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## Optimization of Quarg type cheese with spices

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#### Abstract

The present study entitled "Optimization of Quarg type cheese with spices" was carried out in laboratory of Department of Animal Husbandry and Dairy Science, Post Graduate Institute, M.P.K.V., Rahuri. The objective of this research work was optimization of levels of spices in Quarg type cheese. The Quarg type cheese samples were prepared by using cow milk procured from Research-cum Development Project (RCDP) on Cattle, M.P.K.V., Rahuri, Dist. Ahmednagar. The sensory evaluation was carried out in respect of flavour, body and texture and colour and appearance. Initially, work was carried out to select the levels of four spices (ginger, cumin, garlic and clove powder) for the preparation of Quarg type cheese and the combination of spices with each other was tried in preliminary study. On the basis of sensory evaluation best treatment of each spices combination selected for further experiment. In final experiment seven treatment combinations were as control; 1.6 per cent ginger + 1.2 per cent cumin; 0.6 per cent garlic + 1.2 per cent cumin; 0.6 per cent clove + 1.2 per cent cumin; 1.6 per cent ginger + 0.6 per cent garlic; 1.6 per cent ginger + 0.6 per cent clove and 0.6 per cent garlic + 0.6 per cent clove in Quarg type cheese. The product was evaluated for sensory by five semi-trained panel of judges using quarg cheese score card, total score 100. All the samples were well acceptable but the Quarg type cheese prepared with addition of 1.6 per cent ginger and 1.2 per cent cumin showed highest overall acceptability with 95.20 score.

**Keywords:** Optimization, Quarg, cheese, spices, evaluation

#### Introduction

India is known for the largest milk producing country in the world. The present milk production is more than eight times i.e. as compared to 25 million tonnes back in 1973 to 198.40 million tonnes 46 years later in 2019-20. While the annual world fluid milk production stands at around 860.1 million tonnes in 2020. India's milk production is growing at the rate 5.68 per cent per annum is certainly impressive. This also means that more than 23 per cent of the world's milk is produced in India, rendering the status of first milk producing nation in the world. The Indian dairy industry is contributing significantly to the country's economy besides improving health standards by increasing the nutritional value of the food. Milk and milk products constitute a major share of value of output from the livestock sub-sector; their share increased from less than 50% in 1950-51 to 66.63% in 2018-19. The value output of milk is more than Rs. 7.72 lakh crores during 2018-19 at current prices which is more than value of output of wheat and paddy together (Anonymous, 2021) [2].

The most common dairy products are categorized as heat desiccated, fat rich, frozen, heat acid coagulated and fermented dairy product. Fermentation is the oldest and most economical method in food preservation. Numbers of fermented dairy products are being prepared all over the world including dahi, shrikhand, yoghurt, lassi and cheese. Cheese is one of the most popular manufactured dairy products. Cheese has been a part of well balanced diet all over the world. Cheese manufacture is one of the classical examples of food preservation which has been produced by fermentation (Singh, 2011) [13]. World cheese production is growing steadily in last five years reach to 21.0 MT in 2019 (Ermolaev *et al.*, 2020) [4]. Also, the proportion of milk converted in cheese is increasing and is currently about 40% (Kanawjia, 2021) [8]. This ascribed to increased milk production and greater demand for cheese. USA, Germany, France, Italy and Netherland are the top five producer of cheese in the world and from 2000 to 2015 the cheese production has been increased by 29 percent in these five countries (Yadav *et al.*, 2019) [15].

Quarg cheese is milky white in colour, may be even faintly yellowish, body and texture are homogeneously soft, smooth, good spreadable and it is essentially milk protein paste (Kanawjia, 2021) [8]. The name comes from the German *Quark*, which in turn is derived from the Slavic *tvarog*, which means "curd".

In Austria the name *Topfen* ("pot cheese") is used instead of Quark, while in Estonian, it's known as *kohupiim* ("foamy milk"). The cheese is also known simply as "white cheese" as opposed to any rennet-set "yellow cheese." *Quark* is first described by Tacitus as *lac concretum*, "thick milk", eaten by Germanic peoples (Gahane, 2008) [5].

Quarg cheese appeals to palate of Indian people who don't like the typical sharp flavour of other varieties of cheeses. Flavouring food is one of the most common uses for spices; almost each spice is related to a specific flavour. Ginger, garlic and cumin are most common spices traditionally used in Indian culinary dishes particularly spread. They also have both antioxidant and antimicrobial activities. Keeping this fact in view attempts would have been made to explore the flavour of spices in Quarg type cheese.

### Methodology

The Quarg type cheese samples were prepared by using cow milk procured from Research-cum Development Project

(RCDP) on Cattle, M.P.K.V., Rahuri, Dist. Ahmednagar. The spices were used in the form of powder procured from Jain farm fresh, Jalgaon (M.H.). The prepared Quarg cheese was packed in PVC container. The container was sterilized by using 15 ppm sodium hypochlorite. The quarg type cheese was evaluated sensorily by semi-trained panel of five judges from Department of Animal Husbandry and Dairy Science, Post Graduate Institute, MPKV, Rahuri using 100 point quarg cheese score card (Kadiya *et al.*, 2014) [7]. 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 flavour was evaluated by smelling and testing. The body and texture was assess by inserting the spoon and portion of the sample from sample container by mouth feel and by spreading a layer on the bread slice (Kadiya *et al.*, 2014) [7]. The data obtained from trials of final treatment replicated three times was analyzed by Completely Randomized Design (Snedecor and Cochran, 1994) [14].

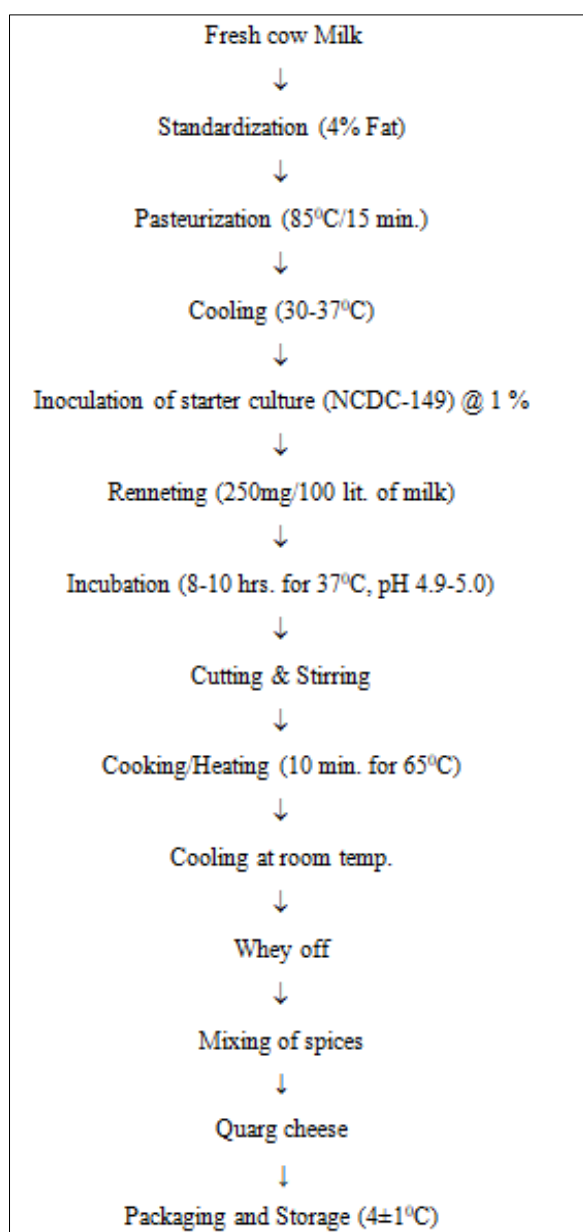


Fig 1: Flow chart for manufacture of Quarg type cheese

### Treatments detail

Pre-experimental trials were conducted and on the basis of the

results of sensory evaluation the final experimental trials were as follows,

- T<sub>0</sub>: Control (Quarg type cheese)  
 T<sub>1</sub>: Quarg type cheese added with 1.6% ginger + 1.2% cumin  
 T<sub>2</sub>: Quarg type cheese added with 0.6% garlic + 1.2% cumin  
 T<sub>3</sub>: Quarg type cheese added with 0.6% clove + 1.2% cumin  
 T<sub>4</sub>: Quarg type cheese added with 1.6% ginger + 0.6% garlic  
 T<sub>5</sub>: Quarg type cheese added with 1.6% ginger + 0.6% clove  
 T<sub>6</sub>: Quarg type cheese added with 0.6% garlic + 0.6% clove

## Results and Discussion

**Flavour:** The acceptability of any food product is influenced predominantly by its flavour. Flavour is a complex trait, composed principally of the sensation of aroma and taste (McSweeney *et al.*, 1997) [10]. The changes in flavour score of quarg type cheese with different treatments are given in Table 1

**Table 1:** Effect of spices on the flavour quality of Quarg type cheese

Treatments	R <sub>1</sub>	R <sub>2</sub>	R <sub>3</sub>	Mean
T <sub>0</sub>	47.14	47.10	47.13	47.12
T <sub>1</sub>	47.22	47.20	47.18	47.20
T <sub>2</sub>	47.08	47.06	47.10	47.08
T <sub>3</sub>	47.08	47.10	47.12	47.10
T <sub>4</sub>	47.05	47.03	47.04	47.04
T <sub>5</sub>	47.09	47.07	47.08	47.08
T <sub>6</sub>	46.98	46.97	46.99	46.98
SE±	0.00959			
CD@ 5%	0.02911			

Table 1 revealed the significant ( $p < 0.05$ ) difference between the treatments. The flavour score preferably offered by the judges were as T<sub>1</sub> (47.20), T<sub>0</sub> (47.12), T<sub>3</sub> (47.10), T<sub>2</sub> (47.08), T<sub>5</sub> (47.08), T<sub>4</sub> (47.04) and T<sub>6</sub> (46.98). The higher score for flavour recorded to T<sub>1</sub> (47.20) followed by control (47.12) and lowest score recorded for T<sub>6</sub> (46.98) as well as T<sub>2</sub> is at par with T<sub>5</sub>. In accordance with the result obtained, all samples were acceptable by the judges whereas the treatment T<sub>1</sub> (1.6% ginger + 1.2% cumin) was significantly ( $p < 0.05$ ) superior and provide the best flavour characteristics in the resultant quarg type cheese.

Judges determined characteristic mild acidic, mid-late light ginger pungency with slightly hot, distinctive bittersweet taste and strong, warm aroma of cumin in T<sub>1</sub> (1.6% ginger + 1.2% cumin) and depicted characteristic multilayer flavour which was comparatively more liked than aromatic, warm pungent, clove sensation in T<sub>3</sub>; strong garlic early pungent flavour in T<sub>2</sub>; intensive burning clove flavour in T<sub>5</sub>; herbaceous garlic

pungency in T<sub>4</sub> and strong garlic-intense clove flavour in T<sub>6</sub>. The attractive smell and pungent flavour of ginger came from the compound gingerol (Bandopadhyay *et al.*, 2007; Abd El-Aziz *et al.*, 2012) [3, 11]. Characteristics cumin odour is principally due to cuminaldehyde, citrusy aroma of cumin due to  $\beta$ -Pinene, bittersweet taste due to  $\gamma$ -terpine (Ramasamy *et al.*, 2013) [12].

## Body and Texture

Body and texture of the product is an important sensory attribute next to the flavour while examining sensory quality of most of the dairy products. The values pertaining to body and texture scores of quarg type cheese are affected by the addition of spices in quarg cheese preparation. The changes in score for body and texture are presented in Table 2. From the result obtained it is revealed that there was significant ( $p < 0.05$ ) difference between the treatments in respect of body and texture.

**Table 2:** Effect of spices on the body and texture quality of quarg type cheese

Treatments	R <sub>1</sub>	R <sub>2</sub>	R <sub>3</sub>	Mean
T <sub>0</sub>	34.29	34.27	34.28	34.28
T <sub>1</sub>	33.98	34.00	34.02	34.00
T <sub>2</sub>	33.92	33.95	33.96	33.94
T <sub>3</sub>	33.89	33.90	33.92	33.90
T <sub>4</sub>	33.95	33.97	33.96	33.96
T <sub>5</sub>	33.90	33.92	33.94	33.92
T <sub>6</sub>	33.97	34.00	33.98	33.98
SE±	0.00951			
CD@ 5%	0.02885			

The results pertaining to body and texture score of quarg type cheese was observed in ranged from 33.90 to 34.28. All the samples were well accepted by the judges but treated samples could not score higher than control sample. The second highest score was recorded to T<sub>1</sub> (34.00) followed by T<sub>6</sub> (33.98) where as comparatively lowest score was recorded to T<sub>4</sub> (33.90) which was at par with T<sub>5</sub> (33.92). Therefore it is revealed that T<sub>1</sub> was good in respect of softness, smoothness and spreadability after control sample as compared to other treatments.

## Colour and appearance

The colour and appearance is an important attribute. It determines the acceptability of a product on visual perception. The result regarding colour and appearance, the scores of quarg type cheese was affected by addition of different spices. The changes in score for colour and appearance are presented in Table 3.

From the Table 3 it is revealed that there was significant ( $p < 0.05$ ) difference between the treatments.

**Table 3:** Effect of spices on the colour and appearance of Quarg type cheese

Treatments	R <sub>1</sub>	R <sub>2</sub>	R <sub>3</sub>	Mean
T <sub>0</sub>	14.10	14.12	14.08	14.10
T <sub>1</sub>	13.98	14.02	14.00	14.00
T <sub>2</sub>	13.96	13.94	13.93	13.94
T <sub>3</sub>	13.90	13.92	13.95	13.92
T <sub>4</sub>	13.98	13.99	13.98	13.98
T <sub>5</sub>	13.95	13.98	13.97	13.97
T <sub>6</sub>	13.92	13.93	13.91	13.92
SE±	0.00984			
CD@ 5%	0.02985			

The colour and appearance score was ranged from 13.92 to 14.10. The highest score was rated to control sample (14.10) and the second highest was T<sub>1</sub> (14.00), where as lowest score recorded to T<sub>2</sub> which was at par with T<sub>6</sub>. From the result it is revealed that all samples were accepted imparting minute difference. The appearance of T<sub>1</sub> was yellowish white with light brown which was most accepted by the judges. This change in colour may be attributed to the presence of 'flavonoids' colour compound in ginger (Hirasa and Takemasa, 1998) [6]. The treatment T<sub>2</sub> appears brownish which might be due to brownish cumin powder and effect of garlic powder which comparatively less liked by the judges. Colour and appearance of T<sub>3</sub> was slightly brownish yellow due to presence of 'tannins' in clove (Kusstianti *et al.*, 2017) [9]. In T<sub>4</sub> colour tends towards yellowish white due to 'flavonoids' in ginger (Hirasa and Takemasa, 1998) [6]. Colour of T<sub>5</sub> was brownish yellow due to combination of ginger and clove and in T<sub>6</sub> light brownish might be due to tannins present in clove.

In accordance with the result obtained T<sub>1</sub> was most acceptable after control. The result obtained was in agreement with Omer (2014) who observed the colour and appearance score of soft cheese enhanced with addition of cumin. Patange *et al.*, (2018) [11] observed that the maximum score for colour and appearance was recorded to the WPC enriched quarg cheese containing 4% ginger and 1% cumin.

### Overall acceptability

The overall acceptability of quarg type cheese with added different spices is presented in Table 4. From the table it is revealed that the result obtained was significant ( $p < 0.05$ ) between the treatments.

**Table 4:** Effect of spices on the overall acceptability of Quarg type cheese

Treatments	R <sub>1</sub>	R <sub>2</sub>	R <sub>3</sub>	Mean
T <sub>0</sub>	95.52	95.49	95.50	95.50
T <sub>1</sub>	95.19	95.21	95.20	95.20
T <sub>2</sub>	94.96	94.97	94.95	94.96
T <sub>3</sub>	94.93	94.94	94.9	94.92
T <sub>4</sub>	94.98	94.99	94.98	94.98
T <sub>5</sub>	94.95	94.96	94.98	94.96
T <sub>6</sub>	94.89	94.87	94.88	94.88
SE±	0.00766			
CD@ 5%	0.02325			

The score for overall acceptability was ranged from 94.88 to 95.50. Thus it is clear that all the treatments were well accepted with minute difference. The highest score was recorded for control sample (95.50) followed by T<sub>1</sub> (95.20) and lowest was T<sub>6</sub> (94.88). Therefore, in accordance with the result obtained, the treatment T<sub>1</sub> (1.6% ginger + 1.2% cumin)

is most accepted treatment for the preparation of spicy quarg type cheese in respect of sensory characteristics.

### Conclusion

Good quality quarg type cheese with mild acidic flavor, smooth and creamy texture can be made by addition of spices such as ginger, garlic, clove and cumin. All the samples were well acceptable but the Quarg type cheese prepared with addition of 1.6 per cent ginger and 1.2 per cent cumin showed highest overall acceptability with 95.20 score.

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