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Prevalence of diseases and its associated risk factors in crossbred Friesian calves

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Abstract

The aim of this study was to determine the prevalence of diseases and its associated risk factors in crossbred Friesian calves in a dairy farm in Bangladesh. Date of birth, birth weight, age and sex of 194 calves up to three months old, season of disease occurrence, date of illness and the percentage of IgG in colostrum were recorded. The prevalence of calf diseases was 33.5%, of which 30.1% were suffering from medical conditions, 19.6% having enteritis: only 5% had surgical disorders.

Calves up to 21 days old had significantly higher disease prevalence (22.2%) than calves aged 22-90 days (11.3%). The prevalence of diseases was significantly higher (43.1%) in calves with birth weight up to 29 kg than calves with birth weight 30 kg or more (28.7%). The prevalence of diseases was higher in male calves (38.0%) than female (28.7%). The prevalence of diseases was significantly higher (72.4%) in calves consumed colostrum containing 22-24% IgG compared to calves given colostrum containing 28-30% IgG. The prevalence of diseases was significantly higher in rainy season (64.2%) than in summer (29.5%) and in winter (6.1%). (*Bang. vet.* 2023. Vol. 40, No. 1 – 2, 37 – 45)

Introduction

Livestock make substantial contribution to human nutrition (Bary *et al.*, 2018). Dairy cattle play an important role in improvement of livelihoods and economy of the country. Under environmental conditions in Bangladesh, crossbred calves and cows suffer more from diseases than the native zebu cattle.

Rearing healthy dairy calves up to weaning requires maximizing the calves' immunity against disease while minimizing their exposure to infectious agents (Godden, 2008). The morbidity and mortality of calves are a constant problem around the world (Radostits *et al.*, 2007). Risk factors for calf disease include type of housing (Darsema, 2008; Wudu *et al.*, 2008; Beam *et al.*, 2009), the method, timing, and volume of colostrum fed (Svensson *et al.*, 2006), overcrowding and poor hygiene (Darsema, 2008; Wudu *et al.,* 2008; Beam *et al.*, 2009; Quinn *et al.,* 2011), sex of calves (Lance *et al.*, 1992), parity of dam (Mee *et al.*, 2008), season of birth, herd size and dystocia

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(Lombard *et al.*, 2007). In smallholdings, calves are maintained to induce letting down of milk in cows and are usually neglected as they bring no immediate financial return. As a result, the calf is at risk of unhygienic maintenance and malnutrition (Samad *et al.*, 2001).

Calf mortality also causes genetic loss to the dairy industry. Limited studies on calf diseases have been performed in Bangladesh and most were retrospective (Hoque and Samad, 1996; Masuduzzaman *et al.*, 1999). Additionally, some studies on the causes of calf diseases have focused particularly on parasites (Samad *et al.*, 2001), microbes (Hossain *et al.*, 2002). Das and Hashim (1996), and Hashim and Das (1997) studied common surgical conditions in calves. The prevalence of diseases and associated risk factors in crossbred Friesian calves in dairy farms have not been investigated in Bangladesh. The objectives of this study were to determine the prevalence of diseases and associated risk factors in crossbred Friesian calves in a dairy farm.

Materials and Methods

Study area

This study was conducted in a farm located at Sreepur Upazila (sub-district) of Gazipur district of Bangladesh.

Management of calves

Colostrum was fed to calves within an hour of birth. In most cases, the calves were bottle-fed and housed separately. The first vaccination was given at three months of age and deworming were done at three to four months of age. General health of calves was monitored regularly and any observed illness was reported to the veterinary surgeon immediately.

Data collection

The data were collected on calf diseases using questionnaire from the farm register, which were recorded by farm personnel from July, 2022 to June, 2023. Records of 194 calves aged 90 days or more included birth date, birth weight, breed, sex, occurrence of disease, date of illness and the percentage of IgG in the consumed colostrum. The tentative diagnosis of diseases was done by the dairy veterinarians on the basis of clinical signs.

Disease classification

Diseases were classified into medical and surgical.

Age of calves

Calves were divided into 1 to 21 days and 22 to 90 days.

Birth weight of calves

Calves were divided into birth weight of less than 30 Kg and 30 kg or more.

Sex of calves

Calves were divided into male and female.

Determination of quality of colostrum

The IgG in colostrum was measured by Brix refractometer (Code-45-02, Bellingham + Stanley, Xylem, UK) with range 0-30%, and divided into 22 to 24, 25 to 27 and 28 to 30%.

Season of diseases occurrence

The disease onset season was divided into summer (March – May), rainy (June – October) and winter (November – February).

Data analysis

The data were entered into a Microsoft Excel spreadsheet and descriptive statistics were performed. The prevalence of calf disease with respect to different risk factors was expressed as a percentage. The data were analysed by chi-square test using SPSS software version 25. The difference in prevalence of calf diseases was considered significant when the p value was less than 0.05.

Results and Discussion

Prevalence of calf diseases

The mean prevalence of calf disease was 33.5% (n = 194). Lower prevalence of calf morbidity was reported in Southern Ethiopia by Bekele *et al.* (2009), Tekle and Berihe (2017) and Tora *et al.* (2021) (29.3, 30.2 and 30.9%, respectively). Higher prevalence of calf morbidity was reported by Yeshwas (2013) in Northwest Ethiopia (58.4%) and by Wudu *et al.* (2008) in Oromia, Ethiopia (62.0%).

The prevalence of medical diseases (30.1%) and surgical diseases (2.6%) is presented in Table 1. Among medical diseases, prevalence of enteritis was highest (19.6%), followed by fever (3.6%), malnutrition (3.1%), indigestion (1.5%), pneumonia (1.5%), suspected Tuberculosis (1.0%) and alopecia (0.5%). Among surgical disorders, the highest prevalence was myiasis (1.0%), followed by umbilical hernia (0.5%), injury (0.5%) and navel ill (0.5%). Ali *et al.* (2015) reported that enteritis was the most prevalent disease in calves (20.3%) in Bangladesh. Higher prevalence of diarrhoea resulting from enteritis than other diseases in calves was demonstrated by earlier studies in Oromia, Ethiopia (Wudu *et al.,* 2008), Bangladesh (Hasan *et al.,* 2017) and Northern Mexico (Rocha Valdez *et al*., 2019). The prevalence of enteritis in calves was higher in previous reports (25.2 to 40.4%) than present study. The high prevalence of diarrhoea in calves may be caused by sudden change of feed or feeding unsuitable feed.

Table 1: Prevalence of medical and surgical diseases in calves

Disease	No. of calves affected	Prevalence (%)
Medical	60	30.1
Enteritis	38	19.6
Fever	7	3.6
Malnutrition	6	3.1
Indigestion	3	1.5
Pneumonia	3	1.5
Suspected	2	1.0
Alopecia	1	0.5
Surgical	5	2.6
Myiasis	2	1.0
Umbilical hernia	1	0.5
Injury	1	0.5
Navel ill	1	0.5

Total number of calves investigated = 194.

Influence of age of calves on prevalence of diseases/disorders

The calves up to 21 days old suffered from disease at significantly ($P<0.05$) higher rate (22.2%) than those aged 22 - 90 days (11.3%) (Table 2). This finding supports the earlier reports in Southern Ethiopia (Megersa *et al.,* 2009; Hordofa *et al.,* 2021). Similar results on prevalence of calf diseases were reported by Ali *et al.* (2019) in Nile Delta, Egypt and by Abebe *et al.* (2023) in Southern Ethiopia. The prevalence of calf diseases was higher in the first few weeks of age due to delayed colostrum intake, assistance with calving and other factors. Previous and current studies suggest that dairy farmers should give extra attention and provide best possible hygienic health care at early age of calves.

Table 2: Influence of age of calves on prevalence of diseases

Age of calves (days)	No. of calves examined	No. of calves affected	Prevalence of calf diseases (%)
≤ 21	194	43	22.2[a]
22-90	194	22	11.3[b]

[a,b] Values within same column differed significantly from each other ($P<0.05$).

Influence of birth weight of calves on prevalence of diseases

The prevalence of diseases was significantly ($P<0.05$) higher (43.1%) in calves with ≤29 Kg birth weight compared to ≥30 Kg birth weight (28.7%) (Table 3). Similarly, the highest prevalence of calf diseases was observed in calves with low birth weight in

Nile Delta, Egypt (Ali *et al.*, 2019). Contrasting to the present study, higher proportion of Girolando calves derived from *in vitro* fertilization were suffering from diseases when the calves were heavier at birth in Brazil (Weiller *et al.*, 2021). The difference might be due to difference in breeds, calf health management and the origin of embryos.

Table 3: Influence of birth weight of calves on prevalence of diseases

Birth weight of calves (Kg)	No. of calves examined	No. of calves affected	Prevalence of calf diseases (%)
≤29	65	28	43.1[a]
>30	129	37	28.7[b]

[a,b] Values within same column differed significantly from each other (P<0.05).

Influence of sex of calves on prevalence of diseases

The prevalence of diseases was higher in male calves (38.0%) than female (28.7%; P>0.05) (Table 4). Earlier studies showed no significant differences with respect to sex of calves although higher proportion of male calves suffered from diseases in Bangladesh (Ali *et al.,* 2015; Hasan *et al.,* 2017). It is likely that lack of proper management of male calf may result in higher prevalence of diseases. Farmers provide often great attention for female calves because they are replacement stock. Male calves are usually sold at a young age for slaughter or fattening and frequently receive less attention (Abebe *et al.*, 2023). It is suggested that farmers should provide best possible health care for calves of both sexes.

Table 4: Influence of sex of calves on prevalence of diseases
Values did not differ significantly (P>0.05).

Gender	No. of calves examined	No. of calves affected	Prevalence of calf diseases (%)
Male	100	38	38.0
Female	94	27	28.7

Influence of IgG% in colostrum on prevalence of calf diseases

The prevalence of diseases was significantly (P<0.05) higher (72.4%) in calves that consumed colostrum with 22 - 24% IgG compared to calves that consumed colostrum containing 25 - 27% or 28 - 30% IgG where prevalence rates were 35.3 and 22.8%, respectively (Table 5**)**. Calf health and survival may suffer from inadequate colostrum consumption (Waldner and Rosengren, 2009), who reported that the average serum IgG concentration in diseased calves was 26 g/L in Western Canada. Farmers should provide good quality and adequate amount of colostrum to newborn calves within 4-6 hours after birth to ensure enough antibodies from their mothers.

Table 5: Influence of IgG% in colostrum on prevalence of diseases

Ig-G % in colostrum	No. of calves examined	No. of calves affected	Prevalence of calf diseases (%)
22-24	29	21	72.4[a]
25-27	51	18	35.3[b]
28-30	114	26	22.8[b]

[a,b,] Values within same column differed significantly from each other (P<0.05).

Influence of season on prevalence of diseases

The prevalence of diseases was significantly (P<0.01) higher in rainy season (64.2%) than in summer (29.5%) and winter (6.1%) (Table 6). The present finding supports the findings of Haque and Samad (1996) where the prevalence of calf diseases was higher in rainy season (41.3%) than the summer (33.3%) and winter (25.2%). Similar results were obtained earlier in Bangladesh (Ali *et al.*, 2015). Hordofa *et al.* (2021) reported that calves born in the rainy season got sick 1.6 times more often than calves born in the dry season in Southern Ethiopia. On the contrary, Samolovac *et al.* (2019) reported that calves were more susceptible to disease in winter than in other seasons in Serbia. There are seasonal variations in absorption of immunoglobulins in newborn calves, which could be the reason for the variation in the occurrence of diseases throughout the year (Norheim and Simensen, 1985).

Table 6: Influence of season on prevalence of diseases

Season	No. of calves examined	No. of calves affected	Prevalence of calf diseases (%)
Summer	61	18	29.5[b]
Rainy	67	43	64.2[a]
Winter	66	4	6.1[c]

[a,b,c] Values within same column differed significantly from each other (P<0.01).

Conclusions

The prevalence of diseases in crossbred Friesian calves in a farm in Bangladesh was 33.5%, of which 30.1% were suffering from medical conditions, 19.6% having enteritis. The prevalence of diseases in calves was influenced by the age, birth weight, IgG% in consumed colostrum and season. This study will help farmers and practising veterinarians to reduce the calf morbidity and mortality in Bangladesh.

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