

Palm-Based Imitation Cheese



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Imitation cheese is defined as a dairy product based on skim milk and vegetable or non-milk fat (Davis, 1976). It can be prepared by homogenizing the fat or oil with skim milk and then following the normal cheese making process. According to Davis the original foreign fat flavour can be masked by using various flavouring agents such as spices. Various modified vegetable fats have been used to produce cheese-like foods and synthetic cheeses having the characteristic texture and eating quality of natural dairy cheese (Seiden, 1976; Narimatsu, Sakamoto, Edayoshi and Kubota, 1985).

In this study, palm oil and other palm products were used as a substitute for milk fat to produce imitation cheese. The method used for the production of this cheese followed standard cheese making procedure closely.

IMITATION CHEESE PREPARATION

An enzyme, Rennilase type T, was obtained from Novo Nordisk. The skim milk powder was purchased from the New Zealand Dairy Board, Wellington. It was reconstituted to 12% total solids with distilled water using the Person Square technique. The starter cultures used in this study were *Streptococcus lactis*, and mixed strain cultures of *streptococcus thermophilus* and *Lacto callus bulgaricus*.

The reconstituted skim milk was heated to 60°C before a predetermined amount of palm oil, palm kernel oil or red palm olein was added. The mixture was agitated and heated to 68°C before it was homogenized at 500 psi (Kosikowski, 1977). The homogenized mixture was then pasteurized at 63°C for 30 minutes in a cheese vat with agitation. It was then cooled to near the optimum growth temperature of the starter cultures, that is *Streptococcus*

lactis, and mixture strain cultures of *Streptococcus thermophilus* and *Lactobacillus bulgaricus*. The active bulk culture was then added at the concentrations of 2, 3, 4 and 5% w/v. The mixture was left for two hours for ripening before 0.3% Rennilase was added. After a further hour, a coagulum formed and it was cut into small cubes. The cubes were then gently agitated and the jacketed vat was heated with hot water, beginning within 15 minutes of cutting, to raise the temperature of the curd and whey. The heating time required depended on the type of the starter culture used. The agitation was stopped when the curd cubes were reduced to about half their original size. The whey was drained and the curd was trenched along the side of the vat.

Control cheeses were made, using the same procedure, from fresh milk, and milk and butter fat from milk reconstituted from skim.

PRODUCT EVALUATIONS

Qualitative analysis for comparison of the imitation cheese at different stages, for both starter cultures, was carried out by sensory evaluation. The flavour, texture and overall acceptability of the cheese produced on every production day were analysed. Other parameters such as coagula-

tion, whey separation, and shrinkage ability were also observed. The above comparisons were obtained using the Hedonic Scale Rating. In this manner any significant difference in the organoleptic qualities of the imitation cheese produced from different strains and concentrations of starter culture would be detected.

PRODUCT CHARACTERISTICS

Tables 1 and 2 show that there was a significant difference in the coagulation of the imitation cheese at different concentrations of the thermophilic and mesophilic starter cultures. However at 5% concentration of thermophilic starter culture, there was no significant difference in the coagulation as compared with the controls (cheese made from fresh or reconstituted milk) (Table 1). Thus it was noted that coagulation was best at the highest starter concentration tested. Significant differences from the control, in texture, shrinkage ability and whey separation, were observed when the imitation cheese was produced using various concentrations and strains. Imitation cheese produced from 4% and 5% concentrations of thermophilic starter culture scored better than those produced from 2% and 3% concentration. There was no significant difference for the three

TABLE 1. HEDONIC RATING SCALE FOR CHEESE MADE WITH THERMOPHILIC STARTER CULTURE

	Imitation Cheese				Control	
	2	3	4	5	Fresh Milk	Butter Fat
Culture Concentration(%)	2	3	4	5	5	5
Rennilase Concentration(%)	0.3	0.3	0.3	0.3	0.3	0.3
Hedonic Parameters						
Coagulation	4	3	2	1	1	1
Texture	4	4	3	3	1	1
Shrinkage	4	4	3	3	1	1
Whey Separation	4	4	3	3	1	1
Flavour	1	1	1	1	1	1
Overall Acceptability	4	4	3	2	1	1

Scoring:

- 1 - Like extremely
- 2 - Like moderately
- 3 - Neither like nor dislike
- 4 - Dislike moderately
- 5 - Dislike extremely

TABLE 2. HEDONIC RATING SCALE FOR CHEESE MADE WITH MESOPHILIC STARTER CULTURE

	Imitation Cheese				Control	
					Fresh Milk	Reconstituted milk
Culture Concentration(%)	2	3	4	5	5	5
Rennilase Concentration(%)	0.3	0.3	0.3	0.3	0.3	0.3
Hedonic Parameters						
Coagulation	5	5	4	4	1	1
Texture	5	5	5	5	1	1
Shrinkage	5	5	5	5	1	1
Whey Separation	5	5	5	5	1	1
Flavour	2	2	2	2	1	1
Overall Acceptability	5	5	5	5	1	1

Scoring:
 1 - Like extremely
 2 - Like moderately
 3 - Neither like nor dislike

4 - Dislike moderately
 5 - Dislike extremely

parameters evaluated using different concentrations of mesophilic starter culture but the imitation cheese produced was found to be unacceptable. From the organoleptic evaluation, it was found that the texture, shrinkage ability and whey separation were better with the thermophilic starter culture.

Tables 1 and 2 show that there were no significant differences in term of flavour produced in the imitation cheese at different concentration of mesophilic and thermophilic starter cultures. Thus the substitution of the milk fat by palm oil and its products in cheese is possible.

Tables 1 and 2 show significant differences in the overall acceptability of the imitation cheese produced from the various concentrations of thermophilic starter cultures. At a 5% concentration of the culture, the imitation cheese produced was found to have no significant difference from the control. But the imitation cheeses produced from other concentrations were found to be unacceptable when compared with the control.

The data in *Tables 1 and 2* refer to imitation cheeses made using palm oil; the results using red palm olein or palm kernel oil were not significantly different.

CONCLUSION

This study has shown that palm oil and related products can be used in the production of imitation cheese. The organoleptic evaluation indicated that the imitation cheese produced using a 5% concentration of thermophilic starter culture was comparable to the control cheese made from milk. The imitation cheese produced from this starter culture performed better in terms of coagulation, texture, shrinkage ability, whey separation and overall acceptability than the product using mesophilic starter culture.

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REFERENCES

- DAVIS, J G (1976). Cheese. Volume III, American Elsevier, New York.
- NARIMATSU, H; SAKAMOTO K; EDAYOSHI, T and KUBOTA H (1985). U.S. Patent No. 4,560,560.
- KOSIKOWSKI, F (1977). Cheese and Fermented Milk Foods, 2nd ed. by F.V. Kosikowski and Associates.
- SEIDEN, P (1974). U.S. Patent No. 3,806,606.