ANTIBODY RESPONSES OF SOME NIGERIAN INDIGENOUS AND SASSO CHICKENS CHALLENGED WITH SALMONELLA ENTERITIDIS

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ABSTRACT

This study was done to assess the antibody titre values of Nigerian indigenous and exotic chickens challenged with Salmonella enteritidis. Enzyme Linked Immunosorbent assay was used to detect chicken antibody titre response against Salmonella enterica serotypes Enteritidis. The assays engaged soluble bacterial proteins to detect antigen. Total of 150 birds used comprised of Fulani ecotype (50), Sasso (50) and Naked neck (50) chickens but five birds were taken at random per genotypes for antibody titre. The antigen results revealed that the Nigerian indigenous chickens have better resistance and response to the inoculated S. enteriditis. In conclusion, Fulani ecotype and Naked neck has a better response and high antibody titre to the inoculated S. enteriditis.

Keywords: Antibody, Responses, Challenged, *Salmonella enteritidis*, Sasso

INTRODUCTION

Poultry population is estimated at 19.46 billion, with Africa contributing 8.08%. Nigerian indigenous chickens are the most common and accountable for approximately 90% of the poultry population worldwide and 96.03% in Africa (FAOSTAT, 2012). Poultry is the general term for the species of birds domestically raised primarily for economic purpose like egg and meat production (Laseinde, 2002). Nigerian indigenous birds are self-reliant, hardy birds with the capacity to withstand harsh weather condition and adaptation to adverse environment. Indigenous (native) chicken is a pool of heterogeneous individuals which differ in adult body size, weight and plumage (Hagan and Adjei, 2012). Their productivity levels are low because of poor nutrition and low genetic potential. Sasso is the finest quality premium colored broiler breeders from France. *Salmonellosis* is an infectious bacterial disease of both humans and animals which is clinically characterised by septicaemia, acute enteritis or chronic enteritis. Animals may be infected without being obviously sick (Grimont and Weill, 2007). Breeding flocks must be free of Salmonella serotypes *gallinarum, enteritidis* and *pullorum*, however, it is very important to detect them as soon as possible to prevent both disease and dissemination (Sapontzis, 2024). Therefore, the study was carried out to evaluate the antibody responses of Naked neck, Fulani ecotype and Sasso chickens challenged with *S. enteritidis*.

MATERIALS AND METHODS

Experimental Site

The experiment was conducted at the Poultry Unit of the Teaching and Research Farm, Ladoke Akintola University of Technology (LAUTECH) Ogbomoso, Oyo State, Nigeria. Ogbomoso is a derived savannah zone, located in the South Western part of Nigeria It is located on latitude 8º07' N and longitude 4º 14' E. (Google map, 2024).

Experimental Birds and their Management

The experimental birds consisted of Nigerian Fulani ecotype, Sasso and Naked neck. Two Nigerian indigenous and one exotic chicken used were sourced from the preexisting stock from Teaching and Research Farm, at Ladoke Akintola University of Technology. The chickens comprised of male and female indigenous chickens (Fulani ecotype, Sasso and Naked-neck) at maturity age of 20 weeks. Total of fifteen sires and sixty dams were used as parent stocks and distributed as 5 cocks to 20 hens in each genotype. Birds were individually wing tagged for identification purposes.

Mating Pattern

Slight pressure was applied to the left side of the abdomen around the vent of each hen which caused the cloaca to evert with the oviduct protruding and 0.1 ml of semen was deposited within the oviduct. Once the semen was deposited, pressure around the vent was released, for the semen to be retained in the vagina or the oviduct. This was repeated twice a week in the evening (1600hours). The mating design adopted was: Fulani ecotype (sire) × Fulani ecotype (dam), Sasso (sire) × Sasso (dam), Naked neck (sire) × Naked-Neck (dam).

Egg Collection and Incubation

Total numbers of 150 eggs were collected from all the three genotypes and the eggs were collected in batches. Fulani ecotype (50 eggs), Sasso (50 eggs) and Naked neck (50 eggs). The eggs were collected every day and arranged in the crates with the pointed ends down and pedigreed along sire and dam genotype lines. Eggs were allowed to cool in the room at 18°C to 20°C for five days before taken to the hatchery for incubation.

Brooding, Chick Rearing and Management

Total of one hundred and fifty birds were generated from the parent stocks for the experiment which includes; Fulani ecotype (50), Naked Neck (50) and Sasso (50). The chicks were brooded for four weeks in which adequate heat, ventilation, medication and feeding were provided. The chicks were given vaccinations. Antibiotics drugs was not administered. The three genotypes were reared separately in deep litter pens and all the experimental birds were wing tagged for proper identification and subjected to the same management practices throughout the experimental period. Commercial chick mash supposedly containing 22.0 % crude protein and 2900 Kcal metabolizable energy were fed to the chicks from day old till eight weeks of age. Cool clean water was supplied *ad-libitum* to the birds.

Data Collection

Data was collected on antibody titre of the chickens used.

Inoculation of Salmonella Disease

S. enteritidis slant was purchased at a Laboratory in Ilorin Kwara State. The experimental birds were inoculated at 8 weeks of age with the slant subcutaneously at 0.5ml (LD_{50}) per birds as recommended by the manufacturer. The process was repeated after 5 weeks of the inoculation in order to ensure that all the birds was properly challenged with Salmonella.

Pre- and Post-Inoculation

Blood samples were collected twice on 8th and 18th pre- and post-inoculation. Two millilitre (2ml) of blood was collected from each experimental bird using sterile needle and syringe. One millilitre from the blood sample collected was transferred into a well labelled plain bottle and was allowed to coagulate to obtain the serum for slide agglutination test (using widal test indicator serum) to determine the level of antibodies against Salmonella.

RESULTS

The bar charts 1 to 4 showed the graphical representation of the antibodies titre on the scale of 1-2 (low), 3-4 (medium) and 5-6 (high) antibodies titre before and after inoculation. genotypes on the antibody titres of all chicken genotypes studied.

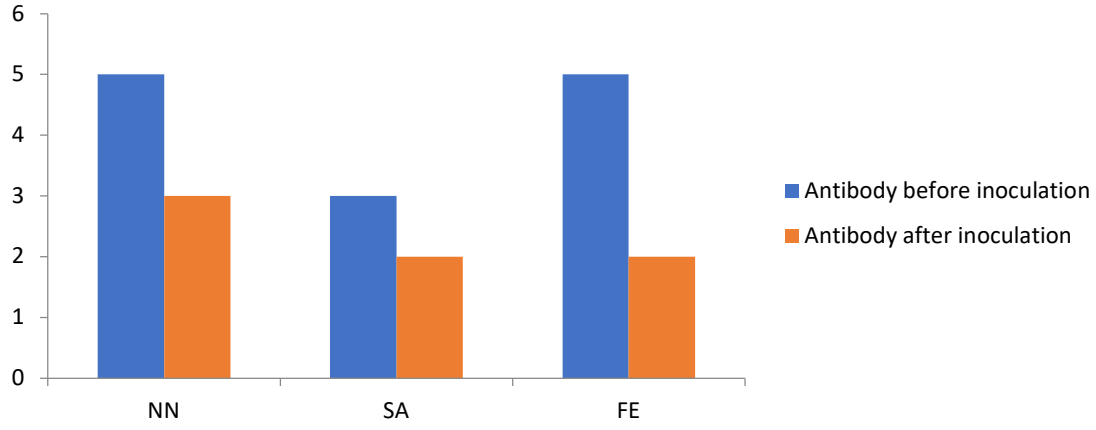


Figure 1: The bar chart representation of antibodies titre of Nigerian indigenous and exotic chickens challenged with *Salmonella enteritidis*. NN = Naked Neck Chicken, SA = Sasso Chicken, FE = Fulani Ecotype Chicken.

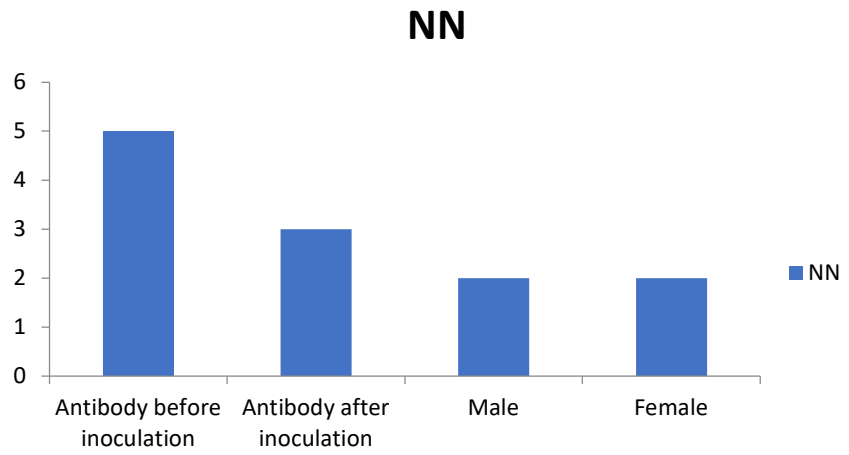


Figure 2: The graphical representation of antibodies titre of Naked Neck Chickens both Male and Female challenged with *Salmonella enteritidis*.

The bar chart indicated that there was significance effect of genotype and sex on the antibodies titre of the chicken genotypes studied before and after inoculation with *Salmonella enteritidis*. Figure 1 presented the antibody titres of Naked neck, Sasso and Fulani ecotype chickens before and after inoculation with *Salmonella enteritidis*. Before inoculation with *Salmonella enteritidis* the antibody titres of Naked and Fulani ecotype chickens were high (5) while that of Sasso chickens was medium (3). There was significant effect of

Figure 2 revealed the antibody titre of Naked neck chickens for male and female after inoculation with *Salmonella enteritidis*. The antibody titre for both male and female was high (falls within the range of 5) before inoculation but was at medium after inoculation. It was noteworthy that antibody titres for both male and female falls within the same range (1-2) which is low after inoculation with *Salmonella enteritidis* which indicated that there was no significant effect of sex on the antibody titres of the chicken genotype studied.

Figure 3 presented the antibody titre of Sasso chickens for male and female after inoculation with *Salmonella enteritidis*. The antibody titres was medium (3) for both male and female was high (falls within the range of 5) before inoculation with *Salmonella enteritidis*, but was low (2) after inoculation *Salmonella enteritidis*. The antibody titres for Sasso male chickens was high (5) after inoculation with *Salmonella enteritidis* while that of female Sasso chickens falls within the medium range (4) after inoculation with *Salmonella enteritidis*. Therefore, there was significant effect of sex on the antibody titres of the chicken genotype studied.

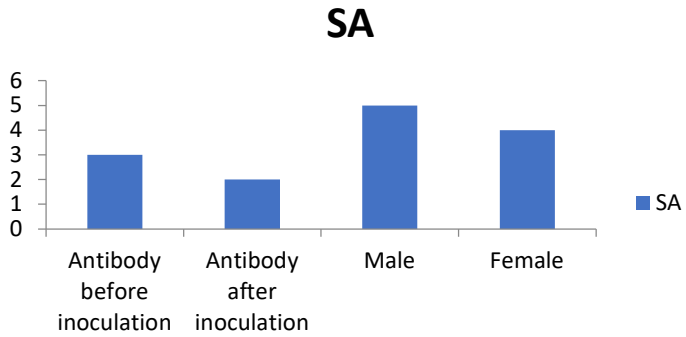


Figure 3: The graphical representation of antibodies titre of Sasso Chickens (Male and Female) Challenged with *Salmonella enteritidis*.

Figure 4 revealed the antibody titre of Fulani ecotype chickens - male and female after inoculation with *Salmonella enteritidis*. The antibody titres were high (5) for both male and female before inoculation with *Salmonella enteritidis*, but was low (2) after inoculation *Salmonella enteritidis*. Surprisingly, the antibody titres for female Fulani ecotype chickens were high (5) after inoculation with *Salmonella enteritidis* while that of male Fulani ecotype chickens was low (2) after inoculation with *Salmonella enteritidis*. Therefore, there was significant effect

of sex on the antibody titres of the chicken genotype studied.

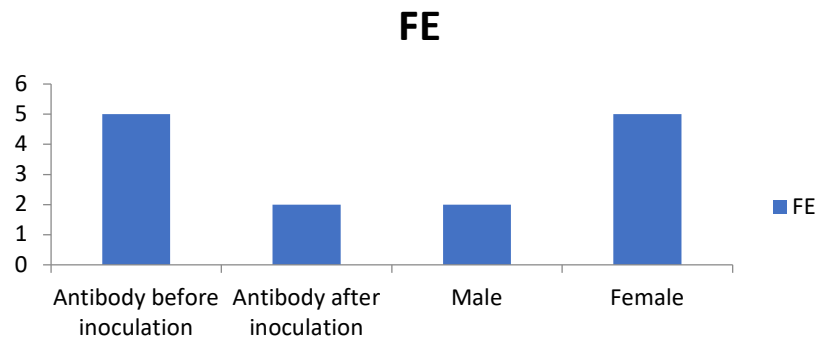


Figure 4: The graphical representation of antibodies titre of Fulani Ecotype Chickens (Male and Female) challenged with *Salmonella enteritidis*.

DISCUSSION

Avian parathyphic Salmonella serotypes, *S. enterica* serotypes *Gallinarum* and *Pullorum* are not frequently excreted in chicken faeces, but infected birds tend to produce humoral response (Santamaria, 2024). Among other measures, the pullorum test has been the method of choice to detect birds infected with these serotypes. Besides being a very simple method, since it uses whole blood sample, this test has also been very useful to control and eradicate *S. pullorum* (Kitchens, Wang and Price, 2024). Poultry birds are vaccinated against Salmonella enterica serotype *enteritidis* in many areas in the world, including Nigeria. The result of the study revealed that the ELISA is effective to detect serological response in chickens against *Salmonella enteritidis* and demonstrated that the ELISA could be performed using soluble protein antigen which is line with the report of Morales *et al*. (2024) and Ather, Zia, and Habib, (2024). The antigen was capable to promote reliable serological reaction as suggested by Resende *et al*. (2024) and Santamaria (2024). The antigen diluted at 1:25,000 was able to detect IgG in serum samples diluted 1:1,000. According to Santamaria (2024), IgG was produced in chickens infected with invasive serotypes like Gallinarum, Pullorum, Typhimurium and Enteritidis and persisted longer than the others immunoglobulins, the present results are in support of Archbold (2024). In order to specifically detect pullorum disease and fowl typhoid, it would be essential to serologically differentiate these diseases from infections caused by other invasive Salmonella serotypes, including Typhimurium and Pullorum, and some other serotypes in group D, which might induce cross-reacting circulating IgG following oral infection (Kitchens, Wang and Price, 2024).

CONCLUSION

From the results of the study Fulani ecotype and Naked neck chickens which are Nigerian indigenous chickens had the highest antibodies titre before and after inoculation *Salmonella enteritidis*.

Recommendation

The Nigerian indigenous chickens may be recommended for poultry production as a good opening stock in terms of disease resistance.

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