To study the physico-chemical and sensory attribute of quarg type cheese

SP Ramteke, DH Kankhare, VS Dhumal and RJ Desale

Abstract

The current upward trend in nutritional and health awareness, consumer’s demands for high nutritive and valuable product in the market with acceptable sensory characteristics. The present study was carried out to explore the possibilities of using goat milk alone and in combination with cow milk for preparation of Quarg type cheese. The levels of cow milk and goat milk treatments were T1, T2, T3 and T4 as 100:00, 75:25, 50:50, 25:75 and 0:100 per cent respectively. The product was served to the semi-trained panel of judges to know its acceptability. The treatment T1 having 50% cow milk and 50% goat milk was rated superior among experimental treatments. In respect of chemical composition protein, moisture and acidity were increased with increased in level of goat milk while fat, carbohydrate, total solid ash and pH were decreased with increased in level of goat milk.

Keywords: Cheese, quarg cheese, cow milk, goat milk

Introduction

Cheese may be defined as curd of milk separated from whey and pressed in solid mass, there has been steady increasing in consumption of cheese in most country worldwide. There are more than 2000 varieties of cheese, although many have little difference in flavour from extremely mild to very sharp and in texture from semi solid to almost stone hard. The most popular variety of cheese are cheddar, mozzarella, feta, cottage and quarg cheese. ‘Quarg’ the proper German name is speisequark, is the natural, unripened, fresh cheese produced on large scale in Germany and is very popular there. It is essentially a milk protein paste manufactured by proper bacterial culture with small amount of rennet addition for better separation of the protein coagulum from the whey and better yield. This cheese is popular in central Europe (eg. Germany, Poland & Austria). Other names for this type of product in different countries include kvarg, tvarag, quark, tworog, tsvarog, sauermilchquark and speisequark. Chakka and Shrikhand are the product related to quarg popular in India.

The goat milk is naturally homogenized, which is good for human health. The average fat globule size is small (<3.5 µm) in goat milk (Park et al, 2007) which provides better dispersion and more homogenous mixture of fat in milk. Goat milk has lower concentration of erotic acid, which can significantly, play important role in the prevention of fatty liver syndrome. Goat milk protein is rich in histidine, aspartic acid and amino acid. The calcium and phosphorus content of goat milk is very high which is beneficial for bone development in human beings. In other extensive clinical studies with children allergic to cow milk, the treatment with goat milk produced positive results in 93% of the children and was recommended as a valuable aid in the children nutrition because of less allergenicity and better digestibility than cow milk. In the further studies, level of cholesterol were reduced because of high medium chain triglycerides (36% in goat milk versus 21% in cow milk), which decrease the synthesis of endogenous cholesterol. Thus goat milk is recommended as a useful alternative to cow milk for all age group.

Goat milk is the proprietary item for a few variety of soft hard and semi-hard cheese which is being marketed a premium cheese in many European countries. Ripened goat milk cheese are characterized by a piquant and peppery sharp flavour due to the presence of greater proportion of short and medium chain fatty acid in goat milk fat. In India, cheese prepared exclusively from goat milk is hardly available.

There are many cheeses which are less like by the consumer because of their strong flavor and high cost. This could be surmounted to a great extent by introducing quarg type fresh cheese. Quarg cheese has multiple application due to its mild slightly sour flavour and smooth texture and can often be substituted for sour cream, cottlege cheese or ricotta cheese. It can also be
blended with seasoning and used as a topping, used as filling in a variety of pasta dishes, can be blended into a souce or dressing to provide viscosity, mixed with fruit etc. quarg can be blended into product such as cake.

Materials and Methods
Fresh cow milk and goat milk was obtained from Research cum Development Project on Cattle and AICRP on Goat unit M.P.K.V. Rahuri. The starter culture obtained from local market in Rahuri. Microbiale Meito rennet was purchased from local market in Ahmednagar.

Technology of quarg type cheese
The quarg type cheese was prepared by using technology developed at NDRI, prescribed by Gahane (2008) with some minor modification.

The milk was standardized at 4% fat by using Pearson’s square method. Standardized milk was further heated to 85 ºC for 15 min and mixed thoroughly and cooled to 30-37 ºC. The milk was inoculated by adding 0.5 per cent starter culture and incubated at temperature 37 ºC. The coagulum was then cut using knives and it was again left undisturbed for about 10 hrs. The obtained quarg type cheese was homogenized by mixing thoroughly. The quarg type cheese prepared by using cow milk and goat milk was packed in sterilized PVC boxes and stored in refrigerator at 4 ºC to 6 ºC.

Flow chart for manufacture of Quarg type cheese

- Milk
- Standardization (4% Fat)
- Pasteurization (85 ºC/15 min.)
- Cooling (30-37 ºC)
- Inoculation of starter culture @ 0.5 %
- Renneting (250 mg/100 lit. of milk)
- Incubation (8-10 hrs. for 37 ºC, pH 4.9-5.0)
- Cutting & Stirring
- Cooking/Heating (10 min. for 65 ºC)
- Cooling at room temp.
- Whey off
- Quarg
- Packaging and Storage (4±1 ºC)

The data obtained from trials of final treatment replicated five times was analyzed by Completely Randomized Design (CRD) method.

Results and Discussion
Chemical analysis
The chemical analysis of quarg type cheese prepared from cow and goat milk was carried out and the results obtained are given in Table 1.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Protein (%)</th>
<th>Carbohydrate (%)</th>
<th>Fat (%)</th>
<th>Acidity (g per c)</th>
<th>Total Solid (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1 (100% cow + 0% goat)</td>
<td>70.12</td>
<td>23.42</td>
<td>4.31</td>
<td>0.93</td>
<td>71.80</td>
</tr>
<tr>
<td>T2 (75% cow + 25% goat)</td>
<td>65.18</td>
<td>25.30</td>
<td>4.37</td>
<td>0.95</td>
<td>73.40</td>
</tr>
<tr>
<td>T3 (50% cow + 50% goat)</td>
<td>60.80</td>
<td>26.73</td>
<td>4.40</td>
<td>0.97</td>
<td>75.00</td>
</tr>
<tr>
<td>T4 (25% cow + 75% goat)</td>
<td>56.30</td>
<td>28.12</td>
<td>4.42</td>
<td>0.98</td>
<td>76.60</td>
</tr>
<tr>
<td>T5 (0% cow + 100% goat)</td>
<td>51.70</td>
<td>30.65</td>
<td>4.44</td>
<td>0.99</td>
<td>78.20</td>
</tr>
</tbody>
</table>

The chemical analysis of quarg type cheese prepared from cow milk and goat milk was packed in sterilized PVC boxes and stored in refrigerator at 4 ºC to 6 ºC.

Treatment detail
The experimental results of cow milk and goat milk for quarg type cheese were 100% cow milk + 0% goat milk (T1), 75% cow milk + 25% goat milk (T2), 50% cow milk + 50% goat milk (T3), 25% cow milk + 75% goat milk (T4), 0% cow milk + 100% goat milk (T5).

Statistical analysis
The selected experimental levels of cow milk and goat milk for quarg type cheese were 100% cow milk + 0% goat milk (T1), 75% cow milk + 25% goat milk (T2), 50% cow milk + 50% goat milk (T3), 25% cow milk + 75% goat milk (T4), 0% cow milk + 100% goat milk (T5).

<table>
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<tr>
<th>Treatment</th>
<th>Protein content</th>
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</tr>
</tbody>
</table>

The decreasing trend was observed from T1 to T5 with the admixing of goat milk in cow milk samples was might be due to less lactose content in goat milk than cow milk.

Moisture
It was observed that the moisture content in quarg type cheese samples was significantly increased due to addition of goat milk. The highest value was reported for treatment T5 (71.80 per cent) which contain 100 per cent goat milk and lowest for T1 (70.12 per cent) which was contain 100 per cent cow milk.

Ash
The ash content of quarg type cheese had shown decreasing trend from T1 to T5. This might be due to the decreasing trend of total solid content in the respective treatments.

Acidity
The experimental treatments had significant influence on the acidity of quarg type cheese. The increasing trend of acidity was observed by increasing the admixing percentage of goat milk in cow milk from T1 to T5. It ranged from 0.93 to 0.98 per cent.

pH
The mean pH content of quarg type cheese was decreasing from T1 (4.84) to T5 (4.40). This might be due to acidity of the treatments samples.
Sensory evaluation

Sensory evaluation of product was carried out by using 100 point score card. Out of 100, the maximum marks 50 were allocated for body and texture and colour and appearance, respectively. The sensory score given by the judges are tabulated in Table 2.

Flavour

The score obtained indicates that treatment T₁ was observed to be superior over other treatments for the flavour. This might be due to fresh clean and mild acidic flavour observed in T₁ as compared to the other treatments and the decreasing trend of score might be due to little tangy goaty flavour noted by the judges.

Body and texture

As far as body and texture concerned, the highest score (33.78) was obtained for T₃ (50:50%) followed by T₁ (33.46). The lowest score for body and texture was observed in T₅ (31.88). The overall body and texture was observed to be homogeneously soft, smooth with good spreadability. But treatment T₃ (100% goat milk) was observed weak in body and texture and this might be due to less casein-N content in goat milk.

Colour and appearance

The score for the colour and appearance had narrow range from 13.60 to 14.50. The treatment T₁ noticed maximum score of 14.50 which was at par with T₂ (14.20) and T₃ (14.00.) while lowest score was obtained by T₅ (13.60). From the result it might be noted that treatment T₁ was superior over other treatments. This might be due to carotene content in milk which attributed slightly yellowish creamy white colour to cow milk and casein content in milk attributed white colour to goat milk.

Overall acceptability

The overall acceptability of quarg type cheese samples was significant which showed the treatments studied in experimental treatments were different from one another. The highest score was obtained by the T₃ (95.24) and the lowest score by T₅ (92.34). From the result it is observed that T₁ was superior to the other treatments and at par with T₁ (94.72).

Table 1: Chemical analysis of quarg type cheese prepared by using cow and goat milk

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Fat (%)</th>
<th>Protein (%)</th>
<th>Carbo-hydrate (%)</th>
<th>T.S. (%)</th>
<th>Moisture (%)</th>
<th>Ash (%)</th>
<th>Acidity (%.L.A.)</th>
<th>pH</th>
</tr>
</thead>
<tbody>
<tr>
<td>T₁</td>
<td>10.74a</td>
<td>11.62</td>
<td>6.20c</td>
<td>29.88a</td>
<td>70.12a</td>
<td>1.32c</td>
<td>0.93c</td>
<td>4.84a</td>
</tr>
<tr>
<td>T₂</td>
<td>10.60a</td>
<td>11.66</td>
<td>5.95b</td>
<td>29.46c</td>
<td>70.54a</td>
<td>1.24b</td>
<td>0.94b</td>
<td>4.72c</td>
</tr>
<tr>
<td>T₃</td>
<td>10.48b</td>
<td>11.71</td>
<td>5.70c</td>
<td>29.04b</td>
<td>70.96c</td>
<td>1.15c</td>
<td>0.95c</td>
<td>4.62d</td>
</tr>
<tr>
<td>T₄</td>
<td>10.34c</td>
<td>11.74</td>
<td>5.48b</td>
<td>28.62b</td>
<td>71.38b</td>
<td>1.06b</td>
<td>0.96b</td>
<td>4.50d</td>
</tr>
<tr>
<td>T₅</td>
<td>10.22d</td>
<td>11.78</td>
<td>5.23c</td>
<td>28.20d</td>
<td>71.80c</td>
<td>0.97c</td>
<td>0.98c</td>
<td>4.40d</td>
</tr>
<tr>
<td>Mean</td>
<td>10.47</td>
<td>11.70</td>
<td>5.71</td>
<td>29.09</td>
<td>70.96</td>
<td>1.15</td>
<td>0.95</td>
<td>4.61</td>
</tr>
<tr>
<td>S.E.±</td>
<td>0.03</td>
<td>0.04</td>
<td>0.02</td>
<td>0.10</td>
<td>0.25</td>
<td>0.00</td>
<td>0.00</td>
<td>0.02</td>
</tr>
<tr>
<td>C.D. @ 5%</td>
<td>0.11</td>
<td>*N.S.</td>
<td>0.06</td>
<td>0.30</td>
<td>0.74</td>
<td>0.01</td>
<td>0.01</td>
<td>0.05</td>
</tr>
</tbody>
</table>

Values with different superscript differ significantly (P<0.05)

Table 2: Sensory evaluation of quarg type cheese prepared by using cow and goat milk

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Flavour</th>
<th>Body and Texture</th>
<th>Colour and appearance</th>
<th>Overall acceptability</th>
</tr>
</thead>
<tbody>
<tr>
<td>T₁</td>
<td>47.80a</td>
<td>32.42c</td>
<td>14.50c</td>
<td>94.72d</td>
</tr>
<tr>
<td>T₂</td>
<td>47.64a</td>
<td>32.84b</td>
<td>14.20b</td>
<td>94.68b</td>
</tr>
<tr>
<td>T₃</td>
<td>47.46b</td>
<td>33.78a</td>
<td>14.00</td>
<td>95.24</td>
</tr>
<tr>
<td>T₄</td>
<td>47.10c</td>
<td>33.46b</td>
<td>13.80b</td>
<td>94.36b</td>
</tr>
<tr>
<td>T₅</td>
<td>46.86c</td>
<td>31.88a</td>
<td>13.60</td>
<td>92.34</td>
</tr>
<tr>
<td>Mean</td>
<td>47.37</td>
<td>32.87</td>
<td>14.02</td>
<td>94.26</td>
</tr>
<tr>
<td>S.E.±</td>
<td>0.15</td>
<td>0.11</td>
<td>0.05</td>
<td>0.24</td>
</tr>
<tr>
<td>C.D. @ 5%</td>
<td>0.44</td>
<td>0.34</td>
<td>0.15</td>
<td>0.72</td>
</tr>
</tbody>
</table>

Values with different superscript differ significantly (P<0.05)

Conclusion

50 per cent cow milk and 50 per cent goat milk (T₃) was found to be most acceptable in respect of physico-chemical and sensory qualities. Goat milk could be used in combination with cow milk for preparation of quarg type cheese.

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References


