

# Postnatal Development of Bursa of Fabricius in the Nigerian Local and Isa Brown Chickens

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## ABSTRACT

Postnatal development of the Bursa of Fabricius was studied in Nigerian local and Isa brown chickens. The local chickens attained maximum weight (.94g) at week 7 and week 13 for cockerels and pullet respectively while the Isa brown attained maximum weight (a.02g and 3.12g) at week 11 and 17 for cockerels and pullets respectively. Regression appeared earlier in local chickens before the Isa brown. These growth patterns may have effect on their resistance to some infections.

**Key words:** Bursa of Fabricius, Chickens.

The Bursa of Fabricius is one of the central lymphoid organs of the avian species (Bank, 1986). Firth, (1977) reported that the Bursa has three phased growth pattern made up of the most rapid growth, the plateau and finally regression. Divergent opinions exist on the exact period when the bursa attain the different stages of development. Some were of the opinion that the bursa attained its maximum size at 4 months and thereafter regressed (Jolly, 1913, 1914; Bradley and Grahame 1960, Nagarajan et al, 1980). While Glick (1956), reported that maximum weight occurred between 10-12 weeks (Wolf et. al 1962), Tisljar et. al, 1974). Aire (1973) observed that maximum weight of the bursa occurred at 20 weeks of age in Nigerian local chicken. The observed variations in the developmental pattern of the bursa have been attributed to sex, breed of bird, environment and rearing method. Glick (1954) reported that the weight of the bursa have effect on the antibody response of chickens to infection.

There is paucity of information on the development of the bursa of Nigerian local and exotic breeds of chicken. The report of Aire (1973), was not comprehensive as its observations were in males only. The present study is therefore aimed at studying the post-natal growth of the Nigerian local and exotic breed of chicken. The data that may be generated will be vital to animal breeder and avian immunologist ad Kulkarin et. al, (1971) reported that lines of chicken with either large or small sized bursa may be developed by selective breeding.

## MATERIALS AND METHODS

The growth of the Bursa of Fabricius was studied using 400 chickens. This is made of 200 local chickens (100 males and 100 females) and 200 Isa

brown chickens (100 males and 100 females). The Isa brown chickens were obtained from a local hatchery at Enugu, Enugu State, Nigeria. To obtain the local chickens, 40 local breed of hens and local breed of matured cocks were bought from a local market, and housed in a pen at the Veterinary farm of the University of Nigeria, Nsukka. The birds were vaccinated against Newcastle disease, dewormed, and fed with Standard Layer's Mash (pfizer) ad libitum. The fertilized eggs laid by these hens were collected and hatched using kerosene incubator.

The day old chickens (local and Isa Brown) were reared by deep litter method. They were vaccinated against Newcastle disease and fed with chicks' starter and later Growers mash ad libitum.

Parameters monitored were body weight of the birds, then after sacrificing the birds, the bursa of fabricine was dissected out and also weighed using a Matler balance. The monitoring programme was based on weekly sampling of five birds of each sex (i.e male and female) from each breed, for the first 7 weeks. Then sampling every other week from week 7 to week 21 thereafter sampling was done at 3 weeks intervals from week 21 to week 30.

Least square Means of results were presented after analysis of variance using the General Linear procedure of SAS (SAS Institute, 1986). Differences between means were tested using Student-test.

## RESULTS

The developmental curves based on absolute bursal weights were presented in Figs 1 and 2, for the cockerels and pullets respectively. Points on these curves show mean absolute bursal weights at each age interval

FIGURES

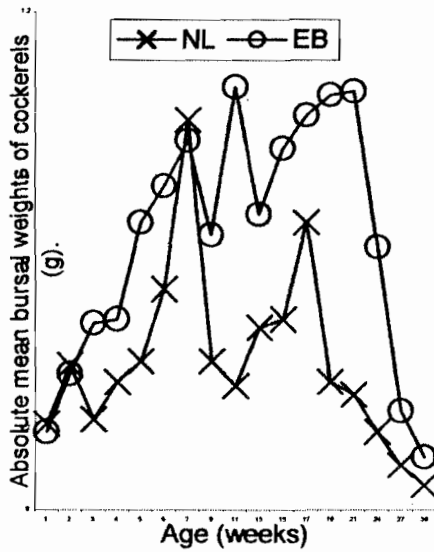


Figure 1. Absolute mean weights of the bursa of Fabricius of Nigerian local (NL) and Exotic breed (EB) cockerels.

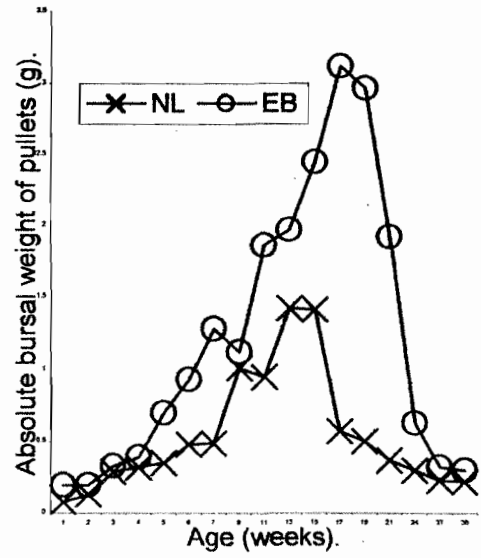


Figure 3. Absolute mean weights of the bursa of Fabricius of Nigerian local (NL) and Exotic breed (EB) pullets.

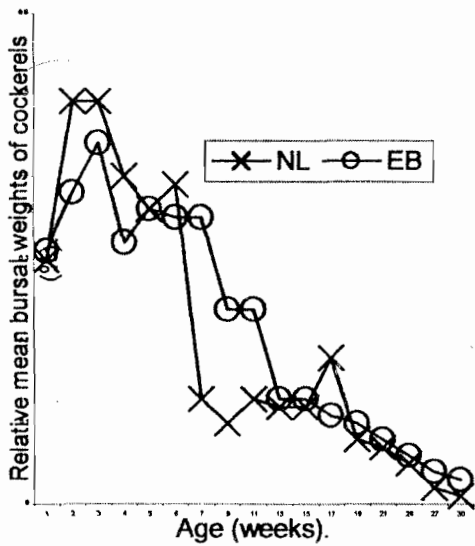


Figure 2. Relative mean weights of the bursa of Fabricius of Nigerian local (NL) and Isa brown (EB) cockerels.

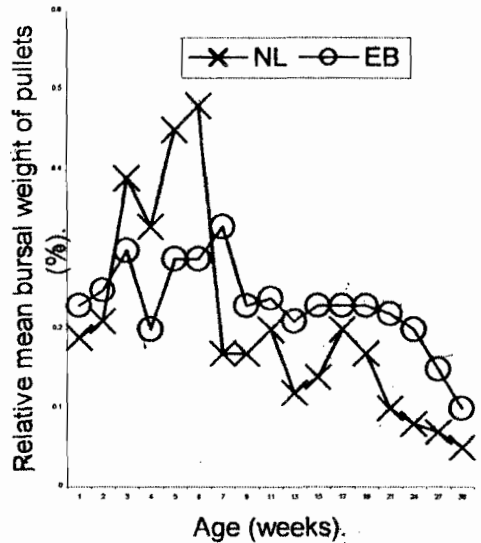


Figure 4. Relative mean weights of the bursa of Fabricius of Nigerian Local (NL) and Isa Brown (EB) pullets.

## Bursa of Fabricius in Chickēns

The bursa of the local cockerels attained its maximum weights (0.94 g) at week 7. At this point, it represented 0.99% of the body weights (Fig 3), and was apparently growing at a very fast rate. Between week 19 and 21, there was a sharp drop in the mean absolute weight of the bursa in the local cockerels (fig 1).

The bursa of the Isa Brown cockerels attained its maximum mean absolute weight (1.02 g) at week 11 (Fig 1). At this age, it represents 24% of the body weight (Fig 1). A sharp drop in weight was observed from week 24 (Fig 1).

The nigeran local pullets attained its maximum mean absolute weight (1.45 g) at week 13 (Fig. 2). At this point, the bursa was growing at a rate of 0.13% of its body weight (Fig 4). The bursal weight attained a Plateau between week 13 and 15 and sharp drop in weight was observed at week 17. While the Isa Brown pullets attained maximum means absolute weight (3.12 g) at week 17. A sharp drop in weight was observed between weeks 19 and 19 and 21 (Fig 2).

The mean absolute bursae of the Isa Brown cockerels were significantly greater than those of the local cockerels at weeks 3, 5, 6, 11, 15, 17, 19, 21, 24, 27 and 30 ( $p < 0.05$ ).

The means absolute bursal weight of the Isa Brown pullets were significantly greater than that of the local pullets at weeks 1, 5, 6, 7, 9, 11, 13, 15, 17, female bursae were generally observed to be larger than the male bursae

## DISCUSSION

The mean weight and development pattern of the bursa of Fabricius in Nigerian local and Isa Brown breeds of chicken have been documented in this stud. Phased growth pattern - initial rapid growth, plateau and period of regression was observed. This further confirms the results of earlier studies (Firth, 1977; Bickford et. al; 1985 and Glick, 1994). The pattern of growth observed in the present study tend to suggest that the bursa of Nigerian local chickens attained maximum mean absolute and relative weights earlier than the Isa Brown breed in both sexes compered. Also the of regression appeared first in the local breed before the exotic breed. The delay in the attainment of maximum bursal size in the Isa Brown could be attributed to possible poor adaptation to external stress factors associated with the environment. Glick (1956), suggested that external stress factors stimulate the bursa to extend its growth and continue inits defensive function. Thus the earlier attainment of the maximum bursal size could be an indication that Nigerian local breed of chicken could be a defensive mechanism to combat some infections, which use the bursa as a target organ. The present assumption is based on an earlier report by Iise and Wwiss (1980), which stressed that the availability of a large number of highly susceptible cells is a crucial point is acute viral infection. According to him, absence of sufficient number of susceptible cells reduces the multiplications of the virus, which can then be kept in check by other host defense mechanisms.

The bursae of the Isa Brown breed were

generally larger than that of the local breed. This further supports the earlier findings that the size of the bursa is breed dependent (Glick 1956, 1960). It has been opined that birds with lager bursae have a greater resistance to diseases (lick 1956). But contributing to the size of the bursa are epithelial cells, connective tissue and lymphoid follicles. It is not the size of the bursa per se, but the presence of active lymph follicles that determine future antibody potential. Thus there is the need for a histoquantitative study on the development of the bursa.

## CONCLUSION

The bursae of Nigerian local chicken attain maximum absolute and relative weight earlier, and also the onset of regression appears first before the isa brown breed (exotic breed). Thus local birds are expected to develop better resistance to some infections that has the bursae as its target organ.

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