GROWTH AND REPRODUCTIVE PERFORMANCE OF N'DAMA CATTLE IN THE FOREST ZONE OF GHANA

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ABSTRACT

Records on the growth and reproductive performance of a herd of N'dama cattle kept at an institutional farm were analysed; the records covered the years 1981 to 1989 inclusive. The farm is located on latitude 06°43'N and longitude 01°36'W. The area has a bimodal rainfall pattern (March - July; September - October). The mean daily temperature for the year is 26°C (range: 18 - 35°C) while the mean annual rainfall is 1300mm. Bull calves were similar in weight to their heifer counterparts at birth (18 kg versus 17 kg respectively). N'dama heifers calved for the first time at an average age and weight of 1071 days and 206 kg respectively while the calving interval for all females averaged 500 days. Approximately 57% of calvings occurred in the dry season (November to February) while 43% occurred in the rainy season stretching from March to October. Total herd mortality averaged 24% with 93% of all mortalities being recorded for calves less than 6 months old. Undernutrition and enteritis were the major causes of mortality. There were no significant seasonal effects (P > 0.05) on birth weight, age at first calving, calving interval and mortality. Dam parity also had no significant effect on calving intervals. The primary findings in this study were the late ages at puberty and first calving, low birth weights, low dam weight at first calving and high mortalities, especially in calves.

KEYWORDS: *N'dama, cattle, reproductive performance, growth, forest zone, Ghana.*

INTRODUCTION

The beef industry in Ghana is largely built around two breeds, the West African Shorthorn and N'dama. These breeds are well suited to the hot humid forest region of the country because they are trypanotolerant and show considerable tolerance to piroplasmosis [1,2]. The N'dama cattle in particular yield reasonably good carcasses underpoor grazing conditons. While many cattle farms in the forest belt contain N'dama cattle, there is a paucity of published information on their growth and reproductive performance. The few available reports indicate poor growth and reproductive performance [3,4,5]. The purpose of this study therefore was to determine the growth and reproductive performance of station-bred N'dama cattle and to delineate the factors responsible for the poor reproductive efficiency of N'dama cattle in the forest zone of Ghana.

MATERIALS AND METHODS

The data for the present study were obtained from the growth and production records of a herd of N'dama cattle bred at the Dairy/Beef Cattle Research Station of the University of Science and Technology, Kumasi, Ghana compiled during the period between 1981 and 1989 inclusive. The station is located within the semideciduous humid forest zone of Ghana at 06° 43'N and 01° 36'W. This zone is characterised by a bimodal rainfall pattern with an annual rainfall of about 1300 mm. The major rainy season(62% of total precipitation) occurs from March to July and the minor season (21%) from late August to October. The dry harmattan season lasts from November to February. Daily temperatutres during the year range from 18°C to 35°C with a mean of 26°C. The relative humidity varies from 97% during the early mornings in the wet season to as low as 20% during the late afternoons in the dry season. The average photo-period is 12 hours.

Animals were grazed extensively between the hours of 9.00 and 16.00 and supplementary wet brewers' spent grains was provided during the dry season. Cows were not milked but had their calves at foot and the service bull(s) remained with the females all year round. All animals were herded at night in fenced paddocks with a grass cover.

The effects of season on herd mortality were assessed by the goodness of fit test and treatment means were compared by the t-test[6]. All tests of significance were performed at the 95% probability level.


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RESULTS

Data on calf birth weights and subsequent post-natal growth are in Table 1. Bull calves were slightly, although not significantly, heavier than their heifer counterparts. They grew at the rate of 280 g/day while heifer calves grew at 250 g/day up to 12 months of age. The season of birth had no significant effect on birth weight which averaged 17 kg for both dry and wet seasons.

TABLE 1: LIVEWEIGHT DEVELOPMENT OF N'DAMA CATTLE ON-STATION

	Mean weight ± SD (kg)	
Age	**Females**	**Males**
Birth	17 ± 5 (93)*	18 ± 5 (73)
3 months	52 ± 12 (53)	51 ± 11 (59)
6 months	77 ± 16 (51)	84 ± 19 (54)
9 months	94 ± 19 (51)	96 ± 21 (54)
12 months	108 ± 23 (44)	120 ± 25 (40)
Mature weight (> 5 years)	269 ± 15 (18)	387 ± 36 (3)

+Body weights of sick animals not considered in the liveweight estimates.

Table 2 is the summary of reproductive data. N'dama heifers mated for the first time at an approximate age of 26 months and delivered their first calf 287 days later at a mean weight of 206 ± 24 kg. There were 44 bull calves to 56 heifer calves at birth. Fig.1 shows the calving pattern of N'dama cattle. Fifty-seven per cent of calvings occurred between November and February, coinciding with the dry season.

TABLE 2: MEANS OF REPRODUCTIVE PARAMETERS OF N'DAMA CATTLE ON-STATION

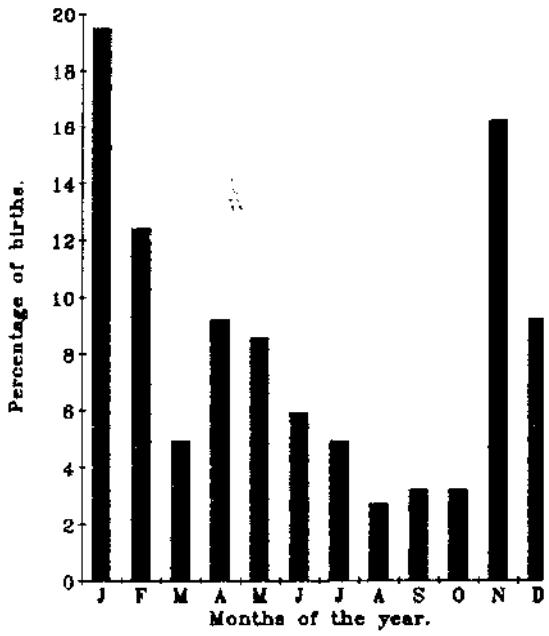
Parameter	Mean ± SD	Range	n*
Age at first pregnancy (d)	784 ± 98	565-1286	41
Weight at first pregnancy*(kg)	183 ± 17	160-220	41
Age at first calving (d)	1071 ± 172	852-1573	41
Weight at first calving (kg)	206 ± 24	180-230	41
Calvinginterval (d)			
Wet season	513 ± 180	308-959	30
Dry Season	488 ± 167	311-1003	28
Both seasons	500 ± 170	308-1003	58
1st - 2nd calving	543 ± 185	311-1003	32
2nd - 3rd calving	462 ± 155	308-821	16

* No. of observations
*Estimated value

January was the peak calving month. There was a significant negative correlation between monthly calvings and rainfall ($r = -0.73$; $P<0.05$). Monthly conceptions were also correlated significantly ($P<0.05$) with mean rainfall 3 months before the month of mating ($r = -0.73$) and monthly minimum temperatue ($r = 0.66$).

The inter-calving interval averaged 500 ± 170 days, but animals calving in the dry season tended to have a slightly, but non-significantly, shorter intervals than those calving in the wet season. Thirty eight per cent of the cows had a calving interval of less than 390 days and the removal of the poorest 20% of the animals reduced the calving interval to 431 ± 98 days. Calving interval decreased with increasing parity of dams although the differences were not statistically significant.

Fig.1. Monthly distribution of births of N'dama cattle.



A mortality rate of 24% was recorded for the herd. About 93% of all deaths occurred before calves reached the age of 6 months while deaths after 6 months accounted for only 7%. More deaths were recorded in the dry season (58%) than in the wet season (42%). Six main causes of postnatal mortality were: undernutrition (30.6%); disease, mainly enteritis (30.6%); acaricide toxicity (11.1%); calves weak at birth and therefore unable to stand and suckle (8.3%); accident (5.6%) and unknown causes (14.0%).

DISCUSSION

The mean birth weight and the subsequent post-natal development of N'dama cattle in this study compare favourably with the observations of Fall et al. [7] for N'dama cattle in Senegal, Osei and Effah-Baah [5] for N'dama in Ghana and Letenneur [8] for N'dama in the Cote d'Ivoire. The N'dama in the Cote d'Ivoire, however, grew faster after birth, weighing 68.1, 101, and 137.4 kg at 3, 6, and 12 months of

age respectively as compared to the 52, 77, and 108 kg recorded for the present herd at the respective ages. The better growth performance of the Cote d'Ivoire herd may be due to better nutrition and a decade-long programme of selective breeding. The differences in weight of calves due to sex agree with data reported by Montsma [9] and Mensah [10]. The absence of a significant seasonal effect on birth weights also corroborates the earlier observations by Osei and Effah-Baah [5]. The forest zone has a bimodal rainfall pattern which permits a relatively continuous growth of vegetation which ensures an all year round availability of forage. As a result of this, the plane of nutrition during the dry season may not have any adverse effect on cow and foetal growth during pregnancy (Osei and Effah-Baah [5].

The mean age at first calving was greater than the 34 months reported by both Annor [3] and Gyawu and Owusu [4], but less than the 39.8 months recorded by Fall et al. [7] and the 37.4 months by Osei and Effah-Baah [5]. The late age at first calving was undoubtedly due to the delayed age at first mating. It is not clear whether the age at first mating is equivalent to the age at puberty since various workers have shown that the first initial pubertal oestruses may be silent and irregular [11]. No such information is available on N'dama cattle in Ghana.

The monthly distribution of calvings agrees with the earlier reports for N'dama in Ghana presented by Alhassan [12] and Annor [3]. The main breeding season for N'dama was estimated to begin from February to May coinciding with the period of the early rains and early green pastures which favour reproduction [13]. The negative correlation between conception rates and rainfall three months before the time of breeding may show the positive effect that improved plane of nutrition has on reproductive function since most of the conceptions occurred at the end of the dry season when the rains started and nutritious pastures became available. The mean calving interval in the present study was longer than the 15.6 months reported for the same breed in Sierra Leone [14] and the 15.2 months reported for N'dama in the coastal savannah zone of Ghana [15]. A much longer calving interval may not necessarily reflect the true genetic potential of these cattle since little culling for performance is practised in the herd under study (as indeed is the practice throughout Ghana) and cows of low fertility are retained in the herd. Salisbury and Van Demark [16] have reported annual culling rates of 20 - 25% in some cattle herds in United States of America. While such culling rates can hardly be applied in Ghana, it is obvious that even a rate of 10% would have reduced the calving interval appreciably. In addition N'dama calves were allowed to suckle their dams until natural weaning which in some cases did not occur for 13 months (average: 6 - 9 months). Suckling delays postpartum resumption of ovarian activity and indirectly increases calving intervals [17].

The mortality rate in the present study was higher than that reported by other workers [5,7]. Undernutrition and enteritis accounted for 55.6% of all deaths, a situation similarly reported for Kenana cattle in the Sudan [18]. Problems of undernutrition arose mainly because the cows would not allow calves to suckle or produced little extractable milk. Deaths due to acaricide toxicity are easily preventable. It thus appears that improved management practices including adequate calf feeding and routine control of enteritis will greatly increase the survival rate of calves. The results of this study show that N'dama cattle kept in the humid forest zone are comparable in their growth and reproductive performance to West African Shorthorn (WASH) cattle. Osei and Effah-Baah [5], for instance, reported the birth weight, age at first calving and calving interval for WASH to be 17.5 kg, 1113 days and 576 days respectively. Tuah and Danso [19] had similarly observed no significant differences in either growth or reproductive performance between N'dama and WASH cattle. Indeed Osei and Effah-Baah [5] concluded that "N'dama and West African Shorthorn cattle perform at a similar level under the humid forest conditions in Ghana".

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