RESEARCH COMMUNICATION

Serological evidence of chicken anaemia virus infection in Nigerian indigenous chickens

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ABSTRACT

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Serum samples from 20 out of 180 (11.1 %) apparently healthy Nigerian indigenous chickens were negative for antibodies against chicken anaemia virus using the enzyme-linked immunosorbent assay (ELISA). Of the 160 positive sera (88.9 %), 12 (7.5 %) had titres ranging from 1 500–3 000, 46 (28.8 %) had titres from 3 000–5 000 while 102 (63.8 %) had titres between 5 000–11 000. The overall mean titre value was 5 845 ± 2 402. This appears to be evidence of a natural outbreak of the infection since the chickens had no history of vaccination against any poultry disease.

Keywords: Antibodies, chicken infectious anaemia, enzyme-linked immunosorbent assay

Indigenous chickens (*Gallus gallus domesticus*) are raised in many subsistence households in Africa and Asia (Spradbrow 1993). They serve as an important source of animal protein to the rural poor (Gueye 1998). Most of them are kept in free-range systems and scavenge for food. It is widely believed that they act as potential reservoirs for important poultry diseases (Bouzoubaa, Lemainguer & Bell 1992).

Various investigations have been carried out on important poultry diseases affecting indigenous chickens in Africa: viral (Adene 1983; Mushi, Binta, Chabo, Hera, Thibanyene & Mkana 2001; Ohore, Ozegbe, Emikpe & Okojie 2003), mycoplasmal (Mushi, Binta, Chabo, Mathiao & Ndebele 1999), bacterial (Mdegela, Msoffe, Waihenya, Kasanya, Mkambo, Minga & Olsen 2002; Ohore, Ozegbe, Emikpe & Oluwayelu 2002) and parasitic infections (Magbool, Ahmed & Raza 1998) but there is a dearth of information on chicken infectious anaemia (Wicht & Maharaj 1998) especially in indigenous chickens.

Chicken infectious anaemia (CIA) is a circoviral disease of young chickens characterized by aplastic anaemia, generalized lymphoid atroply and subsequent immunosuppression (Bulow & Schat 1997). It has been widely reported in major chicken-producing countries (Yuasa, Taniguchi & Yoshida 1979; Bulow, Fuchs, Vielitz & Landgraf 1983; Rosenberger & Cloud 1989; McNulty, Connor, McNeilly, McLaughlin & Kirkpatrick 1990; Firth & Imai 1990; Zhou, Shen, Yang, Han, Wei, Xiao & Zhou 1997) and is associated with high morbidity and relatively low mortality (McNulty, Connor, McNeilly, Kirkpatrick & McFerran 1988) except with simultaneous infections of Marek's disease virus or infectious bursal disease virus (Yuasa, Taniguchi, Noguchi & Yoshida 1980).

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A total of 180 apparently healthy Nigerian indigenous chickens aged between 4 and 12 months from four communities—Apata, Odo-Ona, University of Ibadan and Yemetu—in Ibadan, Oyo State, Nigeria were used. Ibadan, located in the southwest of Nigeria, has the highest commercial poultry activity in the country with indigenous birds transported in from the different geographic zones of the country. Many residents of the city keep small flocks of indigenous chickens, mainly extensively, for domestic use. Blood samples were collected from 36 flocks, with one of five birds being randomly selected per household and bled via the jugular vein. Serum samples were dispensed in 0.5 mℓ aliquots in tubes and stored at –20 °C until used.

Antibodies to chicken anaemia virus (CAV), if present, were detected and quantified using the enzyme-linked immunosorbent assay as described by McNulty *et al.* (1988) and Todd, Mackie, Mawhinney, Connor, McNeilly & McNulty (1990) using commercial kits (Kirkgaard & Perry Laboratory, USA).

A universal microplate reader (Biotek Instrument Inc. Highland Park, United States of America) read the plates at 405 nm wavelength.

According to the manufacturer, a titre of 1 500 and above was regarded as positive. A point prevalence of 88.9 % (160/180) was obtained in the chickens. In the four locations, the prevalence ranged from 80–96 %. The mean titre values for positive reactors were 5 546.6 ± 2 541.4 for the university, 4 649.7 ± 1 880.3 for Yemetu, 6 948 ± 3 093 for Odo-Ona and 6 245.8 ± 2 093.5 for Apata communities, respectively, while the overall mean titre value was 5 845 ± 2 402. The mean titre distribution of positive samples for CAV antibody revealed that 56.7 % (102/180) had a titre of more than 5 000 while 25.5 % (46/180) had titres between 3 000 and 5 000 and 6.7 % had titres from 1 500–3 000.

There are no routine vaccination programmes against CIA in commercial or indigenous chicken production systems in Nigeria. Recently, Owoade *et al.* (2004) reported the serologic detection of CIA in commercial poultry in Nigeria. The present study revealed a high prevalence of CAV infection in indigenous chickens in Ibadan, Nigeria. A higher percentage (63.8 %) of the chickens had titres greater than 5 000, which is quite remarkable and is an indication of repeated exposure to the virus.

The titres obtained in this study could only have been acquired from natural infection as the chickens had not been vaccinated against any disease. The minimum age of the birds was 4 months. Therefore, the presence of maternally-derived antibodies (MA) can be ruled out because in chickens these wane by 3–4 weeks of age (McNulty *et al.* 1988). This is the first report on the prevalence of antibodies to CAV in Nigerian indigenous chickens.

The possibility of false positive results is extremely low since ELISA is highly specific and sensitive and has minimal non-specific binding reaction (Todd *et al.* 1990).

The uncontrolled movement of these chickens as well as their scavenging nature predisposes them to CAV infection as the virus is known to persist in the environment (Bulow & Schat 1997).

The high prevalence (88.9 %) of antibodies against CAV obtained in this study, coupled with the earlier report of CAV antibody detection in commercial chickens, indicates the possible emergence of a relatively new disease problem in the Nigerian poultry industry. Efforts to isolate and characterize the virus from Nigerian chickens are therefore imperative.

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