

## **Protective efficacy of inactivated Newcastle disease virus vaccines prepared in two different oil based adjuvants**

### **ABSTRACT**

Despite the availability of Newcastle disease (ND) vaccines for more than six decades, disease outbreaks continue to occur with huge economic consequences to the global poultry industry. The aim of this study is to develop a safe and effective inactivated vaccine based on a recently isolated Newcastle disease virus (NDV) strain IBS025/13 and evaluate its protective efficacy in chicken following challenge with a highly virulent genotype VII isolate. Firstly, high titre of IBS025/13 was exposed to various concentrations of binary ethylenimine (BEI) to determine the optimal conditions for complete inactivation of the virus. The inactivated virus was then prepared in form of a stable water-in-oil emulsion of black seed oil (BSO) or Freund's incomplete adjuvant (FIA) and used as vaccines in specific pathogen-free chicken. Efficacy of various vaccine preparations was also evaluated based on the ability of the vaccine to protect against clinical disease, mortality and virus shedding following challenge with highly virulent genotype VII NDV isolate. The results indicate that exposure of NDV IBS025/13 to 10 mM of BEI for 21 h at 37 °C could completely inactivate the virus without tempering with the structural integrity of the viral hemagglutinin-neuraminidase protein. More so, the inactivated vaccines adjuvanted with either BSO- or FIA-induced high hemagglutination inhibition antibody titre that protected the vaccinated birds against clinical disease and in some cases virus shedding, especially when used together with live attenuated vaccines. Thus, genotype VII-based NDV-inactivated vaccines formulated in BSO could substantially improve poultry disease control particularly when combined with live attenuated vaccines.

**Keyword:** Newcastle disease virus; Genotype VII; Inactivated vaccine; Water-in-oil emulsion; Virus shedding