

## Pathological and anatomical abnormalities affecting buffalo cows reproductive tracts in Mosul

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### Abstract

A study was conducted to assess the type and prevalence of abnormalities occurring in the female reproductive tracts of 405 buffalo cows slaughtered at Mosul abattoir. Out of the 405 buffalo genital tracts examined, various abnormalities with different degrees of severity were observed in 216 (53.3%) of cases. Twenty two (5.4%) were pregnant and the remaining 41.2% (167/405) were macroscopically normal. The most common abnormalities encountered were endometritis 50 (12.3%), ovarobursal adhesions 26 (6.4%) and hydrosalpinx 20 (4.9%). Other abnormalities recorded were follicular cyst, luteal cyst, cystic corpus luteum, paraovarian cyst, ovarian sarcoma, inactive ovaries, senility anestrus, pyosalpinx, hemosalpinx, obstruction of oviduct, salpingitis, double oviduct, hydrometra, mucometra, pyometra, perimetritis, parametritis, uterine edema, perimetrial adhesions, parametrial adhesions, parauterine abscess and uterine tumor. Histopathological examinations in this study revealed that reproductive tract lesions seem to be an important problem with possible subsequent infertility and sterility in buffalo cows leading to animals slaughtered.

**Keywords:** Reproductive tract, Abnormalities, Endometritis, Hydrosalpinx, Buffalo cow.

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### الإصابات المرضية والتشريحية للأجهزة التناسلية لإناث الجاموس في الموصل

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### الخلاصة

تهدف الدراسة الحالية لتسجيل نوع وانتشار الإصابات المرضية في العينات التناسلية لإناث الجاموس في الموصل. تضمنت الدراسة فحصاً وتقييماً ٤٠٥ عينة تناسلية لإناث جاموس ذبحت في مجزرة الموصل. وجدت حالات إصابات مختلفة بالدرجات المختلفة من الشدة في 216 (53.3%). وجدت ٢٢ عينة (٥,٤%) حوامل و ١٦٧ (٤١,٢%) كانت طبيعية عيانياً. وتبين أن أكثر حالات التشوهات شيوعاً كانت التهاباً لبطانة الرحم ٥٠ (١٢,٣%), موه قناة البيض ٢٠ (4.9%) والالتصاقات المبيضية الجريبية ٢٦ (6.4%). حالات التشوهات الأخرى المسجلة كانت تكيس المبايض الجريبية, تكيس المبايض اللوتيني, تكيس الجسم الأصفر, كيسات جنيب المبيض, ورم مبيضي, مبايض خاملة, انعدام شبق الشيوخة, تقيح قناة البيض, دموي قناة البيض, انسداد قناة البيض, التهاب قناة البيض, قناة بيض مزدوجة, موه الرحم, تقيح الرحم, وذمة الرحم, التصاق جنب الرحم, خراج جنب الرحم وورم رحمي. أوضحت الدراسات المرضية النسيجية بان آفات القناة التناسلية مشكله مهمه حيث تؤدي إلى العقم المؤقت والدائمي مما يسبب ذبح أعداد كبيره من الجاموس.

## **Introduction**

Buffalo production plays an important role in Mosul economy. Buffalo cows are the source of milk and future herd expansion, their slaughter is often associated with a reduced reproductive efficiency (1). The extent to which reproductive wastage reduces production efficiency is not well documented; for example there is currently no information available regarding the proportion of buffaloes having reproductive problems at the time of slaughter or the percentage of culling rate due to genital disorders. Generally female animals are culled and sent to slaughterhouse either because they are uneconomic to maintain or else because they have disease problem. Hence, abattoirs are a good source for studying pathological lesions of buffalo reproductive organs that are severe enough to cause infertility and even sterility (2). Investigation of buffalo reproductive abnormalities based on abattoir survey of specimens provide information on prevalence of reproductive disorders and their incidence. Despite this, no study has been conducted in Mosul on the occurrence of reproductive tract abnormalities based on slaughterhouse materials.

The present study was conducted to determine the extent of reproductive tract abnormalities present in buffalo cows slaughtered in Mosul and percentage of pregnancies between slaughtered buffaloes, as well as, determination of causes which might influence the rate of reproductive tract lesions.

## **Materials and methods**

Buffalo reproductive organs were collected twice weekly from January 2005 to August 2007 from Mosul abattoir. No information regarding the identity and history of the animals included in this study. The genital organs were transported in plastic bags to laboratory at the college of veterinary medicine for examination within two hours of collection. All cases were examined for presence of fetuses. Then the vagina, uterus and uterine tubes were visually inspected for cross lesions. The vagina and uterus were opened up to utero-tubal junction and examined. The patency of each oviduct was checked by injecting a colored fluid (Indian ink) near the junction of the uterine tube with the corresponding uterine horn. Free flow of the fluid considered indicative of non obstructed oviducts. Ovaries were inspected for cross lesions and the number of corpora albicantia (CA) and side of the ovary with corpus luteum (CL) recorded. A pair of ovaries with either a corpus hemorrhagicum (CH), a large CL and > 5 mm follicle (s) in diameter or a regressing CL with follicle (s) > 6 mm in diameter were classified as active and the animals as cycling. When there was no CL or CH or the presence of a regressed CL without > 5 mm in diameter follicle (s), such

ovaries were classified as inactive and the animals as non-cycling. A regressing CL coupled with an incomplete involuted uterus was classified as post-parturient anestrous. Corpora albicantia replacing the corpora lutea of pregnancy are large and tend to persist indefinitely (3). They are more prominent in buffaloes, and can therefore be used to estimate the parity of an animal (4). An animal with more than 7-10 CA and there was no CL or CH and without > 5 mm diameter follicle (s) was regarded as being in anestrous due to old age or senility.

## **Results**

Reproductive organs from 405 animals were examined; 5.4 % (22/405) of the animals were pregnant, 41.2% (167/405) were cycling. Various abnormalities with different degrees of severity were observed in 216 (53.3%) of cases. The prevalence of the various genital tract abnormalities of buffalo cows are presented in Table 1.

### *Ovarian abnormalities*

Follicular cysts (Fig.1) are recorded in 6 (1.5%) cases. The average diameter was  $32.8 \pm 1.3$  mm. Luteal cysts (Fig.2) was diagnosed in 1 (0.2%) buffalo cow. Cystic corpora lutea were encountered unilaterally in 5 (1.2%) cases. The corpora lutea had an average diameter of the cystic cavity in the center of the corpora lutea varied considerably from 6 to 18 mm. Twenty six (6.4%) cases had ovarobursal adhesions (Figs. 3 and 4). The severity of ovarobursal adhesions ranged from mild strands of connective tissue between the ovary and the bursa (34.6%) to severe adhesions (65.4%), when the ovary was completely encapsulated in fibrous tissue. Paraovarian cysts were found in 18 (4.4%) of the cases, they were generally single (Fig. 5), but double and triplet (Fig. 6) were also recorded. These cysts were filled with thick mucoid fluid. One ovarian tumor (Fig. 7) was examined histologically and was confirmed to be ovarian sarcoma. Out of 405 examined genital tracts, 6 (1.5%) were found to be inactive ovaries. While 5 (1.2%) were found as senility anestrous.

### *Oviductal abnormalities*

Hydrosalpinx (Figs. 8 and 9) was found in 20 (4.9%) cases. In these cases dilatation of oviduct due to clear amber fluid accumulation were detected. In 8 cases extreme dilatation were observed with the oviduct having maximum diameter of 30 mm. Pyosalpinx (Fig. 10) was recorded in 9 (2.2%) characterized by dilatation of the oviduct due to thick whitish-yellowish pyogenic fluid. Three cases (0.7%) of oviducts filled with bloody discharge were recorded. Obstruction of oviduct was observed in 6 (1.5%) cases and salpingitis was found in 5 (1.2%) cases. Adhesions between mesosalpinx and perisalpingeal tissues (Fig. 11) were observed 7 (1.7%). One case (0.2%) of double oviduct (Fig.



Fig.1 Follicular cyst A-right ovary, B-left ovary.



Fig. 2 Luteal cyst in the right ovary.



Fig. 3 Complete ovarobursal adhesions.



Fig. 4: Complete adhesions of the reproductive tract.



Fig. 5 Single para-ovarian cyst.



Fig. 6 Multiple paraovarian cysts.



Fig. 9 Unilateral hydrosalpinx in the right oviduct.



Fig. 7 Ovarian sarcoma in the right ovary.



Fig. 10 Pyosalpinx in the right and left oviducts.



Fig. 8 Bilateral hydrosalpinx.



Fig. 11 Adhesions between mesosalpinx and perisalpingeal tissues.

12) was found in the left side of the tracts examined. Histological examination confirmed the diagnosis of double oviduct.

#### *Uterine abnormalities*

One case (0.2%) of hydrometra (Fig. 13) was recorded. Uterus was thin-walled due to accumulation of clear and watery fluid (about 300-350 ml) in the lumen of corpus uteri and both uterine horns with stenosis of the cervical lumen. This lesion was accompanied by atrophy of caruncular and follicular cyst in the right ovary. Mucometra were found in 3 (0.7%) cases, accumulations of 200-300 ml of clear mucinous fluid were detected in the lumen in corpus and cornu uteri. Mucometra was accompanied with follicular cyst and cystic corpus luteum in 2 cases. Two cases of pyometra (Fig. 14) were recorded. In these cases, accumulations of thick dense whitish-yellowish pus discharge of 300-500 ml were detected in uterine lumen. Inflammatory changes of endometritis were found in 50 (12.3%) and classified according to histological examination as; chronic (Fig. 15) endometritis (76%; 38/50), subacute (Fig. 16) endometritis (18. %; 9/53) and acute (Fig. 17) endometritis (6%; 3/53), while metritis cases (2.7%; 11/405) were of the chronic type of inflammation. All perimetritis cases (1.5%; 6/405) were characterized by increased thickness of uterine serosa with yellowish colored pus accumulation. Adhesions between vaginal serosa and rectum (Fig. 18) were observed. The parametritis cases (0.7%; 3/405) observed with severe abscess and yellowish colored content and hard consistency were found in the ligamentum lata and ligamentum intercornuale. One case of uterus didylphs was recorded. This defect is characterized by presence of completely separated cervixes, each one leading to a separate uterine horn (Fig.19, A and B).



Fig. 13 Hydrometra with follicular cyst



Fig 14 Pyometra in the buffalo uterus.



.Fig. 12 Double oviduct.



Fig. 15 Chronic endometritis showing extensive fibrosis around BV and endometrial glands (H&E X20).

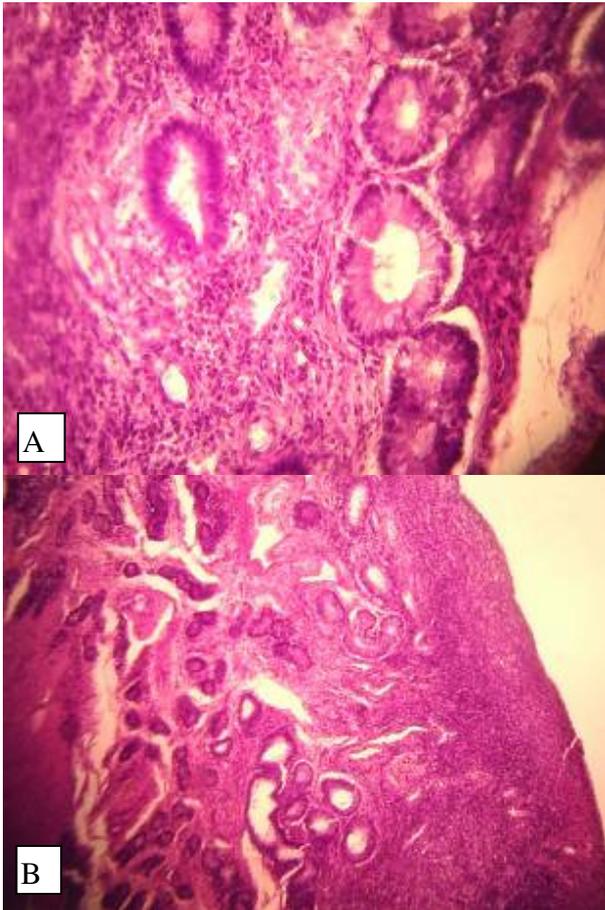


Fig. 16 Subacute endometritis, A- Infiltration of mononuclear cells. (H& E X 400), B- hypertrophy and thickening of blood vessels and infiltration of mononuclear cells (H& E X 200).

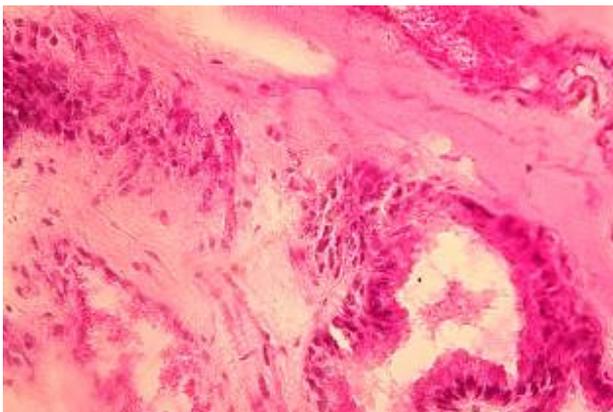


Fig. 17 Acute endometritis note infiltration of PMN cells, exudates of mixed cell types immediately beneath the epithelial layer, and obvious vascular changes (congestion, thrombosis and hemorrhage) (H&E X 400).



Fig. 18 Adhesions between vaginal serosa and rectum.

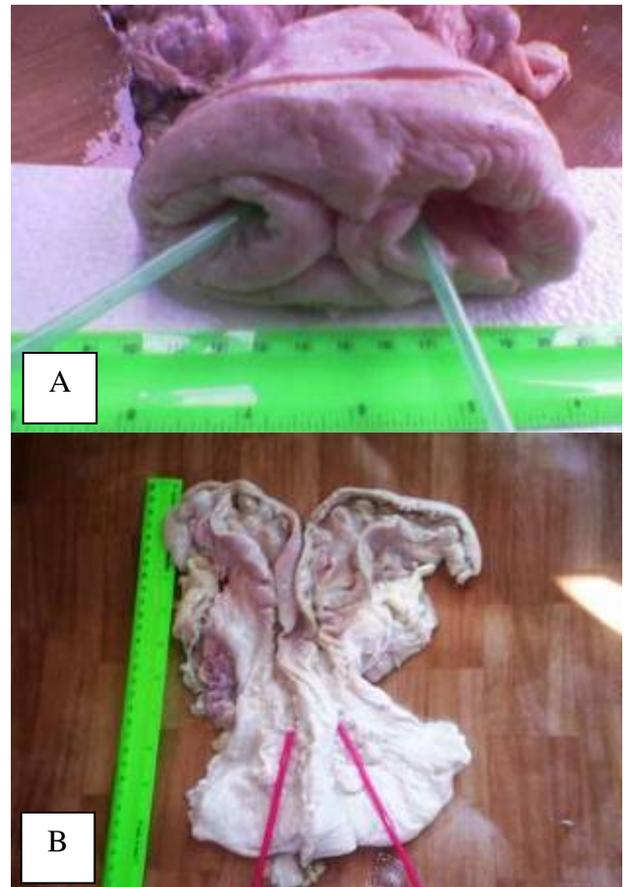


Fig. 19 A-Buffalo heifer reproductive tract showing two cervical canals, B- two cervical canals leading to separate uterine horns.

Table 1. Incidence rate of various kinds of abnormalities in the reproductive tracts of buffalo cows.

Ovary				
Abnormalities	No.	%	R	L
Follicular cyst	6	1.5	4 (0.9)	2 (0.5)
Luteal cyst	1	0.2	1 (0.2)	0
Cystic corpus luteum	5	1.2	1 (0.2)	4 (0.9)
Paraovarian cyst	18	4.4	14 (3.5)	4 (0.9)
Ovarobursal adhesions	26	6.4	15 (3.7)	11 (2.7)
Ovarian sarcoma	1	0.2		
Inactive ovary	6	1.5		
Senility anestrus	5	1.2		
Total	68			
Oviduct				
Abnormalities	No.	%	R	L
Hydrosalpinx	20	4.9	15 (3.7)	5 (1.7)
Pyosalpinx	9	2.2	6 (1.5)	3 (0.7)
Hemosalpinx	3	0.7		
Obstruction	6	1.5		
Salpingitis	5	1.2		
Adhesions-salpingitis	7	1.7		
Double oviducts	1	0.2		
Total	51			
Uterus				
Abnormalities	No.	%		
Hydrometra	1	0.2		
Mucometra	3	0.7		
Pyometra	2	0.5		
Endometritis	50	12.3		
Metritis	11	2.7		
Perimetritis	6	1.5		
Parametritis	3	0.7		
Uterine edema	5	1.7		
Perimetrial adhesions	3	0.7		
Parametrial adhesions	2	0.5		
Parametrial abscess	1	0.2		
Uterus didylphic	1	0.2		
Total	88			

## Discussion

Genital abnormalities play an important role in animal breeding either by causing infertility or sterility and thus inflict heavy economic losses. The prevalence of abnormalities of the reproductive tract of buffalo cows in this investigation 216 (53.3%) is lower than that found by (5), who reported abnormalities in 67.3% of the southern Iraqi buffaloes slaughtered in Basra. However, it is comparable to the findings of (6) and (7) who reported

47.9% and 52%, respectively. On the other hand, higher prevalence rate of 62% and 80% were reported by (8) in Canada and by (9) in Pakistan of dairy cattle. These variations could be attributed to the differences in breed, management, geographic environment and level of nutrition.

The prevalence of ovarian cyst recorded in this study is comparable with those of (10, 11) who reported 5.4% and 3.8%, respectively. However, the prevalence in the present study is lower than that of other previous reports, which varied from 6% to 30% (8, 12, 13). Breed, age, level of milk production, feeding, management and exercise are factors, suggested as influencing the prevalence of cystic ovaries in cattle (14). In dairy cattle cystic ovaries prolongs the postpartum interval to first estrous and conception in about 10-30% of dairy cows (15).

The frequency of paraovarian cyst in the present study is similar to these (16), who reported 4% in Jordan cattle. In some cases of paraovarian cyst were observed on the surface of the oviduct and extended pressure on it. This is in line with the reports of Roine (12), who checked for the blockage of the lumen by flushing.

The prevalence of ovarobursal adhesions obtained in this study is in agreement with those of (5, 6), who reported 5% and 10.4%, respectively. However, it is lower than those of (7, 13), who reported 11% and 11.6%, respectively. Although the exact mechanism by which adhesions develop is unclear (3), extreme adhesions have probably resulted from pregnancy complications that include retained fetal membranes and endometritis (17). Mild adhesions could result from non-infectious conditions such as physical trauma as a result of rough manipulation (18). Localized abdominal infections such as omphalophlebitis and peritonitis are also suggested cause this condition (14). The adhesions involved the right ovary more than the left but bilateral cases were also observed this study. This is in agreement with the findings of several workers (8, 16, 19, 20). This difference may be attributed to the more active of right ovary (3). Extensive adhesions leading to the obliteration of the ovarian bursa, blockage of the abdominal opening of the infundibulum or extensive coverage of the ovarian surface with fibrous tissue will certainly interfere with ovulation. This in turn may lead to infertility or even sterility depending on extent and on whether the adhesions are unilateral or bilateral.

In the present study, hydrosalpinx and pyosalpinx were accompanied with ovarobursal adhesions and chronic endometritis. Results of the present study indicated a high prevalence of hydrosalpinx when compared to the Iraqi southern breeds (5, 6). However, this disagreement can be accounted for largely, due to the high prevalence of toxic puerperal metritis and chronic metritis as founded by previous studies (21, 22). These two reasons may explain the high prevalence of hydrosalpinx in Iraqi northern

buffaloes. The obstruction in the lumen of the oviducts resulted in accumulation of fluid. It is tempting to attach some special significance to the association of endometritis with the occurrence of hydrosalpinx, and to suggest some contributing role in the production of severe inflammation in the endometrium extended to the utero-tubal junction. This theory could be confirmed by the results of the present study as all obstructions of the uterine tubes examined were near the utero-tubal junction or in the end part of isthmus. These observations are in agreement with Miller and Campbell (23) who claimed that hydrosalpinx is a sequel to salpingitis. In addition, Mastroianni (24) reported hydrosalpinx as a result of some inflammatory process in or around the uterine tubes. While, Ellington and Schlafer (25) opinion that is hydrosalpinx may be congenital disease.

Macroscopic and microscopic findings of endometritis and metritis were identical to previously reported (26) and in agreement with those found by (20) who reported 10.8%. On the other hand, higher incidence rate of endometritis 22.4%, 24.7%, and 25% obtained by (27, 28, 29) in Iranian, Indian and Egyptian buffaloes, respectively. Endometritis and metritis may be resulted from inadequate hygienic conditions on postpartum period, during parturition, retained placenta and traumatic lacerations due to dystocia. While studies concerning incidence of uterine diseases in Iraqi southern buffaloes (5, 6, 30), showed much higher results than the incidence of the present study. However, this disagreement can be accounted for largely, by the differences in the definition of uterine infections between the present and previous studies. Also differences in breed, nutrition and management might play a role in the differences between studies. Results of histopathological studies revealed a high incidence of chronic metritis. These observations were in agreement with Jajo-Azar (31) and Al-Sharum (32). Uterus didelphis or true double cervix recorded in this study is a congenital anatomical defect of the female genital tract of monotocous species, including cattle and humans (33). This defect is characterized by presence of completely separated cervixes, each one leading to a separate uterine horn. The condition has been attributed to failure of fusion of the caudal portions of the paramesonephric ducts during embryonic development, resulting in a double cervix / or a divided uterine funds (3). Noakes et al. (14) claimed that these cases could conceive normally, but may show dystocia due to a fetal limb entering each cervical canal. Case reports of uterus didelphis in cows have been sporadic (34). It is believed to be the first report of uterus didelphis in buffaloes.

In conclusion, reproductive tract abnormalities seem to be an important problem with possible subsequent infertility in buffalo cows in Mosul. The high proportion of endometritis, hydrosalpinx, ovarobursal adhesions and chronic metritis are the major problems in buffalo herds in Mosul leading to slaughtered and economic losses.

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