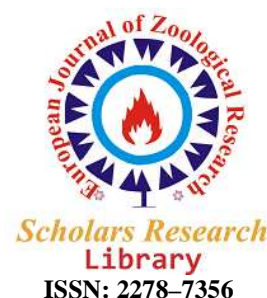




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European Journal of Zoological Research, 2014, 3 (1):81-85  
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### Efficacy of different live Newcastle disease vaccines in broiler farms

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#### ABSTRACT

Newcastle disease is a contagious disease that affects on many domestic and wild avian species. Newcastle has a negative-sense, single-stranded genome. The aim of present study was to compare efficacy of Newcastle disease's live vaccines (Biovac, Clone and LaSota) in broilers using HI method. In this survey we used 1500 broilers from 3 different identical farms. We used Biovac, Clone and LaSota vaccines in farms No. 1, 2 and 3, respectively as dissolved in drinking water on days 8, 22 and 36. At 50 days of age, 20 blood samples from each farm were taken. Samples were transferred to the laboratory. Finally, HI test was done on sera and antibody levels in the sera were measured. There was significant difference between groups from aspect of titer resulted from LaSota and two others ( $P < 0.05$ ). Also, data showed that there is no significant difference between groups Clone and Biovac from aspect of titration. So, authors suggest use of LaSota as the most effective vaccine.

**Keywords:** Newcastle Disease, Live vaccine, broilers, HI test

#### INTRODUCTION

Newcastle disease virus is classified in Genus Paramyxovirus in Paramyxoviride family(1). This virus has RNA non mutation characteristics. The virus contains a single-stranded genome that often causes to different variations with subtle differences in RNA phenotype and incorrect replication of the particles (2). Otherwise, these variations are not progressed under suitable selection conditions. It should be pointed that the population of the Newcastle disease virus challenged in the farm is not clonal with the population of Newcastle disease virus used in the vaccine (2, 3). Selection pressure could change viral behavior. According to this study, some variations change virus pathogenicity and resistance to heat(4). Infectious virus (Virion) has a lipoprotein cover that it is essential for infection (5) and Ministry of Agriculture, Fisheries and Food, 1974. The proteins of virus coverage are specific in terms of genome. They are important for their antigens and they participation specificity of the host and range of virus's pathogenesis(6). We can propose other characteristics of the virus by biological comparing of this virus with other viruses of Paramyxovirus(4). Specifically, it is expected that Newcastle disease virus is stable based on geographical limit and time from antigen perspective(7, 8). Although variants are identified with monoclonal antibodies or analyzing sequences, polyvalent antiserum cannot detect strains easily. Newcastle disease virus usually is cultured in allantoic cavity epithelium in embryonated chicken eggs. Some strains kill the fetus(9). Also, virus grows in cell cultures with the birds and some mammalian cell origin. Some strains of virus replication and host cell destruction is shown that called cytopathogenicity(9, 10). Diagnosis of all strains of Newcastle disease virus cultured in cell is difficult (4). Newcastle disease virus agglutinates RBC of chicken (and sometimes RBC of other species). This stage is known as Hemagglutination and Hemagglutination inhibition forms the basis of conventional tests for the detection of antibodies of this virus *in vitro* and other serological tests are available. Different methods of

preventing and controlling disease can be implemented in international, national and bird flocks level and disease control programs of vaccination is often included. In fact, vaccines are an important part of prevention and control program in the world. Their use in poultry production has traditionally aimed at avoiding and reducing clinical disease in cattle and increases the urgency of poultry production. Regional vaccines and vaccination programs are highly variable depending on various factors (product type, level of biosecurity, regional patterns of disease, maternal immunity, vaccines availability, cost and risk of mortality). Although vaccination of poultry is conducted by the poultry industry, but it rarely is done in the context of a disease eradication programs at national and regional levels for controlling a small number of major poultry diseases (influenza and Newcastle)(11). The purpose of this study was to assess the efficacy of live vaccines of Newcastle disease virus (Biovac, Clone and Lasota) in broiler chickens using Hemagglutination control test.

### MATERIALS AND METHODS

The statistical population consisted of a farm with 15,000 Ross 308 broilers distributed in the three similar halls. The sample consisted of 20 blood samples were drawn in each hall at the end of the period and sampling by wing vein by 2 ml syringe.

In this study, a similar farm with 3 halls was selected and in the first hall Biovac vaccine strains B1, in the second hall Clone vaccine and in the third hall La Sota vaccine were used at days 8, 22 and 36 by drinking water method is used. Program of diet, stocking density, type of chick, light program, temperature, humidity, ventilation and other management factors were similar in all 3 farms and the only difference was between the live Newcastle vaccines. At 50 days of age (at slaughter), 20 blood samples were taken in every rooms and the vaccine antibody was measured by HI test and they were statistically compared. Meanwhile, final weight, feed conversion, mortality and total feed intake were compared in three halls. The data are reported as mean  $\pm$  standard error. After testing the significance of ANOVA and Tukey post hoc test the data were analyzed. The results ( $p < 0.05$ ) was considered as significant.

### RESULTS AND DISCUSSION

Newcastle disease is a viral disease that involves many species of domestic birds, ornamental and wild birds. The disease was first reported in 1926. Newcastle disease is endemic in some countries as a result of trade in poultry and it is considered as one of the limiting factors(11). This disease is one of the most dangerous diseases in the poultry industry which losses rate sometimes reaches to 100%. Its significant factor is Paramyxovirus has different strains. Epidemiologically, Newcastle disease virus has 5 pathotypes that velogenic viscerotropic is the most important type that leads to intestinal disease (11). Because of the existence of hemagglutinin antigen in Newcastle disease virus capsule, the virus has the ability to agglutinate the red cells of some species (12). This characteristic is used in hemagglutination test hemagglutination virus inhibition. In addition to its prevalence, because of the very precise and systematic control program, it is one of the most costly diseases. Given the economic importance of this disease, its prevention is essential.

As well as the bio security factors, Newcastle disease virus vaccines are required for disease control. Vaccination is done as a means to protect birds against Newcastle disease in the worldwide. Newcastle disease has been decreased in some countries. Despite the widespread use of vaccines of Newcastle disease, outbreak is still reported due to the failure to establish an effective cold chain system that it is necessary to maintain the efficacy of vaccines.

Vaccines used in Iran are mostly of the lentogenic strains. Due to the highly virulent form of Newcastle disease that velogenic form is prevalent in our country; vaccines with high immunogenicity are recommended. Considering that among lentogenic vaccine, La Sota vaccine is highly immunogenic, therefore its use is recommended. However, the reaction of La Sota vaccine is controversial. For this reason, the use of alternative vaccines would be ideal provided that the amount of antibody is the same. In this study, we tried to compare the current vaccines La Sota, Biovac and Clone immunogenicity. Three mentioned live vaccines from the HI titer perspective were compared in the broilers. The results of ANOVA showed that from the mean antibody titer perspective, there is a significant difference among the groups ( $p < 0.05$ ). The Tukey test showed that there is a significant differences between groups Biovac and La Sota, but the group vaccinated with Clone did not show a significant difference in the Newcastle disease mean antibody titer ( $p < 0.05$ ). ANOVA test of final weight mean, feed intake, body weight, feed conversion and mortality showed that there is not significant difference among the groups ( $p < 0.05$ ).

Newcastle disease vaccines have been compared in numerous studies. In a study done by Banuet al to detect antibodies derived from the mother and the antibody response comparison with 9 different vaccines of Newcastle disease in laying chickens in the Department of Microbiology and Hygiene, Bangladesh Agricultural University, July to December 2008; it was concluded that the strain of LaSota produces more immune response relative to Clone30 and strain B1 and vaccines Fortdose® and Avipro® have high immune response than all the vaccines and vaccination with lentogenic strain after using mesogenic strains used in this study produces high titers of antibodies. This study reported that the vaccine strain LaSota provides more antibodies relative to the B1 strain and Clone30; this result is consistent with our study.

In Pakistan, Rehmaniet al (1996) studied differences between routes of administration of Newcastle disease vaccine (13). In this study, it was observed that use of the La Sota vaccine in the ocular is the best way and Mukteswar vaccine used by drinking water had the worst titer of HI before challenge. Then he examined the differences between treatments in terms of protection. He found that three vaccines (La Sota, Mukteswar and F) by ocular route were highly secure and an inverse relationship was reported between antibody titer before and after challenge. In this study similar to our study vaccine La Sota has produced high titer. But it was concluded that administration by ocular route better than drinking water used in our study (13).

A study was conducted in Pakistan on 90 laboratory chickens to get an effective control method for Newcastle disease. The amount of antibody responses, by using hemagglutination inhibition test and the degree of protection against pathogenic strains of Newcastle disease virus were studied. The chickens were vaccinated with commercially available vaccines. In Program A, primary vaccination with a vaccine La sota with  $EID_{50}10^9$  was performed in the form of ocular drops in day 5, and then booster vaccination with the same vaccine was carried out at day 21 as the same way and in program B, the primary vaccination with the same vaccine (La Sota vaccine with  $EID_{50}10^9$ ) was performed on day 5 treated with ocular drops, and then a booster vaccination with one mesogenic strain (Mukteswar) intramuscularly on day 21 was performed. When both vaccination programs were challenged with strains of Newcastle disease virus at age of 6 weeks, the safety level was relatively high. Protection index obtained from chickens immunized with the B program was better (14).

In a study conducted by Roy, 3 Newcastle disease commercial lentogenic vaccines and an experimental vaccine V-4 based on inhibiting hemagglutination titer test against Newcastle disease were compared. It was shown that all vaccines in primary vaccination response are similar, but the second vaccination, V4 and La Sota were better than RDFV. Geometric HI titer mean of serum samples before vaccination and 3 weeks after vaccination of the ocular and nose was high, and then samples of tears and tissues of wing was at highest level; there was significant difference ( $P < 0.01$ ). Three weeks after vaccination of the ocular- nose route, the titers geometric mean of serum samples had the highest rate and then the tears and wings tissue samples were in next rank. Ease of preparing wing and tissue samples and its role in Newcastle disease serology is discussed by Roy et al in 1998.

The efficacy of Newcastle disease vaccines Ulster 2C and B1 and oil emulsion adjuvant (IOAV) in broilers was investigated simultaneously in this study. All groups in terms of mortality, weight gain and feed conversion ratio were controlled before and after challenge. All birds in group 1 (non-vaccinated control group) died which showed lack of resistance to the disease in this group. In contrast, disease resistance, in group 2 (immunized subcutaneously in one day with IOAV vaccine concurrent to live vaccines B1) and Group 3 (subcutaneous vaccination with IOAV by a live vaccine Ulster 2C) were  $68.57\% \pm 18.64$  and  $57\% \pm 9.00$  respectively ( $p < 0.05$ ). Side effects rates in groups 2 and 3 were  $37.89\% \pm 14.36$  and  $14.76\% \pm 12.76$  respectively ( $p < 0.05$ ). Weight gain and feed intake and feed conversion ratio within 1-42 days in group 3 was significantly better than in group 2 ( $p < 0.02$ ). Simultaneous vaccination with vaccines B1 or Ulster 2C and IOAV in chicks up to 28 days without a booster vaccination provides some resistance to the disease (15).

In a study conducted in Pakistan, five Newcastle disease commercial vaccine strains of NDV La Sota, A, B, C, D and E in terms of power, performance, heat resistance and the effect on fertility of broiler chickens were evaluated. All vaccines cause weight loss and poor performance in terms of feed conversion and EEF (16). In a study by Bwala et al in 2009, no significant difference was seen in levels of protection between the vaccine viruses Avinew GMPV and RCV observed. Safety level against Newcastle disease vaccine was dependent to dose. The recommended dose of  $10^{6.0} EID_{50}$  of vaccine protection against mortality was 100% by both viruses. But this protection against disease and virus replication was not possible to detect lesions even in apparently healthy birds

that had survived the challenge. Avinew protective vaccine dose for challenge of virus GPMV (PD90) was estimated 10 (4.38) and for virus RCV was calculated 10 (4.43)(17).

A study showed that maternal antibodies against Newcastle disease virus in chickens up to 27 days has reached and at least in 30 -34 days reaches to zero (18). HI titers analyzed by t student test showed that group who received Avinew vaccine had higher titers after primary and secondary vaccinations as well as the challenge with virus in vaccine recipients compared to BCRDV that this difference was significant.

In a study for comparison of available vaccines for Newcastle disease control it was concluded that live vaccines are easily administered and cost effective and produces high protection. The vaccine reaction varies based on vaccine strain. Among the live vaccines, heat-stable vaccines for use in rural areas are an important advantage because they are easy to transport and are used widely in rural areas. Recombinant vaccines have the advantage that they are detectable as non-dependent serological cross-linked to wild virus (19).

In addition, selecting the appropriate vaccines depends on primary factors like specific conditions of each region, including the system of veterinary services, previous experience, population distribution, transport and communications and climatic conditions.

### CONCLUSION

It is recommend to conduct a study to compare the safety of La Sota vaccine induced ocular and drinking water in different ways. A similar study conducted to compare vaccine La Sota, Biovac and Clone in laying chickens and their parents. Due to the ease of use of tissue and wings sample, it is recommended to implement a comparative study of antibody induced by the vaccine, and tissue serological samples of tear and wing. A study conducted to compare the degree of protection created by the use of booster vaccination with strains La Sota as intramuscular injection of the primary vaccination. According to the results, it is recommended to administer vaccine La Sota or Clone in high risk areas of Newcastle disease. Considering that in herds with MG, La Sota vaccine administered will be followed by severe side effects, so it is recommended to not administer La Sota vaccine. Following the LaSota vaccine administer, it is recommended to control environmental stresses and observing exacerbate symptoms associated with the disease, CRD-Complex should be prescribed 4 days with broad-spectrum antibiotics.

### REFERENCES

- [1] Kim LM, King DJ, Curry PE, Suarez DL, Swayne DE, Stallknecht DE, et al. *Journal of Virology*. **2007**;81(22):12641-53.
- [2] Spradbrow PB, Ibrahim AL, Mustaffa-Babjee A, Kim SJ. *Avian Dis*. **1978** Apr-Jun;22(2):329-35. PubMed PMID: 678237. Epub 1978/04/01. eng.
- [3] Kinde H, Utterback W, Takeshita K, McFarland M. *Avian Dis*. **2004** Sep;48(3):669-74. PubMed PMID: 15529993. Epub **2004**/11/09. eng.
- [4] Fontanilla B, Silvano F, Cumming R. *Prev Vet Med*. **1994**;19(1):39-44.
- [5] Arzey G, editor ND vaccination of layers-effervescent titres. Proc February Scientific Meeting of AVPA University of Sydney; **2005**.
- [6] Alexander DJ. Newcastle disease diagnosis. In: Alexander DJ, editor. Newcastle disease. London: Kluwer Academic Publishers; **1988**. p. 147-60.
- [7] Van Eck J. *Vet Q*. **1987**;9(4):296-303.
- [8] Johnston J. Health and Productivity of Village Poultry in Southeast Asia: Economic Impact of Developing Techniques to Vaccinate Birds Orally Against Newcastle Disease: Australian Centre for International Agricultural Research; **1990**.
- [9] Partadiredja M, Eidson C, Kleven S. *Avian Dis*. **1979**:622-33.
- [10] Kaleta EF, Baldauf C. Newcastle disease in free-living and pet birds. Newcastle disease: Springer; **1988**. p. 197-246.
- [11] Alexander DJ, Senne DA, Gough RE, Jones RC. Newcastle Disease, Pneumovirus Infection and Other Paramyxoviruses. In: Saif YM, editor. Diseases of Poultry. 12<sup>th</sup> ed. Iowa, IA: Wiley-Blackwell Publishing; **2008**. p. 75-115.
- [12] Wilden H, Fournier P, Zawatzky R, Schirrmacher V. *Int J Oncol*. **2009**;34(4):971-82.
- [13] Rehmani SF. *Prev Vet Med*. **1996**;25(3):241-8.

- [14] Ahmad M-u-D, Chaudhry M, Rai MF, Rashid HB. *Turkish Journal of Veterinary and Animal Sciences*. **2007**;31.
- [15] Chansiripornchai N, Sasipreeyajan J. *Acta Vet Scand*. **2006**;48(1):2.
- [16] Abbas T, Muneer M, Ahmed M, Khan M, Younus M, Khan I. *Pak Vet J*. **2006**;26.
- [17] Bwala DG, Abolnik C, van Wyk A, Cornelius E, Bisschop SP. *J S Afr Vet Assoc*. **2009** Sep;80(3):174-8. PubMed PMID: 20169751. Epub **2010**/02/23. eng.
- [18] Mahmud M, Hossain M, Monoura P, Amin M. *Bangladesh Journal of Veterinary Medicine*. **2007**;5(1):19-23.
- [19] Bell J, Fotzo T, Amara A, Agbede G. *Prev Vet Med*. **1995**;25(1):19-25.