

RESEARCH ARTICLE

Effects of Vitamin – Mineral Supplement on the Immune Response of Broilers to Newcastle Disease Vaccination.

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ABSTRACT:

To study effects of vitamins-minerals (VMS) supplementation on immune response of chicks to Newcastle disease vaccination (NDV- LaSota), one hundred broiler chicks were assigned to 4 treatment groups of 25 each. One group was given VMS before the vaccination. Another group was given the supplementation after the vaccination. A third group was given the VMS before and after the vaccination while the fourth group served as vaccinated control. Administration of VMS was in each case, through drinking water. Five randomly selected chicks from each group were bled for sera, used for haemagglutination inhibition (HI)-NDV antibodies test. Three weeks post vaccination, mean NDV antibody titre (1.87 ± 0.18) in chicks given VMS before and after the vaccination was significantly ($P < 0.05$) higher than 1.39 ± 0.12 of the control but it did not vary ($P > 0.05$) from 1.81 ± 0.17 and 1.74 ± 0.06 , respectively of groups that received the supplementation only before and only after vaccination.

Keywords: Immune Response, Newcastle Disease Vaccination, Vitamin Mineral Supplementation

INTRODUCTION

Newcastle Disease (ND) is a viral disease of poultry that is deadly and spreads rapidly among chickens and other domestic and semi – domestic species of birds (Monoura *et al.*, 2008). Among the diseases of poultry, ND is rated as the most common disease of local chickens (Sa'idu *et al.*, 1994). The high mortality and morbidity associated with ND are major hindrances to development of the poultry industry in developing countries (Bell, 1990; Chabau, 1990).

To control Newcastle Disease (ND) strong prophylactic measures such as routine

vaccinations in combination with maintenance of strict hygienic and sanitary conditions in the urban area of many developed countries of the world are required (Monoura *et al.*, 2008). Vaccination against ND is being practiced for long time as a means of protecting birds from the frequent outbreaks of the disease in various breeds of poultry. Despite ND vaccinations, several outbreaks of ND are being reported globally.

It is believed that vitamins and minerals have beneficial effects in improving productive performance of poultry. Deficiency of vitamins and minerals have been reported to be responsible for

various diseases such as xerophthalmia, rickets and cage liver fatigue (Monoura *et al.*, 2008). Like vitamins, importance of certain trace minerals in immune function has been increasingly evident. Selenium, Zinc, Copper, Iron and Cobalt have been found to affect various components of the immune system (Suttle and Jones, 1989).

Considering the above factors, the present study was undertaken with a view to evaluating the immune response of broiler chicks vaccinated with LaSota vaccine, when the drinking water of the bird is fortified with multivitamin – mineral supplement before or after vaccination and before and after vaccination respectively.

MATERIALS AND METHODS

One hundred day old broiler chicks were obtained and randomly assigned to four (4) groups of 25 chicks each. The experimental groups were designated A, B, C and D. Groups A, B and C were given vitamin – mineral supplement (VMS) while Group D served as the control group. Feed (commercial feed) and water were given *ad libitum* to the birds.

The vitamin – mineral supplement used, ('Vitalyte), contained; Vitamins A, D₃, E, K, B₂, B₆, B₁₂, C, Nicotinamide, Calcium Panthotenate, Potassium Chloride, Sodium Sulphate, NaCl, MgSO₄, Cu₂SO₄, ZnSO₄, Manganese, Lysine hydrochloride and Methionine (Anglian Nutrition Products Co. UK). The groups which received the VMS in their drinking water received it as follows:

- Group A chicks were given the VMS only for 7 days before vaccination
- Group B chicks received the VMS only for 7 days after vaccination

- Group C chicks received VMS both 7 days before and 7 days after vaccination
- Group D had only vaccination but no VMS- medication.

The VMS was added to the chicks` drinking water at the rate of 10 grams to 2 litres. All the chicks were vaccinated against ND on the 8th day of life with Hitchner B₁ and on the 21st day of life with NDV (LaSota). A 200-dose vial of LaSota was reconstituted in 2000 mL of drinking water and each group of 25 broilers was administered with 250 mL of the reconstituted vaccine.

Blood samples were collected from the chicks through their jugular vein at 2 weeks and at 3 weeks post LaSota vaccination and the sera were used for haemagglutination inhibition (HI) test as described by OIE (2000), to determine immune response of the broilers to the vaccination. The HI titres were transformed to Log₁₀ and the results statistically analyzed using ANOVA in SPSS (Version 12.0)

RESULTS AND DISCUSSION

The group given multi-vitamin supplements (VMS) before and after LaSota vaccination maintained high antibody titre throughout the period of the study (Table 1). At week 2 post vaccination (PV) the log transformed HI titres of group C also, had the highest value though it showed no significant difference ($P>0.05$) when compared to the other groups.

At week 2, titre of the group C was significantly higher ($P<0.05$) than those of the other groups with the Log transformed value of 1.87 compared to 1.81, 1.74 and 1.39 for groups A, B and D respectively.

Sustenance of high titres by group C (with VMS supplementation before and after vaccination) suggests that VMS needs to be given to chicks before and after vaccination.

McDonald *et al.* (1998) and Rao *et al.* (2004) reported that vitamins and minerals are important in developing immunity. Rao *et al.* (2004) further explained that higher levels of vitamins than the current recommendations of NRC will increase the immune response.

The cumulative effect of the vitamin – mineral supplement before and after vaccination in Group C might be responsible for its higher significant value ($P < 0.05$) above the control group D and its maintenance of higher titres than the other vitamin – mineral supplemented groups. The immunity of the experimental groups remained high while that of the control group waned rapidly suggesting that vitamin – mineral supplements sustained the immunity of the vaccinated birds.

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Table 1 **Mean Newcastle Disease HI Titres (Log₁₀ transformed) of Broilers given Vitamin – Mineral Supplements before and after NDV (LaSota) Vaccination.**

Age (Weeks)	Group A	Group B	Group C	Group D	Level of Significance
Post vaccination (PV)					
2	1.99±0.07 ^a	1.69±0.12 ^a	2.05±0.28 ^a	1.69±0.12 ^a	NS
3	1.81±0.17 ^{ab}	1.74±0.06 ^{ab}	1.87±0.18 ^b	1.39±0.12 ^a	*

a, b = Different superscripts along the rows indicate significant difference between means along the rows at P < 0.05

NS = Not Significant * = Significantly different