Effect of multiple births on Jamunapari goat milk minerals under field and farm rearing conditions

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ABSTRACT
The study was conducted at the Central Institute for Research on Goats, Makhdoom, Mathura; under the division nutrition feed resources and products technology for the study of farm rearing condition. A total of 479 milk samples were collected from field and farm rearing condition 222 single (field 28 and farm 194), twins 230 (field 66 and farm 164) and triplets 27 (field 08 and farm 19) milk samples. The overall average calcium content of all above samples in all rearing and births was 0.1455±0.0019 per cent. Phosphorus content was significantly greater in farm samples than field rearing samples in all multiple births. Potassium percentage in the milk of Jamunapari goat breed under field and farm rearing conditions in single, twins and triplets birth was found to be 0.113±0.0008 and 0.113±0.0008, 0.111±0.0007 and 0.111±0.0008 and 0.107±0.0008 and 0.109±0.0008 respectively. The highest magnesium, chloride and selenium content were observed in single birth samples under field as well as farm rearing samples. Multiple births had conspicuous effects on milk quality of goats under study.

Key words: Farm, Field, Goats, Jamunapari, Milk quality, Multiple births.

INTRODUCTION
Goats play a vital socio-economic role in Asian agriculture, particularly for resource-poor people living in harsh environments. Non-cattle milk accounts for approximately 15% of the total milk consumption by humans worldwide. Asia contributes approximately 59% to world goat milk production. The global goat population currently stands at 921 million, of which over 90% are found in developing countries (FAO, 2012).

The main goal of dairy goat production is to improve traits related with milk performance. It is possible to apply stronger selection in goats than in dairy cows due to higher fertility and shorter generation interval. Nevertheless, the lack of suitable Genetic Evaluation System (GES) is a serious obstacle for more intensive genetic progress in dairy goats. In the Czech Republic, the dairy goat population consists of a high percent of small herds (<10 animals) that ranged from about 77% in 1992 to 30% in 2001 (CMA, 2002). In addition, the artificial insemination is not used either for tests of bucks in different herds or for maximal utilization of the best bucks in the population (Ciappesoni, et al, 2004).

MATERIALS AND METHODS
Milk samples were collected from Jamunapari goat under the farm and field rearing condition. Field samples were collected from different villages. The Jamunapari breed milk samples were from villages of Mathura and Agra, India (27° 10’ N, 78° 002’ E and 169 m above MSL). Geologically the Institute is situated under Yamuna river semi arid soil. Temperature ranges between 6° C in winter to as high 45° C in summer. Annual average rainfall is a period of 50 - 60 days. Monsoon arrives in mid July and remains active till mid September Agnihotri and Rajkumar (2007). The methodology used was an adaption from Bourbouze (1995) and Alvarez Funes and Paz Motola (1997).

Sample collection and analysis: - Goat milk samples were collected from research farm and field properly at varied environmental conditions and seasons (summer, rainy and winter). Determination of minerals was followed (Magnesium and Selenium) by Atomic Absorption Spectrophotometer (AAS), determination of Calcium and Potassium by Flame Technique and Phosphorus and Chloride by chemical methods.

Statistical analysis:- Data were recorded as means +/- standard deviation to compare and analyze using randomized
RESULTS AND DISCUSSION

It is evident from the Table 1 that the calcium content in the milk of Jamunapari goat breed under field and farm rearing conditions in single, twins and triplets multiple births was found to be 0.148±0.0018 and 0.157±0.0018, 0.145±0.0019 and 0.150±0.0020 and 0.142±0.0018 and 0.146±0.0019 per cent, respectively. The overall average calcium content of all above samples in all rearing and births was 0.1455±0.0019 per cent. Our results on calcium per cent presented in Table revealed that variation on calcium content under field and farm rearing conditions was observed significant in all above multiple births (p < 0.01) except triplet’s birth in Jamunapari goat breed. These results rather showed that highest calcium content was observed in single birth samples in Jamunapari breeds under field as well as farm rearing conditions. It is observed from the ANOVA Table 2 that the multiple birth effect on calcium content was highly significant in Jamunapari goat breeds under field and farm rearing conditions at 1% level of significance.

The results laid down in Table 1 indicated that the phosphorus percentage in the milk of Jamunapari goat breed under field and farm rearing conditions in single, twins and triple birth was 0.122±0.0011 and 0.125±0.0009, 0.120±0.0012 and 0.123±0.0011 and 0.118±0.0010 and 0.121±0.0011, respectively. The overall average phosphorus percentage of all above samples of milk in all above births was 0.1233±0.0011. It is observed from above table that phosphorus content was significantly greater in farm samples than field rearing samples in all multiple births. The highest phosphorus percentage was recorded in single births in milk samples either field or farm rearing conditions. The statistical analysis also revealed that the effect of multiple births on phosphorus content was significantly different in Jamunapari goat breed milk under field and farm rearing conditions at 1 & 5% level of significance.

Perusal of Table 1 in the present study indicated that the potassium percentage in the milk of Jamunapari goat breed under field and farm rearing conditions in single, twins and triplets birth was found to be 0.113±0.0008 and 0.113±0.0008, 0.111±0.0007 and 0.111±0.0008 and 0.107±0.0008 and 0.109±0.0008 respectively. The overall average potassium percentage of all above 479 samples of milk was 0.111±0.0008. These data obtained from our present investigation are suggested that potassium content was greater in farm rearing samples than field rearing animal in all multiple birth but this variation was in significant. The highest percentage was recorded in single birth in Jamunapari breeds samples either field or farm rearing conditions. Analysis of variance for the effect of multiple births on potassium percentage in the milk of Jamunapari goat breed’s milk under field and farm rearing conditions was determined and found that the same was significant at 5% level of significance.

Magnesium percentage in the milk of Jamunapari goat breed under field and farm rearing conditions in single, twins and triplets birth was found to be 0.0145±0.00015 and 0.0154±0.00017, 0.0144±0.00014 and 0.0152±0.00017 and 0.0143±0.00016 and 0.0150±0.00016, respectively. The overall average magnesium percentage of all above samples of milk in all births was 0.01455±0.00015. The statistical analysis revealed that magnesium content was significantly (1%) higher in farm rearing samples than that of field samples in all multiple births. The highest magnesium content was observed in single birth samples under field as well as farm rearing samples. ANOVA Table 2 on these observations revealed that the multiple birth effect on magnesium content was significant in all births for milk samples either field or farm rearing conditions at 1 and 5% level of significance, respectively.
It is evident from the above Table 1 that the chloride percentage in the milk of Jamunapari goat breed under field and farm rearing samples in single, twins and triplets births was 0.104±0.00062 and 0.107±0.00056, 0.102±0.00060 and 0.106±0.00057 and 0.100±0.00061 and 0.105±0.00057 per cent, respectively. The overall average chloride content of all above birth samples under field and farm rearing conditions was found to be 0.106±0.00058 per cent. Our observations on chloride content presented in above table revealed that difference in chloride percentage under field and farm rearing conditions was observed highly significant in all above multiple births. Our results further indicated that highest chloride content was observed in single birth in milk samples under field as well as farm rearing conditions. It is observed from ANOVA Table 2 that the multiple birth effect on chloride content was significantly different in Jamunapari goat breed milk under field and farm rearing conditions at 1% level of significance.

The results laid down in above Table 1 indicated that the selenium percentage in the milk of Jamunapari goat breed under field and farm rearing conditions in single, twins and triple birth was found to be 0.01683±0.000054 and 0.01667±0.000061, 0.01660±0.000056, 0.01654±0.000061 and 0.01637±0.000055 and 0.01641±0.000060, respectively. The overall average selenium percentage of all above samples of milk in all births was 0.01667±0.000058. It is observed from above table that selenium content was significantly greater in field samples than farm rearing samples in all multiple births. The highest selenium in percentage was recorded in single births in milk samples either field or farm rearing conditions. The statistical analysis also revealed that the effect of multiple births on selenium content was significantly different in Jamunapari goat breed milk under field and farm rearing conditions at 1% level of significance.

Our results on multiple births effect on milk quality in the Jamunapari goat breed are in fair agreement with the findings of Raat (1983) who has reported that the differences in average milk yield between single- and twin-suckled ewes were 29 %, 8 % and 4 % for the two-, four- and six- year-old ewes respectively. The corresponding differences between single- and triplet- suckled ewes were 54 % and 18 % for the two- and six- year-old ewes respectively. The effect of litter size on milk production decreased as lactation
advanced. This effect was more marked in the old ewes. Although there appears to be a minor trend for the percentages of protein, fat, total solids and lactose to decrease with an increase in litter size, this effect was not significant. The groups of older ewes produced milk with lower protein content and higher percentages of fat and total solids. These differences were also not significant. The group averages for protein, fat, total solids and lactose was ranged between 3, 91 % and 4, 48 %; 6, 38 % and 9, 41 %; 15, 81 % and 19, 20 % and 4, 58 % and 4, 92 % respectively. Estimates of the amounts of milk, protein and fat available to the individual Boer goat kids, based on the present data, are presented in Table.

**CONCLUSION**

The calcium, phosphorus, potassium, magnesium and chloride percentage in the milk of Jamunapari goat breeds under farm rearing conditions was significantly higher than that of field rearing conditions.

### REFERENCES


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**Table 2: ANOVAs for the effect of multiple births on goat milk components**

<table>
<thead>
<tr>
<th>Contents for the source of variance</th>
<th>Variance ratio</th>
<th>F-Valuable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calcium</td>
<td>4.912++</td>
<td>5.568++</td>
</tr>
<tr>
<td>Phosphorus</td>
<td>4.822++</td>
<td>3.648+</td>
</tr>
<tr>
<td>Potassium</td>
<td>3.116+</td>
<td>3.761+</td>
</tr>
<tr>
<td>Magnesium</td>
<td>4.713++</td>
<td>4.596++</td>
</tr>
<tr>
<td>Chloride</td>
<td>7.861++</td>
<td>9.116++</td>
</tr>
<tr>
<td>Selenium</td>
<td>9.631++</td>
<td>7.066++</td>
</tr>
</tbody>
</table>