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DEVELOPMENT OF GOAT BREEDING IN HUNGARY

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ABSTRACT

The level of Hungarian goat breeding is far below the European average, the population is less than 10% of sheep's. The number of mother goats is only about 60 000 heads. The population shows medium values in both meat- and milk-production, but well adapted to the environmental conditions. A planned improvement of the present population and local breeds will get the goat breeding close to the level of the EU. Today only a limited number of purebred herds (Alpine, Saanen and Boer), suitable to this purpose, can be found in the country. Maintaining the existing purebred herds, three new dairy breeds (Hungarian Dairy White Goat, Hungarian Dairy Brown Goat, and Hungarian Dairy Multicolour Goat) are being formed. The goal of our investigation was to determine the present production level of our goat population based on the analysis of collected data representing different genotypes. Differences in production of different breeds and genotypes were determined.

Key words: goats / breeds / milk yield / daily weight gain / Hungary

RAZVOJ KOZJEREJE NA MADŽARSKEM

IZVLEČEK

Stopnja razvoja kozjereje je precej pod evropskim povprečjem, stalež koz pa predstavlja le 10 % staleža ovc. Število plemenskih koz znaša samo približno 60 000. Populacija izkazuje povprečne lastnosti tako za prirejo mleka, kot mesa, je pa dobro prilagojena okolju. Potreben je načrten napredek sedanje populacije koz in lokalnih pasem, da bi se približali ravni reje v EU. Danes imamo na Madžarskem samo omejeno število šistopasemskih čred (srnasta, sanska in burska), primernih za ta namen. Z ohranjanjem obstoječih čistopasemskih čred in z njihovo pomočjo oblikujemo tri nove mlečne pasme koz (madžarsko belo, madžarsko rjavo in madžarsko pisano mlečno pasmo koz). Namen našega dela je bil ugotoviti sedanjo proizvodno raven naše populacije koz na osnovi analize zbranih podatkov različnih genotipov koz. Prikazali smo razlike v proizvodnih lastnostih med različnimi genotipi.

Ključne besede: koze / pasme / mlečnost / dnevni prirast / Madžarska

INTRODUCTION

In the literature study, we concentrated to references dealing with the Saanen, Alpine and Boer breeds. In India, during improvement of the local population of low production level, lactation and daily milk production, as well as the lactation length of Alpine × Beetal and Saanen × Beetal F1 mothers was superior as compared to those of R1 individuals (Kale and Torner, 1997). In Mexico, investigating the production of local mother goats, and their hybrids with Alpine, Saanen, Anglo-Nubian, Toggenburg and Murcia breeds, genotypes created using Alpine and Saanen were superior to local breeds and other crosses (Montaldo *et al*., 1995). In Canada, mother goats of different breeds were inseminated with Saanen and Boer bucks. Birth weight of kids of Boer paternity was higher by 9%. The goat population of Bulgaria consists mostly of heterogenous local herds, however a new breed, the Bulgarian White Dairy Goat was formed by combining the advantageous characters of the local and Saanen breeds, with lactations of 1000 kg (Várkonyi and Áts, 2000). In Czech Republic, in spite of the small total population, there are several breeds, from which the conventional Czech White and Czech Brown Shorthair Breeds are the most common. Daily weight gain of Czech White Shorthair × Boer kids (66 g), was superior as compared to the purebred (56 g) Czech White Shorthairs (Fantova and Cernar, 1996). In Slovakia, most of the population belongs to the Slovakian White and Slovakian Brown breeds, results of crossings with imported Saanen and Alpine bucks. In Romania, Carpathian and Banat breeds, resulted in by Saanental crossings, are the most important among local breeds. Lactation production and length of Carpathian goats were improved by repeated Saanen crossing (Carpathian 290 kg/206 days, Carpathian × Saanen F1 365 kg/215 days, Carpathian × Saanen R1 401 kg/220 days; Tafta *et al*., 1993). In Croatia, they want to improve the local breeds by Saanen and Alpine bucks. In Slovenia, besides the traditional Drežnica-Bovec goat, Saanen, Alpine, and Boer are bred, too (Kukovics and Jávor, 2001a,b). In Yugoslavia, the Balkan Lowland and Balkan Mountain Goat, their hybrids, and the White Dairy local breed are to be mentioned, and besides these, there are also imported Saanen and Alpine individuals in the country. In Macedonia the Balkan Goat, in Poland the Improved White Goat breed is dominating. Goat breeding of the Baltic countries is variable. In Estonia, there is only one local breed, while in Litvania and Latvia, there are more breeds, Saanen, Czech and German White in the previous, and Latvian Landrace, Alpine and Saanen in the latter country. It can be stated from literature cited, that in many countries, goat breeding is still in its primitive stage, and local populations are dominating. Crossbreeding started, or planned with imported superior breeds. Locally formed dairy breeds of higher production are present only in a few countries, like Czechia, Slovakia and Bulgaria.

The majority of our goat population (75%) is not yet categorized into concrete breeds, so-called „sporadic population", and planned breeding is necessary for improving production level (of milk, prolificacy and meat). For this goal, production data of registered purebred and crossed individuals were analyzed. Three foreign breeds, the Saanen, the Alpine and the Boer, expectedly having major role in the formation of our goat population, were involved in the study.

Our further goal was to investigate the present production results of the three breeds being formed (Hungarian Milking White, Brown and Multicolour Goat, their breeding programme started in 1999). Moreover, we wanted to know the production data of goats belonging to different genotypes created with the above mentioned breeds, for getting information on their effect on our local sporadic (native) goats.

MATERIAL AND METHOD

Production data of most important breeds and their crosses, registered by the Hungarian Goat Keepers and Breeders Society, were analysed. We concentrated onto two fields, based on the available data: dairy characteristics (lactation production, corrected lactation production, daily milk quantity, lactation length), and offspring's weight gain, depending on genotype, sex and birth category. Data were provided by the Hungarian Goat Keepers and Breeders Society and by the Hungarian Society of Alpine and Saanen Goats. Six breeds and their crossing combinations, out of almost 15 goat breeds and genotypes occurring in Hungary, were involved in the study. The individual breeds were assigned with a breed-code elaborated by the Society (Table 1.).

Data of two different groups were used for the analysis of offspring weight gain. In the first one, daily weight gain of individuals belonging to different genotypes and sexes was evaluated.

In the second one, weight gain was evaluated depending on the sex, birth category and genotype. In this group, individuals of three different genotypes were evaluated in the male sex groups (Alpine × local sporadic, Saanen × local sporadic and Boer × Saane. In the case of female kids, only production data of individuals belonging to the Alpine × local sporadic and Saanen × local sporadic genotypes were available.

Corrected lactation production was calculated according to Molnár (2000). Data were arranged and basic calculations were carried out using a Microsoft Excel for Windows XP programme. Statistical analyses were perfected by SPSS for WindowsTM 10.0 (2001) programme. For the comparison of two groups the „t"-probe, for the investigation of significance of differences of more groups was tested by one- or multifactorial analysis of variance (LSD test). Statistical probes were carried out at P<0.05(*), P<0.01(**) and P<0.001(***) probability levels, indicated in all cases.

The following statistical models were used for the analysis:

$$X_{ij} = \mu+G_i+e_{ij}$$

where

X_{ij} = lactation production according to genotypes; corrected lactation productions according to genotypes; daily milk productions according to genotypes; lactation length (days) according to genotypes

G_i = genotype

e_{ij} = random error

$$X_{ij} = \mu+S_i+BC_j+W_{ij}+e_{ijk}$$

where

X_{ij} = daily weight gain

S_i = sex

BC_j = birth category

e_{ijk} = random error

W_{ij} = interaction between sex and birth category

RESULTS

The best lactation production were reached by the Alpine and Saanen mothers, with 421, i.e. 432 l milk. In the case of lactation production corrected by lactation numbers, also individuals of these two breeds produced the most milk (on average 454, and 535 l). Average production of Hungarian Milking White, Brown, and Multicolour Goats being formed from the Hungarian goat population still showed the effects of their past, their average milk production was 180, 250, and 235 L, respectively. Quantity of daily milk was also highest in at the Alpine (2.48 l day^{-1}) and Saanen (2.57 l) mothers. The Hungarian genotypes produced less, than the average level (Hungarian Milking White 1.33, Hungarian Milking Brown 1.66, and Hungarian Milking Multicolour 1.52 l day^{-1}). At the analysis of milking period (lactation length in days) the Alpine × sporadic genotypes reached the highest value of 200 days, far behind the ideal 300 days one. Even the best milk producer breeds had quite short lactations (Alpine 172.32, Saanen 164.70 days on average). Milking periode of the Hungarian breeds was even shorter: 125.68, 138.96, and 143.94 days for the Milking White, Milking Brown, and Milking Multicolour breeds, respectively. Comparison of dairy characteristics resulted in always highly significant differences between the production of „sporadic" versus Alpine and Saanen, and the three Hungarian Milkings versus the two imported breeds (Table 2.).

Table 1. Codes of breeds and genotypes investigated

Breed / genotype	Code	Number of observations	
		Corrected lactations production, daily milk production, lactation length	Weaning age
″Sporadic″	1	234	198
Alpine cross of undefined rate	5	7	7
Hungarian Milking White	11	28	12
Hungarian Milking Brown	12	114	89
Hungarian Milking Multicolour	13	65	55
Boer	30	10	9
Alpine	50	150	120
Saanen	60	275	205
Alpine × Sporadic (F_1)	501	29	24
Saanen × sporadic (F_1)	601	104	75

Table 2. Analysis of variance of lactation production according to genotypes (Means ± SD on the diagonal and P-value under the diagonal)

Breed-code	1	5	11	12	13	30	50	60	501	601
1	296.00 ±156.01									
5	0.425	237.27 ±107.02								
11	0.002	0.460	177.42 ±126.48							
12	0.014	0.947	0.109	242.23 ±157.13						
13	0.007	0.851	0.294	0.517	222.91 ±137.32					
30	0.493	0.284	0.023	0.128	0.076	338.52 ±76.04				
50	0.0001	0.013	0.0001	0.0001	0.0001	0.187	421.21 ±201.63			
60	0.0001	0.008	0.0001	0.0001	0.0001	0.130	0.577	432.08 ±250.13		
501	0.017	0.065	0.0001	0.0001	0.0001	0.496	0.372	0.224	386.47 ±163.78	
601	0.132	0.742	0.039	0.449	0.198	0.228	0.0001	0.0001	0.002	261.95 ±166.2

Similarly significant differences were proven by the analysis of variance among the production of mothers belonging to the Hungarian White, Brown, Multicolour, and Alpine × sporadic genotypes (Tables 3., 4., and 5.). In all of the milk production characteristics investigated, Hungarian White Milking mothers produced at the lowest level, while among the crossbred genotypes the Alpine × sporadic F1 individuals were the most promising ones (near 400 L lactations^{-1}, 2 L milk day^{-1}, and 200 milking days). The heterogenous home population and the recently recognized Hungarian Milking breeds are not yet able to fulfill the 400 l lactation requirement, since their production remains behind it.

Investigating the offspring daily weigth gain, among different genotypes, the gain of individuals of the Boer breed was the best (273 g), however not significantly higher, than that of

Hungarian Milking Brown (269.9 g) and Hungarian Milking Multicolour (269.6 g) kids. Weight gain of Boer goats remained far behind the expected (Table 6.). This poor result was probably caused by the low number of individuals available not given in the table. In the investigation of weight gain in different sexes, the only significant difference was found between female kids belonging to birth category 1 (266.97 g day^{-1}) and 3 (241.83 g day^{-1}).

Table 3. Analysis of variance of corrected lactation productions according to genotypes (Means ± SD on the diagonal and P-value under the diagonal)

Breed-code	1	5	11	12	13	30	50	60	501
1	315.86 ±164.69								
5	0.382	242.72 ±111.66							
11	0.002	0.496	180.03 ±127.43						
12	0.008	0.935	0.130	249.65 ±161.43					
13	0.008	0.930	0.264	0.667	235.08 ±147.60				
30	0.270	0.161	0.008	0.046	0.033	393.58 ±113.34			
50	0.0001	0.009	0.0001	0.0001	0.0001	0.325	463.67 ±217.69		
60	0.0001	0.0001	0.0001	0.0001	0.0001	0.044	0.001	535.04 ±293.91	
501	0.008	0.043	0.0001	0.0001	0.0001	0.657	0.435	0.013	429.16 ±180.29

Table 4. Analysis of variance of daily milk productions according to genotypes (Means ± SD on the diagonal and P-value under the diagonal)

Breed -code	1	5	11	12	13	30	50	60	501
1	1.89 ±0.707								
5	0.744	1.77 ±0.577							
11	0.002	0.253	1.33 ±0.499						
12	0.027	0.743	0.092	1.66 ±0.581					
13	0.004	0.484	0.365	0.333	1.52 ±0.630				
30	0.905	0.861	0.122	0.516	0.283	1.85 ±0.317			
50	0.000	0.043	0.000	0.000	0.000	0.033	2.48 ±1.079		
60	0.000	0.022	0.000	0.000	0.000	0.014	0.355	2.57 ±1.188	
501	0.625	0.599	0.008	0.094	0.025	0.713	0.006	0.001	1.97 ±0.721

Table 5. Analysis of variance of lactation length (days) according to genotypes (Means ± SD on the diagonal and P-value under the diagonal)

Breed -code	1	5	11	12	13	30	50	60	501	601
1	156.15 ±53.53									
5	0.198	130.29 ±23.70								
11	0.004	0.835	125.68 ±44.3							
12	0.004	0.671	0.229	138.96 ±52.12						
13	0.097	0.512	0.123	0.541	143.94 ±44.13					
30	0.133	0.047	0.004	0.014	0.035	181.60 ±20.44				
50	0.003	0.038	0.000	0.000	0.000	0.588	172.32 ±50.23			
60	0.067	0.086	0.000	0.000	0.004	0.316	0.152	164.70 ±56.09		
501	0.000	0.001	0.000	0.000	0.000	0.325	0.008	0.000	200.52 ±58.92	
601	0.109	0.435	0.065	0.305	0.780	0.042	0.000	0.002	0.000	146.25 ±50.77

Table 6. Analysis of variance of weaning age according to genotypes (Means ± SD on the diagonal and P-value under the diagonal)

Breed code	1	5	11	12	13	30	50	60	501	601
1	209.81 ±49.76									
5	0.008	285.86 ±53.29								
11	0.945	0.035	211.33 ±81.68							
12	0.000	0.585	0.010	269.93 ±84.60						
13	0.000	0.584	0.014	0.977	269.56 ±113.83					
30	0.013	0.724	0.061	0.916	0.907	272.67 ±53.41				
50	0.011	0.060	0.368	0.000	0.002	0.109	231.58 ±87.52			
60	0.063	0.029	0.578	0.000	0.000	0.052	0.350	223.60 ±66.13		
501	0.411	0.005	0.575	0.000	0.000	0.009	0.035	0.092	196.63 ±43.38	
601	0.002	0.128	0.196	0.014	0.031	0.229	0.380	0.008	0.011	241.16 ±85.20

DISCUSSION

We could summarize, that our present goat population – except the imported breeds – does not yet produce at the desired level. In spite of this statement, we can say, that this is the promising starting population of Hungarian goat breeding, from which, as the result of the already started goal oriented breeding work, a population meeting the EU level may be developed.

Correct production and breeding control may be ensured only based on providing precise data and registration, therefore producers must be interested for realizing its importance. It is necessary to develop the registered and controlled herds, increase their production results by the involving imported breeds of superior production. As meat production of goats is more supported, than milk in the EU, therefore improving meat production is also a goal in a part of the goat population. It will be necessary to increase the number of animals of foreign breeds already present, and maybe importing further breeds. As the goat may became an important element of rural development and landscape maintenance, improvement and support of goat breeding is possible on those grassland and hill areas, maintainable only by small ruminants. Populations of such genotypes should be formed, which are able to produce at convenient level in extensive, semi-intensive and intensive conditions.

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