Reproductive System – 1,2

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FEMALE REPRODUCTIVE TRACT

Developmental Anomalies

- ***Freemartinism***
  - The bovine freemartin is a genetic female born co-twin with a male
  - *Communication with the vagina of uterus is always absent*
  - *Has XX/XY chromosomes*
  - *Ovaries are non-functional*
- Ovarian Hypoplasia, Agenesis, Cystic development, Duplication of ovaries, etc. can be there
- Uterus Unicornis
  - Single Uterine horn, segmental aplasia
- Hypoplasia of the cervix

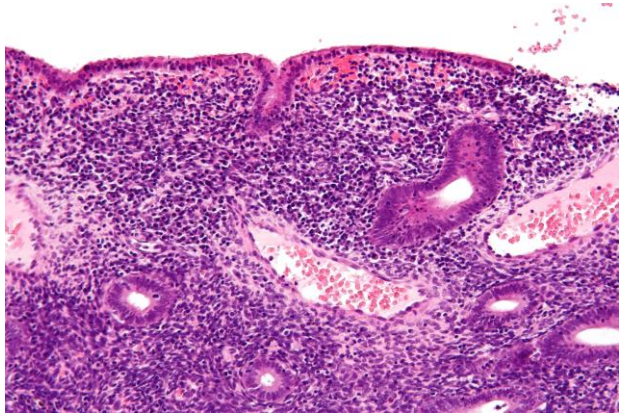
Pathology

- ***Follicular Cyst***
  - *Anovulatory cystic ovarian disease occurs in most, if not all, species*
- ***Luteinized cyst***
  - *This type of cyst develops when ovulation fails to occur and the theca undergoes luteinization.*
- *Ovarian epidermoid cyst*
- **Hydrosalpinx**
  - uterine tube is distended, uniformly or irregularly, up to 1.5 cm or so with clear watery mucus that fluctuates.
- **Salpingitis**
  - *Inflammation of the uterine (fallopian) tubes without significant enlargement is the most common and most important tubal lesion*

- ***Pyosalpinx***
  - *the accumulation of pus in the tube following obstruction of the lumen*
- Uterine Torsion
  - May occur during pregnancy or with pyometra and hydrometra.
  - *The torsion twisting of the uterus along its long axis*
- *Prolapse of vagina and Uterus*
- *Rupture of vagina or uterus*
- *Endometrial atrophy, hyperplasia, adenomyosis, endometrial polyp,*
- *Hydrometera and Mucometera*
  - *Hyperplasia of endometrial glands and obstruction*
- *Inflammations of the Uterus*
  - *Endometritis, metritis,*

- ***Endometritis***
  - Inflammation of the endometrium or uterine mucosa
  - Many bacteria can cause
  - More common in cattle during puerperium period
  - The mucus contain flakes of white or yellow detected at the time of heat sign
  - One of the common condition and may result in infertility
  - May be acute of chronic
  - Chronic can occur due to tuberculosis
  - Mucosa swollen, rough surface
  - Adherent shreds of fibrin and necrotic debris
  - Neutrophils found in stroma and glands
  - Desquamation of surface epithelial cells
  - Mild lesion resolve completely

http://www.msd-animal-health.co.uk/binaries/Farmspeak_-_Minimising_the_impact_of_uterine_infections_tcm80-69452.jpg



http://upload.wikimedia.org/wikipedia/commons/f/f2/Endometritis_-_high_mag.jpg

- **Chronic form**
  - Replaced by granulation tissue devoid of glands and ultimately this mature to form fibrous tissue.
  - Decrease production of PGF2α result in persistent CL

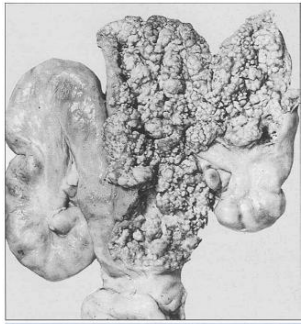


Figure 4.63 Granulomatous metritis in bovine tuberculosis.

- **Pyometra**
  - Accumulation of pus in the uterus
  - the corpus luteum persist and maintain a high progesterone level.
  - The retention of the corpus luteum appears to be due to a reduction in or inhibition of the synthesis and release of the luteolytic factor, PGF2a, by the diseased endometrium.
  - The histological changes do not differ significantly from those of endometritis
  - The organisms involved are hemolytic streptococci, staphylococci, coliforms, Arcanobacterium pyogenes, and Pseudomonas.
  - The venereally transmitted protozoan, *Tritrichomonas foetus*, can be the cause of pyometra after breeding.
  - Pyometras seldom spontaneously resolve and, is not usually life-threatening

http://i1248.photobucket.com/albums/hh496/nilnethnet/LankaVet/images_zpsf5a346e4.jpg

http://i1248.photobucket.com/albums/hh496/nilnethnet/LankaVet/bstd16_zps00ded7d1.jpg

- **Hydramnios and hydrallantois**
  - Excessive accumulations of fluid in the amniotic and allantoic sacs
  - Hydramnios, is usually associated with malformation of the fetus.
  - Hydrallantois in cattle is most often associated with uterine disease
- **ABORTION AND STILLBIRTH**
  - **Abortion** is the premature expulsion of the fetus from the dam and usually occurs because the fetus has died in-utero.
  - If death occurs at 1-2 months of gestation, it is usually termed "**early embryonic death**."
  - **Stillbirth** is usually described as the production of a dead calf after 272 days gestation
  - Significant causes of stillbirth in cattle are BVD, leptospira and neospora

- Infections those cause abortion in cattle include BVD, Brucellosis, Campylobacter, Chlamydia, IBR, leptospira, neospora, sarcocystis, trichomoniasis
- For diagnosis, the optimal submission includes the **fetus** and **placenta** plus **serum** from the **dam.**

Brucellosis

- Bacteria of the genus Brucella are gram-negative bacilli or coccobacilli that are strictly parasitic and chronic infection leads to bacteremias typically manifested by abortion in pregnant animals.
- Three classic species of Brucella were described B. melitensis, goats, B. abortus, cattle, and B. suis, swine
- The usual source of infection for cattle is an aborted fetus or placenta, or contaminated uterine discharges,
- the usual route of infection is alimentary.
- Infection can also occur per vagina, via the conjunctiva, **and** through the skin

- Coital infection can occur but is uncommon,
- Young cattle are relatively resistant up to about the age of puberty.
- The organisms extend quickly to the lymph nodes regional to the point of entry, and there they provoke acute lymphadenitis.
- The inflamed nodes are enlarged, often much so, hyperplastic with no clear corticomedullary distinction, and frequently bear small or large medullary hemorrhages.
- The sinuses are infiltrated with neutrophils and eosinophils; germinal centers and proliferative activity become obvious; and there is slow but remarkable accumulation of plasma cells in the medullary sinuses.
- As the infection becomes chronic, bacteremia becomes intermittent,
- Also, it tends to recur at parturition.

- the bacteremia would result in localization and persistence of the organism in many tissues but largely in spleen, mammary glands, mammary lymph nodes, and pregnant uterus of the female, and to the lymphoid tissues, testis, and accessory glands in the male
- almost without exception, excrete *B. abortus* in the colostrum.
- Organisms excreted in milk are an important source of infection for children; and also for calves, but they recover without significant effect.
- *B. abortus* has **special affinity** for the pregnant endometrium and placenta to which it spreads hematogenously during the initial or later bacteremia.
- **Abortion** occurs most often in the seventh and eighth months of gestation.

- Typically, *between the endometrium and chorion in the intercotyledonary area, there is abundant exudate* that is odorless, dirty yellow, slightly viscid and slimy, and which contains gray-yellow, pulpy floccules of detritus.
- The fetal membranes and the umbilical cord are edematous,
- Affected cotyledons or portions of them are necrotic, soft, yellow-gray, and may be covered with the sticky, odorless, brown exudate
- **Histologically,** edematous placental stroma contains increased numbers of leukocytes, largely mononuclear but with some neutrophils.
- The chorionic epithelial cells desquamate into the uterochorionic space.

- in **placentitis**, infiltrated leukocytes, epithelial debris, and bacteria are present.
- The **fetus** is usually somewhat edematous with blood-tinged subcutaneous fluid.
- The normal abomasal content of a fetus is clear, translucent, thick, and viscid; in brucellosis, it often becomes very turbid, of a lemon-yellow color, and flaky.
- The *important **fetal** lesion in brucellosis is pneumonia that is present to some degree in most fetuses aborted in the last half of pregnancy.*
- *Grossly lungs may be normal but* histologic examination reveals scattered microscopic foci of bronchitis and bronchopneumonia

- **Cervicitis**
- **Vaginitis**
- **Vulvitis**

Infectious pustular vulvovaginitis of cattle

- Infectious pustular vulvovaginitis is caused by the same herpesvirus *(Bovine herpesvirus 1)* that causes IBR or at least is caused by a subtype of that virus that is serologically indistinguishable from it.
- The infection can be transmitted to sheep and goats, producing vaginitis.
- Infectious pustular vulvovaginitis is *highly contagious.*
- It is frequently transmitted by **coitus**, but it can also be transmitted by other mechanical means and is contagious by close contact.

- It may involve individual or a few animals in a herd, but frequently spreads rapidly
- The disease subsides in about 10 days, leaving immunity that is fragile and transient.
- The incubation period is 1-3 days but may be as brief as 12 hours.
- The lesions are restricted to the genital tract, but a viremic phase probably occurs
- Initially, the **vaginal** and **vulvar** mucosa is hyperemic with focal hemorrhages in the lymphocytic follicles of the submucosa.
- The *severity of the vulvovaginitis increases rapidly, and edema of the vulva and mucopurulent vaginal discharge develop.*
- The focal lesions replace the hemorrhages over the lymphoid follicles and consist of small (2-3 mm) loci, slightly elevated, pale, soft, and friable

- The epithelium in the focal lesions erodes or ulcerates
- The virus is epitheliotropic, the initial and most severe alterations occurring in the epithelium of the vagina and vulva.
- There is ballooning degeneration of the epithelial cells,
- The intranuclear inclusions are lightly **acidophilic** and large
- The infected cells undergo **necrosis**, and epithelial disruption and ulceration occur, accompanied by an intense infiltration by neutrophils
- **Acute inflammation** occurs in the lamina propria, with hyperemia and edema and the exudation of numerous plasma cells and lymphocytes.

- **Supernumerary teats** are common, especially in cattle

http://beforeitsnews.com/mediadrop/uploads/2013/38/b414dc103bbe5d67660a63f8a8b51f84354adc89.jpg

BOVINE MASTITIS

- Bovine mastitis is inflammation of the mammary gland
- Potential mammary pathogens are ubiquitous.
- Modern techniques of microbial classification have identified more than 100 species, subspecies, and serovars isolated from the mammary gland.
- *Streptococcus agalactiae and perhaps some types of Staphylococcus aureus are obligate parasites of the gland and inevitable pathogens, but the great majority of infections are opportunistic.*
- Mastitis, excepting that caused by obligate pathogens, might best be regarded as an *inflammatory disease rather than an infectious disease*
- The pathologic process may range from transient to persistent and from mild or subclinical **to** peracute and fatal.

- Notwithstanding the large number of microbial species **that may** be isolated from the diseased mammary gland, *the epidemiological picture of bovine mastitis is dominated by the streptococci, staphylococci, and colforms.*
- Some infections, such as by *Cryptococcus* and the atypical mycobacteria, are usually iatrogenic.
- Once the inflammatory process is established, additional microbial species, particularly the anaerobes, may participate by permission of a changed intramarnmary environment, allowing growth of resident organisms or altered competence of the teat canal, allowing entry of additional species
- The udder become swollen, red, warm to touch and milk may contain flakes of pus.
- The somatic cell count in the milk goes very high
- Sometime the milk may contain blood also

https://jdc325.files.wordpress.com/2011/04/cow-with-mastitis.jpg

http://upload.wikimedia.org/wikipedia/commons/thumb/b/b2/Mamite_å_colibacile_laecea.jpg/150px-Mamite_å_colibacile_laecea.jpg

NEOPLASTIC DISEASES OF THE TUBULAR GENITALIA

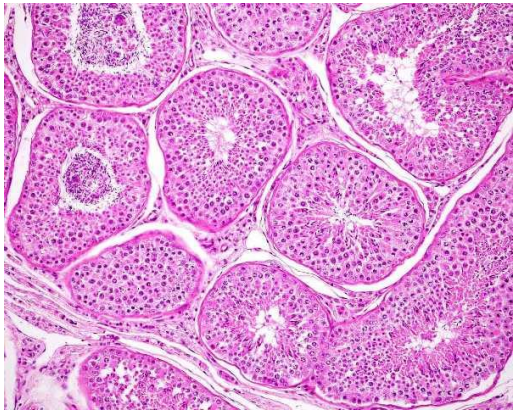
- Leiomyoma
- Leiomyosarcoma
- Transmissible venereal tumor of dogs
- Fibropapilloma of the vulva
- Transmissible genital papilloma of the pig
- Carcinoma of the endometrium and cervix
- Lymphosarcoma
- Metastatic tumors

MALE REPRODUCTIVE SYSTEM

- **Cryptorchidism**
  - Incomplete descent of the testes and associated structures to the scrotum
  - Congenital / hereditary
  - Testes are smaller in size
  - *Retained testes lack spermatogenesis, and fertility may be compromised.*
  - *Increased rates of testicular neoplasia* are associated with cryptorchidism in several species
  - Hyperplastic foci of Sertoli cells occur in some retained testes

- **Testicular Hypertrophy**
- **Testicular Hypoplasia**
- **Testicular Degeneration**
  - Testicular degeneration is manifested clinically and grossly as atrophy, mineralization, and fibrosis
  - Testes undergoing degeneration are usually reduced in size.
  - In early or rapidly progressing degeneration, the testis is soft and flabby, lacks turgor, and the cut surface does not bulge.
  - Wrinkling of the tunica albuginea may be apparent.
  - Epididymis appear to be disproportionately large
  - With continued degeneration and fibrosis, the testis becomes increasingly hard and variable mineralization may occur

- Testicular degeneration may be uni- or bilateral,
- **Histological changes** vary in degree, but are relatively stereotypic.
  - In the early stages, **Sertoli cells** develop vacuolation.
  - There also is disorganization and exfoliation of germ cells.
  - In some cases there may be failure of release of germ cells from Sertoli cells and spermatozoa are phagocytozed by Sertoli cells.
  - Early changes in the germ cells include failure of maturation of spermatozoa and degeneration of spermatids;
  - many spermatids are necrotic and others produce characteristic spermatidic multinuclear giant cells.



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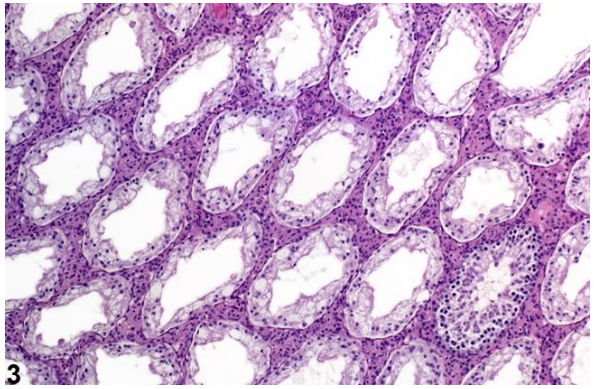

http://ntp.niehs.nih.gov/nnl/male_reproductive/testis/geatrophy/images/figure-003-a42426_medium.jpg

- **Orchitis**
  - *Brucella abortus* or tuberculosis,
  - orchitis is a rare and sporadic disease in domesticated animals.
  - *The vast majority of cases diagnosed clinically as orchitis are actually epididymitis*
  - Focal accumulations of lymphocytes are occasionally seen in the testes of most species as incidental findings
  - Tuberculous orchitis is a multifocal granulomatous disease that is much less common now because of eradication in many countries.
  - Interstitial orchitis, tubular orchitis, necrotic orchitis