Comparative Study Morphology on Genital Tract between Local Iraqi Hen and Duck.

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Abstract

This study was carried out to compare the morphological structures of ovary and oviductal regions of the apparently healthy immature and mature female laying hens (*Gallus gallus domesticus*) and ducks *(Ansa ansa domesticus*),.for this purpose the age of birds taken at average 16 weeks for immature with weight average 700 gm and 48-52 weeks and weight 1700 gm for mature birds. All of the morphometrical parameters were taken after euthanasia , the ovary and oviduct weight , length as well as width of them were recorded. Our analyses indicated that the mean weigth , length as well as width of the five regions of the oviduct in mature hen were significantly differences ($p< 0.01$) greater than in duck. Moreover, noticed that increase from immature parameters to mature ages in hens and duck, but in hens parameters the increases was higher significant ($p< 0.01$) in most parameters.

Introduction:

The poultry industry, one of the pillars of food security in the world as reliable in providing meat and eggs to meet the nutritional needs of the growing, and is all of the chicken eggs and meat material desirable for consumers to the content of the value of vital high-protein , and good metabolic energy as well as the short duration of productivity , and easily of management (FAO, 2012).

The concept is limited to poultry in Iraq on breeding herds different from chicken only (laying hens and broiler chickens , and herds of mothers) . In recent years, began breeding birds , quail , and turkeys beginning limited , and on a small scale for research purposes only , to engage within the concept of breeding poultry . The expansion of the concept of poultry would increase the local production of poultry meat and eggs , meat the local need for these materials and reduce imported as it could not meet the

current domestic production of poultry products , more than 22 % of the total need it as well as meet the needs of consumers and provide different types of birds, according to prefer (FAO, 2012).

The avian oviduct is a complex biological organ that undergoes a series of hormonal, neural, biochemical and cellular changes during the formation of an egg. It is of special interest to the commercial egg industry. Any alteration or deviation in the function of the oviduct of a laying hen can directly affect egg and egg shell quality. Decline in egg and egg shell quality cost the egg industry millions of dollars every year

The reproductive tract in birds differ significantly from that in mammals and most of the parts although they bear similar names to mammalian organs ,have widely different anatomical , histological and physiological features(suraj and suhas,2011).

The avian oviduct is divided into five regions, namely infundibulum, magnum, isthmus, uterus or tubular shell gland and vagina. The infundibulum forms a strong perivitelline membrane and chalaza around the egg yolk, the magnum is responsible for the synthesis and secretion of albumen, the isthmus forms a fibrous membrane around the egg white, the uterus forms the egg shell and finally the vagina connects the uterus to the cloaca. The tubular shell gland was initially known as the red region of the isthmus, but because of its role in egg shell formation, it was later named the tubular shell gland ,histologically In the domestic fowl,The wall of oviduct consists of a mucosa which made up from psedostratified epithelium and a glandular lamina propria. The loose connective tissue of propria submucosa is rich in lymphocytes and plasma cells. The mucosa is vary in heigh and thickness (Aughey and Frye, 2001). The tunica muscularis is smooth muscle and comprises a few bundles in the infundibulum and forms two distinct layers , inner circular and outer longitudinal in the remainder of the oviduct . Its thickest in the uterus , where it forms a sphincter at utero-vaginal junction and in the vagina where it cause expulsion of the egg. The tunica serosa consists of a thin layer of loose connective tissue.(Mohammadpour and Keshtmandi,2008). In the present study, morphological structures of genital tract in mature and immature laying duck and hen were compared the Aims of the present study was to reveal the anatomical structure of immature and mature reproductive system consist of the left ovary and it's five regions (infundibulum , magnum , isthmus , uterus and vagina) of the oviduct of local breed laying hens and duck , due to that, these fowl play role in the economy of Iraqi population because it produce egg , meat and feathers .

Material and methods

Forty apparently healthy ducks and hens (each comprised of 24 birds)divided into four groups 6 immature hen aged between (14-16weeks) and weigth between(600-700gm)and six of mature hen aged (48-52weeks) weight between(1000-1200gm)and six immature duck aged (16-20weeks) weight between(1000-1100gm) and finally six mature duck aged (48-54weeks) and weight between(1700-1800 gm) were utilized in this investigation. They were obtained from local market near baghdad. They were killed by cervical dislocation according to ethical committee in animal house belonged to college of science in al mustansiyriha University. Then, whole oviduct was quickly dissected out and stretched on a paper. After dissection, some morphological parameters such as total weight and length of oviduct were measured and then in each of specimen length, width and weight by sensitive balance and parameters of the all parts of oviduct were measured by digital caliper device; an instrument used for measuring round and irregular shape objects. The data were statistically analyzed using one-way analysis of variance by completely randomized design (CRD) and differences obtained upon statistical analysis were compared with means using Duncan's multiple test (Duncan, 1955).

Results and discussions:

The ovary produces the ovum and yolk being fabricated within the oocyte from raw materials synthesized in the liver(Lucky etal.,2010). Hens and ducks only have a single functional ovary (the left one). The ovary of an adult hen and duck in excellent laying condition. It has an irregular surface, located in the abdominal activity, and is related cranially to the caudal extremity of the lung, ventrally to the abdominal air sac and dorsally to the kidney and adrenal gland. Such observation were also reported by Yonju etal.,(2004);Sulaiman etal.,(2010). The ovaries have mean total weight in immature hen(0.37 ± 0.01) gm lower than in immature duck (0.37 ± 0.11 gm) but not significantly ,However in the mature hen was (47.22 ± 0.70 gm) highly significantly ($p < 0.01$) compared with mature duck(16.89 ± 0.21 gm) because the ovary are small and inert before puberty and adulthood after that become double in size and active and have a form of the cluster where the different size of grains and grow in limited numbers of up to 250-350 an egg to puberty phase, depending on the ability of a hen to provide sufficient quality of food for the formation of yolk &when the reach diameter of yolk about 3.5 cm the latter pressure on the surrounding occure incision allow the exit of the yolk (Allam, 2009).In immature duck, length(17.58 ± 0.12 mm) and width(10.45 ± 0.11 mm) was highly significant ($p< 0.01$) compared with immature hen the length

shorter(12.49 ± 0.33 mm) and the width narrow (7.84 ± 0.06 mm) as showen in Table (1).

In mature hen length of ovary was(49.64 ± 0.72 mm) highly significant ($p< 0.01$) compared with mature duck(44.00 ± 0.86 mm), also the width in mature hen(54.97 ± 0.41mm) was highly significant ($p< 0.01$) compared with mature duck(29.66 ± 0.71 mm)(Table 1). The oviduct carries the ovum to the cloaca and it successively adds the albumin from the glands of magnum finally ,shell pigments from uterus ,and the bloom or cuticle from the gland of vagina. The avian oviduct functions as a biological assembly line ,beginning sequentially with the deposition of the albumen around the fertilized or unfertilized ovum, then the shell membrane ,and lastly ,the shell ,all within 25hr of ovulation (Lucky etal.,2010). The study revealed that the hen and duck's oviduct has distinctive structural variation at different levels which subdivided into five principle parts : Infundibulum, Magnum ,Isthmus, Uterus and Vagina. This result is compatible with results as reported in the domestic fowl by Hodges,(1974) and in rhea's by Parizzi etal.,(2008) and in Iraqi breed geese by Mohammed (2010) and in turkey hen by Riyadh (2012). Morphological examination revealed that the oviduct of lying hen and duck is a highly convoluted and muscular part, which transport ovum from ovary, the place for fertilization, deposition of albumin, formation of egg membranes and finally to form the full-grown egg. It extends from the single ovary to cloaca and occupying a large part of the abdominal cavity(Mohammedpour etal.,2012). In immature hen ,mean weight (0.91 ± 0.05 gm)and mean length (7.80 ± 0.06 cm) of oviduct were not significant in immature duck the weight (1.53 ± 0.15 gm)and mean length (11.24 ± 0.19 cm)(Table 2) Also in the mature hen, the weigth (45.26 ± 2.21 gm) of oviduct were significantly ($p< 0.05$) bigger than mature duck (30.72 ± 1.57 gm). But ,the not significant between the length of the mature hen (31.37 ± 1.12 cm). This result supported with result of saber,(2010) in mature ostrich , Mohammedpour and keshtmandi(2008) in turkey and pigeon, and Mohammed (2010) in the Iraqi breed Geese when he measurement the length and weigth of Geese oviduct in ages of 16 and 20 weeks, Infundibulum is represented the first part of the oviduct, consists of two regions : a thin walled funnel-shaped portion (funnel infundibulum), also known as the chalaziferous zone, which showed narrow slightly thick wall tube (tubulus infundibularis) The results of infundibulum weight in Table(3) showed no significant between immature hen (0.18 ± 0.02 gm) and immature duck (0.21 ± 0.01 gm). But ,it was significant ($p< 0.01$) between mature hen (3.93 ± 0.12 gm) and mature duck (2.13 ± 0.09 gm). This

result was agreement with Saber etal.,(2009) in the hen; Robert etal.,(2011)in Emu; Riyadh(2012) in turkey hen. The mean length of length of infundibulum is(9.01 ± 0.12 mm) in immature hen, and highly but not significant in immature duck(13.76 ± 0.21 mm). furthermore, the length of mature duck(41.92 ± 0.87 mm) greater than mature hen(41.43 ± 0.23mm) but not significant and comprises 12%. The mean width of infundibulum is 4.34± o.87 mm in immature hen and in immature duck was(3.26 ± 0.03 mm). However , the width in infundibulum of mature hen was(12.19 ± 1.09 mm) increased significantly ($p< 0.01$) with mature duck (6.82 ± 0.23 mm), these data shown in Table (6). The infundibulum has a secretory function. It produce the first of egg coats, the chalazae. These are the whitish string-like structure on either side of the yolk, that keep the embryo in proper position during development (Mohammedpour and Keshtmandi 2008).. Magnum It is the largest and most coiled part of the oviduct. Its wall is thick, folded with large diameter than the infundibulum. The increase in average length and thickness of the wall due to increase in the thickness of tunica muscularis in its wall or by presence numerous tubular glands during egg production which responsible for synthesis and secretion of albumin This result also as in lying hen (King &Mclelland,1984; Riyadh,2012 in Turkey hen. In immature ostrich with inactive ovaries the mucosa of the magnum is arranged in branching convoluted folds, separated by deep furrows & lined with non ciliated cells which more densely covered by microvilli (Madekurozwa,2005). The mean weight of immature hen(0.18 ± 0.01 gm), but not significant with immature duck 0.53 ± 0.03 gm) (Table 4)(

In the mature chicken,the lamina propria of the magnum did not contain such developed secretory mucosal folds (Yoshimura and Ogawa, 1998). The weigth of mature hen 19.01± 0.22 gm that was higher significantly compared with weigth of mature duck(14.13 ± 0.21 gm).

The mean length of the magnum is(33.34 ± 1.95mm) in immature hen (Table 6) but increase in immature duck(43.86 ± 2.32 mm) significantly ($p< 0.01$). However ,the length was in mature duck(130.90 ± 2.11mm) increases in mature hen(145.60 ± 3.22 mm) significantly ($p< 0.01$). This result does not correspond with results as described in the Japanese quail as(29.52 ± 1.51 cm) (Operl, 1966); 34 cm in the lying hen (King and Mclelland ,1984);(4.83 ± 1.27cm) in Emu (Robert etal.,2011) and(36.31 ± 0.6 cm) in turkey hen (Riyadh, 2012). But agree with the result of Johnson (1986) who showed that the length of magnum in avian is (13 ± 1 cm). The mean width as demonstrated in (Table 5) of immature hen(2.42 ± 0.98 mm) decrease of the immature duck(4.36 ± 0.02 mm) significantly

(p< 0.01). while , the width in mature hen(17.30 ± 2.11 cm) significant increase (p< 0.01) in mature duck(7.10 ± 0.87 mm). Isthmus is the region where the egg shell membrane is formed and its wall was thinner than that of the uterus &vagina. Isthmus is the third region of the oviduct, this region appear similar to the magnum but thinner and less reduced than that of magnum in diameter .

This result coincides with King and Mclelland (1984)in the laying hen. It is significantly more narrow than uterus. In the laying hen, the isthmus is short and reduced in diameter which extends from the anon glandular zone, which delimits it from the magnum, to the tubular shell gland , which to absoulute eye is marked by distinict color change from off to brown(Solomon,1975). The mean weigth of isthmus is(0.11 ± 0.09 gm)in immature hen but in immature duck increase to(0.53 ± 0.03 gm) ,while the weigth of the isthmus in mature hen(4.64 ± 0.12 gm) increase significant (p< 0.01) compared with mature duck(3.72 ± 0.12 gm). These result in (Table 3). This result corresponding with the result as reported in mature hen & mature duck by (Mohammedpour etal.,2012). The mean length of the isthmus in immature hen(11.88 ± 0.88 mm) decrease significantly (p< 0.01) with immature duck(26.17 ± 0.61mm). the isthmus of mature hen(74.44 ± 1.85mm) increase significantly from mature duck(66.61 ± 1.41 mm). these result agree with the result as described in laying hen as 4 to 8 cm (King and Mclelland, 1984); 5.6 cm in rhea's (Parizzi etal.,2008). And disagree with (Mohammedpour etal.,2012).these data shown in Table (4).

The width of isthmus of immature duck(3.08 ± 0.12 mm) increase significant (p< 0.01) from the immature hen(1.26 ± 0.22 mm). but ,the width of mature duck(7.27 ± 0.32mm) decrease significant (p< 0.01) from mature hen(8.15 ± 0.22 mm). The result of this study agreed with (King and Mclelland, 1984) and (Mohammedpour etal.,2012). These result illustrated in Table (5). From these result we show that in mature hen , the weigth ,width and length of isthmus were greater significantly (o< 0.01) than duck , these result agreed with (Mohammedpour etal.,2012). The uterus showed very thick, muscular and distended wall terminated as a pous to wowb the egg during the period of shell formation between the isthmus cranially and vagina caudally. This result is also the same as in laying hen (Johnson etal.,1963). Weigth of the uterus in immature hen(0.22 ± 0.03 gm)was low significantly (p< 0.01) than in immature duck(0.31 ± 0.32 gm)also, the length was shorter significantly (p< 0.01) in immature hen(11.23 ± 0.38 mm) than immature duck (14.42 ± 0.41mm) and the width was very narrow in immature hen(0.67 ± 0.01mm) than it in

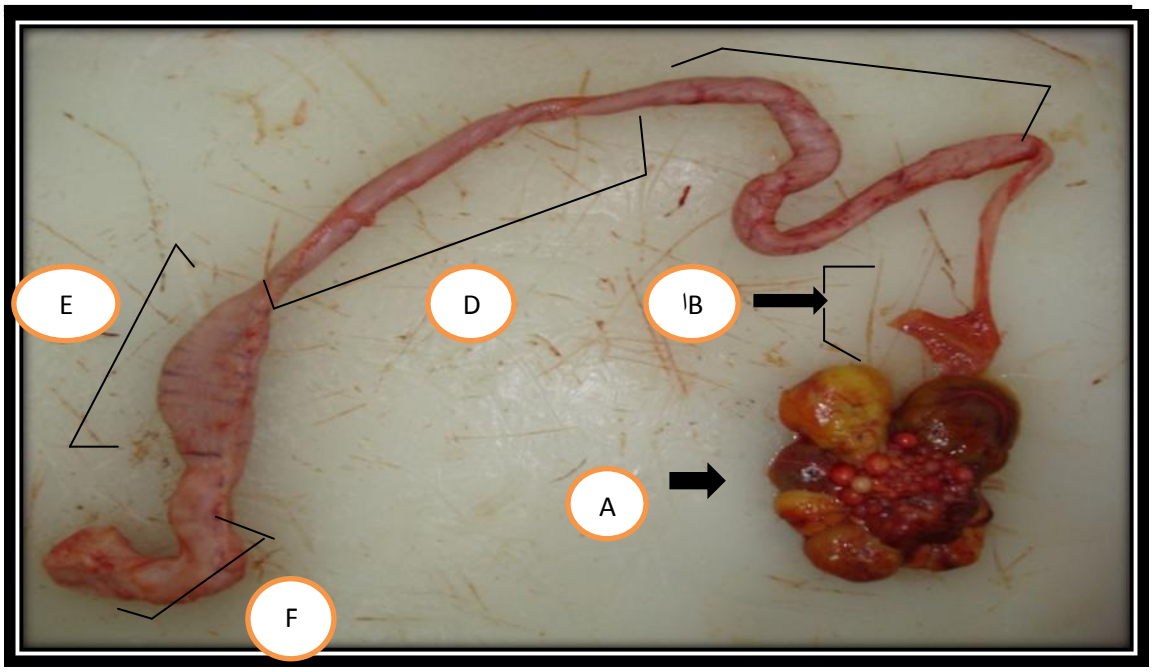
immature duck(9.03 ± 0.13 mm). This result agree with (Mohammedpour etal.,2012).

Also in mature hen, the weigth(14.98 ± 0.82 mm) was more than duck (6.48 ± 1.32) mm and the difference was significant ($p< 0.01$). other parameters such as length of uterus in duck(45.10 ± 0.53mm) were more than hen(18.44 ± 0.41mm). There was significant difference in length of uterus between hen and duck. Also the width of hen(30.15 ± 0.87 mm) was higher than significantly ($p< 0.01$) in mature duck(17.76 ± 0.28 mm) .This result agree with the result as described in hen & duck (Mohammedpour and Keshtmandi,2007). The uterus was wider & thinner than the crinal portions of the oviduct in the day –old birds (Mohammedpour,2007). Generally , uterus weigth, width and length in mature hen was significantly more than mature duck that was shown in these results and in results of Mohammedpour et al.,2012. Finally The vagina is shorter part of the oviduct as S-shaped like structure servring as conduit connecting between the uterus and cloaca, for the egg mass at the time of position. This result corresponds with the result as reported in the domestic fowl by King and Mclelland (1984); Bakst and Akuffo **,**(2009); Mohammedpour (2007) and Mohammedpour et al.,(2012) in chicken and turkey and duck. The vagina was tube-like structure connected to the uterus cranially and opened on the urodeum of the cloaca caudally. The vaginal wall was thicker than of the other portion of the oviduct . Most of parameters in vaginal parts of duck's oviduct were more than of hen's oviduct. It was recorded that the weigth of vagina was(0.18 ± 0.06 gm) and(0.89 ± 0.89 gm) in immature hen and immature duck respectively. There was significant difference in vaginal weigth ($p< 0.01$).

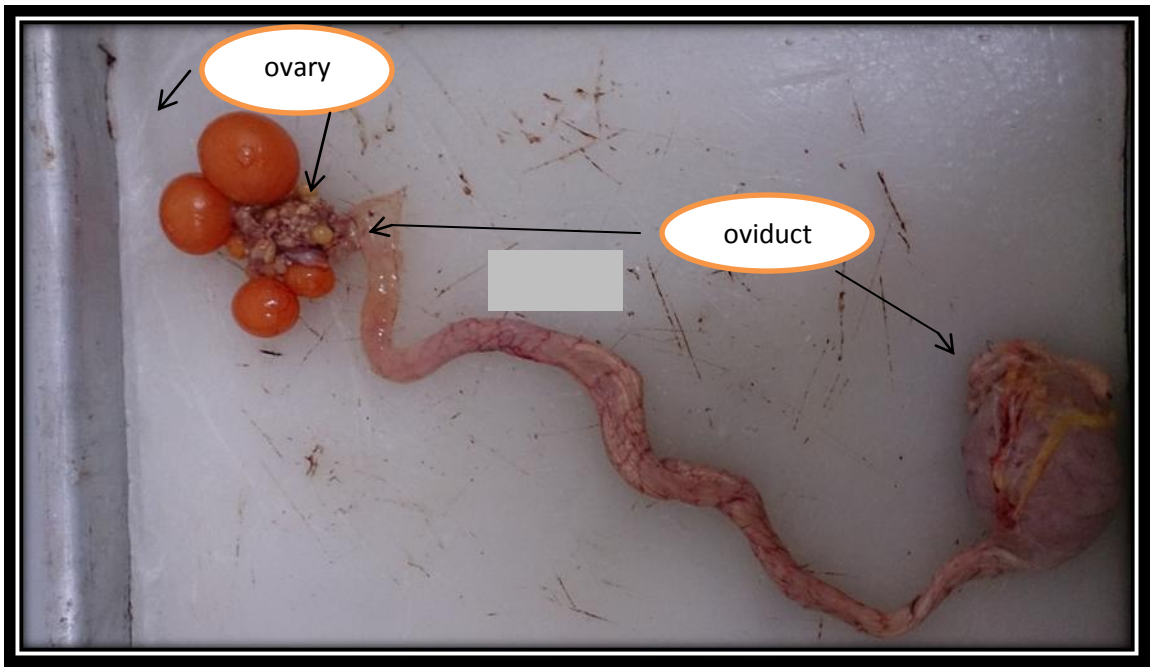
Also in immature hen,the length(9.18 ± 0.41mm) and width(0.98 ± 0.06 mm) of vagina were lower than immature duck the length(13.95 ± 0.62mm) and width(6.08 ± 0.14 mm). there was significant difference in length and width of vagina between immature hen and duck, these data showen in Table (3 ,4 , 5) In mature duck, mean weigth(6.05 ± 0.62 gm), length(29.1 ± 1.02mm) and width(16.18 ± 0.21mm)of vagina were significantly ($p< 0.01$)bigger than mature hen (Table3 , 4 , 5). In laying hen, mean weigth(3.68 ± 0.62 gm), length (22.34 ± 0.81mm) and width(11.76 ± 0.13mm).

picture (1) showing the parts of the female reproductive system in immature laying hen

Picture(2) showing the female reproductive system in immature laying duck



picture (3) showing the ovary and parts of oviduct in female reproductive system in laying mature duck A:ovary, B:infundibulum ,C:magnum,D :isthmus ,E:uterus,F:vagina



Picture(4) showing the female reproductive system in mature laying hen

Table 1: Biometric measurments of the ovary with ovum weigth, length and diameter in immature and mature of hen and duck

Object	Weigth(gm) Mean ±S.E	Length (mm)	Width (mm)
Immature hen	0.37±0.01 c	12.49±0.33 d	7.84±0.06 d
Immature duck	0.73± 0.11 c	17.58±0.12 c	10.45±0.11 c
Mature hen	47.22±0.70 a	49.64±0.72 a	54.97±0.41 a
Mature duck	16.89±0.21 b	44.00±0.86 b	29.66±0.71 b

Values of bearing different superscripts differ significantly ($p < 0.01$). Observation number for each treatment =6.

Table2:Biometeric measurments of the oviduct weight and length in the immature and mature hen and duck.

Object	Weight (gm) Mean±S.E	Length (cm) Mean±S.E
Immature hen	0.19± 0.05 c	7.80±0.06 c
Immature duck	1.53±0.15 c	11.24±0.19 c
Mature hen	45.26±2.21 a	34.57±1.57 a
Mature duck	30.72±1.30 b	31.37±1.12 a

Values of bearing different superscripts differ significantly ($p < 0.01$)
Observation number for each treatment =6.

Table 3: Biometric measurments of the parts of the oviduct weight in hen and duck

Parts of the oviduct		Weight (gm) Mean±S.E		
	Immature hen	Immature duck	Mature hen	Mature duck
Infundibulum	0.18±0.02 c	0.21±0.01 c	3.93±0.12 a	2.13±0.09 b
Magnum	0.18±0.01 c	0.53±0.03 c	19.01±0.22a	14.13±0.21b
Isthmus	0.11±0.09 d	0.21±0.31 a	4.64±0.21 c	3.72±0.12b
Uterus	0.22±0.03 d	0.31±0.32 c	14.98±0.82a	6.48±1.32 b
Vagina	0.18±0.06 d	0.89±0.08 c	3.68±0.62 b	6.05±0.62 a

Values of bearing different superscripts differ significantly ($p < 0.01$)
Observation number for each treatment =6.

Table4:Biometric measurments of the parts of oviduct length in the immature and mature hen and duck

Parts of oviduct		Length(mm) Mean±S.E		
	Immature hen	Immature duck	Mature hen	Mature duck
Infundibulum	9.01±0.12 b	13.76±0.21b	41.43±0.23a	41.92±0.87a
Magnum	33.34±1.95d	43.86±2.32c	145.60±3.22b	190.92±2.11a
Isthmus	11.88±0.88d	26.17±0.61c	74.44±1.85b	66.61±1.41 a
Uterus	11.23±0.23d	14.42±0.41a	48.44±0.41c	45.10±o.53 b
Vagina	9.81±0.41 d	13.95±0.62c	2.34±0.18 b	29.10±1.02 a

Values of bearing different superscripts differ significantly ($p < 0.01$)
Observation number for each treatment =6.

Table5:Biometeric measurments of the parts of the oviduct diameter in the immature and mature hen and duck

Parts of the oviduct		Width (mm) Mean±S.E		
	Immature hen	Immature duck	Mature hen	Mature duck
Infundibulum	4.34±0.87 b	3.26±0.03 d	12.19±1.09a	6.82±0.23c
Magnum	2.42±0.98 b	4.36±0.02 d	17.30±2.11a	7.10±0.87c
Isthmus	1.26±0.22 a	3.08±0.12 b	8.15±0.22a	7.27±0.32a
Uterus	0.67±0.01 d	9.03±0.13 b	30.15±0.87c	17.76±0.28a
Vagina	0.98±0.06 d	6.08±0.14 b	11.76±0.13a	16.18±0.21c

Values of bearing different superscripts differ significantly ($p < 0.01$)
Observation number for each treatment=6.

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الخلاصه

اجريت هذه الدراسه في البيت الحيواني التابع للجامعه المستنصرية وكان الهدف منها دراسة مقارنة للتركيب المظهري للمبيض وقناة البيض لاناث الدجاج والبط البالغ وغير البالغ ولهذا الغرض اخذ عدد من الطيور والتي تبلغ اعمارها 16 اسبوع بلنسبة لغير البالغة و52 اسبوع للبالغه واجريت القياسات بعد التشريح من حيث الطول والعرض والاوزان للمناطق الخمسة لقناة البيض ولوحظت النتائج كما يلي حيث أن الطول والوزن و العرض في المناطق الخمسة من قناة البيض كانت للدجاج والبط الناضج اعلى وبفارق معنوي عالي ($p < 0.01$) عن غيرالناضجة في كلا من الدجاج و البط. ولكن في الدجاج الناضج كانت القياسات الثلاثه للطول والعرض والوزن أعلى وبفرق معنوي($p < 0.01$) مما في البط الناضج .