



Effect of Season on Incidence of Disease and Performance of Holstein Friesian Crossbred Cattle under Farm Condition of Mizoram

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ABSTRACT

Background: In the field condition, various factors related to productivity and reproduction can hinder the animal's ability to reproduce effectively, potentially leading to a significant reduction in reproductive efficiency or, in rare cases, infertility. Hence, it is vital to provide dairy farmers with education and guidance on specific strategies to address reproductive issues and manage the various diseases affecting dairy animals.

Methods: Data regarding performances of 35 Holstein Friesian × local crossbred cattle reared in cattle unit of Livestock Farm Complex were collected from farm records for a period of 14 years (2010 to 2024). To study the effect of season on incidence of disease and performance, the data was categorized into four seasons based on the climate of Mizoram: Winter (November-January), spring (February-April), summer (May-August), autumn (September-October). The data utilized for this study was extracted from the records documented in the disease and treatment register maintained in the cattle farm. After collecting the necessary data for analyses, editing and compilation was performed as per the parameter. Records of diseases affected the crossbred cattle in the farm during 2010-2024 was tabulated and interpreted accordingly.

Result: The most prevalent diseases during the study period (2010 to 2024) showed varying incidence rates across seasons. Anestrus was most common in winter, with an incidence of 27.80%. In spring, mastitis, dystocia and retained placenta (ROP) each accounted for 8.70 per cent. Mastitis was particularly prominent in summer, with a higher incidence of 37.50%, while in autumn, it accounted for 23.30%. The overall incidence of diseases during winter, spring, summer and autumn seasons were 16.30, 20.70, 36.00 and 27.00 per cent, respectively. In conclusion, highest incidence of diseases in Holstein Friesian crossbred cattle was recorded during summer season (May-August).

Key words: Disease, Holstein friesian, Incidence, Season.

INTRODUCTION

Mizoram, known for its hilly terrain and nearly 80% forest cover, primarily engages in small-scale cattle farming, which is a significant source of both milk and meat (Boro *et al.*, 2021). Livestock rearing profoundly influences the socio-economic and cultural aspects of Mizoram (Talukdar *et al.*, 2022). In recent times, the dairy industry in Mizoram has shown growth due to collaborative efforts by organizations dedicated to dairy development. However as compared to other Indian states dairy products and milk production in Mizoram remains relatively low despite the importance of dairying in mixed farming systems and its economic significance (Lalrinsangpuui and Priscilla, 2016).

Mizoram's climate encompasses a range from moist sub-tropical to moist tropical climates featuring moderately warm summers and mild winters. Winter temperatures typically fluctuate between 11°C and 24°C, while summer temperatures range from 18°C to 29°C. The state experiences consistent monsoons, with heavy rainfall from May to September. Annual precipitation varies between 2160 mm and 3500 mm. Notably, Mizoram's winter season is dry with minimal rainfall (Indian State Forest Report, 2011).

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Various environmental factors, including the herd, year, calving season, age at calving and management practices, significantly influence the performance and health assessment of individual animals and populations (Payne and Wilson, 1999). To optimize conditions in intensive farming systems, meticulous planning and effective management of facilities are essential, supported by a thorough understanding of animal physiology. The timing

of calving emerges as a critical element influencing both productivity and reproductive traits. Elevated temperatures lead to increased respiratory rates, resulting in a noticeable decrease in feed consumption and milk production. It is important to highlight that the calving season significantly affects overall milk output, with cows calving in winter demonstrating the highest milk production for each lactation as compared to those calving during dry summer or wet summer-autumn (Amasaib *et al.*, 2011). The profitability of a dairy farming operation relies on four primary components: Breeding, nutrition, healthcare and management strategies. These factors collectively influence the productivity and reproductive efficiency of dairy animals. In the field, various challenges related to productivity and reproduction can impede the effective breeding, potentially leading to a significant reduction in reproductive efficiency or, in rare cases, infertility. Hence, it is vital to provide dairy farmers with education and guidance on specific strategies to address reproductive problems and various diseases of dairy animals (Tomar *et al.*, 2023).

MATERIALS AND METHODS

The study was conducted at the Livestock Farm Complex, College of Veterinary Sciences and Animal Husbandry, Central Agricultural University, Selesih, Mizoram. Data regarding performances of 35 Holstein Friesian×local crossbred cattle reared in cattle unit of Livestock Farm Complex were collected from farm records for a period of 14 years (2010 to 2024). The animals were provided with standard housing and balanced ration comprising of both green and dry fodder. Sufficient quantities of concentrates, based on their maintenance and production requirements were given to the milch animals. Usual deworming and vaccination schedules were followed for the herds.

To analyze the effect of season on disease incidence and performance, the data was divided into four seasons as classified by the Directorate of Economics and Statistics

Planning and Programme Implementation Department Government of Mizoram (2014) such as: winter (November-January), spring (February-April), summer (May-August), autumn (September-October). The data utilized for this study was extracted from the records documented in the disease and treatment register maintained in the cattle farm of the Livestock Farm Complex. The data collection encompasses a span of 14 years (2010 to 2024). After collecting the necessary data for analyses, editing and compilation was performed as per the parameter. Records of diseases affected the crossbred cattle in the farm during 2010-2024 was tabulated and interpreted accordingly.

Statistical analysis

The collected data were compiled, tabulated and subjected to various appropriate statistical tests as per Snedecor and Cochran (1995) to draw meaningful results and logical conclusion by using percentage, mean, Standard error (SE), ANOVA.

RESULTS AND DISCUSSION

The results regarding effect of season on incidence of disease in HF crossbred cattle reared under farm condition of Mizoram are presented in the Table 1.

As per the present study, the most prevalent diseases during the study period (2010 to 2024) were anestrus (27.80%) in winter; mastitis, dystocia and ROP which consist of 8.70 per cent each in spring; mastitis in summer (37.50%) and autumn (23.30%) season. The overall incidence of diseases during winter, spring, summer and autumn seasons were 16.30, 20.70, 36.00 and 27.00 per cent, respectively (Fig 1).

Inaba *et al.* (1986) reported maximum incidence of ROP in Holstein cows during winter season. Verma *et al.* (1986) conducted a study in dairy cattle during winter, summer and rainy season and found the incidence of dystocia as 1.81, 2.38 and 2.19 per cent; retained foetal

Table 1: Season wise incidence of disease in Holstein Friesian crossbred cattle under farm condition of Mizoram.

Disease	Winter	Spring	Summer	Autumn	Overall
Mastitis	11.10	8.70	37.50	23.30	16.25%
Anoestrus	27.80	7.0	10.0	20.0	13.75%
Silent oestrus	16.7	4.0	7.5	13.3	8.75%
Diarrhoea	5.6	4.3	5.0	13.3	6.88%
Hygroma (swelling hoof)	11.1	4.3	-	-	1.88%
Dystocia	5.6	8.7	5.0	6.7	4.38%
Metritis	5.6	4.3	5.0	6.7	3.75%
ROP (Retention of Placenta)	5.6	8.7	5.0	3.3	3.75%
Pyometra	-	4.3	5.0	3.3	2.50%
Protozoan disease	-	-	5.0	3.3	1.88%
Abortion	-	4.3	5.0	3.3	2.50%
Cystic ovaries	5.6	-	-	3.3	1.25%
Obturator paralysis	5.6	4.3	-	-	1.25%
Parasitic infestation	-	-	2.5	-	0.63%
Overall incidence (%)	16.3	20.7	36.0	27.0	

membrane as 5.13, 6.50, 11.27 per cent; and genital prolapse as 0.50, 1.88 and 1.41 per cent, respectively. Lodhi *et al.* (1999) reported maximum incidence of ROP during summer and minimum during winter. Pande *et al.* (2007) also reported highest incidence of ROP in rainy season (15.42%) in crossbred cows. Higher incidence of mastitis recorded in the present study during summer season (37.5%) was in accordance with the reports of (Khair *et al.*, 2013), who reported the declining tendency of cumulative incidence of mastitis, metritis and abortion in the summer, rainy and winter seasons. Contrary to present results, (Khair *et al.*, 2013) reported highest incidence of anoestrus in rainy (0.34%) followed by summer (0.27%) and winter (0.21%) season. On the other hand, Dawit and Ahmed (2013) mentioned that age, management system, season and hygienic condition did not significantly influence the occurrence of reproductive problems. Sheetal *et al.* (2015) recorded highest ROP incidence during summer (13.97%), followed by spring (10.48%), autumn (11.83%) and winter (9.7%), which were contrary with the results of current findings. The highest prevalence rate of haemoprotozoa in Aizawl district of Mizoram during monsoon (51.29%) as reported by (Ghosh *et al.*, 2020) was in compliance with the present findings. (Badu *et al.*, 2020) recorded the overall incidence rate of 72 per cent mastitis in Mizoram in the summer season which was higher than the outcomes of the present study. Variation in the incidence of different diseases across seasons as reported by other workers and observed in the present study does not reveal a consistent seasonal pattern for each disease. This could be attributed to several factors including the climate and conditions prevalent at different places. However, the higher incidence of diseases during the summer season observed in the present study was in agreement with the findings of most other researchers.

Major diseases affected the dairy cattle during the study period are presented in the Table 1 such as mastitis

(16.25%), anoestrus (13.75%), silent anoestrus (8.75%), diarrhoea (6.88%), dystocia (4.38%), retention of placenta (3.75%), metritis (3.75%), pyometra (2.50%), abortion (2.50%) hygroma (swelling of hoof) (1.88%), obturator paralysis (1.25%), cystic ovaries (1.25%), protozoan disease (1.88%) and parasitic infestation (0.63%).

The incidence of different diseases in crossbred cattle during the study period (2010 to 2024), revealed that mastitis, anoestrus and silent oestrus were the most prevalent conditions affecting these animals (Talukdar and Talukdar, 2017). Concurring with the current findings, several studies have reported high incidence rates of mastitis in dairy cattle. Dawit and Ahmed (2013) found a prevalence of 19.3% in exotic cattle, while (Maheshwari *et al.*, 2016) reported a range of 27.81- 36.43% in crossbred cattle. (Jagadeesh *et al.*, 2016) recorded a 43% in crossbred cattle and 12% in non-descript cattle in Karnataka. Similarly (Badu *et al.*, 2020) observed a high incidence of 72% in dairy cattle in Mizoram and Sinha *et al.* (2021) found a prevalence of 41.1% in Karan Fries and Sahiwal cows. (These high incidence rates are likely attributed to increased exposure of teats to urine and dung, which may heighten the risk of mastitis in these cattle.

Higher incidence of anoestrus cases recorded in the present study might be due to low quality of fodder and stall fed management system (Talukdar *et al.*, 2016a; Boro *et al.*, 2021). Under the stall feeding system, the signs of oestrus in animals may go unnoticed, potentially leading to misinterpretation as case of anoestrus (Talukdar *et al.*, 2016b). Compared to present findings, (Pandey *et al.*, 1994) in Tharparkar and Tharparker crossbred (16.47%) and (Khan *et al.*, 2016) in crossbred dairy cattle (31.79%) recorded higher incidence of anoestrus cases. On the other hand, (Ahmed *et al.*, 1992) reported a lower incidence of anoestrus in Deoni cows and their crossbreds (2.55%), compared to a higher incidence of 5.7% in crossbred dairy cows.

In contrast to the results of present study, higher incidence of diarrhoea was reported by Subhash *et al.* (2012)

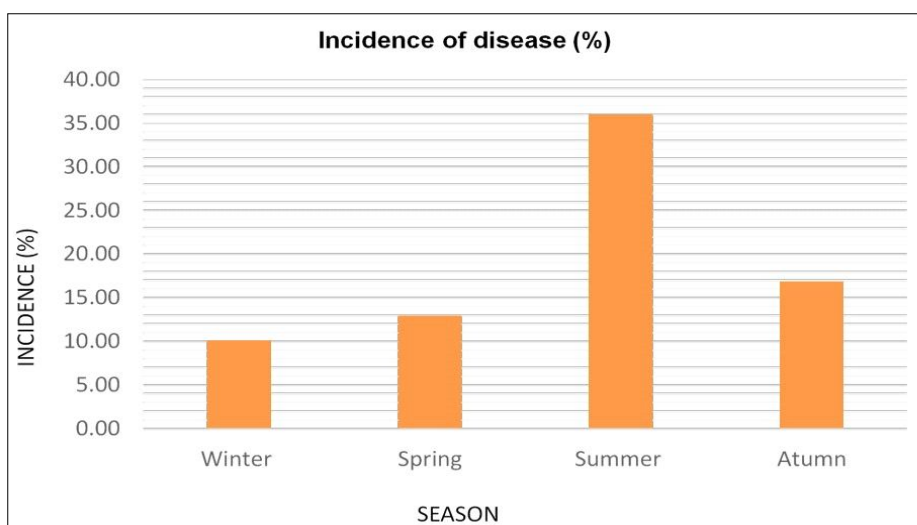


Fig 1: Effect of season on incidence of disease in Holstein Friesian crossbred cattle reared under farm condition of Mizoram.

in cattle (52.51%) and in buffalo (54.37%). Compared to present study, higher incidence of dystocia was reported by Raman and Bawa (1977) in cattle (39.5%), (Kaikini *et al.*, 1983) in Holstein Friesian crossbred (5.35%), (Ahmed *et al.*, 1992) in cattle (5.14%) in Assam, Pandey *et al.* (1994) in Tharparkar and Tharparkar crossbred (0.86%) and (Dawit and Ahmed, 2013) in crossbred cattle (7.7%) and (Khan *et al.*, 2016) in crossbred dairy cattle (5.12%). A lower incidence rate of dystocia, in comparison to present study was reported by (Shukla *et al.*, 1980) in Gir cows and their crosses (1.25%) and (Verma *et al.*, 1986) during winter (1.81%), summer (2.38%) and rainy (2.19%) in dairy herd. Compared to present study, higher incidence rate of ROP (33.9%) was recorded by (Raman and Bawa, 1977), Shukla *et al.* (1980) in Gir cows and their crosses (8.4%), Kaikini *et al.* (1983) in Holstein Friesian crossbred (7.06%), Pandey *et al.* (1994) in Tharparkar and Tharparkar cross (4.78%), Verma *et al.* (1986) during winter (5.13%), summer (6.50%) and rainy season (11.27%) in dairy cattle, Ahmed *et al.* (1992) in Assam cattle (8%), Pande *et al.* (2007) in crossbred cow (15.42%), Dawit and Ahmed (2013) in dairy cow (7.3%), Sheetal *et al.* (2015) in dairy cow during summer (13.97%), autumn (11.83%), spring (10.48) and winter (9.7%) and Khan *et al.* (2016) in crossbred dairy cattle (14.35%). Compared to present study, lower rate (1.9%) of ROP was reported by Singh (2003) in local cattle (3.33 %). Compared to present study, higher rate of abortion was reported Raman and Bawa (1977) in dairy cattle (23.6%), Shukla *et al.* (1980) in Gir cows and their crosses (3.06%), Singh *et al.* (1984) in Sahiwal and Holstein-Friesian crossbred (4.4%), Singh (2003) in crossbred (5.10%), Dawit and Ahmed (2013) in dairy cow (9%), Khan *et al.* (2016) in crossbred dairy cattle (11.25%) and Talukdar *et al.* (2020) recorded 5.11% in crossbred cows. Lower rate of abortion in comparison to the present study was observed by Kaikini *et al.* (1983) in Holstein Friesian crossbred (1.95%), Pandey *et al.* (1994) in Tharparkar and Tharparkar crossbred (2.29%) and Singh (2003) in local cattle (2.22%). Lower rate of metritis compared to present study was observed by Ahmed *et al.* (1992) in cattle (1.4%) of Assam, Pandey *et al.* (1994) in Tharparkar and Tharparkar cross (1.89%) and Singh (2003) in local cattle (2.22 %). Higher rate of metritis than present study was reported by Raman and Bawa (1977) in dairy cattle (29.1%), Kaikini *et al.* (1983) in Holstein Friesian crossbred (13.8%), Singh (2003) in crosses (11.22%) and Boro *et al.* (2021) in dairy cattle (16.66%) in Mizoram. Compared to present study, higher rate of pyometra was reported by Raman and Bawa (1977) in crossbred (14.0%), Khan *et al.* (2016) in crossbred dairy cattle and Boro *et al.* (2021) in dairy cattle (15.00%) in Mizoram. However, Singh (2003) reported lower incidence of pyometra in dairy cattle (1.02%) as compared to present study. Higher rate of cystic ovaries compared to present study was reported by Kaikini *et al.* (1983) in Holstein Friesian crossbred (6.81%) and Boro *et al.* (2021) in dairy cow (10.00%) in Mizoram. In Comparison to present

study, higher rate of protozoan diseases were reported by Panda *et al.* (2011) in crossbred cattle (27%) in Gujrat with a notable higher prevalence during summer than monsoon and winter seasons. Similarly, Kohli *et al.* (2014) recorded a 45.4% incidence in crossbred cattle during the rainy season in Dehradun, while Kumar *et al.* (2016) found a 58.6% incidence in cattle and Ghosh *et al.* (2020) reported higher incidences during monsoon (51.29%) and winter (15.09%) seasons. These findings indicate higher prevalence of protozoan diseases in cattle than those observed in the present study. Incidence rate of silent estrus in the present study was lower than the 20.00% reported by Boro *et al.* (2021) in the cattle of Aizawl district of Mizoram. Higher rate of parasitic disease (GI parasite) compared to present study was reported by Chaudhri *et al.* (2013) in crossbred cows (27.88%) and Kumar *et al.* (2016) in dairy cattle (45.4%). Based on the reports of various studies, it was observed that the incidence of different diseases in crossbred cattle in the preset study was comparatively lower, except for mastitis and anestrus. With improvements in feeding, housing and hygiene, the incidence rate of these diseases could potentially be reduced further.

CONCLUSION

The incidence of diseases most prevalent during the study period (2010 to 2024) varied across seasons. Anestrus had the highest incidence in winter (27.80%); while mastitis, dystocia and ROP each accounted for 8.70 per cent during spring. Mastitis was particularly prevalent in summer (37.50%) and in autumn (23.30%) season. The overall incidence of diseases during winter, spring, summer and autumn seasons were 16.30, 20.70, 36.00 and 27.00 per cent, respectively. In conclusion, the higher incidences of diseases in Holstein Friesian crossbred cattle were observed during summer season (May -August) in Mizoram.

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Disclaimers

The views and conclusions expressed in this article are solely those of the authors and do not necessarily represent the views of their affiliated institutions. The authors are responsible for the accuracy and completeness of the information provided, but do not accept any liability for any direct or indirect losses resulting from the use of this content.

Informed consent

All animal procedures for experiments were approved by the Institution Animal Ethics Committee of College of Veterinary Sciences and Animal Husbandry, Central Agricultural University, Selesih, Aizawl, Mizoram, India.

Conflict of interest

The authors declare that there are no conflicts of interest regarding the publication of this article. No funding or sponsorship influenced the design of the study, data collection, analysis, decision to publish, or preparation of the manuscript.

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