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The Laboratory Assessment of Common Newcastle Disease Vaccination Regimes in Use in Nigerian Poultry

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Abstract: This study was designed to determine the evaluation of different Newcastle disease vaccination regime using the Lasota strain in chickens. Fifty cockerels were divided into four groups with different vaccination regimen for each group which consisted of 15 birds except the control that had 10 birds.group1 was vaccinated on day 7 only, group 11 was vaccinated on day 7 and day 21, group 111 was vaccinated only on day 21 and the control group was not vaccinated. The birds were challenged by a field strain around day 30. The birds were bled at day old and then weekly from the first week throughout the course of experiment. The haemagglutination inhibition test was used to ascertain the titer level. The result showed that the mean geometric titer GMT of the birds at day old was high and uniform (11.8).in all the birds, the antibody titres declined on day 16 with peak recorded in groups 1 and 11 at day 30 while group 111 and control further declined at day 23 before peaking at day 30. In all the groups, there was a sharp decline in the GMT in group1 at day 58 and gradual decline in other groups. Clinical signs of Newcastle disease were observed in all the groups. These signs included ruffled feathers, depression, greenish diarrhea and death. Weight loss was more pronounced in the control group than others. Group 1-111 had 80-87% protection whereas the control group had 60% protection. At postmortem, the carcasses from the group including the control had congested lungs, petechial hemorrhages on the proventricular glands, jejunum and cecal tonsils. The effect of the field outbreak was less severe in group11. The vaccination regimen employed in group11 was found to be the most protective and economical of all the different regimes used in this study.

Key words: Vaccine, regimes, Newcastle disease, assessment, poultry, Nigerian

INTRODUCTION

Newcastle disease, an infectious and highly contagious viral disease of birds caused by Avian Paramyxovirus type 1 (PMV-1) continue to be a major threat to poultry production around the world (Freund *et al*., 2001). The disease is associated with high flock mortality and loss of edible and breeding eggs (Chansiripornchai and Sasipreeyajan, 2006).

At present, the control of the disease without vaccination is unconceivable hence emphasis had been on vaccines and vaccination especially of the free ranged birds, efficacy of killed oil emulsion and thermo stable Newcastle disease vaccine (Folitse *et al.,* 1998; Foster *et al*., 1999; Freund *et al*., 2001; Thekisoe *et al.,* 2004; Chansiripornchai and Sasipreeyajan, 2006).

In Nigeria however, the efficacy of the vaccination is impeded by some factors which include interference of maternal antibodies (Adebayo *et al*., 1998) safety and efficacy of commonly available vaccines (Adene and Ogunjimi, 1990; Faluyi and Adebayo, 2004) lack of routine vaccine testing, presence of very virulent velogenic field strain (Adu *et al*., 1984; Adu, 1987) and inappropriate vaccination regimes resulting in outbreaks in vaccinated flocks (Ugochukwu, 1982; Okoye and Shoyinka, 1983).

Earlier studies in Nigeria, had been on the rate of decay of maternal antibody, (Adene and Njoku, 1979; Abdu and Garba, 1989) safety and efficacy of live vaccines (Oyejide and Owoade, 1986) while very little information are available on the effectiveness of the vaccination regimes commonly used (Oranusi and Onyekaba, 1986).

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In Nigeria, like most developing countries, without documented evidences of effectiveness of vaccination regimes, most farmers tend to sustain their flock immunity with repeated vaccination at short intervals and there is inconsistency in the timing of vaccination and administration of vaccines due to uncertainty in the protective immune profile. With this indiscriminate method, there had been unabated post vaccination outbreaks.

This study presents the report of a laboratory evaluation of different Newcastle disease vaccination regimes in use for poultry in Nigeria with a view to advising on the most appropriate.

MATERIALS AND METHODS

Chicks: A flock of 60 day old chicks was obtained from a local hatchery. The chicks were raised from day old until termination of the experiment at the poultry experimental unit of Department of Medicine, University of Ibadan.

Vaccines: The Vom Newcastle disease vaccine (Lasota) was constituted with a sterile physiological saline by dissolving a vial in 40 mL and given 0.2 mL using oral route at different days (Table 1) all the birds were given Vom IBD vaccine at day 13.

Experimental groups: The birds were divided into 4 groups of 15 birds each with different vaccination regimes for each group (Table 1).The various groups were bled weekly for a period of 8 weeks post hatch. Serum samples were collected, inactivated at 56°C for 30 min and stored at 4°C. They were later tested for the presence of ND antibodies using haemagglutinating inhibition technique (Allan and Gough, 1976; Ezeibe and Ndip, 2004).

Experimental challenge: On day 30 post hatch, all the birds were challenged using ND virus isolated from a recent field outbreak. The intraocular route was used by dropping 0.05 mL of the homogenate into each eye and allowing the birds to blink or flip the third eye lid before being released (Adene and Ogunjimi, 1990).

Clinical observation and pathology: The birds in each group were observed for clinical signs. Morbidity and mortality rates were recorded as well as signs displayed throughout the experiment. Chicks that died during the course of the experiment were necropsied and tissues were fixed in 10% buffered formalin, processed routinely and embedded in paraffin wax. Section 5uL thick were cut, stained with haematoxylin and eosin and examined under the light microscope.

Table 1: Summary of H.I antibody of chickens of different groups

Groups	Vaccination
1	Day 7
11	Day 7 and 21
111	Day 21
Control	None

Statistical analysis: Statistical analysis was carried out by standard ANOVA Duncan multiple range tests.

RESULTS AND DISCUSSION

The mean geometric titres MGT of the birds are as shown in Table 1 with titres at day old being high and uniform (11.8) (Table 2). There was an evidence of field infection sharp increase in the MGT in the groups (Fig. 1). Clinical signs (Table 3) and weight changes (Table 4) was more pronounced in the control group than others. Groups 1-111 had 13.3-20% mortality whereas the control group had 40%. Postmortem and microscopic examination revealed that the groups and the control birds had congested lungs, petechial hemorrhages in the proventriculus, jejunum and cecal tonsils.

The maternal antibodies MA in the chicken waned after 3 weeks post hatch. The titre at hatch was high and uniform. These high and uniform levels of MA are usually associated with chicks derived from breeders that had received oil-based vaccines as boosters. (Chansiripornchai and Sasipreeyajan, 2006) In this study, all the chicks had high and uniform MA for ND as against earlier reports of low MA in chicks from major hatcheries in Nigeria (Abdu and Garba, 1989). This is attributed to the awareness of the farmers over the years in boosting immune status of their parent stocks with the use of oil based vaccines. The result of the experiment showed that vaccination at day 7 provided protection for birds for the first 4 weeks of life, after the decline of maternal antibody. Reduced protection after the first four weeks of life may have been due to inadequate response or titer decayed before field infection occurred. Group 111 and control group that were not vaccinated at day 7 had a sharp decline in ND antibody titre at day 23, most probably due to inadequate amnestic response evident by low slow rising titers before the field infection. There was evidence of ND virus infection as shown by the extremely high antibody titre of up to 12 and wide variation in the titer in all the groups. Group 11 which had the two Newcastle disease vaccines at days 7 and 21, was not affected with the field infection as the first vaccination at day 7 serves as primer to the antibody producing cells and the booster dose at day 21 further enhanced the amnestic response with resultant high titers. Apparently, there is an extended protection of the birds by increasing the level of

Table 2: Summary of H.I antibody of chickens of different groups

	Age (Days)	1	9	16	23	30	37	44	51	58
Group I	GMT	11.88	6.2	4.8	5.8	9.1	1.5	0.3	2.5	0.1
Group II	GMT	11.88	5.9	4.6	5.3	8	6.8	2.5	4.1	2.0
Group III	GMT	11.88	5.5	5.1	2.5	12	7.3	3.5	5.2	1.4
CONTROL	GMT	11.88	5.8	4.4	2.3	12	1.4	0.85	2.85	2.0

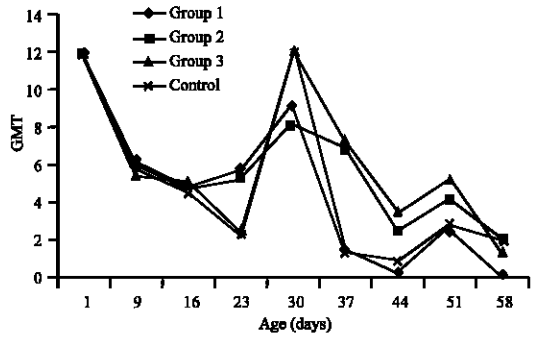

Fig. 1: Showing the pattern of the antibody titres over time

Table 3: Clinical sings and mortalities observed in chickens during ND outbreak

Clinical sings	Group I	Group II	Group III	Control
Ruffled feathers	4/15	2/15	3/15	2/10
Depression	2/15	1/15	2/15	5/10
Greenish Diarrhoea	3/15	2/15	4/15	3/10
Weight loss	0/15	0/15	0/15	3/10
Mortality	2/15 (13.3%)	2/15 (13.3%)	3/15 (20%)	4/10 (40%)
Total	11/75	7/75	13/75	18/50
% Morbidity	14.7	9.3	17.3	36.0

Table 4: Average weight of groups I, II, III and control (in grammes) with age

Group	Day 24	Day 36	Day 47	Day 57
I	155	181	208	251
II	137	150	183	213
III	133	160	190	210
Control	90	175	188	197

protective antibody beyond four weeks and therefore rendering the group 11 less susceptible to the field infection that occurred. The effect of the field outbreak was severe in groups 111 and control evident by the morbidity and mortality experienced by the groups. Therefore, the vaccination regimen employed in groupl1 is the most protective and economical of all the different regimes used in this study.

CONCLUSION

This findings showed that the vaccination against Newcastle disease in South west Nigeria is best done using Lasota strain at day 7 and 21, since the birds will be adequately protected up to 8 weeks using this regimen. This regimen is recommended for broiler especially as most broilers reach table size at 8 weeks.

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