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THE EFFECT OF APPLIED CROSSBREEDING ON INCREASING OF MILK PRODUCTION IN SHEEP

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ABSTRACT

The aim of the research was to identify new methods to increase milk production in sheep. An evaluation of milk production at igaie local breed, in comparison with half-breed females from crossbreeding of local breed sheep with Awassi rams (Aw x Ti) and with Lacaune (La x Ti) was conducted. Estimation of milk production was done according to given by International Committee for Animal Recording (AT method) and statistical analysis was performed using the Restricted Maximum Likelihood method. Mean milk production in Aw x Tiewes was 29, 28% higher than in local breed igaie, and 32. 20% higher than in La x Ti ewes. Differences of milk yield found in three groups of animals were very significant ($p < 0.001$). Based on obtained results it could be concluded that crossbreeding of igaie with Awassi breed rams had a better effect on increasing of milk production than crossbreeding with Lacaune breed rams.

Key words: *igaie sheep, milk yield, crossbreeding.*

INTRODUCTION

In the year 2014, Romania was situated in second place in Europe in sheep milk production (MADR, 2015). This placement, after Greece, is due to the attention that is offered to milk production of most sheep breeders in this country. The support of this production is due to a high demand, from both national and international market, for traditional products made of sheep milk, but also for other sorts of products, fresh or seasoned. Taking into account these trends, since 2008 in Romania have been applied various technical measures to support a further growth for this product. The action plan had a positive effect and, thus, currently in Romania, there are produced more than 18000 tons of sheep milk per year (INSSE, 2014). After 2012, given the high demand of the local and international markets towards quality cheeses, in Romania, the sheep and goat breeders organize producers' groups with the purpose of obtaining high-quality cheeses, especially

those with Protected Designation of Origin and of Protected Geographical Indication (Pascal, 2015; Gîlc et al., 2009).

Because the local breeds of sheep, which own the share in live stock, are not characterized by productive high performance, in many holdings in which they grow sheep for milk, have been commissioned various works of improvement. In this process of improvement were also included the main local breeds, namely the Tigaie and Turcana, which together own 74% of the total number of sheep from Romania, but both have average milk production of 140 l (Pascal, 2014; Padeanu 2010; Tafta, 1996). To speed up the improvement process were developed more crossbreeding schemes that use genitors belonging to breeds with superior performance which have proven that alleviates significantly the main characters of the production specific to sheep.

MATERIAL AND METHODS

The main objective of the research was to evaluate the effect due to the possibility of improvement of crossing local Tigaie sheep with Lacaune and Awassirams. In this regard, have been set up in batches that included lactating females and which belonged to the following working groups: a control group (M) consisting of sheep that belonged to local race Tigaie and two other lots L1 and L2 consisting of crossbreed females F1, within the first lactation, resulting from crossing local sheep breed with Awassi rams (L1) and with Lacaune rams (L2). Each formed batch included 25 females belonging to that group.

The performance evaluation for milk production resulted in the analyzed lactation was based on the application of successive periodic inspections, and using for the lactation period the Nica method and for the milking period was exclusively applied the method AT_i in compliance with the technical specifications suggested by International Committee for Animal Recording.

Estimation of the average total production of milk was carried out using the Fleischmann method.

$$\text{Milk yield [kg]} = L_1 \cdot \text{int}_1 + \sum_{i=2}^n \left(\frac{L_i + L_{i-1}}{2} \cdot \text{int}_i \right) + L_n \cdot 14$$

where:

L_1 = milk yield of the 1st monthly test;

L_i = milk yield of the i^{th} monthly test ($i = 1, \dots, n$);

L_n = milk yield of the last test;

int_1 = number of days from kidding to 1st monthly test;

int_i = number of days between monthly tests ($i-1$) and i ($i = 1, \dots, n$);

n = total number of monthly test for a specific animal.

Data were statistically evaluated with the algorithm REML (REstricted Maximum Likelihood), which provides the achievements of the statistical parametric estimators within the normal range.

RESULTS AND DISCUSSION

To meet the real requirements of the market, from 2007, in Romania there have been started several activities to improve milk production in sheep. One of the routes concerned was represented by the crossings applied between local ewes and rams belonging to breeds that have the quality to improve the characters on which milk production relies on (Calin, 2010). Based on these principles, introduction into the productive circuit of some hybrid female populations was a technical action that highly contributed to the increased total milk yield obtained from this species.

The researches were conducted under an experimental plan in which have been included specific objectives to increase the productive performance in sheep. The option for an inclusion in the scheme of crossing local sheep breed igaie was motivated by the fact that it currently holds roughly over 40% of the total number of sheep from Romania (Pascal et al. 2014) and is found in different farms both in the lowland and hilly areas, as well as in the depression, foothills and mountain areas.

The motivation of research was represented by initiating some actions in order to find some quick methods under which, by extension, to increase the total production of milk. Whereas the local breed igaia emerged naturally from the wild form *Ovisvigneiarkar* (Dr g nescu, 1995) and is semi-late, the breed potential for milk production obtained during the interval of lactation is about 135 kg (Pascal 2007, 2015). That is why through the experimental protocol it was initiated a research that had intended to check new methods, more efficient, but also faster, to improve productive performance. In this case we opted out to apply improvement crossings between local igaie sheep and male genitors belonging to Awassi and Lacaune breeds.

The usage of Awassi and Lacaune rams for crossbreeding was motivated by the result of previous studies carried out in Romania (Atanasiu et al.,2010, C lin et al.,2010, P deanu et al.,2010) and other countries (Espetin 1985, De la Fuente et al.,2006, Pacinovski et al.,2007). During the lactation subjected to the productive control, the three groups have benefited from similar conditions of maintenance and feeding. In table 1 there are presented the average total milk production obtained from each group of ewes.

Table 1. Total average milk production obtained in the controlled lactation (kg)

Specification		M	L1	L2
n		25	25	25
\bar{x}		101. 75	141. 72	97. 71
$\pm s_{\bar{x}}$		1. 29	1. 61	3. 57
V %		14. 43	13. 34	13. 09
s		14. 244	16. 23	14. 35
Limits	Minimum	74. 25	98. 50	86. 30
	Maximum	138. 5	187. 0	165. 5
Difference and its signification for the average total milk production				
Batches	Difference \pm		Statistical significance of the difference	
M – L1	39. 97		*** - F (403. 6698) > F (11. 0849) for 0. 001	
L1 – L2	+ 44. 01		*** - F (88. 2851) > F (11. 3487) for 0. 001	
L2 - M	4. 04		N. S. - F (0. 8958) < F (3. 9034) for 0. 05	

Contrary to all expectations, after obtaining the result of data processing it was found that the lowest productive level in all 200 days of lactation was 97. 71 kg, and resulted after the control made to the half breeds females which formed group 2. The L1 group achieved superior performance to the other two groups. Thus, the average level of the total production of milk made by females of this group was higher by 28. 20% compared to the performance of the M group and by 31. 05% than L2 group.

This indicates that local igaie breed reacted better to the crossing with Awassi, substantiating features of a high degree of genetics combinability. The L2 group realized reduced performances because the females of this group were more sensitive to microclimate factors. Based on this observation is conclude that Lacaune breed for crossbreeding should be used only for some infusion crossings to improve the productive performance in certain herds of sheep.

Differences in absolute values are presented in table 2 and have been of 44. 01 kg of milk between groups L1 and L2, and were very significant ($P < 0. 001$).

The performance of this group was well below expectations, being lower for 31% in relation to production level achieved by L1 ewes and for 3. 97% compared with control group (fig. 1).

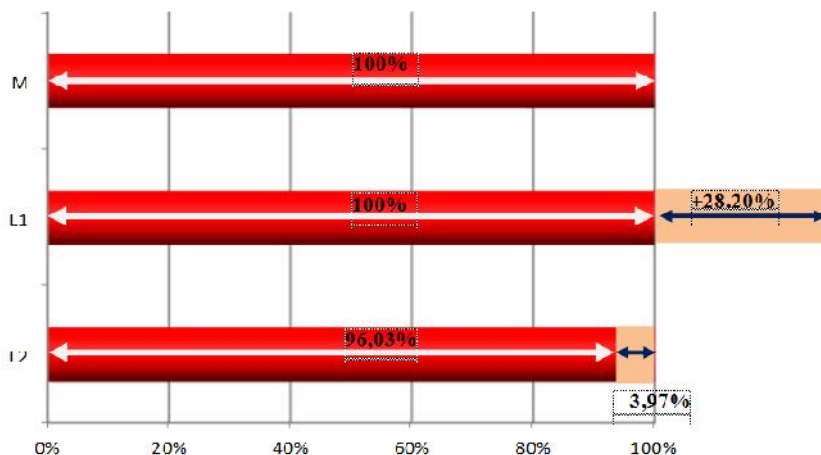


Figure 1. Graphical representation of the differences between groups for productive performance recorded in the controlled lactation

Average variability requires, as a necessity, further selection work and improvement of the three populations in increasing milk production.

The overall mean values assessed during the research for the total average production of milk obtained from igaie sheep are close to the values mentioned by the specialized literature in Romania, quoted by various authors (Pascal, 2007; Taft et al. 1996).

CONCLUSION

The use of crossbreeding to improve milk production in sheep has proven to be a good solution, which enables the growth performance of time for milk production in sheep, to be reduced considerably compared to the application of the enhanced performance of the pure breed.

Using the Awassi breed rams for crossbreeding was beneficial and has increased the average production of milk obtained in the 205 days of lactation for 28% compared to pure igaie ewes.

Regarding the Lacaune breed, due to the fact that crossbred ewe had a lower average milk production by about 4%, compared to pure-breed igaie sheep, it is recommended that the rams of this breed to be used, in particular, at infusion crossings.

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