

Full Length Research Paper

Quality attributes of cheese produced from three Nigeria cattle breeds

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Quality attributes of cheese produced from milk obtained from three Nigerian breeds of cattle (White Fulani, Muturu and Red Borori) were investigated. There were significant differences in the pH and cheese yield among the treatments ($p < 0.05$). White Fulani, Muturu and red Borori cheese had moisture content of 72.51%, 70.03% and 65.42% respectively. There were significant differences in the moisture content, crude protein and crude fat of the cheeses ($p < 0.05$). Cheeses from the three breeds of cattle were stable upon storage for the first 24 hours but further refrigeration slightly decreases the weight of white Fulani and Muturu cheese. The sensory evaluation of the cheeses showed that the three cheeses have good acceptability by consumers but red Borori cheese is mostly preferred for all the properties considered.

Keywords: Cheese quality, Nigeria Cattle, Dairy selection.

INTRODUCTION

Milk and its various products form the major portion of food for infant and adult all over the universe. It is a main source of animal protein in Northern Nigeria where it is mostly consumed in form of 'Nono and Wara'. Due to the difficult conservation of fresh milk in developing countries, attempts of technological approaches were developed in order to transform into added value products (Dossou *et.al*, 2006). Milk from Zebu cattle is processed locally into cheese in Nigeria and other African countries not putting into consideration the suitability of these cattle for milk production and also the nutritional qualities of such cheese to the populace. "Wara" a white soft un-ripened cheese produced by the coagulation of milk protein is a popular food in some parts of South Nigeria. The cheese which is also produced in other West African countries notably Republic of Benin contributes to animal protein and mineral intake especially in rural communities (Alalade and Adeneye, 2006).

These cheeses are produced without putting into consideration the suitability of the indigenous cattle for such purpose. This study will not only shed light on the

suitability of these cattle for cheese production but also help breeders in the development of dairy breed in this part of the world.

MATERIALS AND METHODS

The experiment was conducted at the Animal science laboratory of the College of Agriculture, Kabba,. White Fulani, Muturu and Red Borori were the Nigeria breeds of cattle used for this experiment. Milk samples were collected from the Fulani pastoralists, resident at Mopa – Amuro local government of Kogi state, Nigeria. The climate is humid and located in the Derived Savannah vegetation zone of North Central Nigeria. The cattle used were ensured to be under the same management system and of similar age.

Fresh milk samples were collected from three Nigerian cattle breeds (White Fulani, Muturu and Red Borori) into different containers. Eight cattle of a single breed were used to make a total of 24 samples collected for the experiment. The cattle were milked from the first drop of

Table 1: Nutrient composition (%) of cheese obtained from milk of three Nigeria cattle breeds

Parameters	White Fulani	Muturu	Red Borori
Moisture	72.51± 1.24 ^a	70.03±1.24 ^b	65.42±1.2
Crude protein	2.06±0.40 ^D	12.91±0.24 ^D	16.46±0.22 ^a
Crude fat	13.25±0.35 ^b	14.49±0.7 ^a	15.76±0.23 ^a
Ash	1.83±0.15	1.88±0.71	2.06±0.27
Lactose	0.31±0.08	0.37±0.06	0.29±0.04

^{abc} Means along the same row with different superscripts are significantly different (p<0.05)

Table 2: pH, Yield and Storage stability of cheese produced from milk of three Nigeria cattle breeds.

Parameters	White Fulani	Muturu	Red Borori
Ph	6.00±0.22 ^a	5.9±0.19 ^a	6.8±0.26 ^b
Cheese yield(g/litre of milk)	390± 2.34 ^a	301±3.48 ^c	320±2.79 ^b
Initial weight (g)	50.00±7.33	50.00±7.33	50.00±7.33
Weight after 24 hours (g)	50.00±7.33	50.00±7.33	50.00 ±7.33
Weight after 48 hours (g)	50.00 ±7.33	48.37±5.34	50.00±7.33
Weight after 72 hours (g)	50.00±7.33	48.37±6.32	47.73±6.32

^{abc} Means along the same row with different superscripts are significantly different (p<0.05)

Table 3: Organoleptic properties of cheese produced from three Nigeria cattle breeds

Parameters	White Fulani	Muturu	Red Borori
Colour	5.30±0.29	5.60±0.27	5.39±0.34
Odour	5.50±0.22	5.20±0.33	5.10± 0.21
Texture	5.60±0.31	5.30±0.32	5.20±0.44
Palatability	4.30±0.22	5.00±0.42	6.30±0.55
Overall acceptability	4.20± 0.26	4.30±0.30	4.40±0.46

the foremilk to the last drop of the stripping. 1 litre of each milk sample was measured and used to make cheese using *Calotropis procera* (Sodom Apple) leaves as the coagulant. 60g of the leaves was used for each 1 litre of milk. The leaves were crushed with the use of pestle and later soaked in the milk samples for 5 minutes. Each milk sample was later heated for 18 minutes after which the whey and the curds were formed. The whey was separated from the curd with the use of 1mm sieve. The curds were allowed to drain and cool for 2 hours after which no dropping of whey was observed from the sieve.

In order to obtain the pH of the samples, 5 g each was weighed and suspended in 10 ml of distilled water. The pH was determined with a pH meter.

The weight of cheese was measured using gram sensitive scale and was recorded as cheese yield. Volume of whey produced from each milk sample was measured using measuring cylinder; this was also recorded as whey yield. 50g of each cheese sample was refrigerated at 2°C and weight was measured every 24

hours for 3 days to determine changes in weight upon storage.

The nutrient composition (protein, ash, fat, moisture and lactose) of the cheese produced from the different breeds of cattle was determined by using the standard AOAC method (1990). The protein content was determined with the micro Kjeldal estimation of nitrogen, with the use of a conversion factor of %N × 6.38. Determination of fat was done according to Pearson (1976). The organoleptic properties of each cheese sample produced from different breeds of cattle were determined according to the method of Potter, (1968). The products were assessed for aroma, taste, texture, colour and general acceptability on a seven-point Hedonic scale (7, excellent; 6, Very good; 5, good; 4, average; 3, fair; 2, poor; 1, very poor) and the attribute mean score calculated.

Data collected were analysed with one way analysis of variance and means were separated using Duncan multiple range test (Steel and Torrie, 1980).

RESULTS AND DISCUSSION

Cheese from white Fulani, Muturu and Red Borori cattle had a mean pH of 6.00, 5.90 and 6.80 respectively. There was a statistically significant difference in the pH of cheese obtained from this experiment ($p < 0.05$). Milk from white Fulani, Muturu and Red Borori cattle had mean cheese yield of 390g, 301g and 320g respectively per litre of milk used. There was a significant difference in the cheese yield ($p < 0.05$).

From table 1, the proximate composition of cheese obtained from the three breeds of cattle shows significant difference only in the moisture content of the cheese with white Fulani, Muturu and Red Borori cheese having moisture content of 72.51%, 70.03% and 63.42% respectively. The moisture content of cheese from this study was greater than 62.50% and 61.70 % (for local cheese processed with *Carica papaya* and *Calotropis procera*) obtained by Adetunji and Salawu (2008). Omotosho *et.al.*, (2011) also reported optimum moisture content of 50.5% for alum coagulated cheese. There were significant differences in the crude protein and crude fat among the cattle breeds. Crude protein, crude fat and ash contents of cheese from this study are lower than results obtained from most literatures (Uzeh *et.al.*, 2006; Adetunji and Salawu 2008; Omotosho *et.al.*, 2011) but crude fat obtained from this study is higher than what was reported by Belewu and Morakinyo (2009) for cheese treated with different concentrations of honey.

Table 2 shows that all the cheeses were stable upon storage for the first 24 hours for refrigeration. Muturu and Red Borori cheeses showed slight weight loss between 48 and 72 hours of storage respectively. Cheeses from the three breeds of cattle have good organoleptic properties but Red Borori cheese performed best for all the properties observed.

CONCLUSION

From the result of this study, it can be concluded that all cattle breeds investigated are fairly okay for cheese

production. The three cattle breeds investigated have potential to produce cheese that meets international standards in the quality, if genetic improvement is done on them to improve the cheese yield.

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