Available online at www.scholarsresearchlibrary.com

Scholars Research Library

Scholars Research Library

European Journal of Zoological Research, 2013, 2 (6):22-27
(http://scholarsresearchlibrary.com/archive.html)

Scholars Research Library
ISSN: 2278–7356

Comparative efficacy of Newcastle disease live vaccines (Biovac, Clone and La Sota) in broiler chickens by ELISA

Amir Kazemian Maleki[1*], Adel Feizi[2] and Younes Anzabi[3]

[1]Faculty of Veterinary Medicine, Tabriz Branch, Islamic Azad University, Tabriz, Iran
[2]Department of Clinical Sciences, Faculty of Veterinary Medicine, Tabriz Branch, Islamic Azad University, Tabriz, Iran
[3]Department of Pathobiology, Faculty of Veterinary Medicine, Tabriz Branch, Islamic Azad University, Tabriz, Iran

---

ABSTRACTS

Newcastle disease is a highly contagious and main disease of birds that affects many species of domestic and wild birds. The aim of this study was to compare the antibody titers produced by live vaccines of Newcastle disease (Biovac, Clone and La Sota) in broiler chickens with ELISA test. This study was conducted in a broiler farms that has three similar salons. Three vaccines Biovac, Clone and La Sota were administrated in drinking water on days 8, 22 and 36 in each of groups. At the end of the breeding period at slaughterhouse, 20 serum samples were obtained from each group chickens. Samples using the ELISA test from the aspect of antibody titers were evaluated. The amount of feed consumption, final weight, FCR and Mortality rates were also noted. The results of study showed that from the aspect of antibody titer there was highly significant difference between La Sota vaccine group and other two groups ($p<0.01$). However, feed conversion rate, feed intake and final body weight in Biovac group was better than the other groups, although this difference was not statistically significant. The amount of mortality in Biovac group was lower than the other two groups. The results of the study showed that according to significant difference from the aspect of the antibody titers produced by the La Sota vaccine, although the incidence of reactions of resulting from the use of this vaccine using of it in high risk areas is unavoidable.

Keywords: Newcastle disease, Vaccination, La Sota, Biovac, Clone

---

INTRODUCTION

Newcastle disease (ND) is a highly contagious viral disease affecting various wild and domestic avian species (14) The impact of ND is most notable in domestic poultry due to the high susceptibility of poultry and the severe consequences of outbreaks of virulent strains on the poultry industries. In fact, it has been argued that ND may represent a bigger drain on the world economy than any other animal viral disease (1). In response to the threat presented by ND, several countries have put in place vaccination campaigns to prevent epizootics. However, outbreaks have been reported in vaccinated populations despite the fact that vaccination is widely applied (4), as for example in The Netherlands in 1992 to 1993, the UK in 1997, and the USA in 2002 (1).

It is known that vaccination of poultry provides an excellent means to lessen clinical signs of infection caused by virulent Newcastle disease virus (NDV) (1, 8, 15). It has also been known for a long time that vaccination itself (with live vaccines based on non-virulent virus strains) may cause disease and reduced growth in vaccinated birds. As a consequence, there has been a trend to use ever less virulent strains as the seed viruses for vaccine production. Although this strategy has reduced the disease rates after vaccination, it also may have contributed to the act that current vaccines and vaccination campaigns are not maximally effective in preventing infection and transmission (4, 8, 15, 17).

Hence, it is not clear whether the ultimate goal of prevention of major outbreaks after primary virus introductions can be achieved with current vaccines and vaccination programs. Vaccination of large numbers of broiler chickens against ND is usually carried out using non-virulent live virus that is administered by spray or atomist, or via drinking water. These administration techniques usually produce considerable variation in the individual antibody immune responses of vaccinated birds, indicating potential variation in the levels of protection after vaccination (15). Therefore, a main question in the control of ND is whether virulent viruses are able to spread in heterogeneously vaccinated populations, and, more specifically, under which conditions (vaccination coverage level, distribution of antibody titers) epidemic spread can be prevented.

Different strategies can be implemented to effectively prevent and control the spread of animal diseases at international, national and farm levels and poultry disease control plans often include the use of vaccination. Vaccines are, in fact, an important component of poultry disease prevention and control worldwide. Their use in poultry production is traditionally aimed at avoiding or minimizing the emergence of clinical disease at farm level and thus increasing production. Vaccines and vaccination programs vary widely, depending on several local factors (e.g. type of production, level of biosecurity, local pattern of disease, status of maternal immunity, vaccines available, costs and potential losses). Although poultry vaccination is generally managed by the poultry industry, it has only rarely been applied in the framework of a disease eradication program at national or regional level to control a few major poultry diseases (e.g. Influenza and Newcastle) (1).

The aim of present study was to compare efficacy of Newcastle disease's live vaccines (Biovac, Clone and LaSota) in broilers by ELISA method.

MATERIALS AND METHODS

This study was conducted in a broiler farms that has three similar salons. Three vaccines Biovac, Clone and La Sota were administrated in drinking water on days 8, 22 and 36 in each of the salons. At the end of the breeding period at slaughterhouse, 20 serum samples were obtained from each salon. Following serum isolation, the samples undergoes ELISA test and antibody titers obtained from each of vaccines were evaluated.

The amount of feed consumption in each of the halls, final weight, FCR and Mortality rates were also noted.

The data of study was investigated statistically by One-Way ANOVA at 95% level and also tukey post-hoc test was used for comparison the differences between groups.

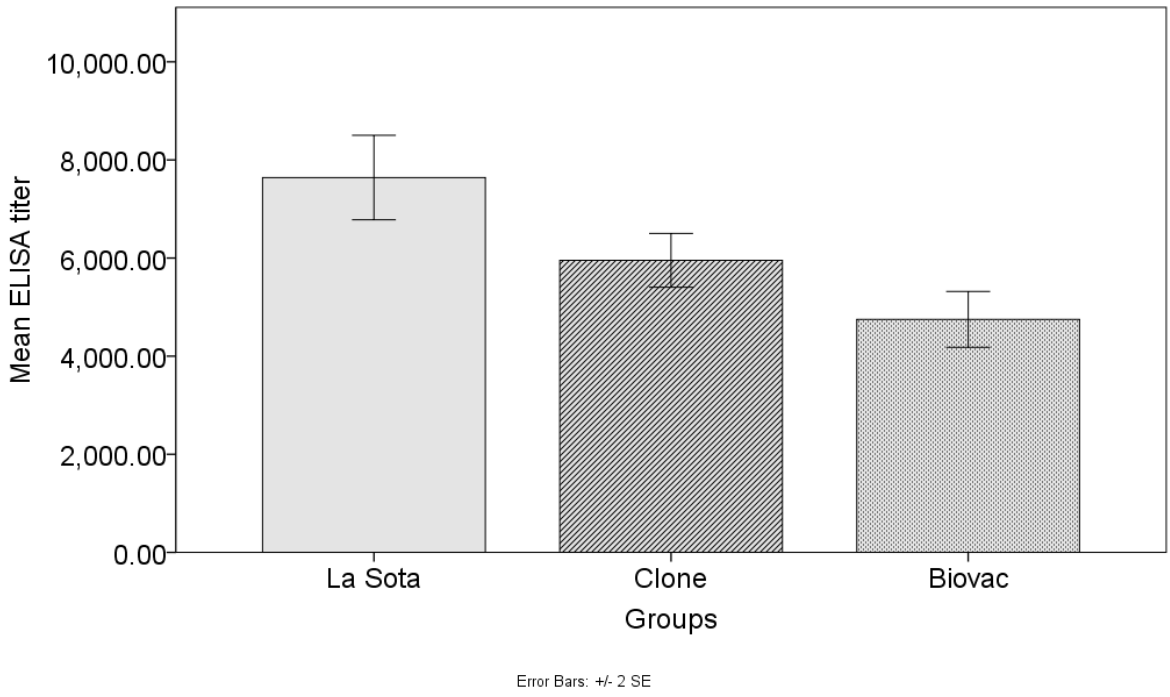

Fig 1: Mean ELISA antibody titer in experimental groups

RESULTS

The results of study showed that the antibody titer was different significantly between La Sota vaccine group and other two groups ($p<0.01$). Our results demonstrated that in La Sota group the antibody titers against Newcastle disease was highest (7641.35±430.03) and the lowest antibody titers was in Biovac group (4750.80±284.83).

Also our results indicated that in Biovac group the feed conversion ratio and feed consumption was lowest and in Lasota group it was higher than other two groups but it was not different significantly ($p>0.05$).

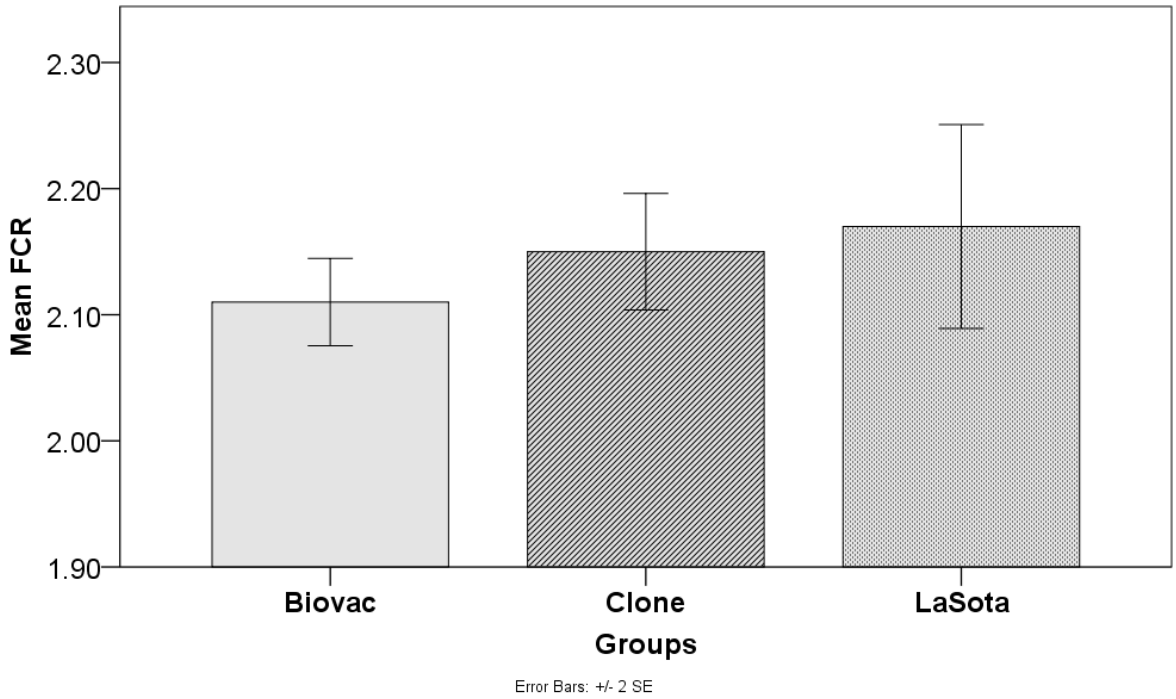

Fig 2: Mean Feed Conversion Ratio in experimental groups

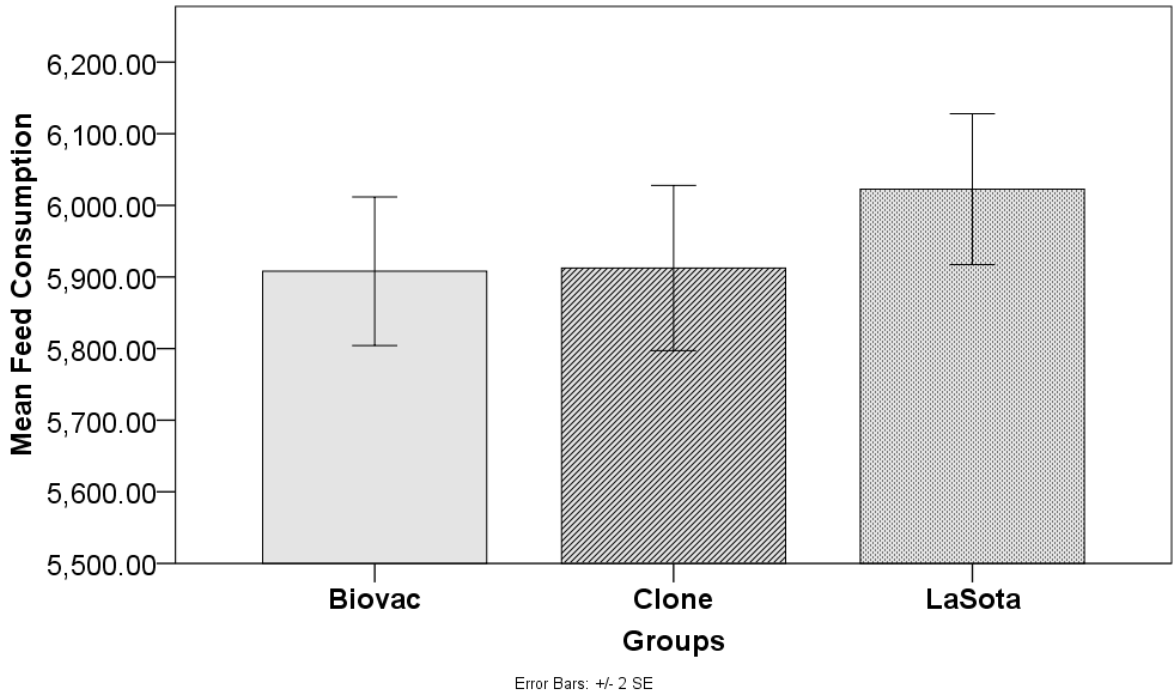

Fig 3: Mean Feed Consumption in experimental groups

Body weight in Biovac group was better also than the other two groups, although this difference was not statistically significant.

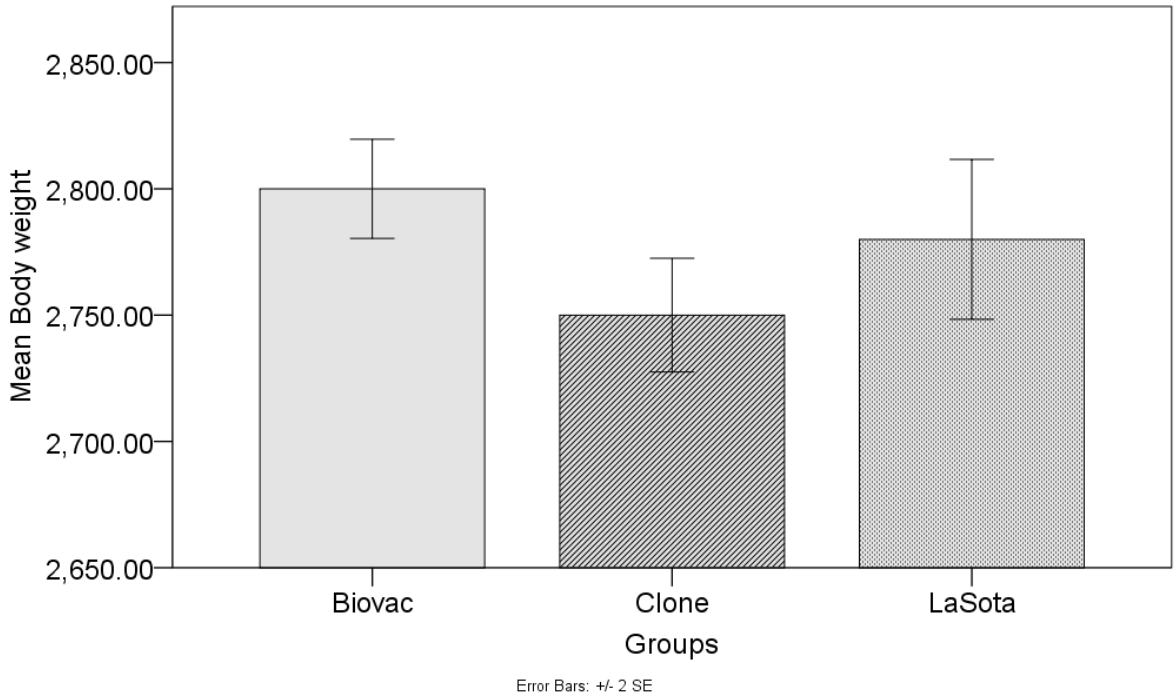

Fig 4: Mean Body weight in experimental groups

Table 1: The results of study; Mean ELISA titer, BW, FC and FCR in experimental groups

	ELISA titer	Body weight	Feed consumption	FCR
Biovac	4750.80±284.83[a*]	2800.00±9.81	5908.00±51.90	2.11±0.01
Clone	5952.70±274.08[b]	2750.00±11.25	5912.50±57.67	2.15±0.02
La Sota	7641.35±430.03[c]	2780.00±15.81	6022.60±5265	2.17±0.04
Sig.	0.001	0.078	0.309	0.382

** Different letter in each column, indicated statistical difference between groups.*

Mortality percent in Biovac group was lower than the other two groups, and our results demonstrated that the type of vaccine was not effective on mortality rate (Table 1).

DISCUSSION

The virus of Newcastle disease is very important from financial aspect. Disease losses in most countries, beside of its prevalence is exerting the accurate and principled controlling program that is one of the most costly disease. In some countries the Newcastle disease is endemic thus considered as one of the limiting factors in poultry industry (9).

Epidemiologically, the viruses of Newcastle disease are allocated into five pathotype that causes most important economical disease of poultry, specially its velogenic pathotypes (1).

Vaccination as a mean of protecting birds against ND is routinely practiced in world. Despite extensive use of vaccines, outbreaks of ND are still recorded due to failure of effective cold chain system, which is required for the maintenance of efficacy of vaccines.

Researchers indicated that although vaccination generally provides good protection against disease and mortality, but it may not provide sufficient protection against virus transmission so as to be able to prevent or halt epidemics of Newcastle Disease. Their finding was of considerable interest as it brings into question the epidemiological effectiveness of current vaccination campaigns against ND. Overall, analyses indicate that a high fraction of birds (>85%) needs to have a high antibody titer (log2 titer ≥3) after vaccination to ensure that no epidemic spread is possible in vaccinated populations (16).

The general question is whether it is possible to obtain consistently high antibody titres using the current vaccines of ND vaccines that are based on viruses of low virulence. Unfortunately, there are no systematic studies that have investigated the distribution of antibody titers after vaccination of large populations of poultry. A pilot experiment in The Netherlands suggests that it may be possible to obtain high antibody titres in the majority of birds, but only if strict preconditions on the vaccine content and administration techniques are met. It should also be noted that in the absence of circulation of virulent virus in a region there may be an incentive for farmers to use vaccination schemes and procedures that are not epidemiologically optimal because of the negative side-effects of vaccination (16).

Bwala *et al*., indicated that no statistically significant difference could be found in the protection offered by Avinew® vaccine against GPMV as compared to RCV challenge. The protection offered against the ND challenge was found to be dose dependent. At the recommended field dose of $10^{6.0}$ EID_{50} the vaccine gave 100% protection from mortality against both the challenge viruses, but not against infection and replication of the viruses, as gross lesions were evident even in apparently healthy birds that survived the challenge. The protective dose of the Avinew® vaccine against GPMV challenge was calculated at $10^{4.38}$ and against that of RCV at $10^{4.43}$ (5).

Also other researchers demonstrated that the protection achieved from vaccination, however, inhibit the challenge viruses from infecting and replicating in the host tissues and organs, as varying degrees of gross pathology were encountered even in the apparently healthy challenged birds that were euthanized, and it was reported that vaccination of poultry against ND can only protect birds from the more serious consequence of virulent NDV infection (clinical signs and mortality) but not infection and replication of the virulent strains of the virus (2, 8, 10).

In a research that was compare La Sota vaccine intraocularly and Mukteswar vaccine by the drinking water route, the results demonstrated that the La Sota vaccine has highest titer og HI antibodies and Mukteswar has lowest titers of HI antibody against ND prior to challenge. Also it was reported that for all vaccines intraocular administration produces higher protection than drinking water vaccine (11).

There was different vaccines available for controlling of Newcastle disease, and it is declared that live vaccines are easy to apply and relatively inexpensive and give moderately good immunity. Vaccination reactions to live vaccines vary according to the vaccine strain. Among the live vaccines, the heat resistant vaccines have the significant advantage for village use of easy transportation and they have also been widely used in villages. Recombinant vaccines have the advantage that they can be serologically detected independently of the wild virus (3). The choice of which vaccine to use is going to depend not only on the preceding factors, but also on the conditions pertaining to a particular region, such as the structure of veterinary services, previous experience, the population distribution, the communication infrastructure and the climate.
Comparison of three commercial ND lentogenic vaccines and a V-4 vaccine, showed that all vaccines primary responses were similar, but in the second vaccination, La Sota and V4 vaccines were better than RDFV vaccine (12).

Certainly, researchers have shown that infection, shedding, and transmission of virulent NDV in vaccinated birds may occur without overt disease signs (8, 16). Given this possibility we believe that, if preventive vaccination programs are to be implemented, they should go together with a monitoring program ensuring that sufficient flock immunity levels are achieved. Similar views have recently been expressed for highly pathogenic avian influenza viruses in poultry (6, 7, 13).

CONCLUSION

The results of current study showed that the feed conversion ratio, final body weight, feed intake was better in Biovac group than the other two groups, however the antibody titers of the vaccine were significantly lower in this group than the other groups. Despite the better performance of flocks vaccinated by Biovac vaccine than to La Sota and clone vaciines, but needing to achieve high titers in field conditions is also important for preventing from disease occurrence.

Thus in regions with prevalence of ND it should be considered that only La Sota and Clone vaccines effective in reduces clinical outcomes of ND, and vaccines like Biovac should be used in low risk regions and only in primary vaccination of flocks and it should be continued with La Sota or clone vaccines dependent of regions.

REFERENCES

[1] D. J. Alexander, D. A. Senne, R. E. Gough, R. C. Jones, *In:* Y. M. SAIF (ed.) *Diseases of Poultry*.(Wiley-Blackwell Publishing,Iowa, IA, **2008**) 75-115.
[2] F. D. Asplin, *Vet Rec*, **1952**, 64, 245-249.
[3] J. Bell, T. Fotzo, A. Amara, G. Agbede, *Prev Vet Med*, **1995**, 25, 1**,** 19-25.
[4] M. Burridge, H. Riemann, W. Utterback, E. Sharman, Proceedings, annual meeting of the United States Animal Health Association, **1975**. 324.
[5] D. G. Bwala, C. Abolnik, A. Van Wyk, E. Cornelius, S. P. Bisschop, *J S Afr Vet Assoc*, **2009**, 80, 3**,** 174-178.
[6] I. Capua, D. J. Alexander, *Avian Pathol*, **2006**, 35, 3**,** 189-205.
[7] I. Capua, S. Marangon, *Emerg Infect Dis*, **2006**, 12, 9**,** 1319.
[8] D. R. Kapczynski, D. J. King, *Vaccine*, **2005**, 23, 26**,** 3424-3433.
[9] D. P. Lana, D. B. Snyder, D. J. King, W. W. Marquardt, *Avian Dis*, **1988**, 32, 2**,** 273-281.
[10] P. J. Miller, D. J. King, C. L. Afonso, D. L. Suarez, *Vaccine*, **2007**, 25, 41**,** 7238-7246.
[11] S. F. Rehmani, *Prev Vet Med*, **1996**, 25, 3**,** 241-248.
[12] P. Roy, A. Koteeswaran, P. Sridevi, A. Venugopalan, *Trop Anim Health Prod*, **1998**, 30, 1**,** 31-35.
[13] N. J. Savill, S. G. St Rose, M. J. Keeling, M. E. Woolhouse, *Nature*, **2006**, 442, 7104**,** 757-757.
[14] B. S. Seal, D. J. King, H. S. Sellers, *Dev Comp Immunol*, **2000**, 24, 2**,** 257-268.
[15] D. Senne, D. King, D. Kapczynski, *Developments in biologicals*, **2004**, 119, 165-170.
[16] M. Van Boven, A. Bouma, T. H. Fabri, E. Katsma, L. Hartog, G. Koch, *Avian Pathol*, **2008**, 37, 1**,** 1-5.
[17] A. Voeten, J. Van Eck, F. Davelaar, B. Kouwenhoven, *Vet Q*, **1987**, 9, 1**,** 38-48.