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SHORT COMMUNICATION

Preparation and consumer acceptability tests of fermented camel milk in Kenya

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There are estimated to be 600 000 camels (*Camelus dromedarius*) in Kenya (Wandera, 1985). Almost 80% of these are kept by pastoral tribes living in arid areas in eastern and north-eastern parts of the country. In these regions, camels are important dairy animals. A camel in north-east Kenya can be expected to yield about 4 kg milk daily as compared with 0.5–1.5 kg for a cow in the same area. Most of the camel milk is consumed in the form of fermented milk. The milk is allowed to ferment naturally at ambient temperature and without prior heat treatment until it turns sour. The resulting fermented camel milk is known as Susa. Due to the spontaneous nature of the fermentation, this traditional method results in a product with varying taste and flavour and is often of poor hygienic quality. In addition, because of the limited scale of production, the product can be sold only in the immediate vicinity of the herd. For production of fermented milk under controlled conditions, thermophilic or mesophilic lactic acid cultures are normally used. In warm countries, mesophilic lactic cultured milk offers some advantages, as it can be incubated at ambient temperature (20–30 °C) and the fermentation stops at 1–1.2% lactic acid, eliminating the need for cooling to stop further souring as occurs in the case of yoghurt (Kurwijila, 1980).

Considering these advantages, Kurwijila (1980) developed, in Kenya, fermented cows' milk using mesophilic lactic cultures. Tests conducted with adult Kenyans showed high consumer acceptability.

The present investigation was undertaken in Garissa, a north-eastern province town of Kenya, where a majority of the population subsists almost entirely on camel milk. The objective of this study was to develop fermented camel milk using mesophilic lactic culture and to test the acceptability of the product in comparison with the traditional fermented camel milk.

EXPERIMENTAL

Milk samples

Fresh camel milk was obtained from herds owned by nomads around the town of Garissa.

Cultures

Multiple strain, mixed type, lyophilized, mesophilic lactic cultures, O-CH:143 (homofermentative) and B-CH:40 (heterofermentative) were obtained from Chr. Hansen's Laboratory, Denmark.

Preparation of fermented milk

Two 10-l churns of fresh whole camel milk were placed in a container filled with water and heated until the milk attained 85 °C. This temperature was maintained for 30 min. After cooling in a water bath to ambient temperature, each milk churn was inoculated with 2% of a 24 h culture and incubated at a room temperature of 27 °C for 24 h.

Chemical analysis

For each milk the following parameters were determined; acidity by titration expressed in Soxhlet-Henkel degrees (° SH), fat by the Gerber method, total solids by calculation after Fleischmann (1896) from the values of fat content, and specific gravity using a lactometer. The same determinations were also made with the traditionally fermented camel milk, Susa, from the local market.

Sensory evaluation

In the sensory tests, the two fermented camel milk samples were compared with a traditionally fermented camel milk, Susa. Two groups of people were selected for the sensory evaluation. Group A consisted of 13 Somali nomads with no formal education. All claimed to consume Susa regularly. Group B consisted of nine Somalis and three Canadians. They all worked as senior officers in the Provincial and District Administrations. Seven of the group reported consuming Susa regularly and five only occasionally.

As the panellists had no previous experience of testing products, the rating test was simplified and limited in respect of consumer preference. Each person was asked to taste the three coded samples and score each product for preference on a three-point scale ranging from 'most preferred' (preference score = 1) to 'least preferred' (preference score = 3). The instructions were given orally in both the Somali and English languages. The panellists were told that they were testing camel milk, but the identities of the individual samples were revealed only after the tests were completed.

RESULTS AND DISCUSSION

Compared with cows' milk, the consistency of fermented camel milk is thin. After fermentation a precipitate in the form of flocs was formed rather than a coagulum. In a preliminary experiment an attempt was made to improve the consistency by the addition of cows' milk powder. However, this had to be omitted in the final experiments, as sensory evaluation and conversation with consumers of camel milk revealed that mixing camel with cows' milk affected the typical camel milk taste and was undesired.

Results of chemical and sensory analysis are presented in Table 1. The values of total solids and fat content were the same in all the samples. Homofermentative culture O-CH:143 showed less titratable acidity. Fermented milk made with mesophilic lactic cultures was clearly preferred by both groups. Within the two

Table 1. Test panel preference scores of three fermented samples of camel milk

Sensory evaluation	Fermented samples of camel milk		
	Mesophilic lactic cultures		
	O-CH:143	B-CH:40	Susa
Group A, n = 13			
Mean score	2.08	1.39	2.31
s.d.	0.76	0.77	0.86
Group B, n = 12			
Mean score	1.58	1.50	2.92
s.d.	0.67	0.52	0.29
Chemical analysis			
Total solids, %	12.7	12.7	12.5
Fat content, %	4.1	4.0	4.0
Acidity °SH	36.2	40.0	40.0

starter cultures used, the homofermentative culture O-CH:143 was least preferred. Both groups described the two prepared cultured milks as particularly good Susa with uniform fresh taste. The study shows that the traditional Susa can be improved by using selected mesophilic lactic acid culture. Seasonal variations in camel milk production are great in north-eastern Kenya, and much surplus milk is wasted during the rainy season (R. Muriuki, pers. comm.). The method described here for fermented milk production can be introduced in rural areas. It allows small-holder producers to process surplus milk on-farm or in centralized small-scale units. Obtaining starter culture could be a limiting factor for large-scale production of fermented milk. However, simple commercial systems for producing frozen starter cultures which maintain their activity for years are in operation in Kenya (Kurwijila, 1983; Schulthess, 1988).

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