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Epidemiological Studies on Kid Diseases Associated with Morbidity and Mortality in Intensive and Semi-Intensive Systems in Bangladesh

Md. Ershaduzzaman[1], M.J.F.A. Taimur[1], Tanuza Das[2], Md. Mamunul Haque[2], and Md. Mahmudur Rahman[2-3]

[1]Bangladesh Livestock Research Institute,
Savar, Dhaka-1341, Bangladesh

[2]Biotechnology and Genetic Engineering Discipline, Khulna University,
Khulna-9208, Bangladesh

[3]Center for Applied Biotechnology,
Dhaka, Bangladesh

ABSTRACT: Kid diseases were investigated on 240 sick kids of small holder farm during two years period from June 2002 to May 2004 of which 76 (31.67%) kids died during research period. Higher mortality rate was recorded in male (16.28%) than female (13.00%) under farm condition, though the difference was not statistically significant. Both the morbidity (42.17%) and mortality (18.29%) rates in kids aged between 0 to 30 days old were found to be significantly (P<0.01) higher in comparison to age between 31 to 90 days (morbidity 31.81% and mortality 13.64%) and aged between 91 to 180 days (morbidity 26.02% and mortality 10.19%). It may be concluded from this result that in avenging condition a farmer should give special attention to the kid from birth to 3 month of age. Although the morbidity range was found to be significantly (p<0.01) higher during rainy (72.37%) in comparison to winter (52.40%) and summer (41.50%) seasons but the mortality rate was found higher during summer (18.03%), followed by winter (13.70%) and lowest during rainy (10.12%) season. It was also observed that 58.25% kids maintained under rural conditions are deprived from first colostrum due to ignorance, which necessitates the veterinary extension services to the rural small holder traditional goat farmer. 14 types of kid diseases were diagnosed at Bangladesh Livestock Research Institute Goat Farm and ten types at the small holder farms and their epidemiological different pattern of occurrence were analyzed and discussed.

KEYWORDS: Epidemiological, Kid diseases, Morbidity, Mortality, Intensive, Semi-intensive, Farm condition.

1 INTRODUCTION

The success of any breeding program depends upon the rate of survival of kid crop produced and accordingly kid morbidity, and mortality are of great concern to farmers because kid mortality represents an irrefutable, and irrevocable financial, and genetic loss of the goat industry. Kid morbidity and mortality has been the subject of much research in the last three decades world wide but very limited works have been made from Bangladesh. The economic costs of kid mortality to the individual farmer have been estimated elsewhere [1, 14] but no such attempt has been made in Bangladesh. Most of the inlands reports based on hospital and or farm record and pathological findings [6,7,8] but there seems to be no reports on etio-epidemiological factors associated with kid morbidity and mortality in Bangladesh. All the findings were in calves and obviously this is the first time work in goat in Bangladesh. Infectious diseases have been recognized as one of the most important limiting factors in the kid production worldwide but this situation is further deteriorated because of continuous and indiscriminate uses of antibacterial drugs which has been found to result in the emergence of drug resistance by pathogenic bacteria (11, 22) but no such reports has been made under local conditions. Considering those factors this work has designed to the following objectives.

Corresponding Author: Md. Mahmudur Rahman (mahmudur.rahman@cappbio.org)

1. To determine the etio-pathological factors and assessment of economic losses associated with kid morbidity, and mortality in intensive and semi intensive conditions in Bangladesh.
2. To find out the definite gastro-intestinal parasites, and bacteria responsible for goat/kid morbidity and mortality so that appropriate regulatory actions are taken.

2 MATERIALS & METHODS

The etio-epidemiological investigation on morbidity and mortality of kids up to 6 months of age was under taken for two years periods at Bangladesh Livestock Research Institute Goat Farm (BLRIGF), Savar, Dhaka during May 2003 to April 2005 based on the records of 415 Black Bengal kids. Kid morbidity was defined as any sickness that had recognizable clinical manifestations.

The epidemiological data and samples of faeces, blood smears, bacteriological swabs, and tissue samples of dead kids, and milk samples from doe (to determine the source of infection to kids) were collected and the diseases were diagnosed on clinical and laboratory findings. Each death report of kids at BLRIGF usually consisted of necropsy findings and occasionally laboratory findings made by the Animal Health Research Division (AHRD), Bacteriology laboratory of Bangladesh Livestock Research Institute (BLRI). Faecal samples were examined microscopically for parasitic detection. The bacteriological investigation of the randomly collected swabs and tissue samples of dead kids and milk samples from doe were examined.

The epidemiological factors thought to be associated with kid morbidity and mortality was divided into three main groups *viz*. (1) Kid level factors: sex and age, (2) Management factors: kid housing, feeding (colostrums & milk) and preventive medicine, and (3) Seasonal factors: months and seasons.

Pure culture of different bacteria was prepared from collected samples by standard routine laboratory methods by using different media. Identification of each of the bacterium was based on the morphological, cultural, colony characteristics, Gram's Staining and bio-chemical tests including haemolytic activity, Catalase test and Coagulase tests as described in ref [3 and 23]. Sensitivity of the isolated bacteria to different antibiotic were studied mostly on blood agar plates using the commercial standardized antibiotic dices (Sanofi Diagnostics Pasteur, 9243 Marnes-La-Coquettes, France)

2.1 DATA ANALYSIS

Morbidity number was the total number of kids that became sick and mortality was calculated by the total number of the death of those sick kids of individual category. Mortality rates were calculated by dividing the number of total mortality by total morbidity of specific category of cause. The morbidity and mortality rates as percentage or number were calculated for the three age groups *viz* (a) Birth to 30 days (b) 31 to 90 days, and (c) 91 to 180 days. The year was divided into three seasons based on meteorological data namely (a) Summer (March to June), (b) Rainy (July to October) and (c) Winter (November to February).

The differences of morbidity and mortality rates between breed, sex, age and seasons were analyzed statistically with the help of Chi-square test [5] for significance.

3 RESULTS

Epidemiological, clinical and laboratory methods were applied to study the morbidity and mortality among 415 Black Bengal kids of BLRIGF and 220 ids from rural management are tabulated here in Table 1, Table 2 and Table 3.

3.1 KID LEVEL FACTORS

3.1.1 SEX DIFFERENCE

No significant fluctuations were observed on the morbidity (male 53.02% and female 53.50%) and mortality (male 16.28% and female 13.00%) of two sexes of Black Bengal kids (Table 4). Almost similar results were also observed under rural management (Table 4).

3.1.2 AGE DIFFERENCES

The overall morbidity and mortality rates in different age groups revealed that both the morbidity and mortality rates were found significantly ($p<0.01$) higher in 0 to 30 days (morbidity 42.17% and mortality 18.29%) in comparison to 31 to 90

days (morbidity 31.81% & mortality 13.64%) and 91 to 180 days (morbidity 26.02% & mortality 10.19%) age groups of kids at BLRIGF (Table 1). In other words, the maximum mortality occurred during the first 30 days (first month of age), then it declined to nearly half during 31 to 90 days (2^{nd} month) and further it reduced during the 91 to 180 days (4^{th} to 6^{th} months) under farm condition. These findings were in conformity with the observations of Speicher and Hepp [19]. Singh and Singh [18] who were working with calves. Similarly, higher incidence of overall clinical diseases were recorded in aged between 0 to 30 days (42.17%) and 31 to 90 days (31.81%) in comparison to higher age group of 91 to 180 days (26.02%) but the difference was not significantly significant at BLRIGF (Table 1)

3.2 MANAGEMENT FACTORS

The status of kid management, kid housing, feeding and nutrition, and preventive aspects of BLRIGF were evaluated. These included pooled colostrums, and milk feeding, limited grazing, deworming with antihelminthes, and immunization against certain infection diseases. The open pail (bucket) feeding with inadequate or improper disinfections insufficient supply of milk, and improper feeding of colostrums have been recognized to be the important farm level risk factors for causing higher morbidity and mortality rates of kid at BLRIGF. These observations are in support with Roy [15] in calves. Insufficient supply of milk through open pail (bucket) feedings to multiple kids resulted sucking lips, tongue, and loose skin on the body surface to each other which might have an important farm level risk factor for high morbidity and mortality rates. The main cause is that several important etiological agents may be shed by kids in saliva. Open pail or nipple feeds may also facilitate spread of organisms among calves [12] and so it is possible against kids.

Table 1. Age wise Morbidity (MB) and Mortality (MT) rates of kids caused by different diseases under farm condition

S/N	Diseases	0-30 days (n=175)		31-90 days (n=132)		91-180 days (n=108)		Total (n=415)	
		MB	MT	MB	MT	MB	MT	MB	MT
1	Fever	03	-	12	-	06	-	21	-
2	Inappetance	01	-	01	-	-	-	02	-
3	Constipation/Impaction	04	01	04	-	02	01	10	02
4	Bloat	03	01	05	02	03	02	11	05
5	Diarrhoea	30	05	20	02	14	-	64	07
6	Dysentery	03	01	04	-	-	-	07	01
7	Aspiration pneumonia	20	10	20	05	20	03	60	18
8	Pneumonia	30	03	25	07	23	03	78	13
9	Pneumo-enteritis	20	04	20	02	27	02	67	08
10	Eye disease	18	-	10	-	03	-	31	-
11	Colibacillosis	08	02	-	-	-	-	08	02
12	Skin diseases	20	-	11	-	10	-	41	-
13	Congenital defects	10	03	-	-	-	-	10	03
14	Undiagnosed	05	02	-	-	-	-	05	02
Total		175	32	132	18	108	11	415	65

n= no. of kid population

It appear from table 6 that 66.18% new born kids (NBK) under rural condition are deprived from first colostrum of their mother because first colostrum are usually thrown on the river or pond water or the grasses with the believe that it would be toxic to the NBK, and this practice would help to increase milk production in kids. Another detrimental effect of pail feeding colostrums and milk is that NBK were struggling to learn how to drink from the open pail.

Table 2. Age wise Morbidity (MB) and Mortality (MT) rates of kids caused by different diseases under rural management

S/N	Diseases	0-30 days (n=98)		31-90 days (n=78)		91-180 days (n=64)		Total (n=240)	
		MB	MT	MB	MT	MB	MT	MB	MT
1	Fever	03	01	02	01	03	01	08	03
2	Inappetance	02	-	02	-	01	-	05	-
3	Constipation/Impaction	05	01	06	02	03	01	14	04
4	Bloat	01	-	01	-	01	-	03	-
5	Diarrhoea	02	-	01	-	01	-	04	-
6	Dysentery	04	02	06	02	08	03	18	07
7	Aspiration pneumonia	10	04	06	03	05	02	21	09
8	Pneumonia	07	01	04	02	-	01	11	04
9	Pneumo-enteritis	10	06	05	02	04	01	19	09
10	Eye disease	06	01	01	-	01	-	08	01
11	Colibacillosis	04	02	-	-	-	-	04	02
12	Skin diseases	10	-	10	01	12	-	32	01
13	Congenital defects	09	02	-	-	-	-	09	02
14	Indigestion	10	04	25	08	20	09	55	21
15	Mobil poisoning	02	01	01	-	-	-	03	01
16	Foot and Mouth Disease (FMD)	02	01	01	-	01	01	04	02
17	Rabies /Dog Bite	02	01	01	-	04	01	07	02
18	Predator	05	03	03	02	-	-	08	05
19	Burn	02	01	01	-	-	-	03	01
20	Undiagnosed	02	01	02	01	-	-	04	02
Total		98	32	78	24	64	20	240	76

n= no. of kid population

Suckled calves have been shown to absorb Immunoglobulin (Ig) more effectively than calves removed from their dams and hand fed [16, 17, 21) and similar results for kids. Low calf serum Ig levels have been related to both higher morbidity and mortality [2, 9, 10, 16, 17] and this was happened in this case.

At BLRIGF, each of the kid was dosed with fenbendazole (peraclear-Techno-drugs) at 5mg/kg of body weight orally once at two month interval for the prevention of gastro-intestinal nematode infections but no similar attempt has been practiced in kids maintained under rural condition in Bangladesh. As a result, all the collected faecal samples from BLRIGF were found negative for parasitic infection.

Table 3. Comparative pattern of occurrence of diseases in kids maintained under farm condition and rural management

S/N	Diseases	Farm condition		Rural management		Proportion	
		MB	MT	MB	MT	MB	MT
1	Fever	21	-	08	03	1:0.38	-
2	Inappetance	02	-	05	-	1:2.5	-
3	Indigestion	-	-	55	21	-	-
4	Constipation	10	02	14	04	1:1.4	1:2
5	Bloat	11	05	03	-	1:0.27	-
6	Diarrhoea	64	07	04	-	1:0.06	-
7	Dysentery	07	01	18	07	1:2.57	1:7
8	Aspiration pneumonia	60	18	21	09	1:0.35	1:0.5
9	Pneumonia	78	13	11	04	1:0.14	1:0.31
10	Pneumo-enteritis	67	08	19	09	1:0.28	1:1.13
11	Eye diseases	31	-	08	01	1:0.26	-
12	Colibacillosis	08	02	04	02	1:0.5	1:1
13	Skin diseases	41	-	32	01	1:0.78	-
14	Congenital defects	10	03	09	02	1:0.9	1:0.67
15	Mobil poisoning	-	-	03	01	-	-
16	Foot and Mouth Disease (FMD)	-	-	04	02	-	-
17	Rabies /Dog Bite	-	-	07	02	-	-
18	Predator	-	-	08	05	-	-
19	Burn	-	-	03	01	-	-
20	Undiagnosed	05	02	04	02	1:0.8	1:1

3.3 SEASON FACTORS

The kid morbidity rate was found significantly ($p<0.01$) higher during Rainy season (72.37%) in comparison to winter (52.40%) and summer (41.50%) under farm conditions (Table 5). However, the kid mortality rate was found significantly higher during summer (18.03%) in comparison to winter (13.70%) and rainy seasons (10.12%) under farm condition (Table 5). The highest kid morbidity and mortality rate in Rainy season and Summer respectively support the findings of Srivastava *et al*. [20] and Debnath *et al*. [4] who reported higher morbidity rates of calves is the monsoon season. Unhygienic condition of kid house and its surroundings accompanied with reduced feed supply and frequent fluctuation of climatic condition might have been responsible for higher morbidity and mortality rates of kids.

Table 4. Sex wise Morbidity and Mortality under both farm condition and rural management

Condition	Sex	Morbidity		Mortality	
		No	%	No	%
Farm condition	Male	114 out of 215	53.02	35 out of 215	16.28
	Female	107 out of 200	53.50	26 out of 200	13.00
Rural management	Male	68 out of 130	52.31	25 out of 130	19.23
	Female	60 out of 110	54.55	18 out of 110	16.36

3.4 ETIO-EPIDEMIOLOGY

13 types of kid diseases and disorders were diagnosed under farm condition (Table 1) and 19 types under rural conditions in Bangladesh (Table 2). It appears from these tables that gastro-enteritis and respiratory diseases were the most common ailments associated with mortality of kids but the higher incidence rate of aspiration pneumonia (50.00%) and pneumo-enteritis (20.00%) were recorded in kids at BLRIGF which were not observed in kids maintained under rural conditions. This different disease pattern may be due to difference in management and feeding practices in kids.

The etio-epidemiological relationship of bacterial causes is presented in Table 7. Four typical bacteria *viz Escherichia coli, Staphylococcus* spp., *Bacillus* spp., *Streptococcus* spp. were isolated and identified from milk of randomly selected 20 alive doe and three randomly selected dead kids respectively.

Table 5. Season wise kid morbidity and mortality under farm condition

Parameter	Summer (March-June) (n=294)		Rainy (July–October) (n=257)		Winter (November-February) (n=292)	
	No	%	No	%	No	%
Morbidity	112	41.50	186	72.37	153	52.40
Mortality	53	18.03	26	10.12	40	13.70

n= no. of kid population

Bacteriological examination of milk samples of selected doe, which were used for feeding to kids revealed that *Staphylococcus* spp. had highest infection with 65.00% (Table 7). Therefore, it clearly indicates that the feeding of infected raw milk to the pre-weaned kids could be the main source of infection for both high morbidity and mortality in kids at BLRIGF. Although no attempt has been made to isolate viral agent from these dead kids but bacteriological results of this study indicates that mixed bacterial infection with *E. coli,* Staphylococcus spp., *Bacillus* spp. and *Streptococcus* spp. might be the cause of high morbidity and mortality in kids.

Table 6. Feeding status of colostrums to new born kids (NBK) under rural management system in Bangladesh

S/N	Colostrums feeding status	New born kids		
		No	%	
1	Kids sufficiently fed colostrums	80	29.41	
2	Kids partially fed colostrums	110	40.44	66.18
3	Kids without colostrums	70	25.74	
4	Unknown (purchased animal)	12	4.41	

Data collected from the owner during recording the disease history and prescribing the treatment of sick kids.

3.5 ASSESSMENT OF ECONOMIC LOSSES

The economic loss due to morbidity and mortality of kid has been calculated. The average value of one month old crossbred calf is assumed to be US $ 12.8 per calf, and the veterinary services and the drug cost along per calf is $ 0.40 [13]. The annual economic loss due to kid morbidity and mortality at BLRIGF has been estimated to be TK. 0.38 million (US $ 6, 507.7).

Table 7. Relationship between the bacteria isolated form milk samples (used for feeding to kids) and tissue samples of dead kids

S/N	Organisms	Milk samples of 20 alive doe		Tissue samples of three dead kids		
		No. of positive	%	Kid-1	Kid-2	Kid-3
1	*Staphylococcus* Spp.	13	65.00	+	+	+
2	*Escherichia coli*	09	45.00	+	-	+
3	*Bacillus* spp.	03	15.00	-	+	-
4	*Streptococcus* spp.	02	10.00	-	-	-

4 CONCLUSION

Black Bengal Goat is very much potential and economic livestock of Bangladesh. The observation from this study on economic losses caused by kid morbidity and mortality in Bangladesh could not be compared due to lack of similar inland report. From this research, it is clear that some common diseases and bacteria are responsible for high morbidity and mortality in kids at BLRIGF and local rural area of Bangladesh. So results of this study will help to minimize the morbidity and mortality of kids in Bangladesh.

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