
PRELIMINARY STUDIES ON REPRODUCTIVE AND GROWTH PERFORMANCE OF MUTURU CATTLE IN SOUTHWEST NIGERIA

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ABSTRACT

The Muturu cattle is a shorthorn, humpless and trypanotolerant breed of cattle found in parts of Southern and North Central Nigeria. Though small in size, it is highly valued for its meat quality, ease of management and as a traditional gift during important ceremonies. However, reliable information on reproductive and growth performance of the breed is scarce, hence, a preliminary analysis of data collected between 2016 and 2023 at a Muturu cattle ranch located in the humid zone of Southwest Nigeria was carried out. Parameters analysed were birthweight, secondary sex ratio, calving interval and liveweight. Results showed birthweight of 12.05 ± 0.09 kg and 11.22 ± 0.13 kg for male and female calves respectively ($P < 0.001$). Calving interval averaged 469.3 ± 31.4 days while calving pattern was significantly influenced by season with most calvings occurring in the late dry season (62.3%) and the least in the late wet season (1.9%). In conclusion, it is recommended that further studies with larger number of animals be carried out for more precise estimates of reproductive and growth parameters in Muturu cattle.

Keywords: Muturu, Southwest Nigeria, Reproduction, Growth

INTRODUCTION

Muturu cattle of West Africa, *Bos taurus brachyceros*, is a humpless shorthorn breed reputed to be trypanotolerant (Berthier *et al.*, 2015). It was once widely distributed across the region but it is now considered endangered. Reproductive and growth data for the breed are very scarce probably because most of the cattle are kept by smallholder farmers who keep little or no performance records. Ezekwe (1999) reported mean ($\pm$ S.E.) birthweight of Muturu in Southeast Nigeria to be 11.3 ± 0.68 kg, with no significant difference between male and female calves. The Savanna strain of Muturu cattle is larger in body size than the Forest strain (Aboagye *et al.*, 1994). Growth curve for Muturu cattle is scarce though regression equations for predicting liveweight from body dimensions abound (Oduguwa *et al.*, 2013; Assogba *et al.*, 2017; Daikwo *et al.*, 2018; Adoligbe *et al.*, 2022). This study involved the analyses of some performance data obtained from a Muturu cattle ranch located in the humid zone of Southwestern Nigeria.

MATERIALS AND METHODS

Data analyzed in this study were obtained between 2016 and 2023 from a herd of pure Muturu, West African Shorthorn Cattle (*Bos taurus brachyceros*), reared at Abass Ranch, longitude 7. 36548°E and latitude 3.34830°N, in Ibarapa Central Local Government of Oyo State. The 10-ha ranch was divided into paddocks sown with *Stylosanthes hamata*, *Chloris gayana* and *Brachiaria ruziziensis*, in addition to natural pastures. The cattle were rotationally grazed. Water supply was provided *ad libitum* from a borehole reticulated to all paddocks. From the middle of November till the end of the dry season in March, the cattle were provided with supplementary feed comprising a mixture of palm kernel cake (30%), wheat offal or brewers' dried grains (69%), bonemeal (0.5%) and common salt (0.5%) fed at an average of 300 g/head/day in addition to about 200 g/head/day of dried cassava peels. The cattle were routinely dewormed and de-ticked. The seasonality of calving was investigated using data from 53 calvings between March 2016 and November 2023. The year was divided into four seasons: Late Dry Season (January to March), Early Wet Season (April to June), Late Wet Season (July to September), and Early Dry Season (October to December). The frequency distribution of calvings between the four seasons was analysed using chi-square test. Calving interval was analysed using descriptive statistics. The relationship between calving interval and parity was investigated by least squares analysis of variance (SYSTAT, 2017) using data from cows with at least three calvings within the study period. Sex ratio was analysed by chi-square using records of 56 calves born on the ranch within the study period. Difference between male and female birthweight was analysed using t-test.

The relationship between age and liveweight was investigated by fitting the data to the linear and polynomial regressions, $Y = a + bX$, $Y = a + bX + cX^2$, and $Y = a + bX + cX^2 + dX^3$, where Y =liveweight in kg and X =age in days, with a , b , c and d being constants. The goodness of fit was estimated using the coefficient of determination, R^2 .

RESULTS AND DISCUSSION

Seasonality of calving

The seasonal distribution of calving showed highly significant difference (Chi-square = 44.74, $df = 3$, $P < 0.01$). Percentage calvings were 62.3, 24.5, 1.9 and 11.3% in the late-dry, early-wet, late-wet and early-dry seasons respectively (Figure 1). The results provide strong evidence for seasonality of calving by the Muturu in Southwestern Nigeria. Steinbach and Balogun (1971) reported a highly significant ($P < 0.001$) effect of photoperiod on conception rate of N'Dama cattle (*Bos taurus longiferos*) in the Southern Guinea Savanna Zone, Southwest Nigeria, in which the highest number of conceptions occurred in April (7.3%) and the lowest in October (4.4%). This translates to highest calving rate occurring in January and the lowest in July, which is in agreement with the present study. Linear, quadratic and cubic regressions of age on liveweight yielded similar results at 1 and 2 years. However, linear and quadratic regressions overestimated birthweight while cubic regression appeared to overestimate liveweight at 3 years of age.

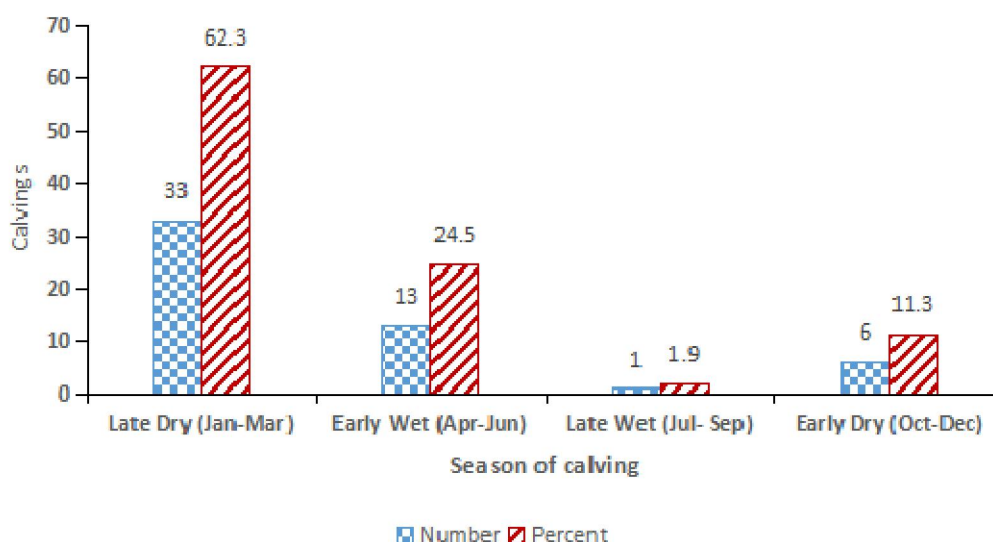


Figure 1. Seasonal pattern of calving in Muturu cattle in Southwest Nigeria

It is notable also that majority of conceptions appear to be taking place in the wet season when pasture is abundant. The interaction between photoperiod and nutrition in relation to calving patterns of Muturu in the study area should be investigated.

Calving interval

The calving interval (Mean $\pm$ SE, $n=27$) obtained for Muturu cows was 469.3 ± 31.4 days (Table 1). This dropped to 441.1 ± 28.0 days ($n=21$) following two-sided 10% trimming of outliers. This compares with a calving interval of 445.34 ± 2.68 days reported for N'Dama cattle by Abanikannda and Olutogun (2019) in Southwest Nigeria. It is also generally within the range of 15.7 ± 0.9 ($n=181$) and 17.0 ± 0.8 ($n=130$) months for Ghana Shorthorns, 13.6 ($n=60$) months for Lagune in Benin and 12.4 ± 0.6 ($n=93$) months for Muturu in Nigeria, all under “improved” husbandry (Rege, Aboagye and Tawah, 2011).

Table 1. Calving interval estimates of Muturu cattle in Southwest Nigeria

No. of cases	Calving Interval, days			
	Mean±SE	95% CL*	Trimmed** Mean±SE	95% Trimmed Mean CL
27	469.3±31.4	404.7-534.0	441.4±28.0	383.1-499.7

* CL=Confidence limits

**10%, 2-sided; No. of observations trimmed out=6

The effect of parity on calving interval was not significant ($P>0.05$). This differs from the findings of Abanikannda and Olutogun (2019) in which year of birth, parity of dam, age of dam and dam's age at first calving all significantly ($P<0.05$) influenced calving interval.

Secondary Sex ratio (SSR)

The percentages of male and female calves born in 56 calvings were 60.7 and 39.3% respectively, which did not differ significantly from the expected 50% each (Chi-Square, .05, tabulated, 1 df = 3.841; calculated= 2.571; $P>0.05$, ns). Much larger sample size would probably be required to detect any significant variation from the expected 1:1 ratio. Gray and Hurt (1979) reported SSR of 52.74% for 4,245 single births between 1940 and 1977, from 1046 Holstein cows at Cornell University. Roche, Lee and Berry (2006) reported that climatic factors associated with higher temperatures and increased evaporation may influence SSR in dairy cattle.

Birthweight

Birthweight showed highly significant ($P<0.001$) difference between (Mean±SE) male (12.05 ± 0.09 kg) and female (11.22 ± 0.13 kg) calves. Gbangboche *et al.* (2011) reported birthweights of 15.37 ± 0.20 kg and 13.44 ± 0.37 kg for male and female Lagune (Muturu) respectively at the Samiondji breeding farm ($2^{\circ}22$ and $2^{\circ}25$ long. E, $7^{\circ}25$ and $7^{\circ}30$ lat. N) located in the Sudano-Guinean zone of Benin Republic. The Savanna strain of Muturu is known to be larger in body size than the Forest Muturu, which could account for the higher birthweight in the Benin study. Birthweight obtained in the present study agrees closely with that (11.3 ± 0.68 kg) reported by Ezekwe (1999) for Muturu in Southeastern Nigeria.

Age and liveweight

The linear, quadratic and cubic regression curves for the combined male and female Muturu cattle are shown in Figure 2. The regression constants, a, b, c and d, with the respective coefficients of determination are shown in Table 2, while the respective liveweight estimates for male, female and combined (male and female) data are presented in Table 3.

In general, R^2 was least for linear, intermediate for quadratic and highest for cubic regressions across female, male and combined data (Table 2). Linear regression appeared to over-estimate birthweight, equivalent to “a”, while cubic regression yielded the closest value to the reported value for birthweight (12.05 kg for male and 11.22 kg for female) in this study. On the other hand, the cubic regression appeared to over-estimate liveweight at 1095 days (3 years) (Table 3). Estimated liveweights across regression models were closest at 1 and 2 years of age.

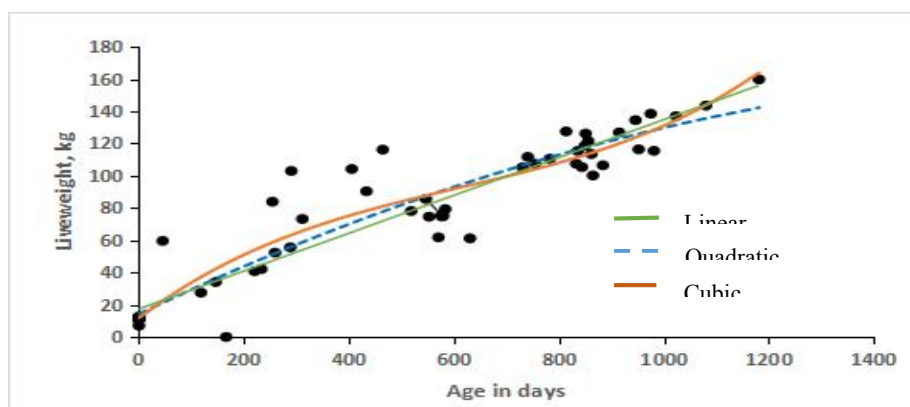


Figure 2. Relationship between age and liveweight in Muturu cattle, Southwest Nigeria

Table 2. Comparative evaluation of linear, quadratic and cubic regression models for prediction of liveweight from age in Muturu cattle in Southwest Nigeria

Group	Regression	Constants				R ²
		a	b	c	d	
Female (F)	Linear, $Y = a + bX$	17.085	0.1169	-	-	0.7695
	Quadratic, $Y = a + bX + cX^2$	12.710	0.2002	-0.0001	-	0.8019
	Cubic, $Y = a + bX + cX^2 + dX^3$	11.997	0.2555	-0.0003	0.0000002	0.8041
Male (M)	Linear	18.242	0.1164	-	-	0.9278
	Quadratic	15.274	0.1465	-0.00003	-	0.9323
	Cubic	11.808	0.2344	-0.0002	0.0000001	0.9424
All (F+M)	Linear	17.302	0.1175	-	-	0.8904
	Quadratic	14.206	0.155	-0.00004	-	0.8976
	Cubic	11.647	0.245	-0.0003	0.0000002	0.9085

Y = Liveweight (kg)
X = Age (days)

Table 3. Simulated liveweights of Muturu cattle at different ages in Southwest Nigeria

Age, days	Female			Male			All (Male + Female)		
	Predicted liveweight, kg			Predicted liveweight, kg			Predicted liveweight, kg		
	Linear	Quadratic	Cubic	Linear	Quadratic	Cubic	Linear	Quadratic	Cubic
1	17.2	12.9	12.3	18.5	15.4	12.0	17.4	14.4	11.9
365	59.8	72.5	75.0	60.9	64.7	75.6	60.2	65.5	70.8
730.5	102.5	105.6	116.4	103.5	106.3	115.2	103.1	106.1	108.4
1095	145.1	112.0	194.6	145.9	139.7	160.0	146.0	136.0	182.8

CONCLUSION AND RECOMMENDATIONS

The study showed that Muturu and Lagune were the same breed, having similar birthweights, calving intervals and liveweights. Seasonality of calving in both the N'Dama and Muturu appeared to be similar. Linear, quadratic and cubic regressions of age on liveweight appeared to yield similar results at one and two years of age but differed substantially at birth and at three years of age. Cubic regression yielded the closest value to actual birthweight. It is recommended that research into birthweight, sex ratio, calving interval, seasonality of calving and growth curve in Muturu cattle be further investigated with larger numbers of animals, for greater precision.

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