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To cite this article: N A Bachmid *et al* 2019 *IOP Conf. Ser.: Earth Environ. Sci.* **343** 012031

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Morphology and histomorphometric study of 1- to 4-month-old Gaga' chicken's testes

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Abstract. Gaga' chicken is one of the endemic fowls originated from Sidenreng-Rappang Regency in South Sulawesi, Indonesia. This study aimed to describe the morphology and histomorphometry of 1- to 4-month-old Gaga' chicken's testes. Eight chicks were used in this study, divided into four groups of ages from 1- to 4-month-old (n=2). Chicks testes were collected by necropsy, and the histological slides were prepared and stained using the Hematoxylin-Eosin paraffin method. The results showed there were no significant differences between Gaga' chicken's testes and the local breeds. The bodyweight of Gaga' chicken was in parallel increase with the testes weight, volume, and length ($P < 0.05$). Gonadosomatic Index (GSI) value also showed an increase in spermatozoa production. Spermatocytogenesis phase was observed in 1-month-old, while myogenesis phase in 2-months-old and spermiogenesis in 3- to 4-months-old chicks. The histomorphometry showed that the seminiferous tubules were developed in diameter. The number of seminiferous tubules increased in 1- to 2-months-old chicks but decreased in older chicks as the area became wider. It is suggested that the spermatozoa production increased as the increase of seminiferous tubule area.

1. Introduction

The breeds of Indonesian chicken, originating from red jungle fowl (*Gallus gallus*) [1–4], is distributed in some local strains. Sidenreng-Rappang (Sidrap) regency possesses a strain of chicken with a unique crowing voice, called Gaga' chicken. The crow of Gaga' chicken cocks has unusual similarity to a human laugh, while the melody and length of it vary individually. Long years ago, Gaga' chicken was set as a social symbol for the royal family at Buginese. However, recently, the breeding of Gaga' chicken is developed as many uncontrolled matings were done. Therefore, some concerns about Gaga' chicken is needed. Reproduction is a biological process to produce a new offspring. The reproductive system of male avian consists of paired of testes, epididymis and ductus deferens. Only a few species of birds possess a penile structure (phallus). The reproductive system of male Gaga' chicken is not known yet, therefore a study is needed to elucidate the physiology of Gaga chicken. The morphology and histomorphometry study of a species included a quantitative study of testes components and spermatogenic function with regards of some factors, such as age [5,6], season [7], hormones [8], and treatment used [9]. This study aimed to elucidate the morphology and histomorphometry of Gaga chicken's testes from 1- to 4-month-old.

2. Materials and methods

This study was conducted descriptively, with the selective method of sampling. A total of eight chicks, age from 1- to 4-month-old were obtained from Sidrap regency, consisted of two chicks in every stage of age. Testes were collected by necropsy and all necropsy instruments were sterilized before use. Before collecting testes, the bodyweight of chicks was recorded and after necropsy, the weight, volume, and length of testes were measured. The volume of testes was measured by putting testes in plenty of water beaker glass and the volume was determined based on the spilled water out of the glass. The weight and length of testes were measured using digital scales and calipers. Testes were fixed in 10% of formalin, dehydrated and then embedded in paraffin. After deparaffinization, sections were stained with Hematoxylin-Eosin staining, dehydrated and covered. Sections were observed with a light microscope equipped with Optilab® with a 40× objective. Morphology and the number of seminiferous tubules were determined based on color, shape, and position of their cell groups. The seminiferous tubules were observed individually to determine the diameter and the number of tubules per mm² of the testes area. A total of 30 tubules were selected and observed with a 100× objective. Data were statistically analyzed with Pearson and T-test using SPSS software.

3. Results and discussion

Testes of Gaga' chicken were not macroscopically different from testes of other chicken breeds. The testes were the elliptical shape and light-yellow color, located along the chicken's back, near the top of the kidneys. The chick's body weight was significantly correlated to the testes weight, testes volume and length with $r = 0.988, 0.974$ and 0.952 ($P < 0.05$), respectively (table 1).

Table 1. Bodyweight, testes weight, testes volume, and testes length of Gaga' chicken aged 1- to 4-months-old (mean±SD)

Parameters	Age (months old)			
	1	2	3	4
Body weight (gr)	260 ± 56.5	512 ± 2.83	728 ± 188.8	1545 ± 148.5
Testes weight (gr)	0.06 ± 0.03	0.2 ± 0.08	0.721 ± 0.2	1.59 ± 0.23
Testes volume (ml)	0.07 ± 0.02	0.29 ± 0.12	0.95 ± 0.77	1.7 ± 0.14
Testes length (cm)	0.5 ± 0.04	0.78 ± 0.02	1.23 ± 0.5	1.63 ± 0.03

Gonadosomatic Index (GSI) is the calculation of the gonad mass as a proportion of the total body mass. It is represented by the formula= (gonad weight/body weight)×100. Gonadosomatic Index of the chicks used in this experiment varied between 0.015 to 0.106 (table 1). The lowest GSI value was observed in the 1-month-old chicks with testes weight of 0.034 g, while the highest value was observed in the 4-months-old chicks with testes weight of 1.747 g. This result indicated that the spermatozoa production in the chicks increased as the increase of the age.

Table 2. Gonadosomatic Index (GSI) of Gaga' chicken aged 1- to 4-months-old

No.	Age (months)	Body weight (g)	Testes weight (g)	GSI (%)
1.	1	220	0.034	0.015
2.	1	300	0.081	0.027
3.	2	510	0.144	0.028
4.	2	514	0.264	0.051
5.	3	595	0.585	0.098
6.	3	862	0.857	0.099
7.	4	1,440	1.424	0.099
8.	4	1,650	1.747	0.106

The histology results revealed that there were different spermatogenic phases and cells type existed among groups of chicks. Spermatogonium cells were dominantly observed in the 1-month-old chicks (figure 1A) compared with Sertoli cells and Leydig cells. Spermatid cells, primary and secondary spermatocytes, Sertoli cells and Leydig cells were observed in the same proportion in the 2-months-old chick (figure 1B). In the 3- and 4-months-old chicks (figure 1C and 1D), spermatozoa cells were dominantly observed, while the amount of spermatogonium and Leydig cells decreased. Quantitatively, the testes development could be observed by histological examination and GSI values.

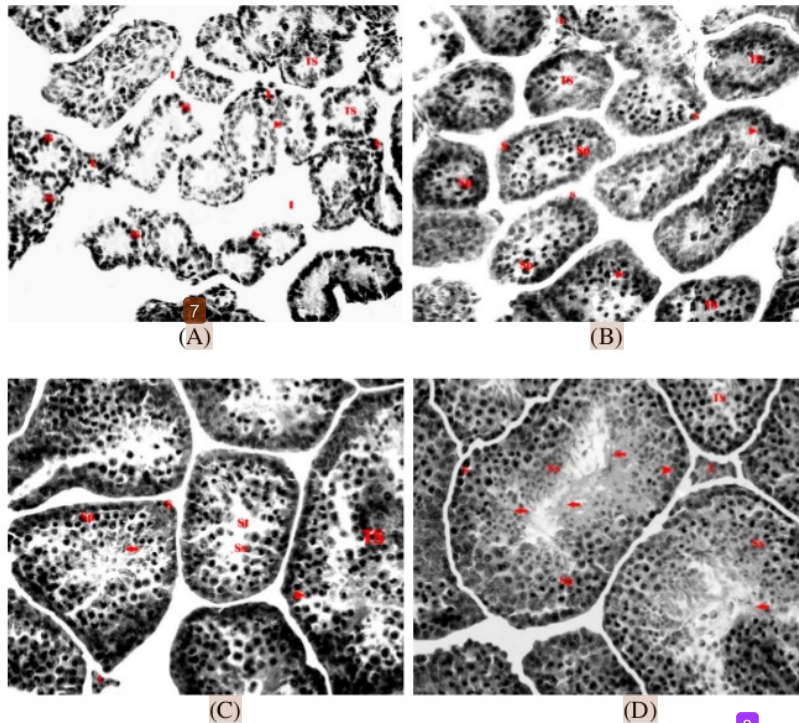


Figure 1. Histology images of Ayam Ketawa's testes 1-month-old (A), 2-months-old (B), 3-months-old (C) and 4-months-old (D). Seminiferous tubules (TS), interstitial tissues (I), spermatogonium (S), primary spermatocytes (Sp), secondary spermatocyte (Ss), spermatid (St), Leydig cells (L), Sertoli cells (▶), spermatid (→). 40× objective with the area of 200 μm .

The diameter of seminiferous tubules of Gaga chicken's testes developed along with the increase of chicks ages. But in this study, the increase of seminiferous tubules diameter was not significantly correlated with the testes volume ($P > 0.05$). The testes area in the 1-month-old chicks was larger than older chicks, while in the older chicks, the area became narrow due to the development of seminiferous tubules. In the 3- and 4-months-old chicks, the testes area became larger due to the decrease of seminiferous tubules number.

4. Conclusion

The morphology and histomorphometry of Gaga chicken's testes were similar to those of local breeds.

References

- [1] Prawirokusumo S 1988 Problems to improve small scale native chickens management in South-east Asian countries *Proc. 18 th World's Poultry Congress, Tokyo, Japan* pp 113–7
- [2] Kuwayama T and Ichinoe K 2003 Reproductive ability of Ceylon Jungle Fowls (*Gallus lafayettei*) after imported in Japan *J. Agric. Sci. Tokyo Nogyo Daigaku* **47** 317–20
- [3] Aini I T 1990 Indigenous chicken production in southeast Asia *Worlds. Poult. Sci. J.* **46** 51–7
- [4] Crawford R D 1990 Origin and history of poultry species *Poult. Breed. Genet.* 1–41
- [5] Johnson L and Neaves W B 1981 Age-related changes in the Leydig cell population, seminiferous tubules, and sperm production in stallions *Biol. Reprod.* **24** 703–12
- [6] Wang C, Leung A and Sinha-Hikim A P 1993 Reproductive aging in the male brown-Norway rat: a model for the human *Endocrinology* **133** 2773–81
- [7] Hochereau-de Reviers M-T and Lincoln G A 1978 Seasonal variation in the histology of the testis of the red deer, *Cervus elaphus* *Reproduction* **54** 209–13
- [8] Chandrashekar V, Bartke A, Awoniyi C A, Tsai-Morris C H, Dufau M L, Russell L D and Kopchick J J 2001 Testicular endocrine function in GH receptor gene disrupted mice *Endocrinology* **142** 3443–50
- [9] Desouky M A, Ahmed M G E, Mokhtar M G A and El-Shennawy A T 1991 Stereological study on the effect of chronic alcoholism on the seminiferous tubules of the adult albino rat *Egypt. J. Anat.* **14** 1–15

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the Male Rat. A Focus on the EDSTAC Recommendations", Critical Reviews in Toxicology, 2008

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