

Factors affecting calf mortality in small scale dairy farms at Biswanath Upazila of Sylhet

Nelufer Yeasmin¹ Mohammed Kawser Hossain¹, Animesh Chandra Roy¹, Md. Rafiqul Islam², Saiful Islam³,
Md. Motiur Rahman² and Md. Shaffiul Alam⁴

¹Department of Surgery and Theriogenology, Sylhet Agricultural University, Bangladesh, ²Department of Medicine, Sylhet Agricultural University, ³Department of Physiology, Sylhet Agricultural University, ⁴Department of Livestock Services, Dhaka, Bangladesh

Abstract

Objectives: The factors of calf mortality in small scale dairy farms such as microbial factors, management factors, sex and seasons were determined.

Materials and Methods: A total of 500 calves of 120 different small scale dairy farms of Biswanath upazila in Sylhet region of Bangladesh were visited in this research during the study period from January 2013 to December 2013. Herd size was 5-6 in average in these farms. All the collected data were analyzed statistically by using Microsoft windows 7 Excel program.

Results: The overall calf mortality rate was 12.6%. The recorded mortality cases were classified into two major groups (microbial and management factors). In case of microbial factors highest mortality was found due to gastro enteritis (28.57%) followed by pneumonia (19.04%), parasitic infestation (4.76%) and others (14.28%) causes. Calf scour was the most important cause of calf mortality in small scale dairy farms. In case of management factors, dystocia (12.70%), cold stress (12.70%) and malnutrition (7.94%) affected the calf mortality. Death in calves aged between 0 to 30 days old (38.09%) were found higher in comparison to age between 31 to 90 days (33.33%) and aged between 91 to 180 days (28.58%). In relation to sex of the species, mortality was higher in male calves (55.55%) in contrast to female (44.45%). In Rainy season, death of calves were substantially higher (42.85%) compared to summer (33.35%) and winter (23.80%).

Conclusion: Calf rearing and management techniques characteristic of herds should be improved to reduce mortality rates. Further investigations and molecular research should be recommended to minimize calf mortality for sustainability of the small scale dairy farms.

Keywords: Age, Calf mortality, Diseases, Factors, Management, Sex.

Introduction

Bangladesh is agriculture based densely populated country and its livestock is a very important and prospective one. Dairy industry is a crucial component of agro-based economy for a country like Bangladesh (Islam *et al.*, 2005). Calves rearing and sale is an important source of income for the farmers of Bangladesh. Calf hood morbidity causes direct cost for treatment and nursing, affects days at first calving, affects dairy herd survivorship and future productivity (Waltner *et al.*, 1986). Most of the farm calf mortality factors related to improper management system. A range of huge risk factors were tested in small holder farms where younger age, delay in first colostrums feeding and unclean calf house is associated with higher risk of mortality. So, reductions calf mortality rate are the first and foremost targets of dairy farm management. Calf mortality has been the subject of much research in the last three decades worldwide; unfortunately very limited works have been made in Bangladesh to find out the factors, causes of calf mortality and the possible outcome to reduce the cases. Most of the reports were based on hospital and on farm records (Debnath *et al.*, 1999). Until now, there were no significant work and published data about this issue in north east region of Bangladesh especially in Sylhet district. Considering this, the aim of the present study was to find out the factors and causes responsible for calf mortality in Sylhet region of Bangladesh.

Materials and Methods

The study was conducted in contract with small scale dairy farmers of 15 selected villages of Bishwanath upazila in Sylhet region of Bangladesh. Data was collected through

questionnaires with direct interviewing contained the information on raising pattern, housing, hygienic condition, feeding habits including colostrums feeding immediately after birth and socio economic status of farmers in this study. The farmers of this area reared both indigenous and crossbred dairy cattle. They followed both natural and artificial insemination techniques for production of replacement heifers and bulls. Both intensive and semi-intensive rearing systems were followed by them. A total of 500 calves of 120 different small scale dairy farms were visited in this research during the study period from January 2013 to December 2013. Herd size was 5-6 in average in these farms. The farmers had achieved enough support from the local veterinary surgeon for examinations for pregnancy, reproductive management and the treatment of sick animals.

In each farm, individual calf and dam identification, the sex of calf, the parity of the dam, the type of parturition and season of birth were noted. Information collected by survey was tabulated and analyzed for getting the assumption of farm status. In order to search out the possible causes of death of calves, the age of the calves' upto 180 days from date of birth were considered and the whole data collected, were classified into microbial and management health hazards. All main effects (management factors, microbial factors, season of birth, sex and type of parturition) were included in this study. Mortality rates as percentage and numbers were calculated for three aged groups mention as Group 1) Birth to 30 days, Group 2) 31 to 90 days and Group 3) 91 to 180 days. All the collected data were analyzed statistically by using Microsoft windows 7 excel program.

* Corresponding author: kawserau07@gmail.com

Results and Discussion

This study reported the causes and risk factors of mortality in small scale dairy farms of Biswanath upazila in Sylhet region of Bangladesh. Details of the total number of death, mortality rate due to microbial and management factors were shown in Table 1. Five hundred calves that were live at birth were considered throughout the study period. A total of sixty three calves were died and overall mortality rate was 12.6%. The recorded mortality cases were classified into two major groups (microbial and management factors).

In case of microbial factors highest mortality was found due to gastro enteritis (28.57%) followed by pneumonia (19.04%), parasitic infestation (4.76%) and other (14.28%) causes. Our results showed that gastroenteritis (particularly calf scour) was the most common cause of death among calves in dairy herds. These findings are in agreement with the findings of Sivula *et al.* (1996), Gitau *et al.* (1994) and Shrivastava *et al.* (2013). Highest incidences of gastroenteritis in calves might be due to bacterial or viral infections, or due to delayed feeding of colostrums to the calves immediately after birth. The second most common cause of death was pneumonia. In cold environment, pneumonia was reported to be the most important cause of dairy calf mortality. Differences in climatic conditions and associated differences in calf management (e.g. outdoor versus indoor rearing systems and absence of calf hutch) are the most likely reasons for these findings.

Table 1. Number of deaths, calf mortality from 0 to 180 days due to management and microbial factors

Variables	Number of deaths	Percentage (%)
Gastroenteritis	18	28.57
Pneumonia	12	19.05
Dystocia	8	12.70
Cold stress	8	12.70
Malnutrition	5	7.94
Parasitic infestation	3	4.76
Others	9	14.28
Total	63	100

In case of management factors, dystocia (12.70%), cold stress (12.70%) and malnutrition (7.94%) affected the calf mortality. In our findings, dystocia was the third significant cause of death. Prolonged parturition, abnormal presentation, position and posture were found to be causes of death of calves within short time after birth. Similar results were reported by Azzam *et al.* (1993) and Gulliksen *et al.* (2009) causing the death of calves.

The age of the calves is also important factor for mortality. The younger the calf, the greater the chance of mortality. The greater percentage of mortality occurs at the first month of age and it was about 38.09% (Table 2) followed by death percentages at the age of 31-90 days and 91-180 days respectively. A high proportion of death occurs in the first week of life. Diarrhoea and pneumonia had been reported as the most important reasons of death during this time. Farmers were not conscious on colostrum feeding to their calves immediately after birth. Colostrums contain immunoglobulins which is responsible for passive immunity for calves. Because of insufficient feeding of colostrums and less development of immune system and lack of previous exposure to infection, mortality rate of calves were more because of different diseases like calf scour, pneumonia at first month of age.

In present study, mortality was higher in male calves (55.55%) in contrast to female (44.45%) as shown in Table 3. Male calves tended to be larger than female calves, as a result dystocia occurred and death rate was more in case of male calves. Another cause may be due to reason for less absorption of serum immunoglobulins by the male.

Table 2. Age-wise mortality rate of calves by different diseases under small scale farm conditions

Age of calves	Number of deaths	Mortality %
0-30 days	24	38.09
31-90 days	21	33.33
91-180 days	18	28.58
Total	63	100

Season also had an effect on calf mortality. The effects of season on calf mortality were also shown in Table 4. Deaths of calves were found greater in monsoon (42.85%) compared to summer (23.80%) and winter (33.35%). The similar results were observed by Islam *et al.* 2005.

Table 3. Percentage of calf mortality according to the sex

Sex of calf	No of calf expired	Mortality %
Male	35	55.55
Female	28	44.45
Total	63	100

Calves born in the rainy season were likely to die more than those born in the summer and winter. The variable effect of season on calf mortality is likely to be due to differences in ambient temperature averages. In Bangladesh during rainy season environment is considerably warmer, hot and humid than other seasons.

Table 4. Calf mortality rate in small scale dairy farms due to effect of season

Seasons	Number of deaths	Mortality %
Summer (March-June)	15	23.80
Rainy(July-October)	27	42.85
Winter(Nov-February)	21	33.35
Total	63	100

We hypothesize that the higher risk of mortality in rainy season identified in this study was the result of heat stress and high humidity. Heat stress is found to decrease bodyweight gain and decrease serum concentrations of IgG (Broucek, 2008). We assumed that high ambient temperature cause physiological stress which in turn activates adrenal steroid output and slow down immunoglobulin absorption during the critical 24 h postnatal period (Broucek *et al.*, 2008, Stott *et al.*, 1976 & Stvensson *et al.*, 2006). Impaired passive transfer of immunoglobulin lessen passive immunity, leading to an increased susceptibility to infectious disorders, particularly those of the gastrointestinal and respiratory tract, leading to an overall increased rate calf mortality.

Conclusion

Calf rearing and management techniques characteristic of herds should be improved to reduce mortality rates. Further investigations and molecular research should be recommended to minimize calf mortality for sustainability of small scale dairy farms.

Author contribution

Both the authors 1 & 2 have equal contributions to study design, analyzing the data and writing the manuscript and the other authors read the manuscript and analyze the data.

Acknowledgement

The authors were grateful to farmers of the dairy framers of the studied area to provide the information of calf rearing and also grateful to local livestock office and also to faculty of veterinary and animal science, Sylhet Agricultural University screening and analysing the data.

Author's contribution

The first two author's have equal contributions to study design, analyzing the data and writing the manuscript. The other authors have contributions to read and analyze the data and finally approved the article.

References

- Azzam SM, Kinder E, Nielsen MK, Werth LA, Gregory KE, Cundiff LV, Koch RM. Environmental-effects on neonatal-mortality of beef-calves. *J. Anim. Sci.* 1993; 71:282–290.
- Broucek J, Kisac P, Uhrinca, M, Hanus A and Benc F. Effect of high temperature on growth performance of calves maintained in outdoor hutches. *J. Anim. Feed Sci.* 2008; 17:139–146.
- Debnath NC, Taimur MJ, Gburr EC. A retrospective study of calf losses on the central dairy cattle breeding station in Bangladesh. *Prev. Vet. Med.* 1999; 24: 43-53. [http://dx.doi.org/10.1016/0167-5877\(95\)00471-8](http://dx.doi.org/10.1016/0167-5877(95)00471-8).
- Gitau GK, McDermott JJ, Waltner TD, Lissemore KD, Osumo JM, Muriuki D. Factors influencing calf morbidity and mortality in smallholder dairy farms in Kiambu district of Kenya. *Prev. Vet. Med.* 1994; 21:167–177. [http://dx.doi.org/10.1016/0167-5877\(94\)90005-1](http://dx.doi.org/10.1016/0167-5877(94)90005-1).
- Gulliksen SM, Lie KI, Loken T, Osteras O. Calf mortality in Norwegian dairy herds. *J. Dairy Sci.* 2009; 92, 2782-2795. <http://dx.doi.org/10.3168/jds.2008-1807>
- Islam SS, Ahmed AR, Ashraf A, Khanam N, Ahmed MB. Causes and Consequences of Calf mortality in Dairy Farm of Bangladesh. *J. Anim. Vet. Adv.* 2005; 2:260-264.
- Kadzere CT, Murphy MR, Silanikove N, Maltz E. Heat stress in lactating dairy cows: a review. *Livest. Prod. Sci.* 2002; 77:59–91. [http://dx.doi.org/10.1016/S0301-6226\(01\)00330](http://dx.doi.org/10.1016/S0301-6226(01)00330).
- Neuwirth, JG, Norton JK, Rawlings CA, Thompson FN, Ware GO. Physiologic responses of dairy calves to environmental heatstress. *Int. J. Biometeorol.* 1979; 23, 243–254. <http://dx.doi.org/10.1007/BF01553775>.
- Shrivastava M, Nanavati S, Yadav DS and Mishra AK. Studies on incidence and causes of Buffalo calf mortality in Malwa region of Madhya Pradesh. *Int. J. Agric. Sci. Vet. Med.* 2013; 1(2):69-72.
- Olsson SO, Viring S, Emanuelsson U, Jacobsson SO. Calf diseases and mortality in Swedish dairy herds. *Acta Vet. Scand.* 1993; 34: 263-269.
- Sivula NJ, Ames TR, Marsh WE, Werdin RE. Descriptive epidemiology of morbidity and mortality in Minnesota dairy heifer calves. *Prev. Vet. Med.* 1996; 27: 155–171. [http://dx.doi.org/10.1016/0167-5877\(95\)01000-9](http://dx.doi.org/10.1016/0167-5877(95)01000-9).
- Spain JN, Spiers DE. Effects of supplemental shade on thermoregulatory response of calves to heat challenge in a hutch environment. *J. Dairy Sci.* 1996; 79: 639–646. [http://dx.doi.org/10.3168/jds.S0022-0302\(96\)76409-3](http://dx.doi.org/10.3168/jds.S0022-0302(96)76409-3).
- Stott, GH, Wiersma F, Menefee BE, Radwanski FR. Influence of environment on passive-immunity in calves. *J. Dairy Sci.* 1976; 59: 1306–1311. [http://dx.doi.org/10.3168/jds.S0022-0302\(76\)84360-3](http://dx.doi.org/10.3168/jds.S0022-0302(76)84360-3).
- Stvensson C, Linder A, Olsson SO. Mortality in Swedish dairy calves and replacement heifers. *J. Dairy Sci.* 2006; 89: 4769-4777. [http://dx.doi.org/10.3168/jds.S0022-0302\(06\)72526-7](http://dx.doi.org/10.3168/jds.S0022-0302(06)72526-7).
- Waltner TD, Martin SW, Merk AH. Dairy calf management, morbidity and mortality in Ontario Holstein herds. II Age and seasonal patterns. *Prev. Vet. Med.* 1986; 4: 125-135. [http://dx.doi.org/10.1016/0167-5877\(86\)90018-8](http://dx.doi.org/10.1016/0167-5877(86)90018-8).