A STUDY OF GROWTH RATE OF WADARA CALVES IN THE SUB-SAHELIAN REGION OF BORNO STATE

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ABSTRACT

Data on birth weight and growth rate from birth to 12 months of age of 90 Wadara calves maintained at the University of Maiduguri Livestock Farm from 1980 - 1987 period were studied. Mean birth weight was 25.5 ± 2.6kg; 26.7 ±2.04kg for 40 males and 24.3 ± 3.19kg for 50 females. The linear regression function was fitted on monthly body weight in two parts: 0-6 months and 6-12 months. Maximum gain in body weight was attained during 6 to 12 months of age in the male (8.30 ± 0.50kg) and 0 to 6 months in the female (0.54 ± 1.07kg). The difference in the rate of gain between the periods 0 to 6 and 6 to 12 months in each of the sexes was highly significant (P< 0.01). Body weights at birth and at various ages were higher (P < 0.05) for the male than the female calves. The relative growth rate was rapid in both sexes during the first 3 months and was appreciable to the 7th month of age before declining progressively. The value in the first quarter was 18.0 ± 1.86 and 20.2 ± 1.60 percent for the male and female calves respectively.

Key words:- birth weight, growth, Wadara cattle, Sahelian region.

INTRODUCTION

In Nigeria, several attempts (Hill and Upton, 1964; Schuman, 1965; Knudsen and Schael, 1970) have been made to upgrade the local cattle breeds for beef and milk production by the importation of high-yielding exotic breeds such as the Charollais and the Friesian. The results of such improvement programmes have been commended (Olaloku, 1974; Akinokun, 1977). However, in areas where the environmental stress on livestock is very severe and the genotype-environmental interactions are highly significant, complete reliance on the local breeds has been advocated (Williamson and Payne, 1978; Alaku, 1982). the local breeds possess some desirable genetic traits associated with acclimatization to their environment.

The Wadara (zebu) cattle, a native of the sahelian zone of Borno State, has for long been recommended (Williamson and Payne, 1978) for improvement for beef and milk production by selection in its semi-arid environment.

The rate of growth of an animal determines, to an appreciable extent, its future performance both in terms of production and reproduction. Growth rate which varies from breed to breed provides information which, apart from indicating genetic variation, could be of help in achieving optimum feeding and management to economic advantage. Extensive studies on growth rate of calves have been made in temperate regions (McDowell et al., 1969; Afifi and Soliman, 1971; Arije and Wiltbank, 1971). In Nigeria, data on various zebu breeds have been presented by Olaloku et al., (1971); Adeneye et al., (1971); and Umoh and Buvanendran (1980).

However, there is little published work (Alaku, 1982) on the growth rate of Wadara calves in their natural environment. The present study was therefore undertaken to investigate the growth rate of Wadara calves from birth to 12 months of age under the sub-sahelian climatic conditions of Borno State.

MATERIALS AND METHODS

Data used in this study were obtained from the 1980 - 1987 breeding records of a Wadara herd maintained at the University of Maiduguri Livestock Farm. Maiduguri is situated at an elevation of 354m above sea level and lies about 11° 51'N and 30° 05'E. The climatic conditions of Maiduguri have been described (Alaku, 1982).

The cows were turned to pasture between 08.00 and 12.00 hours daily. The predominant forage grazed was Gamba grass (Andropogon gayanus). A concentrate supplement was offered to the lactating cows at the rate of 0.5kg per head per day after grazing. The non-lactating cows received half of this allowance. **The con-**

centrate consisted of 67% wheat offal, 20% cotton seed cake, 10% molasses 2% bone meal and 1% salt. The concentrate contained 14.0% crude protein and gross energy value of 19.1KJ/g DM. In addition to the concentrate feeding, the animals were offered some quantity of hay during the long dry season.

Routine deworming of all animals with thiobendazole was carried out twice yearly while each cow was inoculated against rinderpest, blackquarter, brucellosis and contagious bovine pleuropneumonia. Spraying of all animals against ectoparasites with Gammatox (Gamma benzene hexachloride) was done weekly during the wet season and bi-monthly in the dry season.

Calvings were recorded in all the months during the period of investigatin. Each calf was weighed on an 'Avery' platform scale within 24 hours after birth. A calf suckled the dam for at least 4 days post-partum for colostrum. Calves were allowed to run with the dams for 5 to 6 months after which they were weaned. Data on birth weight and weights at monthly intervals to 12 months were obtained from 40 male and 50 female calves. Growth rate was calculated from body weights taken from birth to 12 months of age. The linear regression function was fitted in two parts: 0 - 6 months and 6 - 12 months of age separately for the male and female calves. The regression coefficient from 0 - 6, 6 - 12 and 0 - 12 months were then calculated. Relative growth rate was computed from Brody's (1945) formula:

$$K = \frac{\log_e W_2 - \log_e W_1}{t_2 - t_1}$$

Where $\log_e W_1$ and $\log_e W_2$ are the natural logarithms of weights t_1 and t_2 are the corresponding time units defining the time interval of one month between two observations.

K describes the percentage growth rate when multiplied by 100.

Data were analysed according to the methods outlined by Steel and Torrie (1960).

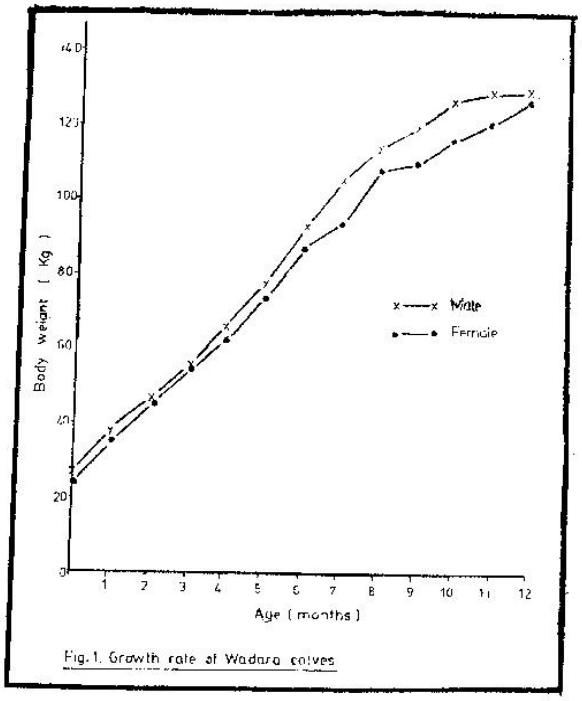

Fig. 1. Growth rate of Wadara calves

TABLE 1: GROWTH RATE OF WADARA CLAVES FROM BIRTH TO 12 MONTHS OF AGE (Kg).

Age in	MALES			FEMALES		
Mos.	No.	Mean	S.E.	No.	Mean	S.E.
Birth	40	26.7	2.04	50	24.3	3.19
1	40	38.5	2.21	50	36.6	3.59
2	36	47.3	2.61	47	45.8	3.84
3	35	56.4	2.88	47	54.9	3.98
4	33	66.3	3.49	44	63.2	4.63
5	30	78.5	4.23	40	74.4	5.65
6	30	93.0	4.87	39	88.0	6.09
7	29	106.5	5.83	37	93.6	7.22
8	28	115.4	6.77	35	109.3	7.64
9	28	120.2	7.37	33	110.9	7.64
10	25	126.7	7.30	30	117.0	8.76
11	15	128.8	9.60	30	121.0	9.43
12	15	130.3	11.24	30	129.3	8.24

SE = Standard Error

RESULTS AND DISCUSSION

The average body weights, from birth to 12 months of age, of the male and female calves, are shown in Table 1 and Figure 1. The male calves at birth averaged 26.7 ± 2.04kg as against 24.3 + 3.19kg for the females. The pooled mean birth weight was 25.5 ± 2.67kg (Table 2). The effect of sex on birth weight was significant (P.05). The present average birth weight was superior to those reported for various zebus (Tasker, 1955; Joshi et al., 1957; Foster, 1960; Denis and Valenza, 1968; Olaloku et al., 1971). An average of 24.24kg birth weight earlier reported (Alaku, 1982) for this breed in a government

TABLE 2: EFFECT OF SEX ON BIRTH WEIGHT OF CALVES

Sex	n	Mean weight (kg)	SE	C.V.(%)
Males	40	26.7[a]	0.98	23.2
Females	50	24.3[b]	0.84	24.4
Both sexes	90	25.5[ab]	0.90	33.3

[a,b,] means on the column with different superscripts differ ($P < 0.05$), SE = Standard Error, CV = Coefficient of variation

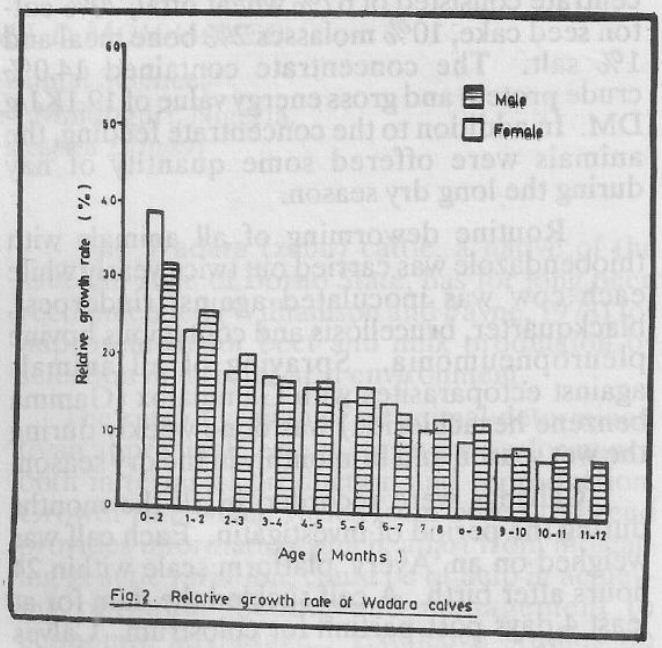

Fig. 2 Relative growth rate of Wadara calves

farm in Maiduguri is less than the present figure. The discrepancy in birth weight could be due to differences in the level of management. However, the present birth weight was close to 26.0kg reported for White Fulani in Vom (Adeolu, 1986). The significantly higher birth weights for male calves compared to the females were consistent with other reports (Koonce and Dillard, 1967; Olaloku et al., 1971; Adeolu, 1986). The daily liveweight gain computed per quarter from birth to 12 months of age averaged 330.0 æ 31.8, 406.7 æ44.3; 302.2 ± 83.8 and 112.2 æ 52.5g for male and 340.0 æ 35.0; 367.8 ± 51.1; 254.4 ± 140.0 and 204.4 ± 41.1g for female calves respectively. Maximum daily gain was attained in the second quarter in both sexes. This agrees with Rao (1983) who reported maximum daily gain in the second quarter in both male and female Jersey calves in India.

The regression coefficient (Table 3) was greater for male calves (92g/day) than for female calves (18g/day) for the period from birth to 6 months of age. Furthermore, the regression coefficients indicated more rapid rate of growth during 6 - 12 months period (277g/day) than during 0 - 6 months of age (92g/day) in the male calves. The reverse was true for the famales (18g/day during 0 - 6 months and 14g/day during 6 - 12 months). Generally, growth rate from 0 - 12 months was better (P 0.05) in the female (153g/day) than in the male (55g/day) calves. In absolute values, the rate of gain was constant up to the 5th month in both sexes and accelerated

TABLE 3: LINEAR REGRESSION COEFFICIENTS FOR VARIOUS GROWTH PERIODS FOR WADARA CALVES

Growth Period	a	b	Y = a + bx	Cor. Coeff(r)
Male Calves				
Birth to 6 months	20.93	2.76 ± 1.15kg	20.93 + 2.76X	0.504**
6 to 12 months	111.53	8.30 ± 0.50kg	111.53 + 8.30X	0.067ns
Birth to 12 mos.	157.46	-1.66 ± 4.06kg	157.46 - 1.66X	-0.165ns
Female Calves				
Birth to 6 months	70.71	0.54 ± 1.07kg	70.71 + 0.54X	0.122ns
6 to 12 months	122.01	0.12 ± 0.61kg	122.01 + 0.12X	0.082ns
Birth to 12 months	25.94	4.60 ± 2.36kg	25.94 + 4.60X	0.622**

ns = Not significant
** = Significant ($P < 0.01$)

TABLE 4: RELATIVE GROWTH RATE OF WADARA CALVES'

Age in Mos,	Males Mean ± SE	Females Mean ± SE
0 - 1	38.6 ± 3.47	31.7 ± 2.28
1 - 2	23.1 ± 2.73	25.6 ± 2.16
2 - 3	18.0 ± 1.86	20.2 ± 1.60
3 - 4	17.7 ± 2.18	17.1 ± 1.70
4 - 5	15.9 ± 2.15	17.3 ± 2.42
5 - 6	14.5 ± 1.64	16.5 ± 3.20
6 - 7	14.6 ± 2.35	12.9 ± 2.16
7 - 8	11.1 ± 1.42	13.5 ± 2.15
8 - 9	9.8 ± 1.40	12.9 ± 1.33
9 - 10	8.3 ± 1.14	9.0 ± 2.85
10 -11	7.5 ± 1.41	8.5 ± 1.35
11 - 12	5.3 ± 0.81	7.7 ± 1.57

'Calculated from Brody's (1945) formula
SE = Standard Error

at a faster rate to the 7th and 8th months in the male and female calves respectively before declining with age. In India, Rao (1983) reported faster rate of growth from 0 - 6 months (665g/day) than during 6 - 12 months of age (582g/day) in Jersey calves. The author observed maximum growth rate in both sexes during the 5th month. In this study, maximum growth rate was recorded in the 5th month (14.5g/day) and 7th month (15.7g/day) for the male and female calves respectively. In North America, Brody and Ragsdale (1921) observed two post-partum growth cycles with maximum growth at 5 and 20 months in dairy calves. Rathore (1949) reported maximum rate in Sindhi cross-breds during 1 and 6 months of age. Accelerated rate of gain from birth to 3 to 4 months of age was reported in Friesian heifers (Ridler t al 1963). In Sahiwal X Friesian cross-breds, Taneja and Bhat (1971) observed maximum growth rate between 19 and 26 weeks of age. Similarly, Mudgal and Ray (1965, 1966) observed that gain from birth to 2 1/2 months was slower than during 2 1/2 to 6 months of age in three Indian breeds. The disparity between the present values and those in the literature could partly be due to differences in animal breeds, age at weaning, climate and management practices.

The relative growth rate of male and female Wadara calves are presented in Table 4 and Figure 2. It would be observed that the percent age growth rate was rapid in both sexes during the first 3 months of age (18 - 39%) and appreciable to the 7th (14.6%) and 6th month (16.5%) in the male and femele calves respectively before gradually declining to its lowest values in the 12th month in both sexes. Comparable maximum relative growth rates from birth to 6 months has been reported (Mudgal and Ray, 1966; Rao, 1983).

The evidence from this study tends to indicate that better growth rate can be achieved through improved feeding and management of the calves especially during the period of (5 - 7 months) maximum growth. Furthermore, the observed variations in weights from birth to 12 months is indicative of possible improvement through selection at various stages.

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