Prevalence of Abortion, Calf Mortality and Proportion of Cattle Population in Commercial Dairy Farms of Bangladesh

Md. Anowar Parvez1, Md. Rayhan Faruque1, Rokeya Khatun2

1Department of Medicine and Surgery, Faculty of Veterinary Medicine, Chattogram Veterinary and Animal Sciences University, Khulshi, Chattogram–4225; 2Additional Veterinary Surgeon, ECTAD–FAO (HPAI), Department of Livestock Services, Farmgate–1215, Dhaka, Bangladesh.

Abstract | Abortion and calf mortality are representing significant economic loss in commercial dairy farms all over the world. The present study aimed to investigate the abortion rate, calf mortality and proportion of different types of cattle in commercial dairy farms of Bangladesh. A preset questionnaire was developed to collect information through active surveillance. This study was conducted in seven divisions a total of 73 registered dairy farms having 3260 cattle were considered as the source of population for epidemiological survey during 2014. The collected data revealed that the sex ratio was (752) 23.06% males and (2508) 76.94% female. Among of the total female cattle (2508), the milking cow, pregnant and heifers and female calf were 47.89%, 37.24%, 17.58% and 21.45% respectively. The results showed that a total of 98 abortion cases were observed in 1201 milch cows. The prevalence of abortion was 8.16%. The number of death calves was 126 among 1026 born calf. The calf mortality rate was revealed 12.28%. Finally the result found that total calf crop loss appears to be (8.16%+12.28%) 20.44%, which is very alarming in the growth of dairy industry. However, the study concluded that abortion and calf mortality are widely prevalent and distributed among commercial dairy farms in Bangladesh. Further studies need to be carried out by using this demographic data to prove the causes and implementation of preventive measures among the dairy farms to prevent abortion and calf mortality in Bangladesh.

Keywords | Abortion, Calf Mortality, Cattle Population, Dairy Farm, Bangladesh

INTRODUCTION

The dairy industry is one of the major parts of livestock in agricultural economic systems of Bangladesh. Livestock contributes biological products especially meat, milk and milk products to fulfill the daily requirement of protein for human being. Total cattle population 24.39 million, milk and meat production 106.80 and 76.74 lakh metric ton separately. There are deficient approximately 46 lakh metric ton milk productions. The livestock contributes about 1.43 % of the national Gross Domestic Product (Bangladesh Livestock Economy, 2019). Therefore Bangladesh government has paid considerable attention to commercial dairy farms to increase productivity (meat and milk) to meet the local demands (Shamsuddoha and Edwards, 2000).

Abortion, calf mortality which leads to decrease milk productions are becoming the major obstacles hindering the development of dairy industry all over the globe. Abortion is the early or late termination of pregnancy where the expelled fetus unable to survive at any stages of gestation period (Schlafer and Foster, 2016). Abortion is a condition where fetus is delivered live or dead before reaching survivable stage visualized by naked eye (Sarder et al., 2010). The success of any commercial dairy farms mainly depends on the survival rate of calf crop produced by the dairy farms, but most of the dairy farms are confronted with acute problems of calf morbidity & mortality (Wudu et al., 2008; Gitau et al., 2010). Abortions cause significant
Table 1: Prevalence of abortion, calf mortality and total calf crop loss in the year of 2014

| Division   | Milch Cow | Number of abortion | Number & (% of Abortion) | Calf (Male & female) | Number & (%) of calf died |
|------------|-----------|--------------------|--------------------------|----------------------|--------------------------|
|            |           |                    | < 6m | > 6m | Stillbirth | 6m | > 6m | Stillbirth | 6m | > 6m | Stillbirth |
| Chittagong | 276       | 13                 | 7   | 3    | 23(8.33) | 246 | 25(10.16) |
| Sylhet     | 177       | 12                 | 6   | 1    | 19(10.73) | 114 | 17(14.91) |
| Rajshahi   | 163       | 4                  | 3   | 5    | 12(7.36) | 141 | 16(11.34) |
| Rangpur    | 189       | 1                  | 8   | 2    | 11(5.82) | 157 | 20(12.73) |
| Barisal    | 65        | 1                  | 3   | 2    | 6(9.23)  | 76  | 9(11.84)  |
| Khulna     | 131       | 10                 | 4   | 1    | 15(11.45) | 116 | 19(14.50) |
| Dhaka      | 200       | 5                  | 6   | 1    | 12(6.0)  | 176 | 20(11.36) |
| Total      | 1201      | 46                 | 37  | 15   | 98(8.16) | 1026| 126(12.28) |
| Total calf crop loss | 8.16+12.28 = 20.44 (%) |

Table 2: Demographic data for cattle population in commercial dairy farms in the year of 2014

| Division   | No of farm | Male population in farm | Total Cattle | Female population in farm | Milking & pregnant |
|------------|------------|-------------------------|--------------|----------------------------|--------------------|
|            | No of farm | Male | Bull | Total | Sex | Total | Male | Bull | Total | Sex | Total | Male | Bull | Total |
|             |            | calf |      |       |     |       | calf |      |       |     |       | calf |      |       |
| Chattogram  | 10         | 125  | 84   | 209  | 856 |       | 647  | 121  | 181  | 276 | 69    | 173  |     |       |
| Sylhet      | 8          | 58   | 13   | 71   | 327 |       | 256  | 56   | 11   | 177 | 12    | 86   |     |       |
| Rajshahi    | 10         | 63   | 69   | 132  | 472 |       | 340  | 78   | 56   | 163 | 43    | 117  |     |       |
| Rangpur     | 12         | 64   | 9    | 73   | 466 |       | 393  | 93   | 51   | 189 | 60    | 89   |     |       |
| Barisal     | 7          | 27   | 10   | 37   | 232 |       | 195  | 49   | 41   | 65  | 40    | 20   |     |       |
| Khulna      | 15         | 57   | 24   | 81   | 363 |       | 282  | 59   | 47   | 131 | 45    | 48   |     |       |
| Dhaka       | 11         | 94   | 55   | 149  | 544 |       | 395  | 82   | 54   | 200 | 59    | 73   |     |       |
| Total       | 73         | 488  | 264  | 752  | 3260|       | 2508 | 538  | 441  | 1201| 328   | *606 |     |       |
| Ratio (%) of male | 64.9 | 35.1 | 100% | Female% | 100% | 21.45 | 17.58 | 47.89 | 13.08 | *24.16 |
| Male& female ratio (%) in farm | 23.06 | 3260(100) | 76.94 |

*Milking and pregnant: Cows giving milk already counted in the column of milch cow but this column is represents to investigate total number of pregnant cow in commercial dairy farm that was 328 (13.08%)+606(24.16%)=934 (37.24%).* 24.16% pregnant cows remain within the milch cow 47.89%.

economic which can be attributed to loss of replacement of calves, reduced milk production, costs of treatment, feeding of animals and premature culling of productive cows and heifers (Abdelhadi et al., 2015). Calf mortality represents an irrefutable and irrevocable economic loss to the dairy farm due to loss of the present value of the calf and loss of genetic potential for herd improvement, increase treatment cost. However, there is very limited information on rate of abortion, calf mortality and proportion of cattle population in commercial dairy farms of Bangladesh. Therefore, the presented study was carried out, for the first time to estimate the prevalence of abortion, calf mortality as well as total calf crop loss and demographic data on the proportion of cattle population in the commercial dairy farms of Bangladesh reared by the farmers.

MATERIALS AND METHODS

The presented research work was conducted on commercial dairy farms in seven different divisions during 2014. There are 73 commercial dairy farms registered by the Department of Livestock Services (DLS, Bangladesh). A total of 3260 cattle populations have been taken into consideration as the source of population for this epidemiological survey. The study area and number of farms consisted of Chattogram (10), Sylhet (8), Rajshahi (10), Rangpur (12), Barisal (7), Khulna (15) and Dhaka (11) (Figure 1). A structured questionnaire was developed to acquire information regarding farm and cow level by active surveillance. The questionnaire was designed to close and open ended (categorical) questions for easy data processing and improve precision of responses (Thrusfield, 2005). The questionnaire was taken up by repeated questioning to capture intended information from the farm owner, managers and attendants, and farm register or log books etc. Important data includes total population at farm, breed, pregnancy status and age determined from birth records and dentition given by observing the animal.
Data were collected, sorted from preset questionnaire input into Microsoft Excel 2007® spreadsheet and stored separately. The prevalence of abortion, calf mortality, male and female ratio was calculated. The collected data exported to analytical software STATA 11.2® for further descriptive analysis.

Figure 1: Geographical distribution of commercial dairy farms marked as white triangle located in different regions of seven divisions in Bangladesh.

RESULTS

The prevalence of abortion was found (98/1201) 8.16% in commercial dairy farms of Bangladesh. The highest prevalence of abortion was observed in Khulna division was (15/131) 11.45% and the lowest prevalence was found in Rangpur division (11/189) 5.82%. But there is no significant variation among other divisions. The calf mortality rate was revealed (126/1026) 12.28% in commercial dairy farms all over Bangladesh. The highest mortality rate was (17/114) 14.91% in Sylhet and lowest mortality rate was (25/246) 10.16% in Chattogram. Therefore the total calf crop loss in the year 2014 in commercial dairy farms of Bangladesh was (8.16+12.28) 20.44% (Table 1).

The total cattle population of this study was 3260. So that the proportion of males was (752) 23.06% and female was (2508) 76.94%. Among the total female cattle (2508), the milking cow, pregnant, female heifers with calf were 47.89%, 37.24%, 17.58% and 21.45% respectively. (A sum of total 124.16% where 24.16% pregnant as well as milking cows which are already counted as a milch cow but this column represents for showing the results of total pregnant cow in dairy farm of Bangladesh that was 37.24%). The male and female calf ratios were appeared (488/1026) 47.56% and (538/1026) 52.44%. In case of male cattle, the result seemed to be 64.9 % male calf and 35.1% bull (Table 2).

DISCUSSION

The reported prevalence of abortion in present study was found 8.16% in commercial dairy farms in Bangladesh, agreed with the results of Degefa et al. (2011) who reported an 8.7% prevalence of abortion in Ethiopia. Markusfeld-Nir (1997) reported that the abortion rate ranges from 4.2-10.2% in Israeli. However the lower prevalence of abortion has been reported by Khair et al. (2013) 0.20% in Shahjadpur Upazilla in Sirajgonj district of Bangladesh, Haftu and Gashaw (2009) 6.0% in Ethiopia. In contrary with that to a higher prevalence of abortion also recorded 13.3%in Ethiopia by Regassa et al. (2016). Differences within Bangladesh due to previous research work (0.20%) limited to a certain region, but present research work was performing all parts of Bangladesh. But others variations might be different geographical locations, time and management practices of this selected area.

This research also reported the calf mortality rate was 12.28% in commercial dairy farms of Bangladesh, similar observation also reported by Madalena et al. (1996) who showed the calf mortality ranges from 10.1-20.4% in Brazil. The lower calf mortality rate also reported 6.29% in (Muktagacha, Mymensing) Bangladesh by Islam et al. (2015), 9.3% in Ethiopia by Megersa et al. (2009). On the other hand higher prevalence of calf mortality also recorded by 30.7% Ferede et al. (2014), 29-36% in (Sherpur, Bogra) Bangladesh by Islam et al. (2005) and 71.1% Hossain et al. (2013). The calf mortality rate in Bangladesh was 6.29% and 29-36% in previous research, but this research was found 12.28% due to previous work was performed in one farm located in one certain region but present work represents entire Bangladesh. Calf mortality ranges from 15 to 25% at pre-weaning stage is common on many tropical dairy farms. Often it is high as 50% due to very poor calf management but the US identified less than 8% mortality and Australian farmers disclosed only 3% mortality published by Moran (2011).

The large group size can increase the risk for calf mortality, with large groups having several animals above the single digits showing a higher mortality rate announced by Losinger and Heinrichs (1997); Gulliksen et al. (2009).
CONFLICT OF INTEREST

No conflict of interest.

AUTHOR’S CONTRIBUTION

Md Anowar Parvez and Md. Rayhan Faruque implemented the study design and carried out the field and laboratory experimentation. Rokeya Khatun analyzed the sorted data. Finally Md Anowar Parvez drafted and revised the manuscript.

REFERENCES

• Abdelhadi F, Abdelhadi S, Niar A, Benallou B, Meliani S, Smail N, Mahmoud D (2015). Abortions in cattle on the level of Tiaret Area Algeria. Glob. Vet. 14:638-645.

• Bangladesh Livestock Economy (2019). Livestock Economy at a glance 2019-2020. http://www.dls.gov.bd/site/page/22b1143b-9323-44f8-bfd8-647087828c9b/Livestock-Economy.

• Degefa T, Duressa A, Duguma R (2011). Brucellosis and some reproductive problems of indigenous Arsi cattle in selected Arsi zones of Oromia Regional State, Ethiopia. Glob. Vet. 7:45-53.

• Ferede Y, Mazengia H, Bimrew T, Bitew A, Nega M, Kebede A (2014). Pre-weaning morbidity and mortality of crossbred calves in Bahir Dar Zuria and Gozamen districts of Amhara region, Northwest Ethiopia. Open Access Library Journal 1: e600. https://doi.org/10.4236/oalib.1100600

• Gitau GK, Aleri JW, Mbuthia PG, Mulei CM (2010). Causes of calf mortality in peri-urban area of Nairobi, Kenya. Trop. Anim. Health Prod. 2: 1643-7. https://doi.org/10.1007/s11250-010-9614-2

• Gulliksen SM, Lie KI, Løken T, Østerås O (2009). Calf mortality in Norwegian dairy herds. J. Dairy. Sci. 92: 2782–2795. https://doi.org/10.3168/jds.2008-1807

• Haftu B, Gashaw A (2009). Major Reproductive Health Problems of Dairy Cows in and around Bako, West Ethiopia. Ethiopian J. Anim. Prod. 9(1):89-98.

• Hossain MM, Kamal AHM, Rahman AKMA (2013). Retrospective study of calf mortality on Central Cattle Breeding and Dairy Farm (CCBDF) in Bangladesh. Eurasian. J. Vet. Sci. 29: 121-125.

• Islam MN, Rahman AKMA, Nahar MS, Khair A Alam MM (2015). Incidence of calf morbidity and mortality at cag dairy farms of muktagacha upazila mymensingh district. Bangl. J. Vet. Med. 13 (1): 37-43. https://doi.org/10.3329/bjvm.v13i1.23715

• Islam SS, Ahmed AR, Ashraf A, Khanam N, Ahmed MB (2005). Causes and consequences of calf mortality in a dairy farm of Bangladesh, J. Anim. Vet. Adv. 4(2): 260-264

• Khair A, Alam MM, Rahman AKMA, Islam MT, Azim A, Chowdhury EH (2013). Incidence of reproductive and productive diseases of cross breed dairy cattle in Bangladesh. Bangl. J. Vet. Med. 11 (1): 31-36. https://doi.org/10.3329/bjvm.v11i1.17730

• Losinger WC, Heinrichs AJ (1997). Management practices associated with high mortality among pre-weaned dairy heifers. J. Dairy. Res. 64: 1-11. https://doi.org/10.1017/S0022029996001999

ACKNOWLEDGEMENTS

This research was funded by the Bangladesh Academy of Science (Grant no: BAS-USDA-PALS-05). Special appreciation to the Late Professor Dr. M. A. Matin Prodhon (Principal Investigator) and Late Tasharof Hossain(Office Staff), Department of Medicine and Surgery in Chatto- gram Veterinary and Animal Sciences University for their kind cooperation during the research period.
• Madalena FE, Teodoro RL, Lemos AM, Barbosa RT (1996). Comparative performance of six Holstein-Friesian x Guzera crossbred groups in Brazil. 8. Calf mortality. Rev. Brasil Genet. 18:215–220.

• Markusfeld-Nir O (1997). Epidemiology of bovine abortions in Israeli dairy herds. Prev. Vet. Med. 31(3): 245-255. https://doi.org/10.1016/S0167-5877(96)01142-7

• Megersa B, Yacob A, Regassa A, Abuna F, Asmare K, Amenu K (2009). Prevalence and incidence rates of calf morbidity and mortality and associated risk factors in smallholder dairy farms in Hawassa, Southern Ethiopia. Ethiop. Vet. J. 13 (2): 59-68.

• Moran JB (2011). Factors Affecting High Mortality Rates of Dairy Replacement Calves and Heifers in the Tropics and Strategies for Their Reduction. Asian-Aust. J. Anim. Sci. 24(9): 1318 – 1328. https://doi.org/10.5713/ajas.2011.11099

• Peter AT (2000). Abortions in dairy cows: New insights and economic impact. Adv. Dairy Technol. 12:233.

• Regassa T, Ashebir G (2016). Major Factors Influencing the Reproductive Performance of Dairy Farms in Mekelle City, Tigray, Ethiopia. J. Dairy Vet. Anim. Res. 3(4):88. https://doi.org/10.15406/rdvar.2016.03.00088

• Roche JR, Lee JM, Berry DP (2006). Climatic Factors and Secondary Sex Ratio in Dairy Cows. J. Dairy Sci. 89:3221–3227. https://doi.org/10.3168/jds.S0022-0302(06)72597-8

• Sarder MJ, Moni MI, Aktar S (2010). Prevalence of reproductive disorders of cross breed cows in the Rajshahi district of Bangladesh. J. Agric. 8:65–75.

• Schalfer DH, Foster RA (2016). Female genital system. Jubb, Kennedy & Palmer’s Pathology of Domestic Animals: Volume 3: 358–464. https://doi.org/10.1016/B978-0-7020-5319-1.00015-3

• Shamsuddoha AK., Edwards G (2000). Dairy industry in Bangladesh: Problems and prospects. In Proceedings of the AARES 2000 Conference, School of Business, La Trobe University, Sydney, Australia, 23–25 January 2000.

• Thrusfield MV (2005). Criteria for Success of Questionnaire. In: Veterinary Epidemiology. 3rd Ed, Blackwell Science, Oxford, UK, pp: 189-213.

• Wudu T, Kelay B, Mekonnen HM, Tesfu K (2008). Calf morbidity and mortality in smallholder dairy farms in Ada’a Liben district of Oromia, Ethiopia. Trop. Anim. Health Prod. 40: 369–376. https://doi.org/10.1007/s11250-007-9104-3