

Epidemiology of Bovine Diseases in Tangail District of Bangladesh

S.H.M. FARUK SIDDIKI^{1*}, MD. GOLAM MORSHED², MD ROBIUL KARIM¹, LUTFUN NAHER¹, MD. SODRUL ISLAM³

¹Department of Medicine, Faculty of Veterinary Medicine and Animal Science, Bangabandhu Sheikh Mujibur Rahman Agricultural University, Gazipur 1706, Bangladesh; ²Upazila Livestock Office, Mirzapur, Tangail, Bangladesh;

³Department of Physiology and Pharmacology, Faculty of Veterinary Medicine and Animal Science, Bangabandhu Sheikh Mujibur Rahman Agricultural University, Gazipur 1706, Bangladesh.

Abstract | Cattle are a significant component of livestock that provides food, draft power, transportation, hides, bones, and biogas. However, they are affected by various diseases that can lead to economic losses for the farmers. This study was conducted to determine the clinical prevalence of diseases in cattle attended at the Upazilla (sub-district) Veterinary Hospital, Mirzapur, in the Tangail district during the period between January 2017 and December 2018. A total of 22,418 clinical cases of cattle were diagnosed using general, physical, clinical, and microscopic examinations, as well as other conventional laboratory procedures. The recorded clinical cases were classified into ten major diagnostic groups. Parasitic diseases (30.16%), infectious diseases (21.84%), general systemic states (20.12%), digestive disorders (18.55%), gynecobstetrical diseases (4.37%), and surgical cases (3.06%) were recorded as major clinical problems, with other diseases having a prevalence of less than 1% for each. Among the ten categories, the prevalence of parasitic diseases, infectious diseases, general systemic states, and digestive disorders was significantly ($P < 0.001$) higher. The diseases were significantly ($P < 0.001$) associated with cattle age, sex and season. Clinical prevalence of the diseases was significantly ($P < 0.05$) higher in adults (63.59%) and males (51.78%) than in young (36.40%) and females (48.22%). The summer season (40.13%) had a significantly higher prevalence of clinical diseases ($P < 0.05$) than the winter (33.29%) and rainy (26.58%) seasons. According to this study, a number of cattle diseases with varying percentages and factors occurred in Mirzapur Upazila. The findings may be useful in developing control strategies for the major diseases reported in this study. Appropriate strategic measures should be taken to control the diseases in the study area to minimize the farmers' production losses.

Keywords | Cattle, Clinical diseases, Mirzapur Upazila, Bangladesh, Epidemiology

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***Correspondence** | S.H.M. Faruk Siddiki, Department of Medicine, Faculty of Veterinary Medicine and Animal Science, Bangabandhu Sheikh Mujibur Rahman Agricultural University, Gazipur 1706, Bangladesh; **Email:** faruk@bsmrau.edu.bd

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INTRODUCTION

Bangladesh is an agricultural country, with livestock being the country's second most valuable resource after sub-sector agriculture. Livestock plays a vital role in maintaining the viability of the rural economy. There

are about 24.7 million cattle, 1.51 million buffalo, 26.77 million goats, 3.75 million sheep, 311.8 million chickens and 63.85 million ducks in Bangladesh (DLS, 2022). Livestock production in Bangladesh is expanding on a daily basis, which has a significant impact on people's livelihoods and health (Uddin et al., 2011). The livestock sub-sector

contributes 16.52% to agricultural gross domestic product (GDP) and 1.90% to the national economy (DLS, 2022). Cattle are an important component of livestock, providing food, draft power, transportation, hides, bones, and biogas. The majority of them are raised in rural areas under the traditional smallholder management system. There are a variety of problems in the livestock sector of Bangladesh, including a lack of grazing areas, technical experts, vaccine availability, epidemiologic studies, a shortage of government workers at the field level, and various diseases of animals. The management practices of animals and the geo-climatic conditions of Bangladesh are favourable for the occurrence of various diseases. Diseases are one of the most important limiting factors in the development of cattle, not only degrading productivity but also causing mortality (Mostari et al., 2020). It has been estimated that about 10% animals die each year due to diseases (Ali et al., 2011). Diseases also cause malnutrition and fertility problems. For an economical livestock management program to be attempted, it is critical to understand the incidence, prevalence, distribution, and determinants or risk factors of diseases in a region. Veterinary hospitals are the ideal and reliable source of information about animal diseases and their solutions. People from the neighbouring areas bring their sick animals to the veterinary hospitals every day. Analysis of the case records from veterinary hospitals gives a comprehensive idea about the disease problems in the local areas. Information on the pattern of occurrence of clinical diseases is required for effective veterinary care, an efficient disease management program, and animal production.

Clinical case records with diverse infection levels have been reported from different regions of Bangladesh (Ali et al., 2011; Kabir et al., 2011; Pallab et al., 2012; Rahman et al., 2012, 2017, 2020; Sarker et al., 2013; Parvez et al., 2014; Karim et al., 2014; Sarker et al., 2015; Siddiki et al., 2015; Badruzzaman et al., 2015; Islam et al., 2015a, b, 2019; Juli et al., 2015; Hossain et al., 2016; Lucky et al., 2016; Khan et al., 2017; Mohammed et al., 2017; Talukder et al., 2018; Alam et al., 2018; Sen et al., 2018; Mostari et al., 2020; Meher et al., 2021; Biswas et al., 2021; Majumder et al., 2022). However, such data is scarce in Bangladesh's Tangail area. Therefore, the present study was undertaken to determine the clinical prevalence of diseases and disorders in cattle of different ages, sexes, and seasons that were attended at the Upazila (sub-district) Veterinary Hospital, Mirzapur in Tangail district.

MATERIALS AND METHODS

ETHICAL APPROVAL

This study received ethical approval from the Animal Research Ethics Committee, Bangabandhu Sheikh

Mujibur Rahman Agricultural University, Gazipur, Bangladesh (FVMAS/AREC/2023/01).

STUDY AREA AND PERIOD

This study was conducted at the Upazila (sub-district) Veterinary Hospital (Livestock Office) in Mirzapur, Tangail district, Bangladesh (Figure 1). This Upazila covers 373.89 square km and is located between 24°01' and 24°13' north latitudes and in between 89°58' and 90°15' east longitudes. It is bounded on the north by Sakhipur and Basail Upazilas, on the south by Kaliakair and Dhamrai Upazilas, on the east by Kaliakair Upazila, and on the west by Delduar and Nagarpur Upazilas. Bangshi, Futjani, and Turag are some of the water bodies in the area. A total of 22,418 clinical cases of cattle of different ages and sexes were diagnosed to determine the prevalence of clinical diseases and disorders during the period between January 2017 and December 2018. The study period was divided into three seasons depending on local climatic conditions: the summer season (March to June), the rainy season (July to October), and the winter season (November to February). Cattle were categorized into two age groups, such as young (≤ 2.5 years) and adult (> 2.5 years) (Kabir et al., 2011).

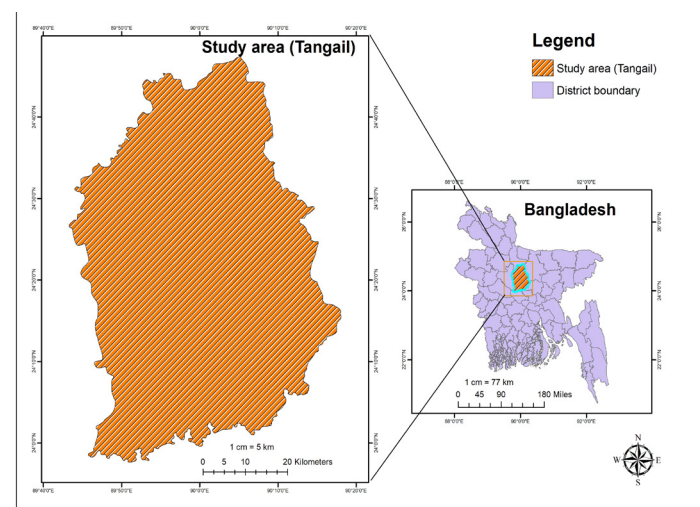


Figure 1: Study area map (Tangail district of Bangladesh).

DIAGNOSIS OF DISEASES

The diagnosis of diseases was made by general physical examination of animals, clinical signs, gross pathology, and simple laboratory procedures. The general physical examination was performed by observing the animal's physical condition, behaviour, posture, gait, locomotive disturbance, temperature, pulse, respiration, abdominal distension, defecation, etc. Palpation, percussion, auscultation, needle puncture, and walking the animals were used to examine various parts and systems of the body of sick animals. While performing a general physical examination on a sick animal, the owner's complaints were taken into account. Animal's breed, sex, age, etc. were

also recorded in the registration book. Specific bacterial, viral, and fungal diseases were diagnosed based on specific clinical signs and gross lesions (Khan, 2000). As previously described, parasitic infestations were detected by examining faeces under a microscope (Karim et al., 2019). To confirm hemoprotozoan infestation, blood smears were prepared and examined under the microscope following Giemsa staining using the methods described elsewhere (Hendrix and Robinson, 2016).

STATISTICAL ANALYSIS

For statistical analysis, the diagnosed diseases were classified as (i) parasitic diseases, (ii) infectious diseases, (iii) digestive disorders, (iv) general systemic states, (v) metabolic diseases, (vi) respiratory disorders, (vii) sensory organ diseases, (viii) dermatological cases, (ix) gynaeco-obstetrical cases, and (x) surgical cases. The data were analyzed using SPSS software (SPSS version 29; IBM Corporation, Armonk, New York, United States of America), and descriptive statistics were expressed as a proportion with a 95% confidence interval (CI). A chi-square test was performed to analyze the association between age, sex, season, and disease categories. P values of < 0.05 were used to determine significance (Mohammed et al., 2017).

RESULTS

OVERALL PREVALENCE

Among the cases recorded in this study, 92.56% were medicinal, 4.37% were gynec-obstetrical, and 3.07% were surgical cases (Figure 2). Parasitic diseases had the highest prevalence (30.16%, 95% CI 29.56-30.76), followed by infectious diseases (21.84%, 95% CI 21.29-22.38), general systemic states (20.12%, 95% CI 19.6-20.65), digestive disorders (diarrhoea, anorexia, ruminal acidosis, simple indigestion) (18.55%, 95% CI 18.04-19.06), gynec-obstetrical diseases (4.37%, 95% CI 4.10-4.64), surgical cases (3.06%, 95% CI 2.84-3.29), metabolic diseases (0.80%, 95% CI 0.68-0.91), respiratory disorders (0.64%, 95% CI 0.53-0.74), and sensory organ diseases (0.43%, (95% CI 0.35-0.52). The lowest prevalence was recorded for dermatological cases (0.02%, 95% CI 0.003-0.04). Among the ten categories, parasitic diseases (30.16%), infectious diseases (21.84%), general systemic states (20.12%), and digestive disorders (18.55%) were significantly ($P < 0.001$) more prevalent (Table 1).

DISEASE-WISE PREVALENCE

Endoparasitic diseases were the most common (24.61%) among parasitic diseases, followed by protozoan diseases (4.16%), ectoparasitic diseases (1.40%), and anaplasmosis (0.004%) (Table 1). Foot and mouth disease (FMD) (16.13%), foot rot (2.64%), mastitis (2.23%), black quarter

(BQ) (0.41%), scouring (0.40%), warts (0.03%), and hemorrhagic septicemia (0.004%) were diagnosed in cattle under the major infectious diseases (21.84%) category. Acidosis had the highest prevalence (11.18%) and fever had the lowest (8.94%) of the general systemic states (20.12%). Milk fever (0.66%) and ketosis (0.14%) were diagnosed in cattle under the metabolic disease category. Anestrus was reported to have the highest prevalence (2.16%) among the gynec-obstetrical diseases (4.37%), followed by repeat breeding (1.03%), retention of the placenta (0.84%), udder oedema (0.29%), uterine prolapse (0.03%), and posthitis (0.01%). Surgical cases included navel-ill (1.64%), myiasis (0.65%), abscess (0.58%), hernia (0.16%), laminitis (0.03%), and atresia ani (0.01%) (Table 1).

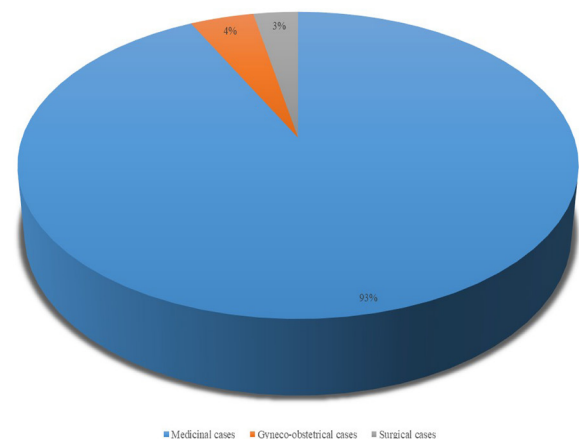


Figure 2: Proportion of three major types of clinical cases in cattle.

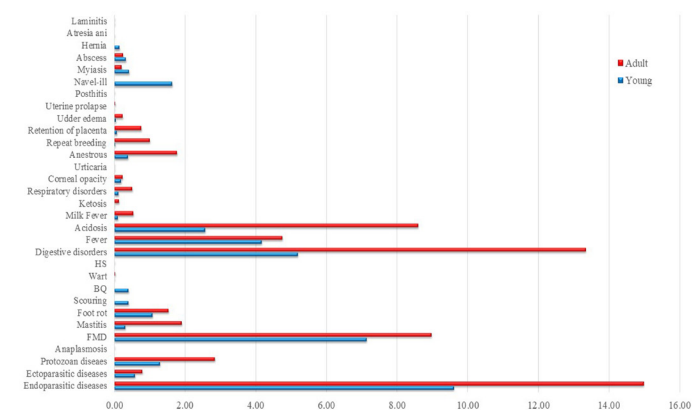


Figure 3: Prevalence of diseases and disorders in cattle according to age.

AGE, SEX AND SEASON-WISE DISTRIBUTION OF CLINICAL CASES

The diseases were significantly ($P < 0.001$) associated with age ($\chi^2 = 1212.29$), and sex ($\chi^2 = 1659.58$) of cattle and seasons ($\chi^2 = 475.01$) (Tables 2-4). According to age, the prevalence of parasitic diseases (18.65%), infectious diseases (12.47%), digestive disorders (13.35%), general systemic states (13.36%), metabolic diseases (0.68%), respiratory disorders (0.52%), and gynec-obstetrical

diseases (3.83%) were significantly ($P < 0.05$) higher in adult cattle than young calves, whereas surgical cases (2.57%) were significantly ($P < 0.05$) higher in young calves than adults. Overall, adult cattle (63.60%) were more susceptible to diseases than young cattle (36.40%) ($P < 0.05$) (Table 2, Figure 3). According to sex, the prevalence of parasitic diseases (15.22%), infectious diseases (11.30%), metabolic diseases (0.80%) and gyneco-obstetrical diseases (4.36%) were significantly ($P < 0.05$) higher in female cattle than male cattle, whereas the prevalence of digestive disorders (11.83%) and general systemic states (12.21%) were significantly ($P < 0.05$) higher in male cattle than female cattle. Overall, male (51.78%) are more susceptible to

diseases than female cattle (48.22%) ($P < 0.05$) (Table 3, Figure 4). According to season, the prevalence of parasitic diseases (11.75%), infectious diseases (8.70%), digestive disorders (8.41%) and general systemic states (8.42%) were significantly ($P < 0.05$) higher in the summer than in other seasons, whereas gyneco-obstetrical diseases (1.91%), metabolic diseases (0.49%), corneal opacity (0.23%) and dermatological cases (0.02%) were significantly ($P < 0.05$) higher in the winter season than other seasons. Overall, the diseases were more prevalent ($P < 0.05$) in the summer (40.13%) than in the winter (33.29%) and the rainy (26.58%) seasons (Table 4, Figures 5-6).

Table 1: Prevalence of diseases and disorders in cattle during the period from 2017 to 2018 recorded at Upazila Veterinary Hospital, Mirzapur, Tangail (N=22,418).

Disease category	Name of disease	No. of cases	Prevalence (%) (95% CIs)	Prevalence (%) by category (95% CIs)	Total
Parasitic diseases	Endoparasitic diseases	5516	24.61(24.04-25.17)	30.16(29.56-30.76)**	6762
	Ectoparasitic diseases	313	1.40(1.24-1.55)		
	Protozoan diseases	932	4.16(3.9-4.42)		
	Anaplasmosis	1	0.004(-0.004-0.01)		
Infectious diseases	FMD	3615	16.13(15.64-16.61)	21.84(21.29-22.38)**	4895
	Mastitis	500	2.23(2.04-2.42)		
	Foot rot	591	2.64(2.43-2.85)		
	Scouring	90	0.40(0.32-0.48)		
	Black quarter (BQ)	91	0.41(0.32-0.49)		
	Wart	7	0.03(0.01-0.05)		
	Hemorrhagic septicemia (HS)	1	0.004(-0.004-0.01)		
Digestive disorders		4159	18.55(18.04-19.06)	18.55(18.04-19.06)**	4159
General systemic states	Acidosis	2507	11.18(10.77-11.6)	20.12(19.6-20.65)**	4511
	Fever	2004	8.94(8.57-9.31)		
Metabolic diseases	Milk Fever	148	0.66(0.55-0.77)	0.80(0.68-0.91)	179
	Ketosis	31	0.14(0.09-0.19)		
Respiratory disorders		143	0.64(0.53-0.74)	0.64(0.53-0.74)	143
Sensory organ diseases	Corneal opacity	97	0.43(0.35-0.52)	0.43(0.35-0.52)	97
Dermatological cases	Urticaria	5	0.02(0.003-0.04)	0.02(0.003-0.04)	5
Gyneco-obstetrical cases	Anestrous	485	2.16(1.97-2.35)	4.37(4.10-4.64)	980
	Repeat breeding	231	1.03(0.9-1.16)		
	Retention of placenta	189	0.84(0.72-0.96)		
	Udder edema	66	0.29(0.22-0.37)		
	Uterine prolapse	7	0.03(0.01-0.05)		
	Posthitis	2	0.01(-0.003-0.02)		
Surgical cases	Navel-ill	367	1.64(1.47-1.8)	3.06(2.84-3.29)	687
	Myiasis	145	0.65(0.54-0.75)		
	Abscess	131	0.58(0.48-0.68)		
	Hernia	35	0.16(0.10-0.21)		
	Atresia ani	3	0.01(-0.002-0.03)		
	Laminitis	6	0.03(0.01-0.05)		
Overall		22,418	100	100	22,418

** Indicates ($P < 0.001$) significant difference between the diseases of cattle.

Table 2: Prevalence of diseases and disorders in cattle according to age (N=22,418).

Disease category	Age**			
	Young ≤ 2.5 Years	Prevalence (%) (95% CIs)	Adult >2.5 Years	Prevalence (%) (95% CIs)
Parasitic diseases	2581	11.51(11.1-11.93)	4181	18.65(18.14-19.16)
Infectious diseases	2099	9.36(8.98-9.74)	2796	12.47(12.04-12.9)
Digestive disorders	1167	5.21(4.91-5.5)	2992	13.35(12.90-13.79)
General systemic states	1516	6.76(6.43-7.09)	2995	13.36(12.91-13.81)
Metabolic diseases	26	0.12(0.07-0.16)	153	0.68(0.57-0.79)
Respiratory disorders	27	0.12(0.08-0.17)	116	0.52(0.42-0.61)
Sensory organ diseases	44	0.20(0.14-0.25)	53	0.24(0.17-0.3)
Dermatological cases	2	0.01(-0.003-0.02)	3	0.01(-0.002-0.03)
Gyneco-obstetrical cases	122	0.54(0.45-0.64)	858	3.83(3.58-4.08)
Surgical cases	577	2.57(2.37-2.78)	110	0.49(0.4-0.58)
Total	8161	36.40(35.77-37.03)	14257	63.60(62.96-64.22)*

*Significantly ($P<0.05$) higher in adults; ** Indicates highly ($P<0.001$) significant relationship between the diseases and ages of cattle.

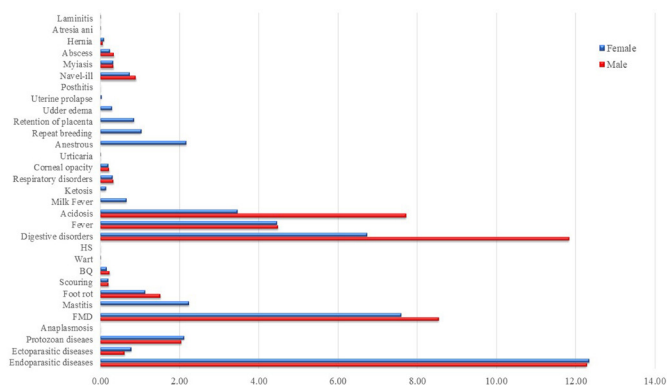


Figure 4: Prevalence of diseases and disorders in cattle according to sex.

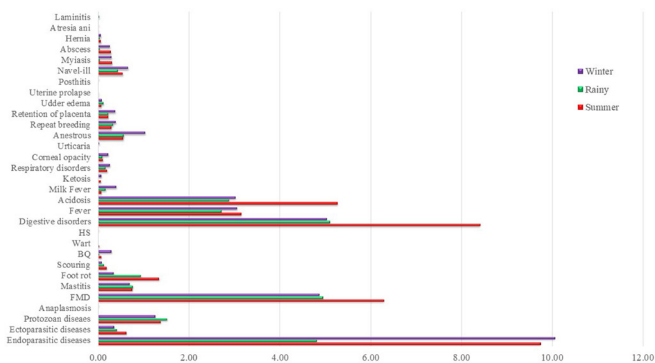


Figure 5: Prevalence of diseases and disorders in cattle according to season.

DISCUSSION

This study highlights the disease burden and their associated factors in cattle attended at the Upazilla Veterinary Hospital, Mirzapur, Tangail. There were 92.56% medicinal cases, 4.37% gyneco-obstetrical cases, and 3.07% surgical cases among cattle. This observation supports the earlier reports of Samad (2001), Rahman et al. (2012), Karim et al. (2014), and Majumder et al. (2022). This study found that

the prevalence of parasitic diseases (30.16%), infectious diseases (21.84%), general systemic states (20.12%) and digestive disorders (18.55%) were significantly higher ($P<0.001$) among the ten disease categories, which is consistent with the findings of Alam et al. (2018), Talukder et al. (2018), Mostari et al. (2020), Biswas et al. (2021), Meher et al. (2021) and Majumdar et al. (2022).

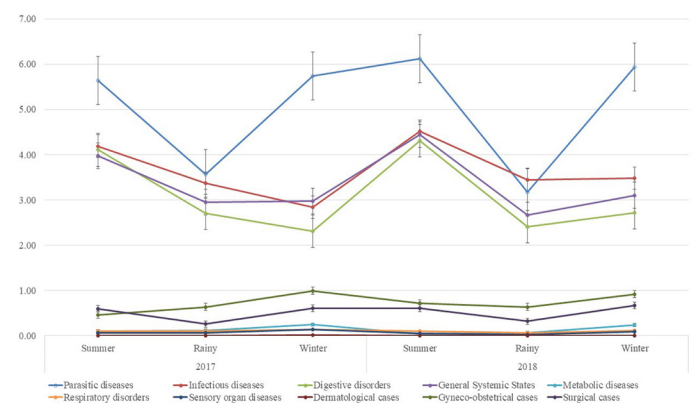


Figure 6: Year and season-wise prevalence of clinical cases of cattle during 2017-2018.

This study found 30.16% of cattle with parasitic diseases, which is comparable to earlier studies that found 30.64%-33.86% of cattle with parasitic diseases (Badruzzaman et al., 2015; Juli et al., 2015; Sarker et al., 2015; Meher et al., 2021). However, Mostari et al. (2020) reported a lower (8.91%) and Rahman et al. (2012) reported a higher (50.40%) prevalence of parasitic diseases in cattle. Endoparasitic diseases were the most common (24.61%), followed by protozoan diseases (4.16%), ectoparasitic diseases (1.40%), and anaplasmosis (0.004%). A higher prevalence of endoparasitic diseases (20.37-32.2%) was also found by Rahman et al. (2012), Juli et al. (2015), and Hossain et al. (2016). Mohammed et al. (2017), on the other hand, reported 22.49% ectoparasitic diseases in cattle.

Table 3: Prevalence of diseases and disorders in cattle according to sex (N=22,418).

Disease category	Sex**			
	Male	Prevalence (%) (95% CIs)	Female	Prevalence (%) (95% CIs)
Parasitic diseases	3349	14.94(14.47-15.41)	3413	15.22(14.75-15.69)
Infectious diseases	2361	10.53(10.13-10.93)	2534	11.30(10.89-11.72)
Digestive disorders	2651	11.83(11.40-12.25)	1508	6.73(6.4-7.05)
General systemic states	2738	12.21(11.78-12.64)	1773	7.91(7.56-8.26)
Metabolic diseases	0	0(0-0)	179	0.80(0.68-0.91)
Respiratory disorders	75	0.33(0.26-0.41)	68	0.30(0.23-0.38)
Sensory organ diseases	52	0.23(0.17-0.29)	45	0.20(0.14-0.26)
Dermatological cases	3	0.01(-0.002-0.03)	2	0.01(-0.003-0.02)
Gyneco-obstetrical cases	2	0.01(-0.003-0.02)	978	4.36(4.1-4.63)
Surgical cases	377	1.68(1.51-1.85)	310	1.38(1.23-1.54)
Total	11608	51.78(51.13-52.43)*	10810	48.22(47.57-48.87)

*Significantly (P<0.05) higher in males; ** Indicates highly (P<0.001) significant relationship between the diseases and sexes of cattle.

Table 4: Prevalence of diseases and disorders in cattle according to season (N=22,418).

Disease category	Season**					
	Summer	Prevalence (%) (95% CIs)	Rainy	Prevalence (%) (95% CIs)	Winter	Prev. (%) (95% CIs)
Parasitic diseases	2635	11.75(11.33-12.18)	1512	6.74(6.42-7.07)	2615	11.66(11.24-12.08)
Infectious diseases	1951	8.70(8.33-9.07)	1528	6.82(6.49-7.15)	1416	6.32(6.00-6.63)
Digestive disorders	1886	8.41(8.05-8.78)	1145	5.11(4.82-5.4)	1128	5.03(4.75-5.32)
General systemic states	1888	8.42(8.06-8.79)	1259	5.62(5.31-5.92)	1364	6.08(5.77-6.40)
Metabolic diseases	31	0.14(0.09-0.19)	39	0.17(0.12-0.23)	109	0.49(0.40-0.58)
Respiratory disorders	46	0.21(0.15-0.26)	38	0.17(0.12-0.22)	59	0.26(0.20-0.33)
Sensory organ diseases	25	0.11(0.07-0.16)	21	0.09(0.05-0.13)	51	0.23(0.17-0.29)
Dermatological cases	0	0(0-0)	0	0(0-0)	5	0.02(0.003-0.04)
Gyneco-obstetrical cases	265	1.18(1.04-1.32)	286	1.28(1.13-1.42)	429	1.91(1.73-2.09)
Surgical cases	269	1.2(1.06-1.34)	130	0.58(0.48-0.68)	288	1.28(1.14-1.43)
Total	8996	40.13 (39.5-40.8)*	5958	26.58 (26-27.2)	7464	33.29(32.7-33.9)

*Significantly (P<0.05) higher in summer season; ** Indicates highly (P<0.001) significant relationship between the diseases and seasons.

The common occurrence of parasitic diseases may be attributable to lowland grazing, irregular deworming, employing insufficient doses of anthelmintics, a favourable environment for parasites, and so on. Overall, 21.84% of cattle were infected with major infectious diseases, which corresponds to previous results by [Sarker et al. \(2013\)](#), [Juli et al. \(2015\)](#), and [Alam et al. \(2018\)](#). FMD (16.13%) was the most common infectious disease of cattle, followed by foot rot (2.64%), mastitis (2.23%), BQ (0.41%), scouring (0.40%), warts (0.03%), and hemorrhagic septicemia (0.004%). [Alam et al. \(2018\)](#) reported 14.44% FMD in cattle. However, [Samad \(2001\)](#), [Rahman et al. \(2012\)](#), and [Badruzzaman et al. \(2015\)](#) reported a lower while [Sarker et al. \(2011\)](#) reported a higher prevalence of FMD. Clinical mastitis was recorded in 1.14%, 0.9%, and 2.1% of cows by [Kabir et al. \(2011\)](#), [Rahman et al. \(2012\)](#), and [Karim et al. \(2014\)](#), respectively. [Samad \(2001\)](#) and [Rahman et al.](#)

(2012) reported 0.58% and 0.19% prevalence of warts in cattle, respectively. Meanwhile, [Samad \(2001\)](#), and [Kabir et al. \(2011\)](#) reported 0.23%, and 0.57% prevalence of BQ in cattle, respectively. This variation might be due to different geographical locations, related environmental factors and different management practices.

The overall prevalence of digestive disorders in cattle was 18.55%, which is comparable to other studies that revealed digestive disorders ranging from 16.9% to 21.88% ([Lucky et al., 2016](#); [Mostari et al., 2020](#); [Biswas et al., 2021](#)). However, our finding was comparatively lower than the reports of [Pallab et al. \(2012\)](#), [Badruzzaman et al. \(2015\)](#), and [Rahman et al. \(2017\)](#), who found 32.68% to 63.38% of cattle with digestive disorders. Most farmers in Bangladesh rear cattle for fattening purposes, and they attempt to overfeed their cattle to fatten them quickly, which may be

the reason for the highest occurrence of digestive disorders.

The overall prevalence of general systemic diseases in cattle was 20.12%, with acidosis having the highest frequency (11.18%) and fever having the lowest (8.94%). This finding is supported by Islam et al. (2015b), whereas a higher prevalence (32.16% to 58.42%) was also recorded (Islam et al., 2015a; Sarker et al., 2013; Juli et al., 2015).

Overall, 0.80% of cattle were suffering from metabolic diseases, including milk fever (0.66%) and ketosis (0.14%). Islam et al. (2015a) and Rahman et al. (2012) reported 0.80% and 1.3% prevalence of metabolic diseases in cattle, respectively; however, a higher prevalence of 3.18% to 9.94% was also recorded (Lucky et al., 2016; Mohammed et al., 2017; Mostari et al., 2020). Respiratory disorders were recorded in only 0.64% of cattle, which is supported by Samad (2001) and Karim et al. (2014). However, Islam et al. (2015a, b) and Alam et al. (2018) found a higher prevalence of respiratory diseases (5.10%–8.70%). About 0.43% of the study cattle had sensory organ diseases (corneal opacity), which is similar to the findings of Sarker et al. (2013). According to Ali et al. (2011), 0.50% of cattle had urticaria, whereas dermatological cases (urticaria) were recorded in 5 cattle (0.02%) of this study. This study recorded 4.37% cases of gyneco-obstetrical diseases, which is similar to previous reports of 4.70% to 5.46% by Juli et al. (2015), Islam et al. (2015b), and Alam et al. (2018), but lower than previous reports of 12.48% to 15.46% by Lucky et al. (2016), and Mostari et al. (2020). The gyneco-obstetrical problems included anestrus (2.16%), repeat breeding (1.03%), retention of the placenta (0.84%), udder oedema (0.29%), uterine prolapse (0.03%), and posthitis (0.01%). Various rates of anestrus (47.03%–59.50%), repeat breeding (0.64%–20.2%), and retained placenta (0.37%–0.90%) were reported in cows in previous studies (Rahman et al., 2012; Biswas et al., 2021). Some of the major reasons for anestrus and repeat breeding in cattle are malnutrition, public unconsciousness, lack of service in remote areas, quack therapy, and so on. Overall, 3.06% of cattle had surgical cases, which included navel-ill (1.64%), myiasis (0.65%), abscess (0.58%), hernia (0.16%), laminitis (0.03%) and atresia ani (0.01%). The overall occurrence of surgical problems is similar to the reports of Mostari et al. (2020) but lower than the reports of Juli et al. (2015) and Biswas et al. (2021). As found in our study, Sarker et al. (2014) also reported navel illness as a common surgical case. Unsanitary calving and maternity pens, a lack of colostrum intake, no antiseptic usage on the naval chord, farmer's unconscious, and other factors may contribute to a higher frequency of navel illness. Disease occurrence was significantly ($P < 0.001$) associated with cattle age, sex, and season, which is consistent with the findings of Ali et al. (2011) and Islam et al. (2015b). Adult cattle (63.60%) were significantly ($P < 0.05$) more susceptible to diseases than

young, which is comparable with the findings of Kabir et al. (2011), Islam et al. (2015a), Rahman et al. (2017), and Alam et al. (2018). The low occurrence of clinical diseases in calves is attributable to acquired maternal immunity as well as the fact that they do not come into direct contact with contaminated feed. Male cattle (51.78%) were significantly ($P < 0.05$) more susceptible to diseases than females, which corresponds to the findings of Hossain et al. (2016) and Meher et al. (2021), but differs from the findings of others (Lucky et al., 2016; Rahman et al., 2017; Alam et al., 2018; Majumder et al., 2022). Surgical cases were insignificantly higher in male cattle, which is consistent with the findings of Hossain et al. (2016) but contradictory to the findings of Mannan et al. (2009). The diseases were significantly ($P < 0.05$) more prevalent in the summer (40.13%) than in the winter (33.29%) and rainy (26.58%) seasons. This result is comparable with the previous reports by (Siddiki et al., 2015; Lucky et al., 2016; Mohammed et al., 2017; Rahman et al., 2017) but not with Sarker et al. (2015) and Hossain et al. (2016). This type of seasonal variation occurs due to geo-climatic conditions of different locations.

CONCLUSIONS AND RECOMMENDATIONS

In conclusion, the cattle were highly susceptible to parasitic infestation, infectious diseases, digestive disorders, and general systemic states. The reported diseases incur significant economic losses via increased mortality, reduced productivity, treatment and control costs, loss in trade, decreased market value, food insecurity, and animal sector instability. Therefore, regular prophylactic treatment and vaccination with proper feeding, housing, good husbandry practices, and disease management are necessary to control the diseases and gain maximum output from the cattle. In the absence of appropriate treatment and vaccination, epidemiological knowledge might be important for controlling any disease in a certain area. The epidemiological knowledge derived from this study will increase our understanding of the clinical cases of cattle in a particular area and allow us to take necessary preventive and control measures against diseases at the national policy level. Therefore, further studies would be necessary for the identification and characterization of etiological agents in the larger areas of Bangladesh to get a better epidemiological picture of the diseases in cattle.

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NOVELTY STATEMENT

This research highlights the prevalence of diseases in cattle in relation to age, sex and season in the selected area.

AUTHOR'S CONTRIBUTION

MGM and SHMFS designed the experiments, and collected the data from the hospital. MRK and SHMFS analysed the data. MRK, LN, MSI and SHMFS wrote the manuscript. All authors participated in the experimental design and read and approved the final manuscript.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are openly available in this manuscript.

ABBREVIATIONS

GDP, gross domestic product; DLS, department of livestock services; IBM, international business machines; SPSS, statistical package for social sciences; CI, confidence interval; FMD, foot and mouth disease; BQ, black quarter.

CONFLICT OF INTEREST

The authors of this manuscript declare that there is no conflict of interest regarding the publication of this article.

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