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Effect of Formulation (particle size) of inactivated AI+ND vaccine on Stability and Immunogenicity in SPF and Broiler Chickens

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Abstract

Mineral oils are the most common adjuvants that are used in the production of poultry killed vaccine based on water-in-oil emulsion (W/O) to create high and long term antibody responses to vaccine antigens. The vaccine structural specifications, including particle size and formulation on stability and immunogenicity, have needed more clarification for vaccine producers so that they can produce their products based on highly efficient methods. This study assessed the effect of particle size on the stability and immunogenicity of a W/O vaccine. Different W/O emulsions were formulated by three different homogenization times by means of inactivated Avian Influenza Virus subtype H9N2 (AI H9N2) and Newcastle Disease Virus (V4) antigens and Montanide™ ISA 70 adjuvant. The three killed AI+ND vaccines were formulated and 2 commercial vaccines were evaluated for magnitude and duration of specific antibody response in SPF and broiler chickens. The vaccine dose for each bird was considered 0/2 ml. On days 7, 14 and 21 post vaccination, antibody titers of serum were evaluated by Hemagglutination Inhibition (HI) test. The serum antibody titers (ND) of group B and C on days 7 and 21 were higher than the other groups ($P<0.05$), but the difference between the other groups was not significant on the same day. The serum antibody titers (ND) of broiler chickens in group B and C on day 7, 21 and also group E on day 21 were significantly higher than other groups. The serum antibody titers (AI) of SPF chickens on day 21, in group C, had significant difference with other groups. The antibody titers (AI) on days 7 and 14 showed no significant difference in all groups except group D. The immunogenicity of emulsions was higher in more homogenization time. In all, these results indicate that increases in homogenization time create a smaller size of droplets and are effective for the rapid onset of antibody production. The small size of droplets not only creates a fast and good response, but also promotes immunogenicity both in broilers and SPF chickens.

Key words: Particle size, Adjuvant, Water in oil, Immunogenicity, Inactivated vaccine

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