THE EFFECTS OF IBD FIBROGUM-BOVAC VACCINE AND A COMMERCIAL VACCINE ON THE BODY WEIGHT BURSAL WEIGHT AND DEVELOPMENT OF ANTIBODIES IN BROILERS

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SUMMARY

A CHICKEN embryo-fibroblast (CEF) cell-culture-adapted infectious bursal disease vaccine (Fibrogumbovac) and a commercial vaccine were studied for their effects on the rate of growth, bursal atrophy and the attainment of antibody level in 450 broilers.

No appreciable difference in weight was observed in vaccinated birds when compared with unvaccinated control birds. The birds were vaccinated at the age of 4 week and at 9 week of age the average weights for birds vaccinated with IBD Fibrogumbovac, the commercial vaccine and unvaccinated controls were respectively 1.949, 2.014 and 1.900kg. The vaccinated birds did not gain weight as rapidly as the controls between the 9th and 14th week (Table 1).

The relative weight loss per week for the last five weeks (10th to 14th week) averaged 0.7 per cent for the IBD Fibrogumbovac vaccinated birds as compared with control birds.

The highest antibody levels recorded in vaccinated birds at the end of two weeks were 1:1024 for Fibrogumbovac, and 1:16 for the commercial vaccine. On the third day after vaccination when the bursa of Fabricius was expected to be largest the average weight of the bursa of 5 birds was found to be 0.250, 0.135 and 0.245 per cent of body weight respectively for birds vaccinated with IBD Fibrogumbovac vaccine, the commercial vaccine, and unvaccinated controls.

INTRODUCTION

Infectious bursal disease is an acute, highly contagious viral disease of young chickens that affects primarily the bursa of Fabricius (Hitchner 1972). The morbidity is high in susceptible flocks, rapid weight loss and low to moderate mortality rate are the principal signs of disease. Chickens that recover from the disease

may have immune deficiencies because of the destruction or atrophy of the bursa of Fabricius which is essential for the development of the humoral immune response of the chicken (Faragher, Allan and Wyeth, 1974). The disease is controlled primarily by vaccination, but the effect of different vaccines on various aspects of chick metabolism has not been evaluated.

In this study we evaluated the effects of IBD Fibrogumbovac vaccine and a commercial vaccine on the body weight, bursa, and on the rate (or rapidity) of antibody production in vaccinated birds.

MATERIALS AND METHODS

Chicken: Four-week-old Ross breed broilers imported from the United Kingdom, and which had no history of previous vaccination against IBD were used in this study.

Virus

1. IBD Fibrogumbovac vaccine used was produced on 21/6/80 in chicken embryo fibroblast cell culture as previously described (Okeke, 1979) but kept at 4°C until used for this experiment on 26/4/82.
2. The commercial Gumboro vaccine was Batch Lot No. 1012D, of a commercial company with the Expiry date in June 1982 and was used for this experiment on 26/4/82. Both vaccines were diluted in distilled water containing 2%

stabilizer.

Agar gel Precipitin test (AGPT)

The AGPT was used in determining the immunity levels in vaccinated birds. The agar gel was prepared by dissolving 8.5 gm sodium chloride, in 100ml distilled water containing 1gm Ion agar and 0.02gm Sodium Azide as a preservative.

Antigen for AGPT

The antigen for AGPT was produced from infected bursa of Fabricius of chickens. A volume of PBS equal to the weight of the bursa is used in dilution during trituration with mortar and piston. The supernatant is used as antigen.

TABLE 1:

Weekly Growth Rate of Broilers Vaccinated with IBD Fibrogumbovac and Commercial Vaccine

Week	IBD Fibrogumbovac kg.	Commercial Vaccine kg.	Unvaccinated Control Birds kg.
5	1.051	1.023	1.002
6	1.226	1.212	1.210
7	1.374	1.401	1.386
8	1.667	1.740	1.681
9	1.949	2.014	1.900
10	2.168	2.374	2.450
11	2.410	2.614	2.575
12	2.744	2.864	2.840
13	3.129	3.173	3.254
14	3.230	3.345	3.359

TABLE 2:

Daily and Weekly Weight of the BF as Percentage of Body Weight of Birds Vaccinated with IBD Fibrogumbovac and Imported Commercial Vaccine

Day	Fibrogumbovac	Commercial Vaccine	Unvaccinated Control Birds
1	0.205	0.230	0.300
2	0.155	0.205	0.260
3	0.250	0.135	0.245
4	0.220	0.150	0.280
5	0.190	0.180	0.225
6	0.140	0.180	0.180
7	0.210	0.185	0.195
Week			
2	0.165	0.100	0.115
3	0.135	0.107	0.122
4	0.101	0.104	0.101
5	0.125	0.084	0.115

1. *Effect of Vaccination on Weight gain*

A total of 150 broilers were used for this experiment. The average weight of 50 broilers weighed at once, not individually were determined every week for each vaccine and the control for the first 14 weeks after vaccination and the weights were compared (Table 1.)

2. *Effect of Different Vaccines on the Bursal Weight*

A total of 165 broilers were used in this experiment. Five birds were sacrificed daily from each group, for the first seven days and thereafter every week for the next four weeks. The bursa and the birds were weighed, and the bursa weight was expressed as percentage of the body weight (Table 2).

3. *Rate of Antibody Production with Different Vaccines*

A total of 150 broilers were used for the determination of the immunity levels in vaccinated birds at one week and at 2 weeks after vaccination. Serial two-fold dilution of the sera were made and antibody titers were determined by AGPT.

RESULTS

1. *Effect of Vaccination on weight Gain*

Table 1, shows the average weight of 50 vaccinated and unvaccinated control birds between 5th and 14th weeks of age. Up to the 9th weeks when all the birds weighed 2kg. or less there was no appreciable difference in weight when vaccinated birds are compared with the controls; in most cases the vaccinated birds showed a slight gain over the control birds. However, from the 10th week onwards the vaccinated birds appeared less efficient in weight gain than unvaccinated controls.

1. *Effect of Different Vaccine Preparations on the Bursal Weights*

The weights of the bursa relative to

the body weight are shown in Table 2. On the 3rd day when infected bursa usually weighed heaviest, those of birds vaccinated with Fibrogumbovac (0.25%) compared favourably with those of control unvaccinated (0.24%) birds. Those of commercial vaccine birds was relatively low (0.13) and remained lower than controls throughout the experimental period of five weeks.

3. *Immunity Levels*

The antibody level in birds vaccinated with the commercial vaccine ranged from 1:4 to 1:16 during the first week and from 1:4 to 1:64 during the second week. The antibody level in birds vaccinated with Fibrogumbovac vaccine ranged from 1:4 to 1:64 during the first week and from 1:4 to 1:1024 during the second week. Table 3 shows the number of birds that attained a given level of antibody at one and two weeks after vaccination. At both 1st and 2nd week all the control birds did not give a level of antibody exceeding 1:4 but at the end of two weeks 25 out of 50 birds still had antibody level less than 1:4. About 35 out of 50 birds vaccinated with Fibrogumbovac gave serum titers above 1:16 in the first week and 44 out of 50 in the second week.

Similarly only 16 out of 50 birds vaccinated with commercial vaccine gave serum titers above 1:16 in the first week and 32 out of 50 in the second week.

DISCUSSION

The quality of a vaccine includes not only its safety and potency but also its ability to rapidly protect the animal without lowering its commercial value and without causing much damage to the immune organs.

The weight of a broiler when due for marketing is of great economic importance to the poultry farmer. In this study

TABLE 3

Number of vaccinated and unvaccinated birds and the immunity level attained by them at first and second week after vaccination

<i>No. of Birds showing this level of immunity</i>				
Week	Level of Immunity	Fibrogumbovac Vaccine	Commercial Vaccine	Unvaccinated Controls
1	1:4	15	34	50
	1:16	29	14	Nil
	1:64	6	2	Nil
	1:256	Nil	Nil	Nil
	1:1024	Nil	Nil	Nil
2	1:4	6	19	50
	1:16	3	21	Nil
	1:64	22	10	Nil
	1:256	14	Nil	Nil
	0:1024	3	Nil	Nil

it appears that neither vaccine had significant effect on weight of broilers up to marketing age (9 weeks) (Table 1).

It means that for maximum benefit, broilers vaccinated with these vaccines should be marketed at 8 or 9 weeks. However, the average gain per week from 10th to 14th week was found to be lower than the average gain per week up to the 9th week for vaccinated birds but there was overall gain in weight for both vaccinated and unvaccinated birds.

A rapid development of antibody means a rapid protection of vaccinated birds before natural exposure. A good vaccine should be able to give a very good protective immunity within the first two weeks. Where this is not the case birds are likely to get infected few weeks after vaccination especially in endemic environment.

It is significant to note that not all the birds vaccinated reached a protective antibody levels of 1:16 within the first 2 weeks.

The lowest antibody level at which birds have withstood challenge was 1:16 in this laboratory. In the case of birds vaccinated with IBD Fibrogumbovac vaccine 44 out of 50 (i.e. 64%) attained the same level of protective immunity at the 2nd week after vaccination.

The reason why a 100% immunity level was not attained by one vaccination might be due to existing maternal antibody in refractory birds. In such case a second vaccination 30 days later is advocated.

That the IBD Fibrogumbovac gave an antibody level of up to 1:1024 within the 2nd week is encouraging. The highest immunity level attained by the commercial vaccine at the same period was 1:16. However, the method of transportation of this foreign vaccine may have adverse effect on the quality of the vaccine. Importation of vaccines should be discouraged because there is at present no established cold chain between the manufacturers and the users. Live vaccines are easily destroyed by direct sunlight and heat.

REFERENCES

- FARAGHER, J., T., W.H. ALLAN and P. J. WYETH (1974): Immunosuppressive effect of the infectious bursal agent in vaccination against Newcastle disease *Vet. Rec.* **95**: 385—388.
- HITCHNER, S.B. (1972): Diseases of Poultry p. 760—779. Iowa State University Press, Ames, Iowa.
- OKEKE, E.N. (1979): Development and production of Infectious bursal Disease (Gumboro) vaccine in Nigeria. Proceedings of the National Poultry Seminar, Ahmadu Bello University, Zaria, 1979.

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STAPPLE, W.S., and HERNANDO BOTERO (1976): The
immuno-suppressive effect of infectious bursal disease. Proc.

25th W. Poultr. Dis Conf. and 10th Poultry Health Symposium,
pp. 36--37.