Chapter 1: Introduction

Bangladesh is a densely populated agro-based developing country where livestock plays a key role in growing national economy. Livestock is an integral sector of agricultural economy of Bangladesh performing multi-dimensional functions such as provision of food, nutrition, income, savings, draft power, manure, transport, social, and cultural functions (Tareque and Chowdhury, 2010). However, Livestock contributes about 1.60% of the total GDP (Gross Domestic Product) whereas livestock sub sector contributes 14.31% to agricultural GDP and 3% to National economy (DLS, 2017). Furthermore, more than 10 million people directly depends on these sectors for their livelihoods (Karim et al., 2010). It generated twenty percent (20%) of full time employment and fifty percent (50%) of part time employment of total population and also supply livestock products (meat, milk and eggs) (DLS, 2017). Livestock plays a very important economic, social and cultural role and function to rural livelihood worldwide (Shackleton et al. 2005; Dovie et al. 2006). For example, it assists in the improvement of income, and asset savings of rural families (Bettencourt et al., 2013). Livestock subsector provides new raw material for industry, serves a social security for the rural poor people, and provides security against crop failure or damage during draught or cyclone (Sarker et al., 2015).

Generally, the overall condition of this valuable resource is not satisfactory. Currently, Bangladesh has total 383.9 million livestock of which ruminant population is 54.7 million. Among ruminant population, cattle, buffalo, sheep and goat are 23.9, 1.4, 3.4 and 25.9 million, respectively (DLS, 2017). Though Bangladesh has one of the highest livestock populations in the world, but characterized by very low productivity, particularly in cattle because of low productivity, inferior genetic material, indiscriminate breeding leading to severe genetic erosion, neglect of animal healthcare and non- existence of an efficient value chain, shortage of feeds and fodder resources

and lack of awareness (BIDS, 2012). Again, the management practices of animals and geo-climatic condition of Bangladesh are favorable for the occurrence of various diseases (Onneshan et al., 2014). It has been reported that about 10% animals die annually because of diseases (Ali et al., 2011). These diseases are responsible for reduced production and mortality.

Viral diseases like foot and mouth disease (FMD), bovine ephemeral fever, peste des petits ruminants (PPR), goat pox, contagious ecthyma, and rabies, and bacterial diseases such as mastitis, black quarter, pneumonia, tetanus, enterotoxaemia, foot rot and colibacillosis, and fungal diseases like ring worm infection are common causes for ruminant mortality in rural areas (Kashem et al., 2012). People from the neighboring areas bring their sick animals to the Upazila veterinary hospital (UVH) regularly for clinical diagnosis and treatment. Cases referred by other private and government veterinarians or non-veterinarians also come to the UVH. Veterinarian generally examine the patient and provide required treatment to the patient and advice to the owner as well.

A healthy livestock population can be achieved by providing proper veterinary care. To ensure this appropriate treatment, application of medication properly is necessary. Generally, assigned veterinarian hardly follows the patient health condition after giving treatment to owner. It is a great constrain in the way of development of livestock sector in Bangladesh. A few studies were conducted on prevalence of common diseases found in different UVH in Bangladesh. However, no comprehensive studies have been conducted yet to determine the effectiveness of treatment by making follow up in Bangladesh. Therefore, the present study was attempted to determine the distribution of ruminant diseases, drug prescription patterns of different diseases, effectiveness of prescribed treatment provided by UVH and identify the possible determinants of ineffectiveness.

The specific objectives of the study were:

1. To evaluate the efficacy of treatment provided at UVH facilities.
2. To determine the occurrence of diseases at UVH in relation to farmers and patients demographic variable.

Chapter 2: Materials and Method

2.1 Study area

The study was conducted in Upazila Veterinary Hospital (UVH), Raozan, Chittagong. This hospital was chosen by Director of External Affairs as one of the internship placements for DVM internship program at Chittagong Veterinary and Animal Sciences University (CVASU).

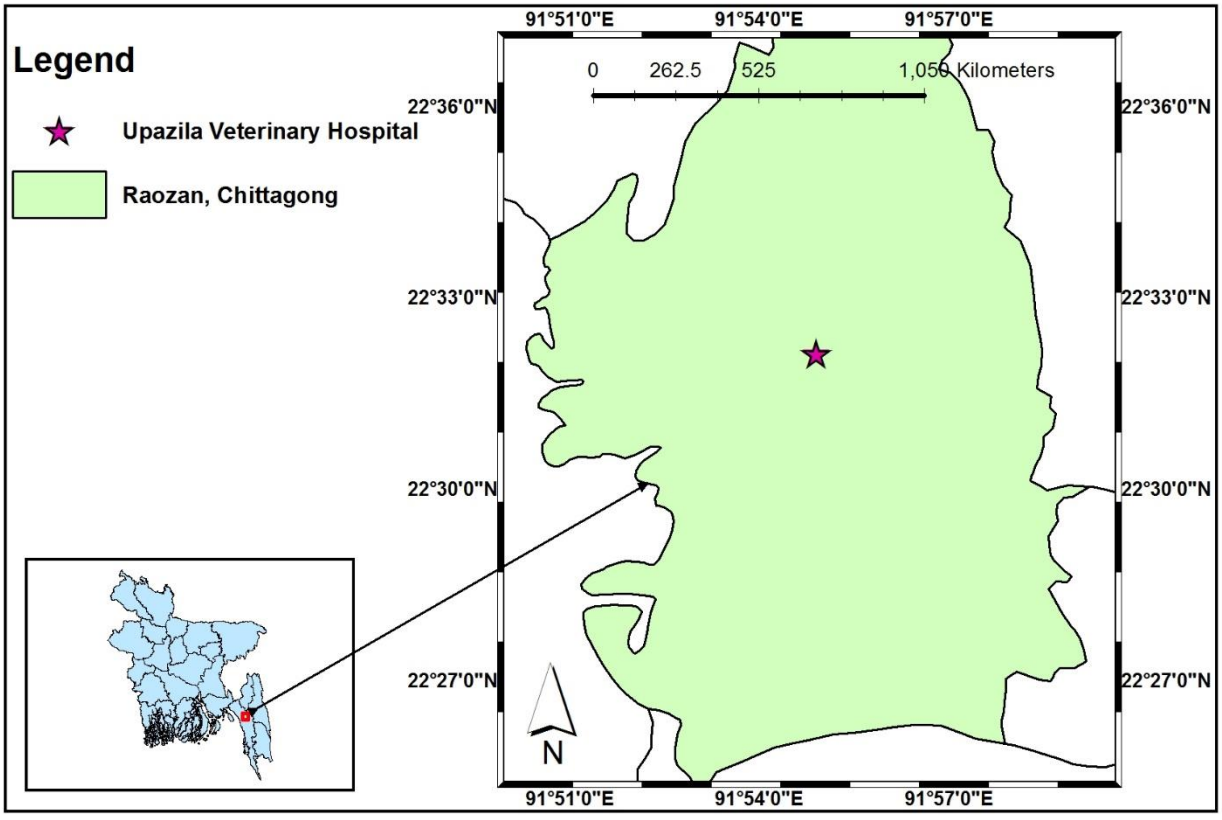

Fig 1: Study area (Raozan, Chittagong)

2.2 Study period

Animals that brought to the UVH, Raozan, Chittagong were chosen during the period from 1 February 2018 to 29 March 2018.

2.3 Study population

A total of 34 cases including 20 cattle and 14 goats were included randomly in this study from the cases came to the UVH during this study period. The population of ruminants of Raozan upazila are 59125 cattle, 825 buffalos, 17975 goats and 245 sheep (Personal communication, DLS, 2018).

2.4 Questionnaire and Data collection

A structured questionnaire was developed and administered to the owners to obtain information related to identity data, farmers as well as patient's details and follow-up details. Identity data include number of the registration and date. Farmer's and patient's details include source of the patient, name of the owner, gender of the owner, mobile number of the owner, educational status, address and number of animal reared. In this study, we considered graduated person as educated and non-graduated as uneducated. Patient data includes species, breed, age, sex, body weight, BCS, rearing system, vaccination, deworming etc. Other questions were filled after clinically examining the patient and providing treatment and follow up to the patient.

2.5 Anamnesis

The history of the sickness of the animals were recorded by carefully asking questions to the owners. Age and sex of the animals were also recorded. Age of the animals was determined by dentition and asking the owners. Feeding and housing management history were also recorded.

2.6 Clinical Examination

Among clinical examinations body condition, temperature, consistency of feces and any prominent clinical signs were recorded. Based on these findings a presumptive

diagnosis was made. In addition, skull bone was palpated to feel the thickness of bone, the umbilical region of the calves was examined for any swelling, wound or hernial ring. The hindquarter and thigh muscles were observed to see lameness and crepitation on palpation. The udders of the cows were palpated to detect any enlargement, reddening or pain. The body surface of animals was examined for any swelling, wound or solid outgrowth. In ungulate animal mouth and feet were observed to detect any vesicle, wound or salivation. Cows with the history of failure to conceive were examined by rectal palpation whether there are any abnormalities of reproductive tract. Cows were observed with the hanging of retained fetal membrane after 12hours of parturition. Ruminal movement was observed through palpation. Different joints of the animals were examined to detect any swelling or pain. Abnormal sound of respiratory tract was detected through stethoscope.

2.7 Treatment and follow up

After diagnosis of diseases by veterinarian, treatment was given to the patient. After that, data was recoded on use of antibiotics and supportive drugs. After 7 days, I called the owner to follow up the patient via mobile phone. I asked few questions to the owner on completion of drug course, how many days they continued the treatment, recovery from the problem and current health status of the patient.

2.8 Statistical evaluation

Data were entered to the MS Excel 2007 and then exported to STATA-13 for performing statistical analysis. Descriptive analysis was done for different factors related to owner and patient details as well as treatment and follow up. The results were expressed in frequency numbers, percentage, confidence interval, probability value etc.

Fig 2: Data collection from farmer

Fig 3: Clinical examination of a goat

Fig 4: Laboratory examination (feces)

Fig 5: Prescribing treatment to owner

Fig 6: Administering drug

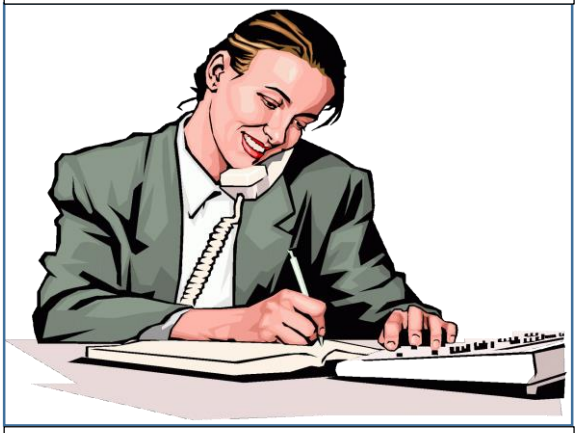

Fig 7: Follow up via phone call

Chapter 3: Results and Discussion

A total number of 34 clinical cases of ruminants were selected to determine the factors related to evaluate the effectiveness of treatment provided in UVH from 1 February to 29 March, 2018. All the details of the results are provided in Table 1-7.

3.1 Farmers demographic Characteristics:

Total 26 owners were male (76.5%) in comparison of 8 female owners (23.5%) among the 34 clinical cases during the study period. This shows that participation in livestock rearing in rural areas is higher in males than females as females are more involved in household works. Also there is limited decision making powers for women because of unequal power relations within the household and the community. Forty-four percent animals (44.1%) were brought to the hospital from surrounding areas (1-5 km distance) whereas, around thirty percent (29.4%) animals travelled to the hospital from a considerable distance (>5km). Few of the animals (26.5%) came to the hospital from the adjacent areas (<1 km) **(Table 1)**. No surprisingly, it is not suitable for female owners to bring their sick animal to the hospital from distant location.

Generally, people in the study population used to rear single species of animal (79.4%) in compare to rear multiple species (20.6%) **(Table 1)**. Most of the people in rural areas cannot afford to keep more than one species due to limited purchasing ability of animal feeds and other accessories to manage their livestock.

Table 1: Farmers demographic characteristics of UVH, Raozan, Chittagong (N=34):

Factor	Category	N	%
Gender	Male	26	76.5
	Female	8	23.5
Educational Status	Un-educated	18	52.9
	Educated	16	47.1
Rearing animal combined	Yes	7	20.6
	No	27	79.4
Distance from UVH	<1km	9	26.47
	1-5km	15	44.12
	>5km	10	29.41

3.2 Animals demographic variable:

In this study, cattle population (55.88%) enrolled to the hospital were slightly higher than their counterpart goat population (44.12%). This shows that cattle rearing is more popular among village farmers to maintain their daily livelihood than other species. Moreover, cattle are more available than any other species in Bangladesh and their versatile nature in relation to existing integrated farming system. Interestingly, most of the animals (97.1%) enrolled in the hospital were rear by family members, and only one animal (2.9%) was coming from a particular farm in the study area (**Table 2)**. Livestock helps to generate multiple function including food supply, family nutrition, family income, asset savings, soil productivity, improved livelihood, transport, agricultural traction, agricultural diversification, sustainable agricultural production, family and community

employment as well (Moyo et al., 2010). Therefore, rearing livestock is strongly linked with the livelihood of rural people.

In case of 19 clinical cases of cattle, 94.74% (18) were indigenous breed and only 5.26% (1) were cross breed. In Bangladesh perspective, 85% of cattle are indigenous in origin and this type of breed are better producer than others in the existing low input management system. Besides, Indigenous breeds are well adapted in the tropical harsh environment and have the ability to survive on poor quality feed stuffs and are well resistant to infectious diseases (Hamid et. al., 2017). In case of fifteen (15) diseased goat, 73.33% (11) were Black Bengal and 26.67% (4) were Jamnapari. Among the several breeds of goat, Black Bengal is a promising draft goat known to be famous for their excellent adaptability, fertility, profitability, delicious meat and high quality skin (Moniruzzaman et al., 2002). Also (Amit et al., 2011) found that Black Bengal goats have significantly lower age at first conception, and age at first kidding. Obviously, majority (67.6%) of the farmers rear their animals in their household as a family members in comparison to semi household farming system (32.4%) **(Table 2)**.

Table 2: Animal demographic Characteristics of UVH, Raozan, Chittagong (N=34):

Factor	Category	N	%
Source	Farm animal	1	2.9
	Family livestock	33	97.1
Species	Cattle	19	55.88
	Goat	15	44.12
Breed	Holstein Friesian	1	5.26
	Indigenous	18	94.74
	Black Bengal	11	73.33

	Jamnapari	4	26.67
Sex	Male	15	44.1
	Female	19	55.9
BCS	Good	15	44.1
	Fair	14	41.2
	Poor	5	14.7
Rearing System	Semi-household	11	32.4
	Household	23	67.6

3.3 Categorization of clinical diseases and its distribution:

The highest patient (11) came to the hospital due to digestive disorders (32.4%). The second most enrolled patient were from integumentary (8, 23.5%) and systemic (8, 23.5%) problem as well. Reproductive (4, 11.8%) and respiratory cases (3, 8.8%) were comparatively fewer in number that came in the hospital during the study period **(Table 3).**

Table 3: Clinical diseases of animal with their prevention and control measures at UVH, Raozan, Chittagong (N=34):

Points	Factor	Category	N	%
History of preventive measures	Vaccination	Yes	5	14.7
		No	29	85.3
	Deworming	Yes	16	47.1
		No	18	52.9
		Vaccination + Deworming	5	14.7

	Vaccination +deworming combined	Deworming	11	32.4
		No vaccination and deworming	18	52.9
Clinical symptoms	Feed intake	Loss of appetite	20	58.82
		Normal	14	41.2
	Feces quality	Normal	28	82.4
		Abnormal	6	17.6
	System affected	Digestive	11	32.4
		Integumentary	8	23.5
		Reproductive	4	11.8
		Respiratory	3	8.8
		Systemic	8	23.5
	Diarrhea (only in digestive cases)	Present	6	54.55
		Absent	5	45.45
History of treatment regimens	Use of antibiotics	Yes	24	70.6
		No	10	29.4
	Complete full course of drug	Yes	25	73.5
		No	9	26.5
Follow up	Condition of animal after treatment	Cure	26	76.5
		Died	3	8.82
		Aggravated	5	14.71

Occurrence of digestive diseases was higher than other diseases but recovery rate was low (45.5%) **(Table 4)**. Similar findings were observed in a separate study by (Rahman et al., 2012), who reported highest percentage (22.9%) of diarrheal cases. Following treatment, the recovery rate was

significantly higher in four different cases (integumentary, 87.5%; reproductive, 100%: respiratory, 100% and systemic, 87.5%) than digestive disorder (*P<0.05*) **(Table 4).** Diarrhea was found to be the major digestive disorder in ruminants. About 54.55% diarrheic cases were found. This observation is not supported by few other studies (Hoque and Samad, 1996, 1997), (Samad, 2001) and (Rahman et al., 1999). (Hoque and Samad, 1996, 1997) who reported that 12.23% diarrhea in goats and 7.6% in cattle. (Samad, 2001) reported, 25.97% and 9.91% of diarrheal diseases in cattle and goats, respectively. (Rahman et al., 1999) reported 4.78% of diarrheal diseases in cattle. The probable causes for significant diarrheic cases in our study, might be for inadequate deworming of the animals. Therefore, the patients affected with digestive disorder accompanied with diarrhea were significantly less responsive (33.33%) to the prescribed treatment compare to other clinical cases (85.71%) *(P<0.05)* (**Table 4).**

Table 4: Significant univariate association between farmer's demographic characteristics and animals demographic Characteristics with binary response variable cure (1=Yes; 0=No) (N=34):

Factor	**Category**	**Positive (%)**	**Negative**	***P-value* (Chi)**
Educational	Un-educated	11(61.1)	7	0.02
Status	Educated	15(93.8)	1	
System affected	Digestive	5(45.5)	6	0.05
	Integumentary	7(87.5)	1	
	Reproductive	4(100)	0	
	Respiratory	3(100)	0	
	Systemic	7(87.5)	1	
Diarrhea	Present	2(33.33)	4	0.006
	Absent	24(85.71)	4	

Antibiotic prescribed	Single	18(85.7)	3	0.03
	Multiple	1(33.3)	2	
Complete full course of drug	Yes	21(84)	4	0.08
	No	5(55.6)	4	

3.4 Prevention and control measures of clinical diseases at UVH:

Only five (14.7%) animals were vaccinated and sixteen (47.1%) animals were dewormed separately **(Table 3).** About five (14.7%) animals were both have vaccination and deworming but a considerable number (52.9%) of animals were neither vaccinated nor dewormed. This might be due to the lack of awareness of owners for vaccination and deworming, inadequate vaccine supply through veterinary services along with their high purchasing system (Imtiaz and Rana, 2014; Rabbani et. al., 2004). Besides, lack of storage and transportation facilities of vaccines and lack of knowledge on cold chain maintain for vaccine and overall the suitable vaccine antigen in the field condition might contribute the scarce field veterinarian to supply sufficient vaccine for the family livestock Rearing systems (Rahman and Rana, 2013; Bangladesh National Livestock Development Policy, 2007).

Majority (24, 70.6%) of the clinical cases were prescribed Antimicrobial and only ten (29.4%) animals were not prescribed **(Table 3).** Interestingly most of the owners were completed full course of the prescribed drug (73.5%), though Nine (26.5%) of them were not concerned about completing the course of the drugs. During the follow-up stage we observed 76.5% animals were completely cured from the clinical diseases and 8.82% animals were died during their course of treatment. The worse issue is that 14.71% animals still worsen their condition in the follow-up period. In the current veterinary practices at UVH, the diagnostics facilities still seek to improve.

There are lots of space to improve the diagnostics tools and field appropriate diagnostic kit to identify the disease within short period of time. On the other hand, the farmers need to suggest to maintain the full course of antibiotics to have a better outcome. The veterinary services need to maintain a follow-up register to have a better diagnosis of diseases in future.

3.5 Association between farmers and patients demography:

In this study, we found a considerable difference in terms of feeding behavior between educated and uneducated owners. The educated owner's cattle were shown normal appetite (still they have diseases) in nine cases, whereas in uneducated owners the number was five **(Table 5).** In this study, 56.3% animal had normal appetite and 43.8% animal had loss of appetite in educated owners. On the contrary, 27.8% animal had normal appetite and 72.2% animal had loss of appetite in uneducated owners which is nearly significant *(P>0.05)* This is because educated owners maintain proper ration of feeding, hygienic managerial condition and they were more cautious about their animals and brought to the hospital immediately when it's become sick. The owners gender effect also been seen in the feeding behavior of animals. The animals belong to the female owners had more loss of appetite (87.5%) than male owners (50%) which is significantly higher *(P<0.05).* Educated owners had more animals with good Body Condition Score (BCS) (68.7%) than uneducated owners (22.2%) **(Table 5).** We did not find any animal with poor BCS (0%) in educated owners where 27.78% animal with poor BCS were found in uneducated owners which is significantly higher *(P<0.05).*

Table 5: Significant univariate association between farmer's demographic characteristics and animals demographic Characteristics with dependent variable Feeding condition (Normal=1, Loss of appetite=2) and BCS of animals (Good=1, Fair=2, Poor=3) (N=34):

Factor	Category	Types	N (%)	*P-value* (Chi)
Sex of owner	Male	Normal	13(50)	0.05
		Loss of appetite	13(50)	
	Female	Normal	1(12.5)	
		Loss of appetite	7(87.5)	
Educational qualification of owner	Educated	Normal	9(56.3)	0.09
		Loss of appetite	7(43.8)	
	Uneducated	Normal	5(27.8)	
		Loss of appetite	13(72.2)	
Educational qualification of owner	Educated	Good	11(68.75)	0.009
		Fair	5(31.25)	
		Poor	0(0.00)	
	Uneducated	Good	4(22.22)	
		Fair	9(50.00)	
		Poor	5(27.78)	

3.6 Assessment of treatment regimen with treatment outcome:

Male owners completed the full course of the prescribed drug (80.8%) in more clinical cases than female owners (50%) which is close to significant *(P>0.05)* **(table 6).** As animals have to bring in the hospital regularly until the drug course completed, so it is difficult for women to bring animals to hospital and sometimes it become quiet impossible if the owners live in a remote areas. It is

easier in case of male owners to visit the hospital for getting consultancy about animal health, management, disease and treatment as well. In contrast, female owners could rarely do it due to social barriers and household works. Interestingly, all the goat owners completed the full course of antimicrobials but only 60% cattle owners completed. The association was significantly differing between both cohort of owners *(P<0.05)*. Transportation difficulty is the main cause behind this. Goat owners find more comfort to carry goat in the hospital due to smaller size where cattle owners find it more difficult. So goat owners were able to bring goats regularly and complete the course of drug prescribed through UVH. On the other hand, educated owners completed full course of drug (87.5%) which is close to significant *(P>0.05)* than uneducated owners (61.1%) **(Table 6).**

Table 6: Significant univariate association between farmer's demographic characteristics and animals demographic Characteristics with dependent variable completing full course of drug (Completed=1, Not completed=2) (N=34):

Factor	**Category**	**Completed (%)**	**Not completed (%)**	***P-value*** **(Chi)**
Sex of owner	Male	21(80.8)	5(19.2)	0.08
	Female	4(50)	4(50)	
Educational qualification of owner	Educated	14(87.5)	2(12.5)	0.08
	Uneducated	11(61.1)	7(38.9)	
Rearing of animal	Cattle	9(60)	6(40)	0.03
	Goat	12(100)	0(0)	
	Both	4(57.1)	3(42.9)	

So recovery rate of the animals of educated owners (93.8%) was much higher than uneducated owners (61.1%) **(Table 7).** Also 16.7% animals of uneducated owner died which is near to significant *(P>0.05)* where no animal died in case of educated owner.

Table 7: Significant univariate association between farmer's demographic characteristics and animal demographic Characteristics with dependent variable condition of animals (Cured=1, Died=2, Aggravated=3) (N=34):

Factor	**Category**	**Cured**	**Died**	**Aggravated**	***P-value*** **(Chi)**
Educational qualification of owner	Educated	15(93.8)	0(0)	1(6.3)	0.07
	Uneducated	11(61.1)	3(16.7)	4(22.2)	
Full course of drugs (antibiotic +supportive)	Completed	21(84)	0(0)	4(16)	0.01
	Not completed	5(55.6)	3(33.3)	1(11.1)	
Full course of antibiotic	Completed	15(83.3)	0(0)	3(16.7)	0.03
	Not completed	4(66.7)	2(33.3)	0(0)	

About 84% animals were cured who had completed the drug course than those who did not completed (cured 55.6%). Also 33.3% animals died who had not completed drug course where no animals died who had completed drug course which is significantly differs from each other *(P<0.05).* Again 83.3% animals cured and no animals died who had completed antibiotic course than who had not completed (cured 66.7% and died 33.3%) which is significantly higher *(P<0.05).* If antibiotic course not completed, some of the bacteria causing infection may survive and these will be the ones with the greatest resistance to the antibiotic. As the surviving bacteria reproduce,

the resulting infection would not be treatable with the same antibiotic (Shephard et al., 2000). So, completion of antibiotic is needed to become cure properly.

Chapter 4: Limitations

1. Few animals were enrolled in this study. Therefore the study period was too short to assess the disease occurrence and treatment efficacy as well.
2. Farmers/owners did not maintain vaccination history adequately. We did not find any vaccination register sheet during the study. We were solely depended on farmers consent about this data in our study.
3. Proper diagnostic protocol to get confirmatory diagnosis could not be maintained due to lack of diagnostic facilities.

Chapter 5: Conclusion

In this study, we were dealing with the patients that are coming to the hospital regularly. However, most of the patients were reared in household farming system. Thus, family livestock play a major role in poverty reduction among the rural people. Therefore we would like to measure the frequency of diseases circulated within this population. Furthermore, we assessed the treatment efficacy, specially the antibiotics prescribed for the clinical diseases. Owners as well as patients factors that are responsible for occurring diseases are also revealed in this study. Sex and educational qualification of the owners put a great emphasis on the health condition of the patients. Lack of knowledge about deworming was highly responsible for digestive diseases (mainly diarrhea). Therefore, adopting regular deworming and vaccination program can reduce the economic loss and help to fight against common diseases. However, completing the course of drugs is necessary to get quick recovery from disease and to decrease the animal mortality rate. Also use of single antibiotic and completing the course of antibiotic is important to reduce the rate of antibiotic resistance. Finally, by following this rules, we can reduce disease occurrence in rural ruminants and make our rural livestock more profitable which can play a crucial role in our national economy.

References

1. Ali, M.H., Bhuiyan, M.K.J. and Alam, M.M., 2011. Retrospective epidemiologic study of diseases in ruminants in Khagrachari Hill Tract District of Bangladesh. *Bangladesh Journal of Veterinary Medicine*, *9*(2), pp.145-153.
2. Amit, K., Singh, L.B., Dhirendra, K. and A Maroof, A., 2011. Goat reproduction in tropical countries. *Indian J. Small Rumin.*, 17, pp. 225-226.
3. Anon, 2017. Bangladesh Bureau of Statistics, http://www.bbs.gov.bd/ (accessed 23.02.17.).
4. Bettencourt, E.M.V., Tilman, M., Narciso, V., Carvalho, M.L.D.S. and Henriques, P.D.D.S., 2015. The livestock roles in the wellbeing of rural communities of Timor-Leste. *Revista de Economia e Sociologia Rural*, *53*, pp.63-80.
5. BIDS (2012). Barriers to the development of livestock in Bangladesh.
6. Dovie, D.B., Shackleton, C.M. and Witkowski, E.T.F., 2006. Valuation of communal area livestock benefits, rural livelihoods and related policy issues. *Land use policy*, *23*(3), pp.260-271.
7. DLS (2016-17). Annual Report of Directorate of Livestock Services, Bangladesh.
8. Hamid, M.A., Rahman, A., Zaman, M.A. and Hossain, K.M., 2017. Cattle Genetic Resources and their Conservation in Bangladesh. *Asian Journal of Animal Sciences*, *11*, pp.54-64.
9. Hoque, M.S. and Samad, M.A., 1996. Prevalence of clinical diseases in dairy cross-bred cows and calves in the urban areas in Dhaka. *Bangladesh Veterinary Journal*, *30*(3-4), pp.118-129.

10. Hoque, M.S. and Samad, M.A., 1997. Present status of clinical diseases of goats in the urban areas in Dhaka. *Bangladesh Veterinary Journal*, *31*, pp.35-40.
11. Karim, Z., Huque, K.S., Hussain, G., Ali, Z. and Hossain, M., 2010. Growth and development potential of livestock and fisheries in Bangladesh. Government of the People's Republic of Bangladesh.
12. Kashem, M.A., Hossain, M.A., Ahmed, S.U. and Halim, M.A., 2012. Prevalence of diseases, morbidity and mortality of Black Bengal Goats under different management systems in Bangladesh. *University Journal of Zoology, Rajshahi University*, *30*, pp.01-04.
13. Moniruzzaman, M., Hashem, M.A., Akhter, S. and Hossain, M.M., 2002. Effect of feeding systems on feed intake, eating behavior, growth, reproductive performance and parasitic infestation of Black Bengal goat. *ASIAN AUSTRALASIAN JOURNAL OF ANIMAL SCIENCES*, *15*(10), pp.1453-1457.
14. Moyo, S. and Swanepoel, F.J.C., 2010. Multifunctionality of livestock in developing communities. *The role of livestock in developing communities: Enhancing multifunctionality*, pp.1.
15. Onneshan, U., 2014. Recent Trends of Growth in Agriculture. *Industry and Power*, *Bangladesh Economic Update*, *5*(3).
16. Rabbi, F., Mannan, M.S., Imtiaz, M.A., Chowdhury, S. and Prodhan, M.A.M., 2014. A Survey of Livestock and Poultry along with Mortality Trends of Goat at Kaunia Upzilla, Rangpur, Bangladesh. *Bangladesh Journal of Veterinary Medicine*, *12*(2), pp.155-160.
17. Rahman, M.M., Ali, M. and Hashem, A., 1999. Livestock disease problems in a selected area of Sherpur district. *Bangladesh Journal of Training and Development*, *12*, pp.205-210.

18. Rahman, M.A., Islam, M.A., Rahman, M.A., Talukder, A.K., Parvin, M.S. and Islam, M.T., 2012. Clinical diseases of ruminants recorded at the Patuakhali Science and Technology University Veterinary Clinic. *Bangladesh Journal of Veterinary Medicine*, *10*(1&2), pp.63-73.
19. Sarker, Y.A., Miah, A.H., Sharif, N., Himel, M.H., Islam, S., Ray, R.C., Paul, T.K., Islam, M.T. and Sikder, M.H., 2015. A retrospective study of common diseases at Veterinary Teaching Hospital, Bangladesh Agricultural University, Mymensingh. *Bangladesh Journal of Veterinary Medicine*, *13*(2).
20. Samad, M.A., 2001. Observations of clinical diseases in ruminants at the Bangladesh Agricultural University Veterinary Clinic. *Bangladesh Veterinary Journal*, *35*, pp.93-120.
21. Shephard, R.W., Malmo, J. and Pfeiffer, D.U., 2000. A clinical trial to evaluate the effectiveness of antibiotic treatment of lactating cows with high somatic cell counts in their milk. *Australian veterinary journal*, *78*(11), pp.763-768.
22. Shackleton, C.M., Shackleton, S.E., Netshiluvhi, T.R. and Mathabela, F.R., 2005. The contribution and direct-use value of livestock to rural livelihoods in the Sand River catchment, South Africa. *African Journal of Range and Forage Science*, *22*(2), pp.127-140.
23. Tareque, A.M.M. and Chowdhury, S.M.Z.H., 2010. Agricultural Research Priority: Vision-2030 and beyond. *Dhaka: Bangladesh Agricultural Research Council*.

Acknowledgement

At first I am really thankful to Almighty who has given me strength and opportunity to complete the report – Evaluation of treatment responses of clinical cases at Raozan Upazila Veterinary Hospital, Chittagong.

Completion of any work or responsibility gives nice feelings but the accomplishment of this work as the partial fulfillment of the requirements for the degree of Doctor of Veterinary Medicine (DVM) in CVASU, not only has given me the pleasure but also given me the confidence to move ahead and showed me a new opening to knowledge. I feel proud in expressing his deep sense of gratitude and indebtedness to Professor Dr. Gautam Buddha Das, Vice Chancellor of Chittagong Veterinary and Animal Sciences University and honorable Professor Md. Abdul Halim, Dean Faculty of Veterinary Medicine, CVASU for placing this type of clinical report as a compulsory part of internship program.

I would like to extend my gratitude to my supervisor Dr. Shahneaz Ali Khan, Associate Professor, Dept. of Physiology, Biochemistry & Pharmacology, CVASU. My heartfelt thanks to him for his support and creative directions. Special thanks to Upazila Livestock Officer (ULO), Veterinary Surgeon (VS) and other stuffs of Upazila Veterinary Hospital, Raozan, Chittagong for their cordial cooperation at the time of conducting the research work.

Author

Biography

I am Shanta Barua, daughter of Professor Dr. Ranjit Kumar Barua and Professor Paramita Barua. I passed my Secondary School Certificate (SSC) examination from Dr. Khastogir Govt. Girls' High School, Chittagong in 2009 and Higher Secondary Certificate (HSC) examination from Chittagong Govt. women's college, Chittagong in 2011. I enrolled for Doctor of Veterinary Medicine (DVM) degree in Chittagong Veterinary and Animal Sciences University (CVASU), Chittagong, Bangladesh in 2012-13 session. At present I am doing my internship program which is compulsory for awarding my degree of DVM from CVASU. In the near future, I would like to work and have massive interest in wildlife medicine, wildlife and conservation of nature.