Trop. J. Anim. Sci. 2 (2): 97-103 (1999)
ISSN: 1119 - 4308

CONSUMER ACCEPTABILITY, PREFERENCE AND QUALITY ATTRIBUTES OF FRESH MILK, 'NONO' (FERMENTED MILK) AND WEST AFRICAN SOFT CHEESE FROM COW AND GOAT MILK

J. K. JOSEPH* AND A. A. OLAFADE

Animal Products and Processing Unit,
Department of Animal Production, University of Ilorin, Nigeria

Target Audience: Dairy products processors, consumers, teachers, researchers and extension workers.

ABSTRACT

Consumer acceptability, consumption pattern and preference for goat milk and its derived products among randomly selected Nigerians were investigated through a well structured questionnaire. The physico-chemical quality and sensory quality ratings of fresh milk, 'Nono' (fermented milk) and West African soft cheese from cow and goat milk were also assessed. Consumption of goat milk is not popular among Nigerians, but seventy-nine per cent (79 %) of the respondents were prepared to take goat milk if it is readily available at reasonable price. Availability, price and taboos were identified as constraints hindering regular intake of the product. Fresh milk and 'Nono from goat milk contained higher ($P<0.05$) values of protein, fat, ash and total soluble solids than that of cow milk but there were no significant difference ($P>0.05$) in pH, total titratable acidity, fat, total solids and sensory quality scores for flavour and overall acceptability. In terms of pH total titratable acidity, fat, total solids and sensory quality scores (of appearance, texture, flavour and overall acceptability) West African soft cheese prepared from goat and cow milk were not significantly different ($P>0.05$). Results showed that goat milk could replace cow milk in the production of 'Nono' and West African soft cheese successfully without consumers noticing the difference.

Key words: Fresh milk, 'Nono', West African soft cheese, quality, acceptability.

DESCRIPTION OF PROBLEM

In Nigeria, milk from cow is the most widely used. Milk production from cow in Nigeria is not sufficient to meet consumer needs either as fresh milk or when converted to 'Nono' (fermented milk) West African soft cheese or butter ("Mai shanu"). Production and utilization of goat milk in Nigeria is obscure and not given the same attention received by cow milk. Yet goat milk has been claimed to have several advantages over cow milk. Goat milk for instance has been reported to be richer in protein, fat, vitamin A, iron and saturated fatty acids when compared to cow milk (1, 2).

*All future correspondence

The higher prices of imported processed milk products such as powdered and canned milk seem to have made consumers more ready to accept locally produced milk products. They now clearly demonstrate their liking for locally produced processed milk (3, 4). There is therefore the need to explore the possibility of increasing the production and utilization of goat milk in Nigeria, since cow milk production cannot meet consumer demand. This work which is in two parts is, therefore designed to test the acceptability and preference for goat milk and its products among Nigerians, and to assess the physico-chemical and sensory quality differences between the fresh milk and two popular milk products (among Nigerians) prepared from cow and goat milk.

MATERIALS AND METHODS

Field Survey

As described in our earlier work (4), structured questionaires were administered to 240 (120 men and 120 women) respondents randomly selected from four major towns (Ilorin, Minna, Markurdi and Jos) in the middle belt of Nigeria. The towns were selected based on their location, i.e. two towns (Minna and Ilorin) from western and two towns (Markurdi and Jos) from the eastern part of the zone. Sixty randomly selected respondents (30 men and 30 women) were contacted in each town. Data collected included consumer acceptability and preference for goat milk and factors influencing actual consumption pattern of the products were also solicited.

Chemical Analysis

Protein content of samples were determined by the Kjeldahl method and the percentage of nitrogen multiplied by 6.38. Fat content was determined by the Rose-Gottlieb method (5). While ash content was determined as described by AOAC (6). Total solids were determined by evaporating a sample in a weighed flat bottom dish at approximately 100^{0}C to constant weight. For pH and titratable acidity determination of cheese, 20 g of cheese from each source was macerated in 100ml distilled and deionized water, while for fresh milk and 'Nono' the pH of the samples were measured directly on a Metrohm Herisau pH meter (Metrohm Ltd. Herisau, Switzerland, Model E-250). Total titrable acidity was determined by titration with standard 0.1M NaOH using phenolpthalein as indicator (7) and expressed as percent lactic acid. Details of the preparation of 'Nono' (fermented milk) and West African soft cheese ("Warankasi") had been reported in our earlier works (4, 8).

Sensory Evaluation

Sixty individuals recruited from within and outside the University of Ilorin community were screened based on their familiarity with the products and their palatability traits (appearance, texture, flavour and overall acceptability). The sixty individuals were screened out of which a thirty-six taste panel was selected. The panelists were familiarised with the scoring procedure (a nine-point hedonic scale with 9 = extremely like, 1 = extremely dislike) during

preliminary training sessions. The panelists were served a plate containing one coded sample (a cup containing 40 ml of fresh milk or 'Nono' or 2 cm cube of cheese) of each product during the three sessions of scoring for the three products (i.e. fresh milk, 'Nono' or soft cheese differently). The samples were served at room temperature and the panelists were provided with water for mouth rinsing after each test, conducted in a room with normal lighting (standard white fluorescent lighting). The panelists scored fresh milk and 'Nono' samples for appearance, flavour and overall acceptability and soft cheese samples for appeareance, texture, flavour and overall acceptability.

Analysis of data

Consumer acceptability and preference data were analysed using frequency distribution and Chi-square (9). For the chemical analysis, triplicate determinations were recorded for all the parameters and data collected were subjected to analysis of variance using the complete randomised design (9). Sensory score data were analysed using the comparison difference analysis as described by Larmond (10). Least significant difference between sample means were determined using Duncan (11) Multiple Range Test.

RESULTS AND DISCUSSION

Field Survey

Consumer acceptablity and preference for fresh milk from goat, 'Nono' and soft cheese is presented in Table 1. Majority of the respondent (85%) did not take goat milk regularly, but 79% were prepared to drink it regularly. Most of the respondents (64%) took the product only occasionally, while 15% took it once per week and 21% did not take goat milk and were not prepared to take it. Twenty one per cent of the respondents that were not prepared to take goat milk attributed their reasons to taboos. Others attributed the low frequency of intake of goat milk to availability (47% of respondents) and price (14% of respondents) constraints. The preference test showed that 46% of the respondents preferred cow milk to goat milk, 15% preferred goat milk, while 39% of the respondents were indifferent. The implications of these results are that goats are not seen nor raised as a source of milk supply in Nigeria. And since 79% of the respondents were prepared to take fresh goat milk, and its products (such as 'Nono" and soft cheese) any increase in goat milk production will find market.

Chemical Analysis and Sensory Evaluation

Table 2 shows the physico - chemical quality attributes data and sensory quality scores (test of difference in acceptability) for fresh milk, 'Nono' and soft cheese from goat and cow milk. Fresh milk from goat contained higher ($P<0.05$) values of protein, fat, ash and total solube solids than that of cow. This result agrees with such previous findings reported by O' Connor (2) and Davendra and Mcleroy (1). Although fresh milk from goat was rated

higher by the panelists for appearance and flavour. There was no significant difference ($P<0.05$) between goat and cow milk in terms of overall acceptability scores.

Table 1: Consumer acceptability and preference of fresh milk from goat, 'Nono' (Fermented milk) and West African soft cheese.

Characteristics	Respondents (%)	Chi-Square $\sum (O-E)^2 = X^2$ E
1. Do you take goat milk regularly?		
Yes	15	49.00*
No	85	
2. Are you prepared to take it regularly?		
Yes	79	33.64*
No	21	
3. Frequency of intake (per week)	-	
5 times and above	-	
4 times	-	
3 times	-	176.11*
Twice	-	
Once	15	
Occasionally	64	
Do not take at all	21	
4. Constraints limiting the consumption		
Price	14	
Availability	47	54.00*
Not familiar with the milk	03	
Taboos	21	
No constraint	15	
5. Which one do you prefer?		
Goat milk	15	
Cow milk	46	16.42
Indifferent	39	
6. Which do you take? Nono or Cheese?		
'Nono' alone	08	
Cheese alone	31	52.40*
Both	52	
None	09	
7. Are you prepared to take 'Nono' or soft cheese prepared from goat milk?		
Yes	79	33.64*
No	21	

*Value significant ($P<0.05$) Source: Survey, 1998.

'Nono' made from goat milk had higher ($P<0.05$) protein, ash and total solids content but there was no signficant difference ($P>0.05$) in pH, total titratable acidity and ash contents between 'Nono' obtained from goat and cow milk. Higher sensory scores for appearance, flavour and overall acceptability were

Table 2: Physico-chemical and Sensory Quality Attribute of Fresh milk, 'Nono'(Fermented milk) and West African Soft Cheese from cow and goat milk

Source of milk and products	Physico-chemical quality						Sensory Quality scores*			
	pH	Tritatable acidity (%)	Protein (%)	Fat (%)	Ash (%)	Total Solids(%)	Appea-rance	Texture	flavour	Overall accep-tability
Fresh cow milk	6.52	0.28	3.54[a]	3.96[a]	0.70[a]	13.45[a]	6.5[a]	ND	7.3	6.9
Fresh goat milk	6.56	0.26	4.15[b]	5.98[b]	0.86[b]	15.59[b]	7.2[b]	ND	7.5	7.1
Nono from cow milk	3.64	2.81	6.29[a]	3.70[a]	0.98[a]	15.27[a]	6.2	ND	6.6	6.8
Nono from goat milk	3.67	2.85	7.03[b]	3.91[b]	1.15[b]	15.91[b]	6.4	ND	6.8	6.9
Soft cheese from cow milk	6.53	0.27	20.40[a]	12.65	1.45[a]	39.44	7.4	6.8	6.4	6.7
Soft cheese from goat milk	6.58	0.27	21.51[b]	12.97	1.67[b]	40.16	7.6	7.0	6.5	6.8

*Rated on 9-point hedonic scale, 9=extremely liked 1= extremely disliked, and higher values indicate greater preference.
ND indicates not determined
Difference superscripts on means within column and product indicate significant difference ($P < 0.05$)

obtained in 'Nono' from goat milk, but the differences were not statistically significant (P>0.05). This therefore means that cow milk could be replaced by goat milk in 'Nono' production without any significant difference in the product.

In terms of pH, total titratable acidity, protein, fat, total solids and sensory quality scores of appearance, texture, flavour and overall acceptability, West African soft cheeses prepared from goat and cow milk were not significantly different (P<0.05). Therefore goat milk could replace cow milk in the production of soft cheese successfully without any significant difference in quality and acceptability of the product.

CONCLUSION AND APPLICATIONS

1. The results of consumer acceptability and preference survey indicated that although the consumption of goat milk and its products are not yet popular in Nigeria, if goat milk and its products are readily available and at reasonable price, marketing the products will not be a problem.
2. It is apparent from this study that goat milk could replace cow milk in the production of the two most popular local milk products ('Nono' and 'Warankasi) in Nigeria without the consumers noticing the difference.
3. In view of the fact that the current milk production level from cow in Nigeria is not enough to meet consumers' fresh milk needs, we recommend that 'Nono' and West African soft cheese (which has now become a delicacy in Nigeria) be produced from goat milk.

REFERENCES

1. Davendra, C. and Mcleroy, G.B. 1982. Goat and Sheep Production in the Tropics. Intermediate Tropical Agric. Series, Longman Group Ltd., U.K.
2. O'Connor, C. 1993. Tropical Cheese making Manual. ILCA. (International Livestock Centre for Africa), Addis Ababa.
3. Aduku, A.O. and Olukosi, J.O. 1991. Animal Products: Processing and Handling in the Tropics. Living Books Series. Gu Publications, Abuja, Nigeria.
4. Joseph, J.K., Belewu, M.A. and Omotuyi, O.J. 1998. Acceptability and effect of mixing ratios on the quality attributes of 'Fura-de-Nono' : A Nigerian milk product. Food Quality and Preference, 9, 1-4.
5. Meyer, L.H. 1978. Food Chemistry, 3rd edn. Avi Publishing Company. INC Connecticut.
6. Association of Official Analytical Chemists (AOAC) 1980. Official methods of Analysis, 13th edn. Washington DC.
7. Pearson, D. 1970. The Chemical Analysis of Foods, 6th edn. Churchill Livingstone, Edinburgh.
8. Joseph, J.K.; and Akinyosoye, F.A 1997. Comparative studies on red sorghum extracts and other chemicals as preservatives for West African soft cheese, Int. Diary Journal. 7, 193-198

9. Steel, R.G.D. and Torrie, J.H. 1980. Principles and Statistics: A Biometrical Approach, 2nd edn. McGraw-Hill Book Company, New York.
10. Lamond, E. 1977. Laboratory Methods for Sensory Evaluation of Food. Publication No. 1637, Department of Agriculture, Ottawa, Canada.
11. Duncan, D.B. 1995. Multiple range and multiple F-tests. Biometrics, 1, 1-42.