REVIEW ARTICLE

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La Sota Vaccination Does Not Offer Satisfactory Protection Against Velogenic Newcastle Disease Virus Infection In Chickens- A Review

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Abstract

La Sota vaccination is the major vaccine used in the control of Newcastle disease (ND) of chickens in most countries of Europe and United States of America where millions of chickens are kept in one farm at a time. La Sota vaccine is administered through drinking water and can be easily administered on millions of chickens in few hours. Furthermore, the predominant field ND virus pathotype in these countries is the mesogenic virus for which La Sota vaccination is effective in providing protection. But this same vaccine has been found to be ineffective against velogenic ND virus pathotype which is enzootic in Africa, Middle and Far East. This makes large scale poultry production difficult in these areas. The Komarov ND vaccine which is effective against the velogenic ND virus is administered intramuscularly and requires individual handling of the chickens which is not possible where millions of chickens are housed together.

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DISCUSSION

Newcastle disease (ND) is a major disease of poultry worldwide (Alexander and Senne, 2008). The virus infects a wide range of avian species including poultry, cage and wild birds (Kaleta and Baldauf, 1988). Chickens are most severely affected probably because it is only in this species that ND causes severe haemorrhagic and ulcerative lesions in the gastrointestinal tract (Okoroafor *et al*, 2018). The velogenic form of ND is the most severe form of the disease and usually causes mortalities of up to 70 to 100 % within seven days in susceptible chickens (Igwe *et al*. 2018). Okpe *et al* (2015) reported that dietary supplementation of vitamin A significantly reduced the mortality of velogenic ND (VND) in chickens. VND is enzootic in Africa, Middle and Far East (Echeonwu *et al*, 1993; Solomon *et al*, 2012 and Shittu *et al*, 2016) and it is a major factor militating against poultry production in these areas (Czegledi *et al*, 2006). The outbreaks cause huge economic losses to poultry producers because of heavy mortalities, loss of egg production, imposition of trade embargo by the international community and the stamping out control policy used to control the disease in those countries where VND is exotic.

Control of ND is mainly by vaccination and biosecurity. Recently, researchers have discovered many inadequacies and problems in the control of VND with La Sota vaccination. Ezema *et al* (2009) challenged La Sota vaccinated and unvaccinated chickens with velogenic viscerotropic ND virus and reported that there was no clinical sign in the vaccinated chickens but the mortality in unvaccinated was 84.6 %. But the atrophy, necrosis and the depletion of the lymphocytes in the bursa, spleen and thymus were equally very severe in both vaccinated and unvaccinated. It was concluded that La Sota vaccination protected chickens against the clinical signs of VND but not against the lesions of the disease in the lymphoid organs. These observations and conclusion were later confirmed by Bwala *et al* (2012) and Ezema *et al* (2016) in chickens. Okoroafor *et al* (2018) confirmed this observation in vaccinated and unvaccinated turkeys. Eze (2017) reported that these lymphocidal lesions significantly ($p<0.05$) reduced antibody responses to infectious bursal disease and infectious bronchitis disease vaccination in both La Sota vaccinated and unvaccinated chickens. It has also been observed by several researchers that La Sota vaccination does not stop the multiplication of the ND virus (NDV) but reduces the shedding of the virus through the faeces and eggs (Miller *et al*, 2007 & 2013; Bwala *et al*, 2012; Cattoli *et al*, 2013; Okwor *et al*, 2016; Sa e Silva *et al*, 2016 and Okoroafor *et al*, 2018) in chickens and turkeys. Igwe *et al* (2018a) challenged La Sota vaccinated and unvaccinated laying chickens with VND virus (VNDV). Severe clinical signs and mortality of 90 % were observed in the unvaccinated but clinical signs were mild and there was no mortality in the vaccinated layers. There was significant ($p<0.05$) drop in egg production in both vaccinated and unvaccinated layers throughout the seven weeks duration of the experiment, even though the drop was more severe in the unvaccinated. This confirms the earlier reports of Bwala *et al* (2012) and Sa e Silva *et al* (2016) who also reported drop in egg production in both challenged La Sota vaccinated and unvaccinated laying chickens. This can constitute huge economic loss to egg producers. Only the

unvaccinated layers produced discoloured (white), thin shelled and misshaped eggs. Pathological changes in the gastrointestinal tract, female reproductive organs and immunohistochemical labeling were more severe in the unvaccinated than the vaccinated layers. Igwe *et al* (2018b) observed that the drop in egg production in VNDV infected laying chickens was strongly and positively correlated with drop in serum phosphorous levels. The above observations show that La Sota vaccination:

- i. Does not protect chickens against the lesions of VND in the lymphoid organs. Immunosuppression is the consequence
- ii. Does not protect chickens against VNDV shedding. Environmental pollution is the consequence
- iii. Does not protect laying chickens against drop in egg production due to VND. Huge economic loss is the consequence.

These conditions are not compatible with profitable poultry farming. In developed countries of Europe and America where poultry production has metamorphosed into large industries where millions of chickens are reared in one farm at the same time, La Sota vaccination at specific intervals is now the practice. Komarov vaccination which is administered at the breast muscle of the chickens at six weeks of age is ruled out because it is impossible to handle millions of chickens individually. Komarov is a mesogenic NDV and will produce stronger protection than La Sota which is a lentogenic NDV. The current practice in developed countries may not expose the chickens to much risk because VND is exotic in those countries and their biosecurity practice is very strong. But it will be risky to embark on large scale poultry production with only La Sota vaccination in those areas where VND is enzootic. Generally, biosecurity practice is weak in Africa. The solution may be to have another look at the La Sota vaccine and the vaccination schedule to make them effective for the control of VND.

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