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Preliminary study of the utilisation of coconut in yoghurt production

Imele H*1., and Atemnkeng A.2

1Research officer, IRAD Bambuiu, P. O. Box 51, Bamenda, Cameroon
2Chie of Service Quality food control, National centre for zootechniacl and veterinary training
*Corresponding author

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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 lyophilized 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 Patritii *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 Patritii *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 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
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.

**Acknowledgements.**

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**References**

- **Hamilton, M. O. 1999.** The manufacture of yoghurt and cottage cheese. Food chain, N°24.
• Spore, 1998. Du coco dans le yaourt (bon appetit!). N° 77. CTA.

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Raw Cow milk

Partly skimming

Preparation of mixture

Heat treatment (at 90°C)

Cooling (to incubation temperature: 45°C)

Inoculation with starter culture (5%)

Packaging and incubation

Cooling and storage

**Figure 1.** Processing steps
### Table 1. Physicochemical Properties of milk.

<table>
<thead>
<tr>
<th>Properties</th>
<th>Range</th>
<th>Means</th>
</tr>
</thead>
<tbody>
<tr>
<td>Density</td>
<td>1.027 - 1.033</td>
<td>1.030</td>
</tr>
<tr>
<td>Titratable acidity (°T)</td>
<td>16.0 - 18.0</td>
<td>17.0</td>
</tr>
<tr>
<td>Butter fat (%)</td>
<td>1.5 - 2.5</td>
<td>1.8</td>
</tr>
</tbody>
</table>
Table 2. Characteristics and coagulation time of yoghurt.

<table>
<thead>
<tr>
<th>Types</th>
<th>Acidity, °T</th>
<th>Viscosity, s</th>
<th>Coagulation time</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Means (Min - Max)</td>
<td>Means (Min - Max)</td>
<td>Means (Min - Max)</td>
</tr>
<tr>
<td>A</td>
<td>95,0 (90,0 - 95,0)</td>
<td>20 (17 - 23)</td>
<td>4h 40mn (4¹⁰ - 4³⁵)</td>
</tr>
<tr>
<td>B</td>
<td>80,0 (80,0 - 82,5)</td>
<td>26 (25 - 28)</td>
<td>5h 00mn (4¹⁰ - 4³⁵)</td>
</tr>
<tr>
<td>C</td>
<td>80,0 (80,0 - 80,5)</td>
<td>50 (45 -55)</td>
<td>4h 50mn (4¹⁰ - 5³⁵)</td>
</tr>
<tr>
<td>D</td>
<td>75,0 (75,0 - 77,5)</td>
<td>*</td>
<td>5h 00mn (4³⁰ - 5³⁵)</td>
</tr>
<tr>
<td>E</td>
<td>90,0 (90,0 - 92,5)</td>
<td>30 (30 - 35)</td>
<td>4h 30mn (4³⁰ - 445)</td>
</tr>
</tbody>
</table>

*The very heavy consistence with some small grains did not allow to determine well the viscosity.*
Table 3. Organoleptic characteristics of yoghurt.

<table>
<thead>
<tr>
<th>Types</th>
<th>Flavour</th>
<th>Colour</th>
<th>Consistency</th>
<th>Taste</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Fermented</td>
<td>White</td>
<td>Semi-fluid</td>
<td>Mild</td>
</tr>
<tr>
<td>B</td>
<td>Fermented</td>
<td>White</td>
<td>Semi-solid</td>
<td>Slight sweet</td>
</tr>
<tr>
<td>C</td>
<td>Coconut flavour</td>
<td>White</td>
<td>Solid</td>
<td>Sweeten</td>
</tr>
<tr>
<td>D</td>
<td>More pronounced coconut flavour</td>
<td>White</td>
<td>Lumpy</td>
<td>Sweet, pronounced taste of coconut</td>
</tr>
<tr>
<td>E</td>
<td>Fermented</td>
<td>White</td>
<td>Semi-solid</td>
<td>Slightly sour</td>
</tr>
</tbody>
</table>