Preweaning Performances of Ndama Cattle

by

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SUMMARY

Data on birth weight, preweaning daily rate of gain and weaning weight of Ndama beef cattle were obtained from routine records kept on the Fashola Livestock Farm between 1959 and 1964 and subjected to least-squares analysis to determine the effect of sex, month, year and sire on the performance characteristics. The results indicated that the Ndama weighed 19.65 kg at birth and 97.61 kg at weaning when adjusted to 205 days with a preweaning daily rate of gain of 0.38 kg. The bulls were significantly heavier at birth and weaning and also had a significantly higher preweaning daily rate of gain than the heifers. Birth weight, preweaning daily rate of gain, and weaning weight showed significant sex, month, year and sire effects.

INTRODUCTION

The local breeds of the different classes of livestock in Nigeria have been repeatedly blamed for their poor productivity. Most of the complaints are unjustified because of the inadequacy of experimental data on which their evaluation has been based. Neither have the exotic breeds, often credited with superior performance, been adequately evaluated in our environment. One factor which many critics fail to realise is that many of the local breeds of livestock have never been subjected to selection and breeding for improvement of the economically important traits in contrast to the exotic breeds that have been intensely selected for several generations.

The importance of livestock in supplying the much needed animal protein in the diet of the average Nigerian cannot be over-emphasized. Only 13% of the per caput protein consumption in Nigeria comes from animal products and the demand for these will become greater with the estimated population growth rate of 3% per annum (Oyenuga, 1972.) One way to attack this problem is to improve the performances of local breeds of livestock through improved feeding and management practices. Unfortunately, however, there is very little reliable information (Williamson and Payne, 1968; Akinokun 1970; 1976)on the performances of the local breeds of livestock, including the Ndama cattle. Such information is valuable for planning both production and improvement of the performances of this breed of beef cattle.

The study reported here was carried out to obtain some basic information on the preweaning performances of the Ndama cattle in terms of birth weight, preweaning daily rate of gain and weaning weight and to determine what influences, if any, such factors as sex, month, year and sire have on these performance traits.

Materials and Methods

The data used in this study were obtained from the 1959–1964 records routinely kept on the Ndama beef herd at the Fashola Livestock Farm near Oyo in the Guinea Savannah zone of Oyo State of Nigeria. Records of rainfall, which was distributed mostly between the months of April and October, showed an average of 1023 mm rain per annum (range 864–1143 mm) on the farm. The average temperature over the period covered in the study ranged between 20·3°C and 38·1°C. The data included birth weight, preweaning daily rate of gain and weaning weight of the progenies of 14 sires which produced an average of 45 calves (range 19–91). These sires were linecross offspring of parents that originated from Sierra Leone, the Congo and Nigeria.

All animals were managed during the period of study under ranching conditions, grazing in rotation on improved pastures comprising *Cynodon ulemfensis* var. *robustus* and *Centrosema pubescens* with supplementary feeding during the dry season consisting of hay made from the same pastures and maize silage. They were routinely weighed, sprayed against ticks, treated for helminthiasis and given prophylatic inoculations against common cattle diseases including hemorrhagic septicaemia, contagious bovine pleuro-pneumonia and anthrax.

Matings in the cow herd, which was pasturebred, were restricted to selected sire and dams in different cow groups in an attempt to prevent or minimize inbreeding. As there was no conscious effort to restrict breeding to any particular time or season, calves were dropped throughout the year although two peak periods, April-June and October-January, were apparent.

The calves, 290 bulls and 339 heifers, were separated by sex at weaning and put in separate pastures comprising a grass/legume mixture of *Cynodon nlemfensis* and *Centrosema pubescens to* prevent uncontrolled breeding. Although calves were weaned between 6 and 9 months of age, all weaning data were adjusted to 205 days for analysis.

Data were analyzed statistically using the least squares analysis of variance with unequal subclass numbers (Harvey 1960)

RESULTS AND DISCUSSION

The arithmetic means, least-squares constants and analysis of variance for the preweaning performances of the Ndama cattle are presented in tables 1, 2 and 3 respectively.

Birth Weight

The average birth weight (table 2) as recorded within 48 hours of birth for all calves was 19·65 kg. The bulls which weighed 20·08 kg were 0·86 kg heavier than the heifers at birth. Differences in birth weight (table 3) due to sex, month and year of calving and sire were highly significant ($p < 0.01$). These average birth weights compare favourably with those reported for male and female White Fulani (Tasker, 1955) and Senegalese Fulani calves (Denis and Valenza, 1968) and are much higher than birth weights of 17·0 kg and 15·0 kg for male and female Sudanese Fulani calves reported by Joshi *et al.*, (1957). This result is of particular interest because the Ndama beef cattle are known to be poor milkers while the White Fulani (Zebu) cattle are generally regarded as dairy cattle in Nigeria and other parts of Africa. However, the birth weights were much lower for the White Fulani raised at the Shika Farm in Northern Nigeria (Foster, 1960) and in the Southern environment (Olaloku *et al.*, 1971). The significantly ($P < 0.05$) higher birth weights of the male Ndama calves are, however, consistent with those of other workers (Eckles, 1918; Knapp *et al.*, 1940; Gregory *et al.*, 1950; Alim, 1964; Denis and Valenza, 1968; Olaloku *et al.*, 1971).

Birth weights varied significantly ($P < 0.01$) from month to month. There was a steady rise in birth weight from 19·04 kg in March to 20·53 kg in August after which there was a sharp drop with another peak of 20·88 kg in February. Similarly, there were significant ($P < 0.01$) differences in birth weight from year to year but the variations in weight were less (range 18·55–20·36 kg) compared with those from month to month (range 18·31–20·88). Calves produced in 1961 were smaller than those produced earlier and in later years. The observed significant ($P < 0.01$) differences in birth weight due to month and year of calving agree with the reports that Ayrshire calves dropped in January/February were, on the average, 0·95 kg heavier at birth than those dropped in July/August (Donald *et al.*, 1962), that the season or month of calving exerted some influence on birth weight (Knapp *et al.*, 1940; Tyler *et al.*, 1947) and that there was a highly significant ($P < 0.01$) influence of year of birth on birth weight (foster, 1960). Other workers (Braude and Walker, 1949; Alim, 1964; Olaloku *et al.*, 1971) have, however, reported that month, season and year of calving, did not influence birth weight in dairy cattle.

The two peaks in birth weight which occurred in the months of August and February might be related to the rainfall

TABLE 1

Arithmetic Means and Standard Error for Birth Weight (BW), Preweaning Daily Rate of Gain (PWG) and Weaning Weight (WW)

		BW (Kg)	*PWG (Kg)*	*WW (Kg)*
General Mean	(629)[1]	19·544 ± 0·09	0·376 ± 0·00	96·538 ± 0·38
Sex				
Male	(290)	20·069 ± 0·15	0·404 ± 0·00	101·894 ± 0·40
Female	(339)	19·095 ± 0·13	0·353 ± 0·00	91·95 ± 60·35
Month				
January	(55)	19·991 ± 0·33	0·449 ± 0·01	109·315 ± 0·45
February	(35)	20·401 ± 0·42	0·441 ± 0·01	109·615 ± 0·44
March	(36)	19·120 ± 0·41	0·395 ± 0·01	99·868 ± 0·39
April	(65)	19·129 ± 0·31	0·345 ± 0·01	90·628 ± 0·35
May	(56)	19·674 ± 0·33	0·310 ± 0·01	83·792 ± 0·31
June	(61)	19·818 ± 0·32	0·345 ± 0·01	90·478 ± 0·35
July	(28)	20·208 ± 0·47	0·326 ± 0·01	86·904 ± 0·33
August	(25)	21·036 ± 0·49	0·351 ± 0·01	92·958 ± 0·35
September	(26)	18·740 ± 0·48	0·351 ± 0·01	90·572 ± 0·35
October	(94)	19·560 ± 0·26	0·384 ± 0·01	99·012 ± 0·38
November	(87)	18·340 ± 0·27	0·393 ± 0·01	98·993 ± 0·39
December	(61)	19·985 ± 0·32	0·395 ± 0·01	100·724 ± 0·40
Year				
1959	(20)	19·000 ± 0·55	0·416 ± 0·02	104·179 ± 0·42
1960	(75)	19·921 ± 0·29	0·409 ± 0·01	103·197 ± 0·41
1961	(17)	18·839 ± 0·21	0·357 ± 0·01	94·428 ± 0·37
1962	(58)	20·272 ± 0·20	0·354 ± 0·01	92·850 ± 0·35
1963	(140)	19·624 ± 0·21	0·378 ± 0·01	96·951 ± 0·38
1964	(99)	19·073 ± 0·25	0·390 ± 0·01	98·171 ± 0·39
Sire				
1.	(69)	19·671 ± 0·30	0·379 ± 0·01	98·277 ± 0·38
2.	(90)	19·505 ± 0·28	0·364 ± 0·01	94·363 ± 0·36
3.	(51)	19·593 ± 0·35	0·395 ± 0·01	96·896 ± 0·40
4.	(49)	18·577 ± 0·36	0·366 ± 0·01	92·888 ± 0·37
5.	(55)	19·666 ± 0·33	0·382 ± 0·01	98·439 ± 0·38
6.	(55)	20·947 ± 0·33	0·382 ± 0·01	99·069 ± 0·38
7.	(46)	18·745 ± 0·36	0·387 ± 0·01	98·206 ± 0·39
8.	(36)	19·404 ± 0·41	0·398 ± 0·01	100·295 ± 0·40
9.	(26)	19·667 ± 0·49	0·389 ± 0·01	99·304 ± 0·39
10.	(19)	19·880 ± 0·56	0·439 ± 0·02	109·759 ± 0·44
11.	(36)	19·672 ± 0·41	0·351 ± 0·01	91·566 ± 0·35
12.	(51)	19·822 ± 0·35	0·369 ± 0·01	95·414 ± 0·37
13.	(26)	19·214 ± 0·48	0·391 ± 0·01	99·19 6 ± 0·39
14.	(20)	18·445 ± 0·55	0·279 ± 0·02	77·763 ± 0·28

[1] No. of animals used for estimation.

TABLE 2

Least-squares Constants for Birth Weight Preweaning Daily Rate of Gain and Weaning Weight of Ndama Cattle

		BW (Kg)	*PWG (Kg)*	*WW (Kg)*
General Mean	(629)[1]	19·647±0·16	0·382±0·00	97·607±0·59
Sex				
Male	(290)	0·429±0·11a	0·020±0·00a	3·846±0·65a
Female	(339)	—0·429±0·15b	—0·020±0·00b	— 3·846±1·00b
Month				
January	(55)	0·434±0·33a	0·065±0·01a	12·066±0·99a
February	(35)	1·225±0·42b	0·057±0·01a	12·796±2·46a
March	(36)	—0·613±0·41ac	0·024±0·01a	4·929±2·40b
April	(65)	—0·160±0·33c	—0·006±0·01b	— 0·681±1·96bc
May	(56)	0·353±0·33a	—0·058±0·01bc	—11·081±1·96d
June	(61)	0·004±0·33a	—0·024±0·01c	— 5·318±1·93cd
July	(28)	0·249±0·46a	—0·040±0·01c	— 8·580±2·68d
August	(25)	0·876±0·47b	—0·030±0·01c	— 5·083±2·79d
September	(26)	—1·105±0·47d	—0·038±0·01c	— 8·945±2·74d
October	(94)	—0·160±0·27c	0·011±0·01a	2·417±1·60b
November	(87)	—1·335±0·28d	—0·017±0·01a	— 2·130±1·64b
December	(61)	0·230±0·56a	0·022±0·01a	5·154±2·60b
Year				
1959	(20)	0·498±0·64a	0·046±0·02a	9·445±3·74a
1960	(75)	—0·011±0·33ac	0·024±0·01a	4·915±1·93b
1961	(137)	—1·098±0·27bc	—0·009±0·01a	— 2·831±1·58c
1962	(158)	0·712±0·26a	—0·041±0·01b	— 7·126±1·53c
1963	(140)	0·450±0·29a	—0·006±0·01c	— 0·969±1·70d
1964	(99)	—0·550±0·28dc	—0·014±0·02c	— 3·444±1·79cd
Sire				
1	(69)	0·279±0·33	0·008±0·01	3·000±1·96
2	(90)	0·099±0·29	0·008±0·01	1·850±1·68
3	(51)	—0·713±0·39	0·009±0·01	—2·459±2·30
4	(49)	—0·726±0·41	—0·025±0·01	—6·380±2·42
5	(55)	0·241±0·37	0·036±0·01	8·072±2·17
6	(55)	1·225±0·37	0·026±0·01	6·619±2·19
7	(46)	—0·694±0·41	0·004±0·01	0·756±2·39
8	(36)	—0·514±0·45	0·002±0·01	—00·023±2·63
9	(26)	0·262±0·55	—0·007±0·01	—0·884±3·20
10	(19)	0·413±0·69	0·008±0·02	2·120±4·02
11	(36)	0·654±0·44	—0·015±0·01	—2·960±2·61
12	(51)	0·874±0·39	—0·002±0·01	0·339±2·27
13	(26)	—0·345±0·49	0·010±0·01	1·895±2·90
1	(20)	—1·055±0·43	0·062±0·00	—1·855±4·70

1 No. of animals used for estimation.

TABLE 3

Analysis of Variance for Birth Weight, Preweaning Daily Rate of Gain and Weaning Weight of Ndama Cattle

		BTHWT		*PRWNADG*		*WNGWT*	
	df	*Mean square*	*F*	*Mean square*	*F*	*Mean square*	*F*
Sex	1	92·432	15·17**	0·193	43·96**	7414·652	35·33**
Month	11	24·652	4·04**	0·057	12·94**	2285·331	10·89**
Year	5	47·115	7·73**	0·034	7·86**	1160·868	5·53**
Sire	13	16·295	2·67**	0·013	2·96**	718·458	3·42**
Error	598	6·095		0·004		209·869	

** Highly significant difference ($P < 0.01$)

pattern. Until very recently there were two easily defined peaks in rainfall in this country: the early rain peak in June/July and the late rain peak in October/November with some seasonal drought in late July/August or August/early September. This pattern of rainfall was characteristic of the period covered by the study.

The characteristic savanah zone rainfall is known to affect the quality as well as the quantity of herbage and nutrients available to livestock. Haggar (1970) found with *Andropogon gayanus* that the yield of the dry matter increased during the Wet season, June to October, reaching a maximum of about 3·8 tons/ha in October, and declining during the dry season from October to February. Reports on the yield and chemical composition of *Pennisetum purpurem* (Oyenuga, 1959a), *Andropogon tectorum* (Oyenuga, 1959b), *Panicum maximum* (Oyenuga, 1960a) and *Tripsacum laxum* (Oyenuga, 1960b) all of which are tropical grasses, indicated that rapid chemical changes accompany the characteristic rapid growth rate of these grasses as shown by the decline in the crude protein but a rise in the crude fibre content of the grasses.

It would therefore appear that the gradual increase in birth weight of calves from month of March coincided with the onset of early rain which continued to increase the nutritive value of the pasture to the benefit of the cows until the month of August. The significant ($P < 0.05$) drop in the birth weight after August might be due to the normal drought experienced within this period of the year. This would adversely affect not only the productivity of the pastures but also the feed intake of the cows. Since the demand for nutrients is greatest in the last quarter fo gestation, inadequate feed intake near parturition would appear to explain the low birth weights of their calves recorded between September and November. The effect of the late rain on pastures might therefore explain the second peak in birth weight.

The low birth weight observed for 1961 might be due to an upsurge in the number of heifers bred in the herd. It has been well established (Tyler *et al.*, 1947; Stone *et al.*, 1958; Legault and Touchberry, 1962; Olaloku *et al.*, 1971) that calves from mature cows are generally heavier than those from heifers and a general trend for increased birth weight occurs (Olaloku *et al.*, 1971) from the first to the sixth parity.

Preweaning Daily Rate of Gain

Preweaning rate of gain corrected to 205 days for the Ndama calves was 0·38 kg per day. The bulls gained 0·40 kg while the heifers gained 0·36 kg daily. Differences in daily rate of gain due to sex, month, year and sire were highly significant ($P < 0.01$). The difference of 0·04 kg in the daily rate of gain between bull and heifer calves agree with the report by Rollins

and Guilbert (1954) that bull calves gained, on the average, 0·06 kg daily more than heifer calves from birth to 4 months of age.

There were significant ($P < 0.01$) differences in the preweaning daily rate of gain from month to month. The daily rate of growth which was lowest (0·32 kg) in May continued to rise steadily until a peak of 0·45 kg was reached in January and then gradually dropped to its lowest in May. This pattern of growth rate might be related to the effect of both the early and the late rain on the quantity and the quality of the available pastures. By the end of October or November when the peak of the late rains must have been reached the pastures would also be reaching their peak in dry matter content. The dry matter content of the pastures might have been maintained at a relatively high level by the few rains before mid dry season in February. Thus from February until the onset of early rain there could have been a decline both in the quantity and quality of the pastures since most of the pastures, if not dried up by this time, would have become woody and highly lignified with a rapid decline in the leaf-to-stem ratio as reported by Ademosun (1970) and Ademosun and Kolade (1973). Furthermore, the heat stress characteristic of this period of relative scarce water supply could have adversely affected the feed intake. Olubajo and Oyenuga (1974) reported that though the protein content of pastures was high enough even in the dry season to maintain grazing White Fulani steers, dry matter production and intake were very low.

There were significant ($P < 0.01$) year to year differences in the preweaning daily rate of gain which was least (0·34 kg) for 1962. This was the year in which the greatest number of calves (158) was produced in the herd. The low rate of gain might therefore be attributed to population pressure on the pastures so that less feed became available to the individual animal. Furthermore, any prolonged seasonal drought in the preceding year could have adversely affected pasture productivity and hence the growth rate of the cattle in 1962. But, perhaps, the main reason is in the low birth weight of calves in 1961 since animals that are small at birth usually tend to grow and mature more slowly compared with animals with heavier birth weight.

Weaning Weight

Weaning weight corrected to 205 days for the Ndama calves was 97·61 kg. The bulls which weighted 101·46 kg were 7·70 kg heavier than the heifers at weaning. Differences in weaning weight due to sex, month, year and sire were highly significant ($P < 0.01$). The significant ($P < 0.01$) difference in weaning weight between the bulls and the heifers agree with similar observations by Koch (1951) and Cundiff *et al.*, (1966) for Hereford and Angus beef cattle. Calves weaned in May were at the greatest disadvantage. From June until February when the highest weaning weight (110·61 kg) was recorded there were increases in the weaning weight of the calves some of which were significant ($P < 0.05$). The pattern in the weaning weight again be attributed to the great influence of rainfall distribution on the pasture and, hence, the performances of the cattle which were also reflected in both the birth weight and the preweaning rate of gain.

It would appear from the observations made in this study that the availability of feed throughout the year which was greatly influenced by rainfall distribution was a major environmental factor in determining the preweaning performances of the Ndama cattle at the Fashola livestock farm.

ACKNOWLEDGEMENTS

The authors wish to express their appreciation to both the Senior Livestock Officer and the Livestock Officer at the Fashola Livestock Farm for permission to use the data and to Mr E. A. Famakin for helping in collecting the data.

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