

OUTBREAKS OF INFECTIOUS BURSAL DISEASE IN VACCINATED AND UNVACCINATED COMMERCIAL COCKEREL FARMS IN BANGLADESH

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ABSTRACT

Infectious bursal disease (IBD) is a contagious viral disease has been reported in young broiler and layer chickens from Bangladesh. This communication report the outbreaks of IBD on two vaccinated (Gumboro D78[®], Intervet) and one unvaccinated commercial cockerel farms which were diagnosed on clinico-pathological findings and assessment of ELISA antibody titre. The outbreaks of IBD occurred on two vaccinated farms in cockerels of 29 to 31 days (Farm 1) and 30 to 33 days (Farm 2), whereas 19 to 22 days old in unvaccinated (Farm 3) birds. It caused 39.38% (Farm 1) and 75.0% (Farm 2) mortality in vaccinated and 29.20% (Farm 3) in unvaccinated cockerel farms. Clinical investigation showed rapid onset, dullness, depression, anorexia, whitish loose diarrhoea, soiling and pasting of the vent, ruffled feathers, trembling and finally prostration and death due to dehydration. Necropsy examination revealed dehydrated carcasses, enlargement and oedematous swelling of bursa Fabricius and some cases yellowish, haemorrhagic, yellowish and caseous exudate in the bursa. Skeletal muscles especially thigh muscles showed haemorrhages in some birds. The IBD ELISA antibody titre of both the vaccinated and the unvaccinated moribund cockerels showed at vulnerable state and the mean antibody titre of vaccinated farm 1 had 161 ± 59.22 and vaccinated farm 2 had 57.82 ± 14.85 , whereas unvaccinated farms had 194 ± 90.35 . The occurrence of IBD outbreaks in both the vaccinated and unvaccinated birds indicate not only vaccination failure but also defective control strategies, which resulted heavy economic loss (85.05%) in the three cockerel farms. Therefore, a sound control strategy requires monitoring of maternal derived antibody with correct vaccination policy as well as good biosecurity principles to control IBD in Bangladesh.

Key words: Outbreaks, infectious bursal disease, cockerels, vaccination failure

INTRODUCTION

Poultry industry in Bangladesh has made significant progress during the last two decades and still it is considered as a growing industry. Poultry meat mainly comes from local fowls, broiler and cockerels in Bangladesh. Poultry farmers usually prefer to cockerel rearing due to low cost of day-old chicks, required less floor space and feed, cockerel-meat price is higher than the broiler meat. However, the major problem in the development of poultry industry in Bangladesh is the diseases, which causes high morbidity and mortality (Bhattacharjee *et al.*, 1996 ; Samad and Chakraborty, 1993 ; Talha *et al.*, 2001) but recently outbreaks of infectious bursal disease (IBD) has been recognized as a major constraint in the development of broiler and layer industry in Bangladesh (Chowdhury *et al.*, 1996 ; Rahman *et al.*, 1996). Review of literatures on poultry diseases reveal that so far only one report on management and disease problem of cockerels has been made from Bangladesh (Sil *et al.*, 2002). This paper describes outbreaks of IBD in vaccinated and unvaccinated cockerels with its economic impact in Bangladesh.

MATERIALS AND METHODS

Reports of sudden mortality in cockerels were received from three commercial cockerel farms during the months of October and November 2002, from the Bhangnamari union of Gauripur upazilla, which are situated about 10 kilometer from the district town of Mymensingh. The detail investigation of these three outbreaks was carried out by visiting them intensively and by taking regular information from the owners of these farms. The management systems of these farms, clinical findings, date and age of outbreaks, and mortality were recorded. The detail informations of schedule vaccination in relation to mortality were noted for analysis. The dead and five moribund cockerels from each of the three farms were collected as soon as possible for necropsy of dead birds and blood collection from moribund birds. Swabs from heart and liver were collected for screening of the bacterial infections.

Sera were separated from the collected blood by conventional method and stored at -20°C until tested for ELISA antibody titre. Diagnosis of IBD was made on the basis of history, clinical signs and characteristic gross lesions on the bursa Fabricius and leg muscles and assessment of ELISA antibody titre. The sera were tested for IBD antibody titre by using commercial ELISA kit (IDEXX Lab., USA). The detail informations about investment like price of day-old cockerel, feed cost and others, and the total income by sale of cockerels were noted from the owners for cost-benefit analysis.

RESULTS AND DISCUSSION

The mortality pattern of cockerels due to infectious bursal disease (IBD) during outbreak in vaccinated and unvaccinated farms are presented in Table 1. The outbreak of the disease was first recorded in farm no. 1 on October 2, 2002, and 28 days later the outbreak of IBD was detected in farm no. 2, whereas the outbreak of the disease was reported from third farm immediately after five days (November 5, 2002) of the onset of IBD at the second cockerel farm (Table 1). All these three cockerel farms were located in the same areas within a kilometer. On investigation it was found that the cockerels of farms no.1 and 2 were vaccinated against IBD with commercial live Gumboro D78® (Intervet) and against Ranikhet disease with live BCRDV (Bangladesh) as per manufacturer instructions, whereas cockerels of farm no. 3 was only vaccinated against Ranikhet disease with BCRDV.

Table 1. Mortality pattern due to infectious bursal disease in vaccinated and unvaccinated cockerel farms

Vaccinated against IBD			Unvaccinated against IBD					
Date	Age of birds (days)	Farm 1 (n = 800)	Date	Age of birds (days)	Farm 2 (n = 1200)	Date	Age of birds (days)	Farm 3 (n = 1000)
02.10.02	29	050	30.10.02	30	225	05.11.02	19	042
03.10.02	30	075	31.10.02	31	280	06.11.02	20	090
04.10.03	31	190	02.11.02	33	395	08.11.02	22	160
Total		315 (39.38%)			900 (75.0%)			

n = No. of cockerels

The mortality rate due to IBD in the two vaccinated cockerel farms (No. 1 & 2) was found higher (39.38% and 75.0%) in comparison to unvaccinated cockerels (29.2%) of farm no. 3 (Table 1 & 2). However, the clinical outbreak of IBD was recorded in vaccinated flock at the age of 29 days in farm no. 1 and 30 days in farm no. 2 but it was appeared earlier at 19 days old in unvaccinated cockerels of farm no. 3 (Table 1). The course of the disease could not be determined in this study because owners dispose of all the birds due to high mortality. These observations are in conformity with the earlier report of Muhammad *et al.* (1996) who reported failure of vaccines to control IBD in broilers of 17 to 35 days old and in layer of up to 45 days old. It also supports the report of Sivaseelan and Balachandran (1999) who reported 20% mortality rate in vaccinated and 20% mortality in unvaccinated flocks and suggested that this could be due to lack of maternal antibodies in the unvaccinated flocks and failure of vaccine. The ELISA antibody titre of the vaccinated flock (farm no. 1) varied from 89 to 250 with mean of 161 ± 59.22 (SD) and flock no. 2 varied from 32 to 69 with a mean of 57.82 ± 14.85 , whereas unvaccinated flock it was varied from 87 to 309 with a mean of 194 ± 0.35 (Table 2). It appears from these results that the mean ELISA titre is comparatively higher in unvaccinated birds (194 ± 90.35) than the vaccinated flock no.1 (161 ± 59.22) and flock no. 2 (57.82 ± 14.85). But the ELISA antibody titre of both the vaccinated and unvaccinated flocks are extremely low in comparison to the protective level of 1000 against natural infection of IBDV (Homer *et al.*, 1992). It indicates that the vaccines might have neutralized the maternal antibodies in vaccinated flocks and the maternal antibodies of the unvaccinated flocks might be decreased at low level to resist the natural virulent infection. These findings indicate that vaccine is required to control IBD in cockerels but vaccination with milder vaccines will not be effective in birds with high levels of maternal antibody. Therefore, knowledge of maternal derived antibody levels and correct timing are necessary for successful vaccination to control IBD.

The onset of the disease was rapid and was characterized by dullness, depression, anorexia, and whitish loose diarrhoea, soiling and pasting of the vent, ruffled feathers and trembling. The moribund birds became prostrated and died due to severe dehydration. These cases did not respond to broad spectrum antibiotics. These clinical observation recorded in this study are in conformity with the earlier reports of Saha and Majumdar (1997) and Chauhan *et al.* (1980) who reported clinical signs of natural outbreak of IBD in chickens.

The dead birds presented dehydration of the subcutaneous tissues and muscles and inflamed vents. The petechial haemorrhages on the thigh and breast muscles were recorded in some birds. The most prominent lesion was enlargement and oedematous swelling of bursa Fabricius in early outbreaks, whereas in a small number of chicks minute streaks of petechial haemorrhages were also noticed on the inner surface of bursa. Some bursa became yellowish in colour, slimy to gelatinous material was noticed inside the bursa. Some changes like enlargement and changes in colour were also noticed on the liver, kidney and spleen. These post-mortem changes recorded in this study are in conformity with the earlier reports of Chauhan *et al.* (1980), Rajeswar and Mohan (1992), Saha and Majumdar

Table 2. Relationship between the immunization and mortality due to infectious bursal disease in cockerel birds

Farm No.	Total No. of birds	Source of birds (Hatchery)	Immunization status			Mortality		IBD ELISA titre	
			Vaccines used	Age (days)	Route	Age (days)	No. (%)	Range	Mean \pm SD
1	800	Kazi	BCRDV [®]	4 & 12	IO	29 – 31	315 (39.38)	89 – 250	161 \pm 59.22
			Vibursa-CE [®]	22	SC				
2	1200	BRAC	BCRDV [®]	7	IO	30 – 33	900 (75.0)	32 – 69	57.82 \pm 14.85
			Vibursa-CE [®]	15	SC				
3	1000	Kazi	ND Clone-30 [®]	7	IO	19 – 22	292 (29.20)	87 – 309	194 \pm 90.35

BCRDV[®] = Baby Chick Ranikhet Disease Vaccine (Bangladesh), Vibursa-CE[®] = Infectious bursal disease vaccine (Vineland, USA), ND Clone-30[®] = Newcastle disease vaccine (Intervet, The Netherlands), ELISA titre of moribund cockerels (5 birds / farm) determined by the commercial ELISA kit (IDEXX Lab., USA).

(1997) and Sivaseelan and Balachandran (1999). However, Sivaseelan and Balachandran (1999) reported that the IBD affected bursa enlargement (75%), haemorrhage (25%), yellowish (60%) and caseous exudate (40%). Cosgrove (1962) reported that specific characteristic signs and lesions distinguished IBD as a specific cavity. Calnek *et al.* (1997) also opined that the lesions produced by IBD virus are pathognomonic. Hanson (1967) considered necropsy lesions as diagnostic and histopathological examination of bursa was rarely necessary for confirmation of IBD (Faragher, 1972).

The direct microscopic examination of the intestinal (caecal) content was found negative for parasitic (coccidia) infection and swabs collected from the heart blood also found negative for any bacteria of pathological significance. Thus, the IBD was diagnosed on the basis of history, clinical findings, pathognomic necropsy findings and extremely low level (unprotective) of ELISA antibody titre in moribund chicks.

The economic importance of the IBD is manifested in two ways, the first is due to the clinical disease and mortality in chickens and the second and more important, manifestation is a severe prolonged immunosuppression of chickens infected at an early age. Sequelae of the immunosuppression include secondary bacterial infection, and vaccination failure. However, an attempt was made to analyze economic losses due to only mortality caused by outbreaks of IBD in three cockerel farms (Table 3). It appears from the Table 3 that a total of Taka 53,190/- was invested by the three cockerel farmers, and outbreaks of IBD associated with heavy mortality resulted a total loss of Taka 45,240/- (85.05%) due to IBD (Table 3). It may be concluded from this study that IBD is an important devastating endemic disease in Bangladesh which is occurred as outbreak form whether vaccinated or unvaccinated chicks accounting for severe economic losses in poultry industry.

Table 3. Economic impact of cockerel farming caused by outbreaks (mortality) due to infectious bursal disease

Farm No.	Total No. of birds	Investment (Taka)				Total income* (Taka)	Total +profit / -loss (Taka)
		Total price of day-old cockerels	Feed cost	Others ^d	Total		
1	0800	3,600/- ^a	07,400/-	1,540/-	12,540/-	2,910/-	- 9,630/-
2.	1200	8,400/- ^b	14,675/-	2,000/-	25,075/-	1,500/-	-23,575/-
3.	1000	8,300/- ^c	05,425/-	1,850/-	15,575/-	3,540/-	-12,035/-
Total	3000	20,300/-	27,500/-	3,390/-	53,190/-	7,950/-	-45,240/-

^aTaka 4/ chick and Taka 400/- as transport cost. ^bTaka 7/chick (transport cost included), ^cTaka 8/chick and Taka 300/- as transport cost, ^dIncluded vaccines, drugs, premix, litter, bulb etc. *Income from sale of birds.

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