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Health Challenges in Cattle Farming: A Study on Common Cattle Diseases and Disorders in a Selective Cattle Farm of Bangladesh

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Abstract

MANY diseases and disorders at cattle farms hinder the growth of animals. Therefore, this study aimed to determine the occurrence of clinical cases of cattle diseases and disorders in selected farming condition. This study was conducted on 737 cattle including Munshiganj, Pabna, Red Chattogram Cattle (RCC), and Cross Breed at Cattle Research Farm, BLRI in Savar, Dhaka, Bangladesh from January 2021 to December 2023. Based on pertinent clinical history, clinical findings, and suitable laboratory testing, clinical records and diagnoses of diseases and disorders have been determined. Diseases and disorders were categorized according to the following variables: nature of diseases, seasons, breed, sex, year, and age. MS Excel 2018 and SPSS (26.0) were used for statistical analysis. Based on clinical examination, among six categories of diseases and disorders, the prevalence rate of digestive disorders (30.94%) and infectious diseases (30.39%) were higher compared to nutritional and metabolic diseases (17.10%), parasitic diseases (6.92%), surgical affections (9.77%), and reproductive and obstetrical diseases (4.88%) with significant variation ($p<0.05$). In terms of breed, sex, season, age, and year, significant variations ($p<0.05$) were reported, where the disease prevalence rate was higher in RCC (56.04%), female cattle (57.80%), the winter season (41.52%), calves (43.69%), and the year 2021 (50.47 %) compared to other variables respectively. The incidence of major infectious diseases wasn't observed due to maintaining strict farm biosecurity and effective health management practices, including regular deworming and vaccination. Based on these findings, proper actions should be implemented to prevent these commonly occurring diseases and their manifestations in the future.

Keywords: Bangladesh; cattle; diseases; disorders; farm; prevalence.

Introduction

In Bangladesh, livestock is an essential component of the diverse agricultural system that has been practiced for decades after decades. The contribution of this sector to the national GDP (Gross Domestic Product) is about 1.80%, with about 16.33% to agricultural GDP (DLS, 2023-2024). Milk and meat are the primary sources of protein, while a significant amount of the exportation consists of skins, live animals, and carcasses to generate profit [1]. As a result, cattle are essential to Bangladesh's agricultural economy, as they provide food, nutrition, income, savings, and other benefits. At present, there are 24.8 million cattle in this country, and the average milk and meat production is 15.044 million metric tons and 9.225 million metric tons, respectively [2]. In daily life, meat, eggs, and milk are essential for fulfilling the demand for animal-derived foods. Livestock contributes approximately 36% of the total animal protein requirements [3,4]. Livestock has the potential to prevent malnutrition, limit unemployment, empower women, increase the fertility of agricultural land, create a skilled, educated nation, and earn more foreign currency. Bangladesh has a large livestock population and people density.

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Livestock and poultry husbandry involves approximately 70% of the population, with 20% directly and 50% indirectly [2].

Most of the cattle in Bangladesh are native and cross-breed. The native cattle breeds and variants in Bangladesh include the Red Chattogram cow (RCC), Pabna cattle, North Bengal Gray (NBG), Munshiganj (Mirkadim) cattle, Madaripur type, Dinajpur dwarf cattle (DDC), and the majority of non-descriptive native or local types [5]. Nowadays, cattle farming is becoming more popular and many people are highly interested in developing cattle farms. Marginal farmers are also motivated to large-scale cattle farming. However, the output, productivity, profitability, and proficiency of cattle farming are being hindered by a large number of diseases and disorders within the industry. Furthermore, the climate of Bangladesh is hot and humid, which gives rise to infectious diseases and diseases transmitted by vectors. These diseases have a negative impact on animal output and have led to an increase in the cost of veterinary care. [6,7]. As a result, they are facing various kinds of infectious diseases like bacterial as Hemorrhagic Septicemia (HS), Black Quarter (BQ), viral as lumpy skin disease (LSD), foot and mouth disease (FMD), parasitic (Fascialiosis, Babesiosis, Anaplasmosis), reproductive (Repeat Breeding, Retention of Placenta), and metabolic disorders which are exposed frequently among the herd [8]. Animals with nutritional deficiencies, such as those consuming insufficient amounts of macro and micromolecules, exhibit reduced resistance to disease. Furthermore, the reproductive health of the livestock may be negatively impacted by disruptions in metabolic pathways. Multiple diseases and reproductive failures in the cattle herd may be caused by poor hygiene and improper management practices including farm biosecurity and immunization [9,10]. The prevalence of disease in cattle is significantly influenced by breed, sex, season, and environmental factors [11]. Furthermore, Ali et al. [12] recorded that about 10% of annual mortality is because of diseases. Due to the importance of cattle to the national economy and the negative effects of infectious and non-infectious diseases on its productivity and reproductivity, the purpose of this study is to investigate the prevalence and patterns of common cattle diseases and disorders in selected farming condition in Bangladesh and to reduce their risk factors. This study will help the formal authority for controlling cattle diseases and disorders in Bangladesh.

Material and Methods

Study site, animals, and duration

The research was conducted at Cattle Research Farm, Bangladesh Livestock Research Institute (BLRI), Savar, Dhaka, Bangladesh. This farm is located between 23 89' North latitude and 90 28' East longitude and about 30 km northwest of the capital city of Dhaka. The study duration was three years from January 2021 to December 2023. The data were documented accurately in the specific register book on the cattle farm. A total of 737 sick animals were registered. The cattle were classified as calf (up to one year), heifer (>one year to calving), cow (after calving), and bull (<one year). The study animals were categorized by breed into 4 groups: Munshiganj, Pabna, Red Chattogram Cattle (RCC), and crossbred. The clinical cases were recorded when the farm was visited physically following the standard procedures described by Sarker et al. [13]. Three years of data were analyzed based on seasons, breed, age, and sex of the cattle. The year was divided into three seasons namely summer (March to June), rainy (July to October), and winter (November to February) [13,6]. The data on the occurrence of clinical diseases and disorders were categorized into six groups: (1) Digestive disorders, (2) Infectious diseases, (3) Nutritional and Metabolic diseases, (4) Parasitic diseases (5) Reproductive and Obstetrical diseases and (6) Surgical affections. The study's animal handling was conducted following the current Bangladeshi legislation, specifically the Cruelty to Animals Act 1920, Act No. I of 1920 of the Government of the People's Republic of Bangladesh.

Diagnosis of Diseases

The initial clinical signs, clinical history, physical examination, laboratory diagnosis, gross postmortem lesion, and treatment responses were all taken into consideration during the clinical diagnosis of the diseases. For confirmatory diagnosis, feces were taken for identifying parasitic eggs under the microscope and blood for identifying protozoal infection.

Physical and clinical examination

Temperature, consistency of faeces, body condition, and any visible clinical symptoms were assessed in order to maintain records. The presumptive diagnosis was made upon these findings. Moreover, the procedures of palpation, percussion, auscultation, needle piercing, and walking of animals were used to examine various bodily regions and systems in diseased animals. Investigation was done in the umbilical region for any swelling, wounds, or hernial rings. To see lameness and crepitation on palpation the hindquarter and thigh muscles were observed. To check for any swelling, reddening, or soreness, the cows' udders were palpated [14]. Any kinds of vesicles, wounds, or salivation were observed in the mouths or feet of ungulate animals. Rectal palpation was used to assess cows with a history of conception failure following

more than three attempts at insemination. Palpation was also used to detect the ruminal movement. Different joints of the animals were examined to find out any swelling or pain. Using a stethoscope, any abnormal respiratory tract sound was noted. Wounds and surgical incidents like myiasis were observed, and the abscess was confirmed by a needle puncture. Additionally, specific clinical symptoms and gross lesions were used to diagnose specific bacterial, viral, parasitic, and fungal infections [14,15].

Feeding management of animals

Animals were raised in a semi-intensive system and were grazed in the selected land of BLRI from 8 AM to 1 PM except for bulls. The concentrate feeds were given by maintaining the standard feeding chart recommended by the Bangladesh Livestock Research Institute (BLRI).

Vaccination program of the animals

The vaccination against lumpy skin disease (LSD), foot and mouth disease (FMD), anthrax, black quarter (BQ), and hemorrhagic septicemia (HS) was given regularly by following manufacturer instructions.

Deworming of animals

Anthelmintics were given three times a year to all the animals. Calves were dewormed first at the age of 6-8 weeks.

Data analysis

The data that was collected was initially recorded in MS Excel (Microsoft Office Excel 2018, USA) and subsequently uploaded to the Statistical Package for Social Sciences (SPSS) statistics version 26.0 for analysis. The association between the categorical explanatory variable and with outcome was determined by Pearson's Chi-square. The association was considered significant if the p-value < 0.05.

Result

Overall incidence of cattle diseases and disorders

A total of 737 clinical cases were diagnosed and were categorized into digestive disorders, infectious diseases, nutritional and metabolic diseases, parasitic diseases, reproductive and obstetrical diseases, and surgical affections which are presented in Table 1.

The highest prevalence was recorded for digestive disorders (30.94%) and the lowest prevalence was recorded for reproductive and obstetrical diseases (4.88%). This variation among disease categories was statistically significant ($p<0.05$). The prevalence rate of diarrhea was highly significant among all diseases ($p<0.001$) with the phi (φ) coefficient of 0.273.

Incidence of cattle diseases and disorders by breed and sex

The incidence of diseases and disorders among different breeds and sexes of cattle is illustrated in Table 2. Disease prevalence in Red Chattogram cattle (56.04%) was significantly ($p<0.001$) higher compared to Pabna cattle (31.07%), Cross-bred (6.78%), and Munshiganj cattle (6.11%) with the phi (φ) coefficient of 0.234 indicating weak relationship. In case of sex, females were more susceptible to diseases than male cattle ($p<0.05$) with the phi (φ) coefficient of 0.134.

Seasonal incidence of cattle diseases and disorders

A significant variation among seasons ($p<0.001$) was recorded. The prevalence of diseases in the winter season was higher (41.52%) compared to the summer season (37.58%) and the rainy season (18.86%) with the phi (φ) coefficient of 0.223. Season-wise incidences of cattle diseases and disorders are presented in Table 3.

Incidence of cattle diseases and disorders in different age groups

Table 4 shows the incidence of diseases and disorders among four distinct age groups of cattle: bull, calf, cow, and heifer. In this current study, calves (43.69%) are more highly affected by diseases than cows (27.14%), bulls (20.62%), and heifers (8.55%) which is statistically significant ($p<0.001$) with the phi (φ) coefficient of 0.610.

Annual incidence of cattle diseases and disorders

The annual incidence of diseases and disorders affecting cattle from 2021 to 2023 is displayed in Table 5. There is a significant ($p<0.001$) variation in disease occurrence rate with the phi (φ) coefficient of 0.273. The year 2021 (50.47%) is a high disease occurrence year compared to the year 2022 (30.53%) and 2023 (19.00 %).

Discussion

Disease is an important barrier to the enhancement of livestock production, reproduction, and commercialization, whether directly or indirectly. Poor productivity and production are the result of a variety of factors, including diseases of varying origins (bacterial, viral, parasitic, etc.) [1,7]. This current study provided a comprehensive understanding of the present scenario of important cattle diseases and disorders in the selective farming condition in Bangladesh, which will ultimately contribute to illustrating the scenario of animal health conditions in intensive or semi-intensive farming conditions and thus have the positive effect on the mitigation of diseases and favoring the cattle production in the country.

Among six categories of diseases, a significantly higher prevalence was recorded for digestive disorders (30.94%) which was in agreement with Hossain et al. [16] where authors found digestive disorders (32.68%) which also have a significant value. In selective farming, the risk of digestive disorders increases due to factors like high-energy diets that disrupt natural rumen fermentation, leading to issues such as acidosis, bloat, and reduced gut health [9]. On the other hand, other researchers reported digestive diseases at 21.88% and 19.0% [17, 18] which were lower than this study. Furthermore, about 22.80% of diarrhea and 5.16% of bloat cases were recorded in this report which was nearly close to the findings of other studies where the author recorded 25.97% of diarrhea [19] and bloat cases were found in 6.67% [20]. In this investigation, simple indigestion was found at 2.99% whereas Hossain et al. [16] and Badruzzaman et al. [11] recorded 4.81% and 15.99% respectively, which is higher than this study. The prevalence of these diseases may vary across different locations because of some factors such as climatic circumstances, animal-raising methods, and their housing system. These factors have previously been associated with the development of different infectious diseases [21]. Moreover, cattle digestion can be influenced by climatic conditions, such as extreme heat or cold stress, which can alter feed intake, rumen fermentation, and metabolism. Additionally, housing can influence digestion through ventilation, temperature regulation, and sanitation of the housing.

The current investigation found a 30.39% prevalence for infectious diseases whereas Badruzzaman et al. [11] and Pallab et al. [22] reported the prevalence of major infectious diseases at 9.49% and 7.84% which is much lower than this study. This could happen because of breed variability and agroecological location because both studies are conducted in hilly areas. Bovine Ephemeral Fever (BEF) was recorded at 19.67% whereas Sarker et al. [13] and Nahian et al. [20] reported 4.75% and 7.78% BEF. It is much lower than this current study due to some factors such as the farm location near the highway road (capital city), a large sample size, higher animal density, high humidity, and temperature. In addition, it is a vector-borne disease especially tick, which was prevalent in those study areas and supports the theory of Salkeld et al. [23]. Prevalence of LSD was 3.39% in this study whereas Kayesh et al. [24] found 2.19%. In this farm, LSD was detected in 2021 before the use of LSD vaccine. After vaccination, no animals were affected by LSD. Whether in 2022 or 2023 few calves were affected who were non-vaccinated due to their birth after the vaccination program. No prevalence was found for FMD, HS, BQ, and Anthrax which are matched with the report of Munsi et al. [25]. This may be due to routine vaccination, no animal movement, no transportation stress, and hygienic management of the farm.

The prevalence of metabolic and nutritional disorders was 22.25% in the study area. However, Meher et al. [4], Hossain et al. [16], and Lucky et al. [17] reported metabolic and nutritional diseases at 14.3%, 9.94%, and 2.82%, respectively, which is much lower than this study. This could happen due to dissimilarities in feeding and management practices. The metabolic disorder was recorded in cows at 9.50%, in bulls at 5.56%, in calves at 4.75 %, and in heifers at 2.44% in this study. The occurrence of metabolic disorders found in cows (9.50%) comparatively more than in bulls, calves, and heifers which was found similar to Ullah et al. [26].

The present study found a 6.92% incidence of parasitic diseases which was very much lower than Lucky et al. [17] and Pallab et al. [22] where authors reported the prevalence of parasitic diseases 26.58% and 26.79% respectively. This may happen because this study area is a very restricted place and where appropriate anthelmintics were used regularly to reduce parasitic diseases. The prevalence of parasitic diseases was found significantly higher in calves (6.24%) than in bulls (0.41%), cows (0.27%), and heifers (0%). It is possible that calves infected with parasitic infections become more susceptible to other diseases [27]. The ectoparasitic infestation was recorded at 5.56% in cattle reported by Nahian et al. [20] whereas the present study got a lower prevalence of mite and tick infestation (3.39%). This could be due to the lower sample size and poor data recording system. This difference also might be due to the diagnostic test used and the difference in sample size, production systems, and husbandry practices.

In this investigation, authors found a significantly higher prevalence of diseases in calves (43.69%) than in cows (27.14%), bulls (20.62%), and heifers (8.55%) which agreed with the report of [28] who found highest disease prevalence in calves (43.17%) followed by adult (41.70%) and heifer (15.12%). According to sex, females (57.80%) are significantly more susceptible than males (42.20%). This finding was almost similar to the results of [29] and [11] in which authors observed a higher prevalence of disease in females. Immunity may vary based on sex as female physiological and immunological conditions vary from male [30]. However, females remain in the herd for longer periods for reproduction; they may be more susceptible to diseases compared to males [31]. In the case of breed, a higher prevalence (56.04%) was found in RCC compared to Pabna cattle (31.07%), Cross

(6.78), and Munshiganj cattle (6.11%). In case of RCC, a higher prevalence of diseases observed due to higher number of samples were collected from this breed. This is in agreement with many researchers, who observed local breeds are more susceptible than crossbred [16, 25, 32]. This can happen due to variations in sample sizes, genetic diversity, and some nutritional and management factors [33]. In terms of seasons, higher prevalence of diseases was higher in the winter season (41.52%) compared to the summer season (37.58%) and rainy season (20.9%). This observation was similar to the findings of Munsi et al. [25] where authors found increased disease prevalence in the winter season. On the other hand, it was contradictory to the findings of Juli et al. [28] who found an increase in disease prevalence in the summer season compared to the rainy and winter season.

Conclusion

Several diseases and disorders have hampered cattle production and are also major threats to the livestock industry. This current study determined the important scenario of cattle diseases and disorders in a selected farm only. The frequency of important clinical diseases and disorders were observed during the clinical examination of diseased cattle including diarrhea, bloat, BEF, mastitis, myiasis, and retention of placenta. However, the incidence of most infectious diseases was not observed due to effective health management practices on the farm, including regular deworming and vaccination. The highest incidence of diseases and disorders was found in RCC cattle, female cattle, calves, and winter seasons in this conduct period. Routine vaccination, deworming, vector control, strict biosecurity, proper feeding and watering management, and nutritional supplements are necessary to limit these common diseases and disorders at cattle farms in Bangladesh. Moreover, a national epidemiological investigation using highly accurate diagnostic assays is recommended to find out the disease's prevalence in cattle throughout the country. Additionally, in-depth research would be required for the identification and characterization of etiological agents in the larger areas of Bangladesh.

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Declaration of Conflict of Interest

The authors declare that there is no conflict of interest.

Authors Contribution

Enam Ahmed: Conceptualization, collection of samples, laboratory test, data analysis, and interpretation, writing, and revising the manuscript; Md. Abu Yousuf: Laboratory test, critical review, supervision; Hemayet Rahman: Data recording, result drafting, critical review; Shamim Ahmed: Supervision, review, and editing. Supriya Ahmed: Data analysis, writing, and revising the manuscript; Rumana Khatun: data analysis, and interpretation, critical review; Md. Habibur Rahman: laboratory test, data analysis, and interpretation, writing the manuscript, and revising the manuscript. All authors have read, reviewed, and approved the final manuscript.

Ethical statement

The experimental procedures and the accession of the study were carried out according to the principles of the Ethics Committee of Bangladesh Livestock Research Institute (BLRI), Savar, Dhaka-1341. Local laws and regulations were also followed.

TABLE 1. Overall prevalence of cattle diseases and disorders

Disease Category	Name of diseases and Disorders	Number of identified cases	Prevalence (%)	Prevalence (%) by Category
Digestive disorders	Diarrhea	168	22.80***	30.94 (228)[§]***
	Simple Indigestion	22	2.99	
	Bloat	38	5.16	
Infectious diseases	Bovine Ephemeral Fever	145	19.67	30.39 (224) ***
	Mastitis	27	3.66	
	LSD	25	3.39	
	Arthritis	21	2.85	
	Aspiration Pneumonia	6	0.81	
	FMD	0	0	
	HS	0	0	
	BQ	0	0	
	Anthrax	0	0	
Nutritional and Metabolic diseases	Milk Fever	6	0.81	17.10 (126)
	Malnutrition	71	9.63	
	Lameness	32	4.34	
	Poisoning	17	2.31	
Parasitic diseases	Coccidiosis	26	3.53	6.92 (51)
	Mite and Mange Infestation	25	3.39	
Reproductive and Obstetrical diseases	Retention of Placenta	24	3.26	4.88 (36)
	Pyometra	7	0.95	
	Orchitis	5	0.68	
Surgical affections	Myiasis	27	3.66	9.77 (72)
	Wound	20	2.71	
	Abscess	18	2.44	
	Uterine prolapse	5	0.68	
	Naval ill	2	0.27	
Total		737	100	100 (737)

§Values in the parenthesis indicate the number of identified cases in each category; *** Significant at p<0.001 by Chi-square test.

TABLE 2. Incidence of cattle diseases and disorders based on Breed and Sex

Disease Category (n=737)	Breed				Sex	
	Munshiganj	**Pabna**	**Cross**	**RCC**	**Female**	**Male**
Digestive Disorders (228)[§]	2.17 (16) [§]	5.83 (43)	1.63 (12)	21.3 (157)	17.1 (126)	13.84 (91)
Infectious Diseases (224)	1.63 (12)	11.13 (82)	2.17 (16)	15.47 (114)	17.23 (127)	13.16 (97)
Nutritional and Metabolic Diseases (126)	0.81 (6)	7.46 (55)	1.08 (8)	7.73 (57)	10.18 (75)	6.92 (51)
Parasitic Diseases (51)	0.41 (3)	2.44 (18)	0.54 (4)	3.53 (26)	3.80 (28)	3.12 (23)
Reproductive and Obstetrical Diseases (36)	0.27 (2)	1.08 (8)	0.13 (1)	3.39 (25)	4.21 (31)	0.68 (5)
Surgical affections (72)	0.81 (6)	3.12 (23)	1.22 (9)	4.61 (34)	5.29 (39)	4.48 (33)
Total	6.11 (45)	31.07 (229)	6.78 (50)	56.04 (413)***	57.80 (426)*	42.20 (311)

§ Values in the parenthesis indicate the number of identified cases and values outside the parenthesis indicate percent prevalence in each category; ***Significant at p<0.001 by Chi-square test; *Significant at p<0.05 by Chi-square test

TABLE 3. Seasonal incidence of cattle diseases and disorders

Disease Category (n=737)	Rainy		Summer		Winter	
	Number of cases	Prevalence	Number of cases	Prevalence	Number of cases	Prevalence
Digestive Disorders (228) §	41	5.56	83	11.26	104	14.11
Infectious Diseases (224)	37	5.02	80	10.85	107	14.52
Nutritional and Metabolic Diseases (126)	25	3.39	57	7.73	44	5.97
Parasitic Diseases (51)	23	3.12	20	2.71	8	1.08
Reproductive and Obstetrical Diseases (36)	9	1.22	9	1.22	18	2.44
Surgical affections (72)	19	2.58	28	3.80	25	3.39
Total	154	20.90	277	37.58	306	41.52***

***Significant at p<0.001 by Chi-square test.

TABLE 4. Incidence of cattle diseases and disorders in different age groups

Disease Category (n=737)	Age			
	Bull (<1year)	Calf (up to 1 year)	Cow (After calving)	Heifer (>1 year to calving)
Digestive Disorders (228) §	2.58 (19) §	23.07 (170)	4.48 (33)	0.81 (6)
Infectious Diseases (224)	9.36 (69)	7.73 (57)	8.00 (59)	5.29 (39)
Nutritional and Metabolic Diseases (126)	4.61 (34)	4.21 (31)	6.38 (47)	1.90 (14)
Parasitic Diseases (51)	0.41 (3)	6.24 (46)	0.27 (2)	0.00 (0)
Reproductive and Obstetrical Diseases (36)	0.68 (5)	0.00 (0)	3.93 (29)	0.27 (2)
Surgical affections (72)	2.98 (22)	2.44 (18)	4.07 (30)	0.27 (2)
Total	20.62 (152)	43.69 (322)***	27.14 (200)	8.55 (63)

§ Values in the parenthesis indicate the number of identified cases and values outside the parenthesis indicate percent prevalence in each category; * Significant at p<0.001 by Chi-square test.

TABLE 5. Annual incidence of cattle diseases and disorders

Disease Category (n=737)	Year		
	2021	2022	2023
Digestive Disorders (228) §	21 (155) §	5.7 (42)	4.21 (31)
Infectious Diseases (224)	12.75 (94)	9.63 (71)	8.00 (59)
Nutritional and Metabolic Diseases (126)	7.06 (52)	6.92 (51)	3.12 (23)
Parasitic Diseases (51)	3.12 (23)	2.44 (18)	1.36 (10)
Reproductive and Obstetrical Diseases (36)	2.71 (20)	1.22 (9)	0.95 (7)
Surgical affections (72)	3.80 (28)	4.61 (34)	1.36 (10)
Total	50.47 (372)***	30.53 (225)	19.00 (140)

§ Values in the parenthesis indicate the number of identified cases and values outside the parenthesis indicate percent prevalence in each category; ***Significant at p<0.001 by Chi-square test.

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