A Report on Clinical Prevalence of Diseases and Disorders in Cattle and Goat at the Upazila Veterinary Hospital, Rupganj, Narayanganj

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A Report on Clinical Prevalence of Diseases and Disorders in Cattle and Goat at the Upazila Veterinary Hospital, Rupganj, Narayanganj

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Abstract

A retrospective epidemiologic study was undertaken to determine the occurrence and distribution of diseases and disorders based on species, age, sex, breed, season variation at Upazila Veterinary Hospital (UVH), Rupganj, Narayanganj from January 2023 to December 2023. A total of 1503 clinical cases were recorded from case sheet of the hospital. Data were imported, categorized, coded and Chi-square test were performed. Analyses of the data demonstrated that the highest number of animals admitted at the UVH were cattle 801 (53.30%) in comparison to goats 702(46.70%).. A total of 43 types of diseases and disorders in cattle and goats were identified. The highest prevalence of diseases or disorders was infectious diseases 258 (32.21%) followed by parasitic & protozoal diseases 191 (27.21%), reproductive disorders 150 (18.73%), respiratory disorders 42 (5.24%), digestive disorders 71(10.11%), metabolic disorders 19 (2.37%), skin associated conditions 11(1.37%), systemic state 8 (1%), eye diseases 6 (0.75%), musculoskeletal disorders 2 (0.25%), urinary disorders 2 (0.25%) and others 78 (9.74%). In case of goats, 37 types of diseases and disorders were detected. The highest prevalence was recorded for infectious diseases 258 (32.21%) which was followed by parasitic & protozoal diseases 191 (27.21%), reproductive disorders 144 (20.51%), digestive disorders 71 (10.11%), respiratory disorders 42 (5.98%), skin associated conditions 12(1.71%), systemic state 12 (1.71%), eye diseases 8 (1.14%), urinary disorders 7 (1%), musculoskeletal disorders 3 (0.43%), and others 69 (9.83%). Further, female animals (59.30%, cattle and 57.40%, goats) were suffered from different types of diseases and disorders in comparison to male animals (40.70%, cattle and 42.60%, goats) The occurrence of diseases or disorders was higher in the crossbred and animals aged between 1 to 2.5 years were found more vulnerable to the diseases or disorders. Prevalence of diseases or disorders was higher in rainy season followed by summer and winter season. It was also observed that worm infestation, Foot and mouth disease (FMD) and Peste des petits ruminants (PPR) were significantly higher during the rainy season ($P<0.05$) And mastitis was significantly higher in winter season ($P<0.05$). This investigation summarizes a number of diseases and disorders in the last one year UVH of of Rupganj upazila, Narayangonj which will help in epidemiological forecasting and taking preventive and control measures against them.

Keywords: Cattle, goats, retrospective study, diseases and disorders, clinical prevalence

CHAPTER I: INTRODUCTION

Livestock is one of the most potential sub-sectors of agriculture in Bangladesh which plays an indispensable role in promoting human health and national economy of the country. Livestock not only assists to upgrade the financial condition but also makes a substantial contribution to human nutrition. However, livestock is an integral part of farming system which has a better contribution to enhance the economy of Bangladesh. Large ruminants (Cattle and Buffalo) and small ruminants (sheep and goat) constitute the major portion of livestock. The present population of livestock is 25.013 million cattle, 1.524 million Buffalo, 27.117 million goat and 3.903 million sheep (DLS, 2023 to 2024). The total contribution of livestock sub-sector to Gross Domestic Product (GDP) in Bangladesh is approximately 1.8% and livestock in agricultural production 16.33% (Anonymous, 2023 to 2024). It also generates 13% of foreign currency and provides 20% fulltime employment and 50% partial employment of rural population (Alam, 1993).

Diseases are one of the most important limiting factors in livestock development, not only reducing productivity but also causing mortality (Islam et al., 2015). However, livestock diseases and disorders are the most significant barriers to livestock development in our country (Alam et al., 2018). Diseases also cause nutritional deficiency and disturbance fertility. Most of the animals are week, emaciated and production performance is low due to malnutrition and disease (Imtiaz, 2014). According to Ali et al. (2013), diseases and disorders kill approximately 10% of all animals each year. The animal management techniques and the geoclimatic conditions in Bangladesh are conducive to the spread of many diseases (Onneshan, 2014). Animal illnesses and zoonoses are significant barriers to efficient livestock production and the safe use of animal products around the world (Perry and Grace, 2009). Production losses, loss of livelihoods, poverty, food insecurity, limited selling prospects, investment disincentives, and public-health hazards are all severe socioeconomic implications (FAO, 2016). However, animal disease control tactics vary over the world, and many countries continue to face significant outbreaks. Globalization, climate change, farm clustering around cities, and the movement of animals, people, and viruses between intensive and traditional farming systems all contribute to the introduction of new disease risks while exacerbating existing ones (Hassell et al., 2017). Infectious illnesses and disorders cause major losses among livestock. Diseases are the most significant impediment to cattle population growth in Bangladesh. Parasitism is one of the most significant obstacles in

growing livestock in Bangladesh (Jabbar and Green, 1983). Bangladesh's hot, humid climate promotes the survival and development of ectoparasites and endoparasites, resulting in parasitic violence. Gastrointestinal parasite infections are a major barrier in animal production (Islam et al., 2015). Understanding the incidence, prevalence, distribution, and determinants or risk factors of diseases in this area is critical for implementing an effective disease control strategy. The purpose of this study was to discover and assess trends in clinical diseases and disorders in goats and cattle.

A veterinary hospital is an excellent and reliable source of knowledge on animal ailments and their treatments. Every day, people from neighboring areas bring their ailing animals to the Veterinary Hospital. The analysis of the case record provides a full picture of the illness concerns in the local communities.

The study's specific goal was to investigate the prevalence of clinically occurring diseases and disorders in cattle and goats brought to the Rupganj, upazila of Narayanganj. The study explored the occurrence of diseases and disorders based on animal related risk factors such as breed, age, sex and environment related factors such as season This study explored the insight of the occurrence of diseases and disorders in cattle and goat which will ultimately help in epidemiological forecasting and designing the appropriate preventive and control measures against them.

CHAPTER II: MATERIALS AND METHODS

2.1. Description of study sites and selection of animals

The retrospective epidemiologic study of diseases in ruminants was done using of 1 year data in Rupganj Upazila Veterinary Hospital of Narayanganj district. Rupganj upazila is located in between in 23'42"and 23'54" North latitude and in between 90'28" and 90'37" East longitude. It has 534768 household and total area is km^2. Rupganj upazilla is divided into seven union parishads. There are about 27524 cattle and 21799 goats. Most of the animal patients came to the mentioned UVH are cattle and goats, therefore, we considered cattle and goats only among other animal patients for this investigation.

Figure 1: Location of Rupganj Upazilla, Narayanganj

2.2. Study period and categorization of the data

The retrospective data of 1 year from January 2023 to December 2023 were collected from patient register of Upazila Veterinary Hospital (UVH), Rupganj Upazila, Narayanganj maintained by a designated veterinary surgeon or upazila livestock officer. A total 1503

animals were registered for cattle and goats. Animal related data such as, species, age, sex, breed were considered based on the date visited to the UVH. To analyze the age specific prevalence, animals were categorized to 3 age groups according to previously published research to determine the age and breed susceptibility of different parasites, cattle were categorized into three sub groups. For HF crossbred cattle, it was calf (≤1 year), Young (>1 – < 2.5 year) and Adult (≥2.5years) and for indigenous or local cattle, it was almost same but age limit differs for young (>1-≤3.5 years) and adult cattle (>3.5 years) (Alim et al., 2012). For goats, the age category was kid (≤1 year), Young (>1-≤2.5 year) and Adult (>2.5 year) (Y.A.Sharkar et al.,2015). All the disease data were categorized as Parasitic & protozoal, digestive, respiratory, infectious, reproductive, urinary, metabolic, musculoskeletal, skin or integumentary, eye related, systematic diseases or disorders including other such as dog biting, fracture etc. To understand the seasonality in the occurrence of diseases and disorders, the entire period was further categorized into three seasons such as summer (March to June), rainy (July to October) and winter (November to February) (Alim et al., 2012).

2.5 Statistical analysis

The obtained information was imported, stored and coded accordingly using Microsoft Excel-2021. Data was analyzed using STATA. Descriptive statistics was expressed as proportion with Confidence Interval. The result was expressed in percentage with P-value for Chi-Square Test. Significance was determined when $P<0.05$.

CHAPTER III: RESULTS

3.1 Overall prevalence of diseases and disorders in cattle

A total of 43 diseases and disease conditions were recorded in 801 cattle, brought to the Upazila Veterinary Hospital for treatment purposes during the study period. Among the 801 cases, 24.47% (n=196), 3.62% (n=29), 5.24% (n=42), 32.21% (n=258), 18.73% (n=150), 0.25% (n=2), 2.37% (n=19), 0.25% (n=2), 1.37% (n=11), 0.75% (n=6), 1% (n=8), 9.74% (n=78) were recorded as parasitic & protozoal, digestive, respiratory, infectious, reproductive, urinary, metabolic, musculoskeletal, skin associated condition , eye related diseases or disorders including other and others (Table 1).

Table 1: Overall prevalence of diseases and disorders in cattle at the Upazila Veterinary Hospital, Rupganj, Narayanganj

Diseases occurred in the different system	No. of affected (N=801)	Prevalence (%)	95% CI
Parasitic & protozoal diseases			
Worm infestation	113	14.11	11.77-16.71
Lice infestation	11	1.37	0.69-2.44
Tick infestation	16	2.00	1.15-3.22
Mange	21	2.62	1.63-3.98
Myasis	23	2.87	1.83-4.28
Coccidiosis	12	1.50	0.78-2.60
Total	**196**	**24.47**	
Digestive diseases or disorders			
Acidosis	3	0.37	0.08-1.09
Indigestion	7	0.87	0.35-1.79
Bloat	3	0.37	0.08-1.09
Non-specific Diarrhea	16	2.00	1.15-3.22
Total	**29**	**3.62**	
Respiratory diseases or disorders			
Pneumonia	2	0.25	0.03-0.90
Aspiration pneumonia	4	0.50	0.14-1.27
Non-specific cold & cough	36	4.49	3.17-6.17
Total	**42**	**5.24**	
Infectious diseases			
FMD	74	9.24	7.32-11.46
LSD	62	7.74	5.99-9.81
E/Fever	70	8.74	6.88-10.91
Anthrax	9	1.12	0.51-2.12
BQ	8	1.00	0.43-1.96
HS	10	1.25	0.60-2.28
Calf scour	4	0.50	0.14-1.27

Foot rot	5	0.62	0.20-1.45
Contagious ecthyma	4	0.50	0.14-1.27
Total	**258**	**32.21**	
Reproductive diseases or disorders			
Anestrus	10	1.25	0.60-2.28
Repeat breeding	1	0.12	0.00-0.69
Mastitis	103	12.86	10.62-15.38
Retained placenta	2	0.25	0.03-0.90
Abortion	19	2.37	1.43-3.68
Prolapse	1	0.12	0.00-0.69
Dystocia	14	1.75	0.96-2.92
Total	**150**	**18.73**	
Urinary diseases or disorders			
Urolithiasis	2	0.25	0.03-0.90
Total	**2**	**0.25**	
Metabolic disorders			
Milk Fever	16	2.00	1.15-3.22
Ketosis	3	0.37	0.08-1.09
Total	**19**	**2.37**	
Musculoskeletal diseases or disorders			
Arthritis	1	0.12	0.00-0.69
Joint ill	1	0.12	0.00-0.69
Total	**2**	**0.25**	
Skin associated conditions			
Dermatitis	9	1.12	0.51-2.12
Alopecia	2	0.25	0.03-0.90
Total	**11**	**1.37**	
Eye related diseases or disorders			
Corneal opacity	2	0.25	0.03-0.90
Keratoconjunctivitis	4	0.50	0.14-1.27
Total	**6**	**0.75**	
Systemic state			
Fever	8	1.00	0.43-1.96
Total	**8**	**1.00**	
Others disease or disorders			
Fracture	25	3.12	2.03-4.57
Dog bite	11	1.37	0.69-2.44
Beef fattening	34	4.24	2.96-5.88
Wound	8	1.00	0.43-1.96
Total	**78**	**9.74**	

CI=confidence interval

The highest overall prevalence was recorded for Infectious diseases (32.21%) followed by parasitic and protozoal diseases and disorders (24.47%) reproductive disorders (18.73%) and

the lowest prevalence was recorded for urinary (0.25%) and musculoskeletal (0.25%) disorders in cattle brought to the UVH.

3.2 Season-wise prevalence of clinical diseases and disorders in cattle

Worm infestation was the highest (6.87%) during rainy season which was statistically significant < 0.05. Similarly, infectious disease prevalence was found to be greater in the summer (13.73%) than in rainy (12%) and winter season (6.49%). Infections with Food and Mouth diseases (FMD) and Lumpy Skin Diseases (LSD) were significantly higher during the rainy season (P < 0.05). Summer showed considerable variance (P<0.05) in Ephemeral fever and mastitis. The findings of the study revealed that diseases and disorders in cattle were more prevalent during the rainy season (35.83%) than in the summer (34.46%) and winter (29.71%) (Table 2).

Table 2: Season-wise prevalent of diseases and disorders in cattle

Diseases occurred in the different systems	**Summer (N-276)**	**Rainy (N-287)**	**Winter (N-238)**	
	Prevalence (%)	**Prevalence (%)**	**Prevalence (%)**	**P - value**
Parasitic & protozoal				
Worm infestation	2.62	6.87	4.62	**0.000***
Lice infestation	0.12	0.75	0.50	0.24
Tick infestation	0.75	0.62	0.62	0.93
Mange	0.87	1.12	0.62	0.83
Myasis	0.87	0.62	1.37	0.12
Coccidiosis	0.65	0.75	0.12	0.31
Total	**5.87**	**10.74**	**7.86**	**0.001**
Digestive disorders				
Acidosis	0.25	0	0.12	0.42
Indigestion	0.37	0.37	0.12	0.73
Bloat	0.12	0.12	0.12	0.99
Non-specific Diarrhea	0.25	1.12	0.62	0.13
Total	**1**	**1.62**	**1**	**0.61**
Respiratory disorders				
Pneumonia	0	0	0.25	0.09
Aspiration pneumonia	0.12	0.25	0.12	0.86
Non-specific cold & cough	1.25	1.75	1.50	0.73
Total	**1.27**	**2**	**1.87**	**0.43**
Infectious diseases				
FMD	1.12	6.24	1.87	**0.000***
LSD	4.37	2.87	0.50	**0.000***
E/Fever	5.12	1.12	2.50	**0.000***
Anthrax	0.75	0.25	0.12	0.13
BQ	0.5	0.50	0	0.24

HS	0.50	0.75	0	0.09
Naval ill	0.50	0.25	0.75	0.21
Calf scour	0.25	0	0.25	0.36
Foot rot	0.25	0	0.37	0.23
Contagious ecthyma	0.37	0	0.12	0.24
Total	**13.73**	**12.00**	**6.49**	**0.000**
Reproductive disorders				
Anestrus	0.37	0.62	0.25	0.63
Repeat breeding	0	0	0.12	0.34
Mastitis	3.37	3.50	6.00	**0.000***
Retained placenta	0	0	0.25	0.093
Abortion	1.00	1.00	0.37	0.46
Prolapse	0.12	0	0	0.41
Dystocia	0.62	0.62	0.50	0.96
Total	**5.49**	**5.74**	**7.59**	**0.009**
Urinary disorders				
Urolithiasis	0.25	0	0	0.13
Total	**0.25**	**0**	**0**	**0.13**
Metabolic disorders				
Milk Fever	1.12	0.37	0.50	0.13
Ketosis	0.25	0.00	0.12	0.37
Total	**1.37**	**0.37**	**0.62**	**0.06**
Musculoskeletal disorders				
Arthritis	0	0.12	0	0.43
Joint ill	0	0.12	0	0.46
Total	**0**	**0.24**	**0**	**0.23**
Skin conditions				
Dermatitis	0.37	0.25	0.50	0.67
Alopecia	0.12	0.12	0.00	0.73
Total	**0.50**	**0.37**	**0.50**	**0.86**
Eye diseases				
Corneal opacity	0.12	0.12	0	0.61
Keratoconjunctivitis	0.25	0.12	0,12	0.88
Total	**0.37**	**0-.24**	**0.12**	**0.79**
Systemic state				
Fever	0.62	2.25	0.12	0.21
Total	**0.62**	**0.25**	**0.12**	**0.27**
Others				
Fracture	1.25	0.87	1.00	0.72
Dog bite	0.87	0.12	0.37	0.08
Beef fattening	1.50	0.87	1.87	0.09
Wound	0.25	0.37	0.37	0.81
Total	**3.87**	**2.25**	**3.62**	**0.04***
Overall prevalence	**34.46**	**35.83**	**29.71**	

3.3 Sex, breed and age wise prevalence of clinical diseases and disorders in cattle

Breed, sex and age wise comparison of the prevalence of clinical cattle diseases and disorders recorded during the study period was performed, and the results are presented in (Table 3) and (Table 4). In this study the prevalence of parasitic & protozoal and infectious diseases was (13.98%) and (16.98%) in female which were higher than (10.49%) and (15,23%) in male. The prevalence of Food and Mouth Diseases (FMD) was higher (5.62%) in male than (3.62%) in female. The highest prevalence of parasitic and protozoal infection was estimated in the indigenous (12.73%) followed by the crossbred than the indigenous (11.73%). The prevalence of other systemic disorders was higher in the crossbred Females had significantly higher rates of infectious diseases, reproductive diseases, metabolic disorders, ocular diseases, and other ailments (136.98%, 18.73%, 2.37%, and 3.0%, 4.36% respectively) ($P<0.05$). There were a statistically significant different ($P<0.05$) in prevalence between cross and indigenous for parasitic & protozoal diseases, digestive disorders, respiratory disorders, infectious diseases, reproductive disorders, eye diseases and other categories.

Table 3: Prevalence of diseases and disorders based on breed and gender of the cattle

Different systems	**Male (N=326)**	**Female (N=475)**		**Cross (N=445)**	**Indigenous (N=356)**	
	(%)	**(%)**	**P - value**	**(%)**	**(%)**	**P - value**
Parasitic & protozoal diseases	10.70	13.98	0.51	11.73	12.73	**0.02***
Digestive disorders	1.47	1.75	0.24	2.37	1.24	**0.006***
Respiratory disorders	3.12	2.12	0.88	23.00	2.24	**0.03***
Infectious diseases	15.23	136.98	**0.008***	19.35	12.85	**000***
Reproductive disorders	0	18.73	**0.000***	9.98	8.73	**0.000***
Urinary disorders	0.25	0	0.09	0.12	0.12	0.83
Metabolic disorders	0	2.37	**0.000***	1.37	1.00	0.12
Musculoskeletal disorders	0.25	0	0.09	0	0.24	0.36
Skin conditions	0.75	0.62	0.41	0.75	0.62	0.41

Eye diseases	0.37	3.00	**0.04***	0.74	0	**0.003***
Systemic state	0.62	0.37	0.23	0.74	0.24	0.05
Others	7.74	2.00	**0.000***	5.36	4.36	**0.000***
Overall prevalence	**40.70**	**59.30**		**55.55**	**44.44**	

In Table 4 , we presented different system wise diseases and disorders in calf, young and adult where calf and young cattle were more vulnerable than adult cattle. The prevalence of reproductive disorders was more common in adult cattle. A significant difference (P<0.05) was seen in worm infestation, naval ill, mastitis, abortion, milk fever, and beef fattening between crossbred and indigenous cattle. In crossbred cattle, myasis and Ephemeral Fever infections were substantial (P<0.05), while indigenous cattle were significantly affected by coccidiosis, aspiration pneumonia, and Food and Mouth Diseases (FMD) (P<0.05).

Table 4: Prevalence of diseases and disorders based on age in cattle

	Cross				**Indigenous**			
Diseases occurred in the different systems	**Calf (N=213) ≤1 year**	**Young (N=153) >1 to ≤2.5 year**	**Adult (N=81) >2.5year**	**P - value**	**Calf (N=139) ≤1 year**	**Young (N=171) >1 to ≤3.5 year**	**Adult (N=46) > 3.5year**	**P - value**
	%	**%**	**%**		**%**	**%**	**%**	
Parasitic & protozoal diseases								
Worm infestation	5.74	1.75	0	**0.000***	5.24	1.25	0.12	**0.000***
Lice infestation	0.12	0.25	0	0.12	0.37	0.62	0	0.51
Tick infestation	0.75	0.62	0.12	0.65	0	0.37	0.12	0.34
Mange	1.00	0.37	0	0.23	0.50	0.62	0.12	0.98
Myasis	1.12	0	0.25	**0.04***	0.50	1.00	0	0.31
Coccidiosis	0.5	0	0	0.11	0.99	0	0	**0.001***
Total	**9.24**	**3.00**	**0.37**	**0.000**	**7.62**	**3.87**	**0.37**	**0.000**
Digestive disorders								
Acidosis	0.12	0.25	0	0.51	0	0	0	_
Indigestion	0.37	0	0	0.25	0.37	0.12	0	0.36
Bloat	0	0	0	_	0.12	0.12	0.12	0.61
Non-specific Diarrhea	0.5	0	0	0.16	0.74	0.50	0.25	0.63

Total	**1.00**	**2.25**	**0**	**0.13**	**1.25**	**0.75**	**0.37**	**0.37**
Respiratory disorders								
Pneumonia	0.12	0.12	0	0.83	0	0	0	_
Aspiration pneumonia	0	0	0	_	0.50	0	0	**0.04***
Non-specific cold & cough	1.25	1.25	0.25	0.46	0.99	0.50	0.25	0.33
Total	**1.37**	**1.37**	**0.24**	**0.3**	**1.50**	**0.5**	**0.25**	**0.04**
Infectious diseases								
FMD	3.87	1.87	1.12	0.41	1.24	0.50	0.62	**0.03***
LSD	2.50	1.00	0.25	0.07	1.37	2.12	0.12	0.21
E/Fever	4.24	1.50	0	**0.001***	0.87	2.00	0.12	0.13
Anthrax	0.75	0.12	0	0.12	0	0.25	0	0.35
BQ	0.50	0	0	0.11	0.25	0.25	0	0.78
HS	0.25	0.50	0	0.24	0.12	0.37	0	0.53
Naval ill	1.00	0	0	**0.01***	0.50	0	0	**0.04***
Calf scour	0.25	0	0	0.34	0.25	0	0	0.21
Foot rot	0.12	0.25	0	0.44	0	0.25	0	0.31
Contagious ecthyma	0	0.37	0	0.16	0	0.12	0	0.67
Total	**10.8**	**5.62**	**1.37**	**0.000**	**4.62**	**5.87**	**0.87**	**0.21**
Reproductive disorders								
Anestrus	0	0.50	0.25	0.06	0	0.37	0.12	0.31
Repeat breeding	0	0	0	_	0	0.12	0	0.62
Mastitis	0	1.87	5.10	**0.000***	0	3.62	2.24	**0.000***
Retained placenta	0	0	0	_	0	0.12	0.12	0.23
Abortion	0	0.50	0.60	**0.002***	0	1.00	0.25	**0.03***
Prolapse	0	0.12	0	0.43	0	0	0	_
Dystocia	0	0.25	0.75	0.62	0	0.62	0.12	0.13

Total	**0**	**3.24**	**6.74**	**0.000**	**0**	**5.86**	**2.87**	**0.000**
Urinary disorders								
Urolithiasis	0.12	0	0	0.63	0.12	0	0	0.61
Total	**0.12**	**0**	**0**	**0.63**	**0.12**	**0**	**0**	**0.61**
Metabolic disorders								
Milk Fever	0	0	1.25	**0.000***	0	0.12	0.62	**0.000***
Ketosis	0	0.12	0	0.45	0	0.12	0.12	0.27
Toral	**0**	**1.12**	**1.25**	**0.45**	**0**	**0.24**	**0.74**	**0.000**
Musculoskeletal disorders								
Arthritis	0	1	0	0.43	0.12	0	0	0.61
Joint ill	0	0	0	_	0	0.12	0	0.67
Total	**0**	**0.12**	**0**	**0.43**	**0.12**	**0.12**	**0**	**0.98**
Skin conditions								
Dermatitis	0.37	0.25	0	0.61	0.37	0.12	0	0.31
Alopecia	0	0	0	_	0.25	0	0	0.23
Total	**0.37**	**0.25**	**0**	**0.61**	**0.62**	**0.12**	**0**	**0.08**
Eye diseases								
Corneal opacity	0	0.50	0.12	0.06	0	0.37	0.12	0.34
Keratoconjunctivitis	0	0	0	_	0	0.25	0	0.36
Total	0	0.50	0	0.06	0	0.62	0	0.06
Systemic state								
Fever	0	0.37	0	0.05	0.37	0.25	0	0.53
Total	**0**	**0.37**	**0**	**0.05**	**0.37**	**0.25**	**0**	**0.53**
Others								
Fracture	0.50	0.75	0	0.13	0.50	1.00	0.12	0.64
Dog bite	0.37	0.62	0	0.25	0.25	0.12	0	0.63

Beef fattening	0	2.50	0	**0.000***	0	1.75	0	**0.000***
Wound	0.12	0.25	0	0.41	0.37	0.25	**0**	0.51
Total	**1**	**4.12**	**0**	**0.000**	**1.12**	**3.12**	**0.12**	**0.009**
Overall prevalence	**23.90**	**16.71**	**10.12**		**17.34**	**20.70**	**5.22**	

3.5 Overall prevalence of diseases and disorders in goats

A total of 37 diseases and disease conditions were recorded in 702 goats came to UVH of Rupganj where 27.21%(n=191) were affected with parasitic and protozoal infestation, 10.11%(n=71) were affected with digestive disorders, 5.98%(n=42) were affected with respiratory disorders, 20.37%(n=143) were affected with infectious diseases, 20.51%(n=144) were affected with reproductive disorders, 1%(n=7) were affected with urinary disorders, 0.42%(n=3) were affected with musculoskeletal disorders, 1.71%(n=12) were affected with skin disorders, 1.14%(n=2) were affected with eye diseases. 1.71%(n=12) and 9.83%(n=9.83%) were affected with systemic state and others (Table 6)

Table 5: Overall prevalence of diseases and disorders in goats at the Upazila Veterinary Hospital, Rupganj, Narayanganj

Diseases occurred in the different systems	No. of affected (N=702)	Prevalence (%)	95% CI
Parasitic & protozoal diseases			
Worm infestation	100	14.25	11.74-17.05
Lice infestation	23	3.28	2.09-4.88
Tick infestation	6	0.85	0.31-1.85
Mange	18	2.56	1.53-4.02
Gid disease	3	0.43	0.09-1.24
Myasis	32	4.56	3.14-6.37
Coccidiosis	9	1.28	0.59-2.42
Total	**191**	**27.21**	
Digestive disorders			
Acidosis	12	1.71	0.78-2.79
Indigestion	7	1.00	0.40-2.04
Stomatitis	3	0.43	0.09-1.24
Anorexia	2	0.28	0.03-1.03
Abdominal hernia	2	0.28	0.03-1.03
Non-specific Diarrhea	45	6.41	4.71-8.48
Total	**71**	**10.11**	
Respiratory disorders			
Pneumonia	4	0.57	0.16-1.45
Aspiration pneumonia	3	0.43	0.09-1.24
Non-specific cold & cough	35	4.99	3.50-6.87
Total	**42**	**5.98**	
Infectious diseases			
Naval ill	10	1.42	0.69-2.60
PPR	118	16.81	14.12-19.78
Foot rot	2	0.28	0.03-1.03
Tetanus	6	0.85	0.31-1.85
Contagious ecthyma	7	1.00	0.40-2.04
Total	**143**	**20.37**	

Reproductive disorders			
Anestrus	8	1.14	0.49-2.23
Mastitis	110	15.67	13.06-18.57
Retained placenta	3	0.43	0.09-1.24
Abortion	15	2.14	1.20-3.50
Dystocia	5	0.71	0.23-1.65
Udder edema	3	0.43	0.09-1.24
Total	**144**	**20.51**	
Urinary disorders			
Urolithiasis	7	1.00	0.40-2.04
Total	**7**	**1.00**	
Musculoskeletal disorders			
Arthritis	2	0.28	0.03-1.03
Joint ill	1	0.14	0.00-0.79
Total	**3**	**0.43**	
Skin conditions			
Dermatitis	3	0.43	0.09-1.24
Alopecia	9	1.28	0.59-2.42
Total	**12**	**1.71**	
Eye diseases			
Keratoconjunctivitis	8	1.14	0.49-2.23
Total	**8**	**1.14**	
System state			
Fever	12	1.71	0.78-2.79
Total	**12**	**1.71**	
Others			
Fracture	39	5.56	3.98-7.52
Dog bite	17	2.42	1.42-3.85
Wound	13	1.85	0.99-3.15
Total	**69**	**9.83**	

3.6 Season wise prevalence of clinical diseases and disorders in goats

Data on diseases infestation in goat related with season revealed that most of the diseases occurred during the rainy season than that of summer and winter ones. Higher disease frequency was observed in the winter season for reproductive disorders, rainy season for parasitic and protozoal diseases, summer season for infectious diseases (Table 7). Occurrence of worm infestation, non-specific diarrhea and PPR were ranked the highest in rainy season which was statistically significant ($P<0.05$). Lice infestation, mastitis and retained placenta were more prevalent in winter season and statistically significant ($P<0.05$)

Table 6: Season-wise prevalent of diseases and disorders in goats

Diseases occurred in the different systems	Summer (N-227)	Rainy (N-254)	Winter (N-221)	P - value
	%	%	%	
Parasitic & protozoal diseases				
Worm infestation	4.13	7.69	2.42	**0.001***
Lice infestation	0.56	0.42	2.27	**0.000***
Tick infestation	0.14	0.42	0.28	0.73
Mange	0.70	0.28	1.56	**0.01***
Gid disease	0	0.28	0.14	0.45
Myasis	1.70	1.28	1.56	0.62
Coccidiosis	0.56	0.42	0.28	0.71
Total	**7.83**	**10.83**	**8.55**	**0.43**
Digestive disorders				
Acidosis	0.99	0.42	0.28	0.16
Indigestion	0.14	0.14	0.70	0.07
Stomatitis	0	0.14	0.28	0.34
Anorexia	0	0	0.28	o.12
Abdominal hernia	0	0.28	0	0.26
Non-specific Diarrhea	0.99	3.27	2.13	**0.03***
Total	**2.14**	**4.27**	**3.70**	**0.14**
Respiratory disorders				
Pneumonia	0.28	0.14	0.14	0.78
Aspiration pneumonia	0	0.28	0.14	0.41
Non-specific cold & cough	1.70	1.13	2.13	0.23
Total	**2.00**	**1.57**	**2.42**	**0.36**
Infectious diseases				
Naval ill	0.85	0.42	0.14	0.12
PPR	6.55	6.98	3.27	**0.009***
Foot rot	0.14	0.14	0	0.06
Tetanus	0.28	0.28	0.28	0.9
Contagious ecthyma	0.70	0	0.28	0.05
Total	**8.55**	**7.83**	**4.00**	**0.25**
Reproductive disorders				
Anestrus	0.28	0.42	0.42	0.98
Mastitis	4.13	4.84	6.69	**0.02***
Retained placenta	0	0	0.42	**0.04***
Abortion	0.70	0.99	0.42	0.63
Dystocia	0.28	0	0.42	0.21
Udder edema	0.14	0.28	0	0.43
Total	**5.56**	**6.55**	**8.40**	**0.02***
Urinary disorders				
Urolithiasis	0.42	0.42	0.14	0.61
Total	**0.42**	**0.41**	**0.14**	**0.61**
Musculoskeletal disorders				
Arthritis	0	0.14	0.14	0.62

Joint ill	0	0	0.14	0.31
Total	**0**	**0.14**	**0.28**	**0.34**
Skin conditions				
Dermatitis	0.14	0.14	0.14	0.91
Alopecia	0.28	0.70	0.28	0.52
Total	**0.42**	**0.85**	**0.42**	**0.61**
Eye diseases				
Keratoconjunctivit**is**	0.28	0	0.85	0.35
Total	**0.28**	**0**	**0.85**	**0.35**
System state				
Fever	0.99	0.42	0.28	0.13
Total	**1.00**	**0**	**0.28**	**0.13**
Others				
Fracture	2.13	1.99	1.42	0.64
Dog bite	0.49	0.56	0.70	0.42
Wound	0.85	0.70	0.28	0.43
Total	**4.13**	**3.28**	**2.42**	**0.26**
Overall prevalence	**32.34**	**36.18**	**31.48**	

3.7 Breed, sex and age wise prevalence of clinical diseases and disorders in goats

In Table 8, the clinical prevalence of illnesses and abnormalities in male and female goats is compared. The prevalence of PPR and worm infestation was higher (9.26%) and (8.55%) in female than (7.55%) and (5.70%) in male and it turns out that females Significantly higher prevalence of parasitic and protozoal diseases, digestive disorders, urinary disorders, musculoskeletal disorders and others conditions were recorded in male which were 13.68%, 6.41%, 1.00%, 0.43%, 6,41% (P<0.05) and reproductive disorders were recorded in female 20.51% (P<0,05). According to estimates, the cross breed had the highest prevalence of parasitic and protozoal infection (16.38%), followed by the indigenous (10.82%). It turns out that cross breeds are more susceptible than indigenous.

Table 7: Prevalence of diseases and disorders based on breed and gender of the goat

Different systems	**Male (N=299)**	**Female (N=403)**	**P - value**	**Cross (N=394)**	**Indigenous (N=308)**	**P – value**
	%	**%**		**%**	**%**	
Parasitic &protozoal diseases	13.68	13.53	**0.01***	16.38	10.82	0.21
Digestive disorders	6.41	3.70	**0.000***	5.69	4.41	0.93
Respiratory disorders	3.28	2.71	0.15	3.13	2.84	0.65
Infectious diseases	9.26	11.11	0.41	11.25	9.11	0.89
Reproductive disorders	0	20.51	**0.000***	10.68	9.82	0.31

Urinary disorders	1.00	0	**0.002***	0.56	0.42	0.99
Musculoskeletal disorders	0.43	0	**0.04***	0.28	0.14	0.73
Skin conditions	0.85	0.85	0.62	1.13	0.56	0.51
Eye diseases	0.71	0.43	0.33	0.85	0.28	0.32
System state	0.57	1.14	0.12	1.28	0.42	0.24
Others	6.41	3.42	**0.000***	4.84	4.98	0.21
Overall prevalence	**42.59**	**57.41**		**56.13**	**43.87**	

(Table 9) provides a summary and presentation of the age-wise distribution of goa diseases and disorders according to systems. Goats with reproductive abnormalities were more likely to be adults, while kids were more likely to have urolithiasis and parasitic and protozoal illnesses. Worm infestation, lice infestation, non- specific diarrhea, naval ill and PPR were more prevalent in kid than young and adult which was statistically significant (P<0.05). Alopecia was significant in young goat and the prevalence of reproductive disorders increased significantly (P<0.05) in adult cattle.

Table 8: Prevalence of diseases and disorders based on age in goats

Diseases occurred in the different systems	**Kid (N=352) ≤1 year**	**Young (N=298) >1 to ≤2.5 year**	**Adult (N=52) >2.5 year**	**P - value**
	%	**%**	**%**	
Parasitic & protozoal diseases				
Worm infestation	11.68	2.13	0.42	**0.000***
Lice infestation	2.56	0.71	0	**0.02***
Tick infestation	0.14	0.71	0	0.13
Mange	1.28	1.13	0.14	0.98
Gid disease	0.14	0.28	0	0.73
Myasis	2.99	1.13	0.42	0.11
Coccidiosis	1.13	0.14	0	0.07
Total	**19.94**	**6.27**	**1.00**	**0.000**
Digestive disorders				
Acidosis	0.85	0.85	0	0.62
Indigestion	0.42	0.28	0.28	0.09
Stomatitis	0	0.42	0	0.13
Anorexia	0.14	0.14	0	0.94
Abdominal hernia	0.28	0	0	0.4
Non-specific Diarrhea	4.13	1.42	0.85	**0.01***
Total	**5.84**	**3.13**	**1.13**	**0.08**
Respiratory disorders				
Pneumonia	0.56	0	0	0.13
Aspiration pneumonia	0.42	0	0	0.25

Non-specific cold & cough	2.70	1.99	0.28	0.82
Total	**3.70**	**2.00**	**0.28**	**0.31**
Infectious diseases				
Naval ill	1.42	0	0	**0.006***
PPR	10.68	5.84	0.28	**0.04***
Foot rot	0.14	0.14	0	0.93
Tetanus	0.28	0.56	0	0.44
Contagious ecthyma	0.56	0.28	0.14	0.71
Total	**13.11**	**6.84**	**0.43**	**0.000**
Reproductive disorders				
Anestrus	0	0.99	0.14	**0.02***
Mastitis	0	13.53	2.13	**0.000***
Retained placenta	0	0.14	0.28	**0.000***
Abortion	0	1.70	0.42	**0.000***
Dystocia	0	0.42	0.28	**0.006***
Udder edema	0	0.14	0.28	**0.000***
Total	**0**	**16.95**	**3.56**	**0.000**
Urinary disorders				
Urolithiasis	0.71	0.28	0	0.57
Total	**0.71**	**0**	**0**	**0.57**
Musculoskeletal disorders				
Arthritis	0.14	0.14	0	0.98
Joint ill	0	0.14	0	0.54
Total	**0.14**	**0.28**	**0**	**0.76**
Skin conditions				
Dermatitis	0.28	0.14	0	0.82
Alopecia	0.14	1.13	0	**0.02***
Total	**0.42**	**1.27**	**0**	**0.06**
Eye diseases				
Keratoconjunctivitis	0.28	0.85	0	0.24
Total	**0.28**	**0.85**	**0**	**0.24**
System state				
Fever	0.85	0.71)	0.14	0.92
Total	**0.85**	**0.71**	**0.14**	**0.92**
Others				
Fracture	3.56	1.56	0.42	0.21
Dog bite	0.85	1.28	0.28	0.48
Wound	0.71	0.99	0.14	0.71
Total	**5.13**	**3.85**	**0.85**	**0.83**
Overall prevalence	**50.14**	**42.15**	**7.40**	

CHAPTER IV: DISCUSSION

4.1 Parasitic and protozoal diseases

Overall, parasitic and protozoal diseases were the most frequent among all diseases and disorders, and the prevalence were (24.47%) in cattle and (27.21%) in goat, these findings were congruent with previous studies from Bangladesh (Alam et al., 2018; Hossain et al., 2016; Sen et al., 2018)**.** Parasitic infestation was also found as the most frequent in case of female in the studied areas due to less attention against preventing measures of worm as described as Rahman *et al.* (2012). Gid disease was recorded only in three goats (0.44%). In goats, Samad (2001) found that 5.38% gid disease in goats. Myiasis was recorded in 2.87% cattle and 4.56% goats. The highest number of myiasis cases were observed more during winter (cattle 1.37% and goats 1.57%) in comparison to summer and rainy seasons, although Samad (2001) recorded the highest myiasis cases in cattle and goats during summer season in comparison to winter and rainy seasons. In this study myasis was more frequent in goats than cattle that agreed by Karim et al. (2014). In the case of parasitic and protozoal diseases, the highest prevalence was observed in the rainy season (10.74%) in cattle and (10.83%) in goat compared to the summer and winter seasons, it was similar to the findings of Lucky et al. (2016). The possible reason behind this might be the wet weather conditions, ignorance of farmer about the parasitic infestation, lack of anthelmintics administration which facilitated parasitic and protozoal agents for infestation and distribution. Islam et al. (2012b) claim that the geoclimatic conditions of the study area made vectors of various internal and external parasites more common, which in turn made parasitic disorders more common.

4.2 Digestive disorders

Several types of digestive disorders including acidosis, bloat, indigestion, stomatitis, abdominal hernia, non-specific diarrhea was recorded in different ruminants. Digestive disorders were found 3.62% and 10.11% in cattle and goat while diarrhea was found in highest number in both cattle and goat, followed by acidosis, bloat, indigestion and abdominal hernia. According to earlier studies, the two main digestive issues affecting ruminants were acidosis and diarrhea (Alam et al., 2014). According to another study, the prevalence of diarrheal illnesses in goats and cattle was 12.1% and 7.6%, respectively (Rahman et al., 2013). The highest percentage of diarrheal cases was recorded during rainy (1.12%) in cattle and (3.28%) in goat and these observations contradict with the report of Samad *et al.* (2002) who reported diarrheal diseases was highest during rainy, followed by summer and lowest during winter seasons.

4.3 Respiratory disorders

The prevalence of respiratory disorders was 5.24% in cattle and 5.28% in goat in all clinical case. Respiratory disorders were found in highest number in calves (2.87%) and kids (3.70%), followed by young and adult. However, Hossain et al., (1988) reported 15.49% incidence rate of pneumonia in calves on necropsy examination in Mymensingh. Around 0.25% and 0.57% cases of pneumonia were recorded in cattle and goats. Cases of pneumonia in cattle were comparatively lower than the earlier reports of Samad (2001) and Samad *et al.* (2002) who reported 0.84% and 1.24% pneumonia in cattle. The highest percentage of pneumonia was recorded during winter and rainy seasons followed by summer seasons in goats and cattle. This observation almost similar with the report of Samad *et al.* (2002) who reported the highest percentage of pneumonia in cattle during winter (47.06%) in comparison to rainy and summer seasons.

4.4 Infectious diseases

Overall, 32.21% cattle and 20.37% goats were affected with major infectious diseases which support the earlier reports of Debnath *et al.* (1990) and Samad *et al.* (2002) who reported 5.86% and 4.7 %. The present study shown a significantly higher prevalence of infectious diseases in the summer season (13.75%) in cattle and 8.55% in goat followed by rainy and winter seasons. These findings were disagreed with the results of Badruzzaman et al. (2015), who also reported the highest prevalence in the rainy season. The prevalence of FMD in this study was (9.24%) which was higher than the results of Samad (2001) and Rahman *et al.* (2012) who reported 1.79%, 1.3% cases of FMD in cattle respectively. But our results are significantly different from the recent report of Bangladesh as 4.74% and 0.27%. Sarker *et al.* (2011) and Mannan *et al.* (2009) stated that prevalence of foot and mouth disease (25.07%) at Rajshahi district and 24.51% at Meghna upazila of Comilla respectively which was higher than this study. Animals were affected with FMD virus although fewer in female (3.62) and more in male (5.62%). Again, most of the FMD cases were recorded in cross breed (19.35%) compared to local/indigenous breed of cattle (12.86%). These results support the findings of earlier outputs who stated 0.88% and 1.3% cases of FMD in calves and cattle, respectively (Debnath et al., 1990; Rahman et al., 2013). Earlier, in various parts of the country, many authors reported greater prevalence rates of FMD in cattle, ranging from as low as 6.91% in females to as high as 38.96% in males (Alam et al., 2018; Chowdhury et al., 2020; Islam et al., 2019; Karim et al., 2014; Lucky et al., 2016). Breed, sex, and topographical location may be the cause of these variances, and more research can support this theory. During this study, we recorded around 16.81% cases of PPR in goats. PPR were recorded higher in female goat

(9.26%) than male goats (7.55%). Similar findings were reported by other researchers who reported 27.94% and 8.33% PPR in goats (Lucky et al., 2016; Rahaman, 2017). Overall, navel-ill was recorded only in cattle calves and kids of goat. This outcome supports the earlier results of where (0.79%) and (0.62%) navel-ill cases were recorded in calves and kids, respectively (Samad, 2001). In earlier, 46.9% and 10.1% navel-ill in calves were noted in Sirajgonj and Patuakhali district of Bangladesh, respectively (Rahman et al., 2013).

4.6 Reproductive disorders

Anestrus was recorded in 1.25% cattle and 1.14% in goat. However, Samad (2001) reported 0.86% in cattle and 0.47% in goats. Retained placenta was recorded only in 0.25% cows and 0.43% goats. The reports of Rahman *et al.* (1999) and Samad (2001) who reported 0.37% and 0.50% cases of retained placenta in cows, respectively. Occurrence of mastitis was recorded more in cattle 12.86% and in goat 15.67% these findings were dissimilar with the study, 6.59% and 2.38% mastitis were recorded in cattle and goat, respectively (Alam et al., 2018). This disorder was recorded in 0.12% cattle. However, Rahman *et al.* (1999) shown lower percentage (0.64%) of repeat breeding in cattle. Uterine prolapse was recorded in 0.12% cows. Islam *et al.* (1998) reported 1.89% uterine prolapse in cows. Dystocia was recorded in cow (0.71%) and doe (1.75%). According to Samad (2001), the prevalence of dystocia in cows and does was 0.02% and 1.56%, respectively.

4.7 Urinary disorders

Urolithiasis was recorded in cattle (0.25%) and in goats (1%) and it is a main problem for goats reported previously (Sutradhar et al., 2018). Urolithiasis was affected in male cattle (1%) and male goat (0.25%) which supports the previous study who investigated prevalence of urolithiasis was higher in male goats (1.37%) than female goats (Parvez et al., 2014).

4.8 Metabolic diseases

In this study, the highest prevalence of milk fever of cattle (2%) was found in metabolic disease. The prevalence of milk fever was reported by Bediuzzaman et al. (2015) to be 1.26%, which is lower than what we observed.

4.9 Musculo-skeletal disorders

Arthritis was recorded in only one cattle (0.12%) and two goats (0.28%), which is in agreement with the findings of Samad (2001) who reported 0.02% and 0.31% cases of arthritis in cattle and goats, respectively. Both in cattle and goats, the highest percentage of arthritis was reported during rainy followed by winter and rainy seasons.

4.10 Skin conditions

1.12% cattle and 0.48% goats were recorded as dermatitis cases. Samad *et al.* (2002) also reported dermatitis (9.64%) as the major skin disease of calves. The highest percentage of dermatitis was recorded in cattle during summer (0.5%) than winter (0.37%) and rainy (0.25%) seasons. Samad *et al.* (2002) reported the higher percentage of dermatitis in calves during summer season (47.24%).

4.11 Eye diseases

Goats had a higher percentage of eye disorders (1.14%) than cattle (0.75%). This finding corroborates Samad's (2001) earlier claim that goats had a greater percentage of eye disorders (7.72%) than cattle (1.18%). Debnath *et al.* (1990) and Samad *et al.* (2002) reported 1.02% and 2.42% eye diseases in calves, respectively. The percentage of eye diseases was highest during summer (0.37%) and rainy (0.25%) seasons than winter (0.12%) in case of cattle. This observation is in agreement with the report of Samad *et al.* (2002) who reported highest percentage of eye diseases during rainy season. Similarly, in case of goats, percentage of eye diseases was highest during rainy (0.85%) followed by summer and winter seasons. 0.12% cows. Islam *et al.* (1998) indicated (1.89%) uterine prolapse in cows. Dystocia was recorded in cow (0.71%) and doe (1.75%). Samad (2001) reported 0.02% and 1.56% dystocia cases in cows and does, respectively.

4.12 Systemic state

The prevalence of fever with an unknown etiology was found to be 1.71% in goats and 1% in cattle. The percentages of occurrence of fever in this study are comparatively lower than the previous reports of 9.04% to 12.1% cases of fever in cattle (Pharo, 1987; Hoque and Samad, 1996; Samad, 2001; Samad *et al.*, 2002) and 10.37% fever cases in goats (Hoque and Samad, 1997). Although the fever cases were recorded in all the three seasons of the year but highest rate was recorded during summer both in cattle (0.62%) and goats (1%). This conclusion slightly supports the findings of Hoque and Samad (1996) and Samad *et al.* (2002) who showed higher percentage of fever in calves during rainy and summer seasons.

4.13 other conditions

Wound was found in 1% cattle and 1.85% goats (Table 1 and 3). Hossain *et al.* (1986) reported 45.2% traumatic injury in cattle. But according to Samad (2001), 2.73% and 0.77% of cattle had wounds. The percentage of goats with a fracture was 5.56%. According to Hossain et al. (1986) and Samad (2001), among surgical conditions in goats, fracture cases were 8.2% and 1.1%, respectively.

LIMITATIONS

Only hospital cases (from the hospital record book) were included in the study, hence the results do not fairly represent the entire Upazilla. A small percentage of cases were diagnosed using laboratory testing, while the majority were diagnosed using clinical signs and symptoms. Another drawback was the inclusion of past cases, whose data might not be as recent as that of current cases.

CONCLUSION

The purpose of this study was to examine the current state of animal diseases and disorders of animals brought to upazila veterinary hospital of Rupganj Upazila. Narayanganj. Animal health and total output are being greatly impacted by diseases and disorders, which in turn have an effect on the economy. Cattle and goats are particularly vulnerable to protozoal and parasitic illnesses, respectively. This might be because the farmers are unaware of the need to treat their animals with anthelmintic agents, and the alluvial, arid soil, and moderate climate provide intermediate hosts for parasitic infestation. In this region, infectious diseases such as paste des petites ruminants (PPR) and foot and mouth disease (FMD) were prevalent. Consequently, immunization and movement restrictions are required to control these diseases. According to the report, the most common conditions include worm infestation, mastitis, non-specific diarrhea, and cold and cough. To keep animals from being exposed to infectious diseases during certain seasons, the necessary biological security precautions should be done. Thus, to optimize the production of rural livestock, appropriate nutrition, regular anthelmintic treatment, and care are crucial. The knowledge gathered from this research will help us better understand the clinical procedures using animals in particular disciplines and implement the necessary national policy-level disease prevention measures. To prevent and control illnesses and disorders, the right policies and initiatives must be implemented.

REFFERENCES

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