PhD THESIS ABSTRACT

Key words: milk production, reproduction traits, correlation, heritability, repeatability, body development.

The evolution of the social, political and economic environment affected all sectors of the Romanian agriculture, inducing significant changes in sheep husbandry, as well. Thus, after 1990, the dynamics of sheep flocks, combined with the changes in the rearing trends, were the main factors that contributed to reach the present situation of the Romanian sheep husbandry.

Sheep husbandry could be considered relevant due to the value of the productions that this species gives. Each of them (milk, mutton, wool, skins and furs) bears high inner biological and economical value, even if the general demand is poor. However, there is particular high interest on milk and mutton; therefore the farmers are privileged, due to markets demands, hence the substantial incomes.

The main topic that the original research refers deals with the improvement possibilities of milk yield in Țigaie breed. The theme is trendy and actual, knowing the farmers try to use any possible way to improve the productions levels per capita, in order to achieve economic efficacy. The researches were conducted accordingly to the trends on the national and worldwide levels, which pursuit the increase sheep production, both as quantity and quality.

The PhD dissertation aimed to investigate the morphological and productive traits of Țigaie breed populations reared in the studied area, as well as to assess the same parameters on the cross-breed sheep, issued from crossings between Țigaie breed sheep and rams belonging to Awassi and Lacaune breeds.

Nowadays, when sheep rearing for milk production becomes less and less attractive for farmers, due to high expenses of labor, the necessity of a work like this one is more and more relevant. Thus increasing yield per capita is one of the ways to become efficient, to develop and sustain the sheep farming sector.

Izvoru Berheciului biobase and Holt biobase, both parts of S.C.D.C.O.C. Secuieni-Bacău, hosted the researches that were carried on in accordance with the experimental design. Physical

and chemical traits of sheep milk were assessed in the biochemistry laboratory of the S.C.D.C.O.C. Secuieni-Bacău and in the laboratory of the "Animal Origin Products Processing technology" discipline, within the Animal Science Faculty, belonging to the "Ion Ionescu de la Brad" University of Agricultural Sciences and Veterinary Medicine, Iaşi.

Grouping method was applied in designing the research and three groups were established (Ti, Aw x Ti and La x Ti), for each technological category (lambs, youth, rams and sheep); sheep groups were sub-divided in accordance with their age.

The results issued from the original research that was carried on in the doctoral thesis entitled "**CONTRIBUTIONS REGARDING THE PERFORMANCES IMPROVEMENT OF MILK PRODUCTION AT ŢIGAIE BREED BY CROSSBREEDING WITH SPECIALIZED BREED RAMS**" were structured in a separate chapter and are briefly listed below.

1) **On the determination of origin and breed belonging for the sheep in the three assessed groups:**

- Phenotypic assessment of Țigaie sheep group indicated good exteriorizing of breed traits; thus, thirteen sheep and two rams achieved maximum score (100), the other individuals achieving scores on the next classifying level (75 – 84 points), while the minimal one being attributed to a sheep and to a ram;
- Phenotypic evaluation of sheep in crossbreed Aw x Ti group revealed that the individualized exteriorized clearly enough the paternal breed traits, most of the animals (76) receiving scores between 85 and 100 points, while the maximal score (100) was granted to a ram only. Unlike the Țigaie group, in this case four animals received scores within the lowest class, between 65 and 74 points, due to the absence or to dimmed appearance of certain breed traits (ears size and positioning, tail shape and so on);
- Phenotypic investigations run on sheep belonging to La x Ti crossbreed group showed intense exteriorization of hybrid traits, while the paternal breed traits were dimmed. The minimal score, 55 – 64 points, was given for two sheep, while the maximal one (100) was used in grading two rams, since they are not crossbreeds;

2) **On the assessment of body weight of the sheep in the three groups, as related to age category:**

- Analysis of the average body weight at lambing, for the lambs in the three groups revealed that Aw x Ti crossbreed lambs had 6.72 % better weight, compared to Țigaie group ones and 1.87 % higher than the other crossbreed group;

- Assessment of lambs body weight at weaning (75 days old) indicated the best growth in Aw x Ti crossbreed lambs – 17.66 kg, followed by Țigaie ones – 16.32 kg, then by La x Ti lambs – 16.08 kg; relative weight difference between Aw x Ti and Țigaie groups reached 7.59 %, while the one occurred between crossbreed groups reached 8.95%;
- Dynamics of lambs body weight was also investigated during youth stage. Thus, at eight months old the crossbreed groups had close values, thus the La x Ti presented the highest one, of 35.38 kg, followed by the Aw x Ti group – 35.31 kg, while Țigaie lambs weighted 29.54 kg only;
- Weightings run at 12 months old revealed the highest body weight values in the crossbreed group La x Ti – 42.26 kg, followed by the crossbreeds in Aw x Ti group – 41.95 kg, then by Țigaie individuals – 34.83 kg. The difference between Țigaie and Aw x Ti groups reached 7.120 kg, therefore distinguished significant for p=0,01, while the one occurring between crossbreed groups – 0.310 kg was statistically not significant (p=0.05). Weight gap between averages of groups La x Ti and Ti reached 7.430 kg, which meant a statistically significant difference (p=0.05);
- Assessment of body weight at youth was ended with the last measurement, run at 18 months age. Thus, the best dynamics was noticed in the crossbreed La x Ti group – 49.94 kg, followed by the other crossbreed group, Aw x Ti – 49.37 kg, while the Țigaie youth presented an average live weight of 40.26 kg;
- Casualties were higher in the crossbreed group La x Ti, that presented 6 non viable lambs, out of 18 newborns. They died within 60 minutes post partum, although some of them had more than 3.50 kg at lambing; till 28 days, other two casualties occurred, even if they had relative normal development till exitus, when they weighted 8.50 kg and 9.50 kg, respectively;
- Rams body weight during mating was found highest in Lacaune males – 85.65 kg, then in crossbreed lambs Aw x Ti – 73.14 kg, followed by Țigaie rams 60.91 kg. All groups felt within the specific weight for the originating breeds;
- Assessment of live weight for the sheep belonging to the three groups was done at mating and at lambing. The highest average body weight was measured at both weightings in the crossbreed sheep group Aw x Ti, respectively 46.21 kg and 54.66 kg;
- Average weight at lambing for the La x Ti crossbreed sheep was 6.83% lower than the one measured in Țigaie sheep, hence, the lack of statistical significance (p=0.05);
- Țigaie females presented average body weights slightly higher in comparison with the literature reports, mainly due to the systemic selection practiced within S.C.D.C.O.C. Secuieni-Bacău and also to the great husbandry and housing conditions;

3) On the evaluation of body development degree in adult sheep:

- Rams body development, assessed through the height at withers trait indicated better values in Lacaune males - 83 cm, while crossbreed rams Aw x Ti presented an average of 80.94 cm and Țigaie rams reached 72.73 cm only;
- Evaluation of body development in the sheep belonging to the three groups revealed that highest values for withers height was recorded in Aw x Țigaie crossbreed sheep – 64.58 cm, followed by the La x Ti sheep - 63.39 cm, then by Țigaie ones – 62.50 cm;
- Body index values in the three experimental groups, Țigaie – 104.90, Aw x Ti – 101.53, La x Ti – 101.58 indicate a decrease of this index in the crossbreed sheep. Probably, the trend will be attenuated in the upcoming generations, if the crossings with milk type rams will be continued. The diminution of body index indicated that the productive traits of crossbreed populations were altered under the characters infusion from Awassi and Lacaune breeds;
- Analysis of body indices reveals the differences between the three studied groups, which are normal, if we consider that one of the group is homogenous (sheep) and reared as pure breed (Țigaie), while the other are still in synthesis, therefore the morpho-productive characters are not well established and consolidated;

4) On the quantitative assessment of milk yield in the sheep belonging to the three studied groups:

- Assessment of milk yield during the lambing - 28 days interval showed the highest values in Țigaie sheep, with an average of 26.55 kg, followed by the Aw x Ti crossbreeds – 25.38 kg and by the La x Ti sheep – 24.03 kg;
- During the suckling period, the best yield was recorded in Aw x Ti crossbreed group – 62.05 kg, followed by the Țigaie sheep – 57.19 kg, then by the La x Ti crossbreeds – 55.26 kg;
- Milk yield assessed throughout the entire suckling period was 8.48 % higher in Aw x Ti crossbreeds, compared to Țigaie group, while the other crossbreed group yielded 3.37 % less milk, compared to the same referential group;
- The quantity of yielded marketable milk straightly influences the economic efficacy of milk type sheep, knowing this is the main production, while the other ones (mutton, wool) are subsequent;
- Total quantity of milked milk was highest in Aw x Ti crossbreed group – 77.62 kg, while the other crossbreed reached just 39.44 kg, thus the lowest one, while Țigaie group presented intermediate values 41.57 kg;

- Great aptitudes for milk production were exteriorized by crossbreed Aw x Ti group, proving thus increased organic resilience and very good adaptive capacity on the husbandry conditions provided by the Izvoru Berheciului biobase;
- The data related to whole milk yield indicated that Aw x Ti group of crossbreed sheep produced 139.67 kg, thus 29.28% more, compared to Țigaie group – 98.77 Kg, or even 32.20 % more than the La x Ti group, which yielded an average of 94.70 kg milk;
- Unsatisfying milk yield was recorded in La x Ti crossbreed group, due to the increased sensitivity induced by the paternal breed or due to the fact that imported breeder rams belonged to mutton type bloodline, therefore indifferent for genetic improvement of milk yield in Țigaie sheep belonging to S.C.D.C.O.C. Secuieni-Bacău;

5) On the results concerning the qualitative assessment of the milk produced in the analyzed sheep groups:

- Analytical chemical findings revealed the highest milk fat percentage in La x Ti crossbreed sheep – 8.80 %, followed by Țigaie – 8.19 %, then by Aw x Ti crossbreed sheep 7.57 %;
- The highest difference for fat percentage in milk was calculated between the crossbreed groups, ie 0.50 %, consequently highly significant and the lowest one was recorded between Țigaie group and Aw x Ti group – 0.10 %, not statistically significant. A difference of 0.40% was calculated between groups La x Ti and Țigaie, not significant for the 0.05 threshold;
- Milk protein content analysis revealed that crossbreed sheep La x Ti had the highest value - 4,52 %, followed by Țigaie sheep 4,37%, while the lowest one was measured in Aw x Ti crossbreeds - 4,23 %;

6) On the specific reproductive activity of the three studied sheep groups:

- The fecundity in adult sheep was higher in Țigaie breed – 98.20 %, compared to Aw x Ti sheep – 97.59 %;
- In ewes, fecundity was better in crossbreeds Aw x Ti – 96.33 %, followed by the other crossbreeds La x Ti – 93.33 %, while the Țigaie ones achieved only a 92.59 % level;
- Fertility percentage, assessed on adult sheep, revealed a value of 111.63 % for Aw x Ti group and 101.79 % for Țigaie one, thus within the limits specified in professional literature;
- Calculation of fertility in ewes indicated the lowest value in Țigaie breed – 89.29 %, while the highest one reached 120 % in La x Ti group, while crossbreed Aw x Ti presented an 103.57% average;

- On prolificacy level, it was found the best value in adult Aw x Ti sheep - 120 % and also in La x Ti ewes – 128.57, while the lowest ones were calculated in Țigaie group, both for adult sheep – 104.59, and ewes 100 %. These values were close to literature findings;

7) On the results related to the estimation of the main genetic parameters:

- Data related to heritability coefficient for milk yield in Țigaie sheep indicated mean values of 0.25, therefore a middle heritable trait (h^2=0.2–0.4), while the same coefficient, calculated for fat content = 0.55 and protein content = 0.58, reveled intense heritability (h^2>0.4) for both traits;
- Heritability estimated for milk yield in Aw x Ti group reached 0.23, indicating thus a middle heritable trait (h^2=0.2–0.4); the value we found was therefore closet o those in literature
- Analysis of heritability coefficients for the main characters in crossbreed La x Ti sheep showed that milk yield was middle heritable, h^2=0.21 (h^2=0.2–0.4), while coefficient value of fat content reached 0.47, thus intense heritable (h^2>0.4) and, meantime, the lowest from all studied groups (Aw x Ti = 0.48, Ti = 0.55);
- Repeatability coefficient for milk yield has been found as average, therefore the character is middle repeatable for the sheep in both groups (Țigaie and Aw x Ti);
- In order to have an overview, repeatability and heritability must be correlated. Both groups presented average values, with lower results for the crossbreed group, compared to Țigaie group;
- The analyzed phenotypic, genetic and environmental correlations indicated negative correlation of average intensity between milk yield and fat percentage in milk (Țigaie – 0.25, Aw x Ti – 0.34, La x Ti – 0.22), as well as between milk yield and protein percentage (Țigaie – 0.25, Aw x Ti – 0.25, La x Ti – 0.28);
- The phenotypic correlation between weight at lambing and milk yield was found as average in all three groups, as following, Țigaie – 0.34, Aw x Ti – 0.37, La x Ti – 0.37;
- Highest interdependence was observed for the phenotypic correlation between withers height and rump height in all three groups (Ti – 0.99, Aw x Ti – 0.98, La x Ti – 0.99);