

# **PREVALENCE OF PPR AND ITS TREATMENT PROCEDURE IN GOATS OF PABNA DISTRICT**

## **ABSTRACT**

The study was conducted at major goat rearing areas of Pabna district from April 2010 to December 2010 to find out the prevalence and treatment strategy of PPR. 140 (2.18%) PPR infected goats were recorded out of 6408 cases studied. Young are more susceptible to PPR than adult. Black Bengal goat showed much more susceptibility (69.29%) than Jamunapari (30.71%) during the study. Combined therapy (atropine, antihistaminic aided antibiotic, fluid therapy) was more effective in the treatment of PPR.

Key words: Peste des petits ruminants (ppr), Goat, Prevalence, Therapy.

## Chapter- I

### INTRODUCTION

Goat is considered as the poor man's cattle. There is a significant population of goats (20.75 million) in Bangladesh (DLS, March, 2007). Recently Bangladesh government has taken a national program on goat rearing. But there is several disease of goat which causes higher mortality. Peste des petits ruminants or goat plague or stomatitis pneumoenteritis syndrome is one of them which are caused by morbilli virus of the paramyxoviridae. It is an exotic disease of goats in Bangladesh (Debnath, 1995, Islam *et al.*, 2001). The morbidity and mortality rates are 80-90% and 40-80% respectively (Sil, 2000) so the effect of this disease in goat population is certainly considerable when a national scheme of poverty alleviation through goat rearing is carrying on in Bangladesh. PPR has been found to be widely distributed in Africa and Arabian Peninsula (Taylor, 1984). In South Africa PPR was recorded in South Indian Sheep (Shaila *et al.*, 1989) and subsequently became more prevalent in goats (Kulkarni *et al.*, 1996, Nanda *et al.*, 1996., Shaila *et al.*, 1996). It was also has been reported in goats of Pakistan (Amzad *et al.*, 1996). In Bangladesh outbreak of Rinderpest like disease, later confirmed by a reference laboratory to be PPR, have been occurring in goats since 1993 in border belts area of south western districts of Bangladesh (Sil *et al.*, 1995, Debnath, 1995). Clinically, PPR resembles rinderpest and is characterized by erosive stomatitis, enteritis with diarrhoea and pneumonia (Rowland *et al.*, 1996, Bundza *et al.*, 1988).

The aim of this study was to diagnosis of PPR cases in field level and minimize the sufferings of goat population by proper nursing, supportive therapy and save life of sick animals and overall disease ideas in Pabna district. Though PPR is immunologically similar to rinderpest and produce solid immunity so prevention of the disease by vaccination is easier than any other methods (Sil, 2000). Bangladesh livestock research institute have developed a

homologous cell culture attenuated PPR vaccine which is very potent against PPR. But vaccination program has not yet been covered total population of the country. So supportive therapy of atropine aided antibiotic, fluid therapy and antihistaminic aided antibiotic, fluid therapy as well as combined therapy can save the life of PPR affected patient in field condition (Richards and Adams, 1982; Scott, 2000).

## **OBJECTIVES**

As per discussion above and considering the fact the specific objectives of this research reports were determined as follows:

01. To know the prevalence of PPR disease in Pabna district.
02. To know the treatment efficacy of this disease with various therapeutic methods.

## Chapter-II

### REVIEW OF LITERATURES

#### 2.1. History

The disease was first recorded in goat and sheep in Ivory coast of West Africa in 1940 (Gargadennec and lalanne, 1992). The PPR virus was first recorded and isolated by Gilbert and Monnier in 1962 (Sil, 2000) in Senegal. PPR virus circulates in belt lying across Africa, Saudi Arabia, in 1981 and spread north wards into Jordan, Syria, Iraq, India, Pakistan (Sil, 2000). Later it spread to South India in 1987 (Shaila *et al.*, 1989) and in Bangladesh in 1993 (Sil *et al.*, 1995; Debnath, 1995).

#### 2.2. Morphology

PPR virus is enveloped with helical pleomorphic shape containing sense single stranded non segmented RNA molecule. The genome of this virus is a single linear molecule of approximately  $4.5 \times 10^6$  DA with 16,000 ribonucleotides which is encoded with six structural protein, the Nucleocapside (N), Matrix (M), Fusion (F), Haemagglutinin (H), Polymerase (P) (Sil, 2000). The PPR virus identified in Bangladesh is under the lineage 4 of PPR phylogenetic tree based on the N gene analysis (Barrett *et al.*, 1998).

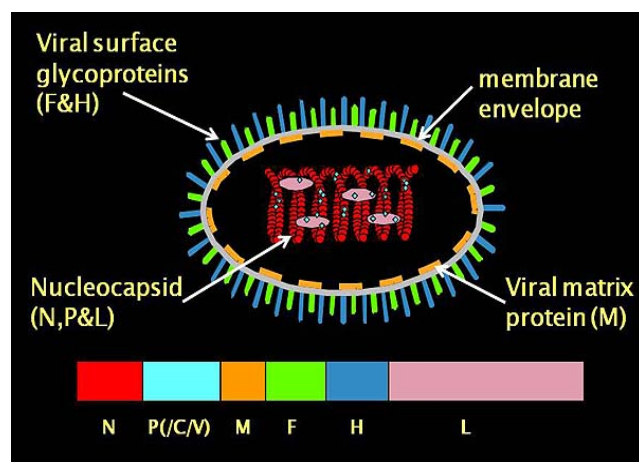


Figure 01: PPR Virus structure

#### 2.3. Pathogenecity and Transmission

PPR virus is not pathogenic for cattle but rinderpest can also affect goat along with PPR (Gibbs *et al.*, 1979). Case fatality rate is higher in goats (55-85%) (Opasina *et al.*, 1985). Faces is the main spreading agent and through it disease may occur in epidemic proportion (Shanthi Kumar *et al.*, 1994). Newly purchased animal from market and wild animal have suspected to play a role spreading of disease (Radostis *et al.*, 1994 and Fraser, 1986).

## 2.4. Pathology

Pneumonia was not always a consistent feature of PPR in goat (Kulkarni *et. al.*, 1996). Lungs were found highly consolidated in apical lobe, echymotic and brush paint hemorrhage were found in epicardium (Rahman *et. al.*, 2001). Zebra stripes are formed by hemorrhages in the fold of rectum (Sil, 2000). The alveoli were altered with the proliferation of type II pneumocytes, multinucleated giants cell with eosinophilic intracytoplasmic inclusion body (Islam *et. al.*, 2001).

## 2.5. Clinical Features

Susceptibility to infection rises with age; however, the disease is rapidly fatal in the young animals (Ozkul, 2002). The clinical signs imitate those of rinderpest, but changes can occur faster. Specific clinical signs are outlined in the table below:

<b>Clinical Features of Petit des Pestis Ruminants</b>	
<b>Feature/Disease Form</b>	<b>Characteristics</b>
Incubation period	2-10 days, most commonly 4-5
Acute	<p>Most common form</p> <p>Sudden high fever (40-41C), remaining high for 5-8 days; will return to normal before recovery or drop below normal before death</p> <p>Serous nasal discharge, becoming mucopurulent; can crust over and occlude nostrils</p> <p>Purulent ocular discharge with congested conjunctiva; can encrust, cementing eyelids together</p> <p>Bronchopneumonia</p> <p>Necrosis and ulceration of mucous membrane and inflammation of gastrointestinal tract leading to severe, nonhemorrhagic diarrhea</p> <p>Respiratory distress, including dyspnea and sneezing in an attempt to clear nose</p> <p>Excessive salivation but not to point of drooling</p> <p>Anorexia</p> <p>Severe dehydration and emaciation followed by hypothermia</p> <p>Death usually occurs after 5-10 days</p> <p>Abortion</p> <p>Mortality rate can reach 100%</p> <p>Secondary infections may be activated and complicate clinical signs</p>
Peracute	Frequent in goats
Subacute and chronic	<p>Pneumonia</p> <p>Develops over 10-15 days</p> <p>Inconsistent symptoms</p>
Adapted from DEFRA, Dhar (2002), EMPRES (1999), Saliki (2008), OIE (2002), Ozkul (2002).	

The prognosis of acute PPR is usually poor, especially when lesions do not resolve within 2 to 3 days or when extensive necrosis and bacterial infection give the animal's breath an unpleasant, fetid odor. Young animals (4 to 8 months) often have more severe disease. Also, poor nutrition, stress of movement, and concurrent parasitic and bacterial infections worsen clinical signs (Saliki, 2008).

## **2.6. Prevalence of PPR**

The prevalence of ppr in small ruminant specially in goat varies due to different causes. Different researchers recorded a lot of findings. Some of the important findings has cite here. Khan and Siddique *et al.*, (2007) reported the overall prevalence of PPRV was 43.33% of the ruminant population in Punjab. They also mentioned the overall PPR antibody seroprevalence in goats was 39.02% which is significantly higher.

Nussieba *et al.*, (2009) examined 519 serum samples for the presence of PPRV antibodies, but 307(59.15%) were positive by CIEP while 263 (50.67%) were positive by C-ELISA. Also 15.36% goats were found positive in PPR c-ELISA in seroprevalence of PPR by Mehmood *et al.*, (2009). In Pakistan the endemic mortalities as low as 20% have been described by Roeder and Ubi, (1999). Abubakar *et al.*, (2008) recorded the prevalence of PPR in small ruminants in Pakistan was 40.98%, but over all was 46.7%. On the contrary in Cameroon, (N = 320), 35% PPR antibodies while for Nigeria (N= 382), the values was 56.5 (Majiyagbe *et al.*, 1992).

Samad (2000) reported black Bengal goats were more susceptible to ppr. Also mortality rate was higher in Barbari black Bengal crosses (Sil, 2000). There is also report of equally susceptibility of male and female goat recorded by Samad (2001). PPR occurs in an epizootic form, it may have morbidity of 80-90% and mortality between 50 and 80 % (Lefevre and Diallo, 1990).

Outbreaks are more frequent during the rainy season or the dry, cold season (OIE, 2002). More cases of PPR and bronchopneumonia were recorded during the dry months of December to January. Okoli, (2003) recorded 25.1% ppr in late dry Season, 25.9 % in early winter season, 22.8% in late winter and 26.2% in early dry seasons. Higher incidence of PPR observed here during the dry months of December and January agrees with earlier reports by Obi (1983) and Onyekweodiri and Uzoukwu (1992).

## **2.7. Treatment and vaccination**

Goats vaccinated with escaped mutant virus were 100% seroconverted following 15 days post vaccination and developed protective immunity against the field strains of PPR for more than 2 years (BLRI, 1999). Two candidates of homologous vaccine have already been developed, one in Ethiopia of Africa and another in Bangladesh (Sil, 2000).

Hyperimmune serum can be used successfully along with long acting antibiotic (Antibiotic Combined Hyperimmune Serum Therapy) to limit the spread of virus and recover those animals which are under incubation and in early stage of infection. Good nursing, Symptomatic treatment with broad spectrum antibiotic/ sulphur drugs can save life of sick animal and also can improve the immunosuppressive condition of the affected goat (Sil, 2000 and Scott, 2000).

There are no known effective drugs against virus etiology of this disease. However, hyperimmune serum and supportive treatment with fluid therapy for dehydration and antibiotics to prevent secondary bacterial infection could be used to save the life of the infected goats. Anene *et al.*, 1987 who studied the appraisalment of the treatment of naturally occurring PPR in goats with oxytetracycline, chloramphenicol 25% aqueous solution and metamerazine in different groups at the recommended dose rates found recovery rate 14.29%. Islam *et al.*, 2003 stated that antibiotic combined therapy with hyperimmune serum, in which recovery rates was an average of 68.75%.

## Chapter-III

### MATERIALS AND METHOD

#### 3.1. Study period

The study was conducted over 8 months from April, 10, 2010 to December, 23, 2010.

#### 3.2. Place of study

Sujanagar, Sathia and Bera upazilla of Pabna district.

#### 3.3. Sample size

The study was conducted on natural PPR infected goats of various age and sex randomly over the study period. A number of cases were recorded in internship case log (Appendix). Of those cases, adult goats were randomly selected, examined, treated and follow up was taken.

#### 3.4. Recording of signs and symptoms

different exposed signs and symptoms were recorded carefully by close infection like erosion of oral mucosa, discharges from eyes, nose, mouth, rough coat, soiled hind quarter, anorexia, depression.

Temperatures were recorded by indirect palpation per rectum by thermometer of every case and tabulated.

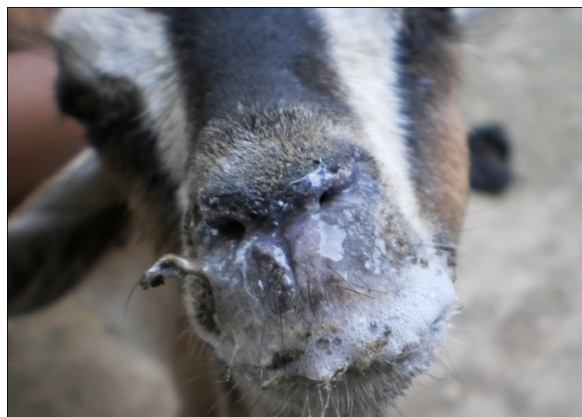
Indirect auscultation was performed to hear the lung and tracheal sound to coincide with the symptoms of pneumonia.

Skin fold test were performed to take the rough estimation of the degree of dehydration.

Presumptive diagnosis was made on the basis of the anamnesis and observed clinical signs and symptoms.



**Figure 02: Diarrhoea with soiled hind quarter**



**Figure 03: Discharges from eyes, nose, mouth**



### 3.5. Criteria for diagnosis of PPR

In this study, population groups were divided in two, depending upon the early stage and later stage of clinical signs and symptoms. PPR consists of 5 phases of infection cycle as incubation period, prodromal phase, erosive phase, pneumonic phase, diarrhea and death (BLRI, 1999).

Here prodromal and erosive phase was considered as early stage and pneumonic phase and diarrhea as later stage of infection.

Infected animal of early stage showed sharp rise of temperature (104°F-106°F), impaired appetite, depression, erected



**Figure 04: Erosion in the lip, buccal mucosa, gum**

hair, serous nasal discharge, sneezing, congestive oral mucosa and later erosion in the lip, buccal mucosa, gum, dental pad, palate, tongue and nasal passage.

Where as in later stage, the animal showed mucopurulent to purulent nasal discharge which may encrusted and matted over the mouth. Pneumonia, severe dyspnoea, diarrhea with dark brown colored fluid faeces with necrotic debris streaked with blood. Temperature regresses with advancing dehydration and emaciation.

### 3.6. Follow up treatment

For treatment the goats were divided into three groups. As being viral disease only supportive therapy was applied to the PPR infected goats. Antibiotic, sulphur drug, antihistaminic and fluid therapy were given to the study population. The therapy regime was-

- i. Sulphadimidine (Salidone® ACI) @ 0.2 g per body wt. (3ml per 5 kg body wt.) in the first dose and ½ of the initial dose in subsequent days, IM.
- ii. Oxytetracycline (Renamycin® Renata) @ 10mg per kg body wt. (1ml per 10kg body wt.) IM daily.
- iii. Promethazine hydrochloride (Dellergen® Renata ) @ 10mg per kg body wt. (2ml per 10kg) IM daily.
- iv. Atropine sulphate: (Atrovet inj.®,techno) 1 mg/kg body wt.
- v. Oral fluid therapy by Oasaline® (SMC).
- vi. First group was treated with the atropine aided antibiotic and second group with antihistaminic aided antibiotic. The third group was treated with combined therapy. Fluid therapies were same for the all group.

### **3.7. Statistical Analysis**

At first the data were collected in previously formed record sheet. Then the collected data were organized by using computer excel programme and fundamental mathematical analysis (sum, percentage etc.) were performed to find out prevalence by this programme. Distinctive analysis was performed to interpret the data.

## Chapter-IV

### RESULT AND DISCUSSION

The study was performed for the findings of prevalence and treatment strategies that are followed in during the treatments of ppr infected goat in pabna district. The prevalence and associated results of this study are summarized in the table given below. In table 4.1, the overall prevalence of ppr in both black Bengal and jamunapari breed has shown.

**Table: 4.1.Prevalence of PPR of goat:**

Name of breed	No. of cases	Percentage
<b>Black Bengal</b>	97	69.29%
<b>Jamunapari</b>	43	30.71%
<b>Total</b>	140	2.18%

The findings of present study (**overall 2.18%, Black Bengal 69.29% and Jamunapari 30.71%**) do not similar with previous records. Where Khan and Siddique *et al.*, (2007) reported higher overall prevalence (43.33%) of the ruminant. Also does not congruous with Nussieba *et al.*, (2009), by Mehmood *et al.*, (2009), Abubakar *et al.*, (2008) where they recorded 59.15%, 15.36% and 40.98% respectively. The susceptibility rate recorded in this study has close similarity with Samad (2000) and Sil (2000) where they mentioned about the higher susceptibility of black Bengal goat.

In the table 4.2, the study revealed that growings( 1.5-2years) are more prone to ppr infection.

**Table: 4.2. Prevalence of PPR according to age of goats:**

Age (year)	No. of cases	Percentage
<b>1 to 1.5 years</b>	55	39.29%
<b>1.5 to 2 years</b>	73	52.14%
<b>2 to 2.5 years</b>	12	8.57%

Although this record showed close relationship with findings of Khan *et al.* (2008) in the case of adult infection, ppr infection in very young (1-1.5 years) was lowest (39.29%) in present report that is totally opposite to khan *et al.* (2008) results (69%).

In table 4.3 (season) and 4.4 (sex), data were analyzed against season and sex respectively which shows that rainy season (32.1%) and autumn-late autumn (33.6%) seasons are much more dangerous for PPR infection. In winter PPR begins to disappear slowly (26.43%) and in summer it is less (7.86%).

**Table: 4.3. Prevalence of PPR according to season:**

Season	Black Bengal Breed		JamunaPari		Total	
	affected	Percentage (%)	affected	Percentage (%)	Affected	Percentage (%)
Summer	9	6.43	2	1.43	11	7.86
Rainy season	30	21.43	15	10.7	45	32.1
Autumn and late autumn	32	23.0	15	10.7	47	33.6
Winter	26	18.5	11	7.8	37	26.43

Here it is also noticed that autumn rainy (32.1%), (33.6%) and winter (26.43) had the higher prevalence than summer. Previous findings also support this as mentioned by Okoli, (2003), (OIE 2002), Obi (1983) and Onyekweodiri and Uzoukwu, (1992).

Although previous findings of Samad (2001) were indicating that female are more vulnerable to ppr, the present findings recorded the female (54.29%) were more susceptible to male (45.71%).

**Table: 4.4. Prevalence of PPR according to sex of goat:**

Sex	No. of cases	Percentage in total infected goat
Buck (m)	64	45.71%
Doe (f)	76	54.28%
Black Bengal (m)	36	25.71%
Black Bengal (f)	61	43.57%
Jamunapari (m)	27	19.3%
Jamunapari (f)	16	11.43%

**Table: 4.5. Efficacy of therapeutic response in PPR of goat in different therapeutic methods:**

<b>Sl. No.</b>	<b>Therapy</b>	<b>Total no. of case treated</b>	<b>No. of cured case</b>	<b>Percentage of cured cases</b>
<b>01.</b>	Atropine aided antibiotic, fluid therapy	54	41	76%
<b>02.</b>	Antihistaminic aided antibiotic, fluid therapy	49	33	67.35%
<b>03.</b>	Combined therapy	37	31	83.8%

In table 4.5 given treatment and therapeutic responses were studied. This matches some previous studies. In antibiotic with fluid therapies the cured percentage was 76% which matches the result of Anene *et al.* (1987). In anantihistaminic aided antibiotic the Successful percentage were 67.35% which matches the result of Islam *et al.* (2003). In combined therapy the cured percentage was 83.8% which is similar to the findings of Islam *et al.* (2003). It was found that combined therapy with atropine and antihistamine aided antibiotic supported by fluid therapy is so much effective to minimize mortality.

## **Chapter-v**

### **CONCLUSION**

PPR is highly contagious disease with higher mortality and morbidity in goat. In this study it is revealed that BBG were more susceptible (69.29%) compared to Jamunapari goat (30.71%). According to age groups, 1.5-2 years goats were highly infected as 52.14% in comparison with others. Here male was more resistant than female to PPR infection. In rainy and autumn season PPR susceptibility is remarkable, that was recorded in 32.1% and 33.6% respectively. Although against virus, there is no specific treatment, combined therapy containing antibiotic, antihistaminics as well as fluid therapy noticed line of treatment in PPR infection of goat.

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Virus in sheep and goats in punjab province of pakistan; Pakistan Vet. J., 2007, 27(3): 109-112.

## Appendix

### 01. Data collected from Sujanagar, sathia and Bera upazilla of Pabna district

Sl. No.	Date	Teeth (permanent Incisor)	Age (year)	Breed	sex
01.	10.04.10	4th	2	J	m
02.	17.04.10	2th	1.5	B	m
03.	02.05.10	2th	1.5	B	f
04.	04.05.10	2th	1.5	B	m
05.	09.05.10	6th	2.5	B	f
06.	10.05.10	2th	1.5	B	f
07.	17.05.10	6th	2.5	B	f
08.	19.05.10	2th	1.5	J	m
09.	20.05.10	6th	2.5	B	m
10.	24.05.10	2th	1.5	B	f
11.	26.05.10	2th	1.5	B	m
12.	02.06.10	4th, 2th	2, 1.5	B, J	f, f
13.	03.06.10	4th	2	B	m
14.	05.06.10	4th	2	J	m
15.	06.06.10	2th, 2th	1.5	B, J	m, f
16.	11.06.10	4th, 4th	2	B, B	f, m
17.	12.06.10	4th, 4th	2	B, B	f, m
18.	13.06.10	4th, 4th	2	B, J	f, m
19.	14.06.10	2th, 2th	1.5	B, J	f, f
20.	16.06.10	2th	1.5	B	f

**Continuation**

<b>Sl. No.</b>	<b>Date</b>	<b>Teeth (permanent Incisor)</b>	<b>Age (year)</b>	<b>Breed</b>	<b>sex</b>
21.	17.06.10	4th, 4th	2	J, J	f, f
22.	19.06.10	4th, 2th	2, 1.5	B, J	m, f
23.	20.06.10	4th, 4th	2	B, B	m, m
24.	21.06.10	2th	1.5	B	f
25.	23.06.10	4th	2	B	f
26.	26.06.10	2th, 4th	1.5, 2	B, B	f, f
27.	30.06.10	4th	2	J	m
28.	02.07.10	4th	2	J	m
29.	04.07.10	4th	2	J	m
30.	07.07.10	2th	1.5	B	f
31.	08.07.10	4th, 4th	2	B, J	f, m
32.	11.07.10	4th, 2th	2, 1.5	B, J	f, m
33.	17.07.10	2th	1.5	B	f
34.	18.07.10	6th	2.5	B	f
35.	21.07.10	4th, 4th	2	B, J	m, m
36.	22.07.10	4th, 4th	2	B, B	f, f
37.	23.07.10	4th, 4th	2	B, B	m, f
38.	23.08.10	4th	2	B	f
39.	25.08.10	4th	2	B	f
40.	26.08.10	2th, 4th	1.5, 2	B, J	f, m

**Continuation**

<b>Sl. No.</b>	<b>Date</b>	<b>Teeth (permanent Incisor)</b>	<b>Age (year)</b>	<b>Breed</b>	<b>sex</b>
41.	16.09.10	4th	2	B	m
42.	18.09.10	4th, 6th(2)	2, 2.5	B, B, B	f, m, m
43.	19.09.10	4th	2	B	f
44.	20.09.10	4th	2	B	f
45.	22.09.10	6th, 6th	2.5	J, J	m, m
46.	23.09.10	6th, 2th, 4th	2.5, 1.5, 2	B, J, J	f, m, f
47.	25.09.10	4th	2	B	f
48.	26.09.10	4th	2	B	f
49.	27.09.10	4th, 4th	2	B, B	m, m
50.	28.09.10	2th	1.5	J	f
51.	30.09.10	2th(4), 6th, 4th(2)	1.5, 2.5, 2	B,B,B, B, B, J, J	m, f, f, f, f, m, m
52.	01.10.10	2th	1.5	B	f
53.	06.10.10	4th	2	B	f
54.	10.10.10	2th	1.5	B	f
55.	14.10.10	4th	2	B	f
56.	20.10.10	2th(2), 4th(2)	1.5, 2	J, J, J, J	m, m, m, f
57.	21.10.10	4th	2	B	m
58.	23.10.10	4th	2	B	f
59.	25.10.10	2th, 4th	1.5, 2	J, J	f, m
60.	27.10.10	2th(2), 4th	1.5, 2	B, B, B	f, f, m

**Continuation**

<b>Sl. No.</b>	<b>Date</b>	<b>Teeth (permanent Incisor)</b>	<b>Age (year)</b>	<b>Breed</b>	<b>sex</b>
61.	28.10.10	2th(6), 4th(2)	1.5, 2	B, B, B, B, B, B; J, J	m, m, m, f, f, f, m, f
62.	30.10.10	6th	2.5	B	m
63.	01.11.10	2th, 4th	1.5, 2	B, J	f, f
64.	03.11.10	4th(2), 6th	2, 2.5	B, B, B	f, f, m
65.	04.11.10	2th, 4th	1.5, 2	B, J	f, m
66.	07.11.10	4th	2	B	m
67.	13.11.10	4th	2	B	f
68.	24.11.10	4th	2	J	m
69.	25.11.10	2th(4), 4th(4)	1.5, 2	B, B, J, J, B, B, B, B	f, m, f, f, m, f, f, m
70.	27.11.10	2th, 4th	1.5, 2	B, B	m, f,
71.	28.11.10	4th	2	B	m
72.	29.11.10	4th(2)	2	B, B	m, f
73.	01.12.10	2th	1.5	J	f
74.	04.12.10	2th	1.5	B	f
75.	05.12.10	2th	1.5	J	m
76.	06.12.10	4th(2)	2	B, B	f, f
77.	08.12.10	2th(3)	1.5	B, B, J	m, m, m
78.	09.12.10	2th(3)	1.5	B, B, B	f, m, m
79.	12.12.10	4th	2	J	m
80.	21.12.10	4th	2	J	m
81.	23.12.10	4th	2	J	f

N.B: here B= black Bengal; J= jamunapari; m= male/buck/wether; f= female/ doe; 2<sup>th</sup>, 4<sup>th</sup> and 6<sup>th</sup> indicates the eruption of 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> pair permanent incisor teeth respectively.

**02. Prevalence of PPR according to month:**

Season		Goat examined	Date counted upon findings	Breed (B) affected	Breed (J) affected	Affected total
Summer	April	132	2	1	1	2
	May	657	9	8	1	9
Rainy season	June	1214	16	17	9	26
	July	733	10	10	5	15
	August	675	3	3	1	4
Autumn	September	554	11	16	7	23
Late autumn	October	725	11	16	8	24
Winter	November	1023	10	18	5	23
	December	695	9	8	6	14
<b>Total</b>		6408	81	97	43	140

**03. Comparative study of prevalence of PPR in three upazillas:**

Upazillas	No. of goat examined	Percent (%) examined	No. of goat infected	Percent (%) infected	% of no. of infection among examined
Sujanagar	1666	26%	25	18%	1.5%
Sathia	3524	55%	87	62%	2.5%
Bera	1218	19%	28	20%	2.3%
<b>Total</b>	6408		140		