

QUALITY CHARACTERISTICS OF CHEESE PRODUCED FROM THREE BREEDS OF CATTLE IN NIGERIA

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ABSTRACT

Quality characteristics of cheese produced from milk obtained from three Nigeria breeds of cattle (White Fulani, Muturu and Red Borori) were evaluated. The experiment was conducted at the Animal product laboratory of the College of Agriculture, Kabba, Nigeria. Fresh milk samples were collected from three Nigeria cattle breeds (White Fulani, Muturu and Red Borori) into three different containers. Eight cattle of a single breed were used making a total of 24 samples. The results showed that there was no significant difference in the pH, cheese and whey yield of the cheeses used for this experiment. White Fulani, Muturu and red Borori cheese had moisture content of 72.51%, 70.03% and 63.42% respectively. There was a significant difference in the moisture content of the cheeses. 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. Hence, milk from these cattle varieties should be produced in commercial quantity in Nigeria adopting the best modern technologies.

Keywords: *Quality, cheese, milk, animal protein*

INTRODUCTION

Milk and its various products form the major portion of food for infant and adult all over the universe. It is the main source of 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, Hounzangbe-Adote and et Soulé, 2006). Milk gotten from Zebu cattle is processed locally into cheese in Nigeria and other African countries not putting into consideration the suitability of this cattle for milk production and 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 Northern 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). The primary purpose of this study is therefore critically experimented the quality of Cheese produced from three breeds of cattle in Nigeria with a view to identifying which of these breeds is mostly suitable for consumption in terms of the quality of properties embedded in it.

MATERIALS AND METHODS

The experiment was conducted at the Animal product laboratory of the College of Agriculture, Kabba, Nigeria. White Fulani, Muturu and Red Borori were the 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 cattle used were ensured to be under the same management system. The cattle were also ensured to be of same age bracket because age has been reported to have greater influence on milk fat.

Fresh milk samples were collected from three Nigeria cattle breeds (White Fulani, Muturu and Red Borori) into three different containers. Eight cattle of a single breed were sampled making a total of 24 samples collected for the experiment. The cattle were milked from the first drop of 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 were used for each 1 litres 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 using 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, 5g each were weighed and suspended in 10ml 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 were refrigerated at 2°C and weight was measured every 24 hours for 3 days to determine refrigeration weight changes. The nutrient compositions (protein, ash, fat, moisture and lactose) of the cheese produced from the different breeds of cattle were determined using the standard AOAC method (1990). The protein content was determined with the micro Kjeldal estimation of nitrogen, using a conversion factor of %N × 6.25. Determination of fat was done according to Pearson (1976).

The organoleptic properties of each cheese sample produced from different breeds of cattle were determined using 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 was 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

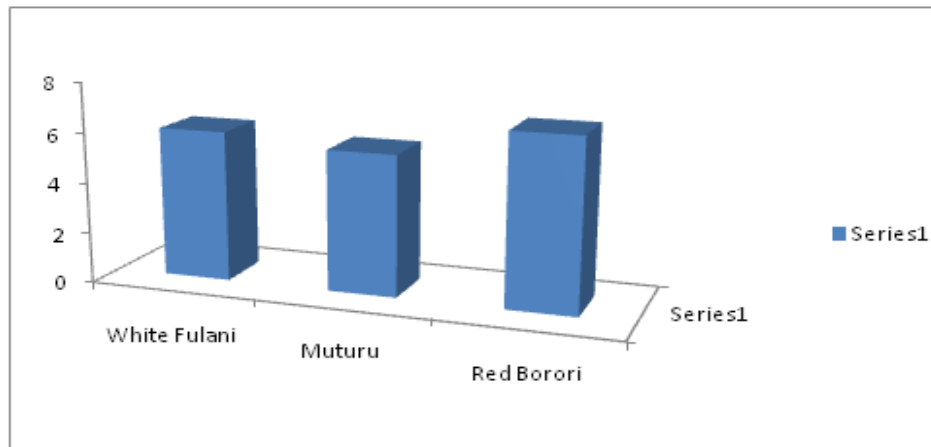


Figure 1: pH of fresh milk from three Nigeria cattle breeds

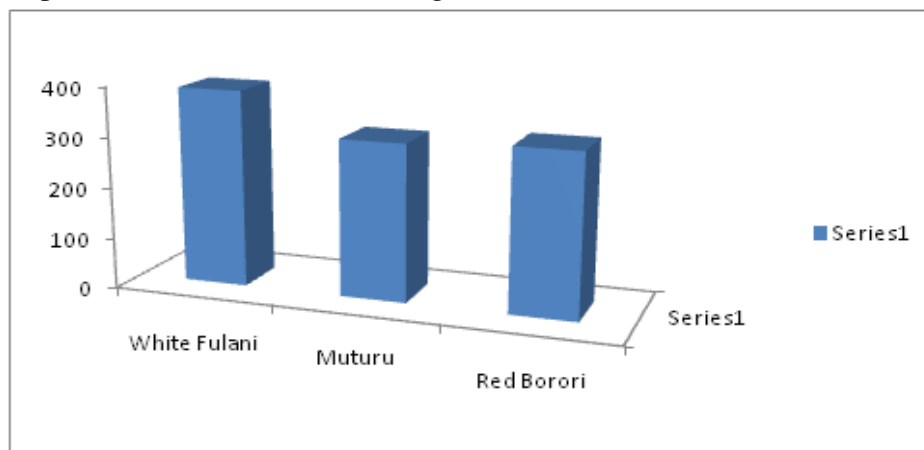


Figure 2: Yield of cheese per 1.5 litres of milk from three Nigeria cattle breeds.

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	63.42±1.22 ^c
Crude protein	12.06±0.40	12.91±0.24	14.46±0.22
Crude fat	13.25±0.35	14.49±0.73	14.76±0.23
Ash	1.63±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 superscript are significantly different ($p < 0.05$)

Table 2: Storage stability of cheese produced from milk of three Nigeria cattle breeds.

Parameters	White Fulani	Muturu	Red Borori
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

Means along the same row with no superscript are not 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	4.60±0.27	5.39±0.34
Odour	5.50±0.22	5.20±0.33	5.10± 0.21
Texture	4.60±0.31	5.30±0.32	6.20±0.44
Palatability	4.30±0.22	5.00±0.42	6.30±0.55
Overall acceptability	5.20± 0.26	4.80±0.30	6.40±0.46

Means along the same row with no superscript are not significantly different ($p>0.05$)

Table 4: Qualitative presentation of organoleptic properties of cheese from three Nigeria cattle breeds.

Parameters	White Fulani	Muturu	Red Borori
Colour	Good	Fair	Good
Odour	Good	Good	Good
Texture	Fair	Good	Very good
Palatability	Fair	Good	Very good
Overall acceptability	Good	Fair	Very good

Means along the same row with no superscript are not significantly different ($P>0.05$)

From figure 1, cheese from white Fulani, Muturu and Red Borori cattle had a mean pH of 6.00, 5.90 and 6.80 respectively. Therefore, there was no statistically significant difference in the pH of cheese gotten from this experiment. Figure 2 shows the cheese yield (g) per 1 litre of milk. Milk from white Fulani, Muturu and Red Borori cattle had mean cheese yield of 390g, 301g and 320g respectively. There was a significant difference in the cheese yield. On table 1, the proximate compositions of cheese obtained from the three breeds of cattle show 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 *Caltropis procera*) gotten by Adetunji and Salawu (2008). Omotosho, Oboh and Iweala (2011) also reported optimum moisture content of 50.5% for alum coagulated cheese. Crude protein, crude fat and ash contents of cheese from this study were lower than the results gotten from Uzeh Regina and Ayodiji (2006), Adetunji and Salawu (2008), Omotosho, Oboh and Iweala. (2011) but crude fat gotten from this study is higher than what was reported by Belewu and Morakinyo (2009) for cheese treated with different concentration of honey. Table 2 shows that all the cheeses were stable upon storage for the first 24 hour of refrigeration. Muturu and Red Borori cheeses show 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.

CONCLUDING REMARK

One of the basic ingredients that the body requires for effective growth is protein. Milk is one of the primary sources. In Nigeria, milk gotten from Zebu cattle is processed locally into Cheese without putting into consideration the suitability of these cattle for milk production as well as the nutritional properties and the health implications of consuming such milk. This experiment explored the quality characteristics of Cheese produced from three breeds of cattle in Nigeria. From the result obtained, it is concluded that the variety of cattle with the most preferred properties is the Red Borori breed. However, the other two varieties equally showed a good acceptability by consumers. Hence, milk from these cattle varieties should be produced in commercial quantity in Nigeria adopting the best modern technologies. This will help in reducing the problem of protein intake among Nigerians who depend on imported milk for consumption. Also, government should create an enabling environment that will promote the production of quality milk from suitable cattle locally.

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