

Pathological Studies on Reproductive Organs of Zebu Cow

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ABSTRACT

The reproductive tracts of 110 non descriptive cows, collected from Faisalabad abattoir, were studied for biometrical values and pathological changes during disease condition. The average length of right ovary was 2.40 ± 0.06 cm and that of left ovary was 2.31 ± 0.05 cm. The average width of right ovary was 1.15 ± 0.02 cm and that of left ovary 1.14 ± 0.03 cm. The average thickness of right ovary was 1.61 ± 0.04 cm and that of left ovary was 1.52 ± 0.03 cm. The average weight of right and left ovaries was 4.29 ± 0.29 and 3.97 ± 0.24 g, respectively. The average size of right and left horns was 20.69 ± 0.59 and 19.76 ± 0.58 cm, respectively. The average length of circumference and number of cervical rings were 6.0 ± 0.22 , 8.40 ± 0.21 and 4.62 ± 0.09 cm, respectively. The incidence of pathological conditions observed were ovario-bursal adhesions, cystic ovary, cystic corpus luteum, parovarian cysts, teratomas, pyometra, metritis, mummified foetus, mucometra, cervicitis, fibrosity of cervix, tortuosity of cervix and double cervixes. No abnormalities of oviducts were found.

Key Words: Zebu cow; Cervix; Uterus; Ovaries; Pathology

INTRODUCTION

Production potential of dairy cattle can be improved through selective breeding, better feeding, adequate management and increased reproductive efficiency. The precise information about the incidence and economic losses due to abnormalities of the reproductive tract is not available in Pakistan. However, most of the cows reach slaughterhouse for reasons of infertility. Some pathological conditions of the reproductive tract, which lower the reproductive efficiency of cow, have been the subject of different studies.

A lot of work on pathological conditions and biometry of reproductive organs of exotic cows have been done during last few decades. But similar studies on indigenous cows have not been made so far which is of utmost importance. Pathological conditions of ovary seriously interfere with normal functions of the entire reproductive tract, consequently, influencing the reproductive potential of the animal. Zemjanis *et al.* (1961) studied 20,913 genital organs of Holstein, Guernsey, Jersey and milking short horn cows and observed follicular cysts in 4 % and luteal cysts in 1.7 %. Ansari and Hedjazi (1975) at Tehran abattoir found that ovarian cysts were numerous and major cause of infertility. Various degrees of incidence of ovarian cysts (2 to 12%) have been reported (Francos, 1974; Erb & White, 1981; Kaikini *et al.*, 1983).

Histopathological details of ovaries in various disease conditions is scanty, however few reports are available on the histological picture of cystic ovary and various neoplastic abnormalities. Jubb and Kennedy (1970) stated that teratomas were rarely observed in

domestic animals but had been reported in cows.

There are many reports about the biometrical values of the reproductive tracts of cows in different countries of the world but not a solitary report is available in Pakistan. The present study was undertaken in order to establish biometrical values and the incidence of reproductive disorders with a view to determine gross and histopathological changes in the morbid tissues in local breeds of cows.

MATERIALS AND METHODS

Intact reproductive organs of 110 cows of non descriptive breeds and ages were collected from Faisalabad city abattoir. Reproductive organs included ovaries, oviducts, uterine horns and cervixes. Measurements were recorded in centimeters with the help of vernier calliper and measuring tape. Weight was recorded in grams by using Ohaus Triple Beam Balance. Measurements of various organs were made as given below:

Ovary: Length, width and thickness

Uterine horns: Length and circumference

Cervixes: Length and circumference (cervical rings and folds were considered as the number of rings/folds from *os externum* to *os internum*)

Gross and histopathology of all the abnormal reproductive organs were recorded including colour, shape, size and pathological lesions. Small sections from organs showing pathological changes were cut and were fixed in Bouin's solution (Humason, 1972). The tissues were processed through ascending grades of ethyl alcohol,

cleared in xylene and paraffin blocks were prepared. Sections of 5-7 μm thickness were cut and stained with Harris hematoxyline and alcoholic eosin for histopathological studies.

RESULTS

The incidence of various diseased conditions affecting the ovaries and bursae are as under:

Ovario-bursal adhesions. Adhesions were found in eight cases (7.27%), (5 bilateral and 3 unilateral) which were two on right and one on the left sides. Bilateral lesions affecting both the ovaries interfered with physiological functions. One unilateral adhesion on right side was in the form of two fibrous strands connecting the ovary with the mesosalpinx, extending as far as right half of the ovary. In the other, unilateral adhesion on the right side completely enveloped the ovary. Unilateral adhesion on the left side formed a thick band obstructing the oviduct at the site of infundibulum.

Parovarian cysts. Parovarian cysts were seen in two cases (1.81%) on the right side. These were small cysts of 2 mm and 5 mm diameter and were attached to the mesovarium.

Cystic corpus luteum. The alteration was observed in one case (0.9%) on the left side. The cyst was 10 mm in diameter bulged from the surface of ovary and when cut was filled with serous fluid. Furthermore, it was found that the cavity was lined by a dark brownish membrane.

Teratomas. Teratomas were seen in two (1.81%) cases, one was bilateral and the other one on right side. The tumour contained thick slimy material, which contained solid debris and long matted hair along with pasty debris (Figs 1 & 2).

Cystic Ovaries. Cystic ovaries were seen in three cases (2.72%). Two were on both sides and one was on the right side. These cystic follicles varied in size from 10 mm in diameter and were filled with sticky, watery transparent fluid. Five sections were examined. In all the cystic follicles, ovum was absent and granulosa cells were present in 2-3 layers. Granulosa cells and thecal cells exhibited degenerative changes (Figs 3 & 4).

Oviducts. All the reproductive tracts were examined carefully. No abnormality was detected.

Uteri. Seven cases (6.36%) of pyometra were recorded. Both the uterine horns were enlarged in size from a small ball to that of football size. There was epithelial desquamation. Lamina propria was infiltrated with lymphoid cells and congested. Muscular coat was increased in thickness due to proliferation of fibrous tissue (Figs 5 & 6).

Twisted cervixes. Twisted cervixes were found in four cases (3.63%). Spiral twist was observed in one case, while the rests were 'S' shaped.

Double cervixes. Double cervixes were recorded in two (1.81 %) reproductive tracts. From the caudal side, the two independent cervical orifices were observed which

led to the *internal os*. In both the tracts, the cervical canals were normal (Figs 7 & 8).

Biometry. Of 110 reproductive tracts collected, the normal organs were subjected to various biometrical values. These parameters were recorded separately for different organs and are summarized in Table I. Uterine horns and cervical biometrical observations are shown in Table II.

DISCUSSION

Most of the work on reproductive pathology has been done in European countries on western breeds of cattle as reported by Humason (1972) and Erb and White (1981). Such studies on indigenous breeds of cows in Pakistan have not been done so far. Cystic ovary conditions are common and important cause of infertility in cows by causing nymphomania, frequent oestrous periods and anoestrus. Cystic ovary conditions were seen in 2.72 % cases in the present study. The cysts were 10-14 mm in size containing variable quantities of fluid in their antrum. Similar incidence has also been recorded by Zemjanis *et al.* (1961), Elwisky (1976), Perkin *et al.* (1954) who observed cystic ovary condition from 2.2 to 4.0%.

The histological studies revealed that all the cystic follicles showed absence of ovum. Granulosa cells were seen in 2-3 layers, exhibiting degenerative changes along with thecal cells. Similar findings have also been recorded by Jubb and Kennedy (1970) and Miller and Campbell (1978). Out of 110 reproductive tracts two cases of teratoma were recorded. The present findings substantiated with Malik *et al.* (1960) Khan *et al.* (1970) and Rao and Rajya (1976), whose observations ranged from 0.39 to 2.3%. Histologically various structures viz., hair follicle, inflammatory cells including mononuclear cells, lymphoid cells, plasma cells, undifferentiated tissues and bundles of fibroblasts were present. Similar findings have also been recorded by Fox and Langley (1976) and Jubb and Kennedy (1970). This pathological condition may be attributed to genetic factors.

Cystic corpus luteum was recorded in one case in this study. The cyst was 10 mm in size and bulging out from the surface of ovary and contained a serous fluid. Low incidence was also recorded by Elwisky (1976) and Rao and Rajya (1976), though higher incidence of 2 and 7.3% had been reported by El-Sawaf and Schmidt (1963) and McEntee (1958), respectively. The difference might be due to breed variation and hormonal imbalance.

Parovarian cysts were recorded in 1.81% cases. The cysts varied from 2 to 5 mm in diameter. These were attached to the mesovarium. Similar incidence was reported by Rao and Rajya (1976), Alam (1981) and Alam (1984) who observed parovarian cysts in 0.69 to 1.09% cases.

Pyometra had been reported to be as a common pathological condition in cows. Pyometra was recorded in 6.36% cases in the present material. Zemjanis *et al.* (1960)

Fig. 1. Ovarian teratoma



Fig. 2. Photomicrograph of ovarian teratoma showing cellular infiltration and undifferentiated tissue

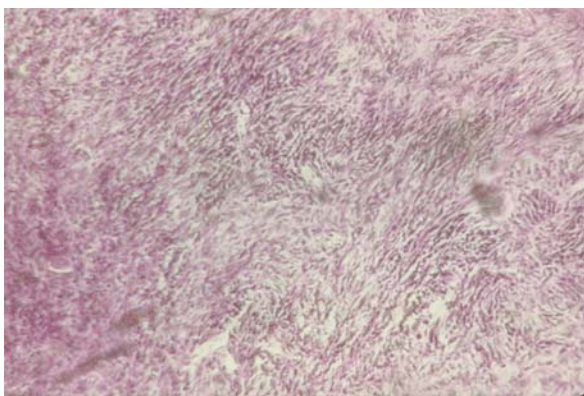
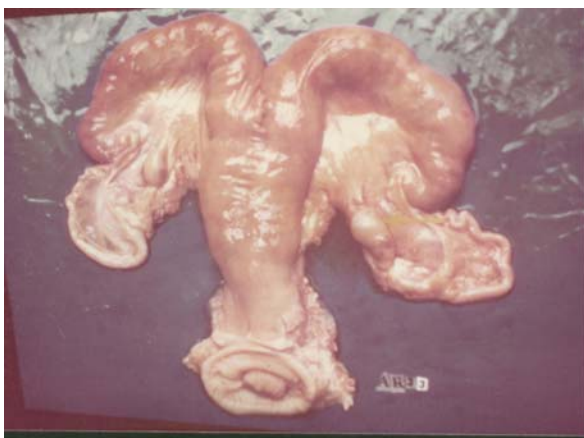


Fig 3. Ovaries with multiple cysts



have reported low incidence of 1.0 and 3.4%, respectively. However, higher incidence of 10.3 and 42% had been recorded by Chung *et al.* (1960) and Cuveas *et al.* (1981),

Fig. 4. Photomicrograph of cystic ovaries showing absence of ovum and degenerative changes in granulosa cells

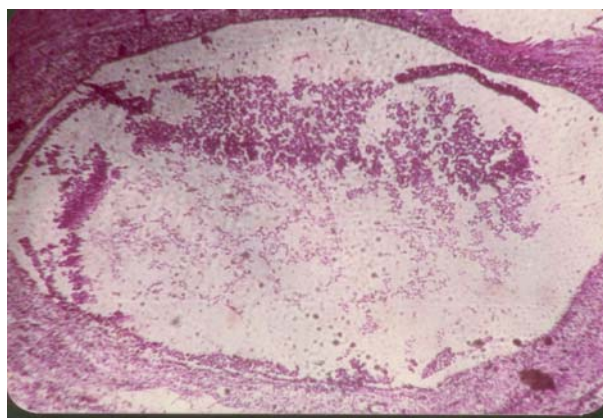
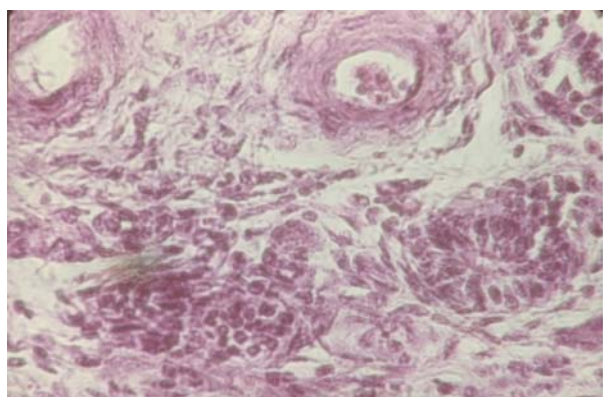


Fig. 5. Uterus with full of pus (Pyometra)



Fig. 6. Photomicrograph of endometrium in pyometra showing leukocytic infiltration and glandular hyperplasia



respectively. Histologically, changes were observed in some cases which revealed that endometrial columnar epithelium merged into squamous epithelium which was

Fig. 7. Uterus with double cervix and pregnancy (left horn)



Fig. 8. Internal structures of uterus showing double cervix



due to metaplasia. The endometrial glands also showed hyperplasia. In early stages of infection the predominant cells appeared to be neutrophils, however, where there were degenerative changes in the endometrial stroma had set in the tissue, was replaced by bundles of fibroblasts and plasma cells (Figs 5 & 6).

Metritis was recorded in 9.09% cases in these studies. Higher incidence had also been recorded from 8.76 to 11.3% by Malik *et al.* 1960, Francos (1974) and Kaikini (1983). Histologically, there was neutrophilic infiltration and ulceration of glandular epithelium in lamina propria. Areas of degenerations were replaced by fibrous tissue proliferation and bundles of fibroblasts in the muscular coat. Similar observations have been reported by Chatterjee *et al.* (1979) and Diewedi and Singh (1975).

Mummified foetus was recorded in the present investigation. Low incidence was also reported by Perkin *et al.* (1954). Histologically, lamina propria showed hyperplasia of columnar epithelium along with proliferation of endometrial glands. Blood vessels were

Table I. Biometrical values of ovaries

| Organs | Mean \pm S.E. | Standard deviation |
|---------------------------|-------------------|--------------------|
| Left Ovary (n=101) | | |
| Length (cm) | 2.31 \pm 0.0578 | 0.5606 |
| Width (cm) | 1.14 \pm 0.0324 | 0.3254 |
| Thickness (cm) | 1.52 \pm 0.0391 | 0.3929 |
| Weight (g) | 3.97 \pm 0.2435 | 2.4476 |
| Right Ovary (n=98) | | |
| Length (cm) | 2.40 \pm 0.0634 | 0.6282 |
| Width (cm) | 1.15 \pm 0.0279 | 0.2761 |
| Thickness (cm) | 1.61 \pm 0.0435 | 0.4377 |
| Weight (g) | 4.29 \pm 0.2966 | 2.9365 |

Table II. Biometrical values of uterine horns and cervixes

| Organs | Mean \pm S.E. | Standard deviation |
|--------------------------|--------------------|--------------------|
| Left Horn (n=88) | | |
| Length (cm) | 19.76 \pm 0.5840 | 5.4781 |
| Circumference (cm) | 7.41 \pm 0.1686 | 1.5816 |
| Right Horn (n=88) | | |
| Length (cm) | 20.69 \pm 0.5956 | 5.6194 |
| Circumference (cm) | 7.52 \pm 0.1775 | 1.6749 |
| Cervices (n=96) | | |
| Length (cm) | 6.00 \pm 0.2234 | 2.1894 |
| Circumference (cm) | 8.40 \pm 0.2145 | 2.1018 |
| Rings (Number) | 4.62 \pm 0.0996 | 0.9760 |

also thickened. Nair and Raja (1975) observed that endometrium was lined by low columnar epithelium, thickening of blood vessels and congestion in endometrial stromas.

Cervicitis was recorded in 6.36% cases. Microscopic studies showed desquamation of the epithelium, lymphoid cell infiltration in lamina propria and excessive proliferation of fibrous connective tissue. Similar changes had also been observed by Nair and Raja (1975) and Deep *et al.* (1980).

Fibrosity and twisted cervix were also noted in the present study. Shokeri (1958) stated double cervix as one of the most important anomaly of cervix. Double cervices were recorded in 2 (1.81%) cases (Figs 7 & 8). The average size of the right ovary was 2.40 \pm 0.06, 1.61 \pm 0.04, 1.15 \pm 0.02 cm and that of left ovary was 2.31 \pm 0.05, 1.52 \pm 0.03 and 1.14 \pm 0.03 cm in length, thickness and width, respectively.

The average length and circumference of right horn was 20.69 \pm 0.59 and 7.52 \pm 0.17 cm, respectively; whereas, average length and circumference of left horn was 19.76 \pm 0.58 and 7.41 \pm 0.16 cm, respectively. There was no remarkable difference between sizes of both the horns in these studies. Robert (1956) also recorded average length of uterine horns from 15.0 to 30.0 cm. However, other workers had recorded higher values from 26 to 40 cm length of uterine horns.

The average length, circumference and number of cervical rings were 6.00 \pm 0.22, 8.40 \pm 0.21 and 4.62 \pm 0.09 cm, respectively. Similar values had been recorded in

different studies (Perkin *et al.*, 1954; Damodaran, 1956; Robert, 1956; Malik *et al.*, 1960; Bhalla & Jain, 1964).

It can be concluded that biometrical values and pathological conditions of zebu cow are similar to other breeds of cattle in the world. However, these pathological conditions should be taken care in management plan of reproductive health of dairy animals

REFERENCES

- Alam, M.G.S., 1984. Abattoir studies of genital diseases in cows. *Vet. Rec.*, 114: 195
- Alam, M.G.S., 1981. Studies on sexual functions and genital malformation in slaughter house material. *Proc. 14th FAO/SIDA International Postgraduate course on Animal Reproduction*. Royal Vet. College, Sweden.
- Ansari, H. and M. Hedjazi, 1975. Malformations encountered in genital organs removed from female cattle at Tehran Abattoir. *Cabiers de Med. Vet.*, 44: 228–30
- Bhalla, R.C., D.P.S. Sengar and G.C. Jain, 1964. Biometry of the genital tract of buffalo-cows. *Indian Vet. J.*, 41: 327–31
- Chatterjee, S.K., N.P. Singh and V.B. Singh, 1979. Spontaneous endometrial lesions in adult repeat breeder buffalo-cows (*Bubalus bubalis*). *Indian J. Anim. Res.*, 13: 103–6
- Chung, U.I., K.W. Lee, Y.B. Kwon and C.K. Chung, 1996. Studies on sterility in dairy cows: incidence in South Korea. *Res. Rep. Off. Rur. Dev. Suwon*, 9: 117–24
- Cuevas, J., J. Valencia and L. F. Cordova, 1981. Occurrence of pathological changes in the genital system of Holstein cows slaughtered in Mexico city. *Vet. Mexico*, 12: 81–4
- Damodaran, S., 1958. Some observations on the measurements of female genitalia of the buffaloes. *Indian Vet. J.*, 35: 227–30
- Deeb, S., M. A. Qamar and M.N. El-Hariri, 1980. Histopathological study of the female reproductive tract of buffaloes with cervical Nabothian cysts. *Assiut Vet. Med. J.*, 7: 101–7
- Diewedi, J.N. and C.M. Singh, 1975. Studies on the histopathology of uterus of Indian buffalo. *Indian J. Anim. Sci.*, 45: 20–4
- El-Sawaf, S. and K. Schmidt, 1963. Morphological changes in the normal and abnormal ovaries of buffaloes with special reference to their function. *Vet. Med. J. Giza* 8: 249–73
- El-Wisky, A.B., 1976. A preliminary study of the genital organs of indigenous cows in Uganda. *Beitrag Zur. Trop. Land. Vet.* 14: 95–107
- El-Wisky, A.B., 1979. Reproductive performance of Iraqi buffaloes, 11. Observation on the genital organs of slaughtered buffaloes. *Beitrag Zur. Trop. Land. Vet.* 17: 85–90
- Erb, H.N. and M.F. White, 1981. Incidence rates of cystic follicles in Holstein cows according to 15 days and 30 days interval. *Cornell Vet.*, 71: 326–31
- Fox, H.F.A., 1976. *Tumour of Ovary*. P. 210–30. Whitefriars Press Ltd. London
- Francois, G., 1974. Observations on frequency of reproductive disorders in dairy herd in Israel. *Deut. Tierar. Woch.*, 81: 135–8
- Humason, G.L., 1972. *Animal Tissue Techniques*. 3rd Ed. W.H. Freeman and Company, San Francisco
- Jubb, K.V.F and P.C. Kennedy, 1970. *Pathology of domestic animals*. p. 487–510, Vol 1. Academic Press New York
- Kaikini, A.S., G.K. Chikhalikar and C.V. Dindorkar, 1983. Reproductive disorders in Holstein Friesian x Gir F1 Cross breed cows. *Indian J. Anim. Sci.*, 53: 556–8
- Khan, B.U., 1970. Incidence of various diseases and disorders of bovine ovary. *J. Rem. Vet. Cps. Hissar*, 9: 2–8
- Luktuke, S.N. and A.S.P. Rao, 1962. Studies on the biometry of the reproductive tract of Buffalo-cows. *Indian J. Vet. Sci.*, 32: 106–11
- Malik, P.S., O.P.S. Sengar and S.N. Singh, 1960. Structure and abnormalities of female genitalia in Indian buffaloes. *Agra Univ. J. Res.*, 9: 271–312
- McEntee, K., 1958. Cystic corpora lutea in cattle. *Int. J. Fort.*, 3: 120–8
- Miller, R.I. and R.S.F. Campbell, 1978. Anatomy and pathology of bovine ovary and oviduct. *Vet. Bull.*, 48: 737–52
- Nair K.P. and C.K.S.V. Raja, 1975. Study on the pathological condition in reproductive organs of cow: pathology of cervix. *Kerala J. Vet. Sci.*, 6: 114–20
- Perkin, J.R., D. Old and D.M. Seath, 1954. A study of 1000 bovine genitalia. *J. Dairy Sci.*, 37: 1158–63
- Rao, P.R. and B.S. Rajya, 1976. Patho-anatomy of the female genital tract of buffaloes. *Indian J. Anim. Sci.*, 46: 125–30
- Robert, S.J., 1956. *Veterinary Obstetrics and Genital Diseases*. 1st Ed. Distrib. Edwards Brothers, Inc. Ann. Arbor, Michigan
- Zemjanis, R., L.L. Larson and R.P.S. Bhalla, 1961. Clinical evidence of genital abnormalities in cows. *J. Amer. Vet. Med. Assoc.*, 139: 1015–8

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