Study Regarding Goat Milk Composition and the Growth Rate in Kids of Carpatina Goat Breed

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Abstract

The aim of the study was to determine the fat and protein content from goat colostrum and milk at weaning the kids. Also, the growth rate of kids was determined during the 50 days of milk feeding period. The experiment was carried out on 8 Carpatina breed goats with their twin male/female couple kids (n=16). Fat and protein content is significant higher (p<0.001) by 8.12 and 13.2 percentage points, respectively compared to normal goat milk. Body weight at birth was on average 2.72 kg for females and 2.89 kg for males. At the end of experimental period, body weight of males was 2.15 kg higher compared to females. Average daily gain during the milk feeding period was 41.97 g/day significantly higher (p<0.001) in males (168.85 g/day) than in females (126.88 g/day).

Keywords: goats, milk quality, kids, growth rate.

1. Introduction

During gestation the fetus organism does not benefit from antibodies (immunoglobulins) because of the placental barrier. An inadequate alimentation of the females in the last period of gestation determines a deficit of immunoglobulins in blood and colostrums, thus the kid’s organic resistance, capacity to cope with infections and also the weight gain are affected until the weaning period. [1]

After 48 to 76 hours from birth, fat and protein contents are dropping in the colostrum composition until the normal parameters and values of goat milk.

Aim of this research was to determine the fat and protein content from the goat colostrums and normal milk, obtained from goats after 12 hours after giving birth until the weaning of the kids. Also, the growth rate of the unweaned kids was registered during their first 50 days of life.

2. Materials and methods

Study regarding the growth rate of kids from birth until 50 days and the chemical composition of milk was conducted in a private farm, on 8 goats of Carpatina breed and on 16 kids of both sexes, kids that were born as doubles in couples male-female (as table 1 shows).

Carpatina goat breed is a natural breed that has her origins in the Carpathians Mountains as a descendent of Capra priscia, being a very hardy and robust. This breed represents 80% of the entire goat population from Romania, being encountered in the entire rural areas of the country. Morphologically and productively points of view, this breed shows a great variability, mainly because of the different rearing conditions and the low level of genetically improvement of the populations.
Table 1. Organization schedule of the experiment

<table>
<thead>
<tr>
<th>Item</th>
<th>Composition of colostrum and milk</th>
<th>Growth rate in kids</th>
</tr>
</thead>
<tbody>
<tr>
<td>Period n</td>
<td>birth-50 days</td>
<td>Body weight</td>
</tr>
<tr>
<td>Indicators Fat and proteins</td>
<td>Fat and proteins</td>
<td>Average daily gain</td>
</tr>
</tbody>
</table>

The fat and protein content was analyzed in goat milk, in both colostral secretion and normal milk using the equipment LACTOSCOPE with infrared technology.

Growth rate was registered by calculating the average daily weight gain.

After the statistical analysis, results obtained were compared among themselves using Mann Whitney test, in order to determine if the differences between the experimental groups are representatively statistic. This test is a non-parametric method which does not take into account the values of the repartition parameters and can be applied in order to appreciate the signification differences between the experimental groups that have a relatively low number of subjects.

3. Results and discussion

After the analysis of the colostrums and milk samples and after the individual weighing of the kids at birth and at weaning, data was statistically interpreted and the results are shown below in tables 2 and 3.

As shown in table 2 it can be seen that in the goat colostrums the fat percentage has a very high level, with a mean of 11.93% and limits ranging between 10.06-15.28%.

Protein content is even higher, average being of 16.80% with limits ranging between 13.5-20.93%.

If we mention the fact that in the goat milk are found the most important essential amino acids for humans and that in the fat yield an important part are no saturated fatty acids of omega 3 type and omega 6 type, we can affirm that the goat colostrums, trough his chemical composition it is a concentrate of superior proteins and fats. [2]

Comparing the data published by Padeanu [3], regarding chemical composition of the goat colostrums in specialized dairy breeds, by means of protein percentage (8.5%) and fat percentage (9%), in our indigenous Carpatina goat breed the almost double percentage of protein and 1.3 times higher fat percentage stand up.

At around 50 days from birth, milk composition has radically changed. Thus, average fat content has dropped to 3.81% with limits ranging between 3.01 and 4.44%, and the average percentage of protein registered was of 3.60% with variations ranging between 3.4 and 3.94%.

In both colostral period and at the end of the 50 days interval, variability of fat and protein content is average, variability coefficient was around 14.72 and 18.62%.

After the carrying out and testing the differences significance for fat and protein content from colostrums and normal milk, result have shown that protein and fat percentages are significantly greater (p<0.001) of 3.13 respectively 4.66 times in colostrums compared to normal milk.

Tafta [2] in 1996 publishes the following results for the goat breeds reared in Romania, a higher value for the protein content in the colostrums (13.9%) but a lower content of the fat percentage (7.9%) compared to data from our research.

Padeanu [3] in 2002, suggests that compared to sheep milk which has an average of 32.22% dry matter, goat milk has less DM (24-25%) and protein (8.5-9%), but the same fat percentage (9-9.2%). Concentration and content of the protein and immunoglobulin’s are decreasing for two weeks since giving birth and the lactose percentage is getting higher in this interval.

After a period of 10 days postpartum, caloric value of the goat colostrums dropped from 1450 to 850 kcal/kg milk.

Iodine witch indices a higher proportion of no saturated fatty acids, dropped in the first 4-5 days postpartum and then at a slightly fluctuant level.

Mineral element content vary different (colostrums and milk) Ca and P are dropping and the growing during maximum lactation, while the other elements are dropping.
Table 2. Differences significance between colostral and normal goat milk

<table>
<thead>
<tr>
<th>Item</th>
<th>n (kids)</th>
<th>( \bar{x} \pm Sx )</th>
<th>CV %</th>
<th>Differences</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fat</td>
<td>Colostrums</td>
<td>8</td>
<td>11.93 ± 0.45</td>
<td>15.25</td>
<td>8.12***</td>
</tr>
<tr>
<td></td>
<td>Milk</td>
<td>8</td>
<td>3.81 ± 0.16</td>
<td>16.96</td>
<td>3.13</td>
</tr>
<tr>
<td>Protein</td>
<td>Colostrum</td>
<td>8</td>
<td>16.80 ± 0.78</td>
<td>18.62</td>
<td>13.20***</td>
</tr>
<tr>
<td></td>
<td>Milk</td>
<td>8</td>
<td>3.60 ± 0.14</td>
<td>14.72</td>
<td>4.66</td>
</tr>
</tbody>
</table>

Growth speed of both sexes kids from birth until weaning is presented in table 3.

Analyzing data presented in this table, it can be observed that kids born as twins register, on average a body weight of 2.80 kg with limits ranging between 1.75 kg and 3.6 kg depending of their sex.

At weaning (approximately 50 days) body weight was on average of 9.47 kg, with limits ranging between 8 and 12.6 kg, heavier in males (10.81 kg) comparing to females (8.66 kg). This data suggest that after 50 days of life, kids from the Carpatina breed can be slaughter (at 9 to 12 kg).

Average daily weight gain in kids during birth to weaning varies between 8 and 12.6 kg, heavier in males (10.81 kg) comparing to females (8.66 kg). This data suggest that after 50 days of life, kids from the Carpatina breed can be slaughter (at 9 to 12 kg).

Average daily weight gain in male lambs (M) during first 50 days of life is also significantly higher (p<0.001) compared to female kids with 2.15 kg, difference that represents 24.82%.

Average daily weight gain in kids fed exclusively with milk. In order to evaluate if there are significant differences by means of growth speed between males and females, Mann-Whitney test was used (table 3).

From data presented in this table it can be observed that body weight at birth is higher in males with 0.17 kg (6.25%), but this difference is not statistically significant (p>0.05).

At weaning male kids are significant heavier (p<0.01) compared to female kids with 2.15 kg, difference that represents 24.82%.

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Table 3. Difference significance for growth speed between male (M=8) and female (F=8) kids

<table>
<thead>
<tr>
<th>Item</th>
<th>Sex</th>
<th>$\bar{x} \pm Sx$</th>
<th>CV %</th>
<th>Differences absolute (kg)</th>
<th>Differences relative (%)</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body weight (kg) at:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Birth</td>
<td>M</td>
<td>2.89 ± 0.24</td>
<td>23.81</td>
<td>0.17</td>
<td>6.25</td>
<td>p&gt;0.05</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>2.72 ± 0.26</td>
<td>27.21</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Couple M-F</td>
<td></td>
<td>2.8 ± 0.17</td>
<td>24.81</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Weaning</td>
<td>M</td>
<td>10.81 ± 0.36</td>
<td>9.50</td>
<td>2.15</td>
<td>24.82</td>
<td>p&lt;0.001</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>8.66 ± 0.45</td>
<td>14.78</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Couple M-F</td>
<td></td>
<td>9.74 ± 0.39</td>
<td>16.21</td>
<td>x</td>
<td>X</td>
<td>x</td>
</tr>
</tbody>
</table>

Figure 2 Graphic portrayals of the body weight and the growth rate in kids from birth until weaning

4. Conclusions

After the carrying out our study on 8 goats from the Carpatina breed, concerning chemical composition of the goat colostrums and milk and regarding growth rate in 16 kids from birth until weaning (50 days) the following conclusions emerged:

- Goat colostrums contains on average 11.93% fat and 16.80% protein, and goat milk at 50 days of lactation has on average 3.81% fat and 3.60% protein;
- Fat and protein content of the colostrums are significantly higher (p<0.001) than normal goat milk;
- Body weight in male kids (10.81 kg) is significantly heavier (p<0.001) compared to female kids (8.66 kg);
- Average daily weight gain in the period 0-50 days of life is significantly higher (p<0.001) in male kids with 41.97 g/day compared to female kids.

References

Reference to a journal publication:

Reference to a book:
3. Pădeanu, I., Producțiile ovinelor și caprinelor, Mirton, Timisoara, 2002, pp. 400-409