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Comparative Evaluation of Milk Samples from Muturu and Bunaji Cows under Extensive System of Management In humid tropics

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Abstract*: A study was conducted to assess the milk yield, microbial load and proximate composition of fresh milk samples collected from two breeds (Bunaji and Muturu) of cows raised under extensive system of management. There were three treatments: T_1 (Muturu), T_2 (high producing Bunaji) and T_3 (low producing Bunaji). Data were analyzed with the computer aided software (SAS). Results showed that Crude Protein, Fat and Total solids were significantly higher ($P< 0.05$) inT_1 while the least was obtained in T_2. Milk yield was lowest in T_1 while the highest value was recorded in T_2. The least ($P<0.05$) total bacterial count was recorded in the low producing Bunaji while the highest ($P< 0.05$) bacterial count was recorded in Muturu. It is concluded that although proximate composition ofMuturu milk was better than others, its milk yield was poor. Muturu cattle may be recommended for milk production due to its milk composition. However it should be crossed with high producing Bunaji to improve milk yield.*
Keywords*: Milk, Cow, Muturu, Bunaji,*

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I. Introduction

Cow milk which is consumed by millions daily in a variety of different products is considered as the most perfect food for humans from birth to senility as it does not only have good sensory properties and all nutrients required for the body for rapid growth but also could prevent or reduce risks of many nutritional deficiency diseases (Kalkwarf*et al*., 2003). Raw milk of good hygienic quality meets the nutritional needs of body better than any single food as it contains essential food constituents such as fat, proteins, carbohydrates, minerals and vitamins (Sharm and Joshi, 1992;Medhammar*et al*., 2012). However, milk production in Nigeria is still very low (15% out of an estimated world total production of 400,000 metric tons of milk) despite the fact that more than half of the world's cattle population are found in the tropics including Nigeria (CBN, 1999). Major reason for this disparity is genetic potential of our indigenous breed. Importing high yielding breeds such as Holstein Friesian become difficult due to current high import duties and climatic change. This is why in Nigeria, milk production continues to rest entirely on the range cattle of Fulani pastoralists who are accustomed to extensive system of production.Equally of importance is the fact that milk, being a wholesome food with high nutritive value is often prone to early contamination and spoilage if not handled properly. Several workers have reported milk to be an ideal growth medium for microorganisms (Lingathurai and Vellathurai, 2010; Mubarack*et al*., 2010; Ali and Abdelgadir, 2011) . Bacterial spoilage of raw milk usually depend upon various factors such as health of the animal, cleanliness of the housing area, the nature of feed, the water used at farm, the milk vessels / utensils for storage and essentially the hygiene of the milkier / handler (Chatterjee *et al*., 2006; Ali and Abdelgadir, 2011; Salman and Hamad, 2011).Since the presence of bacteria in raw milk reduces the keeping quality of milk and certain bacteria with their associated enzymes and toxins may even survive pasteurization creating health hazards (Salman and Hamad, 2011). There's need to evaluate both the yield and the quality of the milk produced by indigenous breeds such as Muturu and Bunaji. The aim of this study therefore was to compare the yield, proximate composition and microbial load of milk from Muturu and Bunaji breeds raised in AkwaIbom State, Nigeria.

II. Materials and Method

Location of experimental site: The study was conducted at the Teaching and Research Farm of the AkwaIbom State University, Obioakpa, Nigeria. The farm site is found on the southern part of Nigeria at an altitude of about 640m above sea level. The annual average rainfall pattern during dry season is 0-25mm and 500-1000mm during wet season, with about 90% fall during wet season (June-September). Daily temperature range is about 30^0- 39^0C while the mean annual temperature is about 35^0 C. The place usually experience 1500hrs per year of sunshine with monthly relative humidity of 95% at 6.00hrs at dry season. This may fall to 60% at noon depending on the weather condition.

Management of Animals and collection of milk:

A total of nine Cows (3 Muturu, 3 high producing Bunaji and 3 low producing Bunaji designated as T_1, T2 and T_3 respectively) were used for the experiment. The animals were extensively managed. The Cows were allowed to graze freely from 9.00am to 6.00pm under supervision of attendants and returned to their pens to rest at night. The animals were routinely vaccinated against diseases. Each breed of dam and the calves were put together and allowed to suckle for a while in the morning before actual milking started. Each milking time lasted for 45 minutes when the udder might have been completely emptied so that subsequent yield of is not depressed or affected. Initial milking commenced two weeks after the colostrum had ceased. Within the two weeks, milk production was closely monitored which resulted in careful selection of the high yielding Bunaji cows from the low yielding counterparts in the herd.

Fresh whole milk samples were collected from the cows using hand milking method. Hygienic precautions such as teat washing and dipping, foremilk stripping was practiced. The milk collection were arranged in phases as follows: Phase 1; Muturu cows .Phase 2; low yielding Bunaji and Phase 3; High yielding Bunaji cows, This exercise took place between 7am and 11.00am thrice (Mondays, Wednesdays and Fridays) weekly and lasted for six weeks. Milk yield was estimated in each test-day observation.

Data collection and analysis

Milk yield were recorded. The milk samples were analyzed for moisture, total solids (TS), crude fibre, and Crude protein, fat and as described by AOAC, (2003).While solid non-fat, (SNF) and total solids were computed accordingly. Microbial assessment of the milk samples was carried out using standard plate count (A.P.H.A, 1992). Data were subjected to one-way analysis of variance (ANOVA) and test of significant difference using statistical package for social scientist (SPSS) version 10 for window, 2002.

III. Results and Discussion

The proximate composition of the milk samples from Muturu and Bunaji breeds is shown in table 1. Results showed that Crude Protein, Fat, Total solids and Solid not fat increased significantly ($P<0.05$) in T_1 than T_2 and T_3. However, there was no significant ($P>0.05$) difference between the low and the high yield Bunaji groups eventhough higher values were recorded in T_2 compared to T_3. The significantly ($P< 0.05$) higher values of protein, fat and total solid in milk obtained from Muturu compared to the Bunaji could be attributed to the differences in genetic potential. Otaru (2003) reported that two important factors affecting milk composition are breed and nutrition. Generally, milk component levels are not only important indicators of cow health and nutrition but positively correlated within a population of dairy cattle and vary in average component levels as the breeds of cattie vary (Bailey *et al*., 2005). It is known that protein and fat percentages are more highly heritable than yield of milk and components (Bailey *et al*., 2005). Results of milk yield is presented in Table 2. Highest yield was obtained in T_2 followed by T_3 while the least was obtained from T_1 .This is in agreement with Payne (1990) who posited that variations in milk yield exist between breeds of cow and within breed of same cow. It was generally observed that milk yield was negatively correlated to fat and protein percent. This corroborate Bailey *et al*., (2005) who reported that fat and protein percent is negatively correlated to milk yield.

Results of bacterial count for the three milk samples are presented in Table 3. Significant ($P<0.05$) increase in bacterial count was observed in T_1 followed by T_3 and T_2 which were also similar ($P>0.05$). The high bacterial count in Muturu could be due to some reasons. Firstly, soiling of the udder teat due to faecal matter and bedding material in its shed compared to the Bunaji cow shed. This agrees with Wallace, (2009) who reported that bacterial contamination of raw milk generally occur from three main sources; within the udder, outside the udder, and from the surface of equipment used for milk handling and storage. Lingathurai *et al*., (2009) also posited that raw milk can often be contaminated with pathogens, either directly through organisms shed as a result of udder infection or indirectly from (i) a cow's own faecal matter contaminating the udder and teats, (ii) faecal matter of other cows contaminating the udder (iii) milking clusters contacting surfaces with faecal contamination, and (iv) Post-harvest environmental contamination. The influence of dirty cows on total bacteria counts therefore seems to depend on the extent of soiling of the teat surface and the udder preparation procedures employed even as milking heavily soiled cows could potentially result in bulk milk counts exceeding 10,000 cfu/ml (Wallace, 2009). Secondly, increase inambient temperature due to longer time the Muturu milk was stored compared to the Bunaji prior to laboratory testing could allow bacterial contaminants to multiply.A report by Mubarack*et al* (2010) indicate that slight increase (2^o C) in temperature in tropical regions can result in 100% in bacterial load. Generally, fresh milk drawn from a healthy cow normally contains a low microbial particularly bacterial load of less than 103 CFU per millilitre (Lingathurai*et al*., 2009; Wallace, 2009), but the load may increase up to 100 fold or more once it is stored for some time at ambient (30 to 35°C) temperature (Lingathurai *etal*., 2009). Pathogenic contamination of raw milk may however be reduced by enforcing enhanced hygienic control throughout the milk harvesting stage. These include teat washing and dipping, foremilk stripping, and good milking hygiene which would reduce the number of pathogens that may enter the milk from environmental sources (Wallace ,2009; Lingathurai *et al*., 2009),.

Table 1: Proximate composition of milk from Muturu and Bunaji Cows

Parameter	T_1 (Muturu)	T_2 (high yield Bunaji)	T_3 (low yielding Bunaji)	Level of significance
Moisture	85.57	89.11	87.63	NS
Crude protein	3.50^{a}	3.19^{b}	3.20^{b}	*
Ash	0.65	0.65	0.19	NS
Fibre	0.43	0.39	0.13	NS
Fat	4.90^{a}	3.96^{bc}	4.17^{ab}	*
Total Solid	14.43^{a}	10.89^{c}	12.37^{b}	*
Solid not fat	9.53^{a}	6.93^{c}	8.20^{b}	*

Means along the same row having no superscripts are not significantly different ($P > 0.05$).
*= significant ($P < 0.05$)   NS=Not significant ($P > 0.05$)

Table 2: Average Daily milk yield (litre) from Muturu and Bunaji Cows

Week	T_1 (Muturu)	T_2 (high yield Bunaji)	T_3 (low yield Bunaji)	Level of significance
1	0.68^{bc}	2.26^{a}	1.20^{b}	*
2	0.75^{bc}	2.33^{a}	1.52^{b}	*
3	0.86^{bc}	2.45^{a}	1.77^{ab}	*
4	0.82^{c}	2.60^{a}	1.90^{ab}	*
5	0.80^{c}	2.65^{a}	1.71^{b}	*

Means along the same row having no superscripts are not significantly different ($P > 0.05$).
*= significant ($P < 0.05$)   NS=Not significant ($P > 0.05$)

Table 3: Total viable bacterial and fungal counts (CFU/ml) of milk from Muturu and Bunaji Cows

Count	T_1 (Muturu)	T_2 (high yield Bunaji)	T_3(low yield Bunaji)	Level of significance
Bacterial	7.00×10^{1a}	5.00×10^{1b}	5.06×10^{1b}	*
Fungal	1.80×10^{1a}	0.06×10^{1c}	1.16×10^{1ab}	*

Means along the same row having no superscripts are not significantly different ($P > 0.05$).
*= significant ($P < 0.05$)   NS=Not significant ($P > 0.05$)

IV. Conclusion

The result of thisstudy demonstrated that local milk components ofMuturu cows should be preferred by the local herdsmen because of its relatively superior milk solid components compared to the Bunaji cows. However, to reduce bacterialcount in fresh milk, constant changing of bedding materials for dairy cows is strongly recommendedas well ashandlingmilkin coolersonceextracted.

References

[1]. Ali AA, Abdelgadir WS (2011). Incidence of *Escherichia coli* in raw cow's milk in Khartoum state. Br. J. Dairy. Sci. 2(1):23-26.
[2]. APHA (1992). Microbiological methods for dairy products. In Standard methods for examination of dairy products.16th edition. Marshall, RT. (ed.). American public health association, Washington, DC. pp. 287- 307.
[3]. Bailey, K. E., C. M. Jones, and A. J. Heinrichs. 2005. Economic returns to Holstein and Jersey herds under multiple component pricing. J. Dairy Sci. 88:2269-2280
[4]. Chatterjee SN, Bhattacharjee I, Chatterjee SK, Chandra G (2006). Microbiological examination of milk in Tarakeswar, India with special reference to coliforms. Afr. J. Biotechnol. 5(15):1383-1385.
[5]. CBN (1999). Central Bank of Nigeria, Annual Report 1999. CBN Lagos, Nigeria.
[6]. Kalkwarf H J, Khoury J C, Lanphear B P. (2003)Milk intake during childhood adolescence, adult bone density and osteoporotic fracture in US women. Am J ClinNutr; 77 (1):10e1
[7]. Lingathurai S., Vellathurai P., Vendan S. E. and Prem A. A. (2009) A Comparative study on the microbiological and chemical composition of cow milk from different locations in Madurai, TamilNadu. *Ind J SciTechnol*2(2): 51-54
[8]. Lingathurai S, Vellathurai P. (2010). Bacteriological quality and safety of raw cow milk in Madurai, South India. Webmed Central. Microbiol. 1(10):1-10.
[9]. Medhammar E., Wijesinha-Bettoni R., StadlmayrB.,Nilsson E., Charrondiere U. R. and Burlingame B.,(2012). Composition of milk from minor dairy animals and buffalo breeds: a biodiversity perspective. *Journal of the Science of Food andAgriculture*, 92, 445–474.
[10]. Mubarack MH, Doss A, Dhanabalan R, Balachander S (2010). Microbial quality of raw milk samples collected from different villages of Coimbatore district, Tamilnadu, South India. Ind. J. Sci. Technol. 3(1):61-63.
[11]. NLPD (1992). National Livestock Project Division.National Dairy Survey. NLPD, Kaduna, Nigeria
[12]. Salman Adil M.A, Hamad IM (2011). Enumeration and identification of coliform bacteria from raw milk in Khartoum state, Sudan. J. Cell Anim. Biol. 5(7):121-128.

[13]. Sharm D.K and Joshi D.V, (1992). Bacteriological quality of milk and milk products with special reference to *Salmonella* and its health significance. *Journal of Science and Technology*, 22:100-103.
[14]. Wallace R. L. (2009). Bacteria counts in raw milk. Dairy cattle Management pp1-4

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