COMPARATIVE SEROLOGICAL STUDIES IN MUSCOVY DUCKS AND LOCAL CHICKENS EXPERIMENTALLY INFECTED WITH XlVb STRAIN OF NEWCASTLE DISEASE VIRUS

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ABSTRACT
Newcastle disease (ND) is a rapidly spreading disease caused by avian paramyxovirus serotype-1 (APMV-1). Strain XIVb of Newcastle disease Virus (NDV) was used to study the comparative antibody response of local chickens and Muscovy ducks. Eggs from local chickens and Muscovy ducks were hatched, brooded differently and divided into four groups (consisting of 10 each) and designated infected chickens (IC), control chickens (CC), infected ducklings (ID) and control ducklings (CD) at five weeks of age. The birds in the infected groups were inoculated orally with $10^{7.8}$/ 0.1ml /bird as the embryo lethal dose (ELD_{50}) of the NDV (XIVb) strain. The mean of the haemaggutination-inhibition (HI) test and enzyme-linked immunosorbent assay (ELISA) were used to compare the antibody response of the birds in each group to their controls (at days 0, 3, 7, 10, 14, 21, 28, and 35). There was significant ($p<0.05$) higher HI value (2.28 0±0.51log_2) in the ID, against their control counterparts (0.57±0.74 log_2) on day 7PI. There was also a similar significant ($p<0.05$) increase in ELISA values with 3.55±2.57 % and 28.50±8.38 % in the IC and ID against their control counterparts with 3.97±3.05 % and 2.47±2.57 % on day 7PI, respectively. The results showed that the Muscovy ducks are more resistant to infection with XIVb strain of NDV than the local chickens hence the Muscovy ducks could transmit the disease to the local chickens in the villages.
Key Words: Antibody response; Local chickens; Muscovy ducks; Newcastle disease; Strain XIVb.

INTRODUCTION
Newcastle disease (NCD) is a highly and rapidly spreading viral disease which affects a great number of avian species including domestic poultry, regardless of sex, breed or age variation within the susceptible avian species (Abdu *et al.*, 2004; Haque, 2010). It is also thought to be one of the most devastating diseases of rural poultry production, causing great economic loss across the developing continent of Africa (Sa'idu *et al.,* 2006). The aim of this work was to compare the Serological changes in Muscovy ducks in relation to that of the local chickens experimentally infected with XlVb strain of Newcastle disease virus (NDV) to know if ducks can resist the infection with the strain and transmit the disease to the local chickens.

MATERIALS AND METHODS
The inoculum of the NDV strain (XIVb) was obtained from the National Veterinary Research Institute (NVRI), Vom, and used for the challenge in this experiment. Forty eggs from local chickens and forty from Muscovy ducks were sampled from the villages within Zaria, Kaduna State. Hatching of the eggs was done using artificial incubator. The chicks and the ducklings were separated during brooding under deep litre system in pens belonging to Veterinary Teaching Hospital, Ahmadu Bello University, Zaria. They were fed on chick and grower mash from day old to 4 weeks and 4 weeks to termination of experiment, respectively. Both feed (Vital®) and water were given *ad libitum*. No vaccination against NDV was given to the any of the birds in both groups.

At 5th week of age, they were randomly divided into 4 groups of 10 birds, designated as group 1 (Infected group for chicks, IC), group 2 (control group for chicks, CC), group 3 (Infected group for ducklings, ID), group 4 (control group for ducklings, CD).

Ethical clearance for the study was approved by the Animal Welfare committee of Ahmadu Bello University, Zaria, with the following approval number: **ABU/CAUC/2018/072**.

Two days prior to the inoculation, HI test was carried out to ensure the waning down of the MDA before the inoculation. At day 0 post inoculation (D0 PI), birds in the control groups were inoculated each with 0.1 ml of normal saline orally. While birds in the infected groups were inoculated each with

the XlVb strain of NDV orally each with 0.1 ml of inoculum. About 1ml of blood sample was collected from all the subjects in each of the groups via the wing vein, at days 0, 3, 7, 10, 14, 21, 28 and 35 PI. The ELISA kit was used in this experiment for all the sampled birds for the analysis.

Data analysis

The serological values between groups and their controls were subjected to statistical analysis using Graph-pad prism-6.0 computer software (One-way Anova) and the level of significance was determined and accepted at $p < 0.05$ for all the results obtained. The mean ± standard error of mean (SEM) of the results obtained in the experiment was calculated and presented in tables and figures.

RESULTS AND DISCUSSION

The infected chicks had significantly lower ELISA mean antibody titre ($p< 0.05$) than their control group on days 10, 14, 21, 28 and 35 PI. Similarly, the infected ducklings showed significantly higher mean titre ($p< 0.05$) than their control group on days 3, 7, 10, 14, 21, 28 and 35 PI (Figure 1).

The mean Haemagglutination inhibition titre (HI) levels of infected chicks were significantly higher ($p< 0.05$) on days 10, 14, 21, 28 and 35 PI than in the control group. Similarly, the infected ducklings showed a significantly higher HI titre ($p< 0.05$) than their control counterparts on days 7, 14, 21, 28 and 35 PI (Figure 2). The serological tests of both ELISA and HI tests for the infected chicks and the ducklings showed a significantly higher titre levels at some points than their control groups after waning of their maternal antibodies. The titres of both ELISA and HI favoured the ducklings with relatively higher values than the chicks which is in agreement with the findings of Bouzari (2014) who recorded a higher antibody titre for in-contact ducks than in-contact chickens when he infected them with v4 strain of NDV. This is contrary to the finding of Amarachuku *et al* (2014) who recorded higher antibody titres for the chicks. Amarachuku *et al*. (2014) may have recorded an exaggerated (anamnestic) to the chickens which might have followed prior exposure to NDV pathogens in the endemic region or following vaccination. This may have therefore increased their susceptibility to the disease. The increase in the titres of both infected groups against those of their controls indicate that the birds have come in contact with the virus after waning of their MDA and this is in line with findings of Tewari *et al.* (1992). While the decrease in the titres of the control groups indicates absence of exposure to the strain (or any other NDV strain) after waning of the MDA.

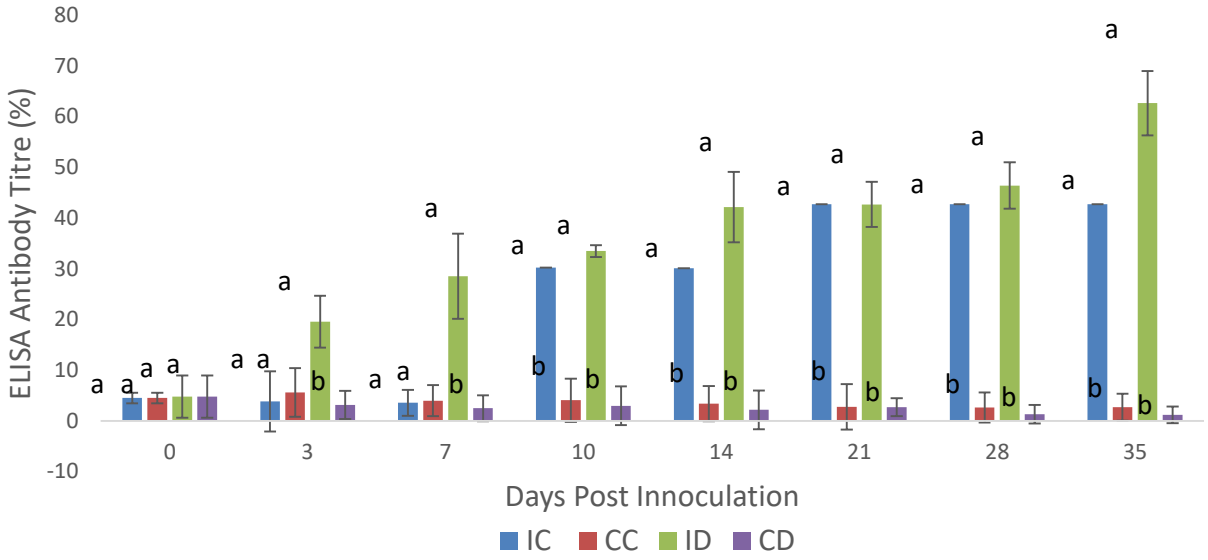


Figure 1: Graph showing result of Mean of ELISA antibody. Means values significantly different at $p < 0.05$, (>40%=+, 30-40%= doubtful, <30%= -). Groups with different superscript are significantly different from that of their controls.

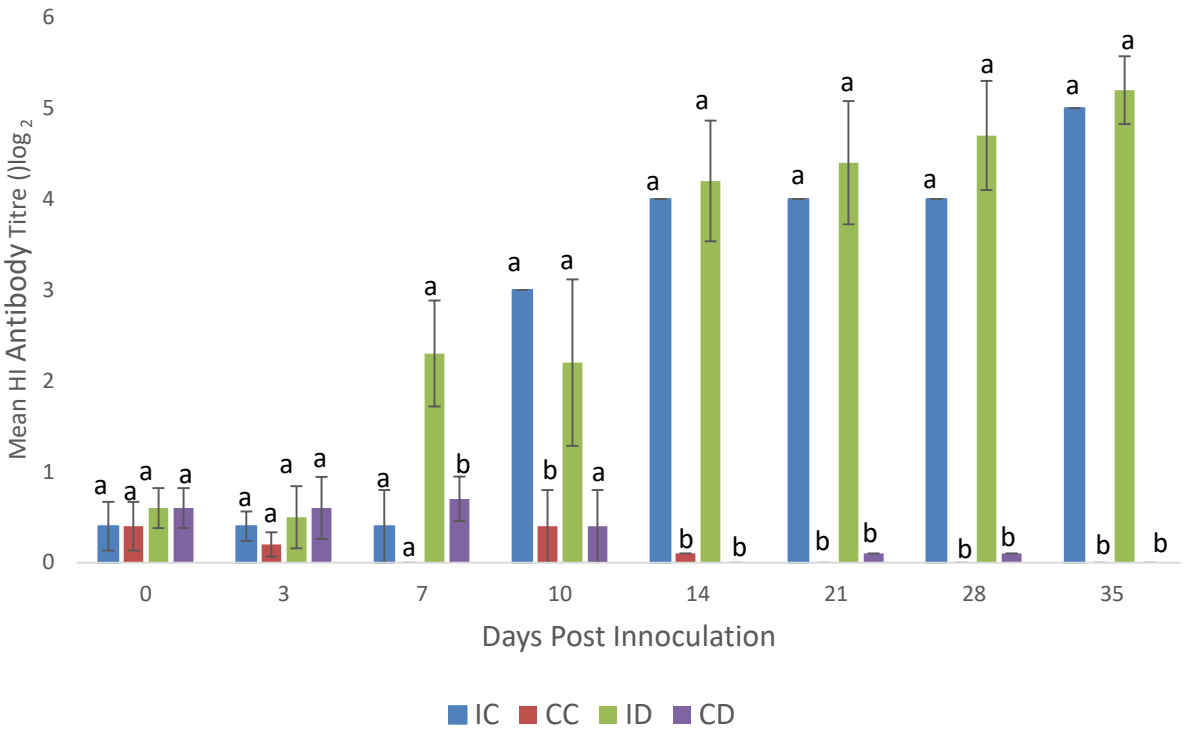


Figure 2: Graph showing result of Mean of HI-HA Antibody titre. Mean values significantly different at $p < 0.05$, (HI titre ≥ 3.0 is protective). Groups with different superscripts are significantly different from that of their controls.

CONCLUSION

In CONCLUSION, the serological findings showed that the effect of XIVb strain of NDV is more severe on the domestic fowl than the Muscovy ducks and therefore the later could serve as a source of infection with XIVb strain of NDV to local chickens and other avian species found naturally roaming together in the villages.

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