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EVALUATION OF VACCINATION PROGRAMMES AGAINST GUMBORO DISEASE WITH PERSISTANCE OF MATERNALLY DERIVED ANTIBODY IN BROILER CHICKENS

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ABSTRACT

The study was carried out to evaluate the vaccination programmes with Nobilis® Gumboro D_{78} (Intervet, Netherland) against Gumboro disease with persistance of maternally derived antibody in broiler chickens during two month period from August to September 2003 in Sherpur district of Bangladesh. A total of seven farms were selected, of which owners of five farms practiced their own vaccination programme i.e., primary vaccination at 5 (three farms), 7 and 8 days old with no booster against infections bursal disease (IBD) whereas imposed vaccination schedule (primary vaccination at 14 days old with a booster at 28 days old) was implemented in the remaining two farms. The vaccination programmes were evaluated by determining the antibody titres before and after vaccination and by morbidity and mortality of the vaccinated chickens against Gumboro disease. The present investigation demonstrated that mortality of chickens occurred in farms in which the birds were vaccinated between 5 to 7 days of age. The present result revealed that 7 days after primary vaccination the titer level decreased significantly ($p < 0.05$) in all the farms in which the farmers followed their own vaccination schedule. The present result also demonstrated that the mean titer before primary vaccination was 1276.8 ± 43.84 but seven days after vaccination it increased (1434.2 ± 29.97) insignificantly ($p > 0.05$) and this increasing trend continued up to 14 days after vaccination that is upto the age of 28 days (1549.6 ± 33.38) and seven days after booster dose that is at the age of day 35 the mean titer increased (2886.60 ± 80.67) significantly ($p < 0.05$) in the remaining two farms where the imposed vaccination programme was implemented. The present results obviously demonstrated that maternal antibody level decreasing about half within five days and decreased to negative level (364.00 ± 8.25) by the day 20. From the present study it may be concluded that broiler birds may primarily be vaccinated at the age of around day 14 with a booster at 28 days old.

Key words: Gumboro disease, maternally derived antibody, vaccination programme, broiler chickens

INTRODUCTION

Several problems interfere with the development of poultry industry, of which emergence of new diseases and failure to control the existing diseases are considered as vital. Among them, infectious bursal disease (IBD), also called Gumboro disease is considered as the number one killer disease in poultry farm in Bangladesh (Chowdhury *et al.*, 1996; Islam *et al.*, 1997). Most of the owners of poultry farms of Bangladesh are using various vaccines indiscriminately in order to safeguard their poultry industry against Gumboro disease without following the instructions provided by the vaccine manufacturer companies. In addition, there are many vaccine manufacturing companies and they have their own specification about utilization of vaccines in the commercial poultry farms from day old to onward, without information about the status of maternally derived antibody in offspring. The present study was, therefore, undertaken to evaluate the vaccination programmes with Nobilis® Gumboro D_{78} (Intervet, Netherland) against Gumboro disease with persistance of maternally derived antibody in broiler chickens.

MATERIALS AND METHODS

The study was designed to evaluate the vaccination programmes with Nobilis® Gumboro D_{78} (Intervet, Netherland) against Gumboro disease and to assess the persistance of maternally derived antibody in broiler chickens during the period from August to September 2003 in Sherpur district of Bangladesh. The vaccination programmes were evaluated by determining the antibody titres before and after vaccination and by morbidity and mortality of the vaccinated chickens due to Gumboro disease.

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Practicing vaccination programme

Five farms of broiler chickens in Sherpur district were selected to evaluate the practicing vaccination programme with Nobilis® Gumboro D_{78} (Intervet, Netherland) against Gumboro disease practiced by the farm owners. Owners of three out of five farms were vaccinated the chickens at the age of 5 days and the remaining two farms at the age of 7 days and 8 days @ one drop in one eye. No booster vaccination was practiced in all the five farms. Birds of all the farms were observed from day old to end of the experiment. Blood samples (n = 10) were collected before and after vaccination regularly from each of five farms for determination of antibody titre by ELISA (IDEXX, Westbrook, Maine, USA).

Imposed vaccination programme

Owners of two farms were motivated to vaccinate their chickens at the age of 14 days and 28 days @ one drop in one eye as primary and booster vaccination respectively. Blood samples (n = 10) were collected weekly before and after vaccination from each farm for determination of ELISA antibody titre.

Maternally derived antibody

Ten birds were reared separately to assess the persistance of maternally derived antibody upto the age of 25 days old. Blood samples were collected for sera every five days from all the birds to determine the antibody titre by ELISA.

Statistical analysis

The differences in the increase or decrease of the ELISA antibody titre of broiler chickens of different groups at different ages were analyzed statistically with the help of Student's '*t*' test (Gupta, 1982) for significance.

RESULTS AND DISCUSSION

The vaccination programme with Nobilis® Gumboro D_{78} (Intervet, Netherland) vaccine and mortality pattern of Gumboro disease in some broiler farms of Sherpur district are presented in Table 1. It is observed that outbreaks of Gumboro disease occurred in four farms out of five farms where the farmers practiced their own vaccination schedule whereas no outbreaks of Gumboro occurred in farms in which imposed vaccination was implemented. The chickens were affected between 17-22 days old with 40-62% morbidity and mortality of 12.5-35%. From the Table 1, it is also observed that high rate of mortality (25.5-35%) recorded in farms vaccinated at day five than vaccination at day seven (12.5%). Another farm faced no outbreak of Gumboro during rearing although the birds were vaccinated at day eight. It might be due to adoptation of strict biosecurity and hygienic measures. The findings of high mortality of chicken support the report of Islam and Samad (2003) who recorded 39.38-75% mortality due to IBD in vaccinated cockerel farms. The morbidity of the IBD following infection with classical strains may be higher than 80% (Mohanty *et al.*, 1971). The present finding also is in agreement with the reports of Chowdhury *et al.* (1996) and Islam and Samad (2004) who reported 20-30% and 29.2% mortality respectively in broiler chickens due to IBD.

Table 1. Vaccination programme with Nobilis® Gumboro D_{78} (Intervet, Netherland) vaccine and mortality pattern of Gumboro disease in some broiler farms of Sherpur district

Vaccination programme	Farm no.	Flock size	Dose & route of vaccination	Age of vaccination (days)		Age of outbreak	Morbidity	Mortality
				Primary	Booster		No. (%)	No. (%)
Practicing	1	1500	One drop in one eye	5	–	18	930 (62)	504 (33.6)
	2	1000	One drop in one eye	5	–	20	400 (40)	350 (35)
	3	1000	One drop in one eye	5	–	17	540 (54)	255 (25.5)
	4	800	One drop in one eye	7	–	22	400 (50)	100 (12.5)
	5	500	One drop in one eye	8	–	–	–	–
Imposed	1	1200	One drop in one eye	14	28	–	–	–
	2	1000	One drop in one eye	14	28	–	–	–

Table 2. Sero-conversion after vaccination with Nobilis® Gumboro D_{78} (Intervet, Netherland) vaccine practiced by the farmers

Farm no.	Age of vaccination (days)	Antibody titre level (Mean ± SE)		Level of significance
		Before vaccination (n = 10)	7 days after vaccination (n = 10)	
1.	5	4760.70 ± 91.46	1732.6 ± 26.35	*
2.	5	4228.75 ± 55.44	1909.80 ± 19.62	*
3.	5	4239.20 ± 61.08	1734.60 ± 27.25	*
4.	7	2718.40 ± 39.80	598.20 ± 12.69	*
5.	8	2253.80 ± 57.91	759.80 ± 19.47	*

*Indicates significant at $p < 0.05$.

Table 3. Sero-conversion after imposed vaccination with Nobilis® Gumboro D_{78} (Intervet, Netherland) vaccine

Age of birds	Antibody titre level • Mean ± SE (n = 20)	Level of significance
14 days old (before primary vaccination)	1276.8 ± 43.84	NS
21 days old (7 days after primary vaccination)	1434.2 ± 29.97	
21 days old (7 days after primary vaccination)	1434.2 ± 29.97	NS
28 days old (before booster dose)	1549.6 ± 33.38	
28 days old (before booster dose)	1549.6 ± 33.38	*
35 days old (7 days after booster dose)	2886.60 ± 80.67	

• Average values of two farms, *Indicates significant at $p < 0.05$, NS = Non significant at $p > 0.05$.

From the Table 2, it is observed that the titer level before vaccination at day 5 in three farms ranged from 4239.20 ± 61.08 – 4760.70 ± 91.46, at days 7 and 8 in other two farms were 2718.40 ± 39.80 and 2253.80 ± 57.91 respectively. But 7 days after primary vaccination the titer level decreased significantly ($p < 0.05$) in all the farms in which the farmers followed their own vaccination schedule. In farms 4 and 5 in which the birds were vaccinated at day 7 and day 8 respectively, the titer level decreased sharply than other three farms (Table 2). From the Table 3, it is observed that the mean titer before primary vaccination was 1276.8 ± 43.84 but seven days after vaccination it increased (1434.2 ± 29.97) insignificantly ($p > 0.05$) and this increasing trend continued upto 14 days after vaccination that is upto the age of 28 days. Booster dose was administered at day 28. Seven days after booster dose that is at the age of 35 days old, the mean titer increased (2886.60 ± 80.67) significantly ($p < 0.05$). Similar result was observed by Snedeker *et al.* (1967) who found that primary vaccination with live vaccine produce mild immunity. Findings of the present study have the similarities with the findings of Knezevic *et al.* (1999) who mentioned that vaccination of chicken using live vaccine with high level of maternal antibody failed to produce primary immune response but revaccination provoked immune response.

Table 4. Persistence of maternally derived antibody in broiler offspring

Age of birds	Maternal antibody level (Mean ± SE) (n = 10)
Day 1	7987.60 ± 27.90
Day 5	3787.60 ± 176.72
Day 10	2007.40 ± 15.42
Day 15	1003.40 ± 25.13
Day 20	364.00 ± 8.28
Day 25	217.2 ± 29.98

The level of maternally derived antibody in relation to age of the offspring presented in Table 4. From the Table 4, it is observed that birds contained high level of maternal antibody at day 1 (7987.60 ± 27.90). The antibody titer decreased gradually by the day 5 (3787.60 ± 176.72), 10 (2007.40 ± 15.42), 15 (1003.40 ± 25.31), 20 (364.00 ± 8.28) and 25 (217.2 ± 29.98) respectively. The rate of declination is about half in each five days interval. The antibody titer decreased to negative level (364.00 ± 8.28) by the day 20. The findings of the present study of the maternal antibody have the similarities with the findings of Chang *et al.* (1995) who reported high MDA level at day 1 in chicks. Mitra *et al.* (1998) found that MDA levels were significantly lower at 12 days of age than at one day old in chickens. According to Hitchner (1971), Wyeth and Cullen (1979), Iordanides *et al.* (1991) and Yehuda *et al.* (2000) maternal antibody persists upto 28, 29, 30 and 20 days after hatching in chickens respectively.

Although the timing of primary vaccination depends on the level of maternally derived antibody in offspring, from the present study it may be concluded that broiler birds may primarily be vaccinated at the age of around day 14 with a booster at 28 days old. From this study it is also demonstrated that level of maternally derived antibody decline below positive level within 15-20 days after hatching.

REFERENCES

1. Chang CY, Zuo BY, Jimei Z, Cao YC, Bi YZ and Zhu JM (1995). Application of enzyme-linked immunosorbent assay for evaluation of immunological efficiency of chicks against IBD. *Chinese Journal of Veterinary Medicine* 17: 39-45.
2. Chowdhury EH, Islam MR, Dewan ML and Khan MSR (1996). Acute IBD in chickens; pathological observation and virus isolation. *Asian-Australasian Journal of Animal Sciences* 9: 465-469.
3. Gupta SP (1982). *Statistical Methods*. 16th edn., Sultan Chand & Son, New Delhi.
4. Hitchner SB (1971). Persistence of present IBD antibody and its effects on susceptibility of young chickens. *Avian Diseases* 896-900.
5. Iordanides P, Koumpate M and Artopois E (1991). Role of maternal antibodies in preventing IBD in chicks in the first week of life. *Delteonten Kitenaiatrikes Elareias* 42: 245-249.
6. Islam MR, Chowdhury EH, Das PM and Dewan ML (1997). Pathology of acute infectious bursal disease in chicken induced experimentally with of very virulent virus isolate. *The Indian Journal of Animal Sciences* 67: 7-9.
7. Islam MT and Samad MA (2003). Outbreaks of infectious bursal disease in vaccinated and unvaccinated commercial cockerel farms in Bangladesh. *Bangladesh Journal of Veterinary Medicine* 1: 21-24.
8. Islam MT and Samad MA (2004). Clinico-pathological studies on natural and experimental infectious bursal disease in broiler chickens. *Bangladesh Journal of Veterinary Medicine* 2: 31-35.
9. Knezevic N, Sekler M, Veljovic LJ, Kozlina B and Rodic J (1999). First experiences with poulvac R Bursine-2 vaccine against Gumboro disease. *Eight Yugoslav Symposium on Poultry Production. Proceedings II, Sokobanja, Yugoslavia,* 5-9 Octobei. 34: 8-9.
10. Mitra M, Bhattacharyya HM, Duttagupta R, Pramanik AK, Sen GP and Mitra M (1998). Studies on maternally derived antibody level of different viral diseases in broiler. *Indian Veterinary Journal* 75: 495-497.
11. Mohanty GC, Pandey AP and Rajkya BS (1971). IBD in chickens. *Current Science* 40: 181-184.
12. Snedeker (Mrs) Carol, Wills, FK and Molulthrop IM (1967). Some studies on the infectious bursal agent. *Avian Diseases* 11: 519-528.
13. Wyeth PJ and Cullen GA (1979). Use of an inactivated IBD oil emulsion vaccine in commercial broiler parent chickens. *Veterinary Record* 104: 188-193.
14. Yehuda H, Goldway M, Gutter B, Michael A, Godfried Y, Shaaltiel Y, Levi BZ and Pitcovski J (2000). Transfer of antibodies elicited by baculovirus derived vp2 of a very virulent bursal disease virus strain to progeny of commercial breeder chickens. *Avian Pathology* 291: 13-19.