PATHOLOGY OF FEMALE GENITALE SYSTEM

What is the benefit of knowing this system?

- It is certain that the detailed examination of these diseases and their knowledge will play an important role in the development of healthy animal populations.
- This success will also affect the economy.

OVARIUM

Developmental anomalies

Agenesis of one or both ovaries is rare, but is observed in ruminants, swine, and dogs.

In bilateral agenesis, the tubular genitalia may be absent as part of the defect or, if present, are infantile or underdeveloped.

Ovarian remnants. Interest in the occurrence of anomalous ovarian duplication commonly arises when either cats or dogs, supposedly surgically neutered, exhibit signs of estrus. In the bitch, the effects of circulating estrogen are easily detected by serial vaginal cytology.

Hormonal studies are confirmatory, and ultrasonographic and exploratory surgical examinations are also done.

Duplication of ovarian tissues is very rare. Although there are no controlled studies, duplication may just be splitting of ovarian tissue.

Hypoplasia of the ovaries is studied primarily in cattle, but occurs in other species. It is usually bilateral but varies considerably in its severity and symmetry so that “severe hypoplasia” or “partial hypoplasia” may be applicable to one or both ovaries.

In severe hypoplasia, the defective gonad varies in size from a cordlike thickening in the cranial border of the mesovarium to a flat, smooth, firm, bean-shaped structure in the normal position.

There are neither follicles nor luteal scars and, microscopically, the ovary is largely composed of medullary connective tissues and blood vessels.

Ectopic adrenal tissue is usually found incidentally during histopathology. These small nodules are composed of adrenal cortex and are most commonly found with the capsule of the ovary of mares or with the ovarian suspensory ligament of the ovary of queens

Ovarian Hypoplasia of Swedish Mountainous Cattle (Hereditary Gonadal Hypoplasia)

- Ovarian hypoplasia of Swedish mountainous cattle is shaped due to incomplete penetrance autosomal recessive gene.
- This is the exact opposite of testicular hypoplasia.
- It is more common in the left ovary. 9% of the cases were bilateral.
- In these animals, there are 3 different types of pathology in ovaries according to the severity and distribution of sex cell hypoplasia.

1. Total hypoplasia
2. Partial hypoplasia
3. Transtitiel hypoplasia

Freemartinism

- It is an ovarium dysgenesis.
- In a twin pregnancy, one female is male and the other one is female (heterosexual twin pregnancy) and the sterile female animal is called freemartine.
- Freemartin can also be expressed as XX / XY chimeras formed as a result of the fusion of chorioallantoic circulation, and freemartine is genetically feminine.
- Twin pregnancy is seen in 1% to 2% of cattle. In 90% of these cases, placental anastomosis is formed between male and twin female calf, and female calf becomes sterile (freemartine).

- **Segmental aplasia** of the paramesonephric duct is found as either failure of short or long segments of the uterine horn to develop. This was commonly found in white Short horn cattle and gave rise to the name “white heifer disease ”for the syndrome, but no breed is exempt from the condition.
- The arrested development is thought to be autosomal recessive.
- Complete absence of an entire horn is called uterus unicornis. Within the isolated segments of uterus, secretions and sloughed epithelial cells accumulate and become inspissated to form soft tan concretions within the distended isolated lumen of the uterine horn proximal to the area of segmental aplasia

Ovarian cysts

Cysts arise either within or adjacent to the ovary. Several different types of cysts develop from embryonic structures, including cysts of the mesonephric duct, mesonephric tubules, and paramesonephric duct. These cysts are discussed briefly in this section.

There are 3 types of cysts that develop from mesonephric tubules: cystic rete, cystic epoophoron, and cystic paroophoron.

A cystic epoophoron develops from the cranial mesonephric tubules, whereas a cystic paroophoron

occurs less commonly and is found on the caudal surface of the ovary. Because these cysts are found near the ovary, they are casually referred to as paraovarian cysts.

Ovarium Cysts

Intra-ovarian cysts:

- Normal atretic follicles
- Follicular cysts
- Cystic Graf Follicle
- Luteinize follicle
- Cystic corpus luteum
- Too many follicles
- Epithelial (germinal) inclusion cyst
- Cystic rete ovari

Extra-ovarian cysts:

- Too many follicles
- Subsurface cysts with epithelium
- Mesonephric tubules and canal cysts
- Paramagnetic canal cysts
- Tuba-ovarian cyst

Ovarian inflammation (Oophoritis, ovaritis)

- Ovarium inflammations are rare in domestic animals. However, most of these are found in cattle.
- The ovarium is more resistant to infections from hematogenesis than all organs. For this reason, septicemia and toxemia are mostly unaffected.
- Oophoritis, usually is spread by the ascendens of the inflammation in the uterus or tuba uterus .

PATHOLOGY OF THE UTERINE (FALLOPIAN) TUBES

- Primary lesions in the uterine tubes are uncommon.
- Hydrosalpinx,pyosalpinx, and salpingitis are most important, and these are usually secondary to disease of the uterus or to manual manipulation of the ovary.
- As regards incidence of salpingeal lesions, the only agreement is that they are much more common than is their diagnosis.
- They are recognized to be important in the cow and sow, but not in other species.

Hydrosalpinx

Hydrosalpinx is so called because the uterine tube is distended,

uniformly or irregularly, up to 1.5 cm or so, with clear watery mucus that fluctuates.

The tube appears to be increased in length and tortuosity and is thin walled.

Histologically, there may be extensive multilocular cyst formation in the mucosa with obliteration of the lumen, and in some chronically

inflamed uterine tubes, there is extensive interstitial fibrosis

Salpingitis

- The uterine tube is a rather simple structure histologically, but even minor inflammatory changes, evidenced by slight congestion or the presence of a few plasma cells, appear to be
- important because of the readiness with which the epithelial cells desquamate or lose their cilia. The proper function of the living epithelium is necessary for the propulsion of the ovum,
- for the dissolution of the cumulus oophorus prior to fertilization, and for the maintenance of a luminal environment suitable to survival of the ovum.
- The salpingeal mucosa has much less capacity for restitution than does the endometrium.

- Inflammation of the uterine (fallopian) tubes without significant enlargement is the most common and most important tubal lesion. It is usually bilateral; is usually not detectable macroscopically; and may show serous, catarrhal, or fibrinous inflammation.
- In the mildest forms of salpingitis, the mucosa alone is affected, and changes of functional significance may be slight enough to be overlooked histologically.
- Congestion of the mucosal vessels, mononuclear cell infiltration, loss of epithelial cilia, and some desquamation of epithelium may be the only changes detectable. With more severe infections, catarrhal exudate collects in the lumen, the mucosal folds are thickened by cellular infiltration and congestion, and the epithelium is in large part destroyed. Loss of epithelium occurs first in the free edges of the mucosal folds, and these denuded areas tend to fuse and adhere to produce intramucosal cysts.
- Alternatively, in chronic catarrhal salpingitis, the mucosa is virtually destroyed and replaced by proliferated connective tissue and cellular infiltrations with partial or complete occlusion of the lumen.

- Salpingitis is a common lesion in animals, with both Mycoplasma and Ureaplasma infections.
- Nonspecific infections causing salpingitis almost invariably do so following spread from the uterus.
- There is probably 70-75% association between uterine and salpingeal inflammation when diagnosis of the latter is based on histologic evidence.
- In some cases there will be perimetritis with adhesions, pyosalpinx, or bursal abscess.
- Adhesions of the infundibulum of the mare are very common.
- The cause of these adhesions is unknown. Some are associated with perimetritis, but most are not. It has been suggested that they may develop as a result of ovulatory hemorrhage.
- Granulomatous salpingitis is uncommon. When it does occur, the uterine tube will be firm and distended.

Pyosalpinx

- This is less common than hydrosalpinx and typically follows metritis in the same manner as do other forms of salpingitis.
- The significant anatomic difference is the accumulation of pus in the tube following obstruction of the lumen.
- The obstruction may be produced by inspissated exudate, inflammatory thickening, and fusion of the mucosal folds, or chronic granulation tissue.

- The length of the tube is usually not uniformly involved by the inflammatory process; rather, there are segments in which the reaction is more acute or more advanced so that the obstruction tends to involve irregular segments with the
- intervening portions distended with exudate.
- The entire thickness of the wall of the duct is infiltrate with neutrophils, lymphocytes, and plasma cells, and the same cells collect in the lumen and in the mucosal cysts formed by adhesions between the denuded epithelial folds. Surviving epithelium may be partly squamous. Eventually, the bacteria will be destroyed and the exudate converted to a watery fluid (hydrosalpinx). Frequently, accompanying pyosalpinx are the bursal adhesions and local peritonitis described earlier.
- Among the organisms that may be found in inflammatory diseases of the uterine tube are streptococci, staphylococci, Escherichia coli, and Trueperella pyogenes, with the latter as the most common and important. Brucella suis in swine and Mycobacterium tuberculosis in cattle are responsible for specific forms of salpingitis; the lesions are as described for these infections in the uterus.

PATHOLOGY OF THE UTERUS

Abnormalities of position or location

- **Torsion of the uterus** is uncommon except in the cow and mare.
- In almost all cases, such twisted uteri are pregnant but torsion may also occur with pyometra, hydrometra, endometrial polyps, and endometrial neoplasia.
- The torsion is of the same nature as an intestinal volvulus and occurs about the transverse axis of the organ, with the mesovarium as one fixe point. In uniparous species (cow) in which a well-developed intercornual ligament does not permit much independent movement of the horns, the entire organ is involved in the torsion, which is about the mesovarium and vagina or cervix as fixed points.
- In multiparous species (bitch, cat) with long horns and no intercornual ligament, the torsion will involve part of one horn or the entire horn, the fixed points in the
- latter instance being the mesovarium and the site ofattachment of the horn to the uterine body. There seem to be no rules governing the direction of the twist. Minor degrees of torsion (up to 90°) are fairly common in cows and apparently resolve themselves.
- The condition becomes of importance only when the torsion is 180°or more and results in dystocia. Any twist in excess of 180° may also result in local circulatoryembarrassment.

- Prolapse of the vagina, cervix, and/or uterus occurs commonly in ruminants and pigs and exceptionally in other species. Predisposing causes in the cow are essentially those that cause,

  or are associated with, uterine hypotony and probably also with dysrhythmia of involutionary

  contractions.

- Among the most common associations in the cow are prolonged dystocia relieved by forced traction, retained placenta, and postparturient hypocalcemia.

- Probably the same sorts of influences operate in ewes, and in addition, uterine prolapse after parturition is a common complication of the hyperestrogenism that results from the ingestion of legumes with a high content of estrogens.

- **Rupture of the uterus** may occur spontaneously, but is usually a result of obstetrical manipulations.
- Most ruptures occur in the body of the uterus adjacent to the pelvic brim as irregular tears that may involve the full width of the wall or only the mucosa. Mucosal ruptures are of little consequence.
- Complete ruptures are often fatal either by virtue of hemorrhage, spread of uterine inflammation to the peritoneum, or displacement of retained membranes into the abdominal cavity.
- The majority of ruptures occur in uteri that are devitalized as a result of torsion or prolonged dystocia.
- Rupture may also follow acute distension of the uterus produced by infusion fluids. This is not an uncommon accient.
- The rupture occurs on the lesser curvature along the line of attachment of the mesometrium, and the irrigating fluid spread into the ligament.

Circulatory disturbances

- Endometrial hyperemia and edema occur normally at estrus and reach the greatest relative development in the bitch in proestrus. The resulting diapedesis and endometrial exfolia
- A small amount of mucosal hemorrhage is common in heifers, less common in older cows, and occurs immediately after estrus.
- The source of the hemorrhage is the endometrial capillary bed immediately cranial to the cervix. It is probably an estrogen withdrawal effect and the nearest thing to menstruation in domestic animals.

PATHOLOGY OF THE ENDOMETRIUM

Irregularities of endometrial growth

- **Atrophy**
- Atrophy of the endometrium results from loss of trophic ovarian function.
- Senile atrophy is not important in large domestic animals.
- Atrophy is common after ovariectomy, may reflec hypopituitarism of chronic inanition or wasting disease, or a primary hypophyseal lesion. The more superficial portions of the endometrium are the more atrophic, and in advanced atrophy, the lining mucosa covers a thin layer of condensed stroma in the depths of which are the inactive glandular remnants that are sometimes cystic..

Hyperplastic conditions of the endometrium

- General considerations. Endometrial hyperplasia in the bitch is common and usually involves cystic distension of endometrial glands. There are 2 discrete patterns: generalized cystic endometrial hyperplasia (CEH) and pseudoplacentational endometrial hyperplasia (PEH) or localized endometrial hyperPlasia of pseudopregnancy.
- Both frequently result in accumulation within the uterine lumen of endometrial secretions.
- In PEH, cellular debris from associated superficial endometrial necrosis will also be present, which causes the distended uterus to have features that can be confused as being pyometra.
- In either CEH or PEH, infection of the uterus may follow. This association between development of endometrial hyperplasia and subsequent infection has been recognized for many years and is known as the cystic endometrial hyperplasia–pyometra syndrome. Bacteria might also provide appropriate stimulation that could drive the endometrium to undergo hyperplasia and hypertrophy.
- An alternative plausible pathogenesis for cystic endometrial hyperplasia–pyometra is that an
- initial event is the establishment of a low-grade, subclinical infection that, during the luteal phase (also referred to as the secretory or progestational phase), causes the endometrium to proliferate.
- Changes in the uterine environment, accumulation of secretions, and other progestational effects could then lead to massive proliferation of bacteria and inflammatory cell within the endometrium and accumulation of purulent exudate in the uterine lumen.

- Cystic endometrial hyperplasia can involve a single or a few glands, or endometrial glands extending along segments of endometrium . Sometimes the entire endometrial surface is involved. Individual endometrial glandular cysts can become quite large, up to 1 cm. More diffuse involvement can leave the endometrium thickened and, on cross-section, effaced by variably dilated glands.
- Endometrial hyperplasia can also be attributed in some species to excessive and prolonged estrogenic stimulation. Sources of estrogen can be endogenous, for example, from sex cord–stromal tumors, such as granulosa cell tumor; exogenous, as in ingestion of certain plants; or iatrogenic, from inadvertent exposure to creams containing estrogens. Secretions from aaccumulation of mucoid fluid in the uterus, a condition called mucometra .

Adenomyosis

- This term applies to the presence of endometrial glands and stroma between the muscle bundles of myometrium .
- In some cases it is a malformation, and in others it arises by hyperplastic overgrowth of the endometrium. It is not a common lesion in any domestic species, but is seen in the bitch with cystic endometrial hyperplasia.
- Adenomyosis is occasionally observed in cows as part of the local disarray of segmental aplasia. It may also be present as a malformation of the tips of the uterine horns in cows.
- Adenomyosis as seen in domestic animals shares features with endometriosis of menstruating primates only when the aberrant site is within the myometrium; in this site the 2 conditions are histologically similar.

Endometrial polyp

This lesion is seen most commonly in the bitch and queen and is striking when the polyps are large . Segmental distension of the uterine horn(s) can be confused with tumors of the myometrium (leiomyomas and leiomyomatosis), chronic pyometra, pregnancy or sites of fetal resorption, or

segmental cystic endometrial hyperplasia.

In contrast to the polypoid form of endometrial hyperplasia, the true polyp conTains substantial connective tissue stroma in addition to dilated

glands and is pedunculated.

Polyps may be multiple or isolated, and their shape is molded to the uterine lumen.

- **Serosal inclusion cysts**
- Uterine serosal inclusion cysts are thought to arise by pinch
- İng off of surface epithelial indentations. They are occasionally observed in the aged pluriparous bitch and less commonly in ruminants, and appear as thin-walled cysts containing clear watery fluid. Serosal inclusion cysts form from small folds ofperitoneum that adhere and form entrapped pieces of serosal epithelium that slowly accumulate secreted fluids. They tend to occur either during uterine involution or in association with perimetritis; however, inflammatory cellular infiltrates are no usually present in or near these cysts.

INFLAMMATORY DISEASES OF THE UTERUS

General considerations

- Inflammation limited in extent to the endometrium is termed endometritis; involvement of the entire thickness of the wall is metritis; of the serosa, perimetritis; and of the mesometrium, parametritis.
- The classification is to some extent a useful index of the severity of reaction and of the pathogenesis.
- The great majority of inflammatory conditions of the uterus begin in the endometrium and are in some manner associated with the reproductive process.
- The predisposing factors are to be sought then at either end of the gestation period.

Endometritis

- In endometritis, the endometrium or uterine mucosa is mainly involved. Almost all uterine infections begin as endometritis, and many such cases progress to involve the myometrium, becoming metritis. The mildest forms are seen postcoitus.
- In the mare, semen is ejaculated directly into the uterus and induces a transient postcoital endometritis. Such postmating endometritis is recognized in most species. Infectious agents tropic for the uterus include T. foetus and C. fetus or pyogenic cocci and coliforms of low pathogenicity.
- Uterine infection by.-hemolytic streptococci, Klebsiella
- pneumoniae, E. coli, and Taylorella equigenitalis (the contagious equine metritis organism) frequently occurs in mares both following foaling and after coitus. The endometritis is usually mild, but the impact on fertility can be substantial.

- More severe grades of endometritis are common to the puerperium in cattle. Nothing of significance may be visible on the serosal surface, but the organ is enlarged and flabby, and collapsed rather than firm and contracted.
- The lumen contains chocolate-colored lochia that is slightly tenacious and often without foul odor. With the admixture of inflammator exudate and placental detritus, the uterine content becomes progressively dirty gray-yellow. The endometrium is red and swollen, and the intercotyledonary areas are ragged and tattered with shreds of mucosa free in the lumen.
- Small hemorrhages are common in the mucosa, and neutrophils are prominent at the surface involving all mucosal elements, including the glands. Where suppuration and superficial necrosis produce the tattered mucosa, the surface is comparable to a pyogenic membrane. The remainder of the genital canal may show nothing more than the traumatic lesions incident to parturition. If the uterus is paretic, there may be no discharge in the vagina.
- Sporadic outbreaks of suppurative endometritis associated with bovine herpesvirus 4 have been reported.
- The histopathology is typical for herpesvirus infections, with focal necrosis, ulceration, and common secondary bacterial infections.
- Intranuclear viral inclusion bodies are found in endometrial epithelial and endothelial cells.

- It is estimated that 20% of cows with generalized tuberculosis and 4% of all tuberculous cows have involvement of the endometrium. There are 3 routes of infection, namely, hematogenous,via the uterine (fallopian) tubes from the peritoneum, and coital; of these, the last is exceptional. As in tuberculous lesions generally in cattle, there are 2 anatomic forms of the lesion—miliary tuberculosis and diffuse caseating tuberculosis, although transitional forms do exist. It is generally accepted that the disseminated miliary lesion is of hematogenous origin during the phase of early dissemination.
- In miliary tuberculosis, the uterus may appear normal externally.
- In the early stages, there may be no exudate in the lumen, but later, as the granulomas enlarge and ulcerate, the uterus will contain yellow purulent exudate. The granulomas are visible as few or many nodules in the mucosa, usually the more superficial portions, and microscopically are of typical tuberculoid structure. A common site is near the bifurcation of the uterus or in the caruncles of the pregnant uterus.
- Caseous tuberculosis causes thickening and rigidity of the horns with serofibrinous or purulent fluid in the lumen. The endometrium is thickened, dry, and extensively caseous . There may be intense leukocytic infiltration and marked exudation. The caseated area is usually demarcated by a zone of epithelioid cells from a margin of connective tissue.
- In association with the uterine lesion in tuberculosis, there is often involvement of other portions of the genital tract.

Uterine abscess

- The formation of single or multiple abscesses is not common.
- The localization of an infection to one part of the uterine wall is thought to follow severe metritis, localized traumatic injury to the infected endometrium, or adenomyosis. Such an abscess may reach 15 cm in diameter and is usually well encapsulated, although there may be some perimetrial adhesion and, in a few instances, rupture into the peritoneal cavity or an adjacent hollow viscus.
- Uterine abscesses are observed more frequently in cattle than in other species. There appears to be a relationship between the frequency of abscesses and uterine manipulations involving the use of instruments. In cattle, most large abscesses are located in the dorsal wall of the uterine body. This is the area most subject to trauma during the passage of insemination pipettes and uterine catheters. Abscesses that develop following severe metritis or pyometra are usually small (1-3 cm) and do not have preferential sites.

INFLAMMATION OF NON-PREGNANT UTERINE

- Uterine inflammation is very common in domestic animals.
- Most of these inflammations are characterized by the penetration of agents into the uterus or by pregnancy, delivery or postnatal uterus.
- Inflammation of the uterine mucosa, endometritis, inflammation of all layers of the uterus, metritis, inflammation of the perimetrium, perimetritis.
- The inflammation of the surrounding tissues of the uterus (such as lig lata uteri) is called as parametritis.

Metritis

- The distinction drawn here between endometritis and metritis for purposes of description is that, in metritis, all layers of the uterine wall show evidence of acute inflammation. The uterus is paretic, and there may be little or no vaginal discharge. The wall of the uterus is thickened with suffused blood and edema

  fluid and is very friable. The serosa is dull and finely granular with “paintbrush” hemorrhages and a thin

  deposition of fibrin or the subserosal vessels may be very prominent. Other than traumatic rupture,

  perforation with secondary peritonitis is not common except in anaerobic infections; death in untreated

  cases usually occurs first from toxemia or septicemia.
- The secretion may be scant or abundant, is fetid, and is dirty yellow to red-black.
- The microscopic picture is that of purulent inflammation. Subserosal connective tissues are edematous and filled with neutrophils, and the same process surrounds the blood vessels of the myometrium and permeates bundles of, and individual, muscle fibers, which themselves undergo granular degeneration.
- In metritis, as in acute endometritis, neutrophils are in large numbers on the mucosal surface, and there is extensive hemorrhage, necrosis, and sloughing. Invasion of blood vessels, both arteriolar and venous,

  intensifies the lesion.
- Thrombosis may extend to the vessels of mesometrium with the usual sequelae of hemorrhage and
- infarction.

Parametritis and perimetritis

- Chronic adhesive peritonitis involving the genital tract does not usually result from septic metritis because the uterine serosa offers an efficient barrier to the spread of infection, and spontaneous rupture of an infected uterus is not common.
- Few virulent infections spread to the supporting ligaments.
- Excluding an origin from an extragenital focus, perimetritis and parametritis in cattle usually follow manual manipulation of the ovary, pyosalpinx, pyometra, obstetrical operation, removal of retained placenta, or uterine irrigation.

Pyometra

- Pyometra is acute or chronic suppurative infection of the uterus with accumulation of pus in the uterine lumen. The escape of the pus is usually prevented by a functionally closed cervix.
- Drainage from the uterus may also be prevented by an acquired or congenital cervical stenosis, and in mares the gravitational pull of the flaccid, distended uterus over the brim of the pelvis may limit the discharge of pus.
- Pyometra may occur as a sequel to uterine infections of the types described in the previous sections, but as it is a pathologic entity with a number of factors unique in its pathogenesis, it is considered separately here.
- Pyometra is an uncommon condition in the sow, ewe, and camelids. It is relatively common in the bitch and cow, but less so in the mare and queen.
- Circumstances under which the disease develops in these species vary.

Pyometra in the bitch and queen.

- Pyometra in the bitch is a disease that characteristically affects older animals, especially those that are not bred.
- The condition most often develops a few weeks after estrus. Affected animals may be depressed and anorexic, frequently vomit, and have polyuria and polydipsia, usually accompanied by a vaginal *discharge.*
- *The patho*logic findings vary with the stage of the disease. In less advanced cases, the uterus may be only slightly enlarged, with mild endometrial hyperplasia and inflammation.
- In the more advanced stages, there is a remarkable distension of the uterine horns , which may occupy most of the peritoneal cavity.
- In contrast, pyometra in cattle most commonly develops in the postpartum period and is frequently associated with retention of fetal membranes .

- Microscopically, the most significant feature is the remarkable endometrial hyperplasia and progestational proliferation in almost all cases . The cells of such progestational epithelium are enlarged, columnar, vacuolated, and have small pyknotic nuclei. In some cases the normal single layer of cells piles up to produce pseudostratification or localized papillary proliferations. Whatever remains of the endometriallining may show this development, or it may be patchy and alternating with normal epithelium.
- The histologic changes caused by infection vary with the bacterial cause and time. Masses of neutrophils collect in the uterine lumen and in the glands, although there is relative sparing ofthe glands unless they are cystic. Neutrophils collect near the surface and then penetrate the epithelium.
- Some cases, surprisingly, are dominated by cells resembling eosinophils.
- In milder cases there may be a few neutrophils in the endometrial stroma, but they are not many when compared with the numerous plasma cells and lymphocytes.
- There may not be much vascular reaction over and above that of hormonal origin, although perivascular reaction and leukocytosis of lymphatic vessels are almost constant in the myometrium.

POSTPARTUM INVOLUTION

- Physiological changes that occur in the postnatal period when the uterus is transformed into a normal, nonpregnant, functional and anatomical state are considered as postpartum involution.
- Uterine involution in domestic animals was investigated in all animals, but the most detailed cows and sheep were examined. Involution is the fastest in mare and pigs, the slowest dogs.

COMPLICATION OF POSTPARTUM INVOLUTION

Placenta Retention

Defines the long-term postpartum fetal membranes.

In cows, fetal membranes are normally excreted in the uterus within 1 h after birth. Passing this period is called placenta retention.

Reasons :

The pathogenesis of the failure to expel fetal membranes is multifactorial.

- Infectious diseases of the placenta
- Mechanical factors
- Nutrition
- Hormonal disorders
- Circulatory disorders
- Hereditary disorders
- Abnormal pregnancy period

Hydramnios and hydrallantois

- Excessive accumulations of fluid in the amniotic and allantoic sacs are infrequent diseases of pregnancy.
- They occur most often in cattle and are rare in other species.
- Excess fluid may accumulate in both sacs, but this is the exception. The source, nature, and control of the fluid in the 2 sacs are different, and

the conditions that give rise to excess fluid in each sac tend to be different.

- The total amount of fetal fluid increases progressively throughout pregnancy, and the volume at term in cattle is between 15 and 20 liters.

- Hydramnios, or hydrops of the amnion, is usually associated with malformation of the fetus. The malformations may be either inherited or acquired. A variety of inherited diseases can cause hydramnios.
- Hydrallantois in cattle is most often associated with uterinedisease with inadequate numbers of caruncles and the development of adventitial placentation.