

Preliminary study of the utilisation of coconut in yoghurt production

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Abstract

The possibility of using the coconut in yoghurt production was evaluated. Four types of yoghurt were made from the mixture of cow milk and coconut milk using the different percentage. The preliminary results show that the final product is delicious, has pleasant coconut flavour. The titratable acidity of yoghurt ranged from 75° T (type D) to 95° T (Type A). The consistency/viscosity of the product has gone up with increase of the percentage of coconut in the mixture. The coagulation time of yoghurt is about 5 hours. After the organoleptic appreciation, the preference was given to different types of yoghurt.

Introduction

Since ancient time, milk from goats, ewes, buffaloes and mare has been fermented by certain oriental people (Gall, 1981). Different cultured milk has been consumed for centuries in Eastern Europe, and in the countries of the near Middle and Far East (Ogilvy, 1976). In some countries, fermented milk foods are favoured over fresh milk because of their hygienic safety, better flavour and texture, and possible therapeutic effects (Kosikowski, 1982).

Fermentation remains the form of transformation that is most commonly practised in Africa. Fermented milk is even preferred to fresh milk because it has better storage stability and higher digestion (Sanogo, 1994).

Yoghurt is a fermented dairy product very popular in Cameroon. Generally this product is made from imported powder milk. Meanwhile, in the zones of high livestock practices (North-west and Adamawa provinces), yoghurt is made also from fresh cow milk.

Yoghurt can be presented in large variety. It exists as set or stirred (drinking) yoghurt, plain, partly skimmed or skimmed, sweetened and flavoured forms. Some yoghurt are flavoured with discernible fruits, honey or essences (Kosikowski, 1982). The fruits and flavouring essences can be used to create exciting new tastes and texture in yoghurt dessert (Hamilton, 1999). Yoghurt obtained by using coconut milk is a delicious and nutritional product (Spore, 1998).

Materials and Methods.

Cow Milk

Cow milk partly skimmed was used in yoghurt production. After leaving milk to stand for about 12 hours at low temperature (4-10° C), the cream can be skimmed off by using a spoon. This milk was divided into equal portions for the preparation of different mixtures.

Coconut milk

Coconut milk is obtained from the fruit as follows:

- Washing and cutting of the coconut
- Grinding of coconut
- Pressing and filtration

Starter culture

The starter culture was composed of *Lactobacillus bulgaricus* and *Streptococcus thermophilus*. The liophilized culture was reactivated by the method described by Rostrossa (1980).

Procedure

Yoghurt was produced from the mixture of cow milk and coconut milk. The different mixtures were composed according to the following percentages presented below:

- A. 80% of cow milk and 20% of coconut milk
- B. 70% of cow milk and 30% of coconut milk
- C. 60% of cow milk and 40% of coconut milk
- D. 50% of cow milk and 50% of coconut milk

As control sample, yoghurt produced from 100% of cow milk (Type E) was presented. The yoghurt was manufactured as described by Bogdonova *et al.* (1982). The manufacturing steps are given in Figure 1.

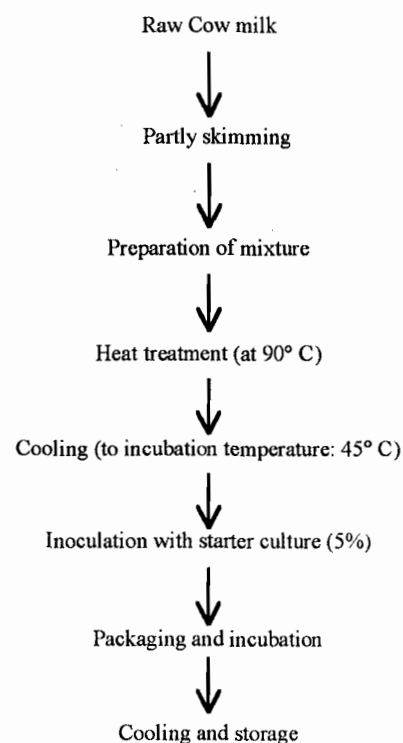


Figure 1. Processing steps

Analysis

Milk samples were analysed for density, titratable acidity and butterfat, following methods described by Patrítii *et al.* (1980).

Yoghurt samples stirred and analysed for viscosity using the viscometer. Yoghurt acidity was estimated by the titration procedure of Thorner. (°T), described by Patrítii *et al.* (1980). The coagulation time of yoghurt was determined.

Organoleptical Characteristics.

Yoghurt colour, flavour, consistency and taste were determined by the consumers and the preference was given to one of

Table 1. Physicochemical Properties of milk

Properties	Range	Means
Density	1.027 - 1.033	1.030
Titratable acidity (°T)	16.0 - 18.0	17.0
Butter fat (%)	1.5 - 2.5	1.8

Table 2. Characteristics and coagulation time of yoghurt.

Types	Acidity, °T	Viscosity, s	Coagulation time
	Means (Min - Max)	Means (Min - Max)	Means (Min - Max)
A	95,0 (90,0 - 95,0)	20 (17 - 23)	4h 40mn (4 ⁰⁰ - 4 ⁵⁵)
B	80,0 (80,0 - 82,5)	26 (25 - 28)	5h 00mn (4 ¹⁰ - 4 ³⁵)
C	80,0 (80,0 - 80,5)	50 (45 - 55)	4h 50mn (4 ⁰⁰ - 5 ³⁰)
D	75,0 (75,0 - 77,5)	*	5h 00mn (4 ⁰⁰ - 5 ³⁵)
E	90,0 (90,0 - 92,5)	30 (30 - 35)	4h 30mn (4 ⁰⁰ - 4 ⁴⁵)

*The very heavy consistence with some small grains did not allow to determine well the viscosity.

Table 3. Organoleptic characteristics of yoghurt.

Types	Flavour	Colour	Consistency	Taste
A	Fermented	White	Semi-fluid	Mild
B	Fermented	White	Semi-solid	Slight sweet
C	Coconut flavour	White	Solid	Sweeten
D	More pronounced coconut flavour	White	Lumpy	Sweet, pronounced taste of coconut
E	Fermented	White	Semi - solid	Slightly sour

the type of yoghurt. For the best appreciation of organoleptical quality of final product, all types of yoghurt were produced without sugar.

Results and Discussion.

The physico-chemical properties of milk present in Table 1. Milk density and titratable acidity within the normal range, acceptable for good quality milk (Trerdoklev et al., 1978). The butter fat content ranged from 1, 5% to 2,5 % and the average was 1,8%. Table 2 and 3 present the result of the yoghurt. Yoghurt type A (95°T) and yoghurt type D (75°T) had the highest and lowest titratable acidity respectively. The acidity was similar for type B and C. The control sample had an acidity of 90°T. The optimum titratable acidity for the plain and flavoured yoghurt reported by Kosikowski (1982) should be 0,9% lactic acid (100°T).

The IDF (Tamine and Robinson, 1985) have suggested a minimum of 0.7g lactic acid (l.a) per 100g of retail product. According to Bogdavona et al. (1982) the titratable acidity of yoghurt should be 80°T at the end of fermentation. However, the production of lactic acid is monitored principally in relation to consumer preference, also with the type of yoghurt. For example: Bulgarian yoghurt has an acidity up to 1.48% l.a (165°T), for Netherland Standards maximum of 1.17% l.a. (130 °) (Tamine and Robinson, 1985). The viscosity of the yoghurt ranged from 20s (type A) to 50s (type C).

These results show that the viscosity of the final product is in direct relation with increasing percentage of coconut milk in the mixture. According to Bogdanova et al. (1982) the average optimum viscosity of the set yoghurt has to be about 50.

The coagulation time of yoghurt increased from 4h 40mn (type) to 5h (type B and D). The time of fermentation of all the types of yoghurt is about 5h.

According to Fellow (1997) incubation time for yoghurt at 42 - 44 °C is approximately 5 hours. It has been reported that the duration of fermentation at 40 - 45°C takes 3 to 6 hours (Ebing et al. 1996) and 3 to 5 hours at 45 °C (Kosikowski, 1982).

The organoleptic descriptions of flavour ranged from fermented (types A and E) to more pronounced coconut flavour for type D. The consistency of the final product ranged from semi-fluid (yoghurt A) to lumpy (type D). The yoghurt type A had had a mild taste and that of type D sweet with a typical accent of coconut (sweeter). Therefore, it can be reduced that increase of percentage of coconut milk in yoghurt results into a sweeter final product.

The strong coconut flavour and sweet taste of yoghurt D was appreciated by some consumers. However, from the

flavour, texture and taste of the yoghurt, consumer's preference favoured type C as the overall best, followed by type B.

Conclusion.

According to preliminary results, the acidity of yoghurt ranged from 75°T (type D) to 95°T (type A). The viscosity of yoghurt increased as the percentages of coconut milk increased in the mixture. The coagulation time for all types of yoghurt is about 5 hours. The final product is delicious and has a pleasant coconut flavour. The general preference of the consumers was given to types C and B, however, some of them liked yoghurt type D for its very sweet taste and the strong coconut flavour.

Our study indicates that it is possible to use coconut milk in yoghurt production; therefore, it is one of the interesting alternative option in the regions with high coconut production.

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References

- Bogdanova, E. A. and Bogdanova, G. I. 1982. Preparation of dairy products. Ed. Liekaya and Pichivaya Prom. Moscow.
- Gall, C. 1981. Goat production. Academic press, P. 370.
- Ebing, p. and Rutgers, K., 1996. Preparation of dairy products. 3rd ed. Agrodox - series N°36. CTA, p. 45 - 46.
- Fellows, P. 1997. Traditional Foods. Processing for Profit. Intermediate technology publication, p. 180.
- Kosikowski, F. V., 1982. Cheese and Fermented Milk Foods. 2nd ED. New York: F. V. Kosikowski & Associates.
- Hamilton, M. O. 1999. The manufacture of yoghurt and cottage cheese. Food chain, N°24.
- Patritii, A. P. et Aristova V.P 1980. Aide memoire pour les techniciens des usines des industries laitieres. Ed. Pichivaya Prom. Moscow.
- Rostrossa, N. K. 1980. Technologie du lait et des produits laitieres. Ed. Pichivaya Prom. Moscow, p. 54 - 57.
- Sanogo, M 1994. Creer une petite fromagerie. Ed. du GRET. Ministere de la Cooperation.
- Spore, 1998. Du coco dans le yaourt (bon appetit!). N° 77. CTA.
- Susan Ogilvy. 1981. Making cheese at home. The cheese press. Ashfield, Massachusetts, p.57
- Tamine, A. Y. and Robinson, R. K. 1985. Yoghurt. Science and Technology. Pergamon Press Ltd.
- Tverdokleb, G. V., Aleceev, V.H., Socolov, F. S. 1978. Technologie du lait et produits laitiers. Ed. Vischaya Skola. Kiev, p. 16 - 17.