STUDY ON GYNAECO-PATHOLOGICAL DISORDERS AND ISOLATION AND IDENTIFICATION OF MICRO-ORGANISMS FROM THE UTERINE DISCHARGES OF COW

A THESIS

BY

ABDULLAH AL MAMUN

SEMESTER: MARCH – AUGUST/ 2010
REGISTRATION NO.: 0905080
SESSION: 2009-2010

MASTER OF SCIENCE (M. S.)

IN

PATHOLOGY

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HAJEE MOHAMMAD DANESH SCIENCE AND TECHNOLOGY UNIVERSITY, DINAJPUR

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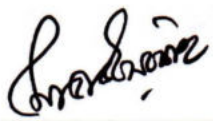

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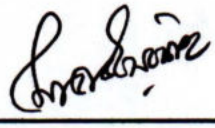

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DEDICATED

TO
MY

BELOVED PARENTS

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The author

August, 2010

ABSTRACT

Cattle are one of the important domesticated animals and easily reared. The local breed of cattle (*Bos indicus*) can easily survive in our environment but the foreign breed (*Bos taurus*) rearing needed so much carefully. Now a day the people of Dinajpur Districts rearing crossbreed cattle which are rearing for both meat and milk purposes. The crossbreed animal infertility problem was high so the farmer culling the animal from their herd and which were slaughtered in the slaughter house in Sadar Thana.This is the first study describing the infertility problem in Dinajpur Districts and is aimed to identify the causes of infertility problem and improve fertility to solving the animal protein requirement as per capital needed. During the period of April/2009 to March/2010, a total of three hundred ten (310) female genital tracts were collected from the Dinajpur Sadar Thana slaughter house. During postmortem examination 199(64.19%) genital tracts pathologically disordered and 73(23.55%) pregnant were found. The most common uterine lesion was endrometritis (31.29%) followed by cystic ovary (8.37%), hyperplasia of ovary (6.77%), pyometra (4.84%), parovarian cyst (4.84%),hydrometra (4.52%), hypoplasia of ovary(4.19%), ovarobursal adhesion(3.55%), vaginal cyst(1.29%) and Haemmorage in uterine in horn (0.66%).Histopathological examination was carried out and found destraction of endometrium which is characterized by huge infilteration of reactive cells, destraction of some uterine gland, in pyometra case presence of neotrophil, presence of protenacious mass in oedematous uterus and ovary, in cystic ovary characterized by the cyst wall appeared to be flattened that might have resulted from pressure exerted by the cysts. In bacteriological examination,50 uterine fluid cultured and found that 30% infected by *Escherichi coli* and 8% infected by *Salmonella spp.*

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ABBREVIATION AND SYMBOLS

^0C	: Degree celcius
%	: Percentage
et al	: And his associates
etc.	: Etectera
EMB	: Eosin Methylene Blue
ELISA	: Enzyme linked immunosorbent assay
Fig	: Figure
g	: Gram
hr	: Hour
H & E	: Hematoxylin and Eosin
HSTU	: Hajee Mohammad Danesh Science and Technology University.
lbs	: Pounds
min	: Minute
ml	: Milliliter
mm	: Millimeter
MS	: Master of Science
MIU	: Mortility Indole Urea
No.	: Number
PCR	: Polymerase chain reaction
Sec	: Second
SS	: Salmonella-Shigella
UV	: Ultraviolet
UK	: United Kingdom
USA	: United States of America
VP	: Voges-Proskaure test
WHO	: World Health Organization

CHAPTER I

INTRODUCTION

Bangladesh is an agriculture based country. Most of the people in this country depend on agriculture. Livestock is an integral part of agriculture and cattle helps to provide important source of animal protein. In our country there are two types of cattle reared; *Bos indicus* and *Bos taurus*. In recent time we found that some people reared crossbred cows are used both for milk and meat purposes. The 100% foreign breed cannot survive in our environment easily. The local breed can easily survive in our environment but production performances not as high as in foreign breed. So recent trend is to choose the cross breed cattle rearing. Sometimes it was reported that the cross breed, local breed and foreign breed are infertile due to defective breeding program, inadequate knowledge of rearing system and there ration formulation. Inadequate nutrition was the major cause of the ovarian atrophy and subsequent anoestrus (Kumi-Diaka, 1981) and some bacterial infection. Gynaeco-pathological disorder is most common which it was characterized by the incidence of smooth ovaries among crossbred cows which appeared lower in local cows (17.73%, v/s 56.60%) (Hussain *et al.*, 1987; Faroo, 2000).

Bangladesh has got about 22.87 million cattle (Department of Livestock Service 2007) population. Every day we 120gm meat /day meat but we are heaving 21gm meat/day. We need 250gm milk/day but we are having 45ml milk/day (BBS, 2007).The economic importance of cattle can not be over emphasized. In each country of the world the cattle product and by-products are utilized for the welfare of human being. Almost whole economy of Bangladesh is based on agriculture and hitherto the cattle population constitutes a major source of draft power. The present cattle populations are not fulfill the

in the diet of majority people of Bangladesh is a well established fact (Talukder, 1982).

Infertility disorder in cows of Bangladesh is commonly seen because of poor nourishment, low quality of semen supply, Rahman *et al.,* (1993) carried out a study on the incidence of reproductive disorders in 2280 cows and heifers in six AI pocket areas namely Hazirhat (Rangpur), Puthia (Rajshahi), Avoynagar (Jessore), Comillav Manikganj and Moshurikhola (savar) during the period from July 1990 to June 1991 and some environmental causes. Gharib *et al.,* (1965) studied the role of environmental variations on infertility in buffaloes and imported cows in Egypt.

Therefore improvement of cattle fertility is a prime target increase cattle population can contribute considerably in solving the human health problems by providing increase animal protein.

It appeared that low reproductive performance in cattle is one of the major problems for the enhancement of cattle Production. In this country majority numbers of heifers and cows are sold for slaughter for their reproductive failure or reduced production efficiency. Thus different reproductive disorders seriously tax the fertility and productive performance of the animal that result in significant economic losses. Reproductive pathology may be of hereditary (Rollinson, 1955; Rao *et al.,* 1965; Faroo, 2000) anatomical disorders of female genitalia (Zemjamis *et al.,* 1961; Mylrea, 1962; Settergren and Gulloway, 1965; Rao *et al.,* 1993; Kubar, 2002; Patel, 2007; Srinivas –Manda *et al.*, 2007) and s various diseases of the female genital tract (Anttilia and Roine, 1972; Berked Leschorn, 1984; Nanda *et al.,* 1989).

Some earlier reports were avaible on reproductive problems in cattle of Bangladesh (Mia and Islam, 1967; Alam and Rahman, 1979; Samad, 1986;

Dewan and Rahman, 1987; Samsuddin *et al.*, 1989; Ahmed *et al.*, 1989; Mollah *et al.*, 1989; Rahman, 1993) however majority of these works pointed out the incidence of reproductive disorders.

Gynaeco-pathological disorder in cattle caused by *Escherichia coli* (Frazie, *et al.*, 2001; Twardon *et al.*, 2001; Kotowski, 2001; McDougall, 2005 Azawi, 2009) played important role of causing metritis, pyometra and other pathological disorder. *Salmonela spp* also causes in uterine infection and leads to abortion,pyometra and endometritis(Pullinger,2010;Saroj *et al.*, 2008). *Salmonella spp* also identified in genital tract (Zhao *et al.*, 2007; Esaki *et al.*, 2004) and may lead to infertility.

The present study was therefore, designed in order to determine the disorder in fertility axis with the following objectives.

Objectives in view

1. To study the gross pathological disorders in female reproductive system of cows from abattoirs
2. Histopathological examination of the ovaries and uterus
3. Isolation and identification of microorganism from the genital tract

CHAPTER II

REVIEW OF LITERATURE

CHAPTER II

REVIEW OF LITERATURE

Mylrea (1962) examined a total 333 of genital organs of cows to detect macroscopic lesions. The author found pathologic lesions in 14.4% cows; 8 of these were pregnant and had eight bursitis or severe unilateral bursitis. Severe multiple lesions occurred in 1.8% of the cows. In the remainder lesions occurred only in one part of the tract, sometimes bilaterally, bursitis and salpingitis occurred in 9.3%, purulent metritis in 1.5%, developmental abnormalities in 0.6%, cystic follicle in 0.3% and miscellaneous lesions in 0.9%. In addition cervicitis was detected in 36% of the corpora lutea in no pregnant, apparently normal cow and in 0.9% of pregnant cow.

Zacchi (1962) observed nymphomania in 202 cows of 1700. Friesians and in 68 of 800 Brown swiss cows. The author recorded ovarian cyst in all cases of nymphomania as follows: in the right ovary in 126 cases in the left ovary in 51 cases and in both ovaries in 91 cases. The condition was most commonly encountered after five months of calving.

Dawson (1963) Conducted postmortem examination on genital organs of 300 cows to detect the causes of infertility. In 59 the uterus appeared to be abnormal on dissection; section from 8 of those and 19 of the remainder contained neither glands nor surface epithelium. From 25 of gross cases and 73 others the site of the glands was marked only by masses by infiltrating leucocytes in histological sections. A further 13 showed cystic development of glands.

Belling (1964) examined normal and abnormal ovarian and par ovarian structures. He illustrated these abnormalities with photographs accompanied by interpretations derived from rectal palpation.

Dawson (1964) conducted his experimental study on fertility relations with the cystic conditions in the oviducts of cows. The cystic enlargements up to 5mm in diameter with the oviduct mucosal folds were found in 12 cows among cattle of which 460 had been discarded. These cysts were recognized both in the mid and upper segments in two cow, however in another cows they occurred in the upper, mid and lower segments of and oviduct only. The author concluded that there was a significant association with the incidence of cystic ovarian disease with the tubular blockage of the oviducts.

Grunert and Fritz (1964) examined cystic ovarian degeneration in relation to follicular hormone in cows. They found that the oestrogen of urine in 25 cows with cystic ovaries was on an average twice as high as in normal oestrus.

Shevchik and Gamchik (1964) diagnosed diseases of the fallopian tubes in cows. They examined 1734 cows in which 68 had specific and 54 animals had nonspecific salphingitis whereas 14 animals showed the presence of hydrosalphinx. Incidence was found to be higher in the right fallopian tube.

Gharib *et al.*, (1965) studied the role of environmental variations on infertility in buffaloes and imported cows in Egypt. They examined 242 buffaloes of one to over ten years old Of 65 abnormalities 11 had bursitis, six chronic salphingitis, two hydrosalpinx, two pyosalpinx, 17 chronic metritis, three catarrhal endometritis, 11 chronic cervicitis, three cysts in the cervix and one or double cervix.

Holy 1965) the author examined ovarian in cows in relation to age, milk yield and some clinical symptoms. He found that cystic ovaries affected about 6% of housed cattle in an area, but incidence varied greatly in different years and herds. Incidence was highest in cows up to eight years of age mainly in high yielding ones in their tourth to sixth lactation period. The cysts were present in both ovaries in 62%, in the left alone was only 7.9%. In 5.5& cases the condition was accompanied by masculization.

Ramamohana *et al.*, (1965) the author examined female genitalia of 200 cows and 100 buffaloes is an abattoir survey for gynecological abnormalities. The recorded abnormalities were atresic cervix, defective uterine development, sub serous cysts, hydrometer, chronic salpingitis, pyosalpinx , bursitis and follicular cystic ovaries, perimetritis par ovarian cysts and dermoid cysts in the ovary in cows and buffaloes.

Schjerven (1965) the author conducted a study on 242 cows with ovarian cysts recovery. He found that recovery from the disease was influenced by the length of the interval between parturition and manual rupture of the cysts.

Settergen and Gulloway (1965) studied the prevalence of genital malformations in female cattle. They examined genital organs of 2230 cows from Jamtland (J) and Vesterbotten (V). They found hypoplasia of avary in 9.8% (J. materials) and 4.8% (V. materials) cases. Malformations of the corpus, uteri, cervix and vagina were found in 4.2& and 2.2%, one or more cysts in anterior vagina in 4.8 and 2.5%, aplasia of the oviduct and par ovarian cysts were found in 1.5 and 2.9% cases respectively.

Bierschwal (1966) The author examined one Guernsey and two Holstein Friesian herds over a period of two and half years and found cystic condition of the ovary in 187 cows. The incidence of ovarian cysts were 17% and in the

respective herds. The highest incidence was found in the month of September to March. Such ovarian cysts associated with anoestrus occurred in 60% of the affected Guernsey and in 67 % of the Holstein- Friesian herds.

Qureshi and Ahmad (1966) they studied the incidence of the various pathological conditions in the genital of cows and buffaloes slaughtered in Karachi. They examined the genital organs of 971 buffaloes and 256 cows. The frequency of pathological conditions in the vagina, cervix and uterus; the distribution of the salpingo-ovarian- bursal lesions; and the distribution of functional pathological abnormalities in the ovary are discussed in relation to fertility. Of the cows, 73% and of the buffaloes 72.8% had some pathological disorders of the genital organs.

Barr and Hashim (1968) they were investigated the causes of infertility in field buffaloes and cattle in E1 Sharkiah province in UAR. Out of 3330 infertile female buffaloes, 81.7% had hypofunction of the ovaries, 12.6% persistent corpus luteum, 3% silent heat, 2.4% endometritis and 0.12% ovarian cysts.

Harch *et al.*, (1968) conducted a clinical study on retained foetal membranes and merits in dairy cows. During 4 years study they examined 360 cows of which 140 animals were treated for retained foetal membranes. Among 140 treated animals 17 developed acute septic merits, 10 developed merits or endometritis. The remaining 113 (80%) animal conceived without further treatment while 80 and 60% cows having septic merits and chronic infections respectively conceived after treatment.

Thain (1968) the author recognised bovine infertility associated with infective agent in Tasmania. The conditions were characterized by the presence of cystic endometrial and cystic ovaries and were considered to be due to the grazing of estrogenic clover posture.

Grunert (1969) reported the occurrence of corpus luteum cysts in cows and their significance as sterility factor. Such corpus luteum cysts were found only after ovulation that differentiated then from follicle luteia cysts and probable causes were inhibition of pituitary function, inflammatory ovarian lesions and uterine influences.

Zafrakas (1969) the author examined 842 sterile cows in kardhitsa region for genital tract diseases during the period from 1965-67. Endometritis was diagnosed in 72, cervicitis in 52, salpingitis in 12 and pnemovagina in 48 cows.

Afanasievs (1971) conducted an experiment on endometrial biopsy and pathological changes in the endometrium in infertile cows. The author examined endometrial biopsy specimens from 427 cows; the examined 56% cows had cystic hyper plastic endometritis, noncystic endometrial, hyperplasia, endometritis or diffuse inflammatory cells with desquamation of the endometrial epithelium and vascular changes. He found 73% of cows with various forms of endometritis due to nonspecific infection.

Seitarisis and Metaxopoulos (1971) they performed a study on the affections of oviduct and ovaries in cows slaughtered in Athens slaughter house. They examined a total of 1097 cows among which 226 were found to be pregnant. They recorded cartain reproductive disorders among the remaining 371 no pregnant cows. Such reproductive disorders included tuberculous salphingitis (34), hydrosalpinx (8), adhesion or the ovarian bursa (9), atrophied ovaries (91), ovarian cysts (24) and cysts of the corpus luteum (91).

Wettke and Jaham (1971) conducted a study on the incidence and treatment of sterility in herds (1019 cattle, 19-92 cows per herd). There were serious fertility problems on all farms; only 52% of the animals were pregnant after insemination (A.I. in 19 herds, civering with bulls in 15) and 49% showed a prolongation on the time between last parturition and conception to 5.6 months, compared with 2.8 months for 125 cows with undisturbed fertility. Uterine and ovarian disorders occurred in 50-60% of the cows after calving. Of 823 cows on 27 of the farms, 145 (17%) were slaughtered in 91 cases because of sterility; 96 animals showed the presence of cystic ovaries of which 43 conceived after treatment.

Antilia and Roine (1972) they were made observation on cystic ovarian disease and its treatment in dairy cattle. Observations based on 605 cases of cystic ovaries in cattle diagnosed during 1968-71 in the practice of the ambulatory clinic. The cyst was located on the left ovary in 30%, on the right ovary in 45% and both ovaries in 22% of the cases.

Gluhovachi *et al.*, (1972) the author performed a study on clinical, histological and cytogenetically aspects of congenital ovarian hyperplasia. They examined 650 Romanian Simmental cows. The incidence of congenital hyperplasia was found to be 4.8% and of the acquired from 11.2%. The clinical, histological, cytogenetic and genealogical differences between the two forms were investigated clinically, the heifer with congenital ovarian hyperplasia remained sexually undeveloped and in a complete anaphrodisisa; cases with the unilateral condition, however developed estrus at irregular intervals and of varying intensity, though these two remained infertile. Nuclei with positive chromatin were found in 70-83% of all heifers with bilateral congenital ovarian hyperplasia.

Onet (1972) the author examined microscopically and histologically the utero-vaginal tract of 665 non pregnant cows after slaughter. He found pathological lesion in 96 (14.4%) animals. Ten cows (1.5%) showed anomalies such as agenesis of one of the uterine horns or persistent hymen. In 54 cows (8%) there wsa (4.5%) showed various inflammatory processes affecting the uterus, vagina and vestibule. Two cows had malignant neoplasia in the uterine wall.

Romaniuk (1972) the author examined 1160 German Black pied cows recorded the incidence of ovarian. During the period of observation he found cystic ovarian disease (COD) in 375 cows. The right ovary alone was affected in 53% of cases, the left in 37% and both ovaries in 10%.

Aranjo *et al.*, (1973) examined a total of 25000 cows in 20 herds to determine the causes of postpartum anoestrus. The authors found 1065 cows did not exhibit the signs of oestrus for more than five months after calving in which 70 had smooth inactive ovaries and 3.3% had uterine infection persistent corpus lnteum.

Vogler (1973) The author examined 1086 cattle; the author observed various reproductive disorders in these cattle such as ovarian cysts (89%), infertile heifers (13%) endometritis associated with ovarian disease (8%) and persistent corpus luteun (6%).

Francos (1974) the author examined 4811 Friesian cows the disorders endometritis (11%), ovarian cysts (2%).

Nair and Raja (1974) The author conducted post mortem examination on 1250 female genitalia of cows and recorded various pathological disorders in ovaries or 82 genitalia. The conditions encountered were hypoplasia (0.08%), cystic graafian follicles (1.44%), cystic corpus luteum (0.08%), inactive ovaries (2.24%), senole trophy (0.08%) nd gibropapillary growth (0.08%).

Whitmore *et al.*, (1974) the author examined 375 Holstein- Friesian cows to detect the incidence of cystic ovaries. The authors found that the average incidence was 5, 16 and 16% for 1st, 2nd and 3rd calving intervals respectively. They concluded that the occurrence of cystic ovaries did not differ much between high (10%) and l9w (12%) milk production or between high (9%) and average (13%) planes of nutrition.

Rao *et al.*, (1975) the author studied the pathology of repeat breeding in cows. Different pathological conditions were found in 44 repeat breeder cows. Such disorders included segmental aplasia of fallopian tube, infantile genitalia, kink cervix, hydrosalpinx, hydrometra, tuberculous endometritis, follicular cysts, bursal adhesions and cervicitis. The significant changes in the uterus were periglandular fibrosis, cystic dilation of glands, lymphoid aggregates in the endometrium alone in various combinations indicating a low grade infection. The most common condition was granular vulvo- vaginitis among repeat breeder cows.

Selunskaya (1975) the author culled 120 cows during his eight years study of 1100 simental and Black pied cows. He examined the cows after slaughter and found the following abnormalities: persistent corpus luteum (44) atrophied ovaries (42), ovarian cysts or degeneration (19), mucopurulent endometritis (13) and oviduct lesions (4).

Kadu *et al.*, (1976) conducted a study on reproductive disorders in 849 farm (435 sahiwal cows and 414 buffaloes) and 1138 field animals (575 cattle and 563 buffaloed). The incidence of anatomical abnormalities was 25.98% in cattle and 24.22%in buffaloes in the field. The authors found fewer (29.8%) functional disorders in cows in the farm than in the field (71.3%) though the incidence among buffaloes was almost similar (67.46 and 68.75% respectively) in farm and field. Parturient disorders were 29 and 24.6% in farm cattle and buffaloes respectively against 0.59 and 2.34% in field animals.

Al- Dahash and David (1977) they were studied bovine genital abnormalities by an abattoir survey. The most commonly encountered abnormality was cystic ovary and 307 (3.8%) genitalia exhibited this condition.

Coster (1977) the author examined histologically of 36 bovine uteruses having non-specific infectious endometritis. The most common lesions were cellular infiltration with only little degenerative changes of the luminal epithelia. Severe endometritis resulted in epithelial necrosis and stromal fibrosis.

Kruif (1977) the author examined 2720 cows in different herds and 20 farms which had recently calved. Of which 438 (16%) failed to reach oestrus within 50-60 days after parturition. The failure was attributed to the following causes: ovary not contained within the uterus (suboestrus) 76%, ovary small and herd (Genuine anoestrus) 9% pyometra 6%, ovarian cysts 7%, and gestation 1%, ovarian cysts and pyometra were diagnosed mosthy in older cows.

Roine (1977) The author examined genitalia of 2010 Finish cows collected form abattoir quarterly over three years period for reproductive abnormalities. The abnormalities diagnosed were ovarian cysts (8.6%), gursal adhesions (2.7%), hydrosalpinx (0.40%), parovarian cysts (2.3%), uterus unicornis (0.2%), uterus dedelphys (0.1%), complete double cervix (0.10%) incomplere

double cervix (1.6%), pyometra and endometritis (1.2%) vaginal cysts (1.0%). Of all the organs examined 18.2% showed these abnormalities. The location or the 172 ovarian cysts was as follows: left (27.9%) right (50%) and in both ovaries (22.7%).The location of 1039 corpora lutea was in left (42.8%), right (56.8%) and in both ovaries (0.4%).

Roine and Salonieme (1978) studied the infertility problem including anoestrus, syboestrus, delayed ovulation, cystic ovaries, repeat breeder cows and endometritis accounted for 20% of all the diseases encountered in 283 herds. Most cases of infertility occurred between December and April but did not correspond with seasonal variation in calving.

Hall (1978) Agglutinating antibodies to somatic "O" and flagellar "H" antigens of S. dublin were measured in the serum of 43 pregnant heifers before intravenous or oral infection with S. dublin and in the serum of 21 uninfected control animals. The data from these animals were analysed statistically and a titre of 1/80, to both antigens, has been interpreted as of doubtful significance and a titre of 1/160 to both antigens, has been interpreted as significantly raised. Animals in which fetal infection occurred after challenge by either the intravenous or oral route developed significant increases in "H" and "O" titres indicating the value of measure "H" titres in the diagnosis of S. dublin abortion. In animals which were infected orally and in which infection appeared to be confined to the alimentary tract the "H" titre did not become significantly raised. Lack of correlation between antibody titres and faecal excretion of S. dublin and persistence of infection in carcasses confirms that the serum agglutination test is of no value in detecting latent carriers.

Alam and Rahman (1979) they were examined genital system of indigenous cows in Dhaka slaughter house of Bangladesh. They recorded one more abnormalities in the genital system of 276 (92%) animals. The commonest abnormalities recorded by the authors were ovarian cysts (129 cows). Other common conditions were granular vulvovaginitis, small contracted cervix, pyometra, cystic corpus luteum and ovarian hypoplasia.

Bostedt *et al.*, (1979) the author performed a study on the occurrence of cystic ovaries in cows. No seasonal incidence of ovarian cysts was detected. During regular health examination diagnosis of ovarian cysts was made within 6 weeks of calving in 21.2% of cows between 7 and 12 weeks in 28% and after that time in the remainder. Nymphomania occurred in 12.5% of cows and the incidence increasing with time after parturition. Cysts of 2 cm or more in diameter usually occurred singly while multiple cysts were seldom found.

Theus *et al.*, (1979) the author studied the clinical, pathological and histological aspects of endometritis in cattle. They examined the endometrium of 30 cows of which some animals showed endometritis, some showed asymptomatic infertility and some normal. The gross pathological changes included marked endometrial hyperplasia which was not always consistent with the clinical findings.

Inubuchi (1978) the author examine Granulosa-cell tumors of 4 cases and theca cells tumor of one case were pathologically investigated. Two cases of granulose-cell tumor represented folliculoid type, forming folliculoids resembled to follicles of an ovary. On the other hand, parenchymatous type of two cases was composed of the cells with atypical characters, and revealed no obvious folliculoid structures. One case of them represented metastatic lesions in many organs. Theca-cell tumor was composed of atypical cells showing various cellular arrangements. Metastatic lesions were also noted.

Ultrastructurally, granulosa-cell tumor cells of folliculoid type contained well developed rough-surfaced endoplasmic reticulums and Golgi- complex remarkably. Concentric lamellar bodies, fat droplets and fine filaments were also noticeable.

Kumi-Diaka (1981) In a study of 3000 cattle of different breeds and origin (Bos indicus and Bos taurus) in Northern Nigeria, an overall 22.7 per cent incidence of anoestrus associated with organic genital abnormalities was observed. Of this 19.3 per cent was due to ovarian atrophy. This was observed mostly during the pre-dry and dry seasons, periods of poor and inadequate feed. The average incidence of atrophic ovaries in the exotic breeds (*Bos taurus)* was 17.1 per cent, while an incidence of 20.4 per cent was observed in the indigenous (*Bos indicus*) cattle; there was no significant difference between the two groups. A relatively higher incidence of functional anoestrus (27.5 per cent) which showed no seasonal pattern and no significant difference between the breeds was observed. Inadequate nutrition was the major cause of the ovarian atrophy and subsequent anoestrus. Other clinical genital abnormalities included hypoplastic ovaries (1.9 per cent), follicular cysts (4.5 per cent), pyometra (4.5 per cent) and freemartinism (0.3 per cent).

Bargai (1982) the author diagnosed 185 cases of cystic ovaries in a large dairy herd during the year of 1971-1981. The manual incidence of cystic ovary in cows varied from 1.5% to 11.6% which appeared at all ages but 70% of cases observed in cows less than 6 years old.

Binemo-Madi and Mposhy (1982) The author Postmortem examination of the complete genital tract from 700 cows aged 3-6 years culled from two ranches revealed pathologic lesions in 55.14%. The high rates of adhesions in ovaries and oviducts were attributed to rectal palpation by unskilled attendants and of bacterial infections in uterus, vagina and vestibule to lack of care of calving animals.

Chatterjee *et al.*, (1982) the author examined 194 cows in 13 organized dairy herds and 795 cows in individual holding in west Bengal. The recorded abnormalities were abnormal termination of pregnancy, cervicitis, endometritis, repeat breeding or anoestrus for brucellosis, compilobacteriosis, leptospirosis and trichomoniasis.

Kirk *et al.*, (1982) carried out a study on bovine cystic ovarian disease (COD). Cystic ovarian disease (COD) was investigated in closed 300 cows dairy herd using dairy herd improvement association and individual health records for a 7 years period (1974-1980). There were 2112 calving by 649 cows during the period and ovarian cysts were detected in 130 cows.

Bostedt and Himstedt (1983) they were examined 30 cows aged 2-12 years at three days interval for two months following abortion due to various infectious and non- infectious causes at 2-8 months of pregnancy. Irregular ovarian activity due to persistent corpus luteum, follicular atresia and ovarian cysts was ovserved in 80% of cow's upto 69 days of such abortion.

Kaikini *et al.*, (1983) investigated reproductive disorders in Holstein Frisian X Gir F_1 crossbred cows. The overall incidence of reproductive disorders was 36.50%. Such disorders were lowest during 3rd lactations (29.17%) and highest during 5th lactations (60.53%). The most frequent disorder was metritis

(8.76%) followed by placental retention (7.06%), cystic ovaries (6.81%) and dystocia (5.35%).

Sinha *et al.*, (1983) the author performed histological studies of endometrial glands and revealed marked differences between fertile and repeat breeder cows and buffaloed. Fertile animal both species exhibited smaller glands and shorter epithelium than those of repeat breeders. In addition, the fertile cows had 76 % glands surrounded by less than two layers of fibroblast, whereas the repeat breeder cows had fewer such glands and higher percentage of their glands was surrounded by more than two layers of fibroblast. In repeat breeder cows more of the glands continued inspissated mass of secretion without cells in the lumen. In buffaloes there was no specific correlation of fertility with either the number of layers of fibroblast around the glands or the contents of the glandular lumen.

Berlel and Leschhorn (1984) they were studied the prevalence of genital diseases in cows and heifers. The authors collected records by health service for cattle for 8059 indeminations carried out during 1981 in 453 herds. They recorded vaginitis and/or endometritis in 248 cows being mild in 59% of cases. Ovarian cysts were found in 172 cows occurring in the left ovary in 27%, right ovary in 36% and both ovaries in 17% cases.

Ahmed (1984) the author conducted an abattoir survey on 980 cows and heifers to investigate various pathological disorders of the reptoductive system in sweden. The pathological disorders tecorded in this study included cystic ovary (20%), ovarian adhesion (4.2%), metritis (5%), salpingitis (2%), double cervix (0.3%), mummified foetus (0.1%), uterine aplasia (0.1%) freemartin (0.1%) testicular feminisation (0.1%), ovarian hypoplasia (1.1%), twin foetus (0.2%) and uterus unicornis (0.1%).

Frie *et al.*, (1984) the author investigated the seasonal distribution of ovarian cysts in German Red pied cattle during the period of January to December. 1984. They diagnosed 684 (1.86%) ovarian cysts in 36707 cases of first insemination in 377 farms. The prevalence of ovarian cysts varied months to months, being significantly higher than average in April and May and significantly lower average in the month or February. Occurrence of ovarian cysts was associated with nymphomania in 69 of cases, relaxed pelvic ligaments in 60% and anoestrus and endometritis in 18% and 7% respectively.

Hussain and Moniraju (1984) they were examined 889 cattle and 1155 buffaloes between january and june 1982 in karnataka to determine the incidence of female reproductive disorders. The authors recorded anoestrus in 42% and various other reproductive disorders in 36% cases. Hpyoplasia of the genital system was observed in 9.7% cows and 15.7% of buffaloes, ovarian cysts in 6.4% and 8.0% and pathological conditions (endometritis, pyometra and vaginatis) in 29 and 9% respectively.

Izquierdo and Angelow (1984) they were examined 118 oviducts from 59 infertile cuban zebu cows. This study revealed acute salpingitis (6), sub-acute salpingitis (15) and chronic salpingitis (61). The disorders were unilateral in 29 and collateral in 24 animals.

Kucharski and zduncayk (1984) they were analysed the records that kept tor 996 calving of cows which showed that the placenta was retained in 52% of calving and it occurred more than once in 34 of the cows. Other disorders were retatded uterine involution (26%), endometritis (41%), ovarian cysts (11%) and ovarian dysfunctoins (11%). These disorders occurred more often in spring and summer than in autumn and winter calvings.

Glatzel and Chadli (1985) they were reported that about half of 3996 pregnant dairy heifer imported into Morocco over a period of eight years had to be culled mostly owing to infertility before they had calved for the second time. The annual incidence of endometritis averaged about 39%. Staphylococci and streptococci accounted for 73% of organisms isolated from uterine discharge.

Kumar *et al.*, (1986) the author performed a survey on reproductive disorders in non descript cattle. In this survey of 810 indigenous cattle 52% were normal and 48% had reproductive disorders. Anoestrus was found in 19%, ovarian hypoplasia in 1.7%, atrophy/ hypoplasia of uterus in 7% underdeveloped/ infantile genitalia 9.5%, cervicitis in 5% and endometritis in 1.2% of the cases. The frequency of various other disorders was each less than 1%.

Rahmathulla *et al.*, (1986) the author examined 331 cows and 181 female buffaloes to determine the main causes of infertility. The recorded causes were failure to conceive (74.7% of cows and 56% of buffaloes), anoestrus (5.4% of cows and 29.3% of buffaloes), endometritis (8.5% of cows and 8.8% of buffaloes). Minof cases of infertility were found to be associated with ovarian cysts, cervicitis, vaginitis and persistent corpus lutem.

Chaffaux *et al.*, (1986) the author examined endometrial biopsy of cows with puerperal disorders. About 25-30% of the examined cows developed endometritis. The study rerealed the occurrence of dilated or cystic glands, periglandular fibrosis, infiltration of mononuclear or polynuclear cells and lymphoid nodules in biopsied materials.

Hussain (1987) The author examined 571 bovine species consisting of 119 local cows, 241 crossbred cows and 211 buffalo cows over a period of two years in order to determine various reproductive disorders. The author reported that the incidence of smooth ovaries among crossberd cows was comparatively

less than that of local cows (17.73%, v/s 56.60%), wheras luteal persistency, cystic ovary, endometritis and repeat breeding wsa conparatively less anong local cows than those of crossbred cows. The author also found that the incidence of smooth ovaries was highest in buffaloes (41.93%) followed by genital hypoplasis (22.58%), luteal persistency (17.74%) and repeat breeders (8.06%).

Rose (1987) the author investigated cases of endometritis occurred on 65 farms in Brittany between October 1985 and April 1986 by testing blood samples and vaginal swabs.

Shamsuddin *et al.*, (1988) the author examined crossbred cows to detect various reproductive disorders. The study was undertaken to find out the relatibe incidence of reproductive disorders after birth in cows of savar Daury Farm. The relative percentage of retained placenta, metritis, pyometra, endometritis, cervicitis, persistent corpora lutea, cystic ovaries and non fyndtional ovaries were 42.26%, 10.38%, 8.15%, 27.39%, 1.52%, 1.17%, 3.13% and 5.98% respectively. They concluded that the persistent corpra lutea and cystic were in right ovaries, whereas higher number of non functional ovaries were found in both the ovaries.

Ahmed *et al.*, (1989) performed a study on the incidence of surgical and reproductive disorders in cattle of Bangladesh. The investigation was conducted at size different places viz.Bangladesh Agricultural University Hospital, Cantral Veterinary Hospital (Dhaka), Jamalpur Veterinary Hospital, Rajahahi Veterinary Hospital, Khulna Veterinary Hospital and Jessote Veterinary Hospital. The authors recorded 12.60% overall incidence of affections of the urogenital system which included rupture of the urinary bladder dye to calculi, phimosis, paraphimosis, posthitis, vaginitis, prolapse of uterus and vagina and dystocia.

Dtsch. Tierarztl. Wochenschr (1991) Genital organs, ureter, urinary bladder, and blood were collected from a 12 year old watusi cow which never exhibited estrous behaviour. Post-mortem findings and hormone assays, however, indicated the incidence of recent estrous cycles. The animal showed a chronic panmetritis, retained fetal membranes or fetal residues, an infected mucometra with cystic glandular hyperplasia, and a leiomyoma. Tubular genitalia, ureter, and urinary bladder exhibited subacute inflammation.

Rahman *et al.*, (1993) carried out a study on the incidence of reproductive disorders in 2280 cows and heifers in six AI pocket areas namely Hazirhat (Rangpur), puthia (Rajshahi), Avoynagar (Jessore), Comillav Manikganj and Moshurikhola (savar) during the periof from July 1990 ti June 1991. The reproductire problems recorded were anestrum (29.69%), metritis (5.66%). Pyometra (6.80%), cervicitis (1.58%), uterine prolapse (1.6%), abortion (4.87%), dystocia (1.6%), vaginitis (2.01%), cystic ovaries (2.45%) and developmental anomalies (1.18%).

Rao *et al.*, (1993) msade a comparative study of the incidence of reproductive disorders among 1860 crossbred Hersy and Holstein cows and heifers that were classified as half bred, three quarter bred or higher (seven- eight). The overall incidence of anatomical functional and infectious (non specific) froms of infertility were 3.0, 56.4 and 40.6 respectively. The highest incidence of specific conditions was for cystic ovaries 49.7% and endometritis 32.8%.

Scheidegger *et al.*, (1993) studied the effect of retained foetal membrane and other puerperal reproductive disorders on postpartum fertility in Holstein cattle. From calving of Holstein cows from 3 high production dairy farma (6500 kg/lactation) in central chile. A total of 822 parturition were selected of which 433 calving showed retention of fetal membranes (RFM), reproductive system infection (RI), ovarian cyst (OC) or recombination of these disorders. Records

of 400 calving were kept as controls. The incid3nce of RFM, OC and RI were 12.6, 13.2 and 23.8% respectively.

Allen H. Garverick (1995) ovarian follicular cysts are anovulatory follicular structures that occur in 10 to 13% of dairy cows. This review focuses upon the dynamics of cyst growth, development, and persistence as well as on associated endocrine and cellular mechanisms. During the estrous cycle of cows, two to four waves of follicular growth occur. From a cohort of recruited follicles, one is selected for continued growth and dominance while the others undergo atresia and regress. In contrast, cysts have long been thought to be static structures that persist for extended periods. Although cysts can persist for extended periods, most regress over time and are replaced during subsequent follicular waves. The next dominant follicle either ovulates or develo6ps into a new cyst. The recruitment of a cohort of follicles from which a cyst develops and the growth rate of cysts to ovulatory size are similar to ovulatory follicular waves, but the cyst continues to grow for a longer pierod.

Chaudhari (2000) The author study to assess the reproductive status, pregnancy wastage and incidence of gross genital abnormalities in cows slaughtered at Maiduguri abattoir, 7375 female genitalia were examined over a period of 36 months from July 1997 to June 2000. A total of 55.49% organs were cyclic while 44.51% were non-cyclic. The cyclic organs included 12.64% at pro-oestrus, 12.0% at oestrus, 13.03% at metoestrus and 17.82% at dioestrus stage of the oestrous cycle. Out of 3283 non-cyclic organs, 1676 were gravid from which 1676 fetuses were recovered. The fetal crown-rump (CR) lengths ranged from 6 to 85 cm with corresponding age range of 60 to 265 days. Juvenile organs with smooth ovaries were 3.78%. The gross abnormalities of the genitalia recorded included cystic ovaries (3.35%), ovarobursal adhesion (2.9%), ovarian hypoplasia (2.2%) and endometrocervicitis (1.7%). Oviductal

occlusion accounted for 0.75%, hydrosalpinx 0.54%, pyometra 0.48%, parovarian cyst 0.26%, hypoplastic uterus 0.24% and uterine cyst 0.08% cases.

Fathalla (2000) the author survey was conducted in Northern Jordan to determine the incidence of gross reproductive tract abnormalities in cattle. A total of 200 specimens of bovine reproductive tracts were collected from cows slaughtered at a local abattoir in Irbid, Jordan between1993-1994. The results of the investigation showed that a large number of slaughtered cows (n=27; 13.5%) were pregnant. A total of 27 (13.5%) specimens had lesions. The predominant lesion of the ovaries was ovarian inactivity (21 cases; 10.5%), ovarobursal adhesions (16 cases; 8%) and cysts (14 cases; 7%). Other, interesting rare pathological lesions of the ovaries were bilateral ovarian haematoma and tuberculosis. Twenty specimens (10%) had uterine lesions, the most common of which were infections, presenting as metritis and pyometra. Seven specimens (3.5%) had oviduct lesions, which included hydrosalpinx, pyosalpinx and haemosalpinx.

Douthwaite (2000) the aims of this study were to assess the accuracy of different common methods of differentiating between follicular and luteal ovarian cysts, and to monitor the response of the cysts to 12 days treatment with a progesterone-releasing intravaginal device (PRID). On the basis of agreement between the different methods, 25 of the 46 cases examined were diagnosed as follicular and 14 as luteal cysts; for the other seven cases the methods disagreed. The use of ultrasound was more accurate in diagnosing follicular cysts than luteal cysts, and combined with plasma progesterone concentrations gave the most accurate assessment of cyst type (92 per cent for follicular cysts and 82 per cent for luteal cysts). The mean (se) plasma progesterone concentration was lower in the cows with follicular cysts than in those with luteal cysts (0·29 [0·05] v 3·90 [0·63] mg/ml; $P<0·05$). Luteal cysts had thicker walls (5·3 [0·04] v 2·5 [0·2] mm; $P<0·0001$), and the wall thickness

of all the cysts was positively correlated with plasma progesterone concentration (r=0·52, P<0·0004). Cows with luteal cysts had more additional follicles greater than 5 mm in diameter (P<0·01). In cows with follicular cysts and other follicles greater than 5 mm in diameter, the mean oestradiol concentration was 7·9 (1·8) pg/ml compared with 24·2 (3·1) pg/ml (P= 0·002) in cows without other follicles greater than 5 mm in diameter on either ovary. At the time of PRID removal, plasma progesterone concentration had increased in the cows with follicular cysts to 1·59 (0·06) mg/ml (P<0·05) and decreased in the cows with luteal cysts to 0·87 (0·01) mg/ml (P<0·05), although there was no change in original cyst structure in 45 per cent of the cases. However, new ovarian structures were frequently observed during the treatment. The overall pregnancy rate for cows with both types of cyst after treatment was 50 per cent after three inseminations, but the first service pregnancy rate was only 18 per cent for cows with follicular cysts and 28 per cent for cows with luteal cysts. After treatment, the fertility of cows with follicular cysts was similar to that of paired herdmates, whereas cows with luteal cysts took 40 days longer to calve again than healthy herdmates. However, the culling rate was higher for cows with follicular cysts (41 v 11 per cent).

Faroo (2000) The author records of 3760 crossbred cows at various locations in Northwest Frontier Province (NWFP), Pakistan, revealed 379 (10.08%) cases of reproductive abnormalities. Cervicitis had the highest incidence at 45.12%, followed by abnormalities of uterus (38.26%), vagina (10.29%) and ovary (6.33%). The frequencies of endometritis and vaginitis were 28.69 and 4.76%, respectively. Ovarian cysts were found in 6.33% of the cases. The incidence of pyometra, vaginal tumors, pyometritis and metritis were 6.53, 1.83, 5.56 and 1.58%, respectively. Genetic group, season and locality had significant effect (P<0.01) on incidence of various reproductive abnormalities. Cows possessing 75% Holstein Friesian (HF) inheritance were the most susceptible to reproductive disorders. Summer was the peak (35.88%) season

mechanism against bacteria of uterus for some causes. It shows the main symptom of metritis and endometritis, and explains the features and diagnostic method of puerperal metritis, postpartum endometritis, and chronic endometritis. It also introduces therapy carried out for each of these inflammations more at present, as well as new therapy that will be possible to practically use in the future. Since the disease state of inflammation of uterus is different by the time of postpartum, it is important to carry out appropriate diagnoses in response to each disease state and give rational treatment.

Twardon (2001) purulent foci in cows' fingers and the occurrence of postpartum disorders like uterine involution, ovarian cysts, endometritis and mastitis was determined. The following aetiologic and pathogenic bacteria from fingers disorders were observed: *Actinomyces pyogenes*, *Pseudomonas aeruginosa, Staphylococcus aureus, Escherichia coli* and *Staphylococcus epidermis*. The first three microorganisms were isolated from the uterine discharges of cows with mucopurulent and purulent endometritis, including pyometra. The fertility of the experimental animals as determined by conception rate, delivery rate and service period were significantly lower than the control group. In bacteriological examination of the inflammatory secretion of the mammary glands from diseased cows (n=35), the same pathogens were recognized from the purulent discharge of the cows' fingers. These results suggest that *Actinomyces pyogenes, Pseudomonas aeruginos*a and *Staphylococcus aureus* could be potential source of purulent processes in the uterus, as well as subclinical and clinical septic mastitis.

Kotowski (2001) the author research was to determine the health condition of the mammary glands and reproductive organs of cows selected for slaughter. The studies were carried out in Poland in 1999 on 84 black-and-white cows aged 3 to 16. It was found that most of the cows subjected to slaughter (31%) were in the 6-8 age bracket and it was at this age that most of the inactive udder

quarters were noticed. Mammary gland irritation was diagnosed in 41 cows, i.e. 48.80%. In the post-slaughter examination fetuses in the uterus were discovered in 6 cows (7.16%) whereas various pathological changes in the reproductive organs were recorded in 49 cows, i.e. 58.34%. The pathological changes more often affected the uterus (59.18%) than the ovaries (40.82%). The bacteriological examination of uterine swabs revealed the presence of potentially pathogenic bacterial flora in all cases. The predominant micro-organisms were of the following types: *E. coli* - 33.33%, *Staphylococcus epidermidis* - 12.5%, *Pseudomonas aeruginosa* - 12.5%, *Enterococcus sp.* - 20.83%. Practical conclusions include: advisable physical check-up of cows prior to slaughter and that chronic illness of the reproductive organs most often affects cows at their peak of performance.

Parmigiani (2001) 8900 dairy cows from farms in 3 large areas of Milan, Cremona and Brescia, Italy, were used in this study. The incidence of genital tract diseases at the post-partum period in the last 5 years was approximatelly 35% with follicular cysts representing about 30% of all cases. The culling rate due to reproductive disorders was 4%. It is suggested that close cooperation between farmers and veterinarians is fundamental for improving productive performance of animals and economic results.

Nobell (2002) Histological examination of genital organs of 16 cows affected with *Besnoitia besnoiti* showed that cysts, with or without surrounding granulomatous reaction, were present in 6 of these animals. The role of these organisms in the pathogenesis of bovine abortions and infertility seems to be minor.

Khurshid Shah (2002) In bovines hydrometra or mucometra develops in untreated cases of cystic ovarian degeneration (Kaikini 1992). Hydrometric uterus containing gallons of fluid associated with retained corpus luteum was

reported in goats, sows and cows (Roberts and Fox, 1968) (Bearden and Fuquay, 1980), (Robert, 1984).

Kubar (2002) the reproductive organs of 20 Estonian Holstein Breed (EHF) cows and 3 heifers, culled because of infertility, were studied by palpation per rectum and ultrasonography. In addition, pathoanatomical and histopathological studies were carried out after slaughter. The histopathological study revealed that small cysts less than 2.5 cm in diameter, often (12 animals) existed in culled cows. These cysts were frequently accompanied by changes in secondary and Graafian follicles, rete ovarii, ovarian stroma, and the endometrium. Three cows had follicular cysts in the ovaries, which were 25-35 mm in diameter. Two cows revealed luteal cysts in the ovaries and one of them had vaginal prolapse. Four animals (one heifer and three cows) manifested tumours or tumour-like malformations: ovarian endosalpingiosis, germ and stromal cell tumour, oviductal myolipoma, and haemangiosarcoma in the uterine blood vessels. One heifer had been culled because of 2 abscesses in the vaginal wall close to the cervix and another had chronic endometritis. The research findings indicated that the most common cause of infertility in the culled cows was cystic degeneration in ovaries (85%), accompanied by pathological changes elsewhere in the reproductive organs.

Rahman (2002) To explore the characteristic tissue changes in the endometrium resulting from different levels of clinical endometritis, samples (n=75) of endometrial biopsy were collected from randomly selected cows (N=174) of the Savar Dairy Farm given scores both for physiological and clinical evidence of pathological genital discharges. Based on histopathological evaluation, different changes in the endometritis were rated (Biopsy rating) and their frequency and strength of association were measured relative to genital discharge scores (GDS). Cows with physiological genital discharge (GDS-1) did not show any pathological changes (BR 1) in the endometrium. A

characteristic change in the endometrium (BR 2) with variable degrees of infiltration of neutrophils, eosinophils (30 PMN) and mononuclear cells (20) including plasma cells and macrophages on hpf (high power field) around uterine glands, with occasional interstitial accumulation of lymphocytic follicles were observed in cows with cloudy to mucopurulent genital discharge (GDS-2). While periglandular fibrosis or encapsulation, subsequent glandular degeneration and cystic dilatation of the lumen, >=20 PMN and >=40 mononuclear cells including epitheloid and plasma cell (BR-3) appeared on endometrial sections from cows with purulent genital discharge (GDS-3). The strength of association between genital discharge score and biopsy rating was regarded as "Good" according to Kappa Test (K=0.616). The results suggest that histopathological evaluation of uterine biopsies could be used as an important supportive diagnostic tool for categorizing different levels of endometritis in cows with clinical evidence of pathological genital discharge.

Kubar (2003) the aim of this study was to determine the pathological changes in the reproductive organs of cows and heifers culled from high-production herds because of infertility. 39 cows and 4 heifers culled because of infertility. After slaughter, the female reproductive organs were studied pathoanatomically. The organ samples were taken and placed in the Rossman fixator. Moreover, a sample from a uterine horn was taken in order to study the uterine secretion microbiologically. After fixing the material, paraffin slides were prepared and stained by the periodic acid-Shiff method (PAS). The histopathological study enabled to divide the cows into two groups. One cow and three heifers represented sporadic cases. Infertile cows, which revealed concurrent changes both in the uterus and the ovaries, formed the largest group comprising of 29 animals. The uterus often revealed changes in the blood vessels of the endometrium and uterine glands. Chronic endometritis was uncommon. The latter was caused by microbes only in two cows. The same animals revealed some changes, mostly cysts, in the ovaries as well. Two cows

of this group had tumours. One had vascular malformations of uterine blood vessels, and the other had an adenoma of the oviduct. The second group was comprised of 10 cows which revealed pathological changes only in the ovaries. Nine out of ten animals had ovarian cysts. Most ovarian cysts were follicular cysts, and only one-third of the animals also had luteal cysts or cysts that revealed at the same time signs of follicular and luteal cysts. Three cows and one heifer had tumours. The latter included the ovarian sex cord tumour, Leydig cell hyperplasia, endovascular angioendothelioma of the ovarian blood vessels, and granulosa cell tumour. In two animals, infertility was caused by vaginal pathology. One cow had vaginal prolapse, and one heifer had vaginal abscesses. Changes in both oviducts had caused infertility in one heifer. To the naked eye, these changes were typical of a papilloma, but the histological study indicated that it was a myolipoma. In one heifer, infertility was caused by uterine pathology (chronic endometritis).

Assey1 (2004),The author examine the Reproductive organs from mature Small East African zebu (SEAZ) heifers and cows slaughtered at the Morogoro abattoir were collected twice a month and evaluated over a period of 12 months. Out of the 402 animals from which reproductive organs were taken, 54% were pregnant, 24% were actively cycling and 22% were non-cycling. Various gross abnormalities were observed in the reproductive organs of about 16% of the cattle, and the major reproductive abnormality in both total and the non-cycling animals was various degrees of fibrous adhesion between the ovary and infundibulum and mesosalpinx. It is concluded that, contrary to common belief, a majority of the female SEAZ cattle that are slaughtered are fertile.

Yener (2004) The 'surface epithelial' tumours, originating from the modified coelomic mesothelial cell covering of the ovary, constitute a group of tumours in female dogs and humans but are uncommon in mares, cats and cows.

Tumours of this group are subdivided into four categories according to their main morphological features: papillary adenoma, papillary adenocarcinoma, cystadenoma and cystadenocarcinoma. Cystadenomas, which appear to arise from the epoophoron and/or rete ovarii, are comparatively rare in domestic animals. This article discusses the occurrence, pathology, histopathology and diagnosis of serous papillary cystadenoma in the ovary of a cow from Turkey

McDougall (2005) Thirty-six (34%) cows had one or more gross lesions which involved the ovary, uterine tube, uterus or vagina. Bacteria were isolated from the uteri of 22 (21%) cows. Isolates included *Arcanobacterium pyogenes* (n=1), *Escherichia coli* (n=1), *Fusobacterium spp.* (n=1), *Haemophilus somnus* (n=5), *Streptococcus acidominimus* (n=12), S. bovis (n=2), S. uberis (n=1) and S. salivarious (n=1). In only five cows were both gross pathology and bacteria detected. There was no relationship between the isolation of bacteria and the diagnosis of gross pathology of the uterus. There were no differences in the degree of histopathological changes in the uteri from the three groups of cows examined, and lesions present were minor. Gross pathological changes and intra-uterine bacteria were found in 34% and 20% of cows, respectively, but the correlation between the two was poor. Histopathological changes were unremarkable, suggesting the bacteriological findings were coincidental, that causative agents of infertility were not present at the time of examination, or that unrelated causes such as nutritional anoestrus may have been responsible for the failure of some cows to conceive.

Esaki *et al.*, (2004) A total of 82 Salmonella were isolated from food-producing animals and tested for antimicrobial susceptibility. Isolates resistant to ampicillin, dihydrostreptomycin, kanamycin, oxytetracycline, chloramphenicol, bicozamycin, nalidixic acid, oxolinic acid and trimethoprim were obtained from healthy animals and diagnostic sample submissions.

Salmonella Dublin was isolated only from cattle and showed resistance to older quinolones.

Abalti1 (2006) the type and prevalence of abnormalities occurring in the female reproductive tracts of 201 Zebu cattle of Fogera type (161 cows and 40 heifers) slaughtered at Bahir-Dar town, north-west Ethiopia. Out of the 201 female genital tracts collected and examined, abnormalities were recorded in 74 (36.8%). The most common abnormalities encountered were ovariobursal adhesion (5.5%),endometritis (3.9%) and cystic ovaries (3.5%). Other abnormalities recorded were ovarian hypoplasia, vaginitis, cervicitis, tortuous cervical canal, mucometra, vaginal cyst, parovarian cyst, hypoplastic cervical rings, cervical cyst, freemartins, closed external cervical os, uterine and oviducts adhesion, cystic uterine tube, remnant of retained fetal membrane and cyst in the uterine wall. The prevalence of the abnormalities was significantly ($p < 0.05$) higher in parous than in nulliparous cows. Moreover, evidence of ovarian cyclicity was found in 51.6% and 30% of non-pregnant parous and nulliparous cows examined, respectively.

Ali *et al.*,(2006) 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 and19.76 ± 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 cervices. No abnormalities of oviducts were found.

Moreira (2006) the present data report the occurrence of adenomyosis in slaughtered cows from the North region of Rio de Janeiro State, Brazil. 27 samples of uterus from zebu cows were collected and individually recorded in the Section of Morphology and Pathological Anatomy/lsa/ccta/uenf.The samples were submitted to histochemical technique and staining with haematoxylin and eosin and Van-Gieson. A score was idealized for adenomyotics lesions. Of the 27 samples, 18 (66.67%) presented adenomyosis and 9 (33.33%) were negative. Ten (55.56%) presented discreet superficial adenomyosis, 2 (11.12%) deep discreet, 1 (5.56%) of the type superficially moderated, 3 (16.67%) deep moderate and finally 2 (11.12%) of the type deep accentuated. The lack of is acceptable description of this dystrophia in other females of domestic animals does not mean a negligence, but a misinter preparation of the lesion of this low commercial value viscera. Besides, the lesion is not demonstrated in endometrial biopsies and associated to processes of clinical significance, as such endometrial cystic hyperplasia; polycystic ovaries, tumour of granular cells, etc. It is important the registration of this pathology, and appropriate study in this species.

Osawa (2006) Clinical and pathological observations were made on a case of pyometra accompanied by a large encapsulated abscess in the perimetrium in a 3-year-old primiparous Holstein cow (body weight: 549kg). With no signs of estrus since calving (on August 19, 2003), rectal palpation was conducted in September 2004, and an indurated softball-sized mass was detected on the left uterine horn. A conspicuous bulge was seen at the lower left of the abdomen when the cow was examined on February 28, 2005, and rectal palpation showed that the uterus had swollen further. Blood biochemistry and bacterial

tests and ultrasonography showed a poor prognosis because of the pyometra with chronic inflammation. Autopsy, performed the following day, revealed purulent inflammation of the endometrium in addition to a giant (100*70*70cm) encapsulated abscess in the perimetrium and a severely atrophied rumen. The encapsulated abscess contained a large amount of creamy to muddy pus and blood clots. Both ovaries had no functional or regressing corpus luteum, and had become atrophied. This was considered to be a case where an abscess that developed in the perimetrium became large, in the process of which causing atrophy of the ovaries and anestrus, and this encapsulated abscess, which eventually grew to a size that occupied most of the abdominal cavity caused systemic symptoms such as total anorexia.

Isobel (2007) Follicular cysts are the most critical reproductive disorder in dairy cows and disturb the normal ovarian cycle, resulting in a prolonged interval from calving to conception. Therefore, this condition causes significant economic losses to the dairy industry. Two direct causal factors for cysts are suggested in this review; ovulation disorder and the delay of regression. Ovulation disorder has been accepted to be a main aetiology of cystic follicle. This seems to be caused by the deficiency of positive feedback of oestrogen to the hypothalamus, leading to the lack of luteinizing hormone surge. On the other hand, if a large anovulatory follicle is regressed immediately after the failure of ovulation, its follicle does not continue to grow, resulting in no cystic follicle being formed. Therefore, it is proposed that another cause of a cystic follicle is the delay (or absence) of the degeneration system of the follicle. This review will introduce these two causes separately, referring to recent advances in understanding the follicular cyst in dairy cows.

Patel (2007) a total of 4188 animals, composed of 2570 buffaloes and 1618 cows, the reproductive disorders were categorized as anatomical, functional and pathological origin. The anatomical abnormalities observed in buffaloes

and cattle were infantile genitalia (9.38 and 5.99%), kinked cervix (0.59 and 3.39%) and uterine adhesion (0.93 and 1.36%, respectively). The percentages of functional form of infertility were anoestrus (27.32 and 24.73%), sub-oestrus (28.99 and 21.38%), cystic ovarian degeneration (1.48 and 6.62%) and repeat breeding (8.68 and 18.79%, respectively). The pathological causes included salpingitis (0.43 and 0.18%), endometritis (5.80 and 2.90%), pyometra (0.78 and 1.86%), metritis (10.38 and 8.90%) and mummification (0.11 and 0.12%) in buffaloes and cattle, respectively. Ovarian tumour was observed only in buffaloes (0.11%).

Manda -Srinivas (2007) The incidence of reproductive disorders in buffalo heifers and cows in Krishna and Guntur districts in Andhra Pradesh, India, was determined during January 2004-November 2005, they examine 1118 (47.70%) was composed of 560 breed able heifers and 558 lactating buffalo cows. The incidence of reproductive disorders was significantly different, with a higher incidence of anatomical (30.36%) and pathological (53.41%) causes in cattle and buffaloes, respectively, while functional causes (46.25%) were equally distributed between species. Endometritis and quiescent ovaries were the most prevalent conditions (63.77%).

Zhao (2007) Three hundred and eighty Salmonella isolates recovered from animal diagnostic samples obtained from four state veterinary diagnostic laboratories (AZ, NC, MO, and TN) between 2002 and 2003 were tested for antimicrobial susceptibilities and further characterized for bla(CMY) beta-lactamase genes, class 1 integrons and genetic relatedness using PFGE. Forty-seven serovars were identified, the most common being S. Typhimurium (26%), S. Heidelberg (9%), S, Dublin (8%), S. Newport (8%), S. Derby (7%), and S. Choleraesuis (7%). Three hundred and thirteen (82%) isolates were resistant to at least one antimicrobial, and 265 (70%) to three or more antimicrobials

Ersbol (2008) The range of influence was estimated for six different regions in Denmark using both methods. The analyses were performed on data collected during 1 year after initiation of the Salmonella Dublin surveillance program providing herd classifications for the 4th year-quarter of 2003 and 2 years later for the 4th year-quarter of 2005. The prevalence of dairy herds with a positive Salmonella Dublin herd classification status in this period had decreased from 22.1 to 17.0%. In non-dairy herds, the prevalence was nearly unchanged during the same period (3.4 and 3.7% in 4th quarter of 2003 and 2005, respectively). For all cattle herds, the range of influence was 2.3-6.4 km in 2003 and 1.5-8.3 km in 2005. There seemed to be no association between the range of influence and the density of herds in the different regions.

Saroj *et al.*, (2008) many virulence phenotypes of *Salmonella enterica* are encoded by genes located on pathogenicity islands. Based on genome analysis, it is predicted that Salmonella pathogenicity island (SPI)-8 is restricted to Salmonella serovars Typhi and Paratyphi A, and SPI-10 to *Salmonella serovars Typhi, Paratyphi, Enteritidis, Dublin* .This study was conducted to investigate the distribution of SPI-8 and SPI-10 among Salmonella isolates from sprouts, fish, water and blood. A total of 110 Salmonella isolates and 6 Salmonella serovars from the Microbial Type Culture Collection, Chandigarh, India, were screened. All isolates belonging to Salmonella serovars Washington, Enteritidis and Paratyphi A had both SPI-8 and SPI-10. All Salmonella serovar Typhi isolates from water and blood had both SPI-8 and SPI-10, whereas isolates from fish contained only SPI-8. SPI-8 and SPI-10 were also detected in only 3 out of 42 isolates belonging to Salmonella serovar Typhimurium. Both SPI-8 and SPI-10 were absent in Salmonella serovars Worthington, Dublin, Paratyphi B and Paratyphi C. These results contradict the predictions from Salmonella genome sequences available in GenBank and indicate that SPI-8 and SPI-10 are widely distributed among Salmonella serovars and that virulence factors other than those on SPI-8 and SPI-10 may be responsible for host specificity.

This is the first report on the distribution of SPIs in Salmonella isolates from India.

Azawi (2009) the author was to study the prevalence of oviduct abnormalities of cow, investigate bacteria accompanying hydrosalpinx, pyosalpinx and salpingitis. In addition, the study was designed to investigate the correlation between bacterial infection of the uterus and oviduct lesions in cow. Bacteriological examinations were performed on hydrosalpinx, pyosalpinx and salpingitis. Hydrosalpinx was found in 28 (6.9%) cases of which 20 (71.4%) were found unilaterally and 8 (28.6%) bilaterally. Pyosalpinx was recorded in 12 (2.9%). Three cases (0.7%) of oviducts filled with blood were recorded. Obstruction of oviducts was recorded in 5 (1.2%). Adhesions between mesosalpinx and perisalpingeal tissues were observed in 7 (1.7) cases. One case of double oviduct was found in the left side of the tract examined. The most prevalent bacteria recovered from hydrosalpinx were *Corynebacterium hemolyticum* and *Actinomyces bovis*, 42.8% and 28.6%, respectively. No correlation was noticed between bacteria isolated from the uterus and hydrosalpinx. The most prevalent bacteria recovered from pyosalpinx were *Escherichia coli, Archanobacterium pyogenes* and *Staphylococcus aureus*, 33.3%, 26.7% and 16.7%, respectively. Higher rates of leukocyte infiltration ($P<0.01$) were observed in the uterine discharge and pyosalpinx than hydrosalpinx. In a conclusion, the current study disclosed that oviductal lesions seem to be an important problem in cows. In addition, there is no correlation between bacteria isolated from uterus and hydrosalpinx. There is a high correlation between bacteria isolated from uterus and pyosalpinx and salpingitis. The occurrence of pyosalpinx and salpingitis is mainly due to bacterial infection. Bacterial isolates from pyosalpinx and salpingitis might be related to ascending infection from the uterus.

Pullinger (2010) *Salmonella enterica* serovar Dublin is associated with enteritis, typhoid and abortion in cattle. Infections are acquired by the oral route and the bacteria transit through varied anatomical and cellular niches to elicit systemic disease. S. Dublin must therefore sense and respond to diverse extrinsic stimuli to control gene expression in a spatial and temporal manner. Two-component systems play key roles in such processes and typically comprise a membrane-associated sensor kinase (SK) that modifies a cognate response regulator.

Martin Sheldon *et al.*, (2010) Escherichia coli are widespread in the environment and pathogenic strains cause diseases of mucosal surfaces including the female genital tract. Pelvic inflammatory disease (PID; metritis) or endometritis affects 40% of cattle after parturition. We tested the expectation that multiple genetically diverse E. coli from the environment opportunistically contaminate the uterine lumen after parturition to establish PID.

CHAPTER III

MATERIALS AND METHODS

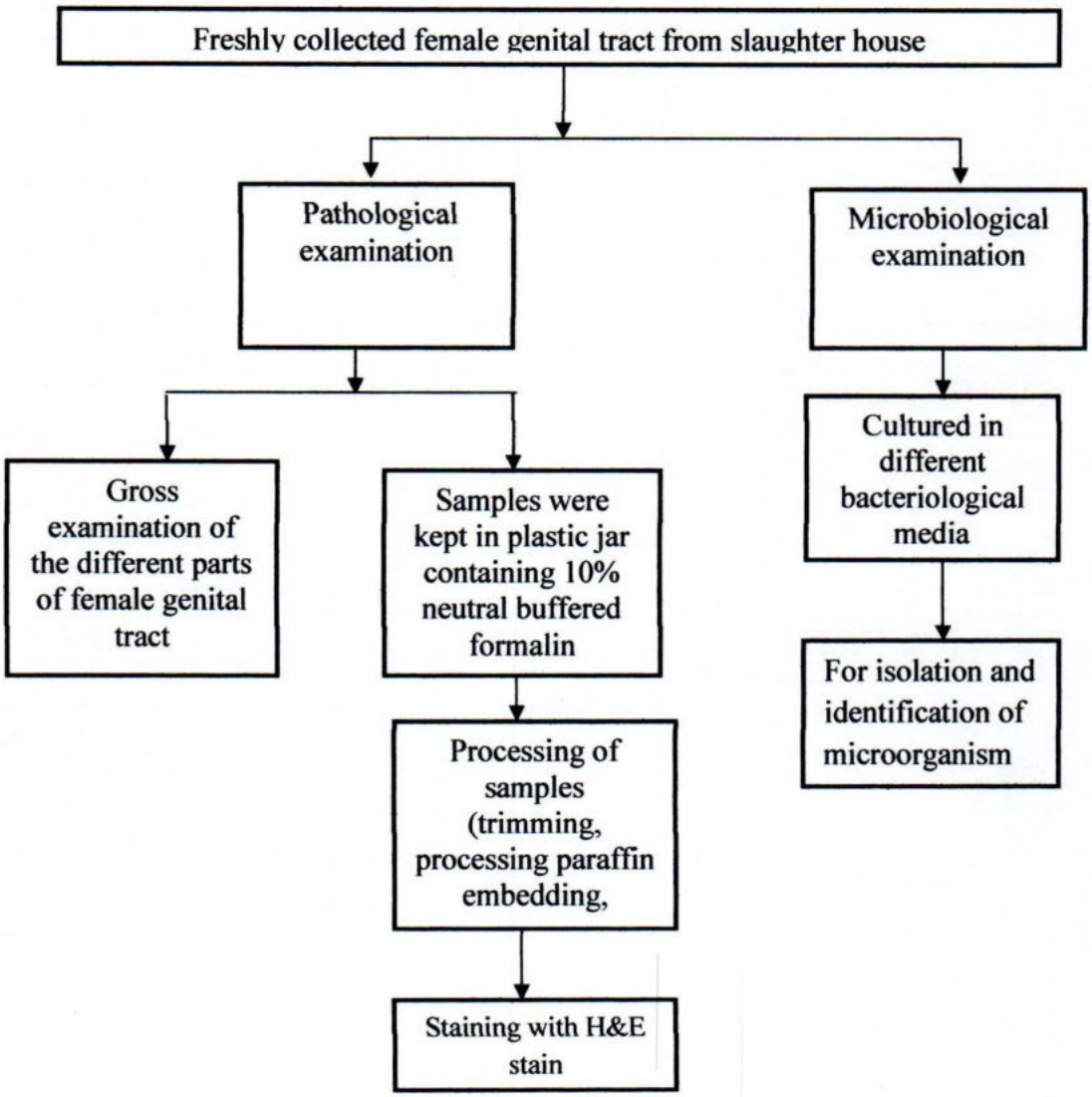
3.1. Experimental area and animals

The investigation was carried out in the Department of Pathology & Parasitology and Microbiology, Faculty of Veterinary and Animal Science, Hajee Mohammad Danesh Science and Technology University (HSTU), Dinajpur. A total of 310 cattle were examined and samples were collected and brought for diagnosis to the laboratory of the Department of Pathology and Parasitology (HSTU). Systemic dissection and investigation were carried out that include the examination of vagina, cervix, uterus, uterine horn, ovary and uterine fluid cultured in bacteriological media in microbiological laboratory. The diagnosis of different diseases or disease conditions was made based principally on characteristics of gross lesions and histopathological study. The followings methods or techniques were used in this experiment.

3.2. Selection of slaughter house area

The female genital tract was collected from the different abattoirs house of Dinajpur districts. The animals were collected with protective clothing using sterile instrument and transferred in the laboratory of the Department of Pathology and microbiology laboratory for necropsy, histopathological examination and isolation and identification of micro organism.

3.3. EXPERIMENTAL DESIGN



Schematic illustration of the experimental design

3.4. Age of the animal

The animal which were slaughtered in slaughter house mostly between the age 6-8years.Some of female young animals were also slaughtered due to infertility.

3.5. Body condition of slaughtered animal

Most of the animal slaughtered animals were ill health. Their weight varied from 70-100kg.

3.6. Gross examination of the female reproductive tract

The gross examination of the female reproductive tract was brought to the Department of Pathology and Parasitology (HSTU).The postmortem examinations of all the cases were performed as soon as the sample and brought to the department. Gross changes were observed carefully and recorded.

3.6. 1. Material required for necropsy examination

- Sample (Female genital tract)
- Scissors
- Forceps
- Gloves
- Musk
- Scalpel
- 10% formalin

3.6.2. Method of Post mortem examination of female genitalia collected from slaughtered animals

In order to diagnose different pathologic disorders a total of 310 female genitalia were collected from Dinajpur Sadar Thana slaughter house. This abattoir study over the period of 12 months starting from April 2009 to March 2010. The entire reproductive tracts were examined carefully following the method of Mc Enttee (1983).

The ovaries were examined for their functional activity as per method described by Ahmed (1992).The ovaries that did not show any developmental medium (10 m.m.) or large (20 m.m.) sized follicle and did not exhibit the presence of corpus luteum were diagnosed as true anestrum. The ovaries which exhibited developmental graafian follicle of medium size were considered as sub-active. Both the ovaries were also examined for the presence of different kinds of cysts and other pathological conditions including ovarobursal adhesions. The uterus also examine and found the presence of a huge amount of mucous and pus, some hemorrhagic lesion. The cervix of both horns was examined for inflammatory changes, and other pathological abnormalities. The fallopian tubes were checked for obstruction or any other abnormalities.

The lesion containing tissue segments were collected in 10% formalin for histopathological studies.

3.7. Histopathological study

During necropsy, various organs having gross lesions were collected fixed in 10% buffered neutral formalin for histopathological studies. Formalin fixed tissue samples were processed and stained as per standard method **(Luna, 1968).**

3.7.1. Materials required for histopathology

Equipment and appliances:

- Samples (Uterus and Ovary)
- 10% formalin
- Chloroform
- Paraffin
- Alcohol
- Tape water
- Xylene
- Hematoxylin and Eosin stain
- Distilled water
- Clean slides
- Cover slips
- Mounting media (DPX).
- Microscope
- Microtome

3.7.2. Processing of tissue for histopathology

1. Collection of tissue and Processing

During tissue collection the following point were taken into consideration-

The tissues were collected in conditions as fresh as possible. Normal and diseased tissues were collected side by side. The thickness of the tissues were as less as possible (5mm approximately).

The tissues (uterus and ovaries) were collected from the slaughtered cattle in the Histopathology Laboratory of Department of Pathology and Parasitology, HSTU, Dinajpur.

2. Fixation: 10% formalin was added in the plastic container. (10 folds of the tissue size and weight) and fixed.

3. Washing: The tissues were trimmed into a thin section and washed over night in running tape water to remove formalin.

4. Dehydration: The tissues were dehydrated by ascending ethanol series to prevent shrinkage of cells as per following schedule.

- 50% alcohol – one hour
- 70% alcohol – one hour
- 80% alcohol – one hour
- 95% alcohol – one hour
- Absolute alcohol – three changes (one hour for each change.)

5. Cleaning: the tissues were cleaned in chloroform for 3 hours to remove ethanol (1 and half hr in each, two changes).

6. Impregnation: Impregnation was done in melted paraffin (56- 60°C) for 3 hours.

7. Embedding: Paraffin blocks containing tissue pieces were made using templates and molten paraffin.

8. Sectioning: Then the tissues were sectioned with a microtome at 5-6µm thickness. The sections were allowed to spread on luke warm water bath (40-42 °C) and taken on a glass slide. A small amount of gelatin was added to the water bath for better adhesion of the section to the slide. The slides containing sections were air dried and stored in cool place until staining.

3.7. 3. Routine Hematoxylin and Eosin staining procedure

3.7.3.1. Preparation of Ehrlich's Hematoxylin solution

Hematoxylin crystals	4.0 g
Alcohol, 95%	200.0 ml
Ammonium or potassium alum	6.0 g
Distilled water	200.0 ml
Glycerine	200.0 ml
Glacial acetic acid	20.0 ml

Hematoxylin was dissolved in the alcohol and the alum was dissolve in distilled water and mixed thoroughly. After these were in complete solution the glycerin and acetic acid are added.

3.7.3.2. Preparation of eosin solution

1% stock alcoholic eosin

Eosin Y, water soluble	1 g
Distilled water	20 ml
95% alcohol	80 ml

Eosin was dissolved in water and then 80 ml of 95% alcohol was added.

Working eosin solution

Eosin stock solution	1part
Alcohol, 80%	3 parts

0.5ml of glacial acetic acid was added to 100 ml of working eosin solution just before use.

3.7.3.3. Staining protocol

The sectioned tissues were stained as described below:

- The sectioned tissues were deparaffinized in three changes of xyline (three minutes in each)
- Then the sectioned tissues were rehydrated through descending grades of alcohol as per following schedule.
  - Absolute alcohol – three changes (three minutes for each)
  - 95% alcohol - two minutes
  - 80% alcohol - two minutes
  - 70% alcohol - two minutes
  - Dipping with distilled water for 10 minutes.
- The tissues were stained with Harris hematoxylin for 2-10 minutes.
- Washed in running tap water for 10-15 minutes.
- Then the tissues were dipped in ammonia water (few dips).
- Stained with eosin for one minute.
- Differentiated and dehydrated in ascending grade of alcohol.
  - 95% alcohol – three changes (2-4 dips for each.)
  - Absolute alcohol – three changes (2-3 minutes for each)
- Cleaned in xyline: three changes (five minutes each).
- Tissues were mounted with cover slip by using DPX
- The slides were dried at room temperature and examined under a low (10X) and high (40X, 100X) power objectives.

CHAPTER IV

RESULTS

CHAPTER IV

RESULT

4.1. Postmortem examination of female genitalia collected from slaughtered animals

Detailed postmortem examination was performed on 310 freshly female genitalia collected from slaughter house. On postmortem examination of 310 genitalia one or more pathological disorders were recorded in 199 (64.54%) genitalia. The occurrence of various reproductive disorders in female genitalia encountered at postmortem examination has been presented in Table 1&2 and the seasonal incidence of the gynaeco-pathologocal disorder in cattle showed in Table 3. The incidence of endometritis was found to be the highest (31.29%), followed by cystic ovaries (8.37%), Ovarian hyperplasia (6.77%), Pyometra (4.84%), Parovarian cyst (4.84%), Hydrometra (4.52%), Ovarian hypoplasia (4.19%), Ovarobursal adhesions (3.55%), Vaginal cyst (1.29%) and Hemorrhage in ovary (0.65%).

Endometritis, the most common pathological disorder encountered at postmortem examination comprised of both acute and chronic in nature. The uterus affected with endometritis showed thickened leathery wall with slimy exudates in the mucosal surface. The organ appeared to be larger in size in almost all cases. The genitalia showed the indication of anestrum had under developed follicle and absence of corpus luteum. The cysts were found either in left or right ovaries. However in few cases both the presence of such cysts. The majority of cysts

appeared to be follicular cysts which are a typical in size. Luteal cyst was identified only in one genitalia. Such cyst was characterized by its thick wall at the centre of corpus luteum. The uterus affected with pyometra showed enlarged size and contained huge amount brownish or cream coloured pus with foul odour (Figure 1). Mucometra also a common case which is characterized by the presence of slimy mucus in the uterus (Figure 2). Inflammation of the cervix (cervicitis) was detected in 3 cases. This condition was manifested by dilation and congestion of the cervix with excessive catarrhal exudation. Hemorrhage also found in the uterine horne in two case (Figure 3). During postmortem examination a cyst found in the uterine horn (Figure 4). Vaginal cyst was also detected in four cases (Figure 5). The typical follicular cyst was detected during necropsy examination in five cases (Figure 6). The parovarian cysts were found to be attached to the mesovarium/mesosalpinx or between their two peritoneal coverings as clear spherical cysts (Figure 7). They were found either in left or right sided ovaries. Ovaro-bursal adhesion was detected either in left or right sided ovary. Subactive ovaries exhibited developmental small or medium size graafian follicle. Such ovaries appeared to be somewhat firm in consistency. Ovarian (unilateral) hypoplasia was detected only in 15 cases by its smaller size. Hyperplastic ovary was also a common case (Figure 8). Salpingitis was characterized by distended fallopian tubes and sometimes presence of pus within the tubular lumen. The condition was found to affect both the fallopian tubes in all cases. The condition was often associated with endometritis and pyometra. Hydrosalpinx was manifested by distention of the fallopian tube with clear fluids. Hydrometra was characterized by collection of watery fluid and mucus in the uterine body and both the horns.

4.2. Microscopic examination of female genitalia

Microscopically endometritis was characterized by massive infiltration of lymphocytes, macrophages, monocytes and plasma cells in the endometrial mucosa, stroma and utetine glands (Figure 9). The glandular structure was almost found to be distorted (Figure 10). In addition to this there was proliteration of fibrous connective tissue. Cellular infiltration and proliferation of fibrous connective tissue was also seen in the caruncle region. In the lumen of uterus the exudates showed massive cellular infiltration (Figure 11). On the other hand the characteristic microscopic feature of pyometra was massive infiltration of neutrophils (Figure12&13). The most important microscopic features of cervicitis were congestion of blood vessels with edematous changes. Histological section through cystic ovaries exhibited the presence of follicular cysts (Figure 14). The cavity of such cysts remind empty. The surrounding cells of cystic wall appeared to be flattened that might have resulted from pressure exerted by the cysts. Oedematous ovary microscopically characterized by presence of proteinacious mass containing ova (Figure 15). The ovarian blood vessels appeared to be flattened with thickening of the vascular wall and Hemorrhagic ovary characterized by rupture of blood vessel and RBC found in the surrounding tissuses (Figure 16). There was degeneration of the granulose cells and of the oophorus wall. The significant histologic features of subactive ovaries were proliferation of fibrous connective tissue and often occupy the whole contents of the follicle (Figure 17 &18). The hyperplastic ovary histopathologically contain a huge proliferation of fibrous tissue having no contain ova(Figure 19).

4.3. Isolation and identification of microorganism from the female genital tract of cow

The microbiological examination was performed on 50 freshly collected female genitalia from slaughter house. On microbiological examination of 50 genitalia, I found that 30% of genital organ affected with *Escherichia coli* and 8% with *salmonella spp.* Isolation and identification of bacteria in genital tract of cow showed in the Table 4&5.

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Escherichia coli identified by their colony characteristic in different bacteriological media. In nutrient agar media the organisim cultered and grow large, opaque, smooth, moist and circular colony (Figure 20). In Grams stain the organism appeared pink colour, slender, rod sometimes curved (Figure 21). Green metallic sheen in EMB agar was a characteristic colony to identify the organism (Figure 22). In Mac Conkey agar media organism also grow as rose, pink colour colony (Figure 23). For biochemical test, TSI (Triple Sugar Iron) medium the butt and slant appeared yellow in colour & also production gas. This was an indication of *E. coli* reactivity (Figure 24A). In MIU (Motility, Indol and Urea test) the organisms were mortile, indol positive and no production of urea (Figure 24B). In VP test the organism gives negative test (Figure 24C).

Salmonella spp identified by their colony characteristic in different bacteriological media. In nutrient agar media the organism grow as large, gray, white, moist circular colony ((Figure 25). In Grams stain the organism appeared pink colors small rod shaped appearance arranged in single or paired (Figure 26). Small moist circular colony was formed in S-S (Salmonella-Shigella) agar and was suggestive

for Salmonella spp (Figure 27). In Mac Conkey agar madia the organisim also grow as pale colourless colony and indiacated as a nonlactose fermenter organism (Figure28). For biochemical test TSI (Triple Sugar Iron) medium the butt appeared yellow and slant appeared pink colour & black colour indicated that hydrogen sulfide gas production indicated presence of *salmonella spp* (Figure 29A). In VP test the organism gives negative test (figure 29B). In MIU (Motility, Indol and Urease test) the organisms were mortile, indol negative and no production of urea.

Table 1: Pathological disorder encountered at postmortem examination of Uterus of cow

Month	Nunber of observation of uterus	Endometritis	Pyometra	Hydrometra	Vaginal cyst	Pregnant uterus	Haemmorage in uterine horn
April	30	5	1	1	0	8	0
May	25	10	0	2	0	5	2
June	40	9	1	0	1	10	0
July	40	11	2	1	0	7	0
August	20	8	0	2	0	8	0
September	35	12	3	0	0	8	0
October	30	7	2	2	0	7	0
November	15	4	1	0	0	5	0
December	20	6	2	1	1	5	0
January	10	7	0	1	2	0	0
February	20	8	1	2	0	5	0
March	25	10	2	2	0	6	0
Total	310	97	15	14	4	73	2
Percentage (%)		**31.29**	**4.84**	**4.52**	**1.29**	**23.59**	**0.65**

Table 2: Pathological disorder encountered at postmortem examination of ovary of cow

Month	Nunber of observation of genitalia	Ovarian cyst	Parovarian cyst	Ovarian hyperplasia	Ovarian hypoplasia	Ovarobursal adhesion	Hemorrhage in ovary
April	30	2	2	3	2	1	0
May	25	3	0	4	2	0	1
June	40	5	1	2	1	0	0
July	40	4	3	2	2	2	0
August	20	1	2	1	0	0	0
September	35	3	1	2	2	3	1
October	30	2	2	3	1	1	0
November	15	0	1	0	1	1	0
December	20	1	0	0	1	0	0
January	10	2	0	1	0	2	0
February	20	1	1	1	2	0	0
March	25	2	2	2	1	1	0
Total	310	26	15	21	15	11	2
Percentage(%)		**8.39**	**4.84**	**6.77**	**4.84**	**3.55**	**0.65**

Table 3: Seasonal incidence of gynaeco-pathological disorders in 310 cows

Season	Number of cases	Gyanecological disorder								
		Endometritis	Pyometra	Hydrometra	Vaginal cyst	Ovarian cyst	Parovarian cyst	Hyperplasia Of ovary	Hypoplasia Of ovary	Hemorrhage in ovary
Summer (April to June)	95 (30.65)	24 (25.26)	2 (2.11)	3 (3.16)	1 (1.05)	10 (10.53)	3 (3.16)	9 (9.47)	4 (4.21)	1 (1.05)
Rainy (July to October)	125 (40.32)	38 (40.32)	7 (5.60)	5 (4.00)	0 (0.00)	10 (8.00)	8 (6.40)	8 (6.40)	4 (3.20)	1 (0.80)
Winter (Nov. to March)	90 (29.03)	35 (38.89)	6 (6.67)	6 (6.67)	3 (3.33)	6 (6.67)	4 (4.44)	4 (4.44)	5 (5.56)	0 (0.00)

Table 1: Cultural and biochemical characteristics of isolated organisms

Samples	Nutrient agar	Staining character	EMB agar	SS agar	Mac Conkey agar	Biochemical Test						Results
						MIU			TSI			
						M	I	U	Butt	Slant	H_2S	
Uterine discharges	large, opaque, smooth, moist and circular	Gram negative Slender, rod sometimes curved.	Green metallic sheen	No	Rose, pink colour	+	+	-	Y	Y	+	*Escheriachia coli*
Uterine discharges	large, gray, white, moist circular	Gram negative, pink color, small rod shaped Appearance arranged in single or paired.	Pink colonies without metallic sheen	Small, moist, circular	Pale colourless	+	-	-	Y	Pink	-	*Salmonella spp*

MIU : Motility Indole Urea

TSI : Triple Sugar Iron

EMB : Eosin Methylene Blue

SS : Salmonella-shigella

Y : Yellow

+ : Positive

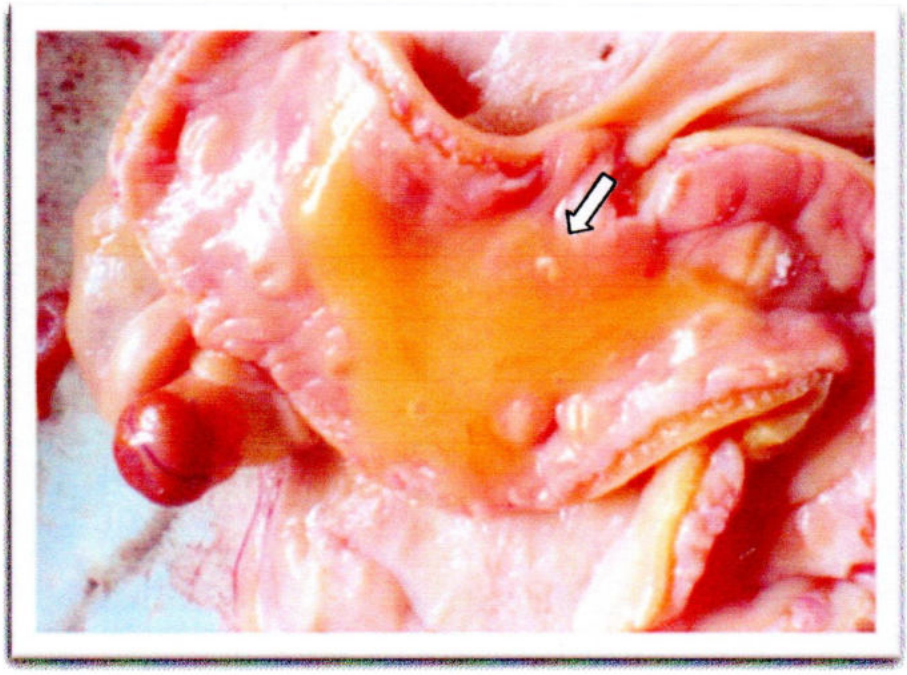

Fig. 1: A case of pyometra which is characterized by presence of Cream color pus in uterine lumen.

Fig.2: A case of mucometra which is characterized by presence of Slimy mucus in uterine lumen.

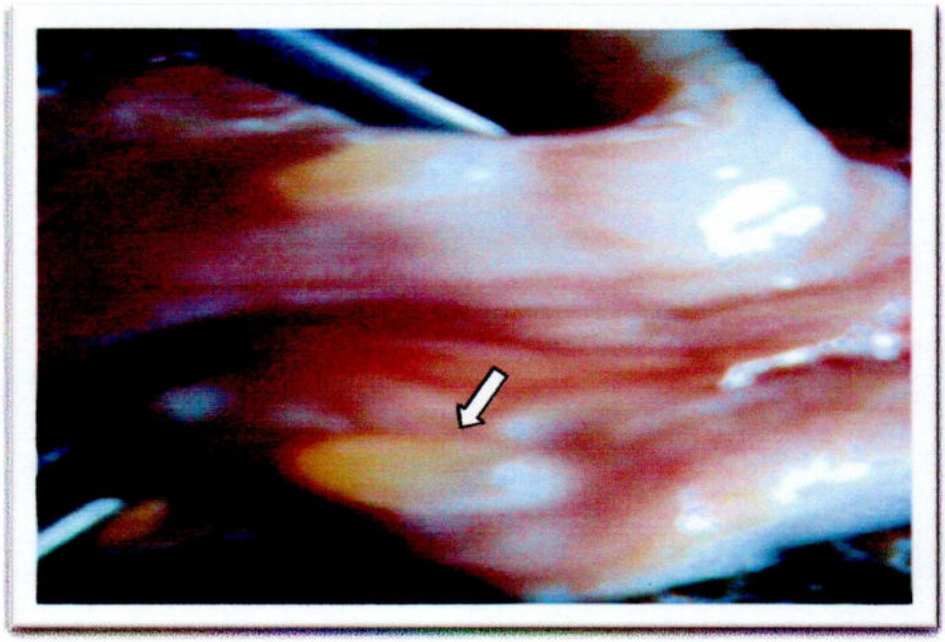

Fig. 5: Cyst in vagina which shows in arrows

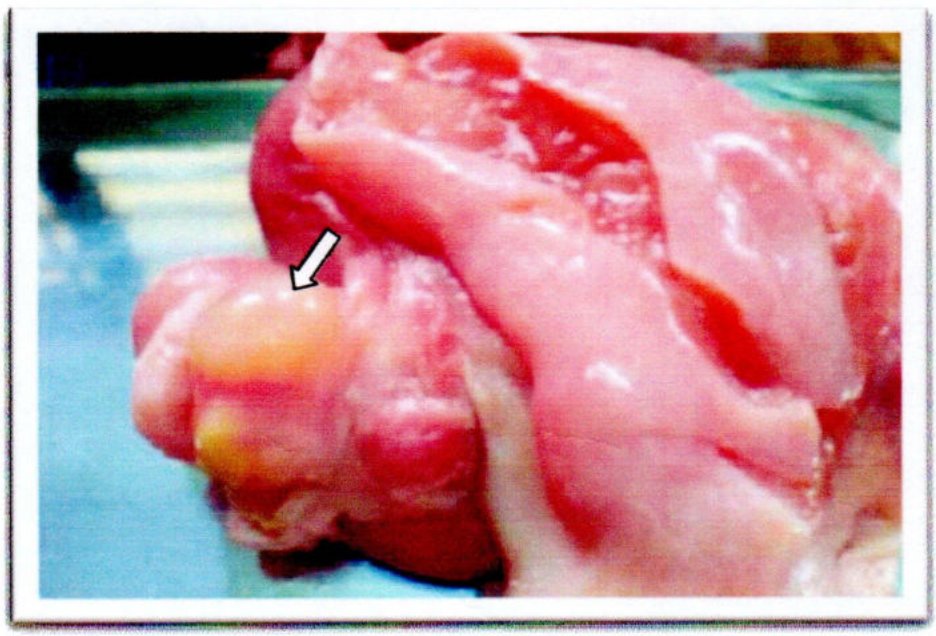

Fig. 6: Protruded Follicular Cyst in ovary which shows in arrows.

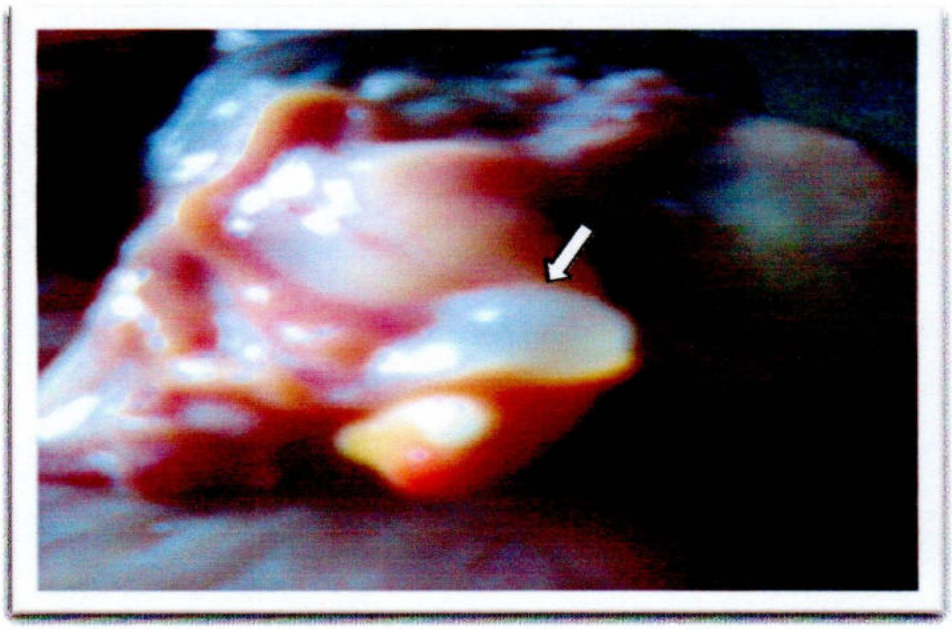

Fig. 7: Parovarian Cyst in ovary which shows in arrows.

Fig. 8: Hyperplastic ovary which shows in arrows.

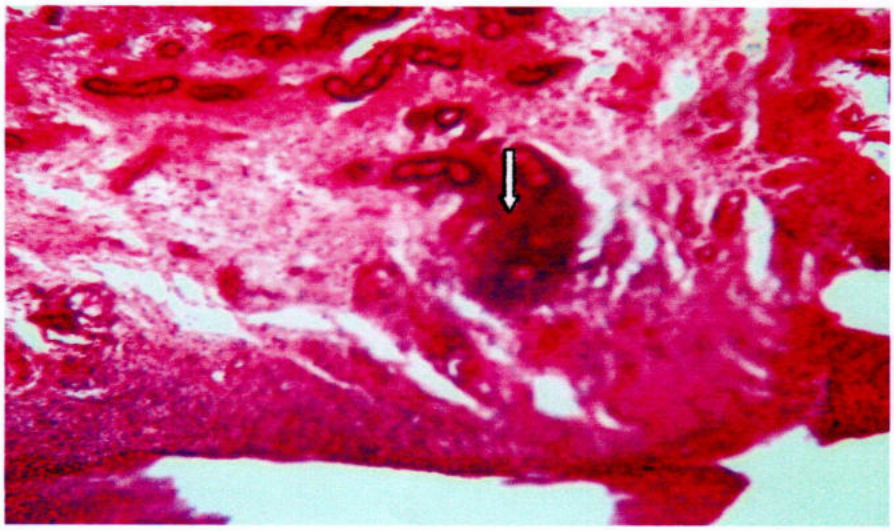

Fig. 9: A case of chronic endometritis exhibiting in filtration of inflammatory cells and moderate fibrosis (H&E X10).

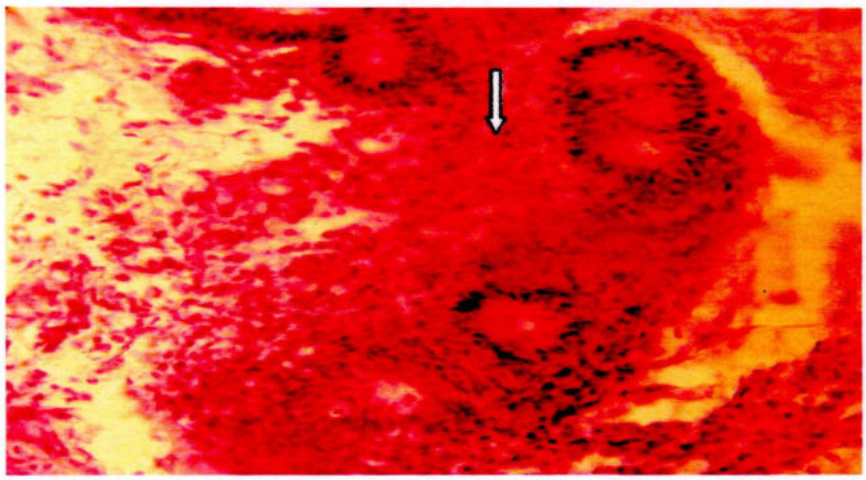

Fig. 10: A case of chronic endometritis exhibiting destruction of uterine gland in filtration Of inflammatory cells and moderate fibrosis (H&E X40).

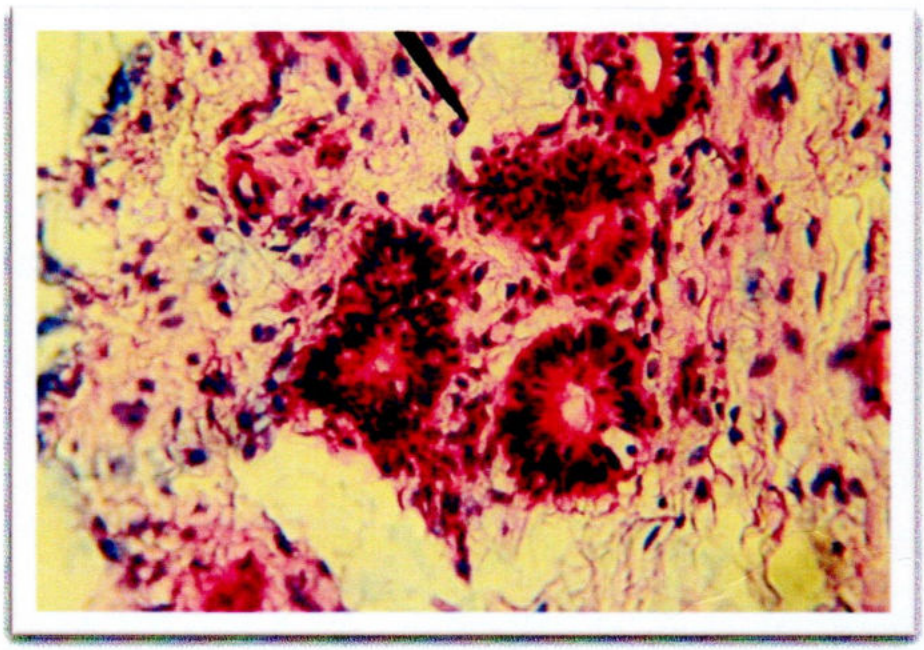

Fig. 11: Higher magnification of a choronic endometritis (H&E X40).

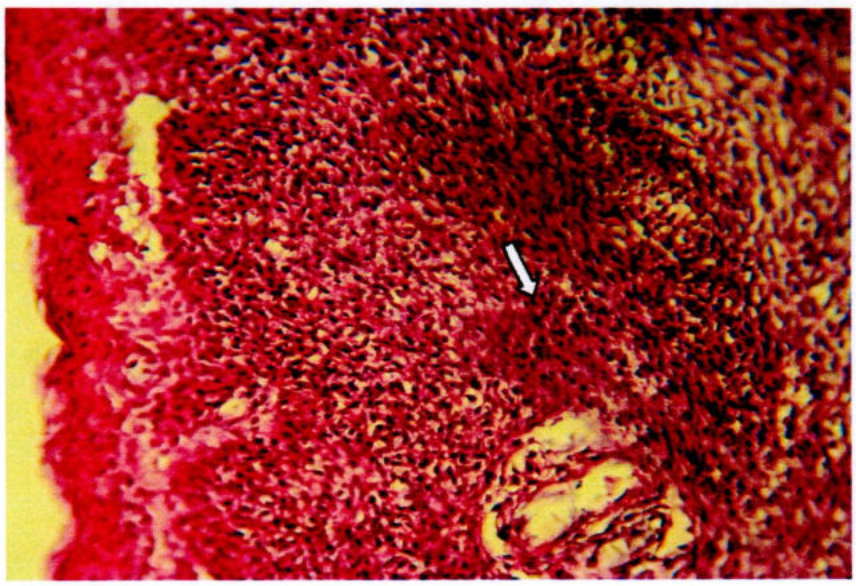

Fig.12: A case of pyometra exhibiting infiltration of reactive Cell (H&E X10).

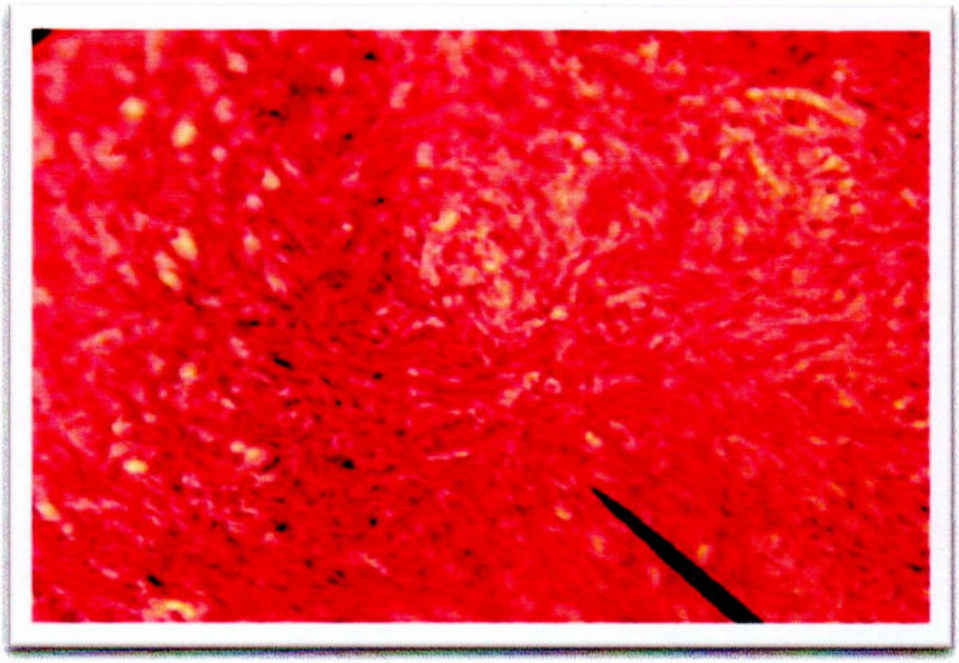

Fig. 13: A higher magnification pyometra exhibiting infiltration of reactive Cell (H&E X40).

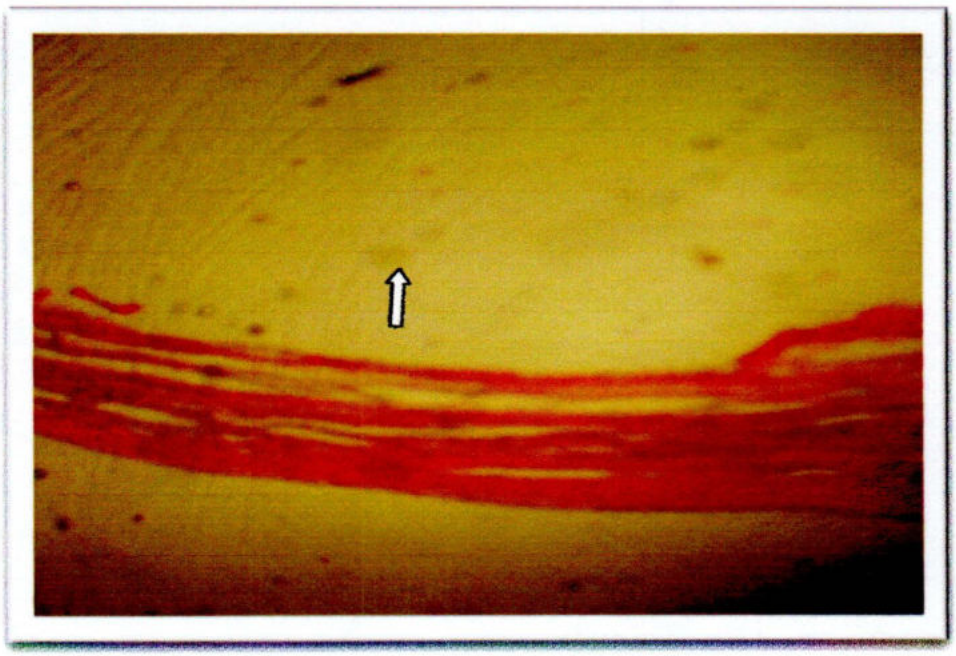

Fig.14: Follicular cyst in ovary which remain empty space, the follicular wall lined by flattened cells (H&E X4).

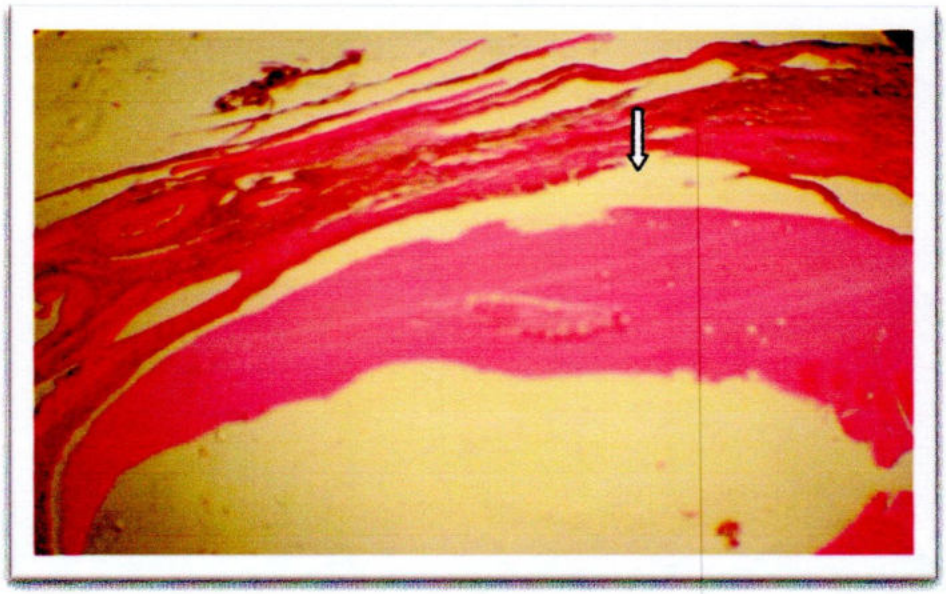

Fig. 15: Oedema in ovary which is characterized by presence of proteinacious mass (H&E X10).

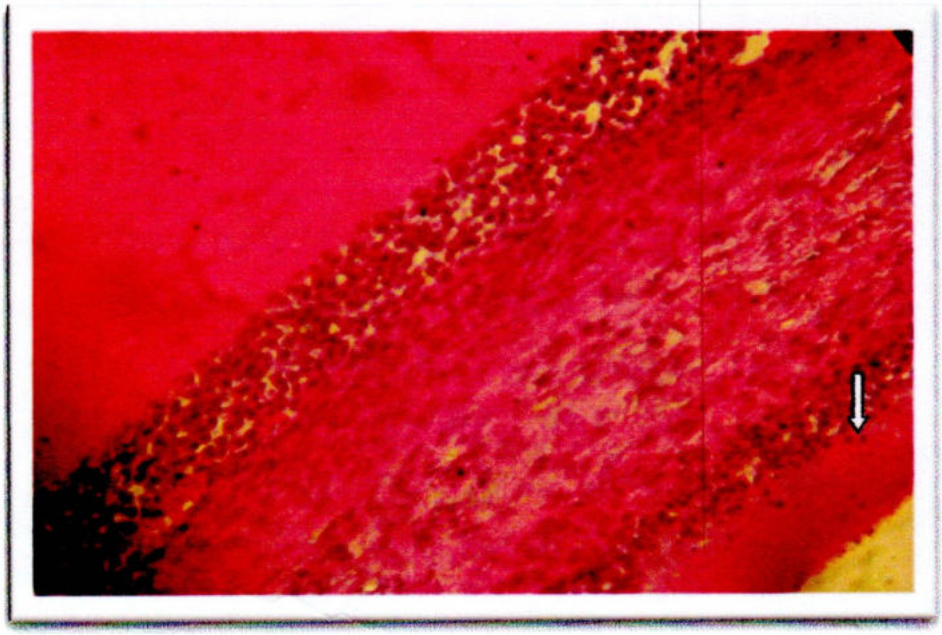

Fig. 16: Hemorrhagic ovary which is characterized by RBC (H&E X40).

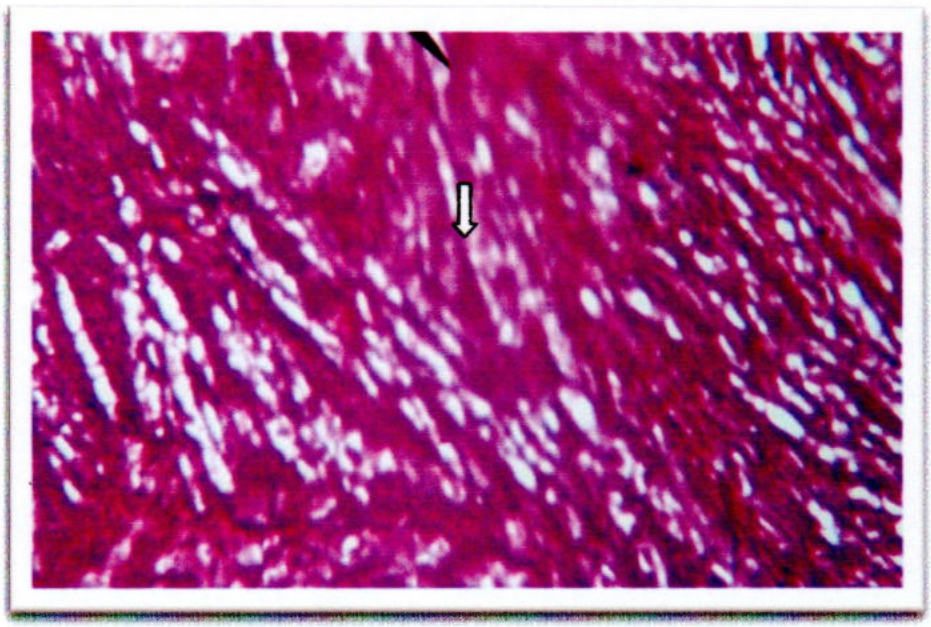

Fig. 17: Hypoplastic ovary, proliferation of fibrous tissue (H&H X10).

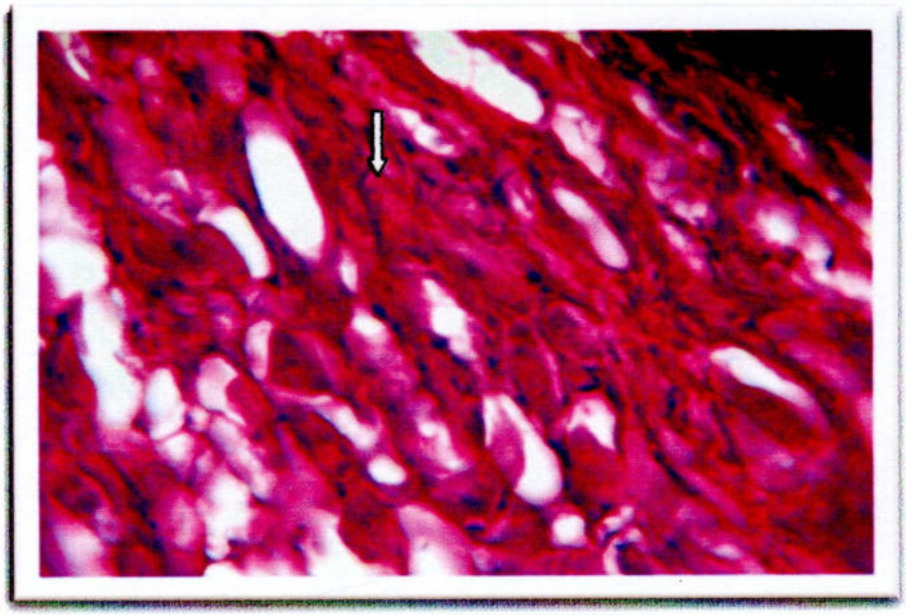

Fig. 18: Higher magnification of hypoplastic ovary (H&E X40).

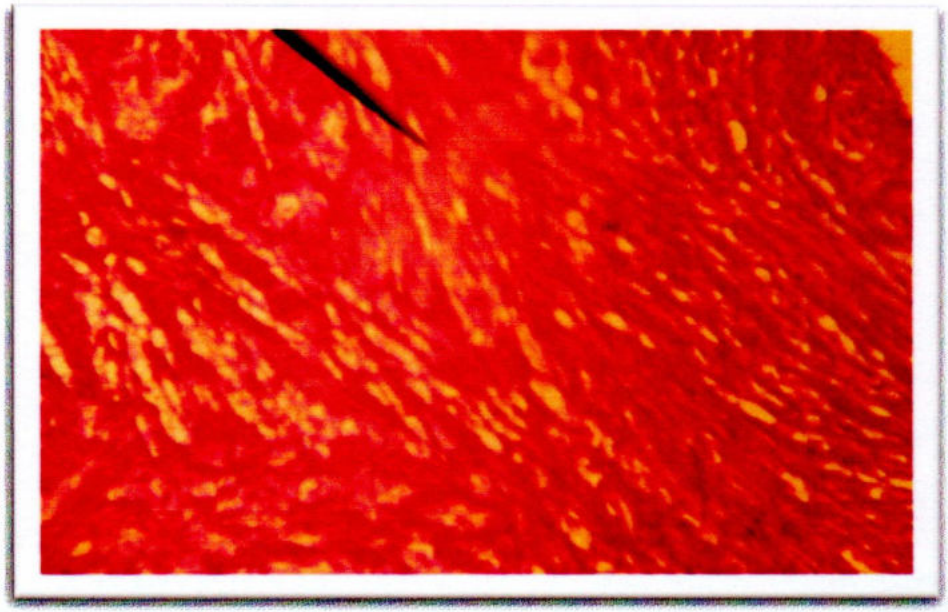

Fig. 19: Hyperplastic ovary which is characterized by proliferation of fibrous tissue (H&E X10).

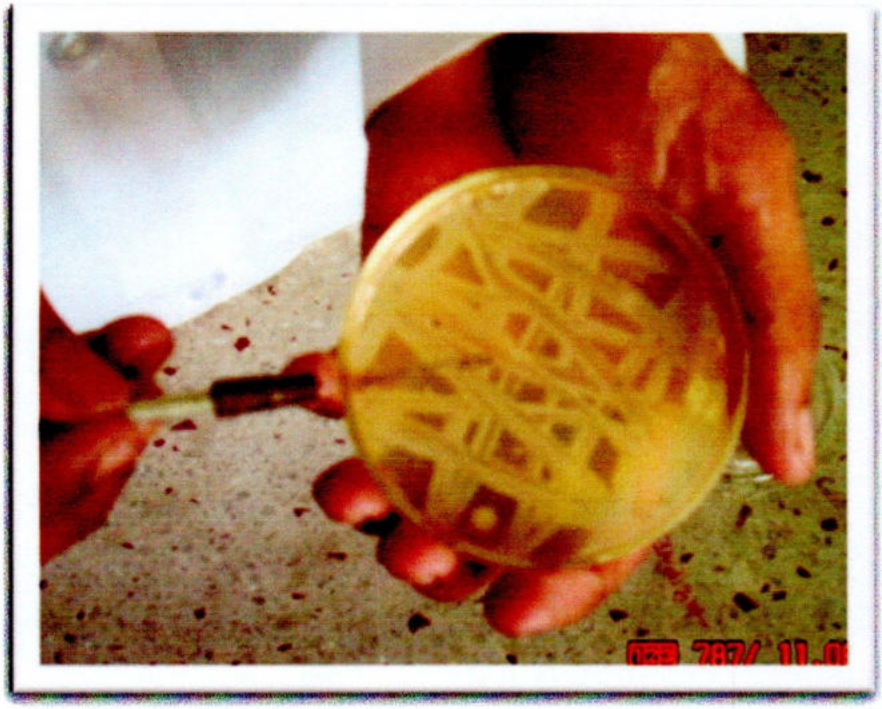

Fig. 20: Nutrient agar media large, opaque, smooth, moist and circular

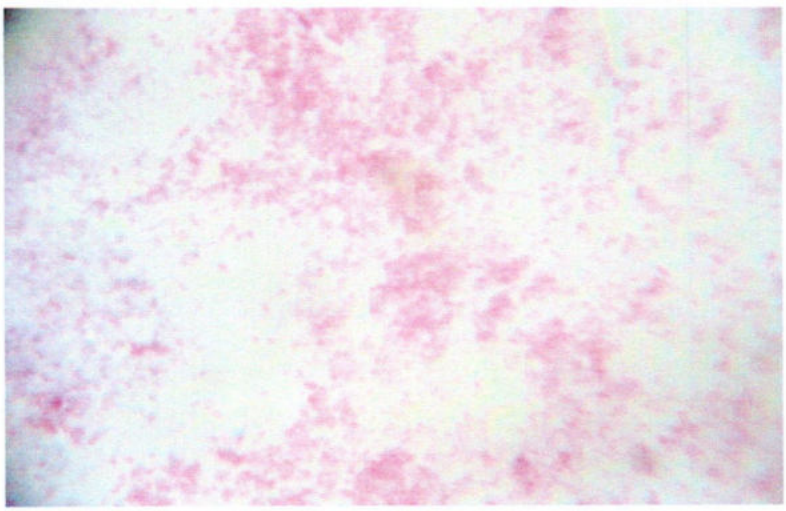

Fig. 21: Gm (-Ve) Slender, rod sometimes curved. organisim after staining

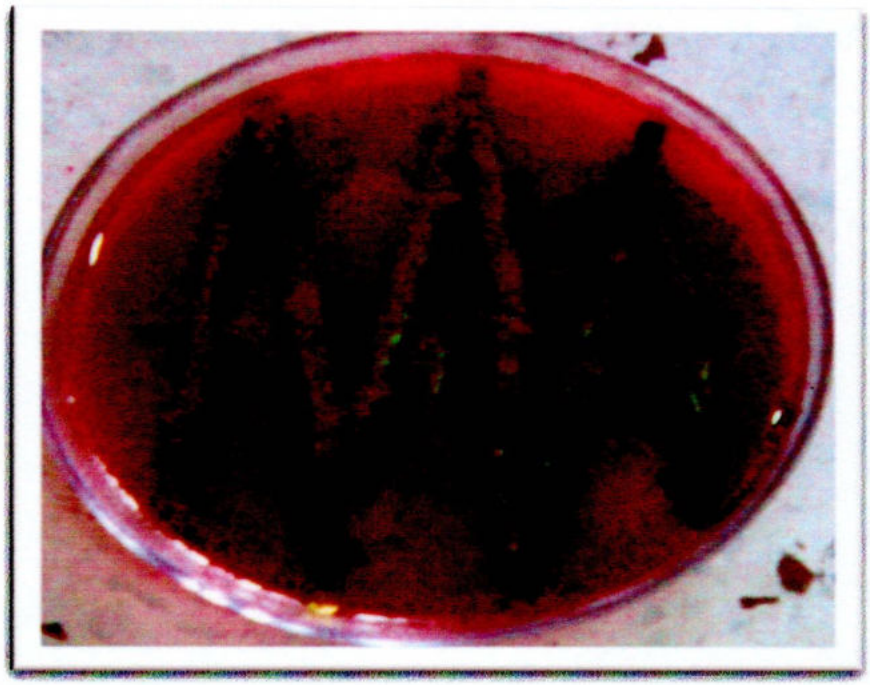

Fig. 22: EMB agar, Green metallic sheen indicated *E. coli* presence.

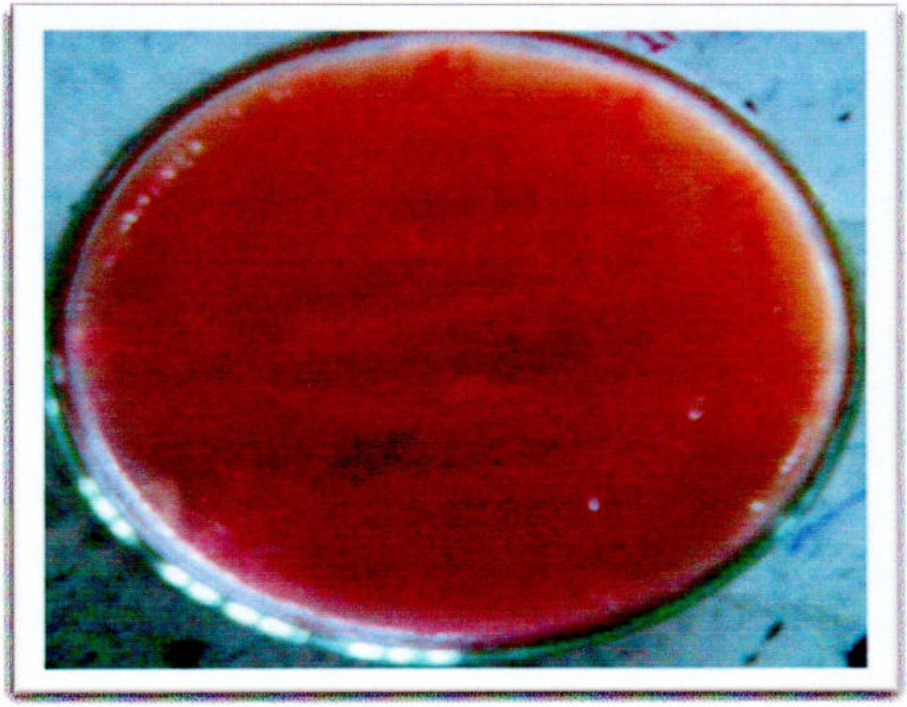

Fig. 23: Mac Conkey agar media Rose, pink colour.

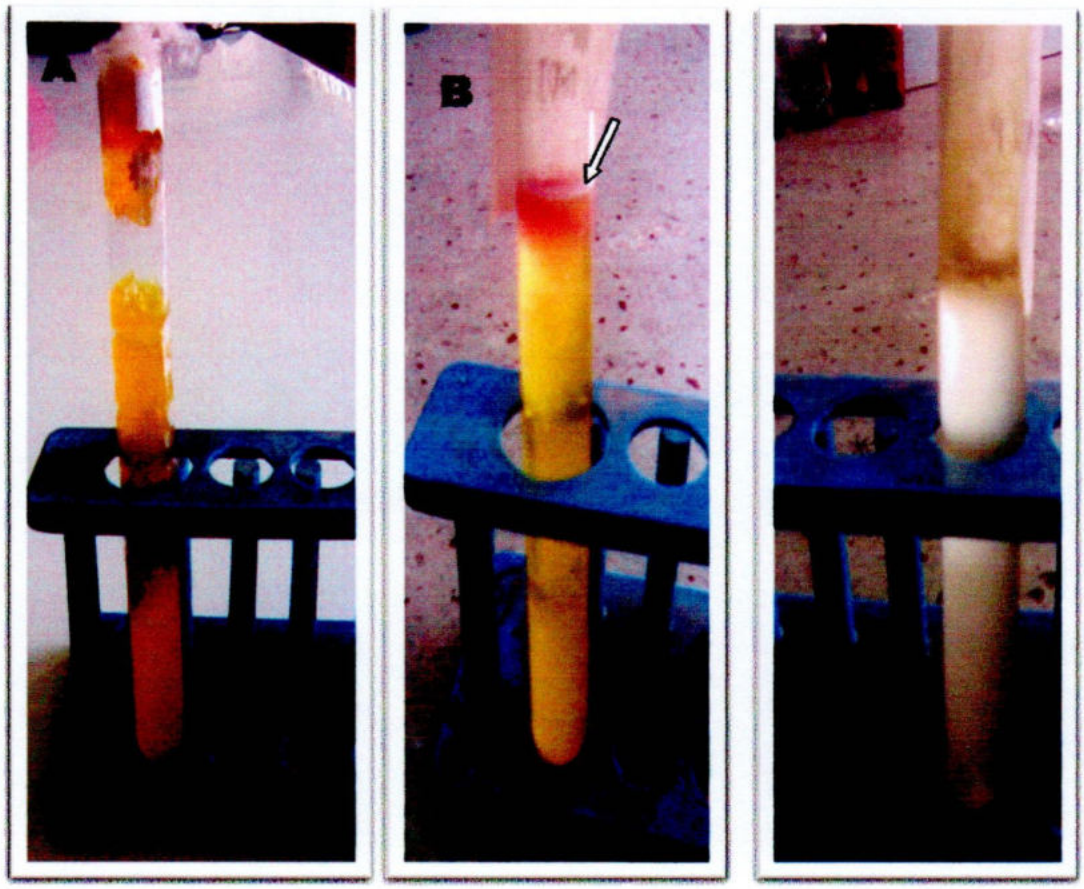

Fig. 24 :(A) TSI media butt and slant yellow in colour (B) MIU media; motile, indole ring at the top. (C) VP media the organism gives negatives test.

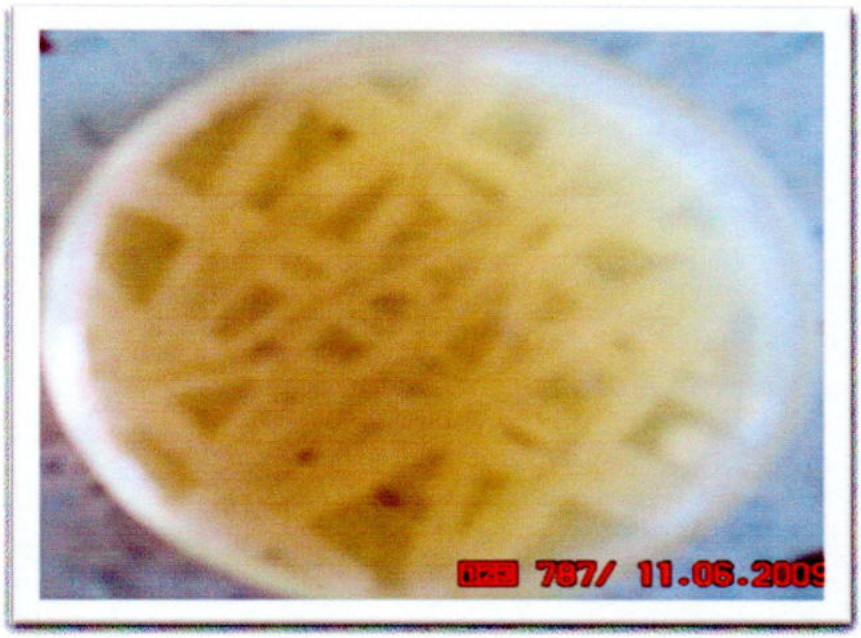

Fig. 25: Nutrient agar medium large, gray, white, moist circular

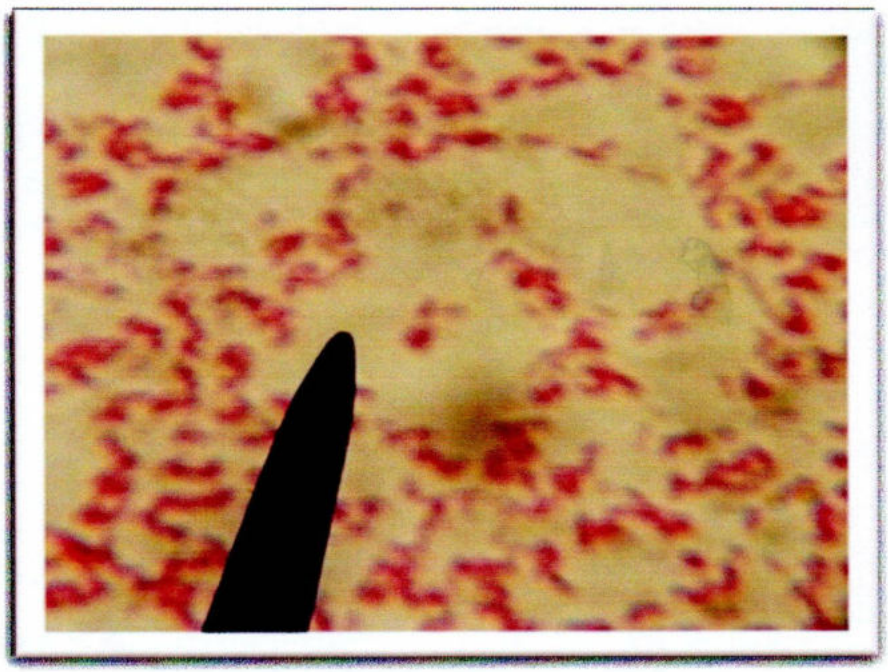

Fig.26: Gram (-ve) pink color, small rod shaped Organisim after Grams stain

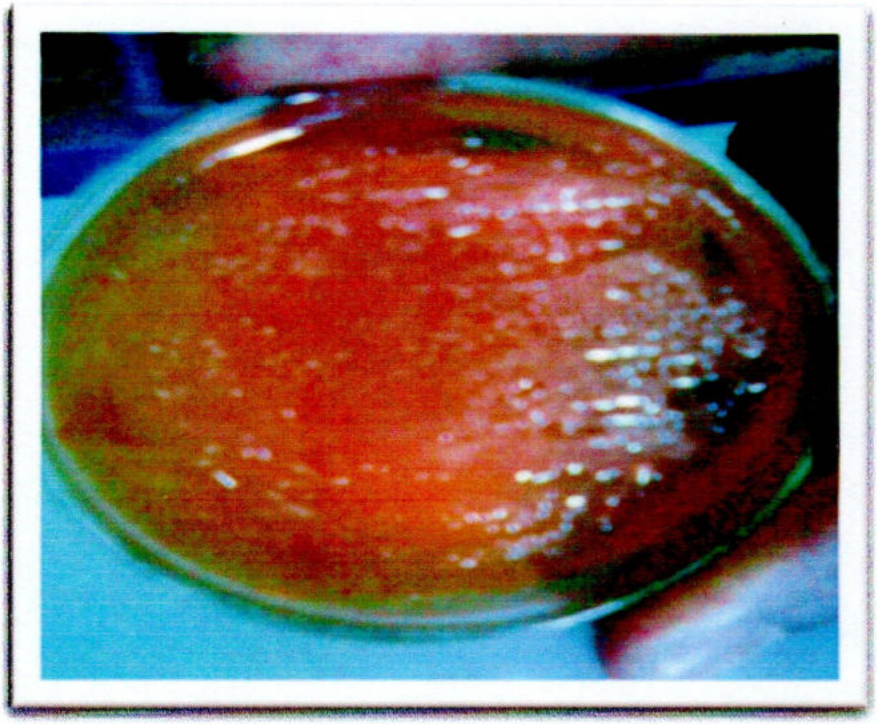

Figure 27: S-S agar medium small, moist and circular colony grows

.

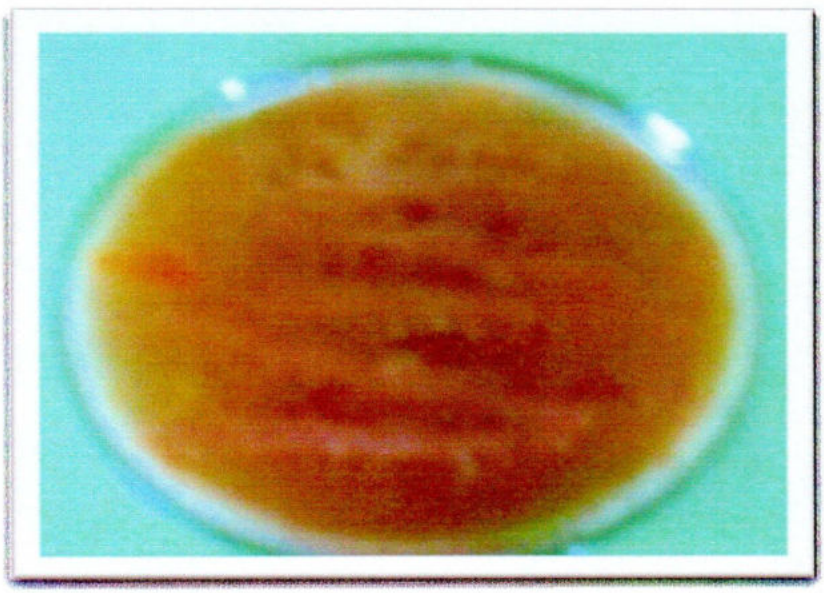

Figure 28: In Mac Conkey agar Pale colourless Colonies.

Fig. 29: (A) TSI media butt yellow and slat pink/black colour.
(B)VP medium the organism gives negatives test.

CHAPTER V

DISCUSSION

In Bangladesh cattle is an economically important animal. But this economic important animal is often found to suffer from various reproductive disorders (Rahman, *et al.,* 1975: Ahmed, *et al.,* 1989 Rahman, *et al.*, 1993). The economic losses due to pathological disorders in the female reproductive system are resulted infertility and reduced production potentiality. In Bangladesh research on animal reproduction and reproductive pathology is scanty. The incidence of various reproductive pathology has increased menacingly in this country probably due to introduction of intensive cross breeding programme through artificial insemination. Therefore the present work on pathological disorders in the female reproductive system was under taken in order to monitor the present status of reproductive problems in cattle of Bangladesh.

In this study freshly collected female genitalia revealed endometritis (31.29%) as the most common pathological disorder in the female reproductive system of cow. Alam and Rahman (1979) conducted a study on the diseases of female reproductive system of indigenous cows in Dhaka slaughter house for the first time in Bangladesh. In this study they recorded one or more abnormalities in as many as 92.00% animals. The commonest abnormalities recorded by the authors were ovarian cysts. Occurrence of endometritis was not reported by them however pyometra was recorded. On the other hand Shamsuddin *et al.,* (1988) and Mollah

et al., (1989) reported that about 8 to 27.00% cows suffered from endometritis among the principal causes of reproductive failure in cows of this country. Borsberry and Dobson (1989) recorded 14.80% incidence of endometritis alone or in combination with other peripaturient disorders. In recent years Simeri *et al.,* (1991) detected an overall incidence of endometritis as 10.50% which constituted as one of the most important postparturient disorders. The present findings of the high incidence of endometritis are in full agreement with reports of other workers (Hatch, *et al.,* 1986; Fivaz, *et al.*, 1978; chaffaux, *et al.*, 1987; Shamsuddin, *et al.,* 1988 and Mollah *et al.*, 1987). Dawson (1977) claimed that the endometritis as the major cause of breeding failure. Sandals *et al.,* (1979) after a long term study reported 8.10% incidence of endometritis as high as 55.00%. Markusfeld (1984) reported that about 37.00% Israeli Friesian cows suffered from endometritis.. Miller (1950) for the first time observed the histopathological changes of uterine sections and described endometritis into following types: chronic endometritis of lower intensity and interstitial endometritis at higher intensity.The interstitial endrometritis is characterized by a decrease in number of glands, the glands being arranged singly or in groups, separated by fibrous band, being dilated, corkscrew shaped with a ragged margin and a dense round cell infiltration between the affected gland.

A characteristic change in the endometrium with variable degrees of infiltration of neutrophils, eosinophils and mononuclear cells including plasma cells and macrophages on a hpf (high power field) around uterine glands, with occasional interstitial accumulation of lymphocytic follicles were observed in cows with cloudy to mucopurulent genital discharge. While periglandular fibrosis or encapsulation, subsequent glandular degeneration and cystic dilatation of the

lumen, mononuclear cells including epitheloid and plasma cell, (Rahman *et al.*, 2002). Endometritis (1.58%), pyometra(6.53%) (Faroo, 2000).Endometritis and quiescent ovaries were the most prevalent conditions (63.77%) (Manda- Srinivas *et al.*, 2007).

In the post-slaughter examination fetuses in the uterus were discovered in 6 cows (7.16%) whereas various pathological changes in the reproductive organs were recorded in 49 cows (58.34%). According to Kotowski, (2001) the pathological changes more often affected the uterus (59.18%) than the ovaries (40.82%).

In a study on the female genital tracts collected and examined, abnormalities recorded were 36.8% cases. The most common abnormalities encountered were ovariobursal adhesion (5.5%), endometritis (3.9%) and cystic ovaries (3.5%) (Abaltil *et al.*, 2006).

In the present study the gross abnormalities in ovary detected cystic ovaries (8.37%), pyometra (4.84%), parovarian cyst (4.84%), ovarobursal adhesions (3.55%) and ovarian hypoplasia (4.84%), Ovarian hyperplasia (6.77%) and hydrometra (4.52%),Vaginal cyst (1.29%),Hemorrhage in ovary(0.65%). Similar the gross abnormalities of the genitalia recorded included cystic ovaries (3.35%), ovarobursal adhesion (2.9%), ovarian hypoplasia (2.2%) and endometrocervicitis (1.7%). Oviductal occlusion accounted for 0.75%, hydrosalpinx 0.54%, pyometra 0.48%, parovarian cyst 0.26%, hypoplastic uterus 0.24% and uterine cyst 0.08% cases. The gross abnormalities ovaries was ovarian inactivity (21 cases; 10.5%), ovarobursal adhesions (16 cases; 8%) and cysts (14 cases; 7%). Other, interesting

rare pathological lesions of the ovaries were bilateral ovarian haematoma and tuberculosis, (Chaudhari *et al.,* 2000). Twenty specimens (10%) had uterine lesions, the most common of which were infections, presenting as metritis and pyometra. Seven specimens (3.5%) had oviduct lesions, which included hydrosalpinx, pyosalpinx and haemosalpinx (Fathalla *et al.,*2000). Various gross abnormalities were observed in the reproductive organs of about 16% of the cattle, and the major reproductive abnormality in both total and the non-cycling animals was various degrees of fibrous adhesion between the ovary and infundibulum and mesosalpinx Assey1 *et al.*, (2004). Besides endometritis other pathological abnormalities encounterd at postmortem examination of female genitalia were anestrum, cystic ovary, pyometra, cervicitis, parovarian cyst, ovarobursal adhesions, subactive ovary, ovarian hypoplasia, salpingitis, hydrosalpinx and hydrometra. On the other hand similar abnormality found Ali *et al.*, (2006) the reproductive tracts of descriptive cows.

Other pathological disorders recorded were almost in conformity with the findings of earlier workers of Bangladesh and abroad (Dawson, 1967; Ramamohana *et al.,* 1965; Qureshi and Ahmed 1966; Onet, 1992; Al-Dahash and David *et al.*,1977; Alam and Rahman 1979; Ahmed 1984).

The lesions observed at postmortem examination are more or less similar with the earlier observations (Jones and Hunt, 1983; Mc-Enttee, 1983; Ganti; A. Shastry (1983). Apart from postmortem lesions the histopathological features of some important reproductive disorders are almost in conformity with the earlier findings; Mc-Entee, 1983; Meisser *et al.,* 1989; Powers *et al.,* 1990; ieishaupt and

Erika 1991; Nascimento *et al.,* 1994) However, detailed histopathological findings of various reproductive disorders are still lacking.

Most researcher agreed that occurrence of different pathological disorders in the reproductive system are more frequent in high producing cows (44.00%) than the medium milk producing (32.00%) counterparts (Nakao *et al.*, 1992). A number of factors influence the intensity and prevalence of reproductive disorders including the species and pathogenecity of the causative agent, the cellular and immunological defensive mechanisms, hormonal imbalance, and dietary status of the animal concerned and environmental sanitation.

In present study the about 30% incidence of uterine infection was found to cause by *Escherichia coli* which is similar 33% with finding of Kotowski, (2001). *Escherichia coli* also identified in genital tract of cow (Frazie *et al.*, 2001; Twardon *et al.*, 2001; McDougall, 2005; Frederickson *et al.*, 1985) also reported an incidence of endometritis (44.00%) among Swedish dairy cattle. Pelvic inflammatory disease (PID; metritis) or endometritis affects 40% of cattle after parturition Martin *et al.*, (2010).

Uterine infection (8%) caused by *salmonella spp* was reported associate with enteritis, and abortion in cattle (Pullinger, 2010; Saroj *et al.*, 2008) reported virulence phenotypes of *Salmonella enterica* were encoded by genes located on pathogenicity islands which may causes metritis also identifted in india. In non-dairy herds, the prevalence was nearly unchanged during the same period (Ersbol, 2008). *S. Typhimurium* (26%), *S. Heidelberg* (9%), *S. Dublin* (8%), *S. newport* (8%), *S. Derby* (7%), and *S. Choleraesuis* (7%). Three hundred and thirteen (82%)

isolates Zhao *et al.*, (2007). Esaki *et al.*,(2004) A total of 82 Salmonella were isolated from food-producing animals.

The incidence of various reproductive disorders especially uterine infections in the form of metritis, pyometra and chronic endometritis has increased alarmingly in this subcontinent with the introduction of cross breeding programme among high yielding varities of cows. In addition to this lack of proper education or hygienic management of the postpartum cows and limited veterinary services have aggravated the situation. Therefore, in order to combat the occurrence of reproductive problems cross breeding programme through artificial insemination must be performed by skilled personnel under adequate veterinary inspection.

CHAPTER VI

CONCLUSIONS

The study on pathological disorders in female reproductive system of cattle was conducted by the examination of freshly collected female genitalia from Dinjapur Districts abattoirs. This study revealed endometritis (31.29%) as a most common pathological disorder. Other conditions diagnosed were cystic ovaries (8.37%), Pyometra (4.84%), Cervicitis (3.74), Parovarina cyst (4.84%), Ovaro-bursal adhesions (3.55%) and Ovarian hypoplasia (4.84%), Hydrometra (4.52%) and Hemorrhagic ovary (0.66%). In bacteriological examination 30% cattle was found to infected by *Escherichia coli* and 8% infected by *Salmonella spp.* The species of Salmonella involved in endometritis was not identified in this study.

It may be concluded that various pathological disorders in the female reproductive system reasonably affect the reproduction potential and thereby suppresses subsequentcalf production. Further it may be pointed out that various pathological disorders in female reproductive system are increasing menacingly along with introduction of cross breeding programme through artificial insemination. The problem became more aggravated due to inadequate veterinary coverage and gynaecological knowledge in controlling such problems. Therefore it is suggested that appropriate measures must be taken to control these gynaeco-pathological disorders.

REFERENCES

Abalti, A.; Bekana, M.;Woldemeske, M.; and Lobago, F. 2006. The type and prevalence of abnormalities occurring in the female reproductive tracts of 201 Zebu cattle of. Fogera type (161 cows and 40 heifers) slaughtered at Bahir-Dar town, north-west Ethiopia.

Afanasjevs, I. 1971. Endometrial biopsy in infertile cows. *Latviiskoi sel, skokhozystvennoi Akademii* 58: 84-100, 101-105.Vet. Bull. 43: 2261.

Ahmed, J. U. 1984. An abattoir survey of female reproductive disorders in sweden. Bang. Vet. Jour.18: 55-58.

Ahmed, J. U.; Das, B. C. and Alam, M. G. S. 1989. Surgical affection and reproductive disorders in the cattle in Bangladesh. Bangladesh Veterinary Journal. 23: 67-70.

Alam M. G. S. and Rahman, A. 1979. Diseases of the genital tract of indigenous cows in Bangladesh. Tropical Animal Health and production 11: 179-180.

Al- Dahash, S. Y. A. and David, J. S. E. 1977. The incidence of ovarian activity, pregnancy and bovine genital abnormalities shown by an abattoir survey.Vet. Rec. 101: 296-299.

Allen, H.; Garverick, 1995. Ovarian Follicular Cysts in Dairy Cows. University of Missouri, Columbia, 65211.

Ali, R.; Ali M.; Raza; Jabbar,A. And Muhammad, 2006. Pathological Studies on Reproductive Organs of Zebu Cow. Journal of Agriculture & Social Sciences1813.

Anttilia, J. and Roine, K. 1972. Clinical observation on cystic ovarian disease and its treatment in dairy cattle. *Sumen Lehti*, 78: 562-564; 569-572.Vet, Bull. 43: 1277.

Aranjo, P. G.; Pizelli, G. N.; Carvalho, M.R.de.; Resende, O. de. A. and Britto, D.P.P. des. 1973. Studies of post partum anoestrus in cattle, *Pesquisa Agropecuaria Brusileira, Serie* Vet. 8: 13-19. Vet. Bull. 45: 1984.

Assey1, R.J.; Kessy1, B.M.; Matovelo, J.A.; and Minga, U. 2004 Incidence of Gross R Tropical Animal Health and Production Publisher Springer Netherlands productive Abnormalities in Small East African Zebu Cattle Journal.

Azawi, -O-I. 2009. A study on the pathological lesions of oviducts of cow Diagnosed at Postmortem.Veterinary-Research-Communications33(1): 77-85.

Bargai, U. 1982. A ten years survey of cystic ovary in cows in an intensive dairy herd. In proceedings at the X11th world congress on Diseases of Cattle, the Netherlands volume I. Utrecht, Netherlands 601-604.Vet. Bull. 53; 567.

Barr, A. M. and Hashim, S. E. 1968. Field investigation of causes of infertility in buffaloes and cattle in El-sharkian province in U.A.R. *Zuchthgy*. 3: 206-209. Vet. Bull. 39: 2282.

Belling, T. H. Jr. 1964. Bovine ovarian palpation. I. Normal ovaries. II. Abnormal and therapy. Veterinary Medicine and Small Animal Clinician 59:161-168 and 289-294, Vet. Bull. 35: 1171.

Berkel, H. and Leschhorn, E. 1984. Prevalence of genital diseases in cows and heifer in herds in the Rhinal and palatinate. *Tierarztliche Umschani* 39: 589-595. Vet. Bull. 54:7432.

Bierschwal, C. J. 1966. A clinical study of cystic condition of the bovine ovary. Journal of the American Veterinary Medical Association. 149: 1591-1595.

Binemo-Mdi. C. and Mposhy, M. 1982. Study of sterility in cows on ranches in Shaba, Zaire, Revue d, *Elevage et* de Medicine Veterinaire des rays Trpoicanx 35: 281-284. Vet. Bull. 53: 4890.

Borsberry, S. and Dobson, B. 1989. Periperaturient diseases and their effect on reproductive performances in five dairy heards. Vet. Records. 124:217-219.

Bostedt, H.; Stolla, R. Humdschell, C. and Leidt, W. 1979. Ovarian cysts in Cows. II. Clinical observation and plasma progesterone concentrations. *Berliner and Miinchener Tierazlliche Wochenschrift*. 92: 506-511. Vet. Bull 50: 5163.

Brochart, M. and Mascarenhas R. 1990. News about subclinical endometritis. Relation with fertility of cows. Science Veterinaries- Medicine-Comparee. 92: 61-62.

Bruyas, JF. and Tainturier D. 1993. The repeat breeding syndrome: a review. Part I. aetiology [metritis, oestrus diagnosis]. Revue-de-Medicine-Veterinarie.44:385-398.

Chaffauw, S.; Recorbet, Y.; P.Y.;Bhat,P.; Crespeau, F. and Thibier, M. 1987. Endometrial biopsy in cows with puerperal disorders. Recueil de Medicine Veterinarie 163: 199-206. Vet. Bull.57: 5967.

Chaffaux, S. Lakhdissi, H. and Thibier, M. 1991. Epidemiologcal and clinical study of postpartum endometritis on dairy cattle. Recueil de Medicine Veterinarie. 167: 349-358.

Chatterjee, A.; Dey, B. N. Bedyanta, J.; Chakraborty, M.; Mondal, P. and sen, G. P. 1985. Studies on the abnormal termination of pregnacy of cattle

and buffaloes in the organized herds in West Bengal. Indian Veterinary Journal. 62: 586-590.

Chaudhari,-S-U-R; Paul-Bokko,-B; 2000. Reproductive status, pregnancy wastage and incidence of gross genital abnormalities in cows slaughtered at Maiduguri abattoir Nigeria. Pakistan-Veterinary-Journal; 20(4): 203-205.

Chmielewski, A. and Tanowski, T.1994. Ovarian function in cows in endometritis puerperalis. Reproduction in Domestic Animals. 29: 246.

Choi, KM.; Kim, BK.; Kim, Jh. and Jung, DC. 1988. Investigaitonal studies on the culling cause of Holstein cows in the kyungnam province and pusan. Korean journal of Dairy science. 10:65-71.

Coster, R. De. 1977. Histological study of non specific infectious endometritis in cows. Annales de Medicine Veterinire 121:491-501. Vet. Bull. 48:5624.

Cruz- sanchez, T. Garcia- Vasquez, zs. Trejo-Nunez, S. and Areia-Garbay, G. 1990. Bovine micotic metritis for candida albicans. Proceedings of National Meeting of livestock Research. Paris. 24-25.

Dawson, F.L.M. 1963. Uterine pathology in bovine infertility. Journal of Reproduction and Fertility 5: 397-407 Vet. Bull. 33.3742.

Dawson, F. L M.1964. Fertility relationships with the cystic condition in cow oveducts. 5th International Congress on Animal Reproduction. Trento 5:182-187 Vet. Bull. 36:1635.S

Dawson, F. L. M. 1964. Report to Government of Israel on bovine infertility. Food and Agricultural Organization of United Nations. FAO/ETAP report No. 1827.

Dawson, F.L.M. 1977. Reproductive potential in female cattle discarded as infertile. Journal of Reproductive and Fertility. 51:53-56.

DE, B. N.; Chatterjee, A. ; Bidyanta, J. Chkroborty, M.Deb, S.K.; P. and Sen, G.P. 1982.Note on the problems of breeding cows with special reference to common coital infections. Indian Journal of Animal Sciences 52: 700-702.

De bois CHW, 1986. Uterine cultures and their interpretation. In: Current Therapy in Theriogenology. Ed. Morrow DA, 2nd ed. WB saunders Co. Philadepphia, London, Toronto. 422-423.

Dohmen MJW, Lohuis JACM, Huszenicza Gy, Nagy, P. and Gacs, M. 1995. The relationship between bacteriological and clinical findings in cows with subacute/Chronic endometritis. Theriogenology 43:1397-1388.

Doig PA, Rhunke HL, Waelchii- Suter R, Palmer NC and Miller RB, 1981. The role of Ureaplasma infection in bovine reproductive disease. Comp. On Continuous Education. 3: 5324.

Donaldson, L. E. and Hansel, W. 1968. Cystic corpora lutea and normal and cystic graafian follicles in cow. Assiut Veterinary Journal 44:304-308. Vet. Bull. 39:1400.

Dtsch Tierarztl Wochenschr Boos, A., Flachsbarth, MF., Koch, R. ,Anatomischen Institut, Tierärztlichen Hochschule Hannover. An unusual case of chronic fibrosing endometritis and mucometra in a Watusi cow (Bos primigenius f. taurus) with uterine foreign.

Ersboll AK, Nielsen LR.2008. The range of influence between cattle herds is Of importance for the local spread of Salmonella Dublin in Denmark.

Esaki, H.; Morioka,A.; Ishihara,K.; Kojima,A.; Shiroki,S.; Tamura,Y.; Takahashi,T.; 2004. Antimicrobial susceptibility and the serology of experimental of Salmonella isolated from cattle. Report from theJapanese Veterinary Antimicrobial Resistance Monitoring Program

Farooq,-M.; Syed,-M.; Amjed,-M.; Siddiqi,-M-N.; Muqarrab,-A-K. 2000; Relative incidence of reproductive disorders among various grades of crossbred cattle at different Locations in NWFP. Pak.Vet. Jour. 20(3): 151-153.

Fathalla,-M; Hailat,-N; Lafi,-S-Q; Basha,-E-A; Al-Sahli,-A;2000; An abattoir survey of gross reproductive abnormalities in the bovine genital tract in Northern Jordan. Israel-Journal-of-Veterinary-Medicine. 2000; 55(3): 83- 87.

Fivaz, B. H. and Swanepoel, R.1978. Bovine postpartum metritis and the reconception period. Rhodesian Veterinary Journal 9:17-23. (Vet. Bull. 49:4762).

Francos, G. 1974. Observation on the frequency of reproductive disorders in dairy herds in Israel. Deutsche Tierarzlliche Wochenschrift 81: 135-138. (Vet. Bull. 44:5138).

Frazier, K.;Pence, M.; Mauel, MJ.; Liggett, A.; Hines ME.; Sangster, L.; Lehmkuhl, HD.;Fredrikssson G, Kindahl G, Sandstedt K and Edqvist LE, 1985. Intrauterine bacterial findings and release of PGF2a in the postpartum period in the cow. zbl Veterinary Medical Association.32:368-380.

Frie, C. G.; Bentele, W. and Sommer, H. 1984. Second distribution of ovarian cysts in cattle: observation under practical conditions. Zuchthygiene 19: 83-89. Vet. Bull. 54:6650.

Ganti, A and Sastry. 1983. Veterinary pathology. 6th ed. Sutish Kumar Jain for CBS publishers, Bholanath Nagar, Shadra, Delhi-32.

Gharib, H. M.; Goher, M. E.; El Sawaf, S. and Schmidt, K. 1965. Some studies on the role by the environmental variations on infertilith in buffaloes and imported cows in Egypt. Ibid 233-343. Vet. Bull. 36:2421.

Gilbert RO, 1992. Boine endrometritis:the burden of proof.Cornell veterinarian. 82:11-14.

Glatzel, P. and Chadli, M. 1985. Reproductive problems among dairy cows imported into Morocco from Europe, Tierarztliche Umschau 40:482, 484-486. Vet. Bull. 55:7995.

Gluhovschi, N.; Bistriceanu, M.; Bilcea, P.; Bratu, M. and Majina, C. 1972. Clinical, histological and cytological studies on congenital ovarian hypoplasia. Monatshefte fur Veterinarimedizin 27:176-178. Vet. Bull. 42:5477.

Grohn, Y. T.; Erb, H. N.; Mcculloch, C. E. and saloniemi, H. S. 1990. Epidemioligy of reproductive disorders in dairy cattle: associations among host characteristics, disease and production. Preventive Veterinary Medicine 8:25-39.

Grunet, E. and Fritz, W. 1964. Follicular hormone in the urine of cows with cystic ovarian degeneration. Dt. tierarzt 71: 482-487. Vet. Bull. 35:787.

Grunert, E. 1969. Corpus luteum cysts in cows and their significance as sterility factor. Dt. tierarztle Wschr 76:668-672. Vet. Bull. 40:3197.

Hall GA, Jones PW, Aitken MM, Parsons MR 1978. The serology ofexperimental Salmonella dublin infections.

Hatch, R. D.; Brodie, B. O.; Thurmon, J. C. and Erwin, B. G. 1968. A clinical survey of retained foetal membranes and metritis in dairy cows. Veterinary Medicine and Small Animal Clinician 63? 607-610. Vet. Bull. 39:417.

Holy, L. 1965. Ovarian cysts in cows in relation to age milk yield and some clinical symptoms. Veterinary Medicine praha 10: 443-452. Vet. Bull. 36:810.

Hossain, M. A.; Shahidulla, Md. and Ali. M. A. 1986. A report on surgical diseases and reproductive disorders recorded at the Veterinary Hospital of Bangladesh Agricultural University, Mymensingh. Bang. Vet. Jour. 20:1-5.

Hussain, P. M. and Muniraju, L. 1987. Study on the incidence of reproductive disorders of bovine in a part of Southern Karnataka. Livestock Adviser 9:16-16.

Izquierdo, N. and Angelov, A. 1984. Morphological changes in the oviducts of infertile zebu cows. Veterinary nomeditsinski Nauki 21: 69-77 Vet. Bull. 54: 5856.

Jackson PS, 1977. Treatment of chronic postpartum endometritis in cattle with cloprostenol. Veterinary Record. 101: 441-444.

Joned, T. C. and Munt, R. D. 1983. Veterinary pathology. 5th ed. Bailliere Tindall, London.

Jubb KVF, Kennedy PC and Palmer N, 1991. Inflammatory disease of the uterus In: pathology of Domestic Animals. 4th ed. Academic press, Sandiago, New york, London, Sydney. Tokyo, Toronto. 378-381.

Kadu, M. S.; Belokar, P. M.; Bhandari, R. M. and Khire, D. W. 1976. Reproductive disorders in cattle and buffaloes under field and farm conditions in Eastern Maharashtra. Maharet, 3:3-5, 7, 9 Vet. Bull. 47:3933.

Kaikini, A. S.; Chikhalikar, G. K.; and Dindorkar, C. V.; 1983. Reproductive disorders in Holstein- Friesian X Gir F1 cross- bred cows. Ind. Jou.of Animal Sciences 53: 556-558.

Kaneene, JB and Miller R, 1994. Epidemioligical study of metritis in Michigan dairy cattle Research. 25: 253-257.

Kirk, J. H.; Huffman, E. M. and Lame, M. 1982. Bovine cystic ovarian disease: Hereditary relationship and case study. Journal of the American Veterinary Medical Association 181: 474-476.

Klug, F.; Fremz H.; Rehbock. F. and Belhge, B. 1988. Breeding aspect of the occurrence of ovarian cysts in dairy cows. Monatshefte tur Varerinarmedizin 43: 149-151. Vet. Bull. 58: 7199.

Kotowski,-K, 2001. The state of mammary glands and reproductive organs of cows subjected to slaughter; Medycyna-Weterynaryjna. 2001; 57(4): 266-267.

Kruif, A. DE. 1977. Studies on anoestrus in cows. Tijdschrift Voor Diegeneeskunde 102: 247-253. Vet. Bull. 47:3936.

Kubar,-H.; Jalakas,-M. 2002. Pathological changes in the reproductive organsof cows and heifers culled because of infertility. Journal-of-Veterinary Medicine-Series-A. 49(7): 365-372.

Kubar,-H.; Jalakas,-M. 2003. Pathological changes in ovary, oviduct, uterine horns and vagina of cows culled because of infertility. Agra; 14(1): 3-12.

Kucharski, J. and zxdunchzyk, S. 1984. Frequency of puerperal disorders in dairy cows. Zeszyty Naukowe Akandemii Rolniczo-Technicznejw Olszlunie, Welrynaria 15:149-154. Vet. Bull. 56:2396.

Kudlac, E. 1965. Causes of anoestrus and stimulation of oestrus in heifers by extrapituitary gonadotrophins. Sb. vys. Sk. Zemed, Brno, Ser. B. 13: 483-492. Vet. Bull. 36: 2854.

Kumar, S.; Agarwal, S. K. and purbey, L. N. 1986. Studies on reproductive disorders in non descript cattle. Indian Veterinary Medical Journal 10: 174-175.

Kummer V, Zraly Z and Canderle, J, 1989. Histology of the endometrium of cows during physiological and pathological puerperium. Veterinari-Medicina-UVTIZ 34: 603-613.

Laprate, H. M.; Hogeveen, H.; Schukken, Y. H. and Noordhuizen, J. P. T. M. 1994. Cystic ovarian disease in Dutch dairy cattle. I. Incidence, risk factors and consequences. Livestock production Science 38: 191-197.

Lein, DH, 1982. Bovine Reproductive disordeds associated with Ureaplasma, Mycoplasma Haemophilus somnus and Chlamydia (A review). Annual Conference on the Society of Theriogenology. Milwaukee Wisc. 245-255.

Luna, L.G.1968. Manual of Histologic Staining Methods of the Armed Forces Institute of pathology 3rd Erd. McGraw Hill Book Company, New York.

Manda-Srinivas; Naidu,-K-S; Naidu,-G-V,2007. Incidence of reproductive disorders in rural buffaloes in Andhra Pradesh; Indian-Vet.Jour.84(8):865-866.

Markusfeld, O. 1984. Factors responsible for postparturient metritis in dairy cattle.Vet. Record. 114:539-542.

Martin Sheldon; Andrew N.; Rycroft; Belgin Dogan; Melanie Craven; John J.; Bromfield; Alyssa Chandler; Mark H;. Roberts; Sian B.; Price; Robert O.; Gilbert; and Kenneth W.; Simpson; 2010.Specific Strains of Escherichia coli Are Pathogenic for the Endometrium of Cattle and Cause Pelvic Inflammatory Disease.

Mc-Entee, K. 1965. Pathology of the female reproductive system In Handbuchder speziellen pathogishen Hanalomic der Haustiere. Volume IV PP. 130-201.

Mc-Entee, K. 1983. 15th FAO/SIDA International postgraduare course on Animal Reproduction. Vol 111 College of Veterinary Medicine Uppsala Sweden.

McDougall,-S. 2005. Gross abnormalities, bacteriology and histological lesions of uteri of dairy cows failing to conceive or maintain pregnancy. New-Zealand-Vet. Jour.,53(4): 253-256.

Mesisser, S.;Higgins, R.; Counture, Y. and Morin M, 1984. Comparison of swabbing and biopsy for studying the flora of bovine uterus. Canadian Vet. Jour. 25: 283-288.

Metzner M, Weiler H, Lessmann HW and Merck CC. 1992. Vaginoscopic, Hyteroscopic and bacterilogical diagnosis of the endometritis in the bovine and its dependence on cyclivuty. Reproduction in Domestic Animals. 27: 2.3-204.

Miller HV,Kimsey BP, Farren JW, Doring, L. and Horton J. 1980. Endometritis in cattle: diagnosis, treatment and fertility. Bovine practitioner 15:13-23.

Miller JG, 1950. A method of endometrial biopsy in the bovine and the study of biopsy specimens in cases of infertility. MSc. Thesis, Cornell Univeresity, Ithaka, NEw York, USA.

Minchev, P.; Boganov, M. and Knyumdzhiev, V. 1969. Hereditary basis of certain disturbances of cattle reproduction (endometritis, placental retention). Veterinary Medicine Nauki, Sofia 6: 21-29, Vet. Bull. 40:883.

Miller,D.; Styer, E.; West, J.;and Baldwin, CA. 2001 Endometritis in . postparturient Cattle associated with bovine herpesvirus-4 infection:15 cases. Journal of Veterinary Diagnostic Investigation, Vol 13.

Moe, R, 1991. Bovine endometritis. A revew. Norks Veterinaertidsskrift. 103: 497-501.

Mollah WA, Rahman A, Alam MGS, Sen MM and Islan A, 1989. Studies on bovine fertility, infertility and health status in an area of Bangladesh. Livestock Advisor. 14:27-33.

Mujuni, P. F.; Mgongo, F. O. K. and Kanuya, N. L. 1993. Ovarian cysts, a post a post partum Ovarian disorder affecting dairy cows in tropical area. Animal Reproductive Science 31: 175-186. Vet. Bull. 65:411)

Muller, W. 1965. Aetiology and therapy of ovarian cysts in cattle Scheweizer Arch. Tierheilk. 107:340-347. (Vet. Bull. 36.1217).

Murbach,A. 1978. Pathological oviduct diseases in cows. Inaugural dissertation, Veterinary- Medizinische Fakultat. Zurich D.41: (Vet. Bull. 49:5514)

Mylrea, P. J. 1962. Macroscopic lesions in the genital organs of cows. Australian Veterinary Journal. 38:457-461.

Nair, K.P. and Raua, C. K. S. V. 1974. Study on the pathological conditions in the reproductive organs of cows. I. pathology of the ovaries, Kerala Journal of Veterinary Science 5: 82-97.

Nakao, T.Moriyoshi, M. and Kawata, K. 1992. The effect of postpartum ovarian dysfunction on high and medium producing dairy cows. Theriogenology. 37: 341-349.

Nanda, A. S.; Ward, W. R. and Dobson, H. 1989. The relationship between milk yield and cystic ovarian disease in cattle. British Veterinary Journal. 145: 39-45.

Nascimento EF, Abdo MAGS, Chquiloff MAG and Cassali GD, 1994. Ovarian and uterine pathological changes in cow. I: metritis endometritis and

cervicities. Arquivo- Brasileiro- Medicina- Veterinaria- Zootechnia. 46: 121-126.

Noakes DE, Till, L. and SMith GR, 1989. Bovine uterine flora postpartum. A Comparison of swabbing and biopsy. Veterinaria Record. 124:563-564.

Olson JD, Bretziaff KN, Mortimer RG and Ball L, 1986. The metritis-pyometra complex. In: Current Therapy in Theriogenology. Fdt. Mottow DA. 2nd ed. WB Saunders Company. Philadelphia, London, Toronto.227-236.

Onet, E. 1972. Frequency and character of some uterovaginal lesions in slaughter cows. Deutsche Tierarztliche Wochenschrift 9: 367-370. (Vet. Bull. 43:857).

Pargaonkar,D. R. and Bakshi, S. A. 1987. Reproductive disorders of Red Kandhari cows and their cross breds. Indian Journal of Animal Reproduction 8: 18-19.

Parmigiani,-E; Bigliardi,-E; Morini,-G; Ambrosi,-V. 2001. Culling rates in Lombardia farms. Atti-della-Societa-Italiana-di-Buiatria, 33: 61-66.

Pavlovic M, Vulovic M, petrovic S, 1988. Histological and immunof lurocent analysis of the endometrium in dybgertile cows. Veterinarski-glasnik. 42:15-2

Patel,-S-B; Hadiya,-K-K; Chavan,-D-B; 2007 Incidence of reproductive disorders in Veterinarians. 2007; 3(2): 15-17. cattle and buffaloes in Kaira Di Amul Dairy, Anand 388 001,Gujarat, India. Ind.Jour.of Field.

Powers BE, Johnson LR, Linton LB, Barry, F. and Smith, J. 1990. Endometrial biopsies technique and uterine pathologic findings in llamas. Journal of American Veterinariy Medical Association. 179: 1167-1162.

Pullinger GD, van Diemen PM, Dziva F, Stevens MP. 2010 Role of two-component sensory systems of Salmonella enterica serovar Dublin the pathogenesis of systemic salmonellosis.

Qureshi, A. W. and Ahmad, M. 1966. The incidence of various pathological conditions in the genital organs of cows and buffaloes slaughtered in Karachi. Agriculture, Oakistan 17: 317:323.

Rahamn, M.F.;Hossain M.S.; and prodhan, M. A.M. 1993. Reproductive problems of cattle in Bangladesh. The Bangladesh Veterinarian 10:71-73.

Rahman,-M-A; Alam,-M-G-S; Shamsuddin,-M. 2002. Histopathological evaluation of the uterine biopsies diagnostic to different level of clinical endometritis in dairy cows. Bangl.Vet. 19(2): 77-85.

Rahumathulla, P. S.;Rajasundaram, R. C. and Gajendran, K. 1986. Incidence of various reproductive disorders among cattle and buffaloes. Livestock Research Development Centre. 15: 78-79. (Vet. Bull. 57:996).

Rao, A. V. N.; Reddy. A. C. and Murthy, Y. N. 1993. Incidence of reproductive disorders in relation to exotic inheritance in crosses bred cows. Indian Veterinariy Journal 70: 722-725.

Rao, R. A.; Rao, N. P. and Roa, A. S. P. 1965. Some observation on genital abniormalities of cattle. . Indian Veterinariy Journal 42: 751-754.

Rao, R. P.; Rajya, B.S. and Parihar N.S. 1975. Pathology of repeat breeding on cows. Indian Journal of Animal Sciences 45: 943-948.

Rodreguez GI, Gonzalez-Charry HE, Gallego-Marin MI, 1991. Correlation of the endometrial morphology with bacteriological isolations in infertile cows of the plain of Bogota. Revista-ICA. 26:275-286.

Roine, K. 1977. Observation on genital abnormalities in dairy cows using slaughter house material. Nordisk Veterinaermedicin 29:188-193 (Vet. Bull. 48:1069).

Roine, K. and Salonieni, H. 1978. Incidence of infertility in dairy cows. Aeta Veterinaria Scandinavia 19:354-367.

Romaniuk, J. 1972. The incidence and treatment of ovarian cysrs in cows. Bulletin of the Veterinariy Institute in pulawy 16:98-108 (Vet. Bull. 43:2629).

Rose, R. 1987. Endometritis in cows: result of laboratory tests during a regional investigation of endometritis. Recueil de Medicine Veterinaire 163: 211-213. (Vet. Bull. 57:5968).

Rostedt, H and Himstedt, R. 1983. Ovarian function in cows after abortion. Wiener Tierazlliche Monatsschrift 70:249-250 (Vet. Bull.54:281).

Samad, MA, 1986. Reproductive disorders in cattle of Bangladesh. Livestock Adviser. 22: 121-128.

Scheidegger, G. A.; Melendezr, P.; Duchens, A. M. and Asnis H. J. 1993. Retained foetal membrane and other purperal reproductive disorders and their effects on postpartum fertility in Holstein cattle. Avance on clincias Veterinairias 8: 18-23 (Vet. Bull.64:2956).

Schjervwn, L. 1965. Treatment of cystic ovarian disease in dairy cattle. The effect of normal rupture as related to the age of the animal and the interval between parturition and time of treatment. Nord Veterinary Medicine 17: 382-385. (Vet. Bull.36:809).

Seitaridis, C and Metaxopoulos, J. 1971. Research on the affections of oviducts and ovaries on cows slaughtered in the Athens slaughter house. Bulletin of the Hellenic Veterinary Medical, 22:79-87.

Selunskya, E. I. 1975. Clinical and histological changes in the genital organs of infertile cows. Veterinary, Moscow. 4: 69-74. (Vet. Bull.45:5805).

Settergren, I. 1980. Physical examination of the female reproductive system: Current therapy in theriogenology. (Ed. Morrow, D.A.) W.B, Saunders Company, Philadelphia, Toronto, London.

Settergren, I. and Gulloway,D.B. 1965. Study on genital malformations in female cattle using slaughter house material, Veterinary Journal 17:9-6.

Shamsuddin, M.; Alam, M. G. S. and Ahmed, J. U. 1988. Reproductive disorder of crossbred cows.Bangladesh Veterinary Journal 22:21-28.

Shevchik, A. and Gamchik, P. 1964. Diagnosis of diseases of the fallopian tubes in cows. Folia. Vet. Kosice 7:141-154.

Siemerl NA, Wilcox CJ, Thatcher Ww and Martin FG, 1991. Prepartum and Peripartum reproductive performances of dairy heifers freshing at young ages. Jour. of dairy Science. 74:1724-1729.

Sinha, A. K.; Nigam, J. M. and Sharma, D. N. 1983. Histological observations on endometrial glands of cows and buffaloes in relation to fertility. Tropical Veterinary and Animal Science Research 1:37-41.

Saroj SD, Shashidhar R, Karani M, Bandekar JR.2008. Distribution of Salmonella pathogenicity island (SPI)-8 and SPI-10 among different. serotypes of Salmonella. J Med Microbiol. 57(Pt 4):424-7.

Takeshi, O.; Keiichi, M.; Kumi, F.; Hozumi Manami, M.; Yamane Masako, Y.; Goryo Masanobu, G.;Okada Keiji, O.; Yoshihisa, N. 2006. A Case of Pyometra with a Large Encapsulated Abscess in the Perimetrium in a Holstein Cow Japanese Journal of Veterinary Clinics Journal 29;no.1.

Thain, R. I. 1968. Residual herd infertility in cattle Australian Veterinary Journal 44:218-222.

Theus, T.; Kupfer, U.; Leiser, R.; and Konig, H. 1979. Endometritis in cattle form the clinicalv pathological and histological aspects. Zentralblatt fur Veterinary medizin 26:914-634. Vet. Bull.50:3021.

Troedsson MHT, Liu IKM and Thumond M. 1993. Function of uterine and blood derived polymorphonuclear neutrophils in mare susceptible and resistant to chronic uterine infection: phagocytosis and chemotaxis. Biology of Reproduction. 49: 507-514.

Twardon,-J; Samborski,-Z; Dejneka,-G-J; Dziecio,-M. 2001. Influence of fingers disorders on reproduction system and udder salubrity in cows.

Vogler, G. 1973. Causes of infertility and effect of treatment in over a thousands cattle failing to conceive. Wiener Tierarztliche Monasschrift 60:16-21(Vet. Bull.43:3036).

Weiler, H.; MEtzner, M.; Lessmann HW and Merck CC, 1994. On the importance of histopathological findings in tissue samples of the endometrium for the clinical diagnosis of endometritis in cows. Reproduction in Domestic Animals. 29: 240.

Weishaupt, V. and Erika, W. 1991. Bibllographic review of inflammatory pathologies of the bovine uterus. Chillan 19:131.

Wettke, K. and Jaham, J. 1971. Investigation and treatment of sterility in dairy herds. Deutsche Tierarztliche Wochenschrift 78:437-441. Vet. Bull. 42-2904.

Whitmire, H. L. Tyler, W. J. and Casida, L. E. 1974. Incisence of cystic ovaries in Holstein- Friesian cows. Journal of the American Veterinary Medical Association 165: 693-694.

Wittenbrink MM Schoon HA, Bisping W and Binder A 1993. Infection of the bovine female genital tract with Chlamydis psittaci as a possible cause of infertility. Reproductive in Domestic Animals. 28: 129-136.

Yener,-Z; Karaca,-F; Alan,-M 2004; Serous papillary cystadenoma in the ovary of a cow. Australian-Veterinary-Journal. 2004; 82(12): 781-783.

Zacchi, B.1962. Nymphomania in cows. Proceedings of the IVth International Congress on Animal Reproduction (1961), 3: 701-705.

Zafrakas, A. M. 1969. Diseases if the genital tract in cattle. Hellen Klen; Thessalonike 12:74-80. Vet. Bull. 40:1443.

Zanaj, S. 1989. Sereral diagnostic tests value for the cows with chronic endometritis discovery. Vuletine- shkencae-zooteknike-e- veterinare. 1:85-92.

Zdunczyk, S.;Hanowski, T.; Ras, A. and Zebracki, A. 1989. Studies of the association between ovarian activity in cows and the incidence of endometritis. Tiearatliche- Umschau. 44: 464-471.

Zemjanis, R.;Larson, L. L. and Bhalla, R. P. S. 1961. Clinical incidence of genital abnormalities in the cow. Journal of American Veterniary Medical Association 139: 1025-1018.

Zhao, S.; McDermott, PF.; White, DG.; Qaiyumi, S.; Friedman,SL.; Abbott, JW.; Glenn, A.; Ayers, SL.; Walker, RD.; 2007. Characterization of multidrug recovered from diseased animals resistant Salmonella.