IBD VACCINATION SCHEDULE UPSHOTS ON IMMUNITY TEMPTED BY ND VACCINATION IN POULTRY

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***ABSTRACT*:** *Newcastle disease (ND) and infectious bursal disease (IBD) pose great hazard to poultry industry in many parts of the world. In Pakistan, a lot of vaccines had been introduced to control these diseases. However, failures encountered from time to time. The salient questions addressed in this study are to determine the interaction between commonly used vaccines against these diseases and its role in vaccination failure. A total of 250, day old broiler chicken were purchased and were randomly divided into 7groups; 35 birds in each group (A, B, C, D, E, F and G). The leftover 5 birds were used to detect the maternal antibody titer. Group A, B, C, D, E and F were vaccinated against ND and varying schedule of IBD. A total of 10 birds from each group were randomly selected for blood collection. The blood was collected from each bird and serum was prepared. The sera were analyzed by HI (Haemagglutination inhibition) test to detect antibodies against NDV and indirect ELISA for the detection of IBD antibodies. The effects of vaccine schedule on growth performance of broiler as determine by Mean body weight (MBW) and feed consumption of chicken measure at termination of the study period.*

The results depicted that maternal HI antibody titer against Newcastle disease virus was 256.0 (GMT) at day one. On day 7 the GMT of HI antibody titers against NDV of groups A, B, C, D, E, F and G were 238.9, 238.9, 274.4, 256.0, 222.9, 256.0 and 128.0, respectively. The highest GMT of HI antibody titer was recorded in group C (274.4) and the lowest GMT in group G (128.0). The FCR of groups A, B, C, D, E, F and G were 2.0908, 2.1416, 1.9805, 2.1101, 1.9884, 1.9594 and 1.9386 respectively. The unvaccinated chicks in control group G had FCR 1.9386. The overall findings of the study indicated that the use of IBDV vaccines has immunosuppressive effects. The vaccinated birds were found less efficient in converting feed than the unvaccinated birds.

1- INTRODUCTION

Newcastle disease (ND) commonly known as Ranikhet is highly contagious and highly fatal viral infection affecting many domestic and wild bird species globally [1]. It caused huge economic losses and has been engaging the attention of workers for its control. Inspite of good management, timely vaccination programme, ND is still an important problem for the poultry industry. The severity of ND may vary from asymptomatic infection to highly fatal disease, depending upon the strain and tropism of the infecting virus, age of the bird concurrent infections and preexisting immunity against the virus in host bird at risk. The disease is caused by avian paramyxovirus serotype 1 (APMV-1) of the genus Rubulavirus belonging to the subfamily Paramyxovirinae, family Paramyxoviridae, order Mononegavirales [2]. The virus is existing in the environment in three pathotypes i.e. Velogenic, Mesogenic and Lentogentic [3]. The disease is mainly controlled by vaccination.

Infectious bursal disease (IBD) is an acute highly contagious immunosuppressive viral infection of young chicks [4]. The incubation period of IBD virus is 2-3 days after exposure. One of the earliest sign is the tendency for some birds to pick at their vents. Causative agent of IBD belongs to family Birnaviridae and genus Avibirnavirus [5, 6]. The outbreaks of the disease were reported in many parts of the world [7, 8, 9, 10]. The control of the disease was confirmed to depend on the proper immunization schedules coupled with the maintenance of good hygienic conditions at the farm [10, 11, 12, 13].

ND and IBD have remained the two most important infectious diseases that are threatening the commercial poultry production in most parts of the world [14, 15, 16]. Live and inactivated vaccines of IBD from serotype 1 [17] is used commercially due it's induce vigorous antibody responses [18]. Six variants of this serotype 1 were identified by the virus neutralization test and antigenic variation can induce failures on the vaccination processes due to the difference of antigenic structures between vaccinal and wild viruses [17, 19, 20]. Besides the antigenic variation, other factors can interfere on efficacy of a vicinal program, among them, the viral interference. This phenomenon can occur among different serotypes of the same virus, for example IBDV with intermediate and pathogenic strains [21] and it can also occur between different viruses, as between infectious bronchitis virus (IBV) and Newcastle disease virus (NDV) [22] or avian pneumovirus [23].

Therefore, the major purpose of this investigation is to study the immunosuppressive effects of IBD vaccines schedule being used in Pakistan on the ND vaccine.

2- MATERIALS AND METHODS

2.1- Experimental Chicks:

A total of 250, day old broiler chicken were purchased from the M/S Big Birds poultry breeders, Lahore. The chickens were reared in thoroughly cleaned and disinfected experimental rooms of Microbiology Department, University of Veterinary and Animal Sciences, Lahore. The chickens were offered feed and water *ad libitum* and were kept.At 1st day, birds were randomly divided into 7groups; 35 birds in each group (A, B, C, D, E, F and G). The leftover 5 birds were used to detect the maternal antibody titer. Group A, B, C, D, E and F were vaccinated according to schedule given in table 1 whereas group G was used as control.

Table 1: Vaccination programme of broiler chicken

No.	Group	IBDV vaccine	NDV vaccine
1	A	9th& 21th day	5th& 24th day
2	B	9th& 21th day	5th& 24th day
3	C	9th& 21th day	5th& 21th day
4	D	5th& 24th day	5th& 24th day
5	E	1st& 21th day	5th& 24th day
6	F	--	5th& 24th day
7	G	Control (un-vaccinated)	

2.2- Sera samples

Blood sample were collected from all the groups on weekly basis up to 42nd day of life in order to determine the pre and post vaccination titers. A total of 10 birds from each group were randomly selected for blood collection. The blood was collected from each bird separately in disposable syringe and allowed to clot in slanting position at room temperature for separation of the serum. The sera then collected were stored at -20 0C till use.

2.3- Humoral immune response

The sera were analyzed by HI (Haemagglutination inhibition) test to detect antibodies against NDV and indirect ELISA (enzyme-linked immunosorbent assay) (Kirkegaard & Perry Laboratories - KPL) for the detection of IBD antibodies.On the days of vaccines the blood samples were collected prior to administration of the vaccine.

2.4- Feed conversion ratio

The effects of vaccine schedule on growth performance of broiler as determine by Mean body weight (MBW) and feed consumption of chicken measure at termination of the study period. Feed conversation ratio (feed consume / weight gain) will be calculated by totaling the amount of feed consumed divided by the body weight gain of the birds [24] for each group separately

3- RESULTS AND DISCUSSION

3.1- Humoral immune response to NDV vaccine

The present study was designed and conducted to determine the effects of Infectious bursal disease vaccines and vaccination schedule on immunity induced by ND vaccine in broiler birds. The antibody titers against ND of the birds from various groups were determined by HI. The antibody titers as detected by HI in all groups of chicks following vaccination with ND and IBD are presented in Table -3.

The maternal HI antibody titer against Newcastle disease virus was 256.0 (GMT) at day one. On day 7 the GMT of HI antibody titers against NDV of groups A, B, C, D, E, F and G were 238.9, 238.9, 274.4, 256.0, 222.9, 256.0 and 128.0, respectively. The highest GMT of HI antibody titer was recorded in group C (274.4) and the lowest GMT in group G (128.0).

On day 14 the GMT, HI antibody titer of groups A, B, C, D, E, F and G were 48.5, 42.2, 55.7, 68.6, 32.0, 294.1 and 52.0, respectively. Group F shows the highest HI antibody titer (294.1) which was vaccinated with ND only.. The lowest HI antibody titer was recorded in group E (32.0).

On day 21 the GMT, HI antibody titer of groups A, B, C, D, E, F and G were 36.8, 36.8, 42.2, 48.5, 22.6, 274.4 and 19.7, respectively. The highest HI antibody titer was recorded in group F (274.4) and the lowest GMT, HI antibody titer was recorded in group G (19.7).

3.2- Mean ELISA antibody titers against IBD virus

The mean, maternal ELISA antibody titer against Infectious bursal disease vaccine was 1583.0 at day one. On day 7 the mean ELISA antibody titers in groups A, B, C, D, E, F and G were 1355.0, 1330.0, 1625.0, 1625.0, 343.1, 1410.0 and 1771.0, respectively. The highest mean ELISA antibody titer recorded was in group G (1771.0) and the lowest in group E (343.1) which was vaccinated with complex IBD vaccine at day one.

On day 14 the mean ELISA titers in groups A, B, C, D, E, F and G were 266.0, 380.0, 488.0, 606.5, 355.0, 974.0 and 1326.0, respectively. The highest mean ELISA antibody titer was recorded in group G (1326.0) and the lowest mean ELISA antibody titer was recorded in group A (266.0).

On day 21 the mean ELISA titers against IBDV in groups A, B, C, D, E, F and G were 464.0, 496.0, 572.0, 572.0, 316.2, 537.0 and 828.0, respectively. The highest mean ELISA antibody titer was recorded in group C (572.0) and the lowest mean ELISA antibody titers were recorded in group F (537.0).

On day 28 the mean ELISA antibody titers were 2256.5, 1382.5, 2130.0, 1582.5, 2920.5, 120.0 and 40.0 of groups A, B, C, D, E, F and G, respectively. The lowest mean ELISA antibody titer was recorded was of group G (40.0) than in group F (120.0) whereas the highest mean ELISA antibody titer was recorded in group E (2920.5).

On day 35 the mean ELISA antibody titers were 4158.5, 5643, 4246.0, 5420.0, 4357.0, 0.0, 0.0 of groups A, B, C, D, E, F and G, respectively. The lowest mean ELISA antibody titer (zero) was recorded in groups F and G, whereas the highest mean ELISA antibody titer was recorded in group B (5643.0).

On day 42 the mean ELISA antibody titers were 6069.0, 9006.0, 5408.0, 7147.0, 5326.0, 0.0 and 0.0 of groups A, B, C, D, E, F and G, respectively. The groups F and G were negative for the presence of ELISA antibodies. However, the highest mean ELISA antibody titer was recorded in group B (9006.0).

Table-11: Comparison of mean ELISA antibody Titers of IBD

Groups	Days indicating Mean ELISA Antibody Titers						
	Day 1	Day 7	Day 14	Day 21	Day 28	Day 35	Day 42
A	1583.0*	1355.0	266.0	464.0	2256.5	4158.5	6069.0
B		1330.0	380.0	496.0	1382.5	5643.0	9006.0
C		1625.0	488.0	572.0	2130.0	4296.0	5408.0
D		1625.0	606.5	572.0	1582.5	5420.0	7147.0
E		343.1	355.0	316.2	2920.5	4357.0	5326.0
F		1410.0	974.0	537.0	120.0	0.0	0.0
G		1532.0	1326.0	828.0	40.0	0.0	0.0

* Maternal antibody titer

3.3- Effects of vaccine and vaccination schedule feed conversion ratio

Feed conversion ratio of (FCR) of different treatment groups of broiler chickens were determine on 42 day. The FCR of groups A, B, C, D, E, F and G were 2.0908, 2.1416, 1.9805, 2.1101, 1.9884, 1.9594 and 1.9386 respectively. The unvaccinated chicks in control group G had FCR 1.9386. The IBD unvaccinated groups F and G had better FCR values (F=1.9594, G=1.9386) than the IBD vaccinated birds A, B, C, D and E. (A=2.0908, B=2.1416, C=1.9805, D= 2.1101and E=1.9884). The hot strain vaccinated chickens groups B and D had poor feed conversion ratio as compared to the intermediate strain and complex IBD vaccinated chickens groups A, C and E. The study also indicates that FCR of group C vaccinated with the IBD intermediate strain vaccines had better than the group A and E vaccinated with the intermediate and complex vaccine. The total feed consumed, mean body weight gain and FCR values of chickens in various vaccinated groups are presented in Table-14. This study indicates that IBDV vaccine have detrimental effects, as the FCR value of NDV vaccinated and non-vaccinated control were better (F= 1.9594 and G=1.9386) as compared to the IBDV vaccinated groups.

Table-14: Feed conversion ratio of different groups.

Groups	Feed consumed(grams)	Mean weight gain(grams)	FCR
A	5110	2444	2.0908
B	5021	2344	2.1416
C	4575	2310	1.9805
D	4695	2225	2.1101
E	4490	2258	1.9884
F	5110	2444	1.9594
G	4870	252	1.9386

Newcastle disease (ND) and infectious bursal disease (IBD) pose great hazard to poultry industry in many parts of the world. In Pakistan, a lot of vaccines had been introduced to control these diseases. However, failures encountered from time to time. The salient questions addressed in this study are to determine the interaction between the most commonly used vaccines against these diseases and its role in vaccination failure.

In the present study different strains of infectious bursal disease virus (IBD) vaccines were incorporated in vaccination schedule of broilers followed in Punjab, Pakistan. The immune profile of ND and IBD vaccines were studied to evaluate the effect of IBD vaccine strain on ND vaccine immune response. The parameters studied were immune response to NDV vaccine, body weight ratio of lymphoid organ such as bursa, spleen and thymus, feed conversion ratio (FCR) and protection to virulent NDV challenge.

It was well established fact that maternally derived antibodies (MDAs) are protective against ND infection [25]. The chicks used in the present study were procured from a well reputed commercial hatchery. The breeder flocks of this hatchery were maintained in controlled environmental houses and follow an intensive vaccination programme.

FCR values for various treatment groups were also calculated to record the effects on production parameter which were in groups A (2.0908), B (2.1416), C (1.9805), D (2.1101), E (1.9884), F (1.9594) and non-vaccinated group G (1.9386). The groups F (only NDVvaccinated) and G (non-vaccinated control) were better FCR as compared to the groups A, B, C, D and E which were vaccinated with intermediate strain, hot strain and complex IBDV vaccine. IBDV vaccine have immunosuppressive effects on the immune system of the chickens and also detrimental for feed conversion ratio of broiler birds [26]. The vaccinated birds were found less efficient in converting feed than the unvaccinated birds.

CONCLUSION

The overall findings of the study indicated that the use of IBDV vaccines has immunosuppressive effects. The vaccinated birds were found less efficient in converting feed than the unvaccinated birds.

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