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SPECIFIC ANTIBODY RESPONSE IN BACKYARD CHICKENS TO NEWCASTLE DISEASE THERMOSTABLE LIVE VACCINE

S. Baksi*, P. Puwar, N. Rao and M. Khan

Hester Biosciences Limited, Ahmedabad – 380006, Gujarat, India

ABSTRACT

Newcastle disease (ND) is widely known poultry disease all over the world. It causes high economic losses even in backyard poultry. The purpose of present study was to estimate specific antibody response of backyard poultry chickens to thermostable vaccine of ND. Presence of antibodies before vaccination was determined by haemagglutination-inhibition (HI) test and vaccine was inoculated intraoccularly to birds of vaccinated group. Blood was withdrawn at regular intervals up to 4 months and generation of specific antibodies to the ND antigen was measured by HI test. The results showed significant increase in antibody titre at 28 days time in vaccinated birds and decrease was found after three months of vaccination in the birds. The study suggests that it is necessary to follow vaccination schedule in the backyard chickens, as they are highly susceptible to ND.

Key words: Newcastle disease, Thermostable, Backyard, Antibody, Vaccine

INTRODUCTION

Newcastle disease (ND), a poultry disease, noted by World Organisation of Animal Health, is caused by virulent avian paramyxovirus type 1 (APMV-1) strains (Jos *et al.*, 2011). It is a disease of birds which is highly distributed throughout the world. It affects many avian species and causes significant economic loss to poultry industry (Lancaster, 1976; Spreadbrow, 1988; Cattoli *et al.*, 2009). It is considered the most economically important avian viral disease in the world especially in developed countries due to its devastating effect on the industry (El-Yuguda and Baba, 2002; Ngaji *et al.*, 2010; Aziz *et al.*, 2010). The native chicken varieties adopted in free-range backyard conditions contribute about 11% of total egg production in India (Kumaresan *et al.*, 2008). Village poultry plays a key and often undervalued role in a rural development in many poor rural households and is a global asset for many millions who live below the poverty line (Gueye, 2000). For control on disease of poultry, especially ND, vaccination has been the principal method (Okwor *et al.*, 2013; El-Mahdy *et al.*, 2013). Generally ND is controlled by vaccination of the flock and the infected birds are culled to prevent the spread of the disease. An effective vaccination procedure includes maintenance of cold chain transport system, holding and vaccinating individual birds properly with skilled workers/vaccinators (Nasser *et al.*, 2000). The vaccination schedule also requires close monitoring and assurance that every bird receives vaccine properly. Control and safety of environment, feed and water supply are also essential parts of poultry farming. The selection of an ND vaccine for use in village chicken will depend on the local conditions in each country. The vaccine should be selected based on user friendliness, cost, availability, immunogenicity and thermostability and transportation facility. In countries like Africa and India, people are having village chicken in small numbers. It becomes difficult to maintain cold chain and other factors, hence is becomes highly suggestive that they use thermostable lasota vaccines (Ideris *et al.*, 1987; Illango *et al.*, 2005). With this background, this study was conducted with the objective to observe the effectiveness of thermostable vaccine of Hester Biosciences Limited (India) in improving protection from ND, egg production and egg quality in backyard chicken.

*Corresponding e-mail address: drsbaksi.vm@gmail.com

MATERIALS AND METHODS

Study design

Eighty healthy kadaknath backyard chickens of four weeks of age were selected for the study and divided into two groups: Group 1: 40 birds (vaccinated with thermostable lasota vaccine from Hester Biosciences Limited, India); Group 2: 40 birds (unvaccinated control). Birds from group 1 were kept at backyard poultry at Merda-Adraj village, Gujarat, India. Unvaccinated birds were kept at backyard poultry at Jetpura village, Gujarat, India. All birds were subjected to free supply of feed and water ad libitum and observed daily throughout study.

Vaccination, blood collection and testing

Group 1 chickens were vaccinated with one dose of thermostable lasota vaccine from Hester Biosciences Limited, India by intraocular route. Blood samples were collected from all birds at 0, 7, 14, 21, 28, 35, 42, 56, 70, 84, 98 and 112 days from chickens of both groups. Serum was separated and stored at -20 °C. All serum samples were subjected to haemagglutination-inhibition (HI) test at Hester Biosciences Limited, Anand laboratory. Specific antibodies were measured through HI against Newcastle disease antigen (Maine Biologicals Limited, USA) by preparing 4 HA units of serum. The result was reported as $\log_2$ HI (Abdu *et al.*, 2012).

Data analysis

All data were entered into Microsoft Office Excel Worksheet (2007, Microsoft Corporation). The data were analyzed by single factor – analysis of variance method and $p < 0.05$ was considered as significant difference between the groups.

RESULTS AND DISCUSSION

Total 40 samples of group 1 and 40 samples of group 2 were collected from both villages at defined time interval and HI test was performed. Prevaccination titre at 0 days of both group 1 and 2 were 0.6 and 0.7 respectively. The HI titre increased gradually and found highest in vaccinated group at 28 days post collection (8.02). After 28 days, titre decreased and was reduced equivalently to 0 day level at 112 days in vaccinated group (1.02). The results of 0, 28 and 112 days were significantly different as data of 28 days were compared with 0 days and that of 112 days were compared with 28 days ($p< 0.05$, Figure 1). Antibody level in unvaccinated group was 0.7 at 0 day and was almost consistent throughout the study (Figure 2).

Newcastle disease virus has haemagglutinating property. Hence, HI test has been used as a standard test to measure specific antibodies against ND virus. The HI titre of 0 to 2 is generally considered negative as it produces no antibody against the virus when infected. HI value of 3 to 12 is considered as protective for chickens (Alders and Spreadbrow, 2000; Aldous, 2003). Seroprevalence of ND is found in backyard chickens all over the world (Alders *et al.*, 1994; Chansiripornchai and Sasipreeyajan, 2006; Musako *et al.*, 2012). In present study, birds were not infected with ND as 0 day titre of antibody was less than 2. As there are difficulties of cold chain transport and other factors, thermostable vaccines are more advantageous in backyard poultry farms in villages (Illango *et al.*, 2005; Ritha *et al.*, 2016). In present study also, backyard chickens were inoculated with one dose of thermostable vaccine, procured from Hester Biosciences Limited, India. The HI titre of vaccinated birds increased and reached to protective level in the duration of 7 days post vaccination. The antibody level reached to much satisfactory level significantly ($p < 0.05$) after 28 days of vaccination. The titre remained at protective level up to 84 days, which suggests that vaccine may provide protection to backyard chicken up to three months post vaccination. Revaccination is suggested to the farmers after the period.

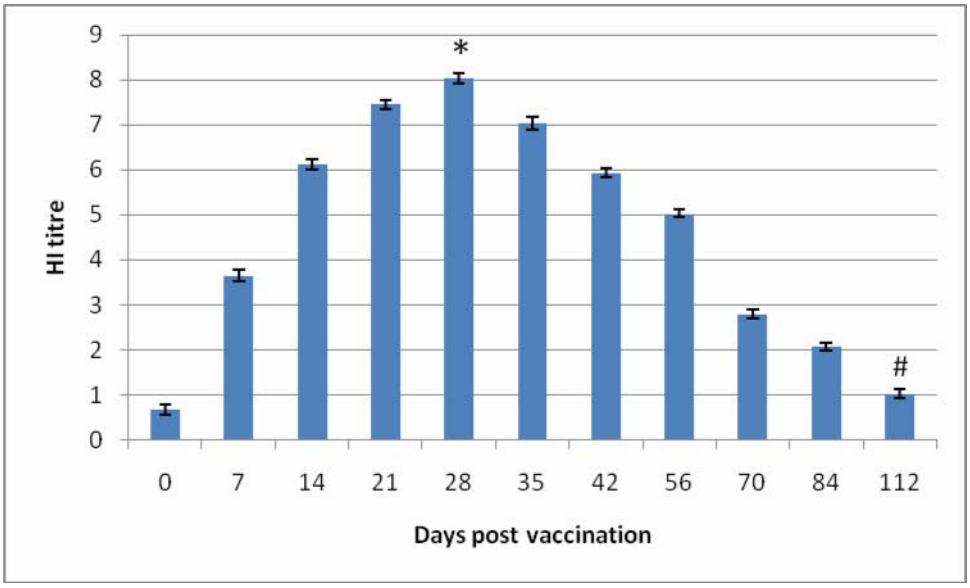

Figure 1. HI titre of group 1 (Vaccinated chickens)
The data are experssed as mean ± SEM
* $p < 0.05$, significantly different as compared to 0 days
# $p < 0.05$, significantly different as compared to 28 days

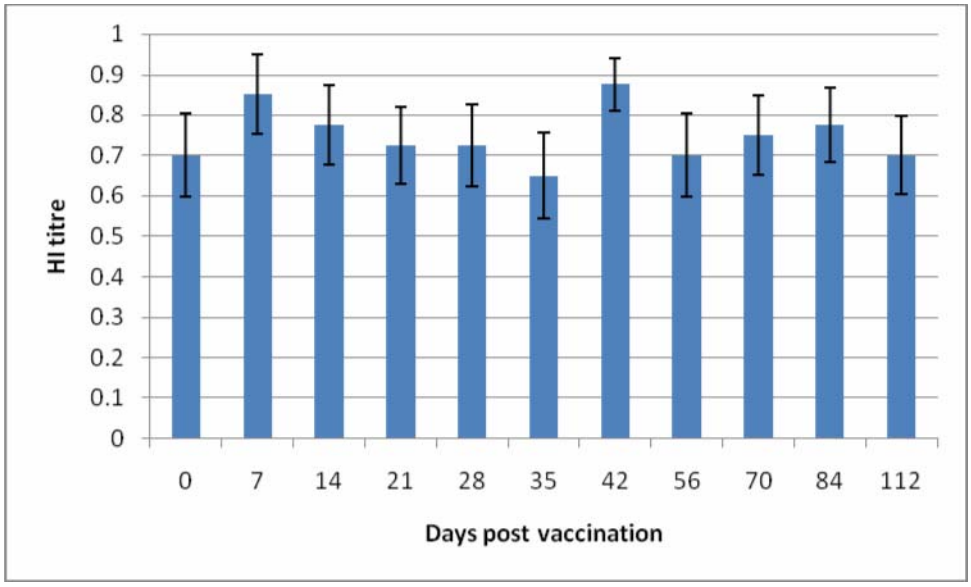

Figure 2. HI titre of group 2 (Unvaccinated chickens)
The data are experssed as mean ± SEM

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