Introduction

Bangladesh is the world’s most densely populated developing country with an area of about 1,47,570 square kilometers. In the recent years, poultry become a growing and prospective industry in Bangladesh. Despite special emphasis given on this sector, recent years, poultry become a growing and prospective industry in the country with an area of about 1,47,570 square kilometers. In the Bangladesh is the world’s most densely populated developing country. The disease (ND) also known as Ranikhet disease stands as a major problem towards the development of poultry in Bangladesh. It is caused by ssRNA containing Avulovirus—a newly formed genus under paramyxoviridae1-3. The factors that affect the disease may be host, species, age, immune status, infection with other organisms and environmental stress4-6. The disease is characterized by sudden appearance and rapid spread within the flock with high morbidity and mortality. It may cause 100% mortality in young chickens and 80-90% in adult chickens7-8.

Newcastle disease is endemic in Bangladesh with prevalence of viscerotropic velogenic strains8-9. The pathogenicity of velogenic NDV largely depends on F-protein cleavage site10. Proper biosecurity measure in farm and effective vaccination of flock are the only means to control the disease. Vaccination schedule against ND as followed by the Department of Livestock Services (DLS) includes administration of live lentogenic vaccine termed as Baby Chick Ranikhet Disease (BCRDV) of F-strain by intraocular inoculation in 1st and 3rd weeks old chicks followed by a live mesogenic vaccine termed as Ranikhet Disease Vaccine (RDV) of M-strain by intramuscular route at 10-12 weeks of age and are repeated in every six months interval. In Bangladesh, many farming do not follow this preventive measures, and thus, the disease appear every year in epidemic form which causes 40-50% of the total mortality rate of poultry population in Bangladesh8,11. However, the schedule of the vaccination differs with type of flocks, like broiler or layer, and (Newcastle Disease Virus) NDVs produced by local industry are not sufficient to meet the demand of poultry industry of Bangladesh. As a result, large quantities of live vaccines belonging to lentogenic and mesogenic strains are imported.

The preventive efficiency of a vaccine depends on its strict post and pre-manufacture quality control. In Bangladesh, the post-quality control of ND vaccine is poorly maintained in some case particularly the modes and means of transport of vaccines under cold-chain system to end-users. This is the main reason of vaccination failure, which causes economic loss to the farmers. In most of the cases, these vaccines are found effective against

Comparative Analysis of Haemagglutination Inhibition Antibody Production Against Three Lentogenic Newcastle Disease Virus Vaccines in Broiler Chicks

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The comparative analysis of haemagglutination Inhibition (HI)-antibody production against three lentogenic Newcastle disease virus vaccines BCRDV (F-strain), Izovac B1 Hitchner ® (B1 strain) and Cevac New L® (LaSota strain) was analyzed in broiler chicks. For this, three groups A, B and C, each consisted of 30 birds were vaccinated with single dosage at day 9 and the other group of 10 birds was maintained as unvaccinated control. Sera samples obtained randomly from 10 birds of each group on the day 17, 20, 28 and 32 and the HI titers estimated. Maternally derived antibody persisted to a maximum level of 17 day and than declined to minimum or none. The results revealed that vaccination of young birds with locally produced BCRDV by the Department of Livestock Service elevated HI antibody at comparable level with that of commercially available vaccine Izovac B1 Hitchner and Cevac New L®. The ‘F’ value preformed with mean±SD of 17, 20, 28 and 32 days appeared non significant among the HI titers of the birds vaccinated with BCRDV, Izovac B1 Hitchner (B1 strain) and Cevac New L®.

Keywords: Maternally derived antibody (MDA); Newcastle disease (ND); Newcastle disease virus (NDV); Haemagglutination inhibition (HI); vaccines.

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ND, however, a comparative study on HI antibody production in broiler, particularly with those produced by the DLS and other commercially available vaccine (CAV) manufacturers are important. Furthermore, there is no prerequisite or compulsion of such data for the imported ND vaccines especially in regard to the influence of environment that is prevailing in Bangladesh. In consideration of these factors, this study was undertaken to observe the persistence of maternally derived antibody (MDA) to NDV in chickens and to evaluate antibody production following single vaccination with BCRDV, Izovac B₁ Hitchner® and Cevac New L® in broiler chicks and also to compare the efficiency of BCRDV with those of two commercial ND vaccines i.e. Izovac B₁ Hitchner® and Cevac New L®.

Prior to vaccination, blood samples were collected from broilers to measure maternal antibody on day 1 and 9. Three groups of A, B and C, each consisted of 30 birds were vaccinated with single dosage at day 9 and another group of 10 birds maintained as unvaccinated control. Elevation of HI titers indicated immune response in chickens after intraocular route (eye-drop) vaccination. MDA persistently maintained in vaccinated broiler response in chickens after intraocular route (eye-drop) vaccination. MDA persistently maintained in vaccinated broiler chicks up to 20 days old and then decline to minimum or none (Table-1). Moreover, in control group D, high level of HI titers was found during first two weeks of life which correlated the findings reported elsewhere. Saeed et al. reported that MDA decline to minimum or none during first two weeks of life which correlated the findings reported elsewhere.

The objectives of this study was to address a comparative performance of BCRDV with those of two CAV such as Izovac B₁ Hitchner® (B₁ strain) and Cevac New L® (LaSota strain) in chicks. For this, birds of the three groups such as A, B and C were vaccinated with BCRDV, Izovac B₁ Hitchner® (B₁ strain) and Cevac New L® (LaSota strain) respectively, and 10 sera samples obtained randomly from each group on day 17, 20, 28 and 32 and HI titers was estimated. A comparative picture is illustrated in Table 2 and revealed that the HI titers of BCRDV on the 17 day were 108.80±30.91 while that of Izovac B₁ Hitchner® and Cevac New L® were 121.60±56.04 and 172.80±74.21 respectively. Similar higher HI titer was observed for 20 and 28 days old birds in case of Cevac New L® vaccinated group, whereas, the value declined to same level on the 32 days in all the three cases (Table-2).

In this context, the utility of measurement of HI antibodies of sera to qualify the protection capacity of birds from an infection with NDV needs to be mentioned. Lancaster reported that serological response of chickens to NDV either from natural infection or vaccination is manifested by the appearance of both HI and VN (Virus neutralization) antibodies. Hossain (1989) and Haplin (1978), stated that HI and VN antibodies production follow a similar course, but VN antibody persist longer and in relatively higher titers. It should further be mentioned that HI test provides a measurement of the ability of serum from an exposed birds to inhibit agglutination of chick RBC by NDV, whereas VN or SN indicates the ability of serum to neutralize infective property of NDV, and therefore provides more precise information about protection. However, as regards vaccination of chicks against NDV in earlier days using of lentogenic strains is recommended. Vaccination with LaSota strain causes considerably greater problems in young susceptible birds than Hitchner® B₁ strain, although LaSota induces a stronger immune response. In conclusion, vaccination of young birds with BCRDV produced by DLS shows elevated HI antibody at comparable level with that of commercially available vaccine Izovac B₁ Hitchner and Cevac New L®, though Cevac New L® produced the highest level of antibody among the three.

Table 1. Persistence of maternally derived antibody (MDA) HI titer of the control chicks

<table>
<thead>
<tr>
<th>Bird age</th>
<th>Control MDA Antibody titers</th>
<th>Average range of HI titers</th>
<th>Mean±SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day 1</td>
<td>64-128</td>
<td>108.80±30.91</td>
<td></td>
</tr>
<tr>
<td>Day 9</td>
<td>16-32</td>
<td>32.00±13.06</td>
<td></td>
</tr>
<tr>
<td>Day 17</td>
<td>8-16</td>
<td>10.40±3.86</td>
<td></td>
</tr>
<tr>
<td>Day 20</td>
<td>4-8</td>
<td>5.20±1.93</td>
<td></td>
</tr>
<tr>
<td>Day 28</td>
<td>2-4</td>
<td>3.40±0.97</td>
<td></td>
</tr>
<tr>
<td>Day 32</td>
<td>2-4</td>
<td>2.60±0.97</td>
<td></td>
</tr>
</tbody>
</table>

Table 2. HI titer of groups A, B, C and D birds

<table>
<thead>
<tr>
<th>Name of vaccine</th>
<th>17 days birds</th>
<th>20 days birds</th>
<th>28 days birds</th>
<th>32 days birds</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Range</td>
<td>Mean±SD</td>
<td>Range</td>
<td>Mean±SD</td>
</tr>
<tr>
<td>BCRDV (Group A)</td>
<td>64-128</td>
<td>108.80±30.91</td>
<td>32-64</td>
<td>44.80±16.52</td>
</tr>
<tr>
<td>Izovac B₁ Hitchner® (Group B)</td>
<td>64-256</td>
<td>121.60±56.04</td>
<td>32-64</td>
<td>54.40±15.46</td>
</tr>
<tr>
<td>Cevac New L® (Group C)</td>
<td>64-256</td>
<td>172.80±74.21</td>
<td>32-128</td>
<td>73.60±30.36</td>
</tr>
<tr>
<td>Unvaccinated control (Group D)</td>
<td>8-16</td>
<td>10.40±3.86</td>
<td>4-8</td>
<td>5.20±1.93</td>
</tr>
<tr>
<td>Level of Significance (F value)</td>
<td>NS (19.167)</td>
<td>NS (23.093)</td>
<td>NS (17.044)</td>
<td>NS (17.044)</td>
</tr>
</tbody>
</table>

SD = Standard deviation; HI = Haemagglutination inhibition; NS = Non-significant
References


