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The study of genotypic and phenotypic particularities at the goats of a local population in Republic of Moldova with the aim of preserving the genetic diversity

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Abstract

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The results of research at local goats are aimed at the accumulation of information for determining the level of their productivity, the specifics of their exterior and the existing variability for improvement actions both within the existing population, as well as the possible crossings with the breeding material from export that recently is appeared in our country. As the material of research were served goats from the local population belonging to different localities of the republic. The color of the pilose coating (the hair) is also an index that can characterize a specific breed of goats, especially of the improved. Under this aspect at the researched local goats is found a pronounced variability: about 25% have white hair, 19% are with black hair, a little over 17% are with brown (grey) hair, about 16% are with brown and red hair of different shades and about 23% have spotted color (mottled). Depending on every animal in all age groups, the limits of body measurement are wide demonstrating the pronounced variability as the body weight, which average at goats is low: 37.0±1.0 kg (lim. 25-50.5 kg), and which is increasing from 32.4 kg (at 2.5 years) to 40.7 kg in those over the age of 5 years. Milk is the base production for which the goats are bred in our republic. According to our research, the average production from local goats constitutes 305.8±13.8 kg of milk during 7 months of lactation with the individual limits between 100-500 kg. According to the chemical composition of the local goats milk, it can be said that it has indices corresponding to its transformation into cheese. Depending on the level of milk production the local goats can be classified as a rustic population that is not improved, and the existing variability under the appearance of the main indicators is denoting the possibility of the implementation and realization of selection programs on the level of the separate herds, in separated localities or districts.

Keywords: goats; production; variability; correlation; selection.

Introduction

Raising goats is favored by the broad spectrum of utilities for humans. All over the world are recognized around 360 breeds of goats (Zabelina, 2009). It is estimated that goat herds are in the numerical growth in most of the countries. The population is increasing worldwide with about 5 million heads per year (Tafta, 2008; Novopashina & Sannikov, 2010). So after the number of goats, as well as after the volume of production of meat and milk at the goats, the Asian continent is on the top returning about 65% of the total meat production and over 50% of milk production (Pascal, 2007; Novopashina & Sannikov, 2010). The European continent is producing about 17% of the total milk volume obtained from goats. Among European countries the first the second and the third places are owned by Spain, France and Greece (Tafta,

1996). These three countries mostly grow specialized breeds or milk breeds that are intensively exploited. In the Republic of Moldova, more attention has been paid to this species since the early 1990s, along with the changes that have taken place in agriculture in general and in the livestock sector in particular. At the present, goats are becoming more and more demanded by livestock farmers in our country being rightfully considered economically advantageous. The reported results are confirmed by the numerical doubling of the goats (58 thousand heads in 1992 and over 130 thousand in the present), with the creation of separate herds (farms) of the goat species, and with the application of the genetic material from specialized breeds for the cross-breeding improvement of the milk production of local goats (Mogoreanu et al., 1998; Bucataru et al., 2003). The results of the research at local goats (Mogoreanu et al., 1998; Mashner, personal communication, 2010) aim at gathering information to determine their level of production, their specificity of the exterior and the variability existing for the improvement actions both within the existing population (Mogoreanu et al., 1998; Bucataru et al., 2003) and by the possible crosses with the exported enhancement material that has recently appeared in the country (Mashner, personal communication, 2010).

Materials and Methods

As the material of research were used the goats from the local population, belonging to different localities of the Republic of Moldova. The exterior evaluation of goats was made using somatoscopic and somatometric methods. The pilosity was examined visual and tactilely in the laboratory according to the usual methods. Milk production was studied on the basis of milking control using the "control coficient" until the weaning of goat kids and then monthly milking control. The chemical milk composition has been made according to generally accepted methods in milk and dairy technology (Guzun, 1996). Based on the milk production control group (n-54), some phenotypic correlations were calculated and the selection core was formed using the standard deviation – σ. The series variation has been statistically processed, with calculating the degree of authenticity, using the criteria of Stiudent, after Plohinschii (1969).

Results and Discussions

Following the evaluation of exterior and body conformation at local goats results were obtained that provide useful criteria for characterizing the investigated population of goats (Tafta, 1996; Pascal, 2007). The analysis of the data shows that according to the external aspect, local goats belong to a late animal population having an elongated and pronounced dry body with poorly developed muscles on the basic regions of the narrow body (thorax, spine, etc.). The head is of medium size – in proportion with the straight or slightly convex profile. Ears are of medium length and not dangling. In a small proportion are found goats with very small ears – not specific. The examined herds are mostly presented by goats (males and females) with and without horns, which reflects the existing variability in terms of homo – and heterozygosis for this quality character. The same refers to the presence of "earrings" and goatee at goats. Males have anyway a goatee as a strong character related to the male. It should be noted that with the choice for the breeding at males without horns there is a risk of sterility, which requires taking into account during the selection and then followed the reproductive ability, as well as the quality of the progeny (Tafta, 1996; Tafta, 2008; Perevalova, 2011).

The color of coating pilose (hair) is an index that can characterize the specific breed of goats, especially among the improved (Tafta, 1996; Bucataru et.al., 2003; Pascal, 2007, Tafta, 2008). At local goats it is shown the same pronounced variability: 25% – white, fewer than 19% – black, less than 17% – brown (gray), around 16% – reddish brown and different shades and about 20% have spotted coat color (mottled). On certain herds these values may have some deviations (Figure 1).

Fig. 1. Color variety at local goats

The research on the morphological and fine structure of the pilosity revealed the difference between our goats and the puffed ones (Orenburg, Pridon, etc.), which is characteristic of certain yields of the main categories of pilos fiber: puff – 33.4%, intermediate fibers – 14.2% and thick and long fibers – over 52%. The average fiber thickness was 57.6 microns. This allows us to conclude about membership of local goats to populations of goats raised for milk production. It is worth mentioning that there are certain differences in the color of the hair in the proportions shown above. The study of body mea-

surements at goats of different ages, as well as of goats used at breeding (aged 3 years) denotes a relatively small gabitus: height at withers – 64.5 ± 0.5 cm, oblique length of the trunk – 68.4 ± 0.5 cm, the perimeter of the chest – 76.2 ± 0.5 cm. Depending on the individual, at all age groups the measurement body limits are wide, demonstrating the variability pronounced as the body weight, which average at goats is low: 37.0±1.0 kg (lim. 25-50.5 kg), increasing from 32.4 kg (at 2.5 years) to 40.7 kg in those over the age of 5 years. The situation presented is more characteristic of peasant households where the goat (2-5 heads) is not main animal to obtain milk being maintained and fed in common herd with sheep. Another situation is observed in goat farms where already a few years is working for specialization in the production of goat milk and are implemented some elements of selection. According to our latest research in farms specialized in raising of goats from south of the country, mean body measurements of adult goats (3-7 years) are: height at withers – 66.2±1.1 cm, oblique length of the trunk – 73.4±1.4 cm and chest area – 95.9 ± 2.5 cm. The difference is statistically true, averages calculated with $P \leq 0.01$ for oblique length of the trunk and $P \leq 0.001$ for thorax perimeter. This demonstrates the possibility and the positive effect of selection in the local herds of goats to improve the exterior indices and conformation of goats.

Milk is the basic production for which goats are raised in our country. For this reason, milk production must be placed as the main criterion for selection and studied for each individual in the flock. According to our research, the milk average at local goats is 305.8±13.8 kg in about 7 months of lactation and individual limits between 100-500 kg.

At goats that produced and suckled one goat kid the average milk production was 263.8 kg. Those that produced twins have average milk production of 325.2 kg. The difference is statistically significant – $P \leq 0.05$.

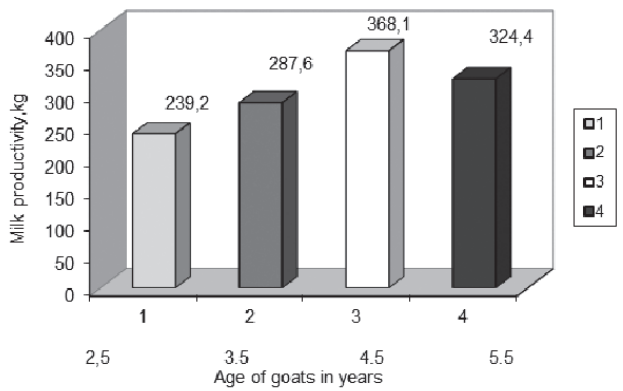

Fig. 2. Milk productivity at local goats depending on ages

Milk productivity is increasing depending on ages of goats (Fig. 2).

Analysis of individual monthly milk production from local goats (lactation curve, Fig. 3) shows that the maximum intensity of milk production is in the range from the second to the fifth month of lactation, so it is also of interest in individual selection.

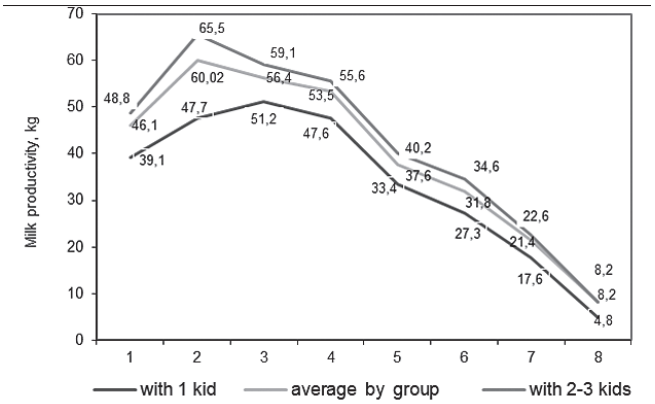

Fig. 3. Lactation curve of local goats

The study of the lactation curve is also important for the technology of dairy production of local goats. So, the technology must be adapted so that the goat kids must be separated from mothers and fed from early artificial with the goal to obtain a maximum yield of raw milk.

According to research on the chemical composition of the milk of local goats can be said that this index is suitable for transformation into cheese: dry matter – 13.2%, fat – 4.13% total protein – 3.44%, including 78.2% casein. The average density of milk is 30.15 °A.

With milk production from local goats we can get some production of goat kids including those that are not retained for breeding but are valued for their meat. The prolificacy of goats in the studied herds include limits between 130-170% depending on the specific conditions and age of the animals. Goat kids show daily increase between 30-60 days (with 130-150 gr. per day depending on gender). The yield in the abattoir of sacrificed young males at 200 days constitute 44.1%, the carcass being on average of 10.3 kg, of which about 66% – portions assigned to the I category.

The values of the phenotypic correlations calculated for the local goats have highlighted the existence of certain links useful for the selection: body mass (development) and total milk production per lactation – 0691±0.11 ($P \leq 0.001$) and milk production of goats – total gain of kids during lactation (0.543±0.19; $P \leq 0.01$).

Simultaneously with the possibility of formation of selection cores on the basis of "+ variants" can be recommended to use for the selection of the coefficient "milk" the values which would be over 9 kg (milk per lactation reported to the body weight of the goat). This, in our opinion, reflects more objectively the individual milk ability of goats. It allows avoiding elimination from herds of animals with a weak body development but possessing good level of milk production and can be more easily applied in practice.

Conclusions

✓ conforming the level of milk production, the local goats can be classified as a rustic population, not improved with the increased level of genetic and phenotypic variability;

✓ the existing variability under the appearance of the main indicators are denoting the possibility of the implementation and realization in communes or districts of selection programs at the level of the separate herds;

✓ in order to preserve the genetic diversity and specificity of the local goats population in the Republic of Moldova it is necessary to develop a state program for the conservation and preservation of the gene pool of this species.

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