Available online at www.ijpab.com

DOI: http://dx.doi.org/10.18782/2320-7051.2833

ISSN: 2320 – 7051

Int. J. Pure App. Biosci. **5 (3):** 628-633 (2017)

Research Article

International Journal of Pure & Applied Bioscience

OPEN ACCESS

Gross and Morphometrical Studies on Female Reproductive System of Adult Local Fowl of Uttarakhand (Uttara Fowl)

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Received: 13.04.2017 | Revised: 25.04.2017 | Accepted: 26.04.2017

ABSTRACT

The experiment was conducted on 12 apparently healthy adult female Uttara fowl birds reared at Instructional poultry farm, G.B.P.U.A.T, Nagla. The mature left ovary of uttara fowl resembled, a bunch of grapes having mean weight of 26.25 ± 1.14 gm. The left oviduct extended caudally from the left ovary and opened in the urodeum of cloaca lateral to the left ureter. The average length and weight of the oviduct of adult uttara fowl was 59.73 ± 0.85 cm and 31.73 ± 0.96 gm respectively, Magnum was the longest segment of the oviduct and had an average length of 29.16 ± 0.66 cm. Isthmus was a short segment of the oviduct. Shell gland was dorsoventrally expanded pouch like structure. Vagina was short and narrow S shaped structure joining the shell gland to the cloaca at the terminal end.

Key words: *Morphometry, Female Reproductive System, Uttara Fowl, Left Ovary, Left Oviduct*

INTRODUCTION

The avian reproductive system of virtually all females within the avian order Galliformes consists of a single left ovary and its oviduct, on rare occasions a functional right ovary and right oviduct may be present. Reproduction in poultry differs from other farm animal species. The reproductive organs consist of left ovary and oviduct which participate in the egg production of laying hen. The mature ova are released from ovary after completing hierarchical cycles and are picked by infundibulum. The oviduct is suspended within the peritoneal cavity by dorsal and ventral ligaments and consists of five anatomically distinguishable regions. These five regions include the infundibulum, which forms a strong perivitellin membrane around the egg yolk, the magnum, responsible for the synthesis and secretion of albumin, the isthmus, which forms a fibrous membrane around the egg white, the uterus, which forms the egg shell, and finally the vagina, which connects the uterus to the cloaca. Therefore, oviduct plays vital role in the assembly of egg components after receiving ova from ovary.

Cite this article: Khan I.M., Singh, I., Saleem, R., Singh, B. and Bharti, S.K., Gross and Morphometrical Studies on Female Reproductive System of Adult Local Fowl of Uttarakhand (Uttara Fowl), *Int. J. Pure App. Biosci.* **5(3):** 628-633 (2017). doi: http://dx.doi.org/10.18782/2320-7051.2833

Uttara fowl is an indigenous fowl found in the Kumauni region of Uttarakhand. It is reared for both egg and meat production purpose. It is being used in rural backyard poultry farming. The hill fowls are unique in their adaptation to the agro-climatic conditions of their habitat[13]. The production and reproduction traits in birds are directly related to the fertility, which in turn is related to the structural and functional status of the reproductive system. This entails a need to gain an insight into the reproductive system of domestic fowl. There is no literature available on the female genitalia of adult uttara fowl. Therefore, this investigation is proposed to explore the gross and biometrical study of female genitalia in the indigenous breed Uttara fowl.

MATERIALS AND METHODS

The experiment was conducted on 12 apparently healthy adult female Uttara fowl birds. The birds were procured from Instructional Poultry Farm, Nagla, GBPUA&T, Pantnagar. After taking live body weight, birds were sacrificed as per the guidelines of SPCEA/ IAEC by severing jugular vein and common carotid artery. Gross biometrical parameters were recorded for each organ (ovary, infundibulum, magnum, isthmus, shell gland and vagina) separately with the help of Vernier Calliper and scale. Various measurements of ovary were recorded viz. Length, width, weight and thickness. Similarly, length, width, weight and diameter of different segments of left oviduct-infundibulum, magnum, isthmus, shell gland and vagina were recorded. The data obtained from various parameters was analyzed and subjected to statistical analysis[20].

RESULTS AND DISCUSSION

The mature ovary of uttara fowl resembled to a bunch of grapes (Fig.1) as reported by King[14], Nickel *et al*[17]., and Dyce *et al*[7]., in domestic fowl. It was in contact with the cranial division of both left and right kidneys cranially. The ovary was also related dorsally to the aorta, caudal venacava, left and right adrenals and ventrally to the proventriculus and spleen these findings supports the reports of King[14] and Nickel *et al*[17]., and Ingole[11] in the domestic fowl.

The ovary of laying hen consisted of macroscopically visible numerous small creamy white follicles and large yellow yolk filled follicles bulging out from ovary with loose stalk, ready for rupture. The number of follicles with diameters >1cm (the hierarchy of large, yolky follicles) varied between 5 and 6. The average weight of ovary of adult Uttara fowl was 26.25 ± 1.14 gm (Table 1). The average weight of ovary was 25.7 gm at 5-7 months of age as reported by Hafez and Kamar[9], in Fayomi fowl. The average weight of ovary was reported as 19.23gm in Aseel birds[2]. A comparable data was observed by Banerjee *et al*[1]., at 20 weeks of age in RIR birds. The average length and width of ovary of Uttara fowl is 3.17 ± 0.27 cm and 2.28 ± 0.08 cm respectively (Table 1). The findings of the adult Aseel birds were 2.62±1.09 length and 1.26±.053[2]. However, Ingole[11] reported as 2.17 and 1.13 cm and 2.15 and 0.95 cm in dwarf and normal WLH birds, respectively.

The left oviduct of uttara fowl extended caudally from the left ovary and opened in cloaca lateral to the opening of left ureter. It was suspended by dorsal and ventral ligaments similar to the reports of Bradley and Grahame[6], Hodges[10] and King[14] in domestic fowl; Ingole[11] in dwarf and normal WLH birds; Johnson[12] and Banerjee *et al*[1]., in the adult Aseel birds and Garg *et al*[8]., in Kadaknath fowl. On right side it was related to the dorsal surface of the proventriculus, gizzard and spleen. These findings are in agreement to the reports of Bradley and Grahame[6], King[14], Nickel *et al*[17]., in domestic fowl, Ingole[11] in dwarf and normal WLH birds, and Garg[8] in Kadkanath birds.

The average length and weight of the oviduct of adult Uttara fowl was 59.73 ± 0.85 cm and 31.73 ± 0.96 gm respectively (Table 1). These measurements were comparable with the reports of Bradley and Grahame[6], King[14] and Nickel *et al*[17]., in domestic fowl, where they reported the length and weight of oviduct in laying birds as 49.1 to 89.0 cm and 28.4 to 76.0 g. However, Naragude *et al*[16]., reported it as 68.50±0.39 cm and 72 ±0.33 gm at 20-24 weeks of age in RIR birds. Garg[8] reported relatively similar findings as 58.7 cm and 38.2 g, respectively at 26 weeks of age in Kadkanath birds. Hafez and Kamar[9] reported that total length of oviduct at 6-7 months of age was 49.1cm in Fayomi fowl.

The average length and width of infundibulum was 7.82 ± 0.15 cm and 0.70 ± 0.02 cm respectively (Table 1). Similar findings were reported by King[14], Sturkie[21] and Singh[19] in domestic fowl. However, Naragude *et al*[16]., reported it as 7.37 cm in RIR birds, Sarma and Sarma[18] noticed it as 5.54cm in non descript chicken, and Garg[8] reported it as 7.8 cm in Kadaknath fowl. The infundibulum exhibited two distinct regions i.e. a cranial funnel and caudal neck, funnel was dorsoventrally flattened with flared lips lying in close proximity to the ovary. These observations corroborates with the findings of Hodges[10], Naragude *et al*[16]., in RIR birds Sarma and Sarma[18] in non descript chicken and Garg[8] in Kadkanath birds. .

Magnum was the longest segment of the oviduct and had an average length of 29.16 ± 0.66 cm and width of 1.34 ± 0.04 cm in adult uttara fowl. It is highly coiled structure having 5- 7 number of coils (Fig 2) as reported by Bharti *et al*[3]., in adult indigenous chicken of Assam.

These measurements were comparable with the reports of Bradley and Grahame[6], King[14], Nickel *et al*[17]., in domestic fowl, Naragude *et al*[16]., in RIR birds and Garg[8] in Kadaknath fowl. However Sarma and Sarma[18] reported the length as 24.76 cm in non descript chicken and Singh[19] reported length of magnum as 37-38 cm.

Isthmus was a short segment of the oviduct. The boundary between magnum and isthmus was clearly delineated by narrow translucent zone similar to the reports of Hodges[10] . The average length was 7.70 ± 0.15 cm and width was 0.78 ± 0.04 cm in uttara fowl (Table 1). These measurements were almost similar to the reports of Bradley and Grahame[6], Sturkie[21] in domestic fowl, Naragude *et al*[16]., in RIR birds, Sarma and Sarma[18] in non descript chicken , and Garg[8] in Kadaknath fowl. However Nickel *et al*[17]., reported the length as 8.7 cm in domestic fowl.

Shell gland or uterus was dorsoventrally expanded pouch like structure similar to the findings of Hodges[10], King[14] in domestic fowl and Garg[8] in Kadaknath fowl. Its average length and width was 9.17 ± 0.20 cm and 2.52 ± 0.03 cm in adult uttara fowl respectively (Table 1). However, Nickel *et al*[17]., reported the length as 8.3 cm in the domestic fowl, Garg *et al*[8]., reported 9.04 cm length in Kadaknath fowl, and Bharti *et al*[4]., reported it was 7.9690 ± 0.1767cm in adult indigenous chicken of Assam.

Vagina was short and narrow S shaped structure joining the shell gland to the cloaca at the terminal end, similar to the reports of King[14] in domestic fowl and Bharti *et al*[5]., in adult indigenous chicken of Assam. The average length and width of vagina in uttara fowl was 5.85 ± 0.25 cm and 0.76 ± 0.04 cm respectively (Table 1). However Bharti *et al*[5]., reported in adult indigenous chicken of Assam it was 7.1680 ±0.2709 cm and 0.9150 ± 0.0544 cm respectively and the wall thickness in laying hen and duck reported by Mohammdpour *et al*[15]., was 2.01 ± 0.78 mm and 3.31 ± 1.11 mm, respectively and King and McLelland[14] reported that the length in domestic fowl as 7 to 8 cm.

Table 1: Gross Bio-metrical observations of Female Genitalia of adult Uttara fowl

PARAMETERS		MEAN ± S.E
WEIGHT OF BIRD		1406.5 ± 32.36
LINEAR LENGTH OCCUPIED BY SYNSACRUM (cm)		10.02 ± 0.42
OVARY	Length (cm)	3.17 ± 0.27
	Width (cm)	2.28 ± 0.08
	Thickness (cm)	1.53 ± 0.11
	Weight (g)	26.25 ± 1.14
OVIDUCT	Length (cm)	59.73 ± 0.85
	Width (cm)	0.76 ± 0.04
	Weight (g)	31.73 ± 0.96
INFUNDIBULUM	Length (cm)	7.82 ± 0.15
	Width (cm)	0.70 ± 0.02
	Weight (g)	0.90 ± 0.06
	Max. Luminal Diameter (mm)	3.73 ± 0.34
	Min. Luminal Diameter (mm)	2.06 ± 0.15
MAGNUM	Length (cm)	29.16 ± 0.66
	Width (cm)	1.34 ± 0.04
	Weight (g)	15.65 ± 0.62
	Max. Luminal Diameter (mm)	10.84 ± 0.62
	Min. Luminal Diameter (mm)	3.31 ± 0.25
ISTHMUS	Length (cm)	7.70 ± 0.15
	Width (cm)	0.78 ± 0.04
	Weight (g)	2.97 ± 0.17
	Max. Luminal Diameter (mm)	6.35 ± 0.33
	Min. Luminal Diameter (mm)	2.16 ± 0.28
SHELL GLAND	Length (cm)	9.17 ± 0.20
	Width (cm)	2.52 ± 0.03
	Weight (g)	8.02 ± 0.47
	Max. Luminal Diameter (mm)	22.91 ± 0.77
	Min. Luminal Diameter (mm)	5.28 ± 0.55
VAGINA	Length (cm)	5.85 ± 0.25
	Width (cm)	0.76 ± 0.04
	Weight (g)	4.17 ± 0.16
	Max. Luminal Diameter (mm)	7.09 ± 0.41
	Min. Luminal Diameter (mm)	3 ± 0.35

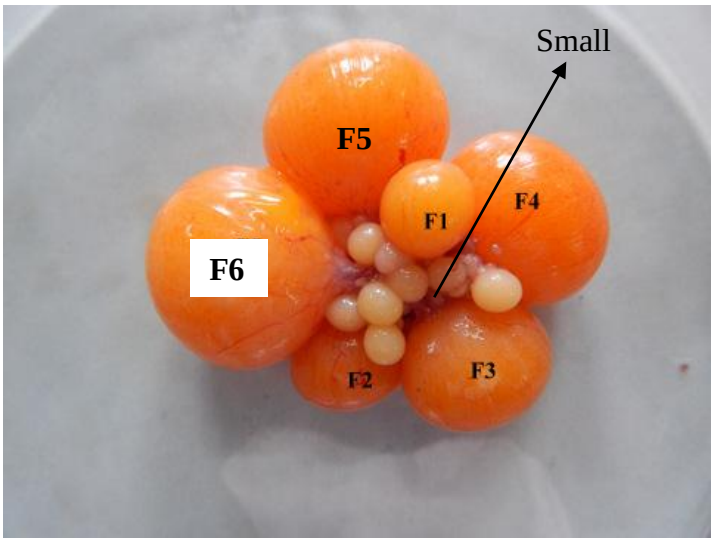

Fig. 1: Left ovary of hen consisting of small follicles and large hierarchical follicles-F1-F6

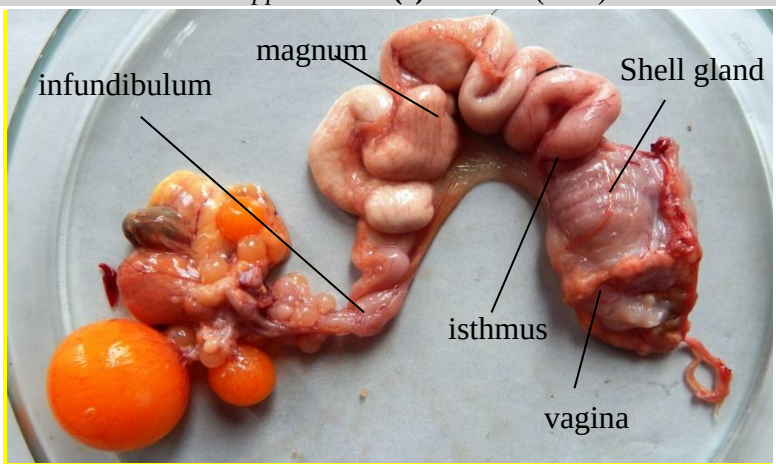

Fig. 2: Female genitalia of laying hen

CONCLUSION

The female reproductive system of adult laying hen consisted of mature left ovary resembling to a bunch of grapes. The surface of ovary contained numerous creamy white small follicles and large yolk filled yellow follicles. Generally 5-6 yolky hierarchial follicles (F1- F6) bulged out of the ovarian surface for ovulation. The left oviduct extended caudally from the left ovary and opened in cloaca lateral to the opening of left ureter. The oviduct of mature hen was highly coiled structure consisting of infundibulum, magnum, isthmus, shellgland and vagina. It was attached with dorsal and ventral ligaments.

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