EVALUATION OF THE GROWTH PERFORMANCE OF CALVES FROM DIFFERENT DAMS SERVED BY SAME BULL

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ABSTRACT

The growth performance of seven calves from different Muturu dams served by same bull was studied in a mini cattle ranch. Body measurements were taken and observed for growth over a period of 12 months. The result indicates an apparent difference among the calves in all parameters measured including body weight, body length, height at withers and heartgirth. Growth rate also showed increased differences among the experimental calves. The birth weights of the seven calves ranged from 9.8 to 13.0kg, with a mean value of 11.42 ± 0.44 while the yearling weights were between 107.80 and 129.48kg with an overall mean of 120.57 ± 2.44 . The coefficients of variation for body weight at birth and at 12 months were 10.16 and 5.36% respectively. The results further revealed that body weight at yearling age correlated positively with all parameters and these include body length ($r=0.81889$, $r^2=67.09$), height at withers ($r=0.8837$, $r^2=78.09$). Similarly, body length had a positive correlation with height at withers ($r=0.9667$, $r^2=93.45$) and heartgirth ($r=0.8782$, $r^2=77.13$). While height at withers correlated positively with heartgirth ($r=0.9291$, $r^2=86.42$). Similar trends were obtained in the regression of each of the body measurements on the other in which body weight changes depended more on those of body length (0.56) than on heartgirth (0.34). Judging from the observed variations existing among the individual calves resulting from the different cows at birth and at 12 months of age, maternal rather than paternal

influences appeared to be more important in the traits studied.

Keywords: Muturu cattle, Calves, Growth performance, Yearling weight, Body measurements.

INTRODUCTION

In Nigeria, the indigenous cattle breeds consist mostly of about 10 largely multipurpose breeds, namely Azaouak, Kuri, Sokoto Gudali, Adamawa gudali, Bunaji, Rahaji, Shuwa Arab, Keteku, Muturu and the N'dama (Ngere, 1975). Of all these breeds of cattle mentioned, Muturu and White Fulani (Bunaji) are of particular interest in this study. The Muturu, also known by various other names as West African Dwarf, Sombe, Bakosi, and Kiridi, refers to the small thickset cattle with short, fineboned limbs, and short broad head found indigenous to the coastal and savannah areas of West Africa. Its normal coat colour ranges from black, dark brown, to black with white patches. The muturu has a reasonably good beef conformation, and its economic importance is anchored on two qualities viz: It is naturally tolerant to trypanosomiasis and piroplasmosis (Williamson and Payne, 1982) and it is widely distributed in the southern parts of Nigeria where (especially in the East) it is maintained solely for social and ritual purposes (Omeje, 1996). Its breeding value is via the trypano-tolerance quality which can be transmitted to other beef breeds.

The White Fulani which is known by various names as Akon in Cameroun, White bororo, Bunaji etc originated from Kano, Katsina and Bauchi areas of Northern Nigeria. They are

usually white, black, white with black at extreme, and have well developed hump and udder with medium-sized teats. According to Nuru (1976), the breed is a good source of meat and milk, and a source of farm power for agricultural production. He further observed that most of these indigenous cows are under extensive system of management, with poor nutrition and healthcare, as well as lack of effective marketing system. These constraints are the causes of the present big gap between supply and demand for beef in Nigeria.

The inclusion of the muturu cattle in existing beef cattle ranches will help to understand more the growth, production and adaptive capability of the native stock under modern intensive rearing system. It therefore becomes necessary to weigh, measure and obtain baseline data on the growth and production performances of the within-sire progenies of this bull in a bid to assess its breeding value in the long run. This work was therefore undertaken to evaluate the intra-sire growth performance of calves from different muturu dams served by one bull; and to estimate the intra-sire relationship between growth parameters at different age periods of the calves.

MATERIALS AND METHODS

The experiment was conducted at the beef cattle breeding unit of the Department of Animal Science, Enugu State University of Science and Technology, Abakaliki Campus. A total of 15 cattle were used for the study. This comprised 7 calves (born between January and February, 1995), seven unrelated primiparous dams and a proven sire (which is a heterotic progeny of a Muturu cow x Bunaji bull). The animals were identified by necktagging from 01 through 08 to 15.

Measurement of the animals:

The 7 calves were measured for body weight, height at withers, body length and heartgirth at the handling section of the paddock at 3 monthly intervals starting from birth.

Statistical Analysis:

All data collected on body weight and other body measurements at birth, 3 months, 6 months, 9 months and 12 months of age were processed to obtain growth rates from birth through 3, 6, 9 and 12 months of age. Coefficients of correlation and regression were obtained to ascertain relationship and the degree of influence which body weight and other parameters at any point in growth had with each other among the experimental calves. Significance of within sire differences were detected by means of the one-tail t-test of Yule and Kendall (1968) adopted by Omeje (1985).

RESULTS

From Table 1, calf No. 4 with birth weight of 12.10kg had the highest weight at 12 months. This was followed by calf No.2 with birth weight of 13.0kg and yearling weight of 122.2kg. Calf No.7 had the least yearling weight of 107.8kg even when its birth weight (10.6kg) was not the least. Evidently, the calves had similar growth patterns, making an average of 0.30kg gain in body weight per day, all within the range of 0.27-0.33kg/day.

Table 2 shows that calf No.2 with birth body length of 68.81 cm had the highest body length (190.40cm) at yearling. Calf No.7 had the least yearling body length of 157.4cm even when its birth body length (70.00cm) was the highest. The calves had similar growth patterns, making an average of 0.52cm gain in body length per day.

Table 3 shows that Calf No.2 with 57.60cm of heartgirth at birth and calf No.5 with 55.80cm of heart girth at birth produced equal heart girth (169.40cm) at yearling age respectively. Calf No.7 which produced highest heart girth (60.00cm) at birth produced the least heart girth (122.4cm) at yearling. The calves had similar growth patterns, making an average of 0.45cm gain in body heartgirth per day. Table 4 shows that calf No.2 with 50cm height at withers at birth had the highest height at wither (161.44cm) at yearling age. Calf No. 7 had the

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least height at withers at yearling age even when its height at withers at birth (52.00cm) was highest. The calves followed the same growth patterns, making an average of 0.45cm gain in height at withers per day.

Table 5 shows that body weight correlated positively with all other parameters and these include body length ($r=0.8189$, $r^2=67.05$), height at withers ($r=0.8837$, $r^2=78.09$) and heart girth ($r=0.8153$, $r^2=66.47$). The Table also shows positive correlation between body length and height at withers and heart girth. They include ($r=0.9667$; $r^2=93.45$) and ($r=0.8782$, $r^2=77.13$) for height at withers and heart girth respectively. Highly significant ($p<0.01$) relationship was also obtained for height at withers and heart girth ($r=0.9291$, $r^2=86.32$). Table 5 also shows that body weight regressed positively on body length (0.56); height at withers (0.31) and heart girth (0.34). The regression coefficient for body length on heart girth (0.88) and height at withers (0.45) were also positive. Also, the regression of height at withers on heart girth was positive and high (0.94).

DISCUSSION

There was an apparent increase in body weight among the experimental calves to 12 months of age (Table 1). Calf No.2 which had the highest birth weight of 13.0kg failed to

maintain this lead to the end of 12 months measurements. Calf No.4 (female) with birth weight of 12.10kg attained the highest yearling weight of 129.48kg. It is therefore possible that there was a better nicking between the dam and sire. The sire effect in calf No.4 became manifest at the puberty period (9-12 months) when the dam influence began to wane.

Apparent increase in body length of the calves were also attained (Table 2). Calf No.2 with the highest birth weight had the longest body measurement of 190.40cm at the end of 12 months. However, calves Nos. 4 and 6 which were the heaviest at the end of the experiment eventually were not the longest at 12 months. This could mean that calf No.2 with the heaviest birth weight tended to maintain this lead in body length probably because the body weight is highly correlated with body length.

The results of heart girth (both thickness) to the 12 months of age show great difference among the calves (Table 3). The animals increased in size as they got older. Calves Nos. 2 and 5 had the fastest growth at yearling while calf No.7 which had the highest heart girth at birth (60.00cm) gave the least heartgirth at yearling (122.4cm). Calf No.7 had the least growth at yearling probably because it was a female.

TABLE 1: BODY WEIGHT (kg) OF THE CALVES AT DIFFERENT AGES

Calf No.	Birth weight	3mon.	6mon.	9mon.	12mon.	Gain Per day
1M	9.8	38.06	66.34	94.58	122.00	0.31
2M	13.00	40.30	67.30	94.58	122.20	0.30
3M	10.40	37.88	65.36	92.81	120.32	0.33
4F	12.10	41.47	70.84	100.21	129.48	0.33
5M	11.90	38.93	65.96	92.99	120.02	0.30
6M	12.20	39.74	67.28	94.82	122.16	0.31
7F	10.60	34.90	59.20	83.50	107.80	0.27
Mean	11.42	38.75	66.04	93.40	120.57	0.3043
S.E.	±0.44	±0.80	±1.32	±1.89	±2.44	±0.00068
C.V.	10.16%				5.36%	

TABLE 2: BODY LENGTHS (cm) OF THE EXPERIMENTAL CALVES AT DIFFERENT AGES

Calf No.	Birth	3mon.	6mon.	9mon.	12mon.	BL Per day
1M	66.63	94.20	122.40	151.50	178.80	0.50
2M	68.81	90.60	125.20	155.80	190.40	0.53
3M	68.20	95.40	126.80	156.80	185.60	0.52
4F	68.20	95.54	83.18	150/62	178.16	0.49
5M	68.06	91.02	122.40	153.10	186.80	0.52
6M	68.72	90.15	123.03	150.53	178.04	0.49
7F	70.00	91.75	113.50	135.25	157.40	0.44
Mean	68.31	92.72	116.64	150.43	179.31	0.50
S.E.	±0.38	±0.85	±5.79	±2.67	±24.08	±0.01141

TABLE 3: HEART GIRTHS (cm) OF THE EXPERIMENTAL CALVES AT DIFFERENT AGES

Calf No.	Birth	3mon.	6mon.	9mon.	12mon.	HG Per day
1M	53.47	79.72	104.29	129.70	160.59	0.45
2M	57.60	84.90	112.8	140.70	169.40	0.47
3M	55.60	82.72	109.84	136.96	165.08	0.46
4F	56.00	81.50	107.00	132.50	162.20	0.45
5M	55.80	84.00	102.32	140.58	169.40	0.47
6M	56.13	82.83	109.53	136.29	160.54	0.45
7F	60.00	75.60	91.20	106.80	122.4	0.34
Mean	56.37	81.61	106.71	131.93	158.52	6.81
S.E.	±0.76	±1.13	±2.81	±4.45	±6.17	±6.36

Table 4 also shows a high increase in the height at withers among the calves born by different dams served by same bull. Calf No.2 attained the greatest height (161.44cm) at the 12 months. This follows the same pattern as with body length in which the same calf No.2 was leading. It is noteworthy that the calf No.2 with the highest body weight maintained the lead in height at withers probably because body weight is positively correlated with height at withers.

Correlation between body measurements:

The positive correlation between body weight and length of body ($r=0.81891$, $r^2=67.05$); body weight and height at withers ($r=0.8837$, $r^2=78.09$); and body weight and heart girth ($r=0.8153$, $r^2=66.47$) as indicated in Table 5

suggest that there are direct and highly significant relationship between body weight and these parameters. This is in agreement with the findings by Bousma and Nescr (1951) that body weight is highly correlated with body measurements especially heart girth and body length. Other workers (Tripathi *et al.*, 1976; Wanderstock and Salisbury, 1946; Veiga, 1939) did not only support the evidence that height at withers is significantly correlated with body weight, but were also of the same opinion that calves' increase in weight was a reflection of accretional increase in the sizes of the corresponding organs and different parts of the body. This implies that body weight is the totality of aggregate organs and different parts that make up the body. If the organs and parts increase in size and weight, the total body size and weight also show positive increase.

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TABLE 4: HEIGHT AT WITHER OF THE CALVES AT DIFFERENT AGES

Calf No.	Birth	3mon.	6mon.	9mon.	12mon.	HW Per day
1M	47.54	73.94	100.34	126.74	156.40	0.43
2M	50.04	77.64	105.25	132.84	161.44	0.45
3M	49.10	76.37	103.64	130.91	150.40	0.42
4F	49.34	75.74	102.14	128.54	153.34	0.43
5M	49.18	77.08	104.98	132.88	160.40	0.45
6M	48.42	75.12	101.82	128.52	156.00	0.43
7F	52.00	68.5	85.00	105.50	118.00	0.33
Mean	49.37	74.91	100.45	126.56	150.85	0.42
S.E.	±0.53	±1.16	±2.66	±3.61	±5.65	±0.01556

TABLE 5: COEFFICIENTS OF CORRELATION AND REGRESSION BETWEEN BODY WEIGHT, BODY LENGTH, HEIGHT AT THE WITHERS AND HEART GIRTH OF THE CALVES AT YEARLING AGE

Physical Measurement	1	2	3	4
1. Body weight		0.56**	0.31	0.34
2. Length of Body	0.8189**		0.45**	0.88**
3. Height at the withers	0.8837**	0.96671**		0.94**
4. Hearth girth	0.8153**	0.8782**	0.9291**	-

NS = No significance indicated

* P < 0.05

** P < 0.01

*All data above the diagonal refer to regression coefficients, while those below the line are correlation coefficients

The length of the body was also correlated positively with height at the withers ($r=0.9967$, $r^2=93.45$) and heart girth ($r=0.8782$, $r^2=77.13$). This agrees with the finding by Akinjalum (1986) in which positive correlation were obtained between these parameters.

Since all parameters were positively correlated it might be concluded that these measures have linear and positive relationship with each other.

Regression between body measurements:

The analysis of linear regression of body weight and other parameters on each other showed that the regression coefficient for body weight on body length is positive (0.50), as did the coefficients for body weight on height at

withers (0.31) and heart girth (0.34). This shows that these other parameters are directly influenced by changes in body weight. That is, any increase in body weight is as a result of an increase in the other parameters namely: body length, height at withers and heart girth. This agrees with Tripathi *et al.* (1976) who indicated that body weight is highly regressed by body measurements especially heart girth.

The regression coefficient for body length on height at withers (0.45) and hearth girth (0.88) were also positive. Also, regression of height at withers on heart girth was positive and high (0.94). This implied that there were a direct relationship between height at withers and heart girth. Since positive regressions were obtained between the growth parameters, it

might be concluded that these measurements have linear and positive relationship with each other.

The findings in the experiment show that calves born by different dams mated to the same sire had appreciable growth rate from birth to yearling age. This was favourable compared with rates reported on the muturu and N'dama cattle (Payne, 1990) indicating the genetic usefulness of the single bull used in the experiment. It was observed that the calves followed the same trend in growth and body size development – indicating that they are progenies of the same sire.

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