THE SHEEP MILK PRODUCTION AND QUALITY OF FOUR ALBANIAN CROSSBRED GENOTYPES

DR. FEHMI XHEMO*
PROF. AS. DR. IRENA KALLCO**
DR. SPIRO GJANÇI***

*Lecturer, Dept. of Biochemistry & Agro Nutrition, Faculty of Agriculture, “Fan S. Noli” University, Korça, Albania
**Dean, Faculty of Agriculture, “Fan S. Noli” University, Korça, Albania
***Head, Dept. of Biochemistry & Agro Nutrition, Faculty of Agriculture, “Fan S. Noli” University, Korça, Albania

ABSTRACT

There are 1378 thousand milked sheep are actually farmed in Albania. About 28% of the sheep population is the Tsigai breed and its crossbreeds and 9.2% are the Merino breed and its crossbreeds. The imported breeds constitute about 0.3%. Awassi and Chios and their crossbreeds have been increased the interest to the private farmers. It is investigated the milk production during lactation as well as the fat and protein of milk samples of four genotypes of sheep. The aim was to compare the milk production and its composition at the genotypes of Albanian Native with Merino and Tsigai themselves with crossbreeds F1 with Awassi and Chios of Albanian Native with Merino. At the present study it is observed a tendency for higher value of day milk production with 52.6%, 26.0% in F1 crosses of Chios and 69.3% and 39.6% of Awassi in comparison with Albanian Native with Merino crossbreeds and Tsigai ewes, respectively. There were not significant differences between genotypes concerned the average fat content (%), P>0.1, but there were significant differences for the protein content, which was higher in Albanian Native with Merino and Tsigai crossbreeds ewes compare with F1 crosses of Awassi and Chios, respectively (P<0.001).

KEYWORDS: Sheep, Genotypes, Milk Production, Milk Composition,

INTRODUCTION

The milking of the sheep has a considerable tradition in Albania. Small ruminants have an important place in livestock products, producing about 20% to 30% milk and meat in Albania (Albania: Strategic Policies for a more competitive agriculture sector. 2007). Large spaces of pastures are favorable to the sheep breeding (Epstein H. 1985). In these conditions, work to improve the genetic capacity of small ruminants, represents the main direction of work, to increase livestock production and incomes of the farmers (Gursoy O. 1992). Sheep and their milk are especially important because the international market needs are constantly increasing and therefore there is no quota for those products, except those of lambs (Albania: Strategic Policies for a more competitive agriculture sector. 2007). This is why the northern
states are slowly changing production systems and their direction in terms of milk production (Ploumi et al. 1995). In these conditions when the demand for milk and meat are required to support this trend by changing the direction of sheep breeding direction towards the breeds with milk and meat production introducing specialized breeds for milk and meat production. The increase of milk yield was a basic objective in sheep breeding, which might be reached by increasing the genetic potential through crossing. The literature show positive effect on daily milk yield and milk yield for milking period in the crosses obtained on the base of local sheep in Balkan region. 

The Merino crossbreds are a triple utilization breed of sheep and they have only an average or sometimes poor milk production compared to the specialized breeds (Papa et al. 2012). The most dams are able to produce 25-35 liters of milk (Kukovics, 1988). 

The most Tsigai ewes are milked during a 120-150 days in average. Daily milk production of lactating ewes varies between 0.470 l (Margetin et al. 1996). In milk composition also high differences were found (Kukovics et al. 2006). 

Awassi is a breed with high capacity to milk production (Epstein H. 1985, Pollott, E. 1998). Breeding work with the Awassi has included within-breed selection, crossbreeding, and gene introgression (Dimov, G.2005). A flock of this breed with good indicators of milk production is currently in the Department of Livestock to ATTC Korça, Albania and in some districts of the country. 

For the last years the Chios breed imported by Greece is being used to crossings (Kume, K., 2006). Chios’ ewes can produce 120 to 272 liters of milk per lactation. The average lactation period is 210 days (Ploumi et al. 1998) 

So it is necessary to do concrete investigations about productive traits of crosses, that were received on base of Albanian genotypes of Albanian Native with Merino and Tsigaia crossbreeds and rams from Chios and Awassi. 

Milk production, milk composition and its technological characteristic as a raw material for sheep cheese production sheep breed were studied in Albania. 

The aim of the present study was to compare the day milk production and composition sheep and their F1 crosses with Chios breed.
MATERIALS AND METHODS

Animals and Management

An experiment was carried out in the Department of Agriculture Technology Transfer Centre, Korça, (former Small Ruminant Station of Korça), Albania, in order to obtain four genotypes that were received on the base of Albanian Native with Merino and Tsigai crossbreeds sheep and F1 crosses of Awassi and Chios with Albanian Native with Merino.

The investigation was carried out with 17 ewes from each genotype. Ewes were selected with the constraint that live weight, the same milking lactation, second lactation, lambing type, average daily milk yields at the beginning of the experiment there not to be sensible differences within the ewes of each genotype, respectively. For the whole experimental period the animals were kept in paddocks and were hand-milked.

The ewes were fed with feed mix and each ewe received 500 g/d concentrate distributed two times per day and meadow hay, available ad libitum. The ewes received concentrate mix 500 g/d each, 200 g /d (40%) of sunflower and 300 g of feed mix (15% maize, 15% wheat bran, 15% wheat, and 15% barley). They also grazed irrigated pasture composed predominantly of rye grass along with meadow hay, available ad libitum. The above diet ensured energy requirements were satisfied to remove any interference of nutrition on our experiment.

Experimental Design

The experiment was conducted in early spring, middle of March so that all groups of animals were exposed to similar environmental conditions characterized by long day lengths and pasture nutritive value. During the experiment, animals were milked twice daily with intervals between milkings of about 12 h.

In every 5 days of the experimental period, milk yields were recorded individually, and milk samples were collected separately for each ewe. The individual milk quantity was measured in volume unit (ml). The milk production of each ewe for the day was calculated according to the formula: \( K = \text{Morning milk} + \text{Evening milk} \).

Fat and protein (\( TN \times 6.38 \)) content were having been determined carried out with Milko Scan 104 equipment.

We compared the figures of the different determined parameters: milk production, fat, and protein content. The information obtained was evaluated using the methods of variation statistics.
RESULTS AND DISCUSSION

Milk production

The length of the milking lactation period in the case of these four genotypes ranged between 105 and 135 days. The shortest (105 days) was in case for the genotype of Albanian Native with Merino, the longest (135 days) for the genotype Awassi F1 and for Chios F1 and Albanian Native with Tsigai prolonged 130 and 125 days, respectively (Table 1). The milked milk production of the investigated ewes during the lactation according to the genotypes was 69.47; 77.06; 55.14 and 45.51 liters/ewe for the Chios F1, Awassi F1, Albanian Native with Tsigai and Albanian Native with Merino, respectively (Table 2). The amount of milk was the highest in the case of Awassi F1 genotype (Table 2). Due to the high daily amount and the length of lactation period, it is more than 1.7 times higher than in the case of the Albanian Native with Merino (Table 2). There were significant differences between four genotypes (P<0.001 in all cases and for all genotypes (Table 7). During the lactation some of the parameters were different between morning and evening. Fat was constantly higher in the evening milking; on the contrary, production was higher in the morning milk. The other parameters do not present different trends in the two milking.

Table 1. Length of the lactation period of investigated ewes according to the genotype (day)

<table>
<thead>
<tr>
<th>Genotypes</th>
<th>n</th>
<th>Average [day]</th>
<th>Error</th>
<th>Difference from Albanian Native with Merino [%]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chios F1</td>
<td>17</td>
<td>130.14</td>
<td>4.07</td>
<td>23.9</td>
</tr>
<tr>
<td>Awassi F1</td>
<td>17</td>
<td>135.87</td>
<td>6.56</td>
<td>29.4</td>
</tr>
<tr>
<td>Albanian Native with Tsigai</td>
<td>17</td>
<td>125.88</td>
<td>3.41</td>
<td>19.8</td>
</tr>
<tr>
<td>Albanian Native with Merino</td>
<td>17</td>
<td>105.04</td>
<td>9.13</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Table 2. Milk production of the investigated ewes during the lactation according to the Genotype [liters]

<table>
<thead>
<tr>
<th>Genotypes</th>
<th>n</th>
<th>Average [liters]</th>
<th>Error</th>
<th>Difference from Albanian Native with Merino [%]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chios F1</td>
<td>17</td>
<td>69.47</td>
<td>3.61</td>
<td>52.6</td>
</tr>
<tr>
<td>Awassi F1</td>
<td>17</td>
<td>77.06</td>
<td>5.82</td>
<td>69.3</td>
</tr>
<tr>
<td>Albanian Native with Tsigai</td>
<td>17</td>
<td>55.14</td>
<td>3.03</td>
<td>21.1</td>
</tr>
<tr>
<td>Albanian Native with Merino</td>
<td>17</td>
<td>45.51</td>
<td>8.09</td>
<td>0.0</td>
</tr>
</tbody>
</table>
Fat content

During lactation, the average fat content was 6.63 percent, 6.50 percent, 6.64 percent, and 6.82 percent for the genotypes Chios F1, Awassi F1, Albanian Native with Tsigai and Albanian Native with Merino respectively (Table 4 and Figure 1). The fat content showed an increasing tendency in all genotypes during lactation. The Awassi F1 produced the highest amount of fat (5.00 kg) which was 61.3 percent higher than in the Albanian Merino, despite the fact that the average of the fat content of Albanian Native with Merino was 6.82% and those of the Awassi F1 was 6.5%. It was because of the higher milk production of Awassi F1 compere with Albanian Native with Merino. There were not significant differences between four genotypes concerned average fat content, P>0.01 NS in all cases between genotypes (Table 7).

Table 4. Fat content of the ewe’s milk according to the genotype

<table>
<thead>
<tr>
<th>Genotypes</th>
<th>n</th>
<th>Average %</th>
<th>Error</th>
<th>Difference from Albanian Native with Merino [%]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chios F1</td>
<td>17</td>
<td>6.63</td>
<td>0.18</td>
<td>-2.8</td>
</tr>
<tr>
<td>Awassi F1</td>
<td>17</td>
<td>6.50</td>
<td>0.29</td>
<td>-4.7</td>
</tr>
<tr>
<td>Albanian Native with Tsigai</td>
<td>17</td>
<td>6.64</td>
<td>0.15</td>
<td>-2.7</td>
</tr>
<tr>
<td>Albanian Native with Merino</td>
<td>17</td>
<td>6.82</td>
<td>0.40</td>
<td>0.0</td>
</tr>
</tbody>
</table>
Figure 2. Fat content of the ewe's milk according to the genotype

**Protein content**

During the lactation the average protein was 5.83 percent, 5.74 percent, 6.00 percent, and 6.49 percent, for the genotypes Chios F1, Awassi F1, Albanian Native with Tsigai and Albanian Native with Merino respectively (Table 2 and Figure 2). The Awassi F1 produced the largest amount of protein, namely 4.59 kg which was 50.5 percent higher than the protein content of the Albanian Native with Merino despite the fact that the average of the protein content of Albanian Native with Merino was 6.49% and those of the Awassi F1 was 5.74%. The protein production of the other genotypes in comparison to the Albanian Native with Merino was 4.20 kg (37.7 percent higher) and 3.42 kg (12.1 percent higher) for Chios F1 and Albanian Native with Tsigai respectively. There were significant differences between four genotypes (P<0.001, P<0.05, P<0.001, P<0.001, P<0.001, P<0.001 (Table 7). We experienced a slight variation in protein content; it showed an increasing tendency during lactation.

Table 6. Protein content of the ewe's milk of different genotypes

<table>
<thead>
<tr>
<th>Genotypes</th>
<th>n</th>
<th>Average %</th>
<th>Error</th>
<th>Difference from Albanian Native with Merino [%]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chios F1</td>
<td>17</td>
<td>5.83</td>
<td>0.08</td>
<td>-10.2</td>
</tr>
<tr>
<td>Awassi F1</td>
<td>17</td>
<td>5.74</td>
<td>0.12</td>
<td>-11.6</td>
</tr>
<tr>
<td>Albanian Native with Tsigai</td>
<td>17</td>
<td>6.00</td>
<td>0.06</td>
<td>-7.6</td>
</tr>
<tr>
<td>Albanian Native with Merino</td>
<td>17</td>
<td>6.49</td>
<td>0.16</td>
<td>0.0</td>
</tr>
</tbody>
</table>
Figure 3. Protein content (%) of ewe's milk of different genotypes

Table 7. The day milk production and milk composition at the ewes from four genotypes (n=17)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Genotypes</th>
<th>Contrast (Significance), P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Chios F1</td>
<td>Awassi F1</td>
</tr>
<tr>
<td>X±SE</td>
<td>69.47±3.61</td>
<td>77.06±5.82</td>
</tr>
<tr>
<td>Milk yield, g/d</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fat, %</td>
<td>6.63±0.18</td>
<td>6.50±0.29</td>
</tr>
<tr>
<td>Protein (TN ×6.38), %</td>
<td>5.83±0.08</td>
<td>5.74±0.12</td>
</tr>
</tbody>
</table>

Note: Ch F1 = Chios F1; A F1 = Awassi F1; ANTs = Albanian Native with Tsigai, and ANM = Albanian Native with Merino

The achieved results are concerned with the crossbreed impact because the external factors in all the groups of study and control have been the same.

CONCLUSION
Based on the results of these investigations, the following conclusions can be made:

The length of the milking lactation period obtained the shortest (105 days) in case for the genotype of Albanian Native with Merino, the longest (135 days) for the genotype Awassi F1 and for Chios F1 and Albanian Native with Tsigai prolonged 130 and 125 days, respectively.

It is observed a tendency for higher value of day milk production with 52.6 percent in F1 crosses of Chios, 69.3 percent in F1 crosses of Awassi and 21.1 percent in Albanian Native with Tsigai in comparison with Albanian Native with Merino ewes. Chios and Awassi F1
crossbreeds produced significantly higher total milked milk production (P<0.001) than Albanian Native with Merino and Tsigai ewes.

The fat and protein percentages were within the normal for sheep milk in the four investigated genotypes.

No significant (NS) differences in the fat percentage between the sheep on the certain second lactation were observed for four genotypes.

The protein content (%) was significantly higher (P<0.001; P<0.001) respectively in the ewes’ milk of Albanian Native with Merino in comparison with F1 crosses of Chios and F1 crosses of Awassi. It was not the same for Albanian Native with Tsigai; not significant difference (P > 0.10) with Chios F1 and not so high difference with Awassi F1 (P<0.05).

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