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acta SATECH **2**(2): 46 - 49 (2005)

Research

Comparative composition of white Fulani and Muturu cows' milk

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Received: 22 Jul., 2005 *Revision accepted: 22 Aug., 2005*

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Abstract
A comparative study of the Muturu and White Fulani cows was conducted to evaluate their milk composition. Milk samples were collected from six cows comprising three White Fulani and three Muturu in their early stages of lactation. Samples were collected early in the morning between 0600 and 0700 hours thrice a week for twelve weeks. Milk samples were analysed for milk protein, milk fat, total solid, solid non-fat and ash. Results revealed a significant difference (P<0.05) in the percentage fat composition of the two breeds, Muturu (3.49%) and White Fulani (4.11%). There was no significant difference in other parameters investigated. A declining trend was observed in all the milk constituents as lactation advanced.

Keywords: Cow, milk constituents, White Fulani, Muturu

Introduction
The White Fulani (WF) and Muturu (MT) breeds of cattle are among the indigenous breeds raised in some parts of Nigeria. The WF is popular among the nomadic Fulanis who migrate from the north towards the south of Nigeria during the dry season in search of grass and water (Dettmers & Williams, 1978). Even though not a dairy breed, the WF is largely milked on a subsistence scale. The Muturu is widely distributed in the South East of Nigeria with an estimated population of 42,000 (RIM, 1992). A few are also found in the Swamp of Cross River, Bendel, Ogun, Ondo and Lagos States (ILCA, 1979). These indigenous cattle are well adapted to the environmental conditions prevailing in the sub-Saharan region (Nouala *et al*., 2003). According to Syrstad (1991), natural selection over the years has provided them with high degree of heat tolerance, resistance to many tropical diseases and the ability to survive long periods of feed and water shortage. Muturu has, however, been reported as one of the breeds at risk of extinction due to interbreeding (Jabbar *et al*., 1997). A dearth of information on the milk producing potential and milk composition of the Muturu (Ezekwe and Machebe, 2005) made this study imperative. With the potential danger of the loss of plant and animal genetic diversity and further genetic improvement of indigenous animal breeds, there is a need to assess the milk composition of these breeds. This study, therefore, evaluate the milk composition of the Muturu in comparison with the White Fulani cow, a more regularly milked breed in Nigeria.

Material and methods
The study was carried out between November 2003 and April 2004 under the humid tropical environment of Ikenne, Ogun State, Nigeria.

Fresh milk samples were obtained from six lactating cows comprising of three WF and three MT cows at the Mayflower School, Ikenne. The cows were raised under semi-intensive system on grasses (*Panicum maximum* and *Gliricidia sepium)* and brewers dried grains. Salt lick and water were provided for them and routine veterinary care was carried out. The animals were between the ages of $2^1/_2$ and 4 years, in their first and second parity and

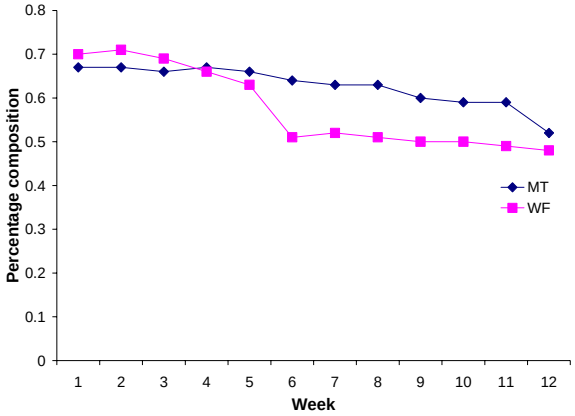

Fig.1: Total Solid composition of White Fulani (WF) and Muturu (MT) cows' milk

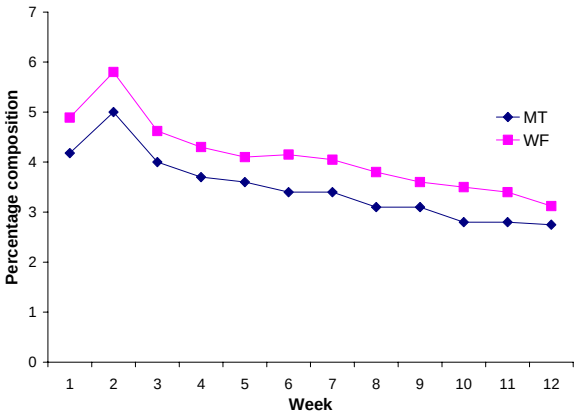

Fig. 2: Fat composition of White Fulani (WF) and Muturu (MT) cows' milk

their early stages of lactation. Milk samples were collected from individual animals between 0600 and 0700 hours by hand milking. Milk samples obtained were kept in clean-labeled bottles, bulked for each animal per week and stored without preservative in a deep freezer at -20^{0}C until required for analysis.

Analysis of milk samples

Milk samples were first warmed to 40^{0}C and cooled to 20^{0}C before analysis. The milk fat content was analysed by the standard Gerber method (Harvey & Hill, 1967). Total solids (TS) were determined by first evaporating 2g of milk sample over a boiling water bath (100^{0}C) for 1h and then oven dried to a constant weight. Milk protein (MP) was carried out by the Kjeldhal method (AOAC, 1980). Solid non-fat (SNF) was calculated by the difference between total solids and fat. Total ash was estimated by evaporating 2g of milk to dryness and ashing in a muffle furnace at 600^{0}C for 3 hours.

Data were analysed using procedure ANOVA (PROC ANOVA) of SAS (1999) and significant means were compared using DUNCAN option of the same software.

Results

The mean percentages of milk fat, SNF, TS, milk protein and ash are presented in Table I. A significant difference was observed (P<0.05) in the percentage fat of the WF and MT cow milk while TS, fat, SNF, ash and MP were non-significant (P>0.05).

The trend in TS, fat, SNF, ash and MP composition of White Fulani and Muturu cows are as shown on Figs. 1-5. Muturu had a higher TS and SNF

Table 1: Breed differences in milk composition of Muturu and White Fulani cows

Milk compo-Sition/Breed	TS	Fat	SNF	MP	Ash
White Fulani	16.09 ±1.29	4.11 ±0.21	12.08 ±1.13	3.25 ±0.22	0.58 ±0.03
Muturu	17.44 ±1.46	3.49 ±0.19	14.07 ±1.32	3.04 ±0.22	0.63 ±0.01

TS: Total Solid, SNF: Solid -Non Fat, MP: Milk Protein

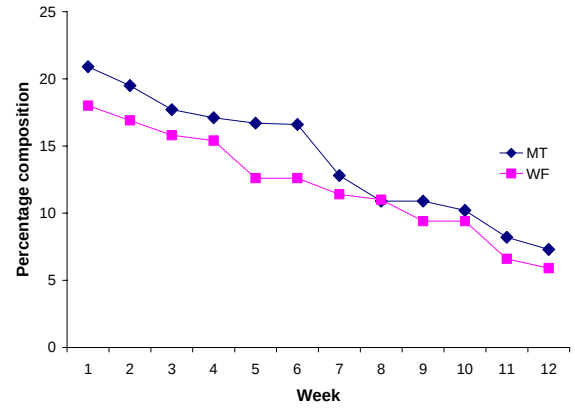

Fig. 3: Solid non-Fat composition of White Fulani (WF) and Muturu (MT) cattle breed

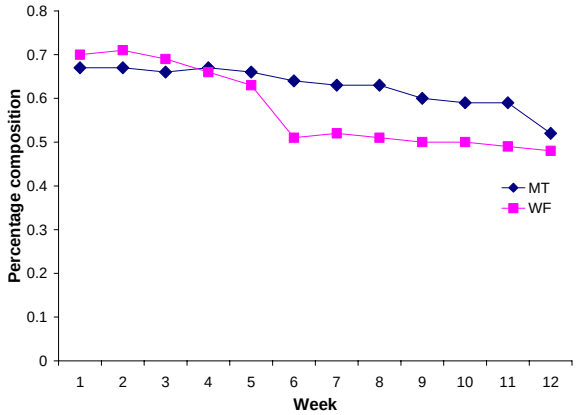

Fig. 4: Ash composition of White Fulani (WF) and Muturu (MT) cows' milk

for the 12-week period except weeks 1-4 and 8 respectively (Figs. 1&3). Milk fat composition was higher in the WF than the MT (Fig. 2). Ash content (Fig. 4) of WF milk was higher till week 4 when it declined below that of the MT. Milk protein (Fig. 5) was lower in WF up to week 3 when it rose sharply above that of MT and subsequently leveled out.

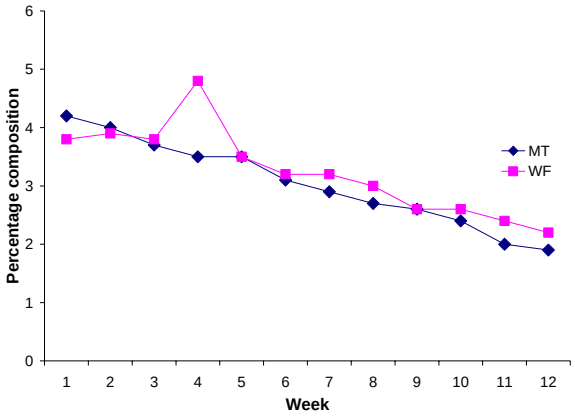

Fig. 5: Milk protein composition of White Fulani (WF) and Muturu (MT) cows

Discussion

The Milk protein, fat and ash values for Muturu in this study were slightly lower than the average of 3.77%, 4.72% and 0.74% respectively reported by Ezekwe and Machebe (2005). The MP value is comparable to the 3.2% reported for Ghana short horn, a strain of the Muturu (Rege *et al.*, 1994) and is not significantly different from the value of the WF (Table 1). There is paucity of information on the milk composition of Muturu, as the cow is not generally milked (Ngere, 1990) except for medicinal preparation by native doctors (Rege *et al*, 1994).

The TS and SNF were between 12 and 25% and, 12 and 23% respectively for WF while they were 11 and 23% and, 8 and 18% for Muturu, which are within normal range. The TS and SNF for WF values in the present study were higher than those of Ibeawuchi and Umoh (1990) but the fat was lower. The present fat values for WF were, however, comparable to those of Adeneye *et. al.*, (1970) and Afolabi (1991) in Nigeria. The high values of TS and SNF reported for both breeds may be due to their low milk yield as compared to exotic breeds (Akinsoyinu, 1981; Ibeawuchi & Umoh, 1990). Percentage milk fat, protein, TS, Ca and P have been found to have an inverse relationship with milk yield (Akinsoyinu 1981, Mikulec *et al.*, 1975). The trend in total solid composition for both WF and MT indicate a decrease as lactation length increases.

The milk fat of WF (4.5-5.8%) and MT (3.5-4.5%) fall within the range reported for Muturu (2.98-5.12%) by Ogunlana (1978). Both breeds had a peak fat composition at week 2 (WF 5.8% and MT 4.7%) which gradually decreased to 4.5% and 3.5% at the 12th week respectively.

The SNF also indicate a decrease with increasing lactation. Ash composition of the MT was almost constant throughout the 12week period with very little variation. WF followed the same trend except for week 6 when there was a slight drop. The trend in MP of the WF revealed a peak at the 4th week. This was, however, not observed in the Muturu. All the parameters were highest within the first few weeks of collection. This is an advantage especially to the calves as they are still in the early stages of growth when nutrient requirement is high. It can be concluded that the milk composition of both Muturu and White Fulani are similar with variation only in the fat content.

Acknowledgements

The authors wish to acknowledge the support of the management of Mayflower School, Ikenne and Mallam Alli for the permission to use their animals for this research.

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