**CHAPTER-I**

**INTRODUCTION**

Animal agriculture has been an integral part of farming systems through millennium development program of Bangladesh. Livestock plays a pivotal role in agriculture by providing draft power and manure for crop production, food (milk, meat & eggs) for human consumption and foreign exchange thorough export of hides and skin. Livestock also generate self employment and earning income; serve as a saving to poor households. They play a great contribution in national economy, through agricultural production, employment generation, export earning, draft power, rural transport and household fuel for cooking.

Livestock population in Bangladesh in 2007-08 was 23 million cattle, 1.3 million Buffalo, 21.6 million Goats, 2.8 million sheep, 212.5 million chicken and 39.8 million ducks (Bangladesh Economic Review-2009 and DLS). The current contribution of livestock sub-sector to overall GDP is about 2.73% (Bangladesh Economic Review-2009 and DLS). Among 21.6 million goats, most of them are reared in backyard system by rural farmers, especially the poor women or children as an integral part of the poor farming system. For rearing goats, a minimum investment of money is required, even without specific arrangement of housing, grazing on barren and road-side grass land and least homemade supplied feed (rice gruel, boiled rice, skins of vegetables etc). In addition, goats are fed on leaves of jackfruits, which is available in most of the rearing areas household. The higher demands for meat and especially for skin in the local as well as foreign markets focused the goat enterprise extremely prominent to the vulnerable groups of people and the existing socioeconomic condition of the country. They also have important role in generating employment, income, capital storage and improving household nutrition. Goat is considered as the poor man’s cow.

Management system is a combination of both tethering and scavenging with or little inputs for breeding, feeding & health care. This type of subsistence farming system covers nearly 85% of the livestock farming environment while the rest being of commercial production system (Saadullah and Hossain, 2000).

Goat occupies an important position as an animal genetic resource in the agro-based economy of the country having greater importance, particularly as a cash income to the subsistence farmers. Goats are used mainly for meat purposes. Mostly Black Bengal breed along with some Jamunapari and their crosses with Black Bengal constitutes the goat population of the country. As they are kept by the marginal and landless farmers, the flock size does not as large as industrial scale and flock size varies from 2-5 head in each holding of the goat production system in Bangladesh.

Different types of diseases both infectious and non-infectious are important problems in goat rearing in our country. Among them, PPR (Peste des Petits Ruminants), pneumonia, diarrhea and parasitic gastro-enteritis are major mentioned four most important causes of mortality in small ruminants in tropical country like Bangladesh.

 This study has covered the measurement of prevalence rate from clinical cases of different diseases (PPR, bronchopneumonia, diarrhea and coccidiosis) of goats, brought to the veterinary clinics in Rangpur Sadar for treatment. High prevalence of infectious diseases constitutes a major impediment to livestock production in most developing countries. Clinical records and abattoir (slaughter house) figures are therefore greatly relied upon as sources of information for disease prevalence studies. For example, clinical records have been used in monitoring trends in diseases of economic and public health importance in Rangpur and different agro-climatic zones of Bangladesh.

This study may be reveals the present status of livestock population along with the morbidity and mortality trends of goat population in Rangpur district.

**Objectives of the study:**

1. To determine the livestock population in Kaunia upazilla at Rangpur district.

2. To study major causes of goat mortality in Kaunia upazilla at Rangpur district.

 3. To study the infectious and non-infectious diseases of goat in Rangpur district.

 4. To find out preventive measures against infectious diseases.

 **CHAPTER-II**

**REVIEW OF LITERATURE**

**Important diseases of goat:**

The most common diseases of goats that hindering the growth of goat population are described by Fraser *et al.* (1991),

PPR

PPR is also known as pseudorinderpest of small ruminants, pest of small ruminants, Kata, stomatitis-pneumoenteritis syndrome etc.It is an acute or sub-acute viral disease of goat characterized by fever, necrotic stomatitis, gastroenteritis and pneumonia.The causal virus is a morbillivirus of the family Paramyxoviridae, has a particular affinity for lymphoid tissue of GI tract,in which it produces characteristic lesion.

**Clinical findings:**

* Sudden rise in body temperature to104-106ºF(40-41.3ºC)
* Profuse catarrhal conjunctivitis
* Necrotic stomatitis in lower lip and gum
* Profuse diarrhea accompanied by dehydration and emaciation
* Coughing

DIARRHOEAL DISEASE

Diarrhoea is one of the common disease condition which is frequently occur in goat.There are many causes of diarrhea such as *E.coli*,Rotavirus,Coronavirus,Cryptosporidia,*Clostridium perfriengens*,Coccidia,Salmonella etc

**Clinical findings:**

* Watery feces sometimes with serous, mucous, blood etc.

PNEUMONIA

It is an acute or chronic inflammation of lungs and bronchi, characterized by disturbance in respiration and hypoxia and complicated by the systemic effect of associated toxins. There are several organisms that cause pneumonia in goats, the most common being the Pasteurella species. Aspiration pneumonia is a form of pneumonia characterized by pulmonary necrosis and caused by ingestion of foreign material in the lungs.

**Clinical findings:**

* Sudden rises of temperature to 104-105ºF
* Presence of serous and later mucopurulent nasal discharge
* Coughing and dyspoea

COCCIDIOSIS

It is a protozoal disease of goat followed by diarrhoea and dehydration.The disease acquired by an acute invasion and destruction of intestinal mucosa by protozoa of the genera Eimeria, Isospora, Cryptosporidium characterized by diarrhea, fever, inappetence, weight loss, emaciation and sometimes death.

**Clinical findings:**

* Diarrhoea with or without mucus or blood
* Dehydration
* Emaciation
* Weakness
* Anorexia and death

FOOT ROT

It is also known as Pododermatitis, Interdigital necrobacillosis. A necrotizing or purulent infection involving distal interphalangeal joint.The disease is caused by bacteria such as *Fusobacterium necrophorum*, *Bacteroides nodosus*, *Bacteroides melaninogenicus.*

**Clinical findings:**

* Edema and erythema in interdigital region
* Lameness and Increase body temperature
* Purulent and foul-smelling discharge

MASTITIS

Inflammation of the mammary gland, almost always due to the effects of infection by bacterial or mycotic pathogens.It is caused by several kinds of microorganism such as *Streptococcus agalactiae, S. dysgalactiae,S. uberis,S. zooepidemicus, Staphylococcus aureus,* *Escherichia coli, Enterobacter aerogenes, Klebsiella spp, Pseudomonas aeruginosa,* *Corynebacterium pyogenes, Mycoplasma mycoides* subspecies *mycoides,M. putrefaciens* etc.

**Clinical findings:**

1.Peracute

* Swelling,heat,pain and abnormal secretion in the gland.
* Fever,marked depression, rapid weak pulse, sunken eyes, weakness and complete anorexia.

2.Acute

* Changes in the gland are similar to those above but fever,anorexia,depression are slight to moderate.

3.Sub-acute

* No systemic changes and change in gland and its secretion are less marked.

4.Subclinical

* Every things will appears to be normal, the inflammatory reaction is detectable by tests.

The inland literature showed that a good number of authors are worked on goat population of BANGLADESH

Kashem *et al.* (2011) studied that 125 goats were infected (74.70%) by a number of diseases and lead to mortality (17.26%). Survival rates and mortality percentage of kids were 80.60 and 19.40, respectively. Seasons had special influences on mortality of adult goats (35.81%) and kids (64.19%) where the highest mortality rates were 22.22% and 25.93%, respectively in rainy season. PPR had the highest mortality rates (37.93% in adults and 25.00% in kids) followed by pneumonia (24.14% and 21.15%, respectively). Predator invasion was the other remarkable cause for increased kids’ mortality (23.08%).

Sarker and Islam, (2011) investigated the prevalence of Peste des petitis ruminants (PPR) in goats; the overall prevalence of PPR in goats was found to be 20.57% (n=129).The clinical prevalence of PPR was highest in the month of December (31.68%) and lowest in June (9.52%). The influence of sex on PPR outbreaks was found to be higher in male (28.52%) than female (13.04%) goats. As regards to age, PPR was significantly higher in young (31.06%) compared to suckers (13.14%) and adult (10.15%). The susceptibility of Black Bengal goats to PPR was higher than other breeds.

Hassan *et al*. (2011) performed an investigation to measure the prevalence of ecto- and endopatasites in semiscavenging black bengal goat (*Capra hircus*);the overall prevalence of gastrointestinal helminths in goat were 63.41% (N=317). *Strongyloides* spp. (51.74%) was more prevalent and *Moniezia* sp. and *Capillaria* sp. were least prevalent (n=201). The gastrointestinal parasitic load of goats varied from egg per gram (epg) from 0 to 1600. Faecal sample evaluation showed 36.95% and 13.56% goats were loaded epg 0 and 300, respectively. Age was evident as risk factor where older goats (> 24 month) were more infected by endoparasites than younger ones (< 24 month).

|  |
| --- |
| Noman *et al.* (2011) studied on clinical records of various diseases among goats at Cox`s Bazar Sadar Veterinary Hospital in Cox’s Bazar district of Bangladesh were found male and female goats were accounted as 46.72% and 46.87% due to PPR, 20.56% and 15.63% due to pneumonia, 14.02% and 20.83% due to diarrhoea, 6.54% and 5.2% due to coccidiosis respectively. The mortality rate of the growing kids in season-I (March to June), season-II (July to October)and season-III (November to February) were 14.7%, 40.6% and 19.4% respectively. PPR and bronchopneumonia were found higher in season-III than other seasons whereas diarrhoea in season-I and coccidiosis in season-II were higher.  |
|  |

Ershaduzzaman *et al*. (2007) showed that adult goats (>1 yr of age) died mostly due to suspected enterotoxaemia in the dry season (October to March) and female goats died significantly more than male. Growing goats (3-12 months of age) mortality were about 22%, died mostly due to diarrhoea and pneumonia and mortality was higher (nearly 40%) in hot and wet season (July to October). The overall kid (0-3 months of age) mortality about 29%, of which the major causes were infectious (63%) i.e., diarrhoea, pneumonia, ecthyma and enterotoxaemia.Kid mortality was affected by birth weight which was just opposite to mortality.Kids like growing goats, also died significantly more during hot and wet season. Morbidity was higher in female goats where mostly diarrhoea and pneumonia and some sorts affected all age groups of goats by ecthyma.

Donkin and Boyazoglu (2004) in their study found that mean annual goat kid mortality of 29% was observed over a period of three years. No effect of breed, gender or of multiple births was apparent. Most goat kid deaths were a result of coccidiosis and pneumonia.

Chowdhury *et al*. (2002) observed that most of the adult mortality was due to enterotoxaemia and kid mortality due to infectious causes like diarrhoea and pneumonia. These higher mortality in semi-intensive rearing systems possibly due to increased stresses on animal, to which they responded by higher diseases incidence and mortality and they found 42.39% kids died due to pneumonia followed by diarrhoea (32.61%), ecthyma (20.65%) and bloat (4.34%).

Faizala and Rajapakse, (2001) reported that *Coccidia* and other gastrointestinal nematodes as mixed or single infections are the major parasitic diseases of goats in tropical and temperate climates.

Raji *et al.* (1999); Obi, (1997) and Adekeye, (1984) agreed with their reports aerobic bacterial agents such as *Pasteurella multocida, Staphylococcus aureus, Streptococcus pyogenes, Corynebacterium pyogenes* and *Bacillus sp* among others have been shown to play important roles in small ruminant pneumonia.

Al-Tarazi and Daghall, (1997) and Adekeye, (1984) reported that those bacteria usually find their way into underlying epithelial surfaces of pneumonic lungs damaged by viral or parasitic agents and hence complicate the infection.

Hoque (1996) observed that overall incidence of PPR ranked the highest portion among the infectious causes in all groups of goats where male affected only 33% cases oppose to 67% in female. Adult goat PPR (48.65%) higher than the Pneumonia(9.69%).

Seifert (1996) and Jensen (1974) both studied that Bronchopneumonia of small ruminants is a bacterial infection caused mostly by Pasteurella organisms, especially *Pasteurella histolytica*, which exits saprophytically on the mucosa of upper air passages of the respiratory tracts. They become pathogenic under environmental and other stress-causing influences such as viral and parasitic infections.

Husain *et al.* (1995) showed that low birth weight, insufficient milk production of does just after kidding, lack of proper care and over all faulty husbandry practices were responsible for higher kid mortality in prevailing production system. Studied that goat are fairly immune to semi- poisonous plants if on free range with plenty of variety; but there comes a time when forage is scarce or a gate left open, so they gorge on something unsuitable with dire results.

Mondal *et al.* (1995) Studied that the prevalence of PPR is higher in indigenous Black Bengal (27.13%) goats than Jamunapari (11.81%) and exotic breeds (9.68%). Higher incidence of PPR in indigenous Black Bengal goats may be due to immunosuppression and irregular vaccination compared to cross breeds.

Javed *et al.* (1992); Suh et al.( 1980) and Riche et al.(1973) agreed with the higher prevalence of haemonchosis in sheep than goats may be attributed to a variety of factors like ground grazing habit of sheep, relatively less cleanliness and extensive pasture grazing compared with goats.

Mowlem (1992) assessed that goat quickly eats plant material and swallows it and later on, usually during a quickest part of the day or night. The dry matter intake of a goat is about 3.5- 5 percent of its body weight per day. Some evidence suggests that goat digest forage more efficiently than other ruminant.

Onyekweodiri and Uzoukwu, (1992) and Obi (1983) agreed with their earlier reports : Higher incidence of PPR observed during the dry months of December and January.

Saadullah (1991) studied about Research and Development Activities and Needs of Small Ruminants in Bangladesh and observed that very few farmers provide separate houses for sheep and goat. They are housed on the verandah, corridor, cow shed, and kitchen and in the open yard of the homestead. It has been found that 47% of the goats are housed in an open shed and 30 % in the cow shed, while the remainder is kept in the house.

Obi (1983) reported that the dusty and dry wind that characterizes this period of the year has been shown to enhance the spread of PPR.

Sriram *et al.* (1982) conducted a research work about Goat mortality in Andhra Pradesh and observed main causes of mortality were due to pneumonia and enteritis.

Rahman *et al*. (1976) observed that the respective mortality rate of kids and adults in season January to March was 11.36 percent and 20 percent; during season April to June 35.22% and 18.18%; during season July to September 26.13% and 27.27% and during season October to December 27.27% and 34.94%.

 **CHAPTER-III**

**MATERIALS AND METHODS**

**3.1. Study area**

The study was conducted on eight villages of Kaunia upazilla at Rangpur district, such as Rajib-2, Rajib-4, Nijdorpa, Sadrataluk-1, Sadrataluk-2, Sadrataluk-3, Jigabari and district veterinary hospital, Rangpur.

 Study area



 

**3.2. Geographical description**

Rangpur district is situated in the north part of Bangladesh. It lies between latitude 25.56° N and longitude 89.25° E. Rangpur has a tropical wet and dry climate. The climate of Rangpur is generally marked with monsoons, high temperature, considerable humidity and heavy rainfall. The hot season commences early in April and continues till July. The maximum mean temperature observed is about 32 to 36 °C (90 to 97 °F) during the months of May, June July and August and the minimum temperature recorded in January is about 7 to 16 °C (45 to 61 °F). The highest rainfall is observed during the months of monsoon. The annual rainfall in the district is about 1,448 millimetres (57.0 in). Average humidity is about 80%, with up to 85% occurring during the rainy season. The mean daily maximum air temperatures range from 28°C to 35°C, while the mean daily minimum ranges from 19°C to 24°C.The Total area of Rangpur sadar is 2,307.78 km² (891.04 sq mi).

**3.3. Data collection**

**3.3.1. Duration of work**

The study was carried out during the period of 16th July, 2012 t,2009200 o 6th September, 2012 at the time of my district veterinary hospital placement and 10th March, 2013 to 10th April, 2013 at the time of my NGO placement.

**3.3.2. Sources of information**

Data on clinical cases of different disaeases among Livestock brought for treatment at Government veterinary hospital of DLS at Rangpur Sadar. The records were collected from the district veterinary hospital, Rangpur Sadar, Rangpur. Diagnoses at the veterinary clinics were usually based on flock history, clinical signs, necropsy findings and laboratory results. Clinical records for the district are usually generated through routine clinical activities of assistant veterinary personnel. Clinical cases of Livestock recorded in district veterinary hospital are classified on the basis of the species, sex, age and diseases. Finally case classification of goat population was concluded from the data and presented in the report.

**3.3.3. Methods of data collection**

 A preset questionnaire survey was made to collect livestock information from Kaunia upazilla at Rangpur district. Firstly questionnaire was prepared containing some basic questions with a view to extract information regarding management and preventive measures undertaken to the objectives and emphasis was given main key word mortality like total number of livestock, total number of species, total number of goat, breed, sex, age, feeding, types of diseases, treatment, deworming, vaccination and cause of death. Data were collected by interviewing the responded farmer from their memory based on the questions included in questionnaire.

 **3.3.4. Data analysis**

**Analytical technique**

After collection of data, the data were coded and stored into MS Excel-2007 program. Then fundamental mathematical analysis (sum, percentage etc.) were calculated and presented in tabulated form. Excel spread sheet was imported to the statistical software STSTA version 12 (Stata crop.,College Station Texas,USA) for further analysis. Descriptive analysis was done by means of frequency, percentage and prevalence. To identify the association between different categorical variables(Breed,Sex,vaccination,Deworming,type of grazing),Chi-square test was performed.An association was considered significant when the p-value was < 0.05.

 **CHAPTER-IV**

  **RESULTS**

**Survey results**

**4.1. Livestock survey in Kaunia upazilla**

Livestock survey in Kaunia upazilla revealed that among 808 total number livestock in which cattle 108(14%), goat 302(38%),Sheep 51(7%) and Poultry 347(43%) showed in table-1.It also revealed that most of the villages of Kaunia upazilla,livestocks are not vaccinated and dewormed,only 7% animals are vaccinated and dewormed were presented in the table-1.

**Table-1: Livestock survey in Kaunia upazilla of Rangpur district**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Name of Village | Cattle | Goat | Sheep | Poultry | GT | Vaccination  | Deworming |
| Yes | No  |  Yes | No |
| Rajib-2 | 17 | 46 | 7 | 42 | 112 | 10 | 15 | 10 | 20 |
| Rajib-4 | 10 | 36 | 4 | 33 | 83 | 5 | 11 | 4 | 12 |
| Nijdorpa | 20 | 42 | 5 | 45 | 112 | 6 | 15 | 7 | 17 |
| Jigabari | 16 | 31 | 3 | 40 | 90 | 10 | 9 | 12 | 7 |
| Arajikanua | 15 | 48 | 9 | 65 | 137 | 9 | 21 | 9 | 22 |
| Sadrataluk-1 | 9 | 35 | 6 | 53 | 103 | 5 | 12 | 4 | 13 |
| Sadrataluk-2 | 10 | 37 | 9 | 39 | 95 | 3 | 17 | 5 | 15 |
| Sadrataluk-3 | 11 | 27 | 8 | 30 | 76 | 4 | 13 | 5 | 12 |
| Total | 108 | 302 | 51 | 347 | 808 | 52 | 113 | 56 | 118 |
| Percentage(%) | 14 | 38 | 7 | 43 |  | 7 |  | 7 |  |

 **Graph-1: Livestock survey in Kaunia upazilla of Rangpur district**

**4.2. Different association of goats with breed and sex in Kaunia upazilla**

The results of different association with breed and sex of goats categorized in vaccination, deworming and type of grazing among goats (n=302) that founded during questionnaire survey.The results of different association presented in the table-2.

|  |
| --- |
| Association with vaccination |
| Variables | Level | Number vaccinatedN (%) | Number not vaccinatedN (%) | Chi square value | p-value |
| Breed | BB | 44 (27) | 122 (73) | 8.11 | 0.01(significant) |
| Cross | 17 (22) | 61 (78) |
| JM | 25 (43) | 33 (57) |
| Sex | Female | 57 (28) | 150 (73) | 0.28 | 0.59( non significant) |
| Male | 29 (31) | 66 (69) |
| Association with deworming |
| Variables | Level | Number dewormedN (%) | Number not dewormedN (%) | Chi square value | p-value |
| Breed | BB | 43 (26) | 123 (74) | 20.21 | <0.001(significant) |
| Cross | 18 (23) | 60 (77) |
| JM | 32 (55) | 26 (45) |
| Sex | Female | 61 (29) | 146 (71) | 0.54 | 0.46( non significant) |
| Male | 32 (34) | 63 (66) |
| Association with type of grazing |
| Variables | Level | Number using community grazingN (%) | Number using individual grazingN (%) | Chi square value | p-value |
| Breed | BB | 54 (33) | 112 (67) | 2.28 | 0.31( non significant) |
| Cross | 18 (23) | 60 (77) |
| JM | 17 (29) | 41 (71) |
| Sex | Female | 65 (31) | 142 (69) | 1.18 | 0.27( non significant) |
| Male | 24 (25) | 71 (75) |

**Table-2: Association with different variables with breed and sex of goats in study area(Kaunia Upazilla)**

**4.3. Mortality of goat in the Kaunia upazilla**

The causes of kid, growing goat, adult goat (male & female) mortality were presented in the table-3.The study revealed that kid were died due to pneumonia, diarrhoea, PPR, Coccidiosis were found to be 40.83%, 27.5%, 18.33% and 13.34% respectively. It also observed that among 100 growing goat were died due to pneumonia, diarrhoea, PPR, Coccidiosis were found 30%, 20%, 35% and 15% respectively. In the study area adult goat (female and male) died from like diseases PPR in female 42.43% & in male 46.22%, diarrhoea in female 20.20% & in male 14.15%, pneumonia in female 15.15% & in male 20.75%, coccidiosis in female 5.05% & in male 6.60%, Poisoning in female 5.05% & in male 2.84%, Accident in female 5.05% & in male 0.94%, female died from dystocia (7.07%) and male died from Urogenital infection 8.5%.

**Table-3: Mortality of goat in the Kaunia upazilla**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Kid** | **Growing goat** | **adult goat(female)** | **adult goat(male)** |
| **Reason of death** | **Number of case** | **Percentage (%)** | **Number of case** | **Percentage (%)** | **Number of case** | **Percentage (%)** | **Number of case** | **Percentage (%)** |
| Pneumonia | 49 | 40.83 | 30 | 30 | 15 | 15.15 | 22 | 20.75 |
| PPR | 22 | 18.33 | 35 | 35 | 42 | 42.43 | 49 | 46.22 |
| Coccidiosis | 16 | 13.34 | 15 | 15 | 5 | 5.05 | 7 | 6.60 |
| Diarrhoea | 33 | 27.5 | 20 | 20 | 20 | 20.20 | 15 | 14.15 |
| Poisoning | 0 | 0 | 0 | 0 | 5 | 5.05 | 3 | 2.84 |
| Dystocia | 0 | 0 | 0 | 0 | 7 | 7.07 | 0 | 0 |
| Urogenital infcetion | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 8.5 |
| Accident | 0 | 0 | 0 | 0 | 5 | 5.05 | 1 | 0.94 |
| **Total** | **120** | **100%** | **100** | **100%** | **99** | **100%** | **106** | **100%** |

 **Graph-2: Mortality of kids in the Kaunia upazilla**

 **Graph- 3: Mortality of growing goat in the Kaunia upazilla**

  **Graph- 4: Mortality of adult goat in the Kaunia upazilla**

**4.4. Study of Livestock attended in the Hospital for treatment**

A total of 1320 livestock were presented in district veterinary hospital.Of them cattle 454, goat 732, sheep 44, pig 5,buffalo 53,chicken 30 and duck 2, brought for treatment during study period which was showed in table-4. It was observed that 35% cattle, 56% goat, 4% sheep , 4% buffalo , >1% pig , 2% chicken and >1% duck. During study period highest number of goat population attended to the hospital for treatment and cattle was in 2nd position. Very small number of sheep ,buffalo,pig ,chicken and duck were attended to the hospital for treatment.

**Table-4:Percentage of Livestock attended in the Hospital for treatment**

|  |  |  |  |
| --- | --- | --- | --- |
| **Species** | **Total number of case** | **Percentage(%)** | **Remark** |
| Cattle | 454 | 35 | 2nd highest |
| Goat | 732 | 56 | Highest |
| Sheep | 44 | 3 |  |
| Buffalo | 53 | 4 |  |
| Pig | 5 | >1 | Lowest |
| Chicken | 30 | 2 |  |
| Duck | 2 | >1 | Lowest |
| **Total** | **1320** |  |  |

 **Graph-5: Percentage of Livestock attended in the Hospital for treatment**

**4.5. Clinical study of infectious and non infectious diseases of goat (male and female) in district veterinary hospital of Rangpur district**

The sex wise clinical study of goat diseases were presented in table-5.A total of 732 goats were presented in the hospital for treatment, of them male 314 and female 418. The cases were classified as infectious and non-infectious in nature. They were presented in table-5.Of them infectious diseases 84.41%(n=618) in which male 35.51%(n=260) and female 48.90%(n=358).Non-infectious diseases among goats about 15.59%(n=114) of them male 7.37%(n=54) and female 8.19%(n=60).Among infectious diseases PPR ranked highest in male 16.12% and in female Diarrhoea 16.25%. PPR was in highest position among overall goat diseases. Overall in first position among non-infectious diseases was Myiasis, in male 3.27%(n=24) & female 3.41%(n=25). But mastitis 2.04%(n=15), metritis 0.68%(n=5), abortion 0.95%(n=7), poisoning 0.40%(n=3), haemonchasis 0.13%(n=1) only found in female goat.

**Table-5: Infectious and non infectious diseases of male goat and female goat attended in the district veterinary hospital for treatment**

|  |  |
| --- | --- |
| **Diagnosed diseases** | **Goat** |
| **Infectious diseases** | **Male** | **Prevalence(%)** | **Female** | **Prevalence(%)** |
| Diarrhoea | 53 | 7.24 | 119 | 16.25 |
| PPR | 118 | 16.12 | 82 | 11.20 |
| Pneumonia | 40 | 5.46 | 74 | 10.10 |
| Coccidiosis | 18 | 2.45 | 18 | 2.45 |
| Arthritis | 1 | 0.13 | 1 | 0.13 |
| Mastitis | 0 | 0 | 15 | 2.04 |
| Metritis | 0 | 0 | 5 | 0.68 |
| Foot rot | 13 | 1.8 | 12 | 1.63 |
| Abscess | 5 | 0.68 | 5 | 0.68 |
| Abortion | 0 | 0 | 7 | 0.95 |
| Skin diseases | 12 | 1.63 | 20 | 2.73 |
| **Total** | **260** | **35.51** | **358** | **48.90** |
| **Non infectious diseases** | **Male** | **Prevalence(%)** | **Female** | **Prevalence(%)** |
| Poisoning | 0 | 0 | 3 | 0.40 |
| Bloat | 8 | 1.09 | 5 | 0.68 |
| Myiasis | 24 | 3.27 | 25 | 3.41 |
| Ectoparasites | 10 | 1.36 | 10 | 1.36 |
| Fascioliasis | 1 | 0.13 | 1 | 0.13 |
| Haemonchasis | 0 | 0 | 1 | 0.13 |
| Paramphistomiasis | 2 | 0.27 | 3 | 0.4 |
| Accidental injuries | 2 | 0.27 | 2 | 0.27 |
| Others | 7 | 0.95 | 10 | 1.36 |
| **Total** | **54** | **7.37** | **60** | **8.19** |
| **GT** | **314** | **42.89** | **418** | **57.11** |

 **CHAPTER-V**

 **DISCUSSION**

**5.1. Livestock survey in Kaunia upazilla**

Small ruminants especially goat is very important in rural economy and nutrition and has potentially of using it as a tool for poverty reduction in Bangladesh, current study showed that among ruminants goat is the first preference to rear about 38%(n=302) goat were reared in kaunia upazilla which is agreed with report of Ershaduzzaman *et al.* (2007).

Smallholder livestock production predominates, with over 70% of rural families keeping Black Bengal breed along with some Jamunapari and their crosses with Black Bengal of local primarily as sources of investment, manure and meat at home or during festivals. In most parts of the state, Black Bengal goats are allowed to roam throughout the seasons, thriving on indigenous browses growing in compound bushes and farm fallows with additional supplementation from kitchen wastes which is agreed with Okoli *et al.* (2003). Prophylactic management of common infectious diseases is rarely practiced. Most of the villages of Kaunia upazilla,livestocks are not vaccinated and dewormed,only 7% animals are vaccinated and dewormed.

**5.2. Different association of goats with breed and sex in Kaunia upazilla**

The results of different association with breed and sex of goats presented in table-2 . Results of vaccination associated with breed showed significant (p-value = 0.01) but with sex non significant (p-value = 0.59). Results of deworming associated with breed showed significant (p-value = <0.001) but with sex non significant (p-value = 0.46). Results of type of grazing associated with breed showed significant (p-value = 0.31) but with sex significant (p-value = 0.27).The association of type of grazing with breed and sex non-significant (p-value > 0.05).

Results could not be possible to compare with other authors because of available inland publication.

**5.3. Mortality of goat in the Kaunia upazilla**

**5.3.1. Kid mortality**

Among the Infectious causes kid were died due to pneumonia, diarrhoea, PPR, Coccidiosis were found to be 40.83%, 27.5%, 18.33% and 13.34% respectively showed in table-3. Similar result were observed by Chowdhury *et al*. (2002) where they found that 42.39% kids died due to pneumonia followed by diarrhoea (32.61%). Sriram *et al*. (1982) and Koul *et al.* (1988) also observed that main causes of mortality were pneumonia and enteritis. Major causes of kid mortality were infectious diseases.Among infectious causes kids were died due to diarrhoea, pneumonia which is similar with the results of Ershaduzzaman *et al.* (2007): they found about 63% kid died due to infectious diseases and dierrhoea 30% & pneumonia 27%. Kashem *et al.* (2011) also studied that the major causes of kid mortality by infectious diseases, among which PPR 25%, pneumonia 21.15% and diarrhoea 17.31% respectively.

**5.3.2. Growing goat mortality**

It was observed from the table-3 that among 100 growing goat were died due to pneumonia, diarrhoea, PPR, Coccidiosis were found to be 30%, 20%, 35% and 15% respectively. Among infectious diseases PPR is the major cause of growing goat mortality. Ershaduzzaman *et al.* (2007) observed that highest numbers of growing kids were died due to diarrhea (34%) and pneumonia (28%) where a small number due to enterotoxaemia (10%) and bloat (7%).

**5.3.3. Mortality of adult goat**

In table-3 showed that mortality of adult goats caused by infectious diseases like PPR higher in male than female (female 42.43%, male 46.22%) which is agreed with Rahman *et al*. (2004). In the study area diarrhoea in female 20.20%(n=20) & male 14.15%(n=15), pneumonia in female 15.15%(n=15) & male 20.75%(n=22), coccidiosis in female 5.05%(n=5) & male 6.60%(n=7) which is similar with Noman *et al.* (2011).

Among the non infectious diseases many female died from dystocia (7.07%) which is agreed with Mannan (1989) and Ross (1981). Mannan (1989) observed the maximum mortality due to diarrhoeal diseases (25.24%) followed by enterotoxaemia (23.30%). Kashem *et al*. (2011) reported that highest percentage of adult mortality (37.93%) was due to PPR followed by pneumonia (24.14%) among the infectious diseases & other infectious diseases such as diarrhea (13.79%) and contagious ecthyma (13.79%) were also observed in adult goats. Non-infectious cause has lower effects on adult goats mortality which also similar with the report of Kashem *et al*. (2011). Further work is needed to reduce the adult mortality by management and preventive (vaccine) intervention.

**5.4. Study of Livestock attended in the Hospital for treatment**

A total of 1320 livestock were presented in district veterinary hospital: Of them, cattle 454, goat 732, sheep 44, pig 5,buffalo 53,chicken 30 and duck 2, brought for treatment which was showed in table-2. During study period different kinds of livestock species attended to the hospital for treatment; of them goat (56%) was in 1st and cattle (35%) was in 2nd position. Very small number of sheep ,buffalo, pig ,chicken and duck were attended to the hospital for treatment.

**5.5. Clinical study of infectious and non infectious diseases of goat in district veterinary hospital of Rangpur district**

The sex wise clinical study of goat diseases were presented in table-4 in which a total of 732 goats of them male 314 and female 418.The cases were classified as infectious and non-infectious in nature. The clinical study of goat diseases were presented in the hospital for treatment, of them infectious diseases like diarrhea,PPR,pneumonia, coccidiosis, arthritis, foot rot, abscess, skin diseases and non infectious diseases like bloat, myiasis, ectoparasites, fascioliasis, paramphistomiasis, accidental injuries. But mastitis, metritis, abortion, poisoning, haemonchasis only found in female goat. Of them infectious diseases 84.41%(n=618) in which male 35.51%(n=260) and female 48.90%(n=358).Current study showed that diarrhoea in male 7.24%(n=53) & female 16.25%(n=119), pneumonia in male 5.46%(n=40) & female 10.10%(n=74),coccidiosis in male 2.45%(n=18) & female 2.45%(n=18), arthritis in male 0.13%(n=1) & female 0.13%(n=1), skin diseases in male 1.63%(n=12) & female 2.73%(n=20). Non infectious diseases that reported to the table-4 about 15.57%(n=114) of them male 7.37%(n=54) and female 8.19%(n=60). Among non-infectious diseases overall in first position was Myiasis, in male 3.27%(n=24) & female 3.41%(n=25).

 Kabir *et al*. (2010) studied diarrhoea in male 3.48% & in female 5.21%,pneumonia in male 2.61% & in female 4.35%,fascioliasis in male 3.48% & in female 6.96%,skin diseases in male 2.61% & in female 5.21% and arthritis in male 1.74% & in female 1.74%.Prevalence of PPR was in highest position overall among goats which is similar with the result of Kabir *et* *al.* (2010) where they found 28.69%. Among infectious diseases diarrhoea 16.25% ranked highest in female. Morbidity was higher in female goat than male where mostly diarrhoea and pneumonia which is similar with Ershaduzzaman *et al*. (2007) and Kabir *et al*. (2010). PPR higher in male 16.12%(n=118) than female 11.20%(n=82) which is agreed with the report of Sarker and Islam, (2011) where they found in male (28.52%) and female (13.04%). Choudhury (1995) reported the prevalence of PPR in Black Bengal goat was 67.28%. Banerjee *et al.* (1985) founded that the prevalence rate of pneumonia in goats 5.80%. Rahman *et al*. (1972) reported the clinical incidence of fascioliasis 8.35%.Prevalence of Paramphistomiasis higher in female (0.4%) than male (0.27%) the result is similar with the Bunza et al. (2008) where they found in female 8% and male 4%.Nooruddin *et al.* (1987) reported overall 26.8% prevalence rate of skin disease in black Bengal goats. Most of the diseases presented to the hospital for treatment were infectious cause similar result observed by Kabir *et al*. (2010).

**Limitations of the study**

The study was conducted in a very limited period of time (internship placement: 3 months).The study was exclusively on goat species of livestock. Seasonal variation was not possible to observe with a limited period of time. Diseases diagnosis was depend on only clinical symptoms not by modern diagnostic techniques in the laboratory. The population study was completely depended on memory of the responded farmers during questionnaire survey. However, the result of the study has given a millstone of the goat disease and its morbidity & mortality trends in Rangpur district.

**Future perspectives of the study**

Further study on goat may give details study on goat diseases in northern part of Bangladesh. Seasonal variation with disease trends should be investigated. Attempt should be taken to apply modern diagnostic techniques in the laboratory for disease diagnosis. One can study the diseases of other species of livestock.

 **CHAPTER-VI**

 **CONCLUSION AND RECOMMENDATIONS**

Bangladesh is a small developing country with densely populated and most of the people are poor. They prefer to rear goat beaucase of a minimum investment of money is required with a minimum land, even without specific arrangement of housing, grazing on barren and road-side grass land and least homemade supplied feed for goat rearing. Different types of diseases: both infectious and non-infectious are important problems in goat rearing in our country. It can be concluded that high prevalence of infectious diseases such as PPR, pneumonia, diarrhoea and coccidiosis in goat than non infectious diseases such as poisoning, myiasis, bloat, ectoparasites irrespective of all age groups and sex groups in Rangpur district. PPR ranked the highest portion among the infectious diseases in goat. Based on the results obtained from the present study the major causes of goat mortality in study area were infectious diseases. Among the infectious diseases PPR, pneumonia, diarrhoea and coccidiosis also causes high mortality rate in goat in Rangpur district. Based on the results obtained from the present study, regular deworming, vaccination and improvement of husbandry practices is suggested to improve the goat rearing in Bangladesh.

**RECOMMENDATIONS**

* Further study needed with adequate time.
* Proper Epidemiological study needed.
* People should aware about the different diseases occurred at different age group of goat and deworming and vaccination should be done in every 6th months.
* Sufficient amount of vaccine should be available to the reach of the owner.

**ANNEXTURE-1**

Table: Infectious and non infectious diseases of Livestock attended in the district veterinary hospital, Rangpur for treatment

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Diagnosis** | **Cattle** | **Goat** | **Sheep** | **Pig** | **Buffalo** | **Chicken** | **Duck** | **Percentage****(%)** |
| **Infectious diseases** |
| FMD | 7 |  |  |  |  |  |  | 0.54 |
| Myiasis | 50 | 49 |  |  | 5 |  |  | 7.9 |
| Ringworm | 9 |  |  |  |  |  |  | 0.7 |
| Coccidiosis | 20 | 36 |  |  |  |  |  | 4.25 |
| Anaplasmosis | 51 |  |  |  |  |  |  | 3.9 |
| Theileriosis | 23 |  |  |  |  |  |  | 1.75 |
| PPR |  | 200 | 7 |  |  |  |  | 15.68 |
| Pneumonia | 5 | 114 | 5 | 2 |  |  |  | 9.55 |
| Arthritis | 20 | 2 |  |  |  |  |  | 1.67 |
| Mastitis | 45 | 15 |  |  | 10 |  |  | 5.30 |
| Metritis | 10 | 5 |  |  |  |  |  | 1.14 |
| Foot rot | 12 | 25 |  |  |  |  |  | 2.80 |
| Abscess | 3 | 10 |  |  |  |  |  | 0.98 |
| Abortion | 5 | 7 |  |  |  |  |  | 0.90 |
| Diarrhoea | 20 | 172 | 11 | 2 | 12 |  |  | 16.43 |
| Skin diseases |  | 32 |  |  |  |  |  | 2.42 |
| ND |  |  |  |  |  | 4 |  | 0.3 |
| IBD |  |  |  |  |  | 4 |  | 0.3 |
| Salmonellosis |  |  |  |  |  | 12 |  | 0.90 |
| Collibacillosis |  |  |  |  |  | 2 |  | 0.15 |
| Fowl typhoid |  |  |  |  |  | 2 |  | 0.15 |
| Brooder Pneumonia |  |  |  |  |  | 2 |  | 0.15 |
| Pox |  |  |  |  |  | 1 |  | 0.08 |
| Duck plague |  |  |  |  |  |  | 2 | 0.15 |
| **Non infectious diseases** |  |  |  |  |  |  |  |  |
| Poisoning | 8 | 3 | 5 |  |  |  |  | 1.2 |
| Bloat | 7 | 13 | 4 | 1 | 7 |  |  | 2.42 |
| Ectoparasites | 15 | 20 | 5 |  | 5 |  |  | 3.40 |
| Fascioliasis | 14 | 2 |  |  | 2 |  |  | 1.36 |
| Haemonchasis | 32 | 1 |  |  |  |  |  | 2.5 |
| Ascariasis | 15 |  |  |  | 1 |  |  | 1.2 |
| Moneiziasis | 10 |  |  |  |  |  |  | 0.75 |
| Paramphistomiasis | 53 | 5 | 7 |  | 11 |  |  | 5.75 |
| Strongyloidosis | 10 |  |  |  |  |  |  | 0.75 |
| Heat stroke |  |  |  |  |  | 3 |  | 0.22 |
| Accidental injury | 10 | 4 |  |  |  |  |  | 1.06 |
| Others |  | 17 |  |  |  |  |  | 1.3 |
| **Total** | **454** | **732** | **44** | **5** | **53** | **30** | **2** | **100** |

  **ANNEXTURE-2**

 **QUESTIONNAIRE**

 Date:………………………………

1.Name of the owner:……………………………………………………………..Occupation:…………………………..

2.Address of the owner: Village…………………………………………………………………………………………………………………………………...

Upazilla:………………………………………………………………..District:………………………………………………….

3.Animal Information:

Total no. of Livestock:……….Cattle:…………………Goat:…………Sheep:…………….Chicken:…………

Total no. of goat:…………………..Breed:……………………Male:………………Female:…………………………

No. of Dead animals past 1yr:……………………….(male:………………………female:…………………………)

Causes of death:…………………………………………...............................................................................

No. of diseased animal:…………………………………….…(male………………………Female:…………………...)

Taken to Hospital for Treatment : Y/N No of cured animal:……(male…….……Female:……...)

Vaccination: Y/N Deworming:Y/N

Housing system: Intensive/ Semi-intensive/ Tethered/ Free range/ other

Concentrate (Y/N)…………………Kg/day Type of grazing: Community/individual

|  |
| --- |
|  **PPR(Peste des Petits Ruminants)** |
|   p pit da  Nasal discharge Necrotic stomatitis Diarrhoea  |
| **Pneumonia** | **Foot Rot** |
|  **cfr**Pneumonic goat | sqwFoot rot in goat |
| **Coccidiosis** | **Mastitis** |
|  *dass tre*  Diarrhoea Oocyst of Coccidia |   IMG_6921  Mastitis affected goats |

**ANNEXTURE-3**

 **Small gallery of different goat diseases**

 **CHAPTER-VII**

 **REFERENCES**

 **Adekeye, J. O. (1984).** Studies on aerobic bacteria associated with ovine and caprine pneumonic lungs in Zaria. *Nigeria Veterinary Journal.13(1):5-8.*

 **Al-Tarazi, Y. H. M. and Daghall, G. J. K. (1997).**  Nasal carriage of Pasteurella hemolytica serotypes by the sheep and goats in the Jordan. *Tropical Animal Health and Production.29:177-179.*

 **Bangladesh Economic Review. (2009).**  Ministry of Finance, Government of Bangladesh.

 **Benerjee, M., Gupta, P. P. and Singh, N. (1985).** Incidence and types of pulmonary affections in sheeps and goats of Ludhiana (Punjab). *Indian Journal of Animal Health.24:21-23.*

 **Bunza, M.D.A , Ahmad, A. and Fana, S.A. (2008).** Prevalence and of *Paramphistomiasis* in Ruminants Slaughtered at Sokoto Central Abattoir, Sokoto. *Nigerian Journal of Basic and Applied Sciences.16 (2 ):287 – 292.*

**Choudhury, C. S. P., Bandopadhyay, L. N., Das, B., Sabir, M. and Guha, D. K. (1995).** Studies on the control of an outbreak of Peste des petitsruminants in goats in west Bengal. *Indian Journal of Animal Health.34:65-66.*

**Chowdhury, S.A., Bhuiyan, M.S.A. and Faruk, S. (2002).** Rearing Black Bengal Goat under Semi-Intensive management 1. Physiological and Reproductive Performances. *Asian- Australasian Journal of Animal Sciences.15 (4):477-484.*

 **DLS, (2009).** Depertment of Livestock Services, Khamer Bari Rd. Dhaka. Personal Communication.

 **Donkin, E.F. and Boyazoglu, P.A. (2004).** Diseases and mortality of goat kids in a South African milk goat herd. *South African Journal of Animal Science.34 :258-261.*

 **Ershaduzzaman, M., Rahman, M., Roy, B.K., Chowdhury, S.A. (2007).** Studies on the diseases and mortality pattern of goats under farm conditions and some factors affecting rates in black Bengal kids. *Bangladesh Jurnal of Veterinary Medicine.5(1&2):71-76.*

**Faizala, A. C. M. and Rajapakseb, R. P. V. J. (2001).** Prevalence of *Coccidia* and gastrointestinal nematode infections in cross bred goats in the dry areas of Sri Lanka. *Small Ruminant Research.40:233-238.*

 **Fraser, M C., Bergeron J.A., Mays, A. and Aiello, S.E. (1991).** The Merck Veterinary Manual.In: Digestive system(coccidiosis,intestinal diseases in ruminants),Generalized condition (Peste Des Petits Ruminant),Masculoskeletal system (foot rot),Reproductive ststem(mastitis),Respiratiry system (introduction,pneumonia).Seventh edition, Merck & Co. Inc.Rahway,N.J.,U.S.A.pp-103,181,402,505,687-691,706,709,755.

 **Hassan, M. M., Hoque, M. A., Islam, S. K. M. A., Khan, S. A., Roy, K. and Banu, Q. (2011).** A prevalence of parasites in black bengal goats in Chittagong, Bangladesh. *International Journal of Livestock Production.2 (4):40-44.*

**Hoque, M.S. (1996).** MS Thesis. Clinical prevalence and findings of diseases and disorders in cattle and goats at the Central Veterinary Hospital, Dhaka. Department of Medicine, Bangladesh Agricultural University, Mymensingh, Bangladesh.

**Husain, S.S., Islam, A.B.M.M. and Horset, P. (1995).** Effect of different factors on pre-weaning survivality of Black Bengal kids. *Small Ruminant Research.18:1-5.*

 **Javed, M. S., Iqbal, Z. and Hayat, B. (1992).** Prevalence and economics of haemonchosis in sheep and goats. *Pakistan Veterinary Journal.12: 36-38.*

 **Jensen, B. (1974).** Diseases of sheep Lea and Febiger, Philadelphia, 171-178.

 **Kabir, M. H., Reza, M. A., Razi, K. M. A., Parvez, M. M., Bag, M. A. S. and Mahfuz, S. U. (2010).** A report on clinical prevalence of diseases and disorders in cattle and goat at the upazilla veterinary hospital,Ulipur,Kurigram. *International Jurnal of Biological Research.2(11):17-23.*

 **Kashem, M. A., Hossain, M. A., Ahmed, S. S. U. and Halim, M. A. (2011).** Prevalence of diseases, morbidity and mortality of Black Bengal Goats under different management systems in Bangladesh. *University Journal of Zoology, Rajshahi University.30:01-04.*

**Koul, G.L., Somvansha, S. and Biswas, J.C. (1988).** Mortality pattern in Pashmina goats. *Indian Veterinary Journal.65:847­-849*.

**Mannan, S.A., (1989).** MS Thesis. Study on goat’s mortality and their probable causes in Madhupur Upazilla of Tangail District. Department of Medicine, Bangladesh Agricultural University, Mymensingh, Bangladesh.

**Mondal, A.K., Chottopadhuay, A.P., Sarkar, S.D., Saha, G.R. and Bhowmik, M.K. (1995).** Report on epizootological and clinico-pathological observation on peste des petits ruminants (PPR) in West Bengal. *Indian Journal of Animal Health Bull.64:261.*

 **Mowlem, A. (1992).** Goat farming.In: feeding and nutrition. Second edition,Farming press,Madison. pp- 37-53

**Noman, M. A., Shaikat, A., Nath, B., Shil, S., Hossain, M. (2011).** Incidence and modulating effects of environmental factors on infectious diseases of Black Bengal goat in Cox’s Bazar district of Bangladesh. *YYU Veterier Fakultesi Dergisi.22(3):163-167.*

**Nooruddin, M., Baki, A., Das, J. G. (1987).** Clinico-pathological studies of an outbreak of Trichuris in cow calves. *Indian Jurnal of Veterinary Medicine.7:116-119.*

**Obi, T. U. (1983).** Studies on the epidemiology of PPR in Southern. Nigeria.*Tropical Veterinary.1:209-217.*

**Okoli, I. C., Ebere, C. S., Uchegbu, M .C., Udah, C. A. and Ibeawuchi, I. I. (2003).** Survey of the diversity of plants utilized for small ruminant feeding in Southeastern Nigeria. *Agricultural Ecosystem and Environment.96:147-154.*

**Onyekweodiri, E. O. and Uzoukwu, M. (1992).** Epidemiology of PPR under the traditional husbandry systems in Eastern Nigeria, Proceedings 29th Annual Conference of Nigeria Veterinary Medicine Association, 27th -30th October 1992, Kaduna, Nigeria.

**Rahman, A., Ahmed, M.U. and Mia, A.S. (1976).** Studies on the diseases of goats in Bangladesh: Mortality of goats under farm and rural conditions. *Tropical Animal Health and Production.8: 90.*

**Rahman, A.U., Ashfaque, M., Rahman, S.U., Akhtar, M. and Ullah, S. (2004).** Pest des petits ruminants antigen in mesenteric lymph nodes of goats slaughtered at D.I. Khan. *Pakistan Veterinary Jurnal.2:159-160.*

**Rahman, M. A., Ali, K. M. and Rahman, A. (1972).** Incidence of disease of cattle in Mymensingh.*Bangladesh Veterinary Jurnal.6:25-30.*

**Raji, M. A., Rodgers, D., Natala, A. J. and Halle, P. D. (1999).** A survey of the aerobic bacterial agents associated with ovine pneumonia in Zaria, Kaduna State, Nigeria. *Nigeria Veterinary Journal.20(1):75-81.*

 **Riche, P. D., Efstathiou, G. C., Alfan, Y. and Campbell, J. B. (1973).** A helminth survey of sheep and goats in Cyprus. *Journal of Helmintholology*.*43:251-262.*

**Ross, J.D. (1981).** Herd health program for Angora goats. In: Current Veterinary Therapy, Food Animal Practice. 1st edition, JL Howard (ed), WB Saunders Co., Philadelphia.

 **Saadullah, M. (1991).** Research and Development Activities and Needs of Small Ruminants in Bangladesh. In: Research and Development Needs of Small Ruminants in Asia. Small Ruminant Production Systems Network in Asia (SRUPNA). Ed. Andi Djajianegara and C. Devendra, Indonesia.

 **Saadullah, M. and Hossain, M. M. (2000)**. Quantification of locally available feed resources and feeding systems of animals in different regions of Bangladesh. Project Report, Bangladesh Agricultural Council.

**Samad, M. A. (2008).** Animal Husbandry and Veterinary Science.1st pub.,LEP pub.No.11.BAU.Campus,Mymensingh.

 **Sarker, S. and Islam, M. H. (2011).** Prevalence and risk factor assessment of peste des petits ruminants in goats in Rajshahi, Bangladesh. *Veterinary world.4(12):546-549.*

**Seifert, H. S. H. (1996).** Tropical animal health Kluwer Academic publishers, London.

 **Sriram, P.K., Rao, P.R. and Naidu, N.G.R. (1982).** Goat mortality in Addhra Pradesh. *Indian Veterinary Journal.59:96-99****.*** *University Press: Cambridge, 453-48.*

**Suh, M. D., Kim, C. S. and Jung, M. K. (1980).**Epidemiological study on the infection rate of internal parasites of sheep at an Alpine breeding station. *Research Reports Rural Development Korea.22:138-146.*