

Prevalence of clinical diseases of cattle and goats at Kaligonj Upazila of Satkhira district

Shuvo Biswas¹, Shamsun Nahar², Sharifuzzaman^{3*}

¹Shuvo Biswas, Jhenaidah Government Veterinary College, Jhenaidah-7300

²Shamsun nahar, Department of Agriculture Economics and Social Science, Jhenaidah Government Veterinary College, Jhenaidah-7300

³Sharifuzzaman, Department of Pathology and Parasitology, Jhenaidah Government Veterinary College, Jhenaidah-7300

ARTICLE INFO

Article history

Received: 24 August 2021

Accepted: 10 September 2021

Keywords

Prevalence, cattle, goats, Bangladesh

*Corresponding Author

Sharifuzzaman

✉ sharif.edu.bd@gmail.com

ABSTRACT

The study was carried out at Upazila Veterinary Hospital, Kaligonj Upazila of Satkhira district during the period of February, 2019 to April, 2019 to evaluate the prevalence of clinical diseases of ruminants (cattle and goats). Disease diagnosis was made on the basis of owner's statement, physical examination, clinical signs and laboratory tests. A total of 500 clinical cases were investigated for the clinical diagnosis and therapeutic purposes. Clinically affected cattle and goats were divided into infectious and non-infectious disease groups and further divided into several categories as Bacterial, Viral, Ecto and Endo-parasitic, Nutritional deficiency, Metabolic disorders, Protozoan infections, Fungal diseases, Digestive disorders, Surgical affections and other syndromes. Clinical cases were also categorized according to the affected body systems e.g. Nervous, Respiratory system etc. The data revealed that the prevalence was highest for infectious diseases (70%) followed by Non-infectious diseases (30%). Goats (83.14%) were more susceptible to infectious diseases than cattle (16.86%). Highest overall prevalence of diseases was found for digestive disorders (16.40%) followed by 14% unknown etiological syndromes, 12.8% Ecto-parasitic infestations, 12.2% Endo-parasitic infections, 11.20% Viral diseases, 10% Surgical affections, 8.80% Nutritional deficiency disorders, 6.60% Bacterial diseases, 3.8% Gynaecological disorders, 2.8% Metabolic diseases, 1.2% Protozoan diseases and 0.2% Fungal diseases. Based on body system, overall prevalence of diseases was highest in digestive system (39%) and lowest in Musculo-skeletal system (2.80%). Prevalence of diseases was slightly higher in female (50.8%) than male (49.2%) animals. This study will help the researchers to understand the status of prevalent diseases and also help to design a program for mitigation and control of diseases at Kaligonjin Satkhira district and elsewhere in Bangladesh.

INTRODUCTION

Livestock play a crucial role in the complex farming system in Bangladesh as it not only a source of animal protein but also a major source of farm power services as well as employment. Mamun et al., (2018) reported that 36% of total animal protein directly comes from livestock. The livestock sub-sector provides full time employment for 20% of the total population and part-time employment for another 50% (Rahman et al., 2014). The livestock production is swelling up gradually in Bangladesh with a significant effect on livelihood and health (Uddin et al., 2011). Out of all livestock population cattle and

goats play important role in rural agricultural farming system by providing food, draft power, transport, hide, skin, bone and biogas etc. (Hossain et al., 2016). Although this crucial role in economy, most of them are severely affected with various types of diseases and disorders. Among the various drawbacks in cattle and goat production system, diseases are the most pivotal factors which are responsible for significant production loss, and mortality of calves and kids (Debnath et al., 1990). Kaligonj is the most potential Upazila (having 70417 and 46781 cattle and goats respectively) in Satkhira district in terms of livestock production but there are lack of clinical reports available at Kaligonj, Satkhira.

Therefore, the present study was conducted at Kaligonj upazila with a view to determine the prevalence of clinical diseases of ruminant (mainly cattle and goats) and to detect the affected body systems and occurrence of diseases based on sex and species of animals.

MATERIALS AND METHOD

Study area and period

The study was pursued at Upazila Livestock Office and Veterinary Hospital in Kaligonj upazila of Satkhira district from February, 2019 to April, 2019. The animals that were brought at Upazila veterinary hospital, were examined and treated. A total of 500 clinical cases were recorded during this study period.

Examination of animals

General examination

Body condition score (BCS), posture, behavior, gait, superficial skin, salivation, nasal or oral discharge, locomotion issues, mammary gland, scrotum, lymph nodes etc. were carefully observed by distant visual examination of the patient.

Physical examination

Different external body parts of each clinically affected animal at hospital were examined at hospital by using palpation, percussion and auscultation techniques.

Clinical examination

For clinical examination the temperature, pulse and respiratory rate from each of the animals were recorded after restraining them properly. The presented clinical findings of various diseases of cattle and the owner's statement in relation to the diseases were also recorded carefully.

Prevalence

Prevalence of disease was calculated as number of cases of disease divided by population at risk and multiple by 100.

$$\text{Prevalence rate (\%)} = \frac{\text{No. of cases of disease}}{\text{Population at risk}} \times 100$$

Statistical analysis

Collected data were analyzed using statistical software STATA 13 (College Station, Texas 77845 USA) where descriptive statistics was expressed as Prevalence (proportion) with 95% confidence intervals (CIs).

RESULTS AND DISCUSSION

Prevalence of infectious and non-infectious diseases

Out of 350 infectious cases, goats (83.14%) were more prone to infectious diseases than cattle (16.86%) (Table 1). This result was more or less similar with the study of Hossain et al. (2016) and Parvez et al. (2014) who respectively reported that 12.39 % and 12.18% cattle were suffering from infectious diseases. Parvez et al. (2014) also reported on the occurrence of non-infectious diseases (goats 5.83% and cattle 4.17%) which didn't match with the present study (18% cattle and 82% goats). However, overall infectious and non-infectious cases of all animals were 70% and 30% respectively.

Table 1: Prevalence of infectious and non-infectious diseases (N=500)

Parameters	Species	No. of cases	Prevalence (95% CI)
Infectious diseases	Cattle	59	16.86% (13.17-21.29)
	Goats	291	83.14% (78.71-86.83)
Total		350	100%
Non-infectious diseases	Cattle	27	18% (12.39-25.29)
	Goats	123	82% (74.71-87.61)
Total		150	100%

CI= Confidence interval and N= Total number of clinical cases

Prevalence of overall diseases and disorders in cattle and goats

The highest prevalence of diseases in animals was digestive disorders (17%) followed by 14.6% unknown etiological syndromes, 12.8% ecto-

parasitic infestations, 12% endo-parasitic infections, 11.20% viral diseases, 10% surgical affections, 8.40% nutritional deficiency disorders, 6.60% bacterial diseases, 3% gynaecological disorders, 2.8% metabolic diseases, 1.2% protozoan diseases and 0.2% fungal diseases (Figure 1).

Prevalence of bacterial diseases

The overall prevalence of bacterial diseases in cattle and goats was 6.60 % (Figure 1). Highest prevalent bacterial disease was mastitis (Table 2). This result was in agreement with Mohammed et al. (2018) who reported most prevalent disease was mastitis (6.08%) and prevalence of hemorrhagic septicemia and conjunctivitis were 1.23% and 0.20% respectively. Badruzzaman et al. (2015) and Karim et al. (2014) respectively reported the prevalence of mastitis were 1.30% and 1.1% which were close to the findings of this result. However, this result differed from the study of Juli et al. (2015) in Dinajpur district who

reported highest prevalent bacterial disease was dermatophilosis (10.43%), followed by mastitis (0.73%), black quarter (0.59%). Samad (2001) found 1.1% tetanus cases which was in agreement with present study (1.2%). However, tetanus was common in male animal after castration

Table 2: Prevalence of bacterial diseases (N=500)

Disease condition	No. of positive case	Prevalence (95% CI)
Conjunctivitis	1	0.2% (0.005-1.10)
Haemorrhagic septicemia	5	1.00% (0.32-2.31)
Mastitis	12	2.40% (1.25-4.16)
Metritis	3	0.60% (0.12-1.74)
Pneumonia	4	0.80% (0.28-2.04)
Scrotal infection	1	0.2% (0.005-1.10)
Tetanus	6	1.20% (0.44-2.59)

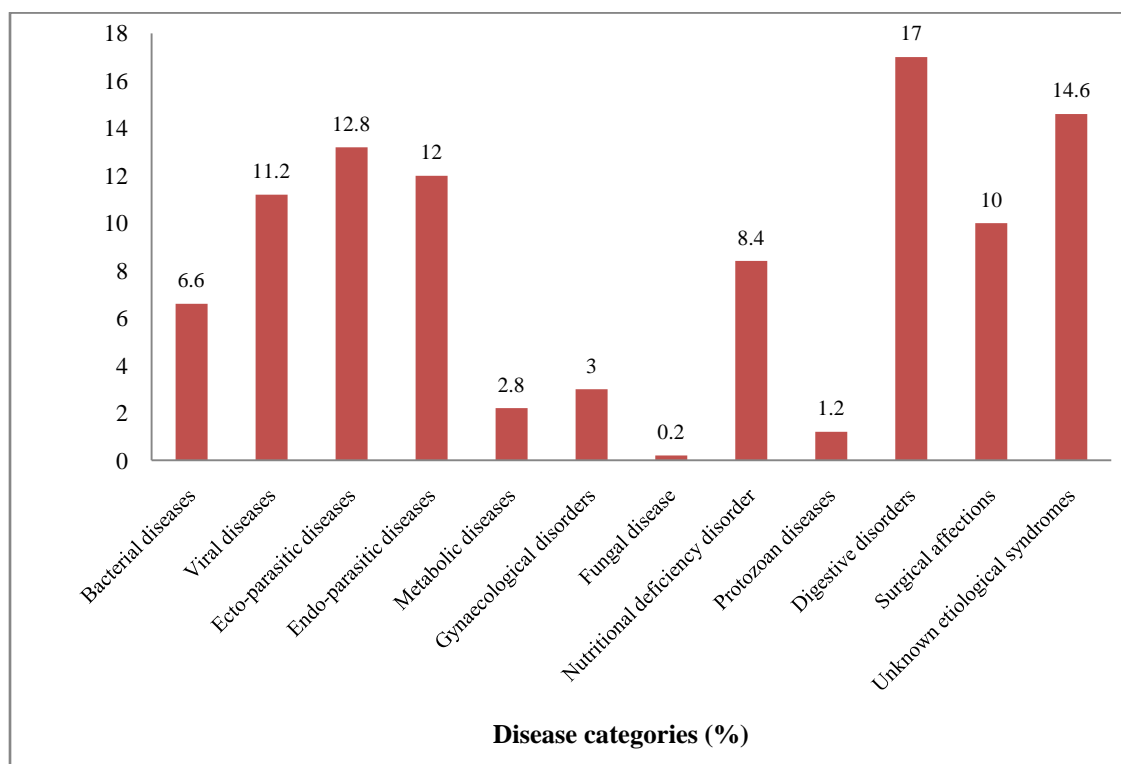


Figure 1: Prevalence of overall diseases in both cattle and goats.

Prevalence of viral diseases

The overall prevalence of viral diseases in cattle and goats was 11.20% (Figure 1). Among viral diseases the highest prevalence were found for Peste Des Petits Ruminants (PPR) in goats, followed by arthritis, whereas the lowest prevalence were documented for foot and mouth disease (FMD), ephemeral fever and lumpy skin disease in cattle (Table 3). Typical signs found in PPR affected animals were pyrexia, nasal discharge, oral sores, dyspnea and diarrhea. Parvez et al. (2014) also found highest prevalent viral disease in goats was PPR. Mohammed et al. (2017) reported that the highest prevalence among viral diseases were found as ephemeral fever (5.79%) followed by foot and mouth disease (3.10%) which weren't in agreement with present study as shown in (Table 3). Badruzzaman et al. (2015) pursued a study in Chittagong district of Bangladesh and they reported that prevalence of foot and mouth disease and ephemeral fever were 4.74% and 0.27% respectively which were higher than present study. Hossain et al. (2016) and Rahman et al. (2012) mentioned that the prevalence of papillomatosis was 0.28% and 0.19% respectively which were close to the present study (0.40% papillomatosis). Newly emerging disease lumpy skin disease was found in only one animal (0.2%).

Table 3: Prevalence of viral diseases (N=500)

Disease condition	No. of positive case	Prevalence (95% CI)
Arthritis	7	1.40% (0.56-2.87)
Ephemeral fever	1	0.2% (0.005-1.10)
FMD	1	0.2% (0.005-1.10)
PPR	44	8.80% (6.47-11.63)
Lumpy Skin Disease	1	0.2% (0.005-1.10)
Papillomatosis	2	0.40% (0.04-1.44)

Prevalence of ecto-parasitic diseases

The overall prevalence of ecto-parasitic diseases in cattle and goats was 12.8% (Figure 1). The most common disease was naval ill (maggots infected) followed by other ecto-parasitic cases (Table 4). Prevalence of myiasis was 2.60%. This result can be compared with the report of Rahman et al.

(2012) who reported 24.7% cattle and 16.4% goats affected with myiasis. Cause of myiasis and maggot infection was mainly the unhygienic condition of animal. Naval ill and myiasis were most frequent in male animals and animals below six months of age and they were treated with different drugs. Prevalence of mange was 0.80% which was close to the study of Samad (2001) who found 0.33% mange but differed to the study of (Karim et al. (2014) who found 4.6% mange. Rony et al. (2010) conducted a research in Gazipur of Bangladesh, and recorded 68.49% and 65.5% prevalence of tick infestation in cattle and goats respectively which were higher than my result (4%). Ghosh et al. (2007) mentioned 80% cattle were affected by ticks in Bangladesh, India and Pakistan.

Table 4: Prevalence of ecto-parasitic diseases (N=500)

Disease condition	No. of positive case	Prevalence (95% CI)
Lice infestation	2	0.40% (0.04-1.44)
Myiasis	13	2.60% (1.39-4.41)
Naval ill (maggots infected)	23	4.60% (2.94-6.82)
Sarcoptic mange	4	0.80% (0.28-2.04)
Scabies	4	0.80% (0.28-2.04)
Ticks	20	4.00% (2.46-6.11)

Prevalence of endo-parasitic diseases

Most common endo-parasitic disease was tapeworm infection and the fewest prevalent disease was gid disease (Table 5). The overall prevalence of endo-parasitic diseases in cattle and goats was 12.0% (Figure 1). Among these, most prevalent disease was Tapeworm (9.00%) followed by Fascioliasis (1.80%) as mentioned in (Table 4) but Karim et al. (2014) and Howlader et al. (1990) respectively reported that the prevalence of fascioliasis were 1.6% and 21%. Fascioliasis was diagnosed mainly by the sign of sub-mandibular swelling and pale mucous membrane. The fewest prevalent (0.2%) disease was gid disease. This result was similar to the study of Karim et al. (2014) who also found only one goat affected with gid disease. Gid disease was diagnosed mainly by the sign of circling and

softening at periosteum region. Parasitic cases were higher in prevalence because most of the owners were unaware about routine deworming program.

Table 5: Prevalence of endo-parasitic diseases (N=500)

Disease condition	No. of positive case	Prevalence (95% CI)
Gid disease	1	0.2% (0.005-1.10)
Fascioliasis	9	1.80% (0.83-3.39)
Tapeworm	45	9.00% (6.64-11.85)
Round worm	5	1.00% (0.32-2.31)

Prevalence of metabolic diseases

The overall prevalence of metabolic diseases was 2.8% (Figure 1) which differed from the findings of Mohammed et al. (2017) who found 7.61% metabolic diseases. The most prevalent (0.60%) metabolic diseases were both acidosis and grass tetany whereas lowest prevalence (0.2%) was found in milk fever case (Table 6). Milk fever was observed in cow just after parturition due to hypocalcemia. This result was more or less similar to the study of Hossain et al., (2016) who mentioned 0.95% milk fever and 0.44% grass tetany.

Table 6: Prevalence of metabolic diseases (N=500)

Disease condition	No. of positive case	Prevalence (95% CI)
Metabolic acidosis	3	0.60% (0.12-1.74)
Grass tetany	3	0.60% (0.12-1.74)
Hypocalcemia	2	0.40% (0.04-1.44)
Milk fever	1	0.2% (0.005-1.10)
PICA	2	0.40% (0.28-2.04)

Prevalence of gynaecological disorders

The overall prevalence of gynaecological disorders was 3.8% (Figure 1) which was close to the study of Alam et al. (2018) who observed 4.87% gynaecological diseases but less than findings of Mohammed et al. (2017) who mentioned 7.37% reproductive or venereal diseases.

Table 7: Prevalence of gynaecological diseases (N=500)

Disease condition	No. of positive case	Prevalence (95% CI)
Anestrous	8	1.60% (0.69-3.13)
Dystocia	2	0.40% (0.04-1.44)
Repeat Breeding Syndrome	2	0.40% (0.04-1.44)
Retained placenta	3	0.60% (0.12-1.74)

The most prevalent (1.60%) disease was anestrous and lowest prevalence (0.60%) was found in both dystocia and repeat breeding syndrome cases (Table 7). Anestrous case was common in weak animals and animals having difficult parturition history. Repeat breeders were those female ruminants that failed to conceive after three or more regularly spaced services in the absence of detectable abnormalities of internal genitalia (Samad, 2000). Samad (2001) also found 0.64% repeat breeding cases which was slightly higher than present study. Rahman et al. (1999) and Samad (2001) reported 0.37% and 0.50% cases of retained placenta respectively which were close to the present result (0.60%). Retain placenta case was considered as clinical condition if placenta was retained more than 12-18 hours after delivery.

Prevalence of fungal diseases

The overall prevalence of fungal diseases was only 0.2%. Fungal dermatitis was diagnosed by the sign of scaly rash and discoloration of skin that is often itchy (Schulman, 2020). The only case found among animals was fungal dermatitis (Table 8). Islam et al. (2018) found 38.75% positive fungal infection which was higher than present study.

Table 8: Prevalence of fungal diseases (N=500)

Disease condition	No. of positive case	Prevalence (95% CI)
Fungal dermatitis	1	0.2% (0.005-1.10)

Prevalence of nutritional disorders

The Prevalence of general weakness was 8.40% which was close to the result of Lucky et al. (2016) who found 9.94% nutritional cases. Tentative cause of general weakness among

animals are considered to be nutritional deficiency (Health line editorial team, 2018). Prevalence of general weakness was 8.40% (Table 9). This result was lower than findings of Parvez et al. (2014) of who mentioned 2.77% weakness cases.

Table 9: Prevalence of nutritional disorder (N=500)

Disease condition	No. of positive case	Prevalence (95% CI)
General Weakness due to nutritional deficiency	42	8.40% (6.12-11.18)

Prevalence of protozoan disease

The overall prevalence of protozoan diseases was 1.2% (Figure 1) which were close to the study of Alam et al. (2018) who found 0.79% protozoan diseases. All of the prevalent diseases were hemoprotozoan diseases e.g. anaplasmosis (0.4%), babesiosis (0.4%) and coccidiosis (0.4%) (Table 10). Alim et al. (2012) reported the overall prevalence of hemoprotozoan diseases as 16.18% and 12.02% in crossbred and indigenous cattle, respectively where babesiosis and anaplasmosis were predominant which were higher than present study. Intermittent fever and anemia were found to be common signs in these hemoprotozoan diseases.

Table 10: Prevalence of protozoan disease (N=500)

Disease condition	No. of positive case	Prevalence (95% CI)
Anaplasmosis	2	0.40% (0.04-1.44)
Babesiosis	2	0.40% (0.04-1.44)
Coccidiosis	2	0.40% (0.04-1.44)

Prevalence of digestive disorder

The overall prevalence of digestive disorders was 17% (Figure 1). But Samad et al. (2002) observed 60.55% digestive disorders. Most prevalent (10.20%) disorder was diarrhea (Table 11) which was in agreement with Khan et al. (2018) who also observed diarrhea to be most prevalent digestive disorder. Samad (2001) found higher degrees of diarrhoeal case (25.97%) in cattle. Prevalence of

simple indigestion case was observed in 5% animals in which anorexia syndrome was the most common complaint. The prevalence of calf scour and constipation was 0.2% as showed in Table 11. The prevalence of bloat was 1.40% which was almost similar to the study of Sutradhar et al. (2000) who reported 1.73% bloat cases and mentioned that bloat was mainly dietary origin and occurred most frequently in Bangladesh.

Table 11: Prevalence of digestive disorder (N=500)

Disease condition	No. of positive case	Prevalence (95% CI)
Bloat	7	1.40% (0.56-2.87)
Calf scour	1	0.2% (0.005-1.10)
Constipation	1	0.2% (0.005-1.10)
Diarrhoea	51	10.20% (7.69-13.19)
Simple indigestion	25	5.00% (3.26-7.30)

Prevalence of surgical affections

Table 12: Prevalence of surgical affections (N=500)

Disease condition	No. of positive case	Prevalence (95% CI)
Abortion	1	0.2% (0.005-1.10)
Abscess	11	2.20% (1.10-3.90)
Atresia ani	1	0.2% (0.005-1.10)
Castration	14	2.80% (1.54-4.65)
Cyst	4	0.80% (0.28-2.04)
Dehorning	1	0.2% (0.005-1.10)
Fracture	7	1.40% (0.56-2.87)
Hematoma	4	0.80% (0.28-2.04)
Prolapse of intestine	1	0.2% (0.005-1.10)
Urolithiasis	5	1.00% (0.32-2.31)
Wound	3	0.60% (0.12-1.74)

The overall prevalence of surgical affections was 10% (Figure 1) which was different from the findings of Pallab et al. (2012) who found 5.22% surgical affections. The most prevalent surgical case was castration (2.80%) and fewest prevalent case (0.2%) were abortion, Atresia ani, dehorning and prolapse of intestine (Table 12). Hossain et al. (2016) reported the prevalence of castration, abscess and fracture were 1.91%, 1.39% and

1.07% respectively which were adjacent to the present study.

Prevalence of unknown etiological syndromes

The overall prevalence of unknown etiological syndrome was 14.6% (Figure 1). The highest prevalent case was fever of unknown origin and fewest prevalent case was cough as showed in Table 13. This result was much higher than the findings of Parvez et al. (2014) who found prevalence of idiopathic diseases was 3.38%. Karim et al. (2014) and Rahman et al. (2012) reported 12.7% and 12.1% fever case which were close to this study.

Table 13: Prevalence of unknown etiological syndromes (N=500)

Disease condition	No. of positive case	Prevalence (95% CI)
Cough	16	3.20% (1.84-5.14)
Fever	57	11.40% (8.74-14.52)
Dyspnea	1	0.2% (0.005-1.10)

Prevalence of overall diseases based on sex

The percentage of male and female animal were close to each other. Distributions of male and female animal according to all disease categories were showed in Table 14.

Table 14: Prevalence of overall diseases based on Sex (N=500)

Disease condition	Male (no.)	Prevalence (95% CI)	Female (no.)	Prevalence (95% CI)
Bacterial disease	17	6.91% (4.07-10.83)	16	6.30% (3.76-10.22)
Viral disease	28	11.38% (7.69-16.02)	28	11.02% (7.57-15.69)
Ecto-parasitic infestation	32	13.01% (9.07-13.86)	32	12.60% (8.90-17.47)
Endo-parasitic infection	18	7.32% (4.39-11.31)	43	16.93% (12.65-22.24)
Metabolic disease	5	2.03% (0.67-4.68)	9	3.54% (1.74-6.84)
Gynaecological disorder	0	0%	16	6.30% (3.76-10.22)
Fungal disease	1	0.41% (0.1-2.24)	0	
Nutritional deficiency disorder	27	10.98% (7.35-15.57)	17	6.69% (4.06-10.69)
Protozoan disease	1	0.41% (0.1-2.24)	5	1.97% (0.73-4.79)
Digestive disorder	39	15.85% (11.52-21.02)	43	16.93% (12.65-22.24)
Surgical affection	40	16.26% (11.88-21.48)	10	3.94% (2.02-7.35)
Unknown etiological syndrome	38	15.45% (11.17-20.58)	35	13.78% (9.91-18.78)
Total	246	100%	254	100%
Percentage out of all animals	49.2%		50.8%	

Prevalence of affected system wise clinical diseases

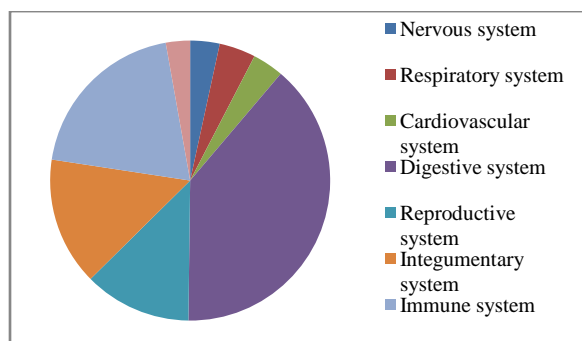


Figure 2: Prevalence of affected system wise clinical diseases.

Various body systems were affected by different clinical diseases. Distributions of affected body system by clinical diseases were displayed in Figure 2.

Prevalence of species wise affected system

Distribution of clinically affected body system based on species (both cattle and goat) were documented in Table 15. Out of 500 clinical cases, 17.2% cattle and 82.8% goats were clinically affected.

Table 15: Prevalence species wise clinically affected body system

System	Cattle Frequency	Prevalence (CI)	Goat Frequency	Prevalence (CI)
Nervous system	4	4.65 (1.28-11.48)	13	3.14 (1.68-31)
Respiratory system	3	3.49 (0.73-9.85)	18	4.35 (2.59-6.78)
Cardiovascular system	4	4.65 (1.28-11.48)	14	3.38 (1.86-5.61)
Digestive system	42	48.84 (37.89-59.85)	153	36.96 (32.29-41.81)
Reproductive system	5	5.81 (1.91-13.04)	57	13.77(10.59-17.46)
Integumentary system	12	13.95 (7.42-23.10)	62	14.98 (11.68-18.78)
Immune system	15	17.44 (10.10-27.13)	84	20.29 (16.52-24.49)
Masculo-skeletal system	1	1.16 (0.002-6.31)	13	3.14 (1.68-31)
Total	86	100.00	414	100.00

Out of 500 animals (including both cattle and goat) 49.2% male and 50.8% female animals were suffering from different types of disease (Table 15). This result didn't match completely with Parvez et al. (2012) who found 38.37% male and 61.63% female were clinically affected. This result revealed that endo-parasitic (7.32% male and 16.93% female), metabolic (2.03% male and 3.54% female) and digestive disorders (15.85% male and 16.93% female) were higher in female than male. But viral and ecto-parasitic diseases had same prevalence between male and female.

The digestive system (39%) was the most clinical disease affected body system followed by Immune system (19.8%), Integumentary system (14.80%), Reproductive system (12.4%), Respiratory system (4.2%), Cardio-vascular system (3.60%), Nervous system (3.4%) and Masculo-skeletal system (2.80%) as mentioned in (Figure 2). The findings were in agreement with Parvez et al. (2014) who reported that the highest prevalence was recorded with the disease of digestive system (goats 16.85% and cattle 20.83%). However, the findings didn't match properly with Pallab et al. (2012) who reported that prevalence of diseases of digestive system and respiratory system were 47.05% and 6.20% respectively. Samad et al. (2002) reported about 14.92% skin diseases which was consistent with present study where diseases of integumentary system was 14.80%.

CONCLUSION

This present report revealed that various infectious and parasitic diseases like viral (11.20%), bacterial (6.60%), ecto-parasitic (12.8%), endo-parasitic (12%) etc. diseases were prevalent in animals at Kaligonj upazila in Satkhira district. Among the bacterial diseases, mastitis (2.40%) occupied highest position; however within viral diseases the most prevalence disease was PPR (8.80%) in goat. In case of parasitic diseases, the highest prevalence was observed in Tapeworm infection. Parasitic infections causes heavy economic losses every year. So, regular anthelmintic treatment should be given to control parasitic diseases. Among all disease categories, digestive disorders were the most prevalent and among all specific diseases/syndromes, fever was the most prevalent syndromes. Proper planning and program should be undertaken to prevent and control diseases and disorder of ruminant (cattle and goats).

REFERENCES

- Alim MA, Das S, Roy K, Masduzzaman M, Sikder S, Hassan MM, Siddiki AZ and Hossain MA (2012). Prevalence of hemoprotozoan diseases in cattle population of Chittagong division, Bangladesh. *Pakistan Veterinary Journal*, 32: 221-224.
- Alam MB, Mahmud T, Khan SA, Islam A, Hai MA and Hassan MM (2018). Occurrence of diseases and disease conditions in cattle and goats at the Upazilla Veterinary Hospital, Debidwar, Comilla. *Journal of Advanced Veterinary and Animal Research*, 5(2):117-122.
- Badruzzaman ATM, Siddiqui MSI, Faruk MO, Lucky NS, Zinnah MA, Hossain FMA and Rahman MM

- (2015). Prevalence of infectious and non-infectious diseases in cattle population in Chittagong district of Bangladesh. *International Journal of Biological Research*, 3: 1-4.
- Debnath NC, Sil BK, Selim SA, Prodhan MAM and Howlader MMR (1990). A retrospective study of calf mortality and morbidity on smallholder traditional farms in Bangladesh. *Preventive Veterinary Medicine*, 9: 1-7.
- Ghosh S, Bansal GC, Gupta SC, Seitzer U and Ahmed JS (2007). Status of tick distribution in Bangladesh, India and Pakistan. *Parasitology Research* 101, 207-216.
- Healthline Editorial Team (2018). Nutritional Deficiencies (Malnutrition). Available at <https://www.healthline.com/health/malnutrition> (Accessed on January 2, 2020).
- Hossain M, Hasan M and Bhuiyan MJU (2016). Prevalence of clinical diseases of cattle of Moulvibazar District in Bangladesh. *International Journal of Natural Sciences*, 6(2):54-61.
- Howlader MMR, Chowdhury SMZH, Taimur MJFA and Johan S (1990). Fluke infestations of cattle in some selected villages of Bangladesh. *The Bangladesh Veterinarian*, 7: 45-47.
- Islam TAB, Majid F, Ahmed M, Afrin S, Jhumky T and Ferdouse F (2018). Prevalence of Dermatophytic Infection and Detection of Dermatophytes by Microscopic and Culture Methods. *Journal of Enam Medical College*, 8(1):11-15.
- Juli MSB, Hoque MF, Badruzzaman ATM and Kawser HM (2015). Bovine diseases at Dinajpur district of Bangladesh: Epidemiological status with relation to age and season. *Journal of Veterinary and Animal Sciences*, 2: 55-63.
- Karim MR, Parvin MS, Hossain MZ, Islam MT and Hussain MT (2014). A report on clinical prevalence of diseases and disorders in cattle and goats at the upazilla veterinary hospital, Mohammadpur, Magura. *Bangladesh Journal of Veterinary Medicine*, 12(1): 47-53.
- Khan N, Pal D and Mollah ML (2018). Study on clinical diseases and disorders of cattle and goats at Gopalganj District in Bangladesh. *Asian Journal of Medical and Biological Research*, 3(4): 412-418.
- Lucky NS, Hossain MK, Roy AC, Haque MM, Uddin AHMM, Islam MM and Howlader MMR (2016). A longitudinal study on clinical diseases and disorders of cattle and goats in Sylhet, Bangladesh. *Journal of Advanced Veterinary and Animal Research*, 3(1): 24-37.
- Mamun A, Islam S, Islam S and Billah M (2018). Problems and prospects of small scale beef cattle fattening program in selected area of Bangladesh. *International Journal of Science and Research*, 8(6): 833-837.
- Mohammed M, Rahman MS, Hoque MF, Rumi N and Afrah O (2018). Study on prevalence of bovine diseases at sadar upazila in dinajpur district of Bangladesh. *Asian Journal of Medical and Biological Research*, 3(4): 446-453.
- Pallab MS, Ullah SM, Uddin MM and Miazi OF (2012). A cross sectional study of several diseases in cattle at Chandanaish Upazilla of Chittagong district, Bangladesh. *Scientific Journal of Veterinary Advances*, 1: 28-32.
- Parvez A, Faruque MR, Sutradhar BC, Rahman MM, Mannan A and Khatun R (2014). Clinical diseases and manifestations of goats and cattle recorded at teaching veterinary hospital in Chittagong Veterinary and Animal Sciences University. *Bangladesh Journal of Veterinary Medicine*, 12(1): 73-81.
- Rahman S, Begum IA and Alam MJ (2014). Livestock in Bangladesh: Distribution, growth, performance and potential. *Livestock Research for Rural Development*, 26:173-177.
- Rahman MA, Islam MA, Rahman MA, Talukder AK, Parvin MS and Islam MT (2012). Clinical diseases of ruminants recorded at the Patuakhali Science and Technology University Veterinary Clinic. *Bangladesh Journal of Veterinary Medicine*, 10(1&2): 63-73.
- Rony SA, Mondal MMH, Begum N, Islam MA and Afroze S (2010). Epidemiology of ectoparasitic infestations in cattle at Bhawal forest area, Gazipur. *Bangladesh Journal of Veterinary Medicine*, 8: 27-33.
- Samad MA (2000). *Veterinary Practitioner's Guide*. 1st Pub. No. 07, BAU Campus, Mymensingh.
- Samad MA (2001). *Poshu Palon O Chikitshavidya*, 2nd edition. LEP Pub. No. 7, BAU Campus, Mymensingh.
- Samad MA, Islam MA and Hossain A (2002). Patterns of occurrence of calf diseases in the district of Mymensingh in Bangladesh. *Bangladesh Veterinary Journal*, 36: 01-05.
- Schulman JS (2020). Types of Fungal Skin Infections and Treatment Options. Available at <https://www.healthline.com/health/fungal-skin-infection> (Accessed on January 2, 2020).
- Sutradhar BC, Hossain MA and Alam MR (2000). Incidence of bloat and its response to certain drugs in cattle. *Bangladesh Journal of Veterinary Medicine*, 17: 37-41.
- Uddin MT, Islam MM and Nasrin M (2011). Impact of recent changes in livestock production pattern on farm families' livelihood and health in selected areas of Bangladesh. *Bangladesh Journal of Livestock Research*, 18 (1&2): 52-69.