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A Retrospective Study on Calf Mortality in Wolaita Soddo Jersey Cattle Breeding and Multiplication Center, Wolaita Soddo, Southern Ethiopia

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Abstract
A retrospective study of calf mortality on calves born from 1998-2007 at Wolaita Soddo Cattle Breeding and Multiplication Center was conducted from December 2006 to May 2007. Data was collected from the farm record book containing relevant information of 10 years. Data analysis was done on 415 calves born during the study period to evaluate the effect of birth year and birth season on calf mortality. Even though the result had not statically significant, it was recorded a relatively high mortality in 2000 and during long dry season. Out of 451 calve born alive, 50 calves were died below one-year of age. The overall calf mortality rates averaged 22%, 16% and 62% for calves between birth and 90 days, 91-180 days and above 180 days but less than one year respectively. Proportionally, the highest mortality rate occurred in age above 180 days but within one year age and the lowest death rate occurred in between 91 and 180 days. The result of the present study revealed that calf mortality in the farm was higher than economically tolerable level which could be achieved through good management. This indicates that efforts are need to be concentrated in improving the management; health care and nutritional status of the calves in particular and the whole farm in general.
Keywords: Calf mortality, Jersey, Season of birth, Year of birth, Wolaita Soddo

1. INTRODUCTION

Ethiopia has an estimated 41.5 million cattle, 41 million sheep and goats, 6 million equines, 1.1 million camels and 52 million chickens (CSA, 2003). Livestock share is estimated to be 40% of the annual agricultural output (COMESA/LLPI AND ILRI, 2005) and 15% of the gross domestic product (Abassa, 1995). Livestock play a significant role in the farm economy of the country. They support rural and urban population with milk, meat, employment, investment opportunities, and draft power for crop production. However, the contribution of Ethiopia to the world market for livestock and livestock products is minimal because of the low productivity of almost all classes of livestock (IAR, 1989).

Performance of livestock as food producer in Ethiopia is poor. The annual growth of meat and milk production is 1.8 and 2.8 percent, respectively (ILCA, 1990), which is below the recommended average rate-4% that is need to feed the growing population (Winrock International, 1992). The poor domestic production leads to heavy imports of animal products whose price is beyond the reach of the vulnerable groups.

Most genetic improvement strategies of cattle in Ethiopia has brought through modification of the breed composition of local populations, either by introducing genes from an external sources or through direct importation of cross breed from other countries. The immediate increase in production from such types of development programs has definite attraction (Yimam and Brannage, 1996). Certain breeding and multiplication centers for highly milk productive exotic breeds have been established in Ethiopia in national level, to support the genetic improvement policy of the government and one of such center is Wolaita Soddo Jersey Breeding and Multiplication Center.

The primary aim of the center is to produce breeding bulls which will eventually sold to individuals or farmer's associations, so that a bull station may be established and hence through cross breeding the genetic potential of local zebu would be up graded. Besides the primary goal, the milk and milk products produced by the farm which are more than the feed requirements of the growing calves are also marketed for the nearby consumers (Wolaita Soddo Cattle Breeding and Multiplication Center, 2007).

Previous study conducted in Ada Berg state farm from 1988 to 1991 in this breed showed that out of calves born alive, the death rate was 53.5% during the study period (Yimam and Brannage, 1996) and similar study had been conducted in Wolaita Soddo Jersey Cattle Breeding and Multiplication Center from November 1991-1992 and found a calf mortality of 40.7% during the study period (Awoke, 1995). According to (Zelalem *et al*., 1998), a research done at Holetta Research Center, Friesian crosses had lower mortality up to yearling and higher mortality from 1 to 3 years of age in compared to Jersey crosses. Moreover, the mortality declined as they got old but Simmental breeds had higher mortality in most age groups than other sire breeds including Jersey. However, a study done in calf mortality in Adami Tulu Livestock Research Center on cross breeds of Friesian, Simmental and Jersey sire breeds crossed with Barka and Boran local dam breeds; exotic blood level hadn't any

significant in calf mortality but found a fewer number of Jersey cross calves to die than Friesian and Simmental cross breed calves (Nesru, 1998). Although the Jersey breeds produce low milk, they are tolerable to hazard condition such as: resistance to feed shortage and also low nutritional requirement than Holstein Friesian. These all mentioned qualities of Jersey may enable it to be selected to Ethiopia condition than other exotic breeds. Therefore the objective of this study was:

- To assess the calf mortality rate of the farm from 1998-2007
- To assess its risk factors

2. MATERIALS AND METHODS

2.1. Study area

Wolaita Soddo is located between 6^0 36'N to up to 7^0 18'N latitude and 37^0 12' E to 38^0 24 E longitude (BOPED, 2000) and is situated in the Southern part of Ethiopia which is about 385km south west of Addis Ababa. The altitude of Soddo is about 1950m above sea level. The rainfall pattern is bimodal; the maximum rainfall is received during the long rainy season (mid June to mid September), the shorter rainfall being between the months of March and May. The long dry season lasts from October to February. The annual rainfall in Soddo ranges from 1200mm to 1300mm (NMSA, 2001). The mean temperature and humidity are 19^oC and 60%, respectively (Wolaita Soddo Cattle Breeding and Multiplication Center, 2007).

2.2. Study population

Study populations were those calves born in the farm from 1998-2007 but with age less than 365 days. A total of 451 calves were born during this period.

2.3. Study design

A retrospective study about calf mortality rate had been done based on a record book found in the farm containing birth date, death date, dam ID, sire ID, calf ID, sex of calves, weaning date and birth weight from 1998-2007 (Annex-1).

2.4. Herd management and feeding

The management of the farm is semi-intensive. The area for both natural and cultivated pasture is approximately 100 hectares and out of this only about 13 ha was cultivated but the rest was used for natural pasture grazing. From the cultivated 13 ha; 5 ha seeded with *chloris gayana* (rhodes grass); the major grass in the farm, 1.5 ha with *Penisetum purpurium* (elephant grass), *Medicago sativa* (alfalfa), *Susanna susban* (sasbania tree), *Leuceana leucosephala* (leuceana tree), a very negligible amount of *Panicum* grass and *Cojanus cajan* (Peagon pea), and about 6 ha of land covered with maize, and 0.5ha covered with pumpkin every year. The main feeds in the farm include both green and dry (hay) grass, which is harvested mainly from both *Chloris gayana* and *Penisetum purpurium* throughout the year. Silage also prepared from both stalk and cereal part of the maize and used as supplementary feed during the long dry season (Wolaita Soddo Cattle Breeding and Multiplication Center, 2007).

Milking cows were grazed every day from 8:00 am – 13:45 pm. The non-milkers were grazed from 8:00-15:30 but the calves (both male and female) were kept indoors (day and night) until eight months of age in individual pens, except for about 3 hours of exercise in a fenced yard around the house and taking concentrated feed in it. But calves in age between 8 months and 1 year were kept separately based on their sex. All the animals spend the rest time kept inside their barns and feed only green grass or hay depending on the availability. The milking cows and calves which were supplemented with concentrates of 2kg/head/ day for cows and ½ kg/head/day concentrates and 3 liters of milk/day/head of calf for 3 months and then ½ kg concentrate up to one year respectively. In addition to hay and green feed, silage was given in limited amount and irregularly during the long dry season for all animals. Water was provided twice per day from tap water. Calves less than one year of age were supplied water in *adlibitum* from 8:30 – 11:30 am every day.

Calves were left with their mother to take colostrums feeding for the first 3 days after birth and then separated from their mothers and joined to calf house. Then after, up to 3 liters of half whole milk and half skim milk mixed together were supplied every day per head by bucket feeding for the following 3 months.

Preventive veterinary practices included vaccination against foot and mouth disease, anthrax, blackleg, lumpy skin disease and pasteurellosis for all age groups more than 6 months of age.

Acaricides spray depending on tick infestation and treatment based on disease occurrence were given for every class of animals including milking cows except for calves less than 8 months. Treatments were given against diarrhea in claves, mastitis in milking cows, *Thelazia* in bulls, external parasites in all grazing animals, heart water in newly exposed for grazing animals and growing calves, lumpy skin disease in all classes of animals.

2.5. Data analysis

All data were entered to excel 2003 and analyzed by using SPSS version 15. The different treatments were compared with at 0.05 significant levels.

3. RESULTS

The study revealed that there is no statistical significant effect of birth year and birth season (p>0.05) on calf mortality (Table1).

Table 1: Birth year and birth season as risk factor for the death of calves

Birth year	**No. of calves died**	***Age in days [Lsmean+S.E]***
1998	7	249.7±23.5
1999	5	159.5±53.6
2000	9	142.5±36.1
2001	4	261.5±38.5
2002	4	246.2±21.6
2003/2004	8	228.5±24.9
2005	7	183.7±50.7
2006/2007	6	134.8±43.3
Birth season		
Long rainy season	14	187.8±27.1
Short rainy season	15	212.7±30.9
Long dry season	21	201.9±20.6

Age had no significant effect on calf mortality (p>0.05). The overall calf mortality rates averaged 22%, 16% and 62% for calves between birth and 90 days, 91-180 days and greater than 180 days of age but less than one year, respectively (Table 2). Proportionally, the highest mortality rate occurred in age above 180 days but within one year of age and the lowest death rate occurred in between 90 and 180 days.

Table 2: Effects of age and sex on calf mortality

Age (days)	**male**	**female**	**total**	**%**
<90	5	6	11	22
91 –180	5	3	8	16
>180	17	14	31	62

The effect of sex on calf mortality is depicted in figure 1 as follow. At the end of the study period there was an apparent increase in death of male calves but declining in female calves to zero level.

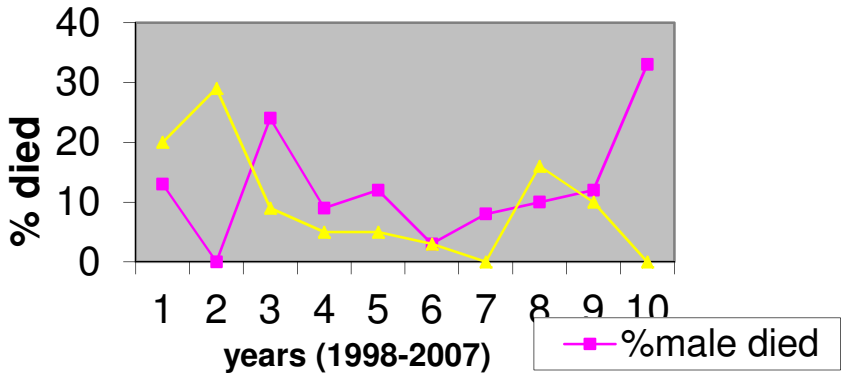

Figure 1: Calf mortality based on sex differences

4. DISCUSSION

The mortality rate recorded up to 6 months of age in the current study was 16%- 22%, the maximum death being in the first 3 months after birth. This could be possibly due to deficiencies in the calf immunity system (Alemu and Teshome, 1987) or adaptational hygienic/stress (Mengesha, 1993). This is by far lower than the mortality rate (38.1%) recorded by (Tadesse *et al*., 2004) or Horro breed in Bako farm. This may be due to the different

management system applied in different farms as well the differences in climatic condition, veterinary facilities, nutritional availabilities and disease prevalence. However, this result is inclined with the range which was reported by (Mc Dowell, 1972) who had been reported in developing countries, calf mortality rate between birth and 3 months of age were found to be between 20% and 60%. This is due to pre-weaning losses are influenced by season of birth which have an effect on the quality and quantity of feed available, the incidence of the disease and the level of parasitic infections and management (Zelalem *et al*., 1998)

Out of the 50 calves died during the study years, 31 (62%) died between 180 days and one year of age. This can be explained by the fact that, factors that commonly cause death after weaning are diseases and malnutrition (ILCA, 1990). In general, a mortality rate over 5% is considered to be high (Alemu and Teshome, 1987) and in this study except during 2004 that was mortality rate 5%; the rest were more than this limit, may be due to low nutrition availability and poor management.

1. In this finding sex had no significant effect on pre and post-weaning calf mortality ($p>0.05$). This result disagree with (Zelalem *et al*., 1998) who had reported sex to be significant in calves with age below 3 months and the report on Horro calves at Bako farm (Tadesse *et al*., 2004) where female calves showed better survival (51.2 *vs* 48.7%) than male calves. Likewise (Wilson, 1986) recorded high mortality rate of male calves (29.2 *vs* 34.3) in central Mali.

Although birth season had not significant effect on calf mortality ($P>0.05$), calves born during the long dry season (October to February) and short rainy season (March to May) had slightly higher mortality than those born during long rainy season. This might be attributed to shortage of feed in terms of both quality and quantity during dry season for those born during dry season

whereas there is excess /high availability of green forages for these calves born during long rainy season (June to September) (Zelalem *et al*., 1998) and the fluctuating sunny and rainy condition during the short rainy season may favors for the occurrence of soil borne and tick borne diseases which resulted in death of many animals. In 2007 of the study period, high mortality rate of male calves (33% *vs* 0%) was found, this might be due to the short duration of study which results in a very few and in proportional calf birth and death. The effect due to year of birth was not significant. But there were very negligible differences in calf mortality among the study years. These differences might be associated with annual changes in environmental conditions, variation in the quantity and quality of feed availability, disease prevalence and differences in management practices followed over the study years.

5. CONCLUSION AND RECOMMENDATIONS

The calf mortality rates found in this study where higher than economically tolerable that can be achieved through good management. Birth year and birth season had no significant effect on calf mortality but a relatively high mortality was recorded during 2000 and during long dry seasons of the study period. Age also had not significant effect; however, high mortality occurred during post weaning. Proportionally, the highest mortality occurred in age above 180 days but within one year of age and the lowest death occurred in between 90 and 180 days. For all these facts, the following recommendations are forwarded:

- Age, sex, birth year and birth season had no significant effect on calf mortality, so other factors should be studied.
- Further and prolonged study assessing on the management applied for the calves should be conducted through longitudinal study.
- Management associated with calf health care and rearing should be improved.
- Rearing of calves in a clean, disinfected calf pen, under good nutrition and each disease condition should be addressed by animal health professionals as early as possible.

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7. Annex

Record Book

Birth date	Dam ID	Sir ID	Calf ID	Sex	Birth weight	Weaning date	Death date

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