ISOLATION AND CHARACTERISATION OF NEWCASTLE DISEASE VIRUS STRAIN IN A FERAL DOVE (STIGMATOPELIA SENEGALENSIS) IN NIGERIA

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SUMMARY

An isolate of Newcastle disease virus (NDV) was obtained from a feral dove, (Stigmatopelia senegalensis). The isolate was shown to have a mean death time of 96 h and an intracerebral pathogenicity index of 0.10. It was immunogenic but not pathogenic for 6-week old chicks on experimental infection. Based on these observations the isolate was classified as a lentogenic strain. The role of such isolates of NDV from wild birds on the Nigerian poultry industry is discussed.

INTRODUCTION

Since its first recognition as a disease entity in Nigeria, in 1952, (Hill, et al., 1953), Newcastle disease (ND) has continued to be one of the most deadly viral diseases of the Nigerian poultry industry. The history, current status and severity of the disease up to 1984 and the different control measures employed in combating it have been reviewed (David-West, 1972; Patrick, et al., 1987).

It has been speculated that all forms of NDV strains viz lentogenic, mesogenic and velogenic forms exist in Nigeria, but all the isolates so far obtained from both domestic and wild avian species have been characterised as belonging to the virulent (velogenic) type (Nawathe et al., 1975; Onunkwo and Momoh, 1980; Majiyagbe and Nawathe, 1981; Adu et al., 1985). Most of these isolations, particularly those from wild non-domesticated birds, have led to the suspicion that the isolates from the wild play a role in the epizootiology of ND in Nigeria; but the exact role has yet to be determined.

In Italy, Biancifiori and Fioroni (1983) isolated NDVs from pigeons and characterised them as belonging to the lentogenic strains. In this communication, we report the first isolation of NDV from a feral dove (Stigmatopelia senegalensis) in Nigeria.

MATERIALS AND METHODS

NDV isolation

A male dove, (Stigmatopelia senegalensis) was observed to be unable to fly. It exhibited some nervous signs, such as circling, falling on its back when attempting to fly and then paddling with its legs in the air. On post-mortem examination, the only gross lesions observed were hyperaemia of the small intestine particularly in the duodenal region, swollen kidneys and whitish-green diarrhoea in the colon and rectum.

Brain, kidney and portions of the small intestine and colon and rectum were ground separately in tissue homogenisers for antigen detection by the haemagglutination assay (HA) and for virus isolation. Based on the preliminary results from these tissues, inoculum for virus isolation was prepared from the ground small intestine, colon and rectum, which had been centrifuged at low speed to remove particulate debris and the supernatant treated with antibiotics. Isolation of NDV was then carried out by inoculating 0.2 ml of the supernatant into 9 to 10 day old embryonated
TABLE I

Experimental design of chick inoculations

<table>
<thead>
<tr>
<th>Group</th>
<th>No. of chicks</th>
<th>Virus inoculum</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>5</td>
<td>NDV-D1</td>
<td>Infected</td>
</tr>
<tr>
<td>B</td>
<td>5</td>
<td>NDV-L</td>
<td>Infected</td>
</tr>
<tr>
<td>C</td>
<td>5</td>
<td>NDV-K</td>
<td>Infected</td>
</tr>
<tr>
<td>D</td>
<td>5</td>
<td>Sterile PBS</td>
<td>Control</td>
</tr>
</tbody>
</table>

hens' eggs via the allantoic cavity route. After 4 to 5 days of incubation at 39°C, the allantoic fluid was harvested and spot HA which was inhibited by the haemagglutination inhibition (HI) test, was carried out, using reference anti-NDV antiserum. This isolate was designated NDV-D1.

Reference NDV strains

The NDV-Lasota (NDV-L) and NDV-Komarov (NDV-K) vaccine strains were included in this study to represent lentogenic and mesogenic NDV strains respectively.

Characterisation of the isolate, NDV-D1

HI and double immunodiffusion (DID) tests

In addition to inhibiting the HA activity of the isolate, NDV-D1, using anti-NDV-antiserum, the isolate was further characterised using the same reagents and anti-infectious bursal disease virus (IBDV) antiserum with their respective antigens in a DID test. This was performed as described by Derbyshire (1964).

Mean-death-time (MDT)

The inoculum prepared from the small intestine and colon was used for the MDT assay. In addition, dilutions of NDV-L and NDV-K were included in this assay. Serial 10-fold dilutions of each of these viruses (i.e. NDV-D1, NDV-L, and NDV-K) were made in sterile PBS and 10⁻¹, 10⁻² to 10⁻⁷ of each strain were used to inoculate embryonated hens' eggs (5 eggs/dilution). The rest of the test was carried out as previously described (Allan et al., 1978).

Intracerebral pathogenicity index (ICPI)

The 10⁻¹ dilution of the first egg passage of the isolate (NDV-D1) was used in this test, while the 10⁻² dilution of each of the NDV-L and NDV-K in sterile PBS was also used. Groups of chicks less than one day old (10 chicks/sample dilution) were inoculated intracerebrally and observed for 10 days in complete isolation for signs of illness and death as detailed elsewhere (Anon, 1971; Allan et al., 1978).

Experimental chick inoculations

Twenty, 6-week old cockerel chicks of the same age and approximately similar weights and seronegative for ND by HI were divided into 4 groups (A-D) of 5 birds each. Groups A-C birds were inoculated with NDV-D1, NDV-L, and NDV-K respectively, while group D birds were inoculated with sterile PBS (Table I). All groups were inoculated intramuscularly with 0.5 ml/bird, with the appropriate virus or sterile PBS. Birds were observed daily and bled 14 days post inoculation (p.i.) for serology.

Serology

The standard HI method of constant virus varying serum dilutions was employed in assaying the post inoculations sera from the experimentally infected birds.