

## Anatomical Study of Feral Queen's Reproductive Systems in Iraq

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### SUMMARY

The present study is carried out to investigate some morphometric aspects of reproductive organs in Iraqi feral cats. Forty six female genital specimens from sexually mature queens were trapped during the period from December 2008 to December 2009. The specimens were classified into pregnant and non pregnant. The non pregnant were further classified into reproductive systems with or without obvious pathological changes.

During the entire period, the results showed that the means of length, width and thickness of right and left ovaries were  $9.8 \times 5.03 \times 3.95$  mm and  $9.56 \times 4.8 \times 3.05$  mm respectively, with no significant variation ( $p \geq 0.05$ ) between the dimensions of right and left ovaries or between dimensions of the different seasons. The means of length of right and left uterine tubes were 54.4 and 55.7 mm respectively, with no significant

variation ( $p \geq 0.05$ ) between the dimensions of right and left uterine tubes or between dimension of different seasons. The means of length and diameter of right and left uterine horns were  $48.44 \times 5.41$  mm and  $54.43 \times 5.14$  mm, with significant variation ( $P \leq 0.01$ ) between dimensions of right and left uterine horns and between the dimensions of different seasons. Also, the result showed that the means of the length and diameter of uterine bodies and cervix were  $22.75 \times 5.29$  mm and  $13.2 \times 8.72$  mm respectively with significant variation ( $P \leq 0.01$ ) between dimensions of different seasons.

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### INTRODUCTION

Domestic cat (*Felis catus*) is one of seven species of the genus *Felis* (a group of small size cats), which include in addition to domestic cat, lion, tiger, cougar and many others [1]. Scientifically, domestic cats are

used as laboratory animals due to the fact that they have some physiological features more in common with human than the laboratory rabbit or other rodent, hence they have extremely used in behavioral and biomedical researches particularly in neurological signs [2].

Recently, the domestic cat (*Felis catus*) is a useful model for studying comparative biology of the Felidae family and for developing assisted reproductive techniques for propagating related, endangered species [3]. For all above, and due to the rarity of the available references about the feline reproductive system particularly in Iraq, the present study was aimed to spotlight on some anatomical aspects of Iraqi feral queens.

## **MATERIALS AND METHODS**

The study was carried out in three governorates, Babylon, Al-diwaniya and An-najaf from December 2008 to December 2009, 46 mature female cat were captured by feral cat trap, each captured animal was anaesthetized according to [2], then they were examined clinically and recorded in special examination card.

Forty six samples of the female reproductive tract were collected directly

after euthanizing the animals, the female reproductive tract was taken entirely from the ovaries to the vulva for measurements. The reproductive tracts which appear normally were examined for anatomical study (topographical description as well as recording of different measurements of reproductive tract). The age of animals were estimated roughly to less and above one year according to [4].

The measurement data were obtained from the reproductive organs and recorded after dissecting, both ovaries were detached from oviducts and surrounding tissues, the measurement of length, width and thickness will obtained by caliper vernier (Nichi-Japan). Both oviducts were dissected and detached at uterine orifice, the measurement of straight length was recorded by caliper vernier. After removing of the ovaries and oviducts from reproductive tract, the length and external diameter of both uterine horn, uterine body, and cervix were measured by the caliper vernier.

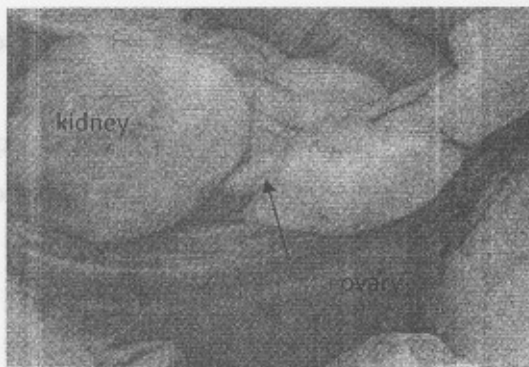
### **Statistical Analysis**

The obtained data were recorded and analyzed statistically by chi square test and student's t test in order to determine the significant variation between different means [5].

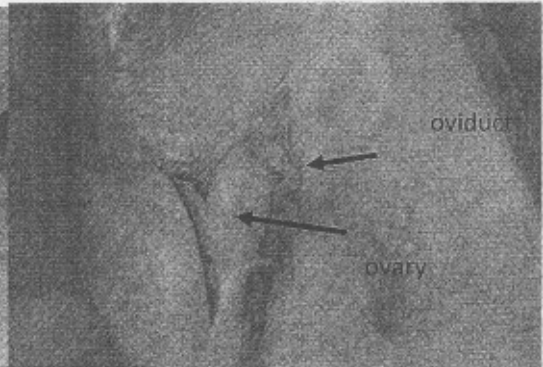
## RESULTS

Regarding the ovaries the results showed that the shape of the adult queen's ovary was oval, with slight bilateral compression, it was located in dorsal abdomen caudal to the kidney and attached to the dorsal body wall by mesovarian, to the diaphragm by suspensory ligament and to

the end of the uterine horn by proper ligament of the ovary, figure (1). The ovary was enclosed by bursa with a small slit-like opening located medially. The uterine tube extends from the craniomedial aspect of the ovary to the cranial ovarian end, and then extends caudally through the mesosalpinx to join with the cranial end of the uterine horn, figure (2).



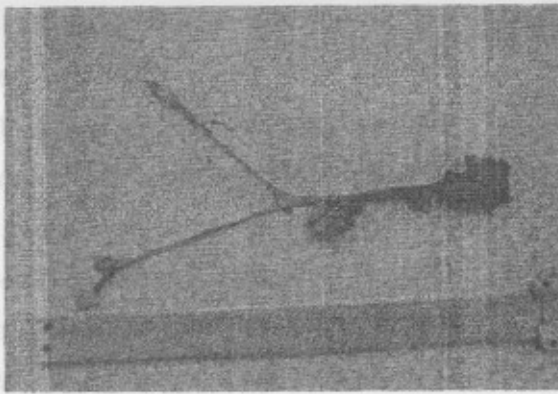
**Figure (1):** reveal location and shape of the queen ovary



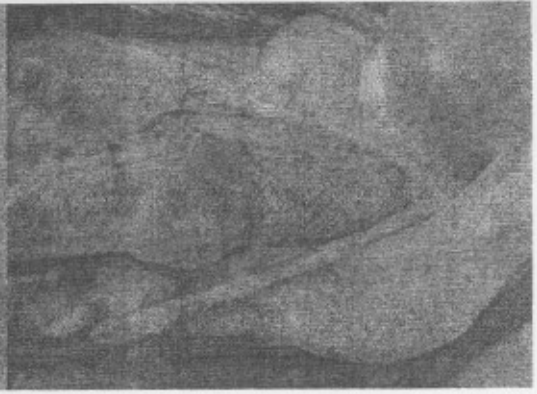
**Figure (2):** reveal the topography of the queen oviduct.

The uterus of queen was "Y" in shape with short uterine body and relatively long uterine horns, figure (3). The uterine body was located ventral to the descending colon and dorsal to the urinary bladder. The mesometrium, apart of the broad ligament

, attached the uterine horns and body to the lateral abdominal wall. The round ligament of the uterus was embedded in the cranial part of the mesometrium and extended caudolaterally to disappear near the intestinal inguinal ring, figure(4).



**Figure (3):** reveal the Y shape of the queen's uterus



**Figure(4):** reveal the attachments of the uterus

### Measurements of Queen's Reproductive System

The measurements of pathological changes free reproductive system of 46 adult, non-pregnant queens were taken during the different seasons.

#### Ovary

**Morphometric measurements:** The results showed that the mean of the length, width and thickness of the right ovary were  $9.8\text{mm} \pm 0.27$  (mean  $\pm$ SE; range 7-14.5),  $5.03\text{mm} \pm 0.12$  (mean  $\pm$ SE; range 3-8) and  $3.95\text{mm} \pm 0.7$  (mean  $\pm$ SE; range 2-5) respectively, while they were  $9.56\text{mm} \pm 0.26$  (mean  $\pm$ SE; range 7-14),  $4.8\text{mm} \pm 0.13$  (mean  $\pm$ SE; range 3-7) and  $3.05\text{mm} \pm 0.12$  (mean  $\pm$ SE; range 2-5) respectively in the left ovary. The statistical analysis reveals no significant variation between right and left ovaries or between the total

mean and the means of the different seasons ( $P \geq 0.05$ ), table.1.

According to the age, in the queens less than one year old, the mean of the length, width and thickness of the right ovary were  $9.46\text{mm} \pm 0.33$  (mean  $\pm$ SE; range 7-12),  $4.56 \pm 0.18$  (mean  $\pm$ SE; range 3-5),  $2.8 \pm 0.12$  (mean  $\pm$ SE; range 2-3.5) respectively, while they were  $9 \pm 0.33$  (mean  $\pm$ SE; range 7-11.5),  $4.64 \pm 0.19$  (mean  $\pm$ SE; range 3-5),  $2.48 \pm 0.11$  (mean  $\pm$ SE; range 2-3) in the left ovary. In queens above than one year old, the length, width and thickness of the right ovary were  $9.95 \pm 0.38$  (mean  $\pm$ SE; range 7-14.5),  $5.1 \pm 0.18$  (mean  $\pm$ SE; range 3.5-8),  $3.44 \pm 0.14$  (mean  $\pm$ SE; range 2-5) respectively, while in the left ovary they were  $9.94 \pm 0.35$  (mean  $\pm$ SE; range 7-13.5),  $5 \pm 0.19$  (mean  $\pm$ SE; range 3.5-7),  $3.4 \pm 0.13$  (mean  $\pm$ SE; range 2-5) respectively, table 2.

## Uterine Tube

The mean length of the right uterine tube was 54.4mm  $\pm$ 0.08 (mean  $\pm$  SE; range 52.-60mm) while it was 55.7mm  $\pm$ 0.05 (mean  $\pm$  SE ; range 53-58mm) in the left uterine tube . The statistical analysis reveals no significant variation between right and left uterine tubes and between the total mean and the means of the different seasons, table (3).

According to the age ,especially in the queens less than one year old , the mean of the length of the right uterine tube was 53mm  $\pm$  0.33(mean  $\pm$ SE; range 52-54mm), while it was 56.8mm  $\pm$  0.33 (mean  $\pm$ SE; range 53-61mm)in left uterine tube. In the queens above than one year old, the length of the right uterine tube was 58.1mm  $\pm$  0.38(mean  $\pm$ SE; range 51-65mm), while in the left uterine tube it was54.4 $\pm$  0.35(mean  $\pm$ SE; range 50-60), table 4.

**Table (1):** reveal the measurements (mm) of left and right ovaries during different seasons

Season		Winter	Spring	Summer	Autumn	Total
ovary		M $\pm$ SD	M $\pm$ SD	M $\pm$ SD	M $\pm$ SD	M $\pm$ SD
right	Length	9.93 $\pm$ 0.46	8.85 $\pm$ 0.17	10.15 $\pm$ 0.21	10.48 $\pm$ 0.63	9.80 $\pm$ 0.27
	Width	5.13 $\pm$ 0.32	5.20 $\pm$ 0.13	4.80 $\pm$ 0.15	4.46 $\pm$ 0.13	5.03 $\pm$ 0.12
	Thickness	3.33 $\pm$ 0.24	3.45 $\pm$ 0.21	3.10 $\pm$ 0.16	2.91 $\pm$ 0.09	3.95 $\pm$ 0.70
left	Length	9.53 $\pm$ 0.42	8.90 $\pm$ 0.28	9.60 $\pm$ 0.61	10.85 $\pm$ 0.77	9.56 $\pm$ 0.26
	Width	4.90 $\pm$ 0.29	5.20 $\pm$ 0.19	4.80 $\pm$ 0.15	4.30 $\pm$ 0.16	4.80 $\pm$ 0.13
	Thickness	3.00 $\pm$ 0.26	3.18 $\pm$ 0.25	2.95 $\pm$ 0.15	3.16 $\pm$ 0.10	3.05 $\pm$ 0.12

**Table (2):** reveal the measurements (mm) of left and right ovaries according to age

ovary		Age		Above than one year	
		Less than one year		n	M $\pm$ SE
		n	M $\pm$ SE	n	M $\pm$ SE
Right	Length (mm)	18	9.46 $\pm$ 0.33	28	9.95 $\pm$ 0.38
	Width (mm)	18	4.56 $\pm$ 0.18	28	5.10 $\pm$ 0.18
	Thickness (mm)	18	2.80 $\pm$ 0.12	28	3.44 $\pm$ 0.14
Left	Length (mm)	18	9.00 $\pm$ 0.33	28	9.94 $\pm$ 0.35
	Width (mm)	18	4.64 $\pm$ 0.19	28	5.00 $\pm$ 0.19
	Thickness (mm)	18	2.48 $\pm$ 0.11	28	3.40 $\pm$ 0.13

**Table (3):** reveal the measurements (mm) of left and right uterine tubes during different seasons

Season	Winter		Spring		Summer		Autumn		Total	
	n	M $\pm$ SE	n	M $\pm$ SE	n	M $\pm$ SE	n	M $\pm$ SE	n	M $\pm$ SE
Right	15	56.50 $\pm$ 0.08	10	55.60 $\pm$ 0.55	10	57.70 $\pm$ 0.05	11	55.30 $\pm$ 0.18	46	54.40 $\pm$ 0.08
Left	15	55.90 $\pm$ 0.08	10	55.90 $\pm$ 0.12	10	55.10 $\pm$ 0.08	11	56.30 $\pm$ 0.14	46	55.70 $\pm$ 0.05

**Table (4):** reveal the measurements (mm) of left and right uterine tubes according to age

Age	Less than one year		Above than one year	
	n	M±s	n	M±s
U. tube				
Right	18	53.00±0.33	28	58.10±0.38
Left	18	56.80±0.33	28	54.40±0.35

### Uterine horn

The present work showed that the mean of the length and diameter of the right uterine horn were 48.44mm ±1.47 (mean ± SE ; range 40-60) and 5.41mm ±0.5 (mean ± SE ; range 2-14) respectively ,while they were 54.43mm ±1.13 (mean ± SE ; range 42-65) and 51.4mm ± 0.08 (mean ± SE ;

range 2-15) respectively in the left uterine horn.

The statistical analysis reveals significant variation ( $P \leq 0.01$ ) between the measurements of right and left uterine horns, and another significant variation was observed between the total mean and each of the recorded means of different seasons, table 5.

**Table (5):** reveal the measurements of left and right uterine horns during different seasons

Season		Winter	Spring	Summer	Autumn	Total
U.horn		M± SD	M± SD	M± SD	M± SD	M± SD
right	Length	50.33 ±1.73	44.8 ±1.42	53.52 ±2.12	49.66 ±3.34	48.44 ±1.47
	Diameter	4.73 ±0.67	7.7 ±1.04	5.3 ±1.23	3.5 ± 0.34	5.41 ±0.5
left	Length	55.53 ±1.86	7.7 ±1.04	56.6 ±2.15	54 ±3.48	54.43 ±1.13
	Diameter	4.73 ±0.61	7.45 ±1.16	4.4 ±1.29	3.58 ±0.32	5.14 ±0.08

The results also showed that in the animals less than one year old, the mean of the length and diameter of the right uterine horn were 54.7mm±1.55 (mean ± SE ; range 42.5-62) ,3.38mm±4.83(mean ± SE ; range 2-14) respectively, while they were 51.06mm±2.13 (mean ± SE ; range 42-65),4.5 mm ±0.95(mean ± SE ; range 3-15 ) respectively in the left uterine horn. In animals above than one year old the mean of the length and diameter of the right uterine

horn were 53.57mm±1.38(mean ± SE ; range 42.5-62) ,6.4mm ±0.65(mean ± SE ; range 2-14) respectively, while they were 49.8mm ±1.44 (mean ± SE ; range 42-65),5.32 mm ±0.63(mean ± SE ; range 3-15 ) respectively in the left uterine horn. The statistical analysis reveals significant variation ( $P \leq 0.01$ ) between right and left uterine horns length, while no significant variation observed between the means of

uterine horns lengths according to the age, table 6.

### Uterine Body

The current work showed that the total mean of the length and diameter of the uterine body were  $22.75\text{mm} \pm 1.52$  (mean  $\pm$  SE; range 20-35) and  $5.29 \pm 0.36$  (mean  $\pm$  SE; range 3-12) respectively. According to the age, the results showed that the length and diameter of the uterine body were  $16.8\text{mm} \pm 2.94$  (mean  $\pm$  SE ; range 14-19)

,  $4.33\text{ mm} \pm 0.57$  respectively in the animals less than one year and  $26.53\text{ mm} \pm 0.95$  and  $5.9 \pm 0.58$  respectively in the animals above than one year. The statistical analysis reveals significant variation ( $P \leq 0.01$ ) between the measurements of the uterine body diameter and another significant variation was observed between the total mean and each of the recorded means in less and above one year, table 5.

**Table (6):** reveals the measurement of length and diameter of left and right uterine horns according to age

U.horn		Age		Less one year		Above one year	
		n	M $\pm$ SE	n	M $\pm$ SE		
Right	Length (mm)	18	54.70 $\pm$ 1.55	28	53.57 $\pm$ 1.38		
	Diameter (mm)	18	3.38 $\pm$ 4.83	28	6.40 $\pm$ 0.65		
Left	Length (mm)	18	51.06 $\pm$ 2.13	28	49.80 $\pm$ 1.44		
	Diameter (mm)	18	4.50 $\pm$ 0.95	28	5.32 $\pm$ 0.63		

### Cervix

The results showed that the mean of the length and diameter of the cervix were  $13.2\text{mm} \pm 0.59$  (mean  $\pm$  SE; range 6-20) and  $8.72\text{mm} \pm 1.95$  respectively in the different seasons. The mean  $\pm$  standard error of the length and diameter of the cervix  $12.6\text{ mm} \pm 0.9$  and  $3.6\text{ mm} \pm 0.44$  respectively in the animals less than one year, and  $12.26\text{ mm} \pm 0.78$  and  $4.3\text{ mm} \pm 0.35$  respectively in the animals above than one year.

### DISCUSSION

Regarding the topography of different genital part the current work revealed that the free Iraqi feral queens are completely compatible with other results were recorded by many authors [6, 7, 8, 9].

concerning the mean measurements (length  $\times$  width  $\times$  thickness) of right and left ovaries in this study are close to that obtained by [8] that measured the dimension of ovary as (10mm length  $\times$  3mm width 5mm thickness).

The absence of significant variation between the measurements of age classes are in disagreement with [10], that they supposed that the length and width of ovaries of young queens were 3mm×2mm respectively , while in adult queens were 10mm×5mm. The reason of the disagreement may be due to that the previous authors may include immature queens, while in the present study, the measurements in the mature queens aged less than 1 year, or due to breed variations none of other references refer to any variation between right and left mature queen's ovaries on age basis.

The means of length of right and left uterine tubes in the present study are similar to the results obtained by [11], where uterine tube length was (50-60mm).

It is worthy to mention that none of any reference refer to the variation in the lengths of the right and left uterine horn, but [12], recorded same results in Arabian she camels which has the same 'Y' shape uterus, another explained the same findings as that incidence of pregnancy in left uterine horn is greater than right one [10], and the confirmation of this result as fact in cats, need more studies of more samples either live or postmortem examination.

The seasonal variation in our data of the uterine body and cervix are in agreement with result of [13], as fact that the uterine horn is place of implantation, so it is influenced with the physiological sequences of estrous phase, and that interpret that the lowest measurements in this study was recorded in season of anestrous (Autumn and Winter), while the variation in measurement was observed in other seasons according to the incidence of different reproductive stages. The measurements of uterine body and cervix are similar to those reported by [10, 11] .

## REFERENCES

- Wilson, D. E. and Reeder, D. M. (2005). *Mammal Species of the World. A taxonomic and Geographic Reference.* (editors). (3rd ed), Johns Hopkins University Press, p. 547.
- James, A. E. (1995). *The Laboratory Cats. ANZCCART News*, 8(1):1-2.
- Pope, C. E.; Crichton, M. G.; Dumas, C. and Dresser, B. (2004). Birth of Domestic Cat Kittens of Predetermined Sex After Transfer of Embryos Produced by Invitro Fertilization of oocytes with Flow Sorted Sperm. *Theriogenology*, 71(5):864-871.
- Van Aarde, R. J. (1983). Demographic Parameters of The Feral Cat *Felis catus* Population at Marion Island S. Afr. J. Wild. Res., 13(1).
- Steel, R. G. D. and Torrie, J. H. (1980). *Principles and Procedures of Statistics* .



Abiomedical Approach ,2<sup>nd</sup> edi. MCG  
raw .Hill international book company.

Del Campo, C. H. and Ginther, O. J.  
(1974).Arteries and Veins of Uterus and  
Ovaries in Dogs and Cats. *American  
Journal of Veterinary Researches*, 35:409-  
415.

Shille, V. M.; Munro, C. and Farmer,  
S.W.(1983).Ovarian and Endocrine  
Responses in The Cat After Coitus .  
*Journal of Reproduction and Fertility*,  
68:29-39.

Johnston, S. D.; Root-Kustritz , M. V. and  
Olson, P. N. (2001). Canine and Feline  
Theriogenology. Philadelphia: WB  
Saunders, pp. 389-474.

Chatdarong, K.; Rungsipipat, A.; Axner, E. and  
Linde, F. C. (2005).Hysterographic  
Appearance and Uterine Histology at  
Different Stages of The Reproductive

Cycle and After Progesterone Treatment  
in The Domestic Cat. *Theriogenology*,  
64(1):12-29.

Bliley, M. and Al-Qara'awy, A. (2005).Practice  
Reproduction in Female Domestic  
Animals .University of Suood the king,  
p.1-22.

Fletcher, T. F. (1974).Anatomy of The Pelvic  
Viscera .Veterinary Clin North American,  
4:471-486.

Al- Delemi, D. H. (2007). Anatomical.  
Physiological, Bacteriological and  
Pathological study in Iraqi She Camels.  
Doctoral Thesis. Vet. Med. College,  
University of Baghdad, Iraq.

Reece, W.O. (1997). Physiology of  
Reproduction in Domestic Animals,  
(2ed).Lippincott Williams & Wilkins, pp.  
390-397.

# دراسة تشريحية للجهاز التناسلي للقطط السائبة في العراق

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أجريت الدراسة الحالية لمعرفة بعض جوانب التكاثر في القطط السائبة في العراق ، حيث جمعت 46 عينة جهاز تناسلي من إناث قطط تم اصطيادها للفترة من كانون الأول ٢٠٠٨ إلى كانون الأول ٢٠٠٩. تم تقسيم العينات إلى عينات حيوانات حوامل وغير حوامل التي بدورها قسمت إلى أجهزة تناسل سليمة ظاهريا وأخرى تحوي على علامات مرضية ظاهرية .

أظهرت النتائج خلال فترة الدراسة إن معدل الطول والعرض والسلك للمبيض الأيمن والأيسر كانت بين إبعاد كلا المبيضين أو بين المعدلات في الفصول المختلفة . كان معدل طول قناتي البيض اليمنى واليسرى هي ٥.٤٤ و ٥.٥٧ على التوالي مع عدم وجود فرق معنوي ( $P \geq ٠.٠٥$ ) بين معدل طول القناتين أو بين معدلات فصول السنة المختلفة ، كما بينت الدراسة إن معدل طول وقطر قرني الرحم الأيمن والأيسر هو ٤٨.٤٢ × ٥.٤١ ملم و ٥٤.٤٣ × ٥.١٤ ملم على التوالي مع وجود فرق معنوي ( $P \leq ٠.٠١$ ) بين إبعاد القرنين المختلفين وبين معدلات الإبعاد في الفصول المختلفة ، كذلك كانت معدلات طول وقطر جسم الرحم هي ٢٢.٧٥ × ٥.٢٩ ملم و ١٣.٢ × ٨.٧٢ ملم على التوالي مع وجود فرق معنوي ( $P \leq ٠.٠١$ ) بين الإبعاد خلال فصول السنة المختلفة.