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Phenotypic and genetic parameters of milk traits of German fawn goats in Serbia

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Abstract

Records of milk traits (length of lactation, milk yield, fat and protein content, fat and protein percentage) of German Fawn goats (100) which were bred in Serbia were analyzed with mixed linear models in order to estimate the effects of year and season of kidding, number of born kids and order of lactation on milk traits. All factors considered in the models affected some of milk traits significantly. Significant influence of year and season of kidding was just to length of lactation. Yield of milk, fat and protein was lower in the first parity of goats than in latter parities. Fat and protein contents showed the same trend. Goats with more than one kids at parturition had higher milk, fat and protein yield than goats with one kid.

The flock with 50% of goats in first lactation and with 622 kg average milk yield present good base for further selection. The same suggest obtained high values of heritability coefficients for milk, fat and protein yield (0.727, 0.704 and 0.888).

Introduction

The excellent quality of goat milk – good nutritional value, good digestibility and acceptability and low allergic potential, recommends it for children, elderly and convalescent persons (Ribeiro and Ribeiro, 2001). It is the reason for increasing the number of goats every year in developed countries, and for it`s tendency for establishing resorts and hospitals where diseases are successfully treated by goat`s milk (Sprūžs, 2004).

In Serbia goat breeding is not tradition and Serbian was not important feeders of goat`s products. Nowdays, Serbian consumers have an increasing interest in non-traditional foodstuffs. That increased interest of breeders to breeding dairy goats which is not so many in Serbia. Last few years more than 300 dairy goats were imported in Serbia, mainly from Germany. Most of them belong to German Fawn breed.

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The main objective of our study was to evaluate the effects of some genetic and non genetic factors to milk production and milk composition in first three lactation period of German Fawn goats.

Material and methods

Milk yield was measured during first three lactation period of 100 German Fawn goats every 30 days, when milk sampled for milk composition analyses. Content of fat and protein was determined in milk laboratory of Department of Animal Science at Faculty of Agriculture in Novi Sad using standard Gerber and Kjeldahl methods.
Since all goats included in this study were kept under the same management condition into account were taken factors: year and season of kidding, number of born kids and parity (order of lactation).
Traits statistically analyzed were: length of lactation, milk yield, protein and fat content and protein and fat percentage. The data were analyzed with the following mixed model:

$$Y_{ijkl} = \mu + F_i + J_j + S_k + B_l + P_m + e_{ijklm}$$

where

Y_{ijkl} = dependent variable; μ = population mean; F_i= random effect of fother; J_j = fixed effect of year of kidding; S_k = fixed effect of season of kidding; B_l = fixed effect of number of born kids; P_m = fixed effect of parity; e_{ijklm} = random residual effect

Results

Means and standard deviations of analyzed traits are in Table 1. Dimassi et al. (2005) presented higher value for milk yield of German Fawn goats (717.9 kg) as well as Spath and Thume (2000) (767 kg). It is important to say that in research of Dimassi et al. (2005) were included results of second and third lactation, while in the research presented by Spath and Thume (2000) showed average milk yield of 4507 goats. In our study at about 50% of goats were in the first lactation and it was the reason for lower level of milk production.

Table 1: Arithmetic mean (x), standard deviation (SD), heritability (h^2) and standard error of heritability (SG h^2) of traits

Traits	X	SD	h^2	SG h^2
Length of lactation	238.72	25.38	0.28	0.355
Milk Yield	622.07	155.89	0.727	0.548
Fat Content	18.91	5.50	0.704	0.542
Protein Content	18.96	5.10	0.888	0.593
Fat Percentage	3.02	0.18	0.183	0.344
Protein Percentage	3.04	0.12	0.599	0.508

Values for fat and protein content and those for fat and protein percentage were in agreement with those reported by Dimassi et al. (2005) and Spath and Thume (2000) for German Fawn goats.
High values of heritability for milk yield and fat and protein content presented in table 1 suggested low phenotypic and high genetic component of variance which means that goat flock we researched could be good base for further selection. Heritability and repeatability estimates for fat content always are lower than those reported for other component, such as protein content (Othmane et al. 2002).

Results of F test presented influence of the fixed factors (year and season of kidding, number of born kids and parity) to length of lactation, milk yield and milk components.

Table 2: Influence of the fixed effects to analyzed traits

Traits Fixed effects	Length of lactation	Milk Yield	Fat Content	Protein Content	Fat Percentage	Protein Percentage
Year of kidding	7.653***	0.858^{ns}	1.256^{ns}	0.802^{ns}	1.812^{ns}	1.467^{ns}
Season of kidding	9.109***	2.656^{ns}	2.091^{ns}	2.488^{ns}	0.881^{ns}	0.424^{ns}
Number of born kids	0.878^{ns}	3.127*	3.067*	3.234*	1.540^{ns}	0.455^{ns}
Parity	0.660^{ns}	13.767***	23.753***	18.634***	26.662***	15.952***

* P<0.05
*** P<0.001
ns no significant

All factors considered in the models affected some of milk traits significantly. Significant influence of year and season of kidding was just to length of lactation. Yield of milk, fat and protein was lower in the first parity of goats than in latter parities. Fat and protein contents showed the same trend as well as fat and protein percentage. Goats with more than one kids at parturition had higher milk, fat and protein yield than goats with one kid.

Conclusions

In our research at about 50% of goats was in the first lactation. In that case, 622 kg average milk yield presented good production. The fact that order of lactation significant influence to milk yield and milk composition, as well as obtained high values of heritability coefficients for milk, fat and protein yield (0.727, 0.704 and 0.888) suggested that goat flock included in the research present good base for further selection.

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