THE REPRODUCTIVE PERFORMANCE OF N'DAMA AND MUTURU CATTLE IN NIGERIA. 1. OESTROUS CYCLE LENGTH, DURATION OF OESTRUS AND OESTROUS BEHAVIOUR PATTERNS.

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ABSTRACT

Twelve primiparous cycling N'dama and Muturu cows comprising 8 N'dama and 4 Muturu Cows, were subjected to three hour continuous observations twice daily at 0630 - 0930hrs and 1500 - 1800 hrs for a period of 9 months during which oestrous behaviour and oestrous cycle characteristics of the cows were monitored. Results indicated that oestrous cycle length in the two breeds averaged 20.09 ± 0.56 days and 20.56 ± 0.87 days for N'dama and Muturu cows, respectively. Durations of standing oestrus were 12.55 ± 2.93 hr in the N'dama and 11.31 ± 4.29 hr in the Muturu. There were no significant breed effects ($P > 0.05$) on these parameters. Mounting activities in the herd were significantly higher ($P < 0.05$) in the morning hours than in the evening hours. The practical implications of these results in relation to controlled animal breeding were discussed.

Keywords: N'dama, Muturu, oestrous Cycle, Oestrus, Oestrous behaviour.

INTRODUCTION

With over 13 Million heads of cattle in Nigeria, (FLD, 1991), coupled with the abundant fallow and bush grazing areas of nearly 40 million hectares, (Nuru, 1978), the potential for the cattle industry in Nigeria is great. Unfortunately, the productivity of tropical livestock is generally considered to be less than those in the temperate regions (Mason and Ewanendran, 1982). Attempts to improve cattle production in the tropics have met with only limited success partly because technological advances which were developed in industrial countries and applied to tropical animal production have not worked

well under local conditions. Santiago (1967) indicated that a suitable alternative for increasing livestock production in the tropics is through genetic improvement and wider distribution of the native breeds which are naturally adapted to their surroundings. However, there is dearth of information on the reproductive traits and behaviour of indigenous breeds although reproductive efficiency is generally reported to be low (Randel, 1984). This problem is compounded by the irregular oestrous cycles, poor heat signs, short heat duration (Rakha *et al*, 1970; Zakari, 1981) and a high incidence of silent heats (Johnson and Gambo, 1979, Dawuda *et al*, 1989) which are associated with tropical livestock. This study was therefore initiated to evaluate the oestrous cycle characteristics and related phenomena in N'dama and Muturu cattle under paddock condition. These two cattle breeds are widely recognised as being trypanotolerant and thus hold enormous potential for beef production in the humid zone of West Africa, where trypanosomiasis is endemic.

MATERIALS AND METHODS

Location of Study:

The study was conducted at the University of Nigeria Nsukka, (UNN) Teaching and Research farm. Nsukka is located on longitude $07^{\circ}24$ E and latitude $06^{\circ}52$ N and characterized by two distinct seasons - rainy (April-October) and dry (November - March) seasons. The mean annual temperature is 26.5°C , the mean minimum being 21°C while the mean maximum is 32°C . at the UNN Meteorological Station.

Animals and their Management: A group of 12 cycling primiparous cows aged about 3-4 years and consisting of eight (8) N'dama and

four (4) Muturu were used for the study. These were selected from a herd of breeding cows belonging to the beef cattle unit of the Teaching and Research farm complex. Selection of cows was based on the result of rectal palpation (Zemjanis, 1970) to indentify cycling materials.

Cows were grazed together in fenced paddocks containing some guinea grass, (*Panicum maximum*), giant star grass (*Cynodon dactylon*) and *Penisetum*. During the dry season, their grazing was supplemented with silage and hay feeding only. All cows had unlimited access to water. The routine health programme of the farm was also carried out.

Observation of Animals:

Three hours continuous observation were made on the herd twice daily at 0630hr to 093hr and 1500hr to 1800hr, from October 1987 to June 1988 - a period of 9 months covering five months of the dry season and 4 months in the rainy season. The observations were made when the cows were either grazing or in their sleeping paddocks during which visual signs of heat and frequency of observation was chosen on the basis of previous reports by Donaldson (1968) and Williamson *et al.* (1972).

At each observation period, the following oestral activities were recorded:

- (i) Sniffing the vulva of oestrus cow
- (ii) licking the vulva of oestrus cow
- (iii) Chin rubbing/resting on an oestrus cow
- (iv) tail raising and switching by oestrus cow
- (v) Following an oestrus cow
- (vi) mounting activity which include mounts received by oestrus cows and those she made. The time taken to accomplish these events was recorded with aid of a stopwatch. The total number of occasions and time it took each of these behavioural parameters to be expressed in each observation period were calculated. Each cow on oestrus was monitored continuously until she ceased to show behavioural signs of heat. A cow was deemed to on heat

when she stood to be mounted by other cows. Duration of oestrus was estimated as the time interval between the onset of heat and its termination.

Statistical Analysis:

A one-way analysis of variance was used to analyse data on the two breeds. Correlation coefficients were computed on the behavioural events. All analysis were carried out in accordance with the procedures outlined by Steel and Torrie (1980). Some calculations were also computed as follows:

- (i) Mean number of mounts received by each cow per hour of the observation period was computed as: number of mounts received by all oestrus cows / the number of oestrus cows x duration of observation
- (ii) the intensity of Oestrus was computed as the mean number of mounts which an oestrus cow received per oestrus period. (Voh *et al.* 1987).

RESULTS

Oestrous Cycle length:

A total of 42 oestrous cycles were observed in both breeds - 23 for Ndama and 19 for Muturu. The mean lengths of the cycle were 20.09 ± 0.56 days and 20.56 ± 0.87 days for the Ndama and Muturu cows, respectively. There was no significant difference ($P > 0.05$) in the cycle length for the two breeds. In the Ndama group, 21.74% of all the cycles were shorter than 19 days, 73.92% ranged between 19 and 22 days, while 21.77% were more than 21 days (Fig 1a). In the Muturu 33.34% of all the cycles were shorter than 20 days, while 44.45% of the cycles ranged between 20 and 22 days (Fig 1a).

Onset and Duration of Oestrus:

In the Ndama, 60% of the 23 oestrus period recorded commenced in the morning hours while in the Muturu, 59% of the 19 oestrus periods occurred during the morning hours. In both breeds therefore, there were significantly ($P < 0.05$) more oestrus occurring in the morning hours than in the evening hours.

The average duration of heat was

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Fig 1a: FREQUENCY DISTRIBUTION OF OESTROUS CYCLE LENGTH

12.55±2.93 hour with a range of 6.98-20.20 hr for the Ndama while in the Muturu, oestrus duration averaged 11.31±4.2hr with a range of 5.30-19.17hr. The duration of oestrus was not significantly different ($P>0.05$) in the two breeds studied.

Oestroual behaviour:

The major activities exhibited by the oestrus cows and the percentage of their occurrences are presented in Table 1. Although there was

no consistent pattern in the display of these signs by the cows, all the animals exhibited most of the signs to varying degrees during any one heat period. Standing to be mounted was, however, the most consistent behavioural sign shown by all the cows studied. The average number of mounts which an oestrus cow received was significantly higher ($P<0.01$) than those she made on other. Thus in Muturu cows, oestrus cows received on the average 1.80±0.28 mounts per hour while

TABLE 1: OCCURRENCES OF BEHAVIOURAL HEAT SIGNS

Parameters	N'dama (%)	Muturu (%)
1. Mounts received by oestrous cow	34.97	31.93
2. Following an Oestrous Cow	16.00	18.49
3. Sniffing the vulva of Oestrous cow	15.48	10.92
4. Chin resting and rubbing	12.52	15.80
5. Mounts done by Oestrous Cow	11.10	11.93
6. Licking the vulva of Oestrous Cow	8.26	8.57
7. Tail raising and stwicking	1.68	2.35

making only 0.19 ± 0.12 mount per hour, and in Ndama cows, oestrus cows received an average of 2.73 ± 0.87 mounts per hour and made 0.92 ± 0.11 mounts per hour on other cows during oestrus. Generally, cows were found to be more active in mounting and soliciting for mounts in the morning hours than in the evening.

Highly significant correlations ($P < 0.01$) were observed between sniffing of the vulva and mounting ($r = 0.62$), licking of vulva and mounting ($r = 0.67$), chin resting/ rubbing and mounting ($r = 0.88$) in Ndama cows. In Muturu cows, corresponding correlations ($P < 0.05$) were $r = 0.42$, $r = 0.58$), while correlation ($P < 0.01$) between chin resting/rubbing and mounting was $r = 0.62$.

DISCUSSION

Results of the present study indicate that the oestrous cycle lengths in Ndama and Muturu cows are consistent with the 21 days reported by many workers for some tropical cattle breeds (Purbey and Sane 1978, Sharma *et al.*, 1984). However, cycle lengths of 20.09 days for Ndama and 20.56 days of Muturu cows obtained in this study are lower than valued of 22.8 days and 23.7 days reported by Zakari *et al.* (1981) for white Fulani and Sokoto Gudali cows, respectively in Nigeria, and value of 24.25 days reported for Boran cows in Zambia by Rakha *et al.* (1970). Seasonal and nutritional influences are known to affect the duration of oestrous cycle in cattle (Please *et al.* 1970, Zakari *et al.* 1981).

Several workers have reported that oestrous behaviour in cows is best monitored in the early morning hours (Purbey and Sane 1978; Salano *et al.* 1984). This is corroborated in this study where 60% of Ndama cows and 58% of Muturu cows exhibited oestrous activities in the morning hours. Although the physiological reason for this trend is not clear, it has been suggested that management activities such as movement of cows between paddocks for feeding or herding of cows for milking may influence the cow's opportunity to interact (Esselmont and Bryant 1976). The observed durations of oestrus of about 13hr in Ndama

and 11 hr in Muturu are within the range of 3.1hr to 21.7hr and a mean of 10.6hr reported for some breeds of tropical cattle (Zakari *et al.* 1981, Voh *et al.*, 1987, and Galina and Arthur 1990). This is also consistent with the general observation that the duration of standing oestrus is considerably shorter in breeds of *Bos taurus* and *Bos indicus* cattle which are raised in the tropics than the 24 hr period reported for cattle that are maintained in a more temperate climate (Galina *et al.*, 1993). Heat stress is known to cause poor manifestation of oestrus in Zebu and *Bos taurus* cattle raised in the tropics (deAlba *et al.*, 1961). Duration of oestrus is also affected by age of the cow (Arthur and Rahim 1984) and season of the year (Zakari *et al.*, 1981). The general management implication of this result with regard to timing of breeding operations is that heat of very short duration is very likely to be missed by the farmer especially if an artificial insemination programme is being practised with the resultant adverse effect on the reproductive performance of the herd.

The intensity of oestrus is reported to be low in tropical cattle (Sigh and Kharcha, 1985) because of infrequent mounting behaviour and poor manifestation of secondary signs of oestrus encountered in tropical cattle breeds (Galina *et al.*, 1993). It is therefore not surprising to observe in the present study that Muturu and Ndama cows averaged only about two mounts per hour during oestrus. More of the mounting activities were found to be accomplished by non-oestrus cows, thus raising some doubt about the reliability of using mounting behaviour as a criterion for selecting cows for breeding operation. Williamson *et al.* (1972) had cautioned that if a cow is seen mounting others repeatedly, such individual should be observed more closely for further evidence of oestrus. Therefore, standing for mounts which was mostly exhibited by oestrus cows would appear to be the more accurate and reliable methods of heat detection in Ndama and Muturu cattle. It was quite obvious from the present study that other behavioural parameters such as chin resting,

sniffing and licking of the vulva, tail raising and switching are less reliable indicators of heat since only a minority of the herd was consistent in displaying these activities at similar levels during consecutive heat periods. The significant relationships that were observed between vulva sniffing/licking and mounting, chin resting/rubbing and mounting in the two breeds seem to suggest that these events are a necessary prelude to mounting and should be watched for when observing cows for oestrus.

In conclusion, it is suggested that Ndama and Muturu cows should be observed closely for sign of oestrus early in the morning if high detection rate is to be achieved. The most objective physical sign manifested by oestrus cows is standing to be mounted and this activity is usually preceded by vulva sniffing/licking, and chin resting/rubbing.

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