Eth. J. Anim. Prod. 3(1)- 2003: 109-117

Abortion and Calf Mortality of Friesian-Boran Crossbred Cattle at Cheffa State Farm, Wollo, Ethiopia

Gebeyehu Goshu[1] and B. P. Hegde[2]

[1]Andasa Livestock Research Center, P. O. Box 27, Bahir Dar, Ethiopia
[2]Alemaya University of Agriculture, P. O. Box 138, Dire Dawa, Ethiopia

Abstract

Abortion and calf mortality of Boran-Friesian graded calves maintained at Cheffa state farm, Wollo, Ethiopia, were analyzed to interpret the effect of level of inheritance (1/2, 3/4, 7/8 and ≥15/16 Friesian), parity (1 to 9+) and season (short rains, long rains and dry).The least squares mean for abortion was 17.6 ± 0.01% out of 2589 pregnancies and ranged from 9.9% for 1/2 breds to 37.7% for ≥ 15/16 breed groups. All the considered factors significantly affected abortions. The rate of abortion was much higher than the available reports and significantly higher for the later two grades. The prospective causes for abortion were not confirmed, but suspected to be associated either with diseases, abortifacient plants and genetic factors. The rate of female calf mortality was 29.9 ± 0.02% out of 1024 total female calves born and significantly affected only by breed group. There was a progressive increase of calf mortality from 3/4 to highest grade. The largest proportion of calves died was due to diarrhea, followed by cowdriosis and pneumonia. Stabilization of native inheritance and improving the level of management are preconditions for better performance at the farm.

Keywords: Abortion, Calf mortality, Friesian-Boran crosses, Cheffa state farm, Wollo-Ethiopia

Introduction

During the last three decades intensive infusion of Friesian inheritance into native breeds is going on in tropics with the sole aim of obtaining higher milk out put per cow. This has led to a serious situation of reduced genetic ability of graded calves to survive in tropical environment. In the tropics, the estimates of abortion ranged from 2.5% to 13.4 % (Vaccaro and Vaccaro, 1982; Mekonnen, 1987; Melaku, 1994) and calf mortality ranged from 3.0 to 29% (Mekonnen, 1987; Yimam, 1994; Zelalem *et al*., 1997) among graded calves. Some of the causes of calf losses were calf scour (Abraham, *et al*., 1992), pneumonia and inadequate feeding (Yimam, 1994). Brucellosis and moulds grown on reserved hay (Mekonnen, 1994), feeding poisonous plants, stress and

starvation (CTA, 1996) cause untimely delivery. Under these health and physiological challenges the calves with higher *Bos taurus* blood were lost at higher rate (Mekonnen, 1987 & 1994 and Zelalem *et al.,* 1997).

In this paper, an attempt was made to quantify the abortion rate as affected by the level of *B. taurus* inheritance, parity state of dams and season of birth of calves. The female calf mortality rate based on age group and causes of death is also studied.

Materials and Methods

The study was conducted at Cheffa farm situated at 10° 55'N latitude and 39° 47'E longitude at an altitude of 1490 masl in Wollo Ethiopia. The three defined seasons in the area were short rains (February to May); long rains (June to September) and dry season (October to January). A bimodal rainfall pattern is thus the case with an annual average of 960 mm of which 32% falls in short rainy season. The average maximum and minimum temperature were
30.2 °C and 13.6 °C, respectively.

The herd was established in 1976 with Boran dams and pure Holstein-Friesian bulls. At the beginning animals were subjected to 24 hours grazing system. Starting from 1986, the grazing hours were arranged from 0200 hrs to 1800 hrs. Animals were allowed to graze in groups based on sex and age. Grazing land management was poor and affected by water logging, infested with noxious weeds and unpalatable annuals. Mating was natural during the study period. Traditionally made hay, alfalfa green and concentrate feed prepared from maize and noug cake were fed according to age, stage of pregnancy and milk yield. Calves were weaned from the dams immediately after birth and fed with colostrums for two days. During the first 45 days, calves were offered milk. A small quantity of concentrate was also provided with milk from 45 to 90 days and then weaned from milk. Vaccination against rinderpest, CBPP, anthrax and blackleg were given. Animals were dewormed for parasites and treated for other infectious and tick born diseases. However, this was continued at irregular interval. The calves of different age groups were housed in different pens of concrete floor and corrugated zinc sheet wall.

The data on abortion and female calf mortality were collected from 1976-1997. A total of 2589 and 1024 records were analysed for abortion and calf mortality from 602 cows. Pregnancies culminated below 260 days were considered as abortion. Those calves born dead or died within 48 hours of

birth were taken as stillbirths. For calf mortality, the calves died after two days of birth to 12 months of age were included. Fixed effects studied were breed groups (1/2, 3/4 7/8 and 15/16 and above), parity and season of birth. The half grades were not considered for calf mortality since the fetus carried is 75%. Male calves were culled at earlier age and thus not included in the analysis of calf mortality. Diagnostic results of the Kombolcha Regional Laboratory, clinical case books and individual animal records were used. Some species of the natural pasture were identified in collaboration with the weed unit of Kombolcha Plant Health Clinic

Data were analyzed using the General Linear Model (GLM). Only breed group means were presented for stillbirth since the data set were not affected by any of the factors considered before or after square root transformation. Percentage data on abortion and calf mortality were analyzed after transformation and the final results were presented in original scale (Gomez and Gomez, 1984). Linear contrasts of least-squares means were computed to detect the significant difference within the variable group.

Results

Abortion

The overall percentage of abortion was 17.6 ± 0.01 and it increased to 22% of total pregnancy when stillbirth was included. The least squares means are presented in Table 1. Abortion was affected by breed group, parity and season. As the Friesian blood level increased from 1/2 to 15/16 so did rate of abortion from 9.9 to 37.7%. The rate of abortion was 12.0% for first calvers and increased 21 to 29% after the fourth parity. The abortion rate was highest during the long rainy season. On a separate analysis, the average abortion rate in the month of August was about 17%. Stillbirth was not affected by breed group, parity and season. The mean rates of stillbirth for 1/2, 3/4, 7/8 and higher groups were 3.0 ± 0.03, 4.1 ± 0.04, 4 ± 0.04 and 6.7± 0.06%, respectively.

Calf mortality

Overall mean of female calf mortality up to one year of age was 29.9 ± 0.02% (Table 2). Only breed group significantly affected calf mortality. Parity and season of birth had no significant effect. Calves with higher exotic blood died at a higher rate than lower groups before reaching the age of one year. Nearly, 49% of the calves with 15/16 and more Friesian blood died.

Mortality rates for breed group 3/4, 7/8 and 15/16 and above were almost similar during the first three months of life while for group 7/8 the rate was higher after six months of age (Table 3). The highest number of calves died was due to diarrhea followed by heart water and pneumonia. Furthermore, scrutiny of data revealed that diarrhea killed calves particularly between birth and four months of age (Table 4). Cowdriosis claimed more life when the calves were at the second quarter of their age and comparatively more calves of 7/8 and 15/16 grades and above crosses were died. The rate for pneumonia was almost similar in all the age groups. Streptotrichosis and certain physiological problems were serious between the fourth and eighth month of age.

Discussion

Abortion

The prenatal death is a significant loss associated with dairy enterprise. The rate of abortion (17.6%) estimated in this study (Table 1) is alarming and higher than the estimates of Vaccaro and Vaccaro (1982) for tropical cases; and, Mekonnen (1994) and Melaku (1994) under Ethiopian condition. The increased abortion with increase of *taurus* blood level could be due non compliance of better management as exotic inheritance is enhanced as well as the inability of these cows to overcome nutritional, environmental and disease problems. Similar results are on records incase of cross breeds of different developing countries (Singh *et al.,* 1987; Mekonnen, 1994). High rate of prenatal loss for older cows observed in this study support the fact that the ageing uterus reacts too slowly to the demands of the rapidly growing hybrid fetus and rapidly to the untimely stimulus initiating parturition (Hafez, 1993).

Serological tests of brucelosis undertaken at Cheffa state farm in 1988 using Serum Agglutination Test (SAT) and in 1993 using Rose Bengal Plate Test (RBPT) revealed that there were 22 and 22.6% positive reactors, respectively (Tariku, 1994). In this farm, one cow for every three cows aborted and 52% of the cases the cows aborted twice or more. Also, one cow for every seven cows gave stillborn calves and 22.3% of the cases the cows delivered two or more stillborn calves. Though positive reactors for brucellosis were high in the farm (Tariku, 1994), this alone can not be taken as main cause of abortions since in brucellosis majority of affected animals do not abort more than once. The existence of some estrogenous plants such as *Amarantaceae, Asteraceae, Cucurbitaceae, Euphorbiaceae, Fabaceae* and *Solanaceae* in the grazing area

might caused fertility problems. Certain physiological stage of growth of these plants may be coincided to the late stage of long rainy season and might cause abortion as evidenced by occurrence of about 17% of abortion in the month of August.

Moreover, overgrazing during earlier season and drought may reduce the amount of palatable plants and thus allowing poisonous plants to multiply. Stagnant water which remained for a long time in the field was a good growing media for various types of algae which might further aggravated the death of the fetus. The genetic variability in resisting the effects of abortificient may be the cause of higher abortion rates noticed in the higher grades. Further, from farm records it was observed that the herd was affected by single or multiple infection of foot and mouth disease, anaplasmosis, anthrax and blackleg during the study period and different grades might have responded differently.

Calf mortality

The average calf mortality was found to be 29.9% and is higher than averages recorded in reports of Mekonnen, 1987; Nesru, 1997 and Zelalem *et al.,* 1997 except that reported by Yimam (1994) for pure Jersey breed which it self is unusually very high (62%). The calves with higher exotic blood died at a higher rate (Table 2) and the trend concords with the findings of Zelalem *et al.* (1997). This may be associated with increased demand for quality feed, management and health care. Higher mortality in higher grades might also be to increased susceptibility to diseases prevailing in the farm environment with the dilute of the local blood.

High percentage of female calve mortality as the level of inheritance increased (Table 3) might be poor response of this group of animals to that local environment. The death of many calves from diarrhea causing diseases could be as a result of inadequate feeding of colostrums and sanitation of the living quarter. Also, tick species of *A. coherence, A. gemma* and *B. decoloratus* were identified in this farm (Daniel, 1994). The Kombolcha Regional Laboratory identified *A. marginale* in 1980; *anaplasmosis* and *babesiosis* causing agents in 1988 and 1989; and, fasciola, paramphistomum, strongly species in 1984, 1986 and 1988 to 1990. Suspected cases of heart water, streptotricosis and bovine babesiosis were also observed in the clinical case books. Though no confirmatory diagnosis were established throughout the study periods, the above evidences strongly suggest that disease of

various sets such as helminthes, protozoan infestation and external parasites are common in the study area. This indicates that the routine health care and management of calves was not to the level required. The largest proportion of calves died from cowdriosis after 120 days of age (Table 4) may be the contamination of the pasture by various tick species and other parasites. A good proportion of calves died with no obvious reason demands a thorough investigation.

Table1 Least squares means (S.E.) of abortion by breed group, parity and season of calving

Source	**Conceived n**	**Abortion (%) Mean ± S.E.**
Overall	2589	17.6 ± 0.01
Breed group		**
½	825	9.9 ± 0.06^{d}
¾	1133	14.4 ± 0.12^{c}
7/8	472	32.0 ± 0.27^{b}
≥15/16	159	37.7 ± 0.26^{a}
Parity		*
1	599	12.0 ± 0.12^{e}
2	475	14.7 ± 0.14^{de}
3	393	14.5 ± 0.12^{e}
4	304	18.8 ± 0.15^{cd}
5	250	25.6 ± 0.24^{ab}
6	160	21.3 ± 0.18^{bc}
7	141	22.7 ± 0.30^{bc}
8	112	27.7 ± 0.20^{a}
9+	155	25.2 ± 0.2^{ab}
Season		*
Short rainy	741	14.8 ± 0.15^{b}
Long rainy	780	21.3 ± 0.33^{a}
Dry	1068	16.9 ± 0.20^{b}

* = P < 0.05 ** P < 0.01

Within variable groups, means followed by the same letter do not differ significantly (P<0.05)

Conclusions

Abortion and calf mortality were a serious problem in this farm and the rate increased with blood level. Abortion may be associated with brucellosis, infectious diseases and abortifacient plants. However, in-depth scientific

inquiry on the content of abortifacient agents, estrogenic factors and poisonous substances in natural plants and forages of pasture of lowland area. The largest proportion of calves died was due to diarrhea followed by cowdriosis and pneumonia reflects the farm hygienic conditions and management. Reliance on high grades over 3/4 Friesian blood carries a element of risk-genetic vulnerability of some traits in prevailing divergent environment. At the same time economically feasible standardization of repressible environment and timely application of animal husbandry skill is needed to harvest the genetic potentiality of exotic inheritance.

Table 2 Female calf mortality percentage among breed groups

Source	**n (born)**	**Mean ± S.E.**
Overall	1024	29.9 ± 0.02
Breed group		**
¾	368	19.8 ± 0.02[c]
7/8	458	28.8 ± 0.03[b]
≥15/16	198	51.0 ± 0.04[a]

*P < 0.05

Within variable groups, means followed by the same letters do not differ significantly (P < 0.05).

Table 3 Breed group and age wise distribution of number of female calf died

Breed group	**Total died (n)**	**Age group (days)**		
		3-120	**121-240**	**241-365**
¾	73	39	17	17
7/8	132	47	32	53
≥15/16	101	47	22	32

Table 4 Cause and age wise percentage distribution of total female calf mortality

Cause	**Age group (days)**			**Total (n) died**
	3-120	**121-240**	**241-365**	
Diarrhea	51.9	22.7	10.7	89
Cowdriosis	24.0	39.4	26.2	87
Pneumonia	10.6	10.6	11.7	33
Anthrax	6.7	-	15.5	26
Streptotrichosis	1.9	6.9	2.9	9
Indigestion	1.9	6.9	-	5
Unknown	3.0	13.5	33.0	57

Acknowledgments

The author would like to thank the management of Cheffa state farm for allowing us to use the data. We also thank Ato Endale Berhe for his cooperation in identifying plant species.

References

Abraham, G., Roeder, P. L. and Roman Zewdu. 1992. Agents associated with neonatal diarrhoea in Ethiopian dairy calves. Trop. Anim. Hlth Prod. 24: 74-80

CTA. 1996. (Technical Center for Agricultural and Rural Cooperation). A few medicinal plants used in traditional veterinary medicine in sub-Saharan Africa. A data bank. Wageningen, Netherlands.

Gomez, K. A. and Gomez, A. A. 1984. Statistical Procedures for Agricultural Research. 2nd ed. John Willy and Sons (eds). New York.

Daniel Wolde-Senbet. 1994. Survey on tick species of cattle, camel, sheep and goats in south Wollo region, Ethiopia. DVM Thesis. Addis Ababa University, Debre Zeit, Ethiopia.

Hafez, E. S. E. 1980. Reproduction in Farm Animals. 6th ed Lea and Febiger, Philadelphia.

Mekonnen Haile-Mariam. 1987. Evaluation of growth and reproductive performance of Borana cattle and their crosses with Friesians at Abernosa, Shoa, Ethiopia. M.Sc. Thesis. Alemaya University of Agriculture, Dire Dawa, Ethiopia.

Mekonnen Haile-Mariam. 1994. Genetic analysis of Boran, Friesian, and crossbred cattle in Ethiopia. Ph.D. Thesis. Swedish University of Agricultural Sciences. Uppsala, Sweden.

Melaku Negash. 1994. Reproductive performance of a Holstein-Friesian dairy cattle herd at Holeta, Shoa, Ethiopia. M.Sc. Thesis. Alemaya University of Agriculture, Dire Dawa, Ethiopia.

Mohammed Ali and Castro, J. D. E. 1993. Host resistance to ticks in different breeds of cattle at Bako, Ethiopia. Trop. Anim. Hlth. Prod. 25 (4): 215-222

Nesru Hussien. 1997. A study on calf mortality at Adamitulu Livestock Research Center. Fifth National Conference of Ethiopian Society of Animal Production. 15-17 May 1997, Addis Ababa, Ethiopia.

Singh, R. N., Mishra, R. R., Dutta, O. P. and Malhotra, J. C. 1987. An investigation on the viability of indigenous and crossbred cows with special reference to mortality and culling. Indian J. Anim. Sci. 57 (2): 141.

Tariku Sintaro. 1994. The impact of brucellosis on productivity in an improved dairy herd of Cheffa state farm, Ethiopia. M. Sc. Thesis. Institute of Parasitology and Tropical Veterinary Medicine Konigsweg 67, Berlin, Germany.

Vaccaro, R. and Vaccaro, L. P. 1982. Age at first calving, reproduction and prenatal survival in Holstein-Friesian and Brown Swiss crossbreeds in the intensive tropical milk production system. Trop. Anim. Prod. 7:191

Yimam Hassen. 1994. Evaluation of the performance of Danish Jersey cattle at Ada Berga state farm, Ethiopia. M.Sc. Thesis. Alemaya University of Agriculture, Dire Dawa, Ethiopia

Zelalem Yilma, Alemu G/Wolde and Yoseph Shiferaw. 1997. Observation on mortality rates of local and crossbred cattle at Holeta research center. Fifth National Conference of Ethiopian Society of Animal Production (ESAP). 15-17 May 1997, Addis Ababa, Ethiopia.