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Studies on preparation and sensory evaluation of paneer spread developed from cow milk using papaya and kiwi fruit

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Abstract

In order to utilize cow milk to formulate milk products like paneer spread and use of fruits as sources of natural preservatives to enhance shelf life of the product the present investigation was planned to formulate paneer spread in different proportion of fruits like papaya and kiwi to develop fruits incorporated cow milk paneer spread. Formulation of paneer spread was done by using different percentage (5 per cent, 10 per cent, 15 per cent) of fruits papaya and kiwi in single or in combination. plain paneer spread was considered as control (T₀), and cow milk paneer spread with papaya (10 per cent) considered as T₁, cow milk paneer spread with kiwi (10 per cent) considered as T₂, cow milk paneer spread with papaya+kiwi (5 per cent+ 5 per cent) considered as T₃. The sensory evaluation of fruits incorporated cow milk paneer spread was performed by using 8-point hedonic scale by a group of panellists to know the sensory characteristics such as appearance and colour, flavour, body and texture and overall acceptability. On the basis of sensory scores, 10 per cent level of papaya and kiwi incorporation in single or in combination, scored maximum for almost all sensory quality parameters such as appearance, color, flavour, taste and overall acceptability compared to control and other levels of fruits (5 per cent and 15 per cent).

Keywords: evaluation, paneer spread, papaya, kiwi fruit

Introduction

Milk has a high nutritive value and supplies body building proteins, bone forming minerals, healthful vitamins and provides energy giving lactose and milk fat. Milk provides essential nutrients and is an important source of dietary energy, high-quality proteins and fats. Milk can make a significant contribution to the required nutrient intakes for calcium, magnesium, selenium, riboflavin, vitamin B12.

Scientific evidence suggests that milk from zebu (humped) cattle has several advantages over the milk of exotic European varieties of cattle like Holstein. The key difference between the two types of milk is the crucial A₂ variety of beta casein protein, which is found in the milk of the zebu cows and the exotic cow contain the A₁ variant of beta casein protein, which has been related to allergies and serious health conditions. Few Indian studies says that incidences of type-1 diabetes and cardiovascular diseases is low in populations with high consumption of the A₂ variant of Beta Casein.

Papaya is healthy and delicious soft, fleshy fruit. The many benefits of papaya are owed due to high content of vitamin A, B and C, proteolytic enzymes like papain and chymopapain which have antiviral, anti-fungal and antibacterial properties. Papaya is purgative, stimulates production of bile and digestion which makes liver and pancreas healthy (Aravind *et al.*, 2013) [1].

Potential benefits of kiwi include a rich source of antioxidants, improvement of gastrointestinal laxation, lowering of blood lipid levels, and alleviation of skin disorders. Kiwifruit not only is rich in vitamin C but also is a good source of other nutrients such as folate, potassium, and dietary fiber.

Mainly two types of spreads are available in market: butter spread and cheese spread. Since butter is high in fat content, it is avoided by obese persons or those suffering from coronary heart diseases. Besides being high in cost, butter contains saturated fatty acids, cholesterol and has poor spreadability at room temperature which limits its consumption (Prajapati *et al.*, 1991) [5]. Moreover, cheese has saturated fat and cholesterol which is bad for health.

Hence, an alternative to butter and cheese spread needs to be developed. Paneer is popular among Indian population. The main advantage of paneer is low fat content as compared to butter and characteristic cheese flavour is absent. It can be consumed by all age groups. Hence, spread developed from low fat paneer will be a suitable alternative to other dairy spreads available in the markets which can be further flavoured with herbs and spices that play a multifarious role.

Material and Methods

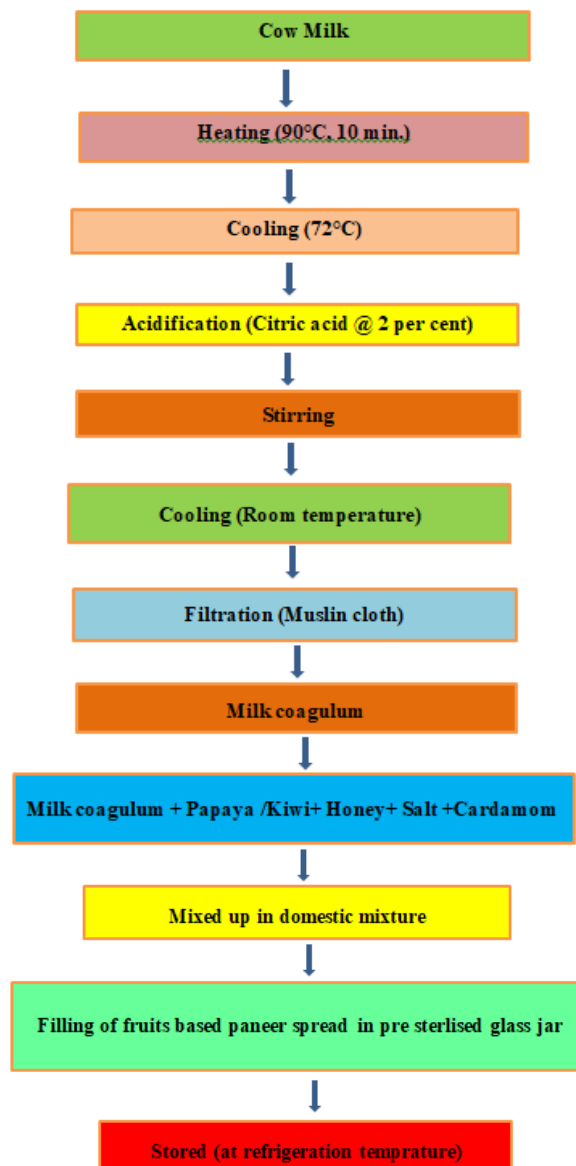
Formation of paneer spread was done by using cow milk coagulum with incorporation of fruits *viz* papaya and kiwi.

Formation of paneer spread with Incorporation of fruits

A lot of review have been collected and studied before formulating the paneer spread under the present investigation i.e. Sharma (2004), Dixit (2006), Kumar HA (2006), Kumar *et*

al. (2010), Sharma and Jaseja (2016) [8, 2, 4, 3, 7].

The milk used for preparation of coagulum was subjected to heating at 90 °C for 10 minutes. The milk was subsequently cooled to 70 °C. Citric acid was added at the rate of 2% by weight of milk in form of 2 per cent solution. The solution was added with continuous agitation until the coagulation was complete. The milk coagulum was allowed to settle for 10 minutes. It was drained through a muslin cloth by gentle squeezing with hand and coagulum was collected and various blends of coagulum and papaya or kiwi pulp were prepared using a constant level of honey 5 per cent, salt 0.5 per cent and cardamom 0.5 per cent. The treatments so prepared were thoroughly mixed, and then filled in the sterilized glass jar then sealed. Product was stored at refrigeration temperature. Fruits incorporated cow milk paneer spread were prepared as shown in flow chart.



Flow chart for the preparation of fruits incorporated cow milk paneer spread

Product development

On the basis of sensory quality of various levels of papaya, kiwi and papaya + kiwi incorporated cow milk paneer spread it was concluded that the inclusion of 10% papaya, 10% kiwi and 5% papaya + 5% kiwi would be most suitable for preparation or formation of treatment paneer spread under study. T₀ – cow milk paneer spread without inclusion of any fruits; T₁ cow milk paneer spread with inclusion of 10% papaya; T₂ – cow milk paneer spread with inclusion 10% kiwi; T₃ -cow milk paneer spread with inclusion and 5% papaya + 5% kiwi.

Results and Discussion

Sensory evaluation of fruits incorporated cow milk paneer spread.

The sensory evaluation of fruits incorporated cow milk paneer spread. was performed by using 8-point hedonic scale to know the sensory characteristics such as appearance and colour, flavour, body and texture and overall acceptability. Eight semi- trained panelists consisting of academic staff, technical staff and students were included in sensory evaluation. Control cow milk paneer spread and all the preparations of fruits incorporated cow milk paneer spread, were presented in plates under fluorescent light. All samples were marked with digital code, and the order of presentation of samples was randomized for each panelist.

The average values for all the attributes like appearance and colour, flavour, body and texture and overall acceptability for different cow milk paneer spread varies from 6.6±0.245 to 7.8±0.2. The average score for flavour of control cow milk paneer spread (T₀) was found to be 6.6±0.245 and for fruits incorporated cow milk paneer spread i.e. for T₁, T₂ and T₃ it was found to be 7.2±0.2, 7.2±0.2 and 6.6±0.245 respectively. Thus it may be concluded that T₁ and T₂ (papaya and kiwi

incorporated cow milk paneer spread) scored maximum point 7.2±0.2 for flavour by the panellist.

The average score for body and texture of control cow milk paneer spread (T₀) was found to be 7.2±0.2, fruits incorporated cow milk paneer spread i.e. for T₁, T₂ and T₃ it was found to be 6.8±0.374, 7.8±0.2 and 7.2±0.374 respectively. Thus it may be concluded that T₂ (kiwi incorporated cow milk paneer spread) scored maximum point 7.8±0.2 for body and texture by the panellist whereas papaya incorporated cow milk paneer spread (T₁) obtained minimum point 6.8±0.374 for body and texture.

The average point for appearance and colour of control cow milk paneer spread (T₀) was found to be 6.8±0.374 and fruits incorporated cow milk paneer spread i.e. for T₁, T₂ and T₃ it was found to be 7.6±0.245, 7.2±0.374 and 7.4±0.245 respectively. Thus it may be concluded that T₁ (10 per cent papaya incorporated cow milk paneer spread) scored maximum point 7.6±0.245 for appearance and colour by the panelists. Without fruit incorporated cow milk paneer spread (T₀) obtained minimum point 6.8±0.374 for appearance and colour. The papaya +kiwi incorporated cow milk paneer spread (T₃) had obtained maximum overall acceptability 7.6±0.245 Whereas fruits incorporated cow milk paneer spread T₀, T₁ and T₂ it was found to be 7.4±0.245, 7.4±0.245 and 6.6±0.245 respectively.

A non significant difference was observed for flavour, body and texture and appearance and colour however significant difference (P<0.05) was observed for overall acceptability

The data related to sensory evaluation of papaya + kiwi incorporated cow milk paneer spread in present study are in agreement with vishal *et al.* (2017) and Rohit *et al.* (2020)^{19, 61}. The result of fruits incorporated cow milk paneer spread, has been presented in Table 1 and analysis of variance in Table 2.

Table 1: Sensory evaluation of fruits incorporated cow milk paneer spread

Parameter	T ₀ (control)	T ₁	T ₂	T ₃
Flavor	6.6±0.245	7.2±0.200	7.2±0.200	6.6±0.245
Body and texture	7.2±0.200	6.8±0.374	7.8±0.200	7.2±0.374
Appearance and colour	6.8±0.374	7.6±0.245	7.2±0.374	7.4±0.245
Overall acceptability	7.4 ^{ab} ±0.245	7.4 ^{ab} ±0.245	6.6 ^a ±0.245	7.6 ^b ±0.245

Note– Means bearing different superscript in a row (small letter) differ significantly, T₀(control) – cow milk paneer spread without any fruits, T₁ – cow milk paneer spread with papaya(10%), T₂ – cow milk paneer spread with kiwi (10%), T₃ – cow milk paneer spread with papaya +kiwi(5+5%).

Table 2: Analysis of variance (Between Treatments) for incorporated cow milk paneer spread

Parameter	D.F.	Mean square	Level of sig.
Flavor	3	0.6	NS
Body and texture	3	0.583333	NS
Appearance and colour	3	0.85	NS
Overall acceptability	3	0.983333	S*

** = Highly Significant (P<0.01), * = Significant (P<0.05) and NS = Non significant

Conclusion

Thus from the present study it may be concluded that the inclusion of fruits enhanced the sensory quality (flavour, color, appearance and overall acceptability) as well as keeping quality and overall acceptability of cow milk paneer spread and fruits like papaya and kiwi may be used to incorporate in cow milk paneer spread with very good acceptability. Incorporation of functional ingredients like papaya and kiwi will beneficial to health conscious consumers. It also results in development of new varieties of paneer which further will increase paneer market.

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