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Gross morphological and biometrical studies on the bursa of Fabricius in various chicken genotypes

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Abstract
Hansli chicken is especially reared in Mayurbhanj district and in some parts of its nearby districts like Keonjhar of Odisha. They play a vital role in the economic upliftment of poor, landless and marginalised section of the people in the rural areas besides providing them with nutritious egg and meat for consumption. A total number of eighteen day old Hansli chicks and eighteen day old Vencobb broiler chicks were divided into three age groups viz. group I (up to 1 month), group II (1-3 months) and group III (3-6 months) with six birds in each age group. On each observation day (4th week, 12th week and 24th week), six birds from each breed were used for the study of gross morphological and gross morphometrical features of the bursa of Fabricius. It was found that the bursa of Fabricius was located at the dorsal aspect of rectum and connected to the wall of proctodeum of cloaca by a small stalk. The organ was oval in shape and creamy white in colour in both Hansli chicken and Vencobb broiler chicken. The size and weight of the bursa increased up to 12th week of age and then gradually decreased at 24th week of age in both the birds. Further, the average weight of bursa was significantly ($p\leq0.05$) more in 4th and 24th week of age in Vencobb broiler chicken than Hansli chicken. However, the volume of the organ was significantly ($p\leq0.05$) different between the birds at 24th week of age. The present study provided a detailed baseline data on the age wise development of bursa of Fabricius in Hansli chicken and Vencobb broiler chicken which could be used in future research in other breeds of birds.

Keywords: Bursa of Fabricius, Hansli, morphology, biometry, Vencobb

Introduction
The organized poultry sector contributes about 70 per cent of the total output of poultry industry and the remaining 30 per cent is shared by the unorganized sector [1]. The indigenous breeds of chickens mostly contribute to the rural economies in most of the underdeveloped and developing countries like India. The environment rural relations and demand of food safety in recent years might encourage the use of native fowl in a gastronomical niche market [3]. Besides, providing nutritious chicken egg and meat for consumption, the native fowl play an incredible role in giving the subsidiary income to the rural poor and marginalized section of the people in our country [16]. The Hansli chicken is especially reared in Mayurbhanj district and in some parts of its nearby districts like Keonjhar of Odisha [15]. The Hansli chicken is very well adapted to the hot and humid tropical climates of Odisha and has been mainly reared for meat, egg and game purpose.
The basic structures of the lymphoid organs pave the way to understand their physiology and their age. The basic structures of the lymphoid organs pave the way to understand their physiology and their role in providing immunity. Several works have been reported on the lymphoid system of broiler chicken [10], domestic chicken [9], Japanese quail [17] and turkey [2] has been done, but very scarce literature is available on the lymphoid system of Hansli chicken and Vencobb broiler chicken till date. Viewing the increased popularity of the Hansli chicken and Vencobb broiler chicken in Odisha, the present study is carried out on the gross morphological and morphometrical development of bursa of Fabricius in these breeds with age.

Materials and Methods
A total number of eighteen day old Hansli chicks and eighteen day old Vencobb broiler chicks were purchased from Mayurbhanj district and Eastern Hatcheries Pvt. Ltd., Bhubaneswar,

Odisha (A subsidiary of Venkateswara Hatcheries Group, Pune) respectively to study the post-hatched development of bursa of Fabricius. The birds (Hansli chicken and Vencobb broiler chicken) were divided into three age groups viz. group I (up to 1 month), group II (1-3 months) and group III (3-6 months) with six birds in each age group. On each observation day (4th week, 12th week and 24th week), six birds from each breed were used for the study of gross morphological and gross morphometrical features of the bursa of Fabricius. The different biometrical parameters of the organ were recorded with the help of weighing machine, graduated tape, scale and digital Vernier's calliper. The recorded data were subjected to routine statistical analysis as per the standard methods given by Snedecor and Cochran [20] and independent samples t-Test with Systat Software Inc, USA and SPSS 16.0 version software.

Results and Discussion

(i) Gross Morphology

The bursa of Fabricius was present at the dorsal aspect of colorectum in both Hansli chicken and Vencobb broiler chicken. It was connected by a small stalk to the dorsal wall of the proctodeum of the cloaca. The present findings were in agreement with the reports of [4, 5, 7, 8, 11-14, 21].

The bursa of Fabricius was oval in shape in both the birds in all the age groups (Fig. 1). The present reports were in accordance with [5, 7, 8, 11, 13, 19]. But it was contradicting to the reports of [6 and 21] who described the bursa as a cylindrical and caecum like structure with pointed apex. These differences might be due to the breed and strain variations. The bursa was creamy white to pale yellow in colour in both Hansli chicken and Vencobb broiler chicken which was similar to the findings of [11-14, 18, 21]. However, it was contradicting to the findings of Jayachitra *et al*. [8] in turkeys who reported that the bursa was pale pink in colour after 5 months of age. This difference might be due to the variation in age, breed, strain and nutritional status.

The luminal surface of the bursa of Fabricius consisted of number of smaller and larger plical folds in both Hansli chicken and Vencobb broiler chicken (Fig. 2). The present finding was in accordance with the reports of [6, 8, 13].

(ii) Biometrical observations

The average weight of the bursa of Fabricius was found to be 0.8±0.02 gm, 1.9±0.07 gm and 0.48±0.03 gm in Hansli chicken at 4th week, 12th week and 24th weeks of age respectively. Similarly, the average weight of the bursa of Fabricius was measured 1.1±0.03 gm, 2.4±0.10 gm and 0.71±0.07 gm in Vencobb broiler chicken at 4th week, 12th week and 24th weeks of age respectively. Further, the difference in the average weight of the bursa of Fabricius was found to be significant ($p \leq 0.05$) in 4th week and 24th weeks of age between the birds.

The average volume of the bursa of Fabricius was found to be 1.0±0.08 cc, 1.9±0.09 cc and 0.47±0.02 cc in Hansli chicken at 4th week, 12th week and 24th weeks of age respectively. Similarly, the average volume of the bursa of Fabricius was measured 1.6±0.16 cc, 2.7±0.13 cc and 0.78±0.06 cc in Vencobb broiler chicken at 4th week, 12th week and 24th weeks of age respectively. Further, the difference in the average volume of the bursa of Fabricius was found to be significant ($p \leq 0.05$) in 24th weeks of age between the birds.

The average longitudinal diameter of bursa was found to be 0.44±0.02 cm, 0.59±0.02 cm and 0.13±0.01 cm in Hansli chicken at 4th week, 12th week and 24th weeks of age respectively. Similarly, the average longitudinal diameter of bursa was measured as 0.51±0.01 cm, 0.7±0.01 cm and 0.19±0.02 cm in Vencobb broiler chicken at 4th week, 12th week and 24th weeks of age respectively. The average transverse diameter of bursa was found to be 0.38±0.01 cm, 0.43±0.01 cm and 0.20±0.1 cm in Hansli chicken at 4th week, 12th week and 24th weeks of age respectively. Similarly, the average transverse diameter of bursa was measured as 0.44±0.01 cm, 0.51±0.02 cm and 0.23±0.007 cm in Vencobb broiler chicken at 4th week, 12th week and 24th weeks of age respectively. The average thickness of bursa was found to be 0.17±0.01 cm, 0.27±0.02 cm and 0.11±0.01 cm in Hansli chicken at 4th week, 12th week and 24th weeks of age respectively. Similarly, the average thickness of bursa was measured as 0.20±0.01 cm, 0.34±0.01 cm and 0.16±0.02cm in Vencobb broiler chicken at 4th week, 12th week and 24th weeks of age respectively.

The morphometrical data could not be compared due to availability of scanty literature in this field.

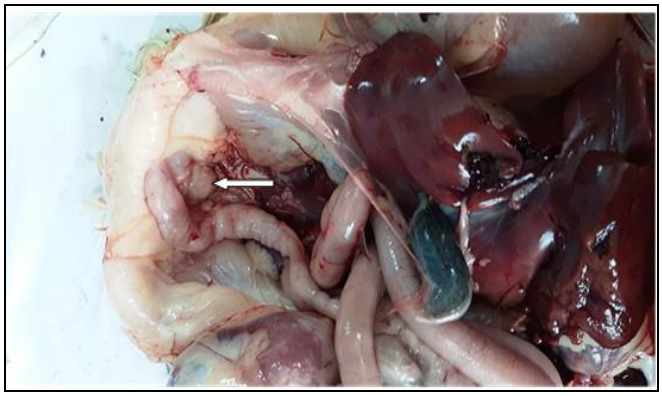

Fig 1: Photograph showing bursa of Fabricius arrow of Vencobb broiler chicken (12th week)

Fig 2: Photograph showing mucosal folds (plicas) of bursa of Fabricius (arrow) of Vencobb broiler chicken (12th week)

Conclusion

The present study provided a detailed baseline data on the age wise development of bursa of Fabricius in Hansli chicken and Vencobb broiler chicken which could be correlated with various molecular techniques in characterization of the age related immunogenic potency of these two breeds of poultry.

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