.17 in Beetal and 0.43, 0.41 and 0.25 in Bengal goat among birth weight and weights in I, II and III months after kidding, respectively. Positive genetic and phenotypic relationship between weaning weight and growth rate also was reported by *Mavrogenis et al.* (1984).

The similar results for correlation between milk yield and length of lactation were obtained by *Markovic Bozidarka* (1997). She carried out research on two genotype of Balkan goat (with red hair and spotted hair) rose on private farms. She reported very strong relationship between investigated traits (coefficients of correlation were 0.755 and 0.796 in red and spotted kids, respectively). Further more, strong relationships among milk production traits and body measurements as well as birth weight and successive body weights also were obtained. Correlations among birth weight and body weights at 30, 60 and 90 days after kidding were 0.83, 0.785 and 0.736 in red kids and 0.827, 0.763 and 0.672 in spotted kids. On the other hand, correlations among average daily gain in I, II and III months after kidding and body weight at the end of these months were even more stronger (in range of 0.842 to 0.971).

Material and methods

The research was carried out on the herds of the Balkan goat on the farms of individual breeders in the villages from the Prizren municipality. Investigation material consisted of four herds of Balkan goats, located at varius altitudes and

in various locations. An effort was made for the control to encompass goats with reddish coats, as the authentic representative of the domestic Balkan goat.

In order to establish weight development of kids, in period January-May (season of kidding) during 1996 and 1997, 428 single kids were measured (206 male and 222 female kids) and 282 of twin kids (132 males and 150 females).

Kids were measured individually, at birth and after 30, 60 and 90 days. Technical scale of approved accuracy (10 grams) was used for measuring weight of kids every 10 days, and each time the measured weight was calculated for age of 30, 60 and 90 days. The milk yield in all goats was established from the latest day 10 after kidding, and then until the end of lactation (drying off). All animals were in A type control. The milk yield was measured by using graduated cylinders, the smallest segment being 10 ml.

Simple correlation between mentioned traits were calculated using a PC and the LSMLMW program (*Harvey,* 1990), while strength of correlations was determined according to the *Roemer-Orphal* classification *(Latinović,* 1996)*.* The statistical significance of the effect considered was evaluated by means of the variance analysis at the level P-0,05 and P-0,01. The variations between each mean value were also tested by applying the t-test.

Results and discussion

Results of analysing the to phenotypic correlations between the milk production traits of the domestic Balkan goats, are presented in Table 1. All the correlation coefficients are positive, except for total milk yield in first and second control, as well as daily milk yield with duration of period of lactation, and in most of the cases they were statistically signifficant (P<0,01).

Strong correlation between first and second control was established, as well as between daily milk yield and second control (0,796) and total milk yield (0,870),and the established coefficients were statistically significant (P<0,01). Correlation coefficient between period of lactation and investigated milking traits are low and negative and express existance of non correlative dependance, the values were from 0,191 to 0,028, and they were statisiticaly insignificant (P>0,05).

Quite similar values of correlation coefficient between milk traits to those this investigation shows, has presented *Marković* (1997), who has established complete correlation dependance between daily milk yield and total milk yield by both genotype of goats (0,944 i 0,951), as well as a strong positive correlation between   durration of period of lactation and total milk yield, which is totaly opposite to the results for those two traits in our investigation.

Tabela 1. Fenotipske korelacije osobina mlečnosti
Table 1. Phenotypic correlations between milk production traits

	I kontrola I control	II kontrola II control	KM[1] MP	DL LL	DM AY
I kontrola / I control	0,1**	0,807**	0,446**	-0,191[NS]	0,662**
II kontrola / II control		1	0,643**	-0,149[NS]	0,796**
KM / MP			1	0,028[NS]	0,870**
DL / LL				1	-0,117[NS]
DM / AY					1

[1], KM –ukupna količina mleka / MP- milk production
DL-dužina laktacije/ LL- lactation length i DM-dnevna mlečnost/ AY- average yield

The results of established correlation coefficients between growth traits of suckling kids (up to age of 90 days) are presented in Table 2.

All the established values for correlation between the growth traits during the suckling period are positive and statistically significant ($P < 0,01$). Very strong correlation is shown between birth weight as well as the weight at specific ages (30, 60 and 90 days), while the correlation between birth weight and average daily gain measured by months (0,526, 0,553 i 0,384) was changeing from weak to strong, and with ageing the correlation was decreasing. Also the established correlation coefficients between total daily gain during suckling period and birth weight, than at 30, 60 and 90 days, as well as the average daily gains among these periods, were strong and complete (0,681 - 0,953). Analyses have also shown very strong correlation(0,862, 0,808 i 0,639) between average daily gain by certain age of suckling period and body weight of kids by the end of control periods (at 30, 60 and 90 days).

According to available publications, the similar values for correlation coefficients between growth traits presents *Marković* (1997) for kids of domestic Balkan goat, where the very strong correlation between birth weight and weight at 30, 60 and 90 days is established, as well as very strong to complete correlation between average daily gain at certain control periods and weight by the end of those periods.Our results are similar to those of *Mavrogenisa et al.* (1984), which have prooven existance of positive and strong phenotypic correlation between speed of kid's weight gain up to the end of suckling period and the weight at the end of this period.

Tabela 2. Fenotipske korelacije izmedju porodne mase i prosečnog dnevnog prirasta jaradi od rodjenja do 90 dana uzrasta
Table 2. Phenotypic correlations between birth weight and average daily gain during the suckling period

	PM/ BW[1]	M30 W30	M60 W60	M90 W90	PDP-I ADG-I	PDP-II ADG-II	PDP-III ADG-III	PDP-0-90 ADG-0-90
PM / BW[1]	1	0,753**	0,676**	0,627**	0,526**	0,553**	0,384**	0,681**
M30 / W30		1	0,933**	0,891**	0,862**	0,548**	0,435**	0,783**
M60 / W60			1	0,971**	0,827**	0,808**	0,461**	0,904**
M90 / W90				1	0,804**	0,812**	0,639**	0,953**
PDP- I ADG-I					1	0,521**	0,430**	0,833**
PDP-II / ADG-II						1	0,560**	0,833**
PDP-III / ADG-III							1	0,650**
PDP-0-90 ADG-0-90								1

[1] PM- Porodna masa, BW – Birth weight; M30 – Masa sa 30 dana, W30-Weight with 30 days; M60 -Masa sa 60 dana, W60- Weight with 60 days; M90- Masa sa 90 dana, W90- Weight with 90 days; PDP-I Prosečan dnevni prirast od 0-30 dana, ADG-I- Average daily gain from 0-30 days; PDP-II Prosečni dnevni prirast 30-60 dana, ADG-II- Average daily gain from 30-60 days; PDP-III Prosečni dnevni prirast od 60-90 dana, ADG-III- Average daily gain from 60-90 days; PDP-0-90 Prosečni dnevni prirast 0-90 and TDG- Average daily gain from birthday to 90 days.

Lower results in their researches have established *Malik et al.* (1986) following weight gain of kids of Indian betal and bengal breed of goats in period from birth to the end of suckling period, where they established lower correlation between birth weight and weight at 1, 2 and 3 months of age in both groups.

Conclusion

On analysing the to phenotypic correlations between the milk production traits and growth traits of kids of the domestic Balkan goat that is raised in the region to the north-west of the Šarplanina massif, the following can be concluded:

Data pertaining to correlation coefficients established between investigated milk production traits of the domestic Balkan goat, reflect existing correlations, which in most cases, were positive and statistically significant (P<0,01).

Correlation between birth weight and the weight at specific ages (30, 60 and 90 days) were strong and very strong, while correlations between birth weight and average daily weight gain established by individual months (0.526, 0.553 and 0.384) varied between weak and strong, with an established weakening of correlations with advancing age. Also, established correlation coefficients were strong to complet (0.681 to 0.953) between the total daily weight gain the entire suckling period and the birth weight, the weight at 30, 60 and 90 days, as well as the average gains between these periods.

Korelaciona analiza proizvodnih osobina domaće balkanske koze

N. Memiši, M. Žujović, V. Bogdanović, M. P. Petrović

Rezime

Kod domaćih životinja postoje odredjene medjusobne veze i uslovljenosti u ispoljavanju pojedinih proizvodnih i drugih osobina. Suština je u tome što ispoljavanje jedne pojave, osnovne osobine, manje ili više, uslovljava ispoljavanje druge pojave, odnosno osobine. Pručavanjem tih veza uočeno je da na njih mogu da utiču genetski i paragenetski činioci.

U radu su prikazani rezultati ispitivanja fenotipskih korelacija između osobina mlečnosti (kod 578 koza) i porasta jaradi u dojnom periodu (kod 710 jaradi), domaće balkanske koze koja se odgaja na području planinskog masiva Šarplanine. Istraživanja su izvedena u stadima balkanskih koza privatnih odgajivača, u toku dvogodišnjeg perioda. Korelaciona zavisnost između navedenih osobina urađena je primenom programa LSMLMW *(Harvey,* 1990). Podaci o utvrđenim koeficijentima korelacije izmedju ispitivanih osobina mlečnosti u domaće balkanske koze, odražavaju postojanje korelativne zavisnosti, pri čemu su u većini slučajeva bili pozitivni i statistički značajni (P<0,01), osim za utvrđene vrednosti ukupne količine mleka sa prvom i drugom kontrolom, kao i dnevne mlečnosti sa dužinom laktacije. Takođe, sve ustanovljene vrednosti za korelacije izmedju osobina porasta jaradi u dojnom periodu (mase jaradi po pojedinim periodima uzrasta, dnevnog prirasta) su pozitivne i statistički vrlo značajne (P<0,01).

Ključne reči: domaća balkanska koza, fenotipske korelacije, osobine mlečnosti, porast jaradi

Literatura

GALL, C. (1980): Relationship between body conformatiion and production in dairy goats. Journal of Dairy science, Vol. 63, No. 10.

GROSSMAN, M., FERNANDO, R.L., MOHAMMAD, W.A., ALI, A.K.A., SHANKS, R.D. (1986): Correlations between parities for lactation traits in United States dairy goats. J. Dairy Sci. 69, 1917-1921.

HARVEY, W.R. (1990): Mixed Model Least Squares and Maximum Lidelihood Computer Program. User`s Guide for LSMLMW and MIXMDL.

ILOEJE, M.U. and VAN VLECK, L.D. (1978): Genetics of dairy goats. A. Review. Jorunal Dairy Sci. 61, 1521-1528.

KEENEDY, B.W., FINLEY, C.M., BRADFORD, G.E. (1982): Phenotypic and genetic realitonships between production and milk production in dairy goats. Journal Dairy Sci. 65, No 12.

LATINOVIĆ, D. (1996): Populaciona genetika i oplemenjivanje domaćih životinja. Praktikum, Beograd.

MALIK, C.P., KANAUJIA, A.S., PANDER, B.L. (1986): A note on the factors affecting pre-weaning growth in Beetal and Black Bengal kids and Their crosses. Animal production, Vol. 43, part 1.

MARKOVIĆ, BOŽIDARKA (1997): Proizvodne i reproduktivne osobine važnijih varijeteta domaće balkanske koze u Crnoj Gori. Magistarski rad, Beograd.

MAVROGENIS, A.P., CONSTANTINOU, A., LOUCA, A., (1984): Enviromental and genetic causes of variation in production traits of Damascus goats. 1. Pre-veaning and post-veaning growth. Animal Production, 38 (1) 91-97. Agricultural Research Institute, Nicosia, Cyprus.