CAUSES AND COSTS OF CALF MORTALITY AT GOVERNMENT RESEARCH AND PRIVATE FARMS IN THE DRY SUBHUMID SAVANNA ZONE OF NIGERIA

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SUMMARY

Data on causes, costs and calf mortality in three farms in Kaduna State in the dry subhumid savanna zone of Nigeria were analysed in order to relate the causes to the costs of calf mortality. A total of 447 calving records comprising 29 from Government Farm {GF}, 309 from Research Farm (RF) and 109 from Private Farm (PF), were analysed using least square analysis of variance procedure. The overall calf mortality during the study was 16.55% with a total associated cost (loss) of ₦534,576. The mean cost per calf death was N7,224 of which ₦ 6,880 was attributed to the potential value of the calf and an additional ₦344 was for veterinary services, drug, producers labour and carcass disposal expenses. Calf mortality rate was significantly (P<0.5) affected by year of calving, season and farm with highest deaths occurring in 1999 (28.09%) and during the early dry season months of October to December (34.09%). Calf mortality rate of 11.93% recorded from the PF was the lowest among the three farms. The most commonly reported causes of calf mortality were helminthosis 24.34%, starvation 17.58%, Heartwater 9.47% and calf scours 9.47%. These four conditions accounted for over 60% of all calf deaths. It was concluded that the environmental factors of year, season of calving and type of farm were responsible for the differences in calf mortality observed in this study. The lower calf mortality from PF was an indication of better management over GF and RF respectively. Cattle producers and veterinarians should aim at decreasing calf mortality and increasing profits in calf operations by implementing management strategies and herd health programmes designed to decrease number of calf deaths caused by these disease conditions. It is suggested that monitoring of calf mortality be incorporated into the National Animal Health Programme of Nigeria by the Federal Livestock Department.

KEYWORDS: Causes, Costs, Calf Mortality, Farms.

INTRODUCTION

Calf mortality is a serious production constraint globally. In humid tropical countries where traditional system of animal production still prevails, calf mortality could be considerably high with resultant reduction in farm products, lowered income and poor feed security for the peasant farmers. In Sri Lanka and Fiji for instance, an overall calf mortality rate of 23.4% and 17.5% were reported on dairy farms respectively (Ramatunga, 1974; Fediaevsky and Pratap, 2002). In Nigeria, incidence of calf mortality in Bunaji cattle range from 22.4% under traditional cattle production in the

subhumid zone of Nigeria (Otchere, 1986) to 12.5% in calves reared semi-intensively (Uza *et al.*, 2000).

Studies on calf mortality in Nigeria have paid no attention to costs associated with calf deaths. The objectives of this study therefore were to assess the calf mortality rate on the three farms managed by Government, Research Institute and privately; investigate the causes of death of calves and relate these deaths to cost implications to the owners.

MATERIALS AND METHODS

Description of the study area
Data were obtained from records kept at National Animal Production Research Instituted (NAPRI) Shika, Shika ranch and Damau cattle ranch during the period 1995 to 1999. NAPRI Shika, Shika ranch and Damau cattle ranch are situated in Kaduna State of Nigeria. While NAPRI Shika and Shika ranch are opposite each other, Damau cattle ranch is 80km east of NAPRI and Shika ranch respectively.

The study area falls within the dry sub humid zone at latitude 11° N and longitude 70°E with an altitude of 640m above sea level. Topographically, the area rises irregularly to rolling on gently undulating plains typical of the Northern High Plains of Nigeria. The soil of the area is ferruginous tropical soils having little profile morphology and texturally described as sands and sandy loams. Average annual rainfall is 110mm of which about 90% falls during the wet season period of July to September (Adefolalu, 2002). The dry season commences with a period of dry, cool weather known as the harmattan lasting from about mid-October to January followed by dry hot weather from February to April. The average

temperature is 31°C (Adefolalu, 2002). The area lies within the Northern Guinea Savanna characterized by short grass, which consists mainly of *Hyperrhenia* and *Andropogon spp.* The main trees are *Isobelina spp.*, which flush during the middle of the dry season. The main crops in the study area are sorghum, millet, groundnut, cowpea and cotton.

Animal management
The cattle herd at NAPRI Shika consisted of Bunaji and Bunaji x Friesian crossbreds. The calves along with the rest of the herd were taken out daily from 0900 hrs to 1500 hrs for grazing natural and improved pastures of *Bracharia, Digitaria* and *Gamba spp.* The animals were kraaled at the end of the day and water and mineral salt lick were provided *ad libitum.* During the dry season, improved pastures were fed as hay and silage respectively. All animals were deticked, dewormed and vaccinated against Rinderpest, Contagious Bovine Pleuropneumonia (CBPP) and Blacquarter (BQ) routinely.

The Shika ranch which is a private farm covering 300 – 400 hectares consisted mainly of Bunaji cattle. Like NAPRI, calves along with the rest of the herd grazed daily on natural pasture as well as on improved grasses of *Brachria, Digitaria* and *Gamba spp.* Water and salt lick were provided daily *ad libitum.* During the dry season, animals were fed hay. All animals were routinely deticked, dewormed and vaccinated against Rimderpest, CBPP. Damau cattle ranch is a Kaduna State Government establishment located at Damau in Kubau Local Government Area. The ranch which covers an area of about 120 hectares is used for selective breeding of Bunaji cattle for improved milk and beef production under local conditions. Proven bulls and heifers were distributed to farmers through

the extension services. Animals were raised on native pastures and crop residues. Calves along with the rest of the herd were taken out for grazing daily at 0900 hrs to 1500 hrs. Water was provided from the dam located on the ranch while salt lick was also made available regularly. The animals were sprayed against ticks, dewormed and vaccinated against Rinderpest, CBPP and BQ routinely.

Statistical analysis

Data on calf mortality were analysed using Harvey (1990) mixed model least squares analysis of variance procedure. The mixed model included effects of year and season of calving as well as location of farm, sex and breed of calf. Interactions between year and season were incorporated in the model. The residual mean square was used as the error term to test the significant differences evaluated. The associated costs of calf mortality were calculated based on the cost and returns analysis per calf (Uza *et al.*, 1999).

RESULTS

The overall mean calf mortality rate was $16.55\pm2.10\%$ and was affected by year of calving, season and farm (Table 1). Calf mortality rate was significantly ($P<0.05$) higher in 1999 ($28.09\pm1.54\%$) than the other four years. Calf mortality rate of $34.09\pm1.46\%$ in the early dry season months of October – December were significantly ($P<0.05$) higher than $17.78\pm1.51\%$ during the late rainy season months of July – September while deaths during late dry season $9.35\pm2.06\%$ and early rainy season ($11.54\pm2.10\%$) were comparatively lower. Calf mortality rate at the Private Farm (PF) $11.93\pm1.37\%$ was significantly ($P<0.05$) lower than the deaths from the Government and Research Farms respectively. Differences in sex and

breed of calf did not have any significant ($P>0.05$) effect on calf mortality rate.

TABLE I: Least square means of calf mortality rate (%)

Variable	No. of calves	No. dead	Mean mortality rate
	447	74	16.55 ± 2.10
Year of calving			
1995	85	14	16.47 ± 1.91^{b}
1996	68	8	11.76 ± 1.70^{c}
1997	94	14	14.89 ± 2.01^{c}
1998	111	13	11.71 ± 1.92^{c}
1999	89	25	28.09 ± 1.54^{a}
Season			
Late dry season (January-March)	139	13	9.35 ± 2.06^{c}
Early rainy season (April-June)	130	15	11.54 ± 2.10^{c}
Late rainy season (July-September)	90	16	17.78 ± 1.51^{b}
Early dry season (October–December)	88	30	34.09 ± 1.46^{a}
Sex			
Male	203	40	19.70 ± 1.01
Female	244	34	13.93 ± 1.00
Breed			
Bunaji	315	51	16.72 ± 1.76
Bunaji x Friesian	132	23	17.42 ± 1.91
Farm			
Government Farm(GF)	29	6	20.69 ± 1.05^{a}
Research Farm (RF)	309	55	17.80 ± 1.26^{a}
Private Farm (PF)	109	13	11.93 ± 1.37^{b}

a, b, c: Means in the same column with different superscripts differ significantly ($P<0.05$).

The distribution of calf mortality is shown in Figs. 1 – 5 and reveals that significant ($P<0.05$) deaths that occurred in 1999 (Fig 1), during the early dry season (Fig 2) and on the Research and Government Farms (Fig 5), were mainly due to helminthosis, starvation, heartwater, calf scours, dermatophilosis, pneumonia and deaths from unspecified causes. Differences in calf deaths per disease by sex (Fig 3) and breed (Fig 4) were not significant ($P>0.05$). The most commonly reported causes of calf mortality were helminthosis

24.34%, starvation 17.58%, heartwater 9.47% and calf scours 9.47% (Table II).

These four conditions accounted for 60.86% of all calf deaths. Resulting to a total loss of ₦534, 576
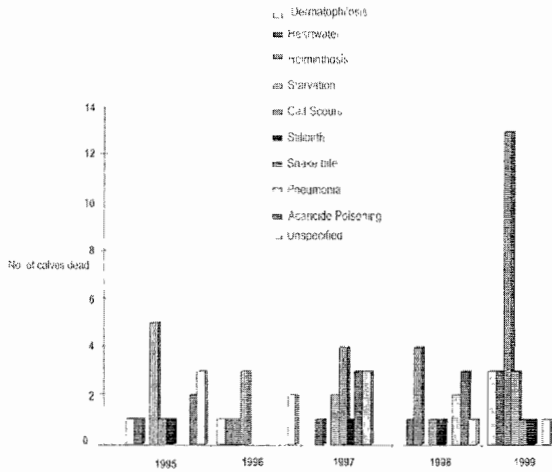

Fig. 1: The distribution of calf mortality per disease by year
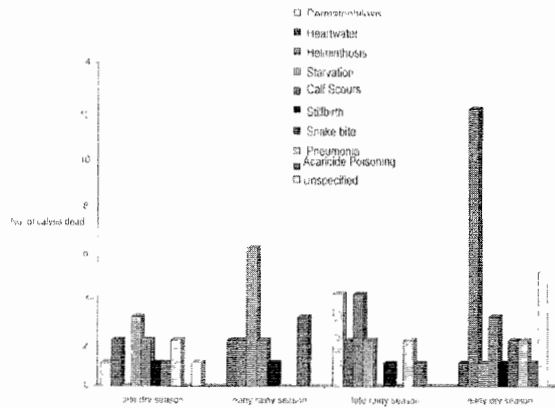

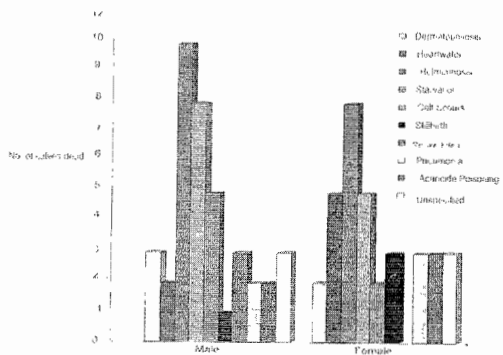Fig. 3: The distribution of calf mortality per disease by sex

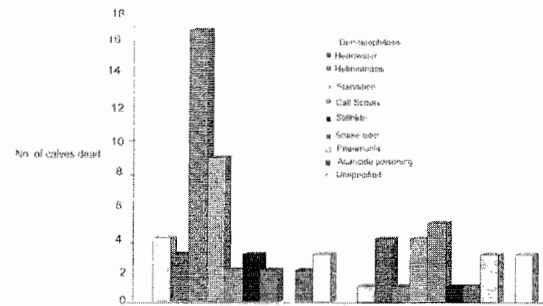Fig. 2: The distribution of calf mortality per disease by Season

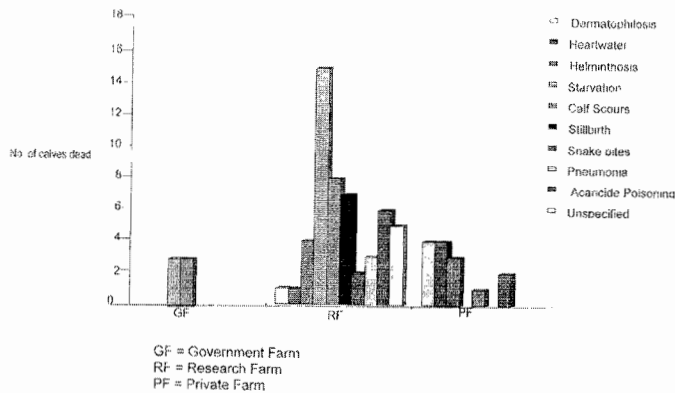Fig. 4: The distribution of calf mortality per disease by breed

GF = Government Farm
RF = Research Farm
PF = Private Farm

Fig. 5: The distribution of calf mortality per disease by farm

TABLE II: The causes and costs of calf mortality

Cause	Number of calves lost	Potential value of calves lost (₦)	Other costs (₦)	Total loss (₦)	Percentage loss (calves, ₦)
Dermatophilosis	5	34,400	1720	36,172	6.76
Heartwater	7	48,160	2,408	50.568	9.47[c]
Helminthosis	18	123.840	6.192	130,032	24.34[a]
Starvation	13	89,440	4,472	93,912	17.58[b]
Calf Scours	7	48,160	2,408	50,568	9.47[c]
Stillbirth	4	27,520	1,376	28,896	5.34
Snake bites	3	20,640	1,032	21.672	4.06
Pneumonia	6	41,280	2,064	43,344	8.11
Acaricide Poisoning	5	34,400	1,720	36,120	6.76
Unspecified	6	41,280	2,064	43,344	8.11
Total	74	509,120	25,456	534,576	100.00

i.   Potential costs per calf = ₦6,880.00
ii   Cost per calf for veterinary, drug, producers labour and carcass
        disposal expenses (5% of "i") = ₦344.00.
iii.   Mean cost per calf death = ₦7,224.00
a, b, c;   Means in the same column with different superscripts differ significantly (P<0.05).

DISCUSSION

The mean calf mortality rate of 16.55% observed in this study was high compared to calf mortality rate of 6.7% obtained in settled pastoralist herds in the subhumid zone of Nigeria (Uza *et al.*, 2000). This high calf mortality reduces calves required for herd replacement both in terms of quantity and quality.   Usually, it is considered that calf mortality of over 6% is an issue (Radostits *et al.*, 1997). This mortality rate was however similar to values of 16, 22 and 24% reported by Maina (1989) for Bunaji cattle in sedentary herds in the southern humid zones of Nigeria, Otchere (1986) for traditional Bunaji herds in subhumid zone of Nigeria and Pullan (1979) for Bunaji herds on the Jos Plateau respectively. Fediacvsky and Pratap (2002) also reported similar mean calf mortality rate of 18.2% on dairy farms in the Fiji Island.

The significantly ((P<0.05) high calf mortality in 1999 during the early dry season and on the Research and Government farms was mainly due to

helminthosis 24.34%, starvation 17.58%, heartwater 9.47% and calf scours 9.47%. These four conditions accounted for 60.86% of all calf deaths. The high calf mortality in the dry season may have been due to poor nutrition of the calves (Wilson and Clarke, 1976; Pullan, 1979) and depressed feed intake (Otchere, 1986) making the calves more susceptible to helminthosis.

In the Southern Guinea Savanna of Nigeria however, higher calf mortality rate was reported in the wet than dry season (Uza, 1997; Uza and Aki, 1997), which the authors attributed to helminthosis, calf scours, calf pneumonia and heartwater (*Cowdria ruminantium*) more prevalent during the wet than the dry season.

The significantly (P<0.05) lower calf mortality rate at the Private Farm is an indication of better management and disease control over Government and Research Farms respectively.

A total associated cost of N534,576 with 60.86% of the deaths accounted for by deaths from helminthosis, starvation,

heartwater and calf scours underscores the importance of instituting measures against these conditions on the farms. Since calf scours and calf pneumonia are often a result of helminthosis (Uza, 1997), the major problem on the farms seem to be helminthosis and starvation. In the Fiji Island, the major causes of calf mortality were unknown cause 46.43%, calf scours 19.05%, dog attack 17.86% and stillbirth 11.31% (Fediaevsky and Pratap, 2002). Uza (1987) reported a mean calf mortality rate of 40.83% in Santa Gertrudis beef cattle imported into Nigeria and attributed the cause of death to Trypanosomosis and Dermatophilosis. In the present study, the high cost of calf mortality from helminthosis alone of ₦130,032 representing 24.34% of the cost may considerably affect the profit in a farm economy. It has been shown that a calf mortality rate of 20% can reduce net profit by 38% (Martin *et al.,* 1975; Radostits, 1997). The health management strategy on the farms therefore should target regular deworming and other anthelmintic activities during early dry season months of October – December instead of the rainy season, as was the practice. Research and Government Farms were worst affected. This may be as a result of lack of funds to procure the needed anthelmintics for use in calves to reduce pasture contamination with parasite eggs and improved drainage of ponds to eliminate the habitats of snail in case of fasciolosis which was the major cause of death from helminthosis on these farms.

Starvation which caused calf deaths in 17.58% cases costing ₦93,912 is an indication of lack of feed for the dams and calves. This occurred on the Research and Government Farms. This may also be explained to be as a result of the usual lack of funds from Government to finance Research and Government Farms. Perhaps

the way out of this chronic lack of funds is the reduction of a number of calves at an early stage by selecting and retaining females and potential good male calves. Resources are then channeled towards rearing the selected animals with better standard of feed and management in order to have minimal mortality. The remainder of the calves are sold or fattened for maximum profit.

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