

Studies on Preparation of Quarg Type Cheese From Cow Milk and Goat Milk

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ABSTRACT

The current upward trend in nutritional and health awareness is the consumer's demands for high nutritive 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, T₄ and T₅ as 100:00, 75:25, 50:50, 25:75 and 00:100 per cent respectively. The product was served to the semi-trained panel of judges to know its acceptability. The treatment T₃ having 50% cow milk and 50% goat milk was rated superior amongst 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, twarog, sauermilchquark and speisequark. Chakka and Shrikhand are the product related to quarg popular in India (Kanawjia *et al*, 2011).

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 lactic 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 (Kumar *et al*, 2009). 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, cottage 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 sauce or dressing to provide viscosity, mixed with fruit etc. quarg can be blended into product such as cake.

MATERIALS AND METHODS

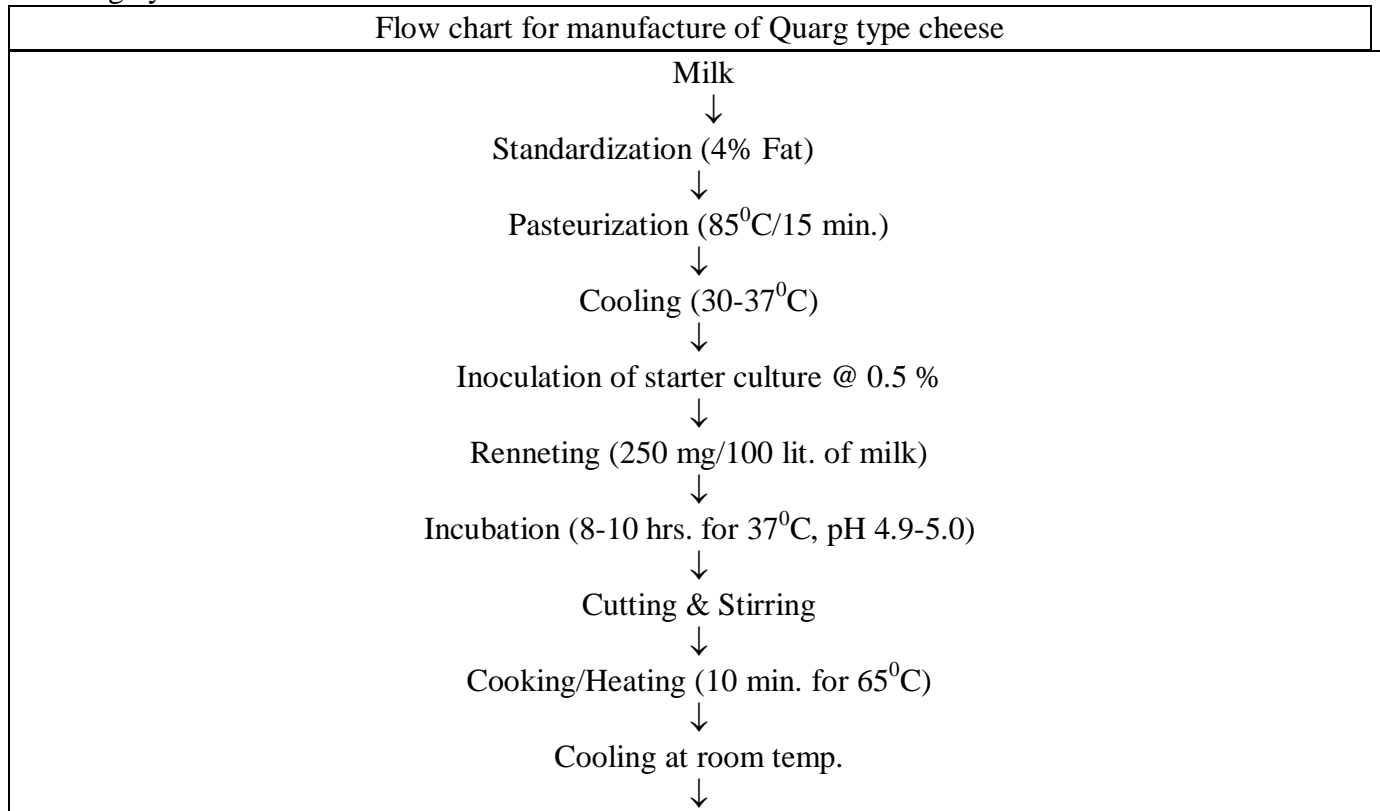
Fresh cow milk and goat milk was obtained from Research cum Development Project on Cattle and AICRP on Goat unit M.P.K.V. Rahuri. The starter culture obtained from local market in Rahuri. Microbial Meito rennet was purchased from local market in Ahmadnagar.

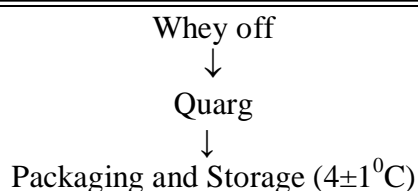
Technology of quarg type cheese

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°C for 15 min and mixed thoroughly and cooled to 30-37°C. The milk was inoculated by adding 0.5 per cent starter culture and incubated at temperature 37°C. Two and half hrs after the addition of starter culture, microbial rennet @ 250 mg/100 lit. milk was added and mixed thoroughly.

Flow chart for manufacture of Quarg type cheese





The content was left undisturbed for curd setting in incubator at 37°C , which took around 8-10 hrs starting from culturing. The coagulum was then cut using knives and it was again left undisturbed for about 10-15 minutes. The curd was heated slowly and gradually increasing temperature to $55-60^{\circ}\text{C}$ @ 1°C per minute and curd hold for 10 minutes at 60°C . Cooked curd was then cooled to room temperature and filled in muslin cloth hanging for 3 to 4 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°C to 6°C .

Treatment detail

The selected experimental levels of cow milk and goat milk for quarg type cheese were 100% cow milk + 0% goat milk (T_1), 75% cow milk + 25% goat milk (T_2), 50% cow milk + 50% goat milk (T_3), 25% cow milk + 75% goat milk (T_4), 0% cow milk + 100% goat milk (T_5).

Statistical analysis

The data obtained from trials of final treatment replicated five times was analyzed by Completely Randomized Design (CRD) method (Snedecor and Cochran, 1994).

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.

Fat

There was significant decreased in fat content with the increase in the level of goat milk from 0 to 100%. This is due to decreasing trend of total solid content from T_1 to T_5 .

Protein

Protein content in quarg type cheese was non-significantly increased due to addition of goat milk in cow milk. This is due to higher loss of whey protein in cow milk quarg as compared to goat milk quarg.

Carbohydrate

The decreasing trend was observed from T_1 to T_5 with the admixing of goat milk in cow milk samples was might be due to less lactose content in goat milk than cow milk.

Total Solids

The total solid content in quarg type cheese was found to be statistically significant decreased due to addition of goat milk in cow milk. This might be due to more moisture retention in goat milk quarg 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 T_5 (71.80 per cent) which contain 100 per cent goat milk and lowest for T_1 (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.

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

Treatment	Fat (%)	Protein (%)	Carbo-hydrate (%)	T.S. (%)	Moisture (%)	Ash (%)	Acidity (%.L.A.)	pH
T ₁	10.74 ^a	11.62	6.20 ^a	29.88 ^a	70.12 ^d	1.32 ^a	0.93 ^c	4.84 ^a
T ₂	10.60 ^b	11.66	5.96 ^b	29.46 ^b	70.54 ^{cd}	1.24 ^b	0.94 ^c	4.72 ^b
T ₃	10.48 ^c	11.71	5.70 ^c	29.04 ^c	70.96 ^{bc}	1.15 ^c	0.95 ^b	4.62 ^c
T ₄	10.34 ^d	11.74	5.48 ^d	28.62 ^d	71.38 ^{ab}	1.06 ^d	0.96 ^b	4.50 ^d
T ₅	10.22 ^e	11.78	5.23 ^e	28.20 ^e	71.80 ^a	0.97 ^e	0.98 ^a	4.40 ^e
Mean	10.47	11.70	5.71	29.09	70.96	1.15	0.95	4.61
S.E.±	0.03	0.04	0.02	0.10	0.25	0.00	0.00	0.02
C.D.@ 5%	0.11	*N.S.	0.06	0.30	0.74	0.01	0.01	0.05

Values with different superscript differ significantly (P<0.05)

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 flavour, while 35 and 15 marks 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 T₄ (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 T₅ (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 T₃ was superior to the other treatments and at par with T₁ (94.72).

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

Treatment	Flavour	Body and Texture	Colour and appearance	Overall acceptability
T ₁	47.80 ^a	32.42 ^c	14.50 ^a	94.72 ^{ab}
T ₂	47.64 ^a	32.84 ^b	14.20 ^b	94.68 ^{ab}
T ₃	47.46 ^{ab}	33.78 ^a	14.00 ^c	95.24 ^a
T ₄	47.10 ^{bc}	33.46 ^a	13.80 ^d	94.36 ^b
T ₅	46.86 ^c	31.88 ^d	13.60 ^e	92.34 ^c
Mean	47.37	32.87	14.02	94.26
S.E.±	0.15	0.11	0.05	0.24
C.D.@ 5%	0.44	0.34	0.15	0.72

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 sensory qualities. Goat milk could be used in combination with cow milk for preparation of quarg type cheese.

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