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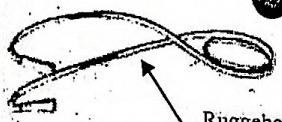
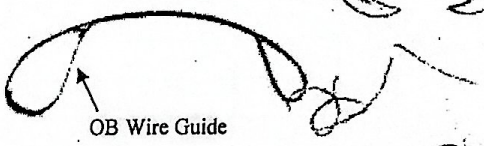
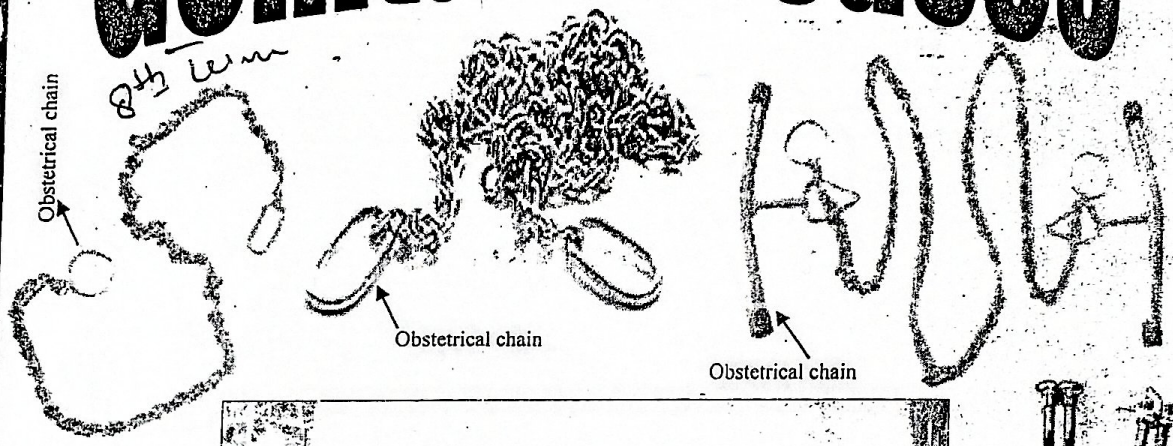
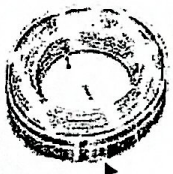
Obstetrics & Genital Diseases









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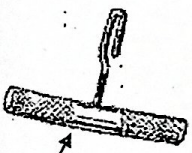

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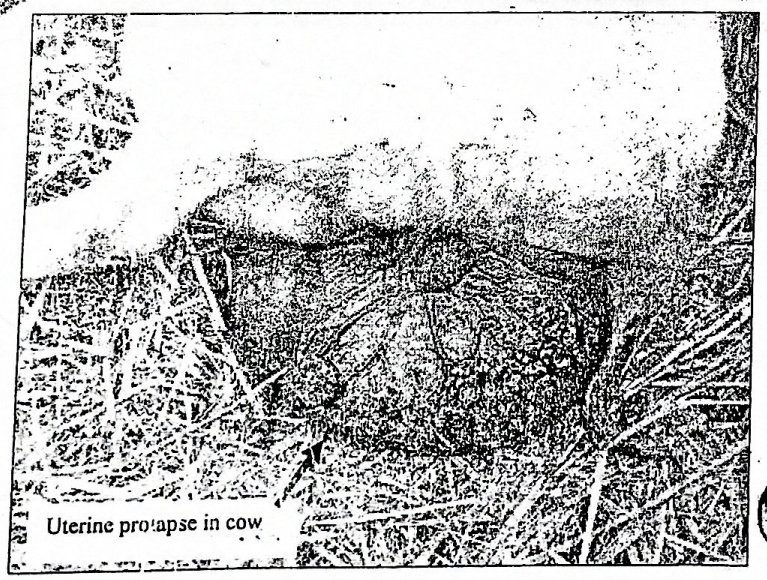
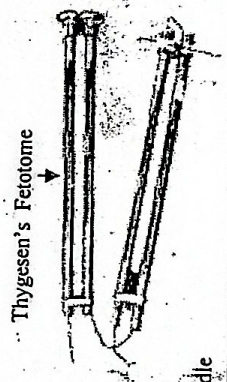
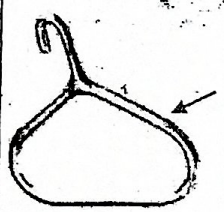


Uterine prolapse in cow





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OBSTETRICS AND GENITAL DISEASES

In majority of countries of the world economics is based on livestock population and performance. Livestock population depends upon successful livestock reproduction. In order for livestock to be quite economical and fruitful they must proliferate (reproduce) healthily and in a due period of time. For this purpose they must be healthy overall with particular importance to the health of the reproductive system. Thus economical livestock reproduction requires healthy and optimally functional reproductive system on the part of animals. A variety of difficulties, abnormalities and diseases are encountered during the management, pregnancy, parturition and postpartum period of the females. Several hereditary, structural and physiological anomalies related to reproduction both in males and females are also of special interest in the vast domain of Animal Reproduction. An animal's deviation from normal reproductive health can be studied under following two major heads;

Gynecology: It is the study of the diseases of female reproductive system including genetic and congenital anomalies that may be structural or functional. It also encompasses various maladies of infectious and-non-infectious origin.

Obstetrics: It is branch of surgery dealing with the care and management of females particularly during gestation, parturition and puerperium (post partum period).

To be better obstetrician / Veterinarian one must be well equipped with the latest obstetrical knowledge and practical know-how supported by advances made in other related fields like reproductive physiology, endocrinology, nutrition, genetics, embryology, teratology, pathology, medicine and surgery. Antibiotic therapy has got very crucial role in dealing with the reproductive diseases of infectious origin.

EARLY EMBRYONIC DEATH

The earliest young one from blastula stage to the point of formation of the organ rudiments (organogenesis) is called embryo. Death of the normal or genetically abnormal embryo can occur at time during the period of the embryo. This embryonic death whether diagnosed or unnoticed is the reasonable cause of infertility and economic loss. A large number of factors cause death of the embryos and fetuses. Some of the etiological factors of early embryonic death and fetal loss are mentioned as under;

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Genetic Causes: Owin g to abnormality in the chromatin / genetic material death may occur at embryonic stage, fetal period or malformed individual may develop that will not survive postnatally. These genetic abnormalities are;

Non-Disjunction: In this genetic abnormality chromosomes fail to segregate during gamatogenesis (spermatogenesis & Oogenesis). As a result one daughter cell contains diploid chromosomes and the other is devoid of chromatin material. At fertilization if a diploid gamete fuses with the haploid gamete the resultant zygote will have three chromosomes. This abnormality is called trisomy. Similarly if one normal gamete (haploid) unites with another one which is devoid of chromosomes the resultant zygote will have single chromosome. This chromosomal aberration is called monosomy. The above conditions cause either embryonic or fetal death.

- Double gamete + single gamete → Trisomy
- single gamete + deficient gamete → Monosomy

Translocation: It is genetic abnormality in which a part of the chromatin (chromatin, gene etc) pinches off the main log and attaches to either the same chromosome at another location or another chromosome. This results either in missing body parts or an additional one as in the case of **double heads, extra limbs or tailless condition.**

Deletion: In this chromosomal abnormality a part of the chromosome is cut off and permanently lost leaving deficiency of that character. It is the cause of missing body parts.

If non-disjunction, translocation or deletion of chromosomes is moderate to severe, the zygote usually succumbs during the period of the ovum or early embryo. However some may survive longer as fetal monsters, parasites on the placenta of the normal twins or as a defective individual. Chromosomal aberrations are the known leading cause of pregnancy failure. Normally 6 – 7 % of zygotes have chromosomal abnormalities. Mostly death occurs before 5 – weeks of early gestation.

Non-Genetic Causes

Breed: Incidence is more frequent in certain breeds than others.

Inbreeding: Inbreeding favours chromosomal defects and hence embryonic death

Environment: Environmental stress (heat, cold, transportation), drugs, alcohols, smoking, chemicals like parasiticides and radiations like x-rays and ultraviolet rays etc.

Age of the Dam: Chance of early embryonic death is higher in senile or aged females.

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Failure of corpus luteum formation: During early gestation CL is prerequisite in nearly all species the absence of which leads to death and abortion.

Lack of endometrial glands: Endometrial glands secrete uterine milk which is food for ovum or embryo. In the absence of these glands the embryo dies due to lack of nutrition.

Vitamin A deficiency: Vitamin-A deficiency causes keratinization of the endometrium. This keratinization not only prevents uterine milk formation but also placentation or feto-maternal exchange medium.

Hormones: Excessive secretion mostly of estrogenic hormones causes embryonic death.

Polyspermy: Penetration of ovum by more than one sperm causes genetic disruption and death.

Degeneration of Cervical Seal: Damage to cervical seal by various agents causes death and abortion of the embryo.

Rough handling of the gravid horn by operator: This causes physical damage to the embryo and death.

Coitus: Coitus in certain species with long penis (equines) can cause death and abortion.

ABORTION

Abortion, one of the important mishaps during pregnancy is defined as "The expulsion of the non-viable live or dead fetus before the completion of the gestation period. Expulsion of the premature but viable live fetus few weeks prior to the completion of the gestation period is called premature birth. Birth of the dead fetus at the completion of gestation period is called stillbirth.

Economic losses in the form of abortion are of great concern to the farmer, because the fetus is lost; prolong period of uterine disease and sterility; the unproductive female must be maintained for a long period or sold; and if the cause of abortion is infection the rest of the herd is threatened. Most of the early abortions go unnoticed and classified as infertility. Large number of etiological agents can cause abortion. Nature of the causative agent determines the degree of damage to the fetus, fetal membranes and endometrium and the possibility of retained afterbirth and subsequent sterility. Abortions more than 2 – 7 % should be taken serious. A list of the various etiological agents causing abortion is as under;

Genetic Causes: Various chromosomal abnormalities including monosomy, trisomomy, tetrasomy , polyploidy, translocation and deletion cause the death of fertilized ovum and embryo during early gestation or death of the fetus during the fetal period.

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Heredity: This pathological trait is occasionally transmitted genetically in certain breeds like Holstein cattle in which a Sire was diagnosed as having recessive gene for abortion.

Physical Agents: Physical pressure on the embryo or fetus like rough handling of the gravid horn and manually damaging the fetal membranes (amnion and allantochorion), fetal heart or large vessel can cause abortion. Damage to the cervical seal either by douching the uterus with liquids / fluids or by long penis as in equines can occasion death of the embryo and abortion. .

Removal of Corpus luteum: Removal of corpus luteum in cow causes abortion at any stage of gestation whereas in mare early removal causes abortion but late removal of CL has no effect because of adequate placental progesterone.

Chemicals: Several chemicals like nitrates, urates etc accumulate in the body of slowly grown stunted plants and cause abortion. Arsenic and lead poisoning too cause abortion. Chlorinated naphthalene used in lubricants and several pesticides sprinkled on the plants cause abortion.

Drugs: Different antibiotics and anthelmintics can cause abortion and hence are contraindicated in certain species during pregnancy.

Poisonous plants: A variety of plants like locoweeds, perennial broomweed, sweet clover hay or silage can cause abortion. Ergot poisoning due to accumulation of fungus on edibles causes abortion in pregnant animals if ingested.

Hormonal Causes: Injection or overproduction of lutolytic steroids like estrogens, glucocorticoids, stilbestrol or $PGF_{2\alpha}$ can cause destruction of the CL and thereby abortion. Deficiency of progesterone causes abortion and external supply of excessive progesterone prolongs pregnancy in normal pregnant females suggesting the role of this pregnancy pro hormone.

Nutritional Causes: Severe malnutrition, underfeeding or starvation can induce abortion. Deficiency of certain nutrients like Vitamin A, iodine and selenium has been found to cause abortion. Vitamin A deficiency especially causes the keratinization of the endometrium , damage to the placenta and ultimately abortion.

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Infectious Causes of Abortion: Different microorganisms at various stages of gestation can cause abortion in different domestic animals. These can be bacteria, virus, fungi, ricketcia and protozoa.

Bacterial causes of abortion

Brucilosis: Brucella, a small gram negative rod shaped bacteria causes abortion in different species of domestic animals. Brucella abortus is the predominant cause of abortion in cattle. Other serotypes like B-suis, B-canis etc cause abortion in pig and dog respectively. It is a contagious disease.

7, 8, 9th month

Leptospirosis: Different serotypes of Leptospira mostly leptospira Pomona causes abortion in cattle. It enters the body via abraded skin. Abortion usually occurs during the last half of pregnancy usually 1 – 3 weeks after recovery from acute febrile stage. Abortion outbreaks are common in susceptible animals during summer and fall months while on pasture.

3, 4, 5th month

Vibriosis: It is venereal disease causing abortion usually from 3 – 5 months of gestation. It is caused by vibrio fetus (campylobacter fetus). Both vibrio fetus venerealis and vibrio fetus intestinalis cause abortion in different domestic species.

7, 8, 9th month

Listeriosis: This is a gram positive rod shaped bacteria. Only its reproductive form causes abortion during the last trimester of pregnancy. Sporadic abortions due Listeria monocytogen are not uncommon.

Tuberculosis: Mycobacterium bovis, a gram positive bacterium also causes abortion in bovines in addition to its other pathogenic affects.

Miscellaneous bacterial infections: A large number of bacteria including streptococci, diplococci, staphylococci, E.Coli, Pseudomonas aeruginosa, cornybacteruim pyogenes, hemophilus spherophorus necrophorus etc cause a reasonable number of abortions either directly affecting reproductive system or indirectly through damaging other systems.

Treatment: Following diagnosis, the adequate, judicious and timely use of broad specrum antibiotics in the infected animals can prevent any possible abortion. Vaccination if feasible is the protocol of choice to preclude abortion.

Viral Causes of Abortion: A variety of viral diseases like IBR-IPV, Epizootic bovine abortion, FMD, Rinderpest, Rift valley fever, BVD, Canine distemper etc can cause abortion in various species. Vaccination is the only solution against viral affections.

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Fungal and Mycotic Causes: All mycotic bovine abortions are caused by two groups of gungi i.e. aspergillus (aspergillus fumigatus) and mucorales

(absidia, mucor & rhizopus). These occur in the form of moulds mostly on edible items. Broad spectrum antibiotics are affective.

Protozoal Causes: Trichomonas fetus, Trypanosoma, Babesia, Thelaria, Toxoplasma, Anaplasma and Piroplasma cause, abortion in different domestic animals.

Miscellaneous Causes of Abortion: Twinning in cattle sometimes cause abortion. Allergic and anaphylactic reaction to drugs, poison can also cause abortion.

Diagnosis: Proper diagnosis is vital for effective treatment. History, breeding record, proper and timely collection, preservation or storage (chemically or through refrigeration) and shipment of the aborted material (fetus and fetal fluid) to the standard clinical laboratory is needed for exact diagnosis. Serological tests are also available in advanced laboratories that can help prevent abortion.

Treatment: It depends upon the nature of the cause. Antibiotics and vaccination can prevent abortion in case of bacterial, fungal and protozoal infections. Only vaccination can prevent viral abortion. Hereditary cause necessitates the elimination of that Sire or Dam to prevent the spread of abortion.

FETAL MUMMIFICATION

Sometimes after death of the fetus usually from 3 – 8 months of gestation abortion does not occur and fetus is not expelled. Instead endometrium moulds onto the fetus and the later is changed into a harmless mass that remains within the uterus until abortion, stillbirth associated with dystocia or occasionally prolonged pregnancy up to two years. This whole process of fetal death followed by its changing into harmless mass is called mummification whereas the dead, preserved and harmless fetus is called mummy.

Before mummification the entire fetal fluid is absorbed. Persistent and functional corpus luteum is necessary for fetal mummification. If fetus dies before three months of age no mummification occurs because bones have not formed by this time. The soft boneless fetus is digested and absorbed by the immune system. Fetal mummification is frequently observed in swine, occasionally in canine and feline, uncommonly in sheep and goat but no incidence in mare. However mummification in cattle is not uncommon. Mummification may end up in spontaneous abortion before

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or near completion of the term or prolongation of pregnancy. Before abortion no signs of abortion are observed except those of estrus.

Types of Mummification: Mummification is of following two types;

Hematic Mummification: It is type of mummification that occurs only in cattle. After fetal death maternal placenta (cruncls) undergoes a certain degree of involution. A variable degree of hemorrhage occurs between the endometrium and fetal membranes. Absorption of blood plasma leaves a reddish brown gummy tenacious mass autolyzed red cells, clots and mucus on the surface of the dead fetus. Therefore appearance of the mummified fetus in cattle is reddish brown due to hemorrhage. Some times similar discharge of blood from crauncles is noted in normal parturient cows about 10 – 14 days after calving and is characterized as bloody discharge.

Papyraceous Mummification: This type of mummification occurs in all other species except cattle. There occurs no hemorrhage and no red coloration of the fetus. The fetus looks brown and not reddish brown like that in hematic mummification.

Causes of mummification

Diagnosis of the exact cause of mummification is difficult because there is a lot of time lapse between fetal death and the time this condition is known or diagnosed. However the following can be the possible causes of fetal death and subsequent mummification.

Genetic Causes: Various genetic abnormalities like tisomy, tetrasomy, polyploidy, deletion etc can cause fetal death followed by mummification.

Developmental defects: Several developmental defects like anasarca, microcephalus, ascites, double monsters etc can die and get mummified.

Hereditary Causes: Incidence is higher in Guernsey and Jersey breeds. In Holstein it is due to recessive gene. Death may also be caused by the inherited endocrine defects.

Torsion of the umbilical cord or compression around the extremity can cause death and mummification.

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Infections like vibriosis, moulds, leptospirosis, BVD and other microbial infections can cause fetal death folloed by mummification. Infections sometimes cause outbreaks.

Treatment: After making accurate diagnosis the following treatment protocol can be followed;

- Intramuscular injection of stilbestrol @ 50 – 80 grams or 5 -8 mg of setradiol (IM) to expel the fetus. These cause contraction of the uterus, relaxation of the cervix, involution of CL and subsequent expulsion of the dead fetus. Usually single dose will expel the fetus in 37 – 72 hrs. If not then 2nd or 3rd dose can be given.
- Repositol diethyl stilbestrol @ 100 – 150 mg IM.
- If mother is small and fetal cadaver large then estrogen injection along with lubrication and traction can be given. In exceptional cases it is impossible to expel the fetus and cesarean section is recommended.

FETAL MACERATION

It is also one of the important accidents of pregnancy. Maceration implies softening or dissolution of the substance / tissues. Fetal maceration means softening and decomposition of the antenatal dead fetus. It occurs in all species and at any stage of gestation. If death and maceration occurs before three months in cattle the entire fluid and soft tissues are absorbed and the animal begins to cycle after following sexual rest. In case death occurs after three month of gestation and the skeleton is formed then bones are left in the uterus after the absorption of fetal fluid and soft tissues.

Causes: Maceration occurs after death. Death may be caused by a number of factors including genetic factors, hormonal factors, nutritional factors, developmental defects, uterine torsion, torsion of umbilical cord and a wide variety of microorganisms. However maceration and decomposition is caused by microorganisms particularly if death occurs after three months of gestation. If death is not followed by expulsion then emphysema begins within 24 – 48 hrs and maceration in 3 – 4 days.

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Signs

- History of intermittent straining for several days with foul, fetid, reddish grey, uvular discharge.
- Anorexia

- Elevated temperature and pulse
- Drop in milk yield
- Occasionally diarrhea
- Vaginal palpation reveals emphysematous and crepitating fetus or fetal bones. In long standing fetal maceration when acute emphysematous stage has passed then straining seldom occurs and the cervix is closed.
- Generalized symptoms of high temperature, pulse and anorexia are absent.
- Often a history of chronic, fetid and mucopurulent discharge from the vulva over a period of several weeks or months.
- There is history of gradual drop in the milk yield and loss of body weight.
- In most of the cases no external symptoms are noted except chronic vulvular discharge.
- Rectal palpation reveals fetal bones, thick uterine wall and closed cervix.

Diagnosis: It is based on the signs and symptoms.

Prognosis: Prognosis is usually poor and the future breeding life is threatened.

Treatment: Treatment is usually difficult. The following strategy may be adopted to deal this condition;

- If cervix is closed then give injection of estrogens (50 – 100 mg stilbestrol) for 4 – 7 days or longer. This treatment may avoid fetotomy, laceration of the cervix and uterus.
- When cervix is open apply gentle traction to remove the emphysematous and macerated fetus.
- In case of pyometra laprotomy is indicated.
- Cesarean section is indicated in certain cases.
- Longer the condition poorer the prognosis. Slaughter is recommended in most of the cases. Occasionally uterus ruptures and fetal contents drop into the abdominal cavity.

Teratology

It is the division of embryology and pathology dealing with the abnormal development and malformation of the antenatal individual. Teratologic or abnormal development or arrest in the development of the ovum, embryo or fetus may either result in the death or malformation of the antenatal individual. Malformation of the

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antenatal individual that may be severe or mild, inherited or congenital is thought to be caused by various factors called teratogens which include the following;

Nutritional deficiencies: Deficiency of nutrients can cause certain developmental defects during pregnancy. Deficiency of vitamins including Vit-A, E, riboflavin, pantothenic acid, niacin, deficiency of minerals including iodine, manganese, iron, cobalt and deficiency of amino acids like tryptophane can cause congenital defects. Hypervitaminosis A & D also causes developmental defects in the antenatal individual. Nutritional deficiencies have chronic teratogenic effects

Endocrine disturbances: Endocrine disturbances of the dam including diabetes, thyroid malfunction as well as large exogenous doses of glucocorticoids, ACTH, insulin, androgens, progestagens, estrogens, thyroxine and thiouracil will induce defects in the embryo. It has also been pointed out that large doses of glucocorticoids in pregnant animals may cause cheiloschisis or platoschisis in the fetus. Progestagens given during pregnancy may cause masculinization of the genitalia of the female fetuses.

Physical Factors: Environmental factors like hyperthermia, hypothermia, atmospheric pressure, pica, anoxia, rough manipulation of the embryo or fetus during rectal palpation etc can cause various anomalies in the antenatal young one.

Radiations: Radiations like X-rays, ultraviolet radiations and radiations from the radioactive substances such as uranium can induce developmental faults in the fetuses. These have acute or sudden effects.

Drugs or Chemicals: Several drugs like quinine, thalidomide, sulphonamides, tetracycline, streptomycin, salvarsan, lead, mercury, arsenic, nicotine, malathion, carbon tetrachloride, selenium, fluorine, nitrates and urea induce fetal defects. Similarly cytotoxic agents including aminopterin, nitrogen mustard, actinomycin D, azoserine, azo dye, trypan blue and other dyes, salicylates, histamines, ergot and E.D.T.A also cause developmental defects. Plant poisoning caused by locoweeds, veratrum californicum, pines, broomweeds etc can also cause malformation.

Infections: Several infectious agents including Viruses of blue tongue in sheep, hog cholera in swine, feline panleucopenia virus in cats, bovine viral diarrhea, mucosal disease virus and rubella or measles in women can reportedly cause developmental anomalies in the antenatal individual.

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Ageing of the germ cells: Ageing of the ova by delaying ovulation 24 – 48 hours causes three fold chromosomal defects and higher incidence of early embryonic deaths in rats. Likewise ageing of rabbit spermatozoa before permitting them to fertilize ovum resulted in normal fertilization but higher incidence of embryonic deaths. Pregnancy in older women caused increased number of mongoloid newborn whereas children from older fathers are mostly achondroplastic (dwarf).

The inherited/Genetic Anomalies or Malformations in Domestic Animals

Various lethal and semilethal genetic anomalies in cattle are given below as a reference;

Achondroplasia/Dwarf/Comprest Or Buldog Calves:

In this condition the calves remain stunted and dwarf. Moreover they have short broad heads, bulging forehead, malocclusion of the jaw, potbelly, low viability and great susceptibility to bloat and dystocia. The condition is seen in Hereford, Ayrshire, Angus and Dexter breeds of cattle and is thought to be caused by recessive genes.

Epitheliogenesis imperfecta: The condition is mostly seen in Holstein, Ayrshires, Jerseys, Brown Swiss and Shorthorns breeds of cattle. In this anomaly skin fails to form mostly below the knees and hocks, on the muzzle, ears, tongue and mucus membrames.

Hypotrichosis congenital or alopecia: This defect has been described in Holsteins, Polled Herefords, Swedish Friesian and Jerseys and is characterized by degrees of hairlessness caused by recessive genes.

Ichthyosis congenita: This condition described in Brown Swiss and Red Polled cattle is caused by recessive genes and is characterized by lack of hair and thick scaly, horny epidermis with raw fissured skin around the body orifices.

Acroteriasis congenita or Amelia and hemimelia: This abnormality is characterized by missing, shortened, deformed or amputated limbs and is described in Holsteins, Brown Swiss and other breeds.

Ankylosis, hydrops, death and mummification of the fetus in red Danish cattle is caused by recessive genes.

Cerebellar hypoplasia & degeneration: This condition is seen in Herefords, Guernseys and Holsteins and is caused by autosomal recessive genes.

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Ataxia: Condition caused by recessive genes has been seen in Angus, Shorthorns, Jerseys, Herefords, Holsteins and Hariana cattles in which animal displays staggering gait and jerky movements.

Paralyzed hind quarters: This inherited malady has been seen in Red Danish calves.

Curved limbs: In this anomaly all the four limbs are curved anteriorly and have been found in Guernsey cattle.

Muscle contractures and ankyloses or arthrogryposis: In this condition the entire musculature of the body is contracted so that the tail lies close to the head and the joints are locked (do not articulate). It has been reported in Dole cattle, Shorthorns, Holsteins and Hereford breeds. Recessive gene is involved.

Hyrdocephalus: Enlarged cranial cavity or normal head with extended ventricles (due to more CSF) has been seen in Herefords, Ayrshires and Holsteins. Cause may be genetics and some other non genetic factors.

Brachynathism: This inherited condition is characterized by underdeveloped mandible and is seen in all breeds of cattle including Herefords, Jerseys, Shorthorns etc.

Malocclusion: Shortened long bones and misshapen mandible is the main feature of this inherited malady.

Platoschisis (Cleft Palate) and Cheiloschisi (Cleft lip): Breakage or discontinuity in the lips and palate has been seen in Shorthorns and Jersey breeds.

Atresia of Colon & ileum: Absence of patency of the colon and ileum has been found in Swedish Highland cattle.

Atresia ani: Has been found in Holstein, Angus and Guernsey breeds of cattle.

Cardiac defects: Patent ductus arteriousus, persistent foramen ovale and septal defects have been found in Hereford and Jersey breeds.

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Partial alopecia, failure of horn growth, slobbering and stiffness: These inherited defects have been described in Holstein breeds.

Laminitis: Inflammation of the Lamina of the hoofs has been seen in Jersey breeds.

Inherited but nonlethal developmental defect of cattle:

Polydactylism: An extra digit(s) of the hoof has been seen in Hereford and Holstein breeds.

Syndactylism: Mule foot or odd toe has been found in Jersey, Holstein and Hariana breeds of cattle.

Muscular hypertrophy: Excessive muscle growth or double muscling with reduced fat, light bones and thin skin has been found in Hereford, Holstein, Angus, Charolias and Piedmont breeds of cattle.

Umblical hernia: This dominant sex-limited character has been found in male Holstein calves.

Spastic paresis: It is the condition in which the rear legs remain straight due to the continuous contraction of gastrocnemius muscle. It has been described in Angus, Holstein, Charolias, Shorthorn, Ayrshire, Simmental and rarely in Jersey calves usually 2 – 8 months of age.

Spastic syndrome, krampfigkeit or Stretches: This inherited anomaly occurs in Holstein, Guernsey, Charolias and Ayrshire breeds usually at 2 – 7 years of age. It is characterized by spastic contraction of the rear legs and back muscles.

Epilepsy: This condition is characterized by sudden loss of consciousness preceded by convulsions. It has been described in Brown Swiss and Swedish Red cattle.

Lack of lid pigmentation and ocular carcinoma: Pigmentation of the eye lid and carcinoma of the eye has been described in Holsteins, Herefords and Ayrshire breeds of cattle.

Congenital cataract and blindness: Occurs in Jersey and Holstein breeds.

Polycythemia: This condition has been found in one to two months old Jersey calves characterized by congested mucus membranes, lethargy, dyspnea and reduced growth rate.

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Wry tail: Curved or coiled tail has been found in nearly all breeds.

Screw tail: Holstein, Jersey, Shorthorns and Red Polled breeds.

Vestigial tail: Holstein, Angus and Shorthorns.

Taillessness: In Holstein and other breeds.

Fused teats: Herefords and Guernsey breeds.

Supernumerary teats: Occurs nearly in all breeds.

Notched or Short ears: Has been found in Ayrshires and Jersey breeds.

Missing Phalanges or Creeper calves: Has been found in Swedish cattle.

Agnathia or absence of lower jaw: Occurs in Jersey and other breeds.

Ankylosis of the Jaw: Locked jaw has been found in Norwegian cattle.

Nongenetic/Congenital Defects or Anomalies in Domestic Animals

Different types of congenital defects have been described in different animals. If defect / malformation involve an organ or limited part of the body it is called an "anomaly" and if malformation is extensive the victim is called "monster". If a similar defect appears frequently in related individuals or those having common ancestors the genetic cause may be suspected. However a non genetic defect may be similar to the genetic one. Such a condition in which a congenital defect is similar to the genetic one the condition is called "phenocopies".

Malformations due to alterations in tissue differentiation during embryogenesis: These include the following:

Defects due to excessive cell division: These include polydactylia, polythelia, polydontia etc.

Defects due to failure of structures to fuse normally: These include platoschisis, cheiloschisis, cranioschisis or crania bifida, rachischisis or spina bifida (dorsal portions of vertebrae are absent in the lumber & sacral regions) and schistosomus reflexus.

Defects due to arrest in division: These defects include cyclopia; ren arcuatus or horse shoe kidney and syndactyly.

Defects due to complete local failure of tissue growth: These include Amelia, hemimelia, ectrodactyly or absence of phalanges, vertebral or costal abnormalities, epitheliogenesis imperfecta, acrania, agnathia and anophthalmia etc.

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Defects due to arrest in assumption of final form or position: These include ectopia cordis, hypognathia and dextroposition of the aorta.

Defects in the persistence and disappearance of contiguous structures: These include foramen ovale, patent ductus arteriosus, patent ductus venosus, urachus and Mullerian ducts.

Defects due to overdevelopment of tissues: These include polycystic kidneys, tumors like carcinoma, double muscling, macromegaly and gigantism etc.

Defects due to fusion of sexual characters: These include true hermaphrodites (having both testes & ovaries), false hermaphrodites (have gonads of one sex) and freemartins.

Defects due to miscellaneous causes: These include ichthyosis, chondrodystrophies, osteogenesis imperfecta and porphyrinuria.

Embryonic duplications

These malformations are due to abnormal duplication of the germinal area giving rise to fetuses whose body structures are partially but not completely duplicated Embryonic duplications can be;

A. Free monozygotic or dizygotic twins or triplets

1. Symmetrical twins are either monozygotic or identical OR dizygotic or fraternal
2. Asymmetrical twins consist of one normal and another monster individual. These include the following three types;

Hemicardius: It an imperfect individual with recognizable body parts and a rudimentary heart.

Holocardius acephalus: This individual is without head and heart.

Holocardius amorphous or Amorphus globosus: It is an individual with unrecognizable body and occurs in cow, mare, ewe and goat. Amorphus globosus usually appears as a round, oval, edematous structure weighing half to seven pounds and may be covered with skin and hair. It contains connective tissue, fat, soft tissues and occasionally bones.

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B. Conjoined twins

These abnormal individuals arise from the same ovum and are monozygotic. Frequency in bovines is one per 100,000 bovine births. Commonly occur in cattle, rarely in sheep, pig, dog and cats and very rarely in horses.

1. **Conjoined twins each with complete body but connected at various locations. These include the following:**

Thoracopagus / sternopagus or ziphopagu: These conjoined monsters are fused in the thoracic or sternal region.

Pyopagu: These monsters are joined at the sacrum and face back to back.

Craniopagu: Individuals are connected in the head region and may be positioned face to face or back to back.

Ischiopagus: These are joined in the lower pelvic region and usually lie in a straight line.

2. **The two components / body parts may equal one another but less than the entire individual;**

Theses may vary from one normal to those of two normal but superficially joined. Duplication may be in the cranial or caudal region with rest of the body being single.

Duplication in the cranial region: These include monsters with partial duplication of forehead, nose and mouth, dicephalus or those with two heads. Dicephalus dipus tribrachius has two heads and three fore limbs while dicephalus dipus tetrabrachius has two heads but four fore limbs.

Duplication in the caudal region: These individuals may have three or four rear limbs, single neck and fused heads, one head one face and four ears, those with two faces on the opposite side of the same head.

Duplication of both cranial and caudal regions: Both the cranial and caudal regions of the same individual may be duplicated or doubled.

Unequal and asymmetrical conjoined twins

These connected monsters are composed of one very incomplete (parasite) and the other complete (autosite) or nearly complete individual. Parasite is attached to and dependent upon the autosite. This monster is called hetropagus monster. The parasite may be attached to the back, thorax, sacrum or pelvis or rarely the belly, head or palate. Rarely parasite may develop within the body of autosite mostly in the abdominal, thoracic or pelvic cavity or very rarely scrotum.

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Dropsy

It is an important accident of the pregnancy. It refers to an abnormal accumulation of large quantities of fluid within the fetal sacs, fetus and placenta. Therefore dropsical conditions can be;

1. **Dropsy or oedema of the Placenta**
2. **Dropsy of the fetal sacs**
3. **Dropsy of the fetus itself**

Dropsy of the Placenta

It is an inflammatory condition associated with palcentitis. This inflammation may be caused by a number of factors including infection like Brucella abortus. Watery fluid accumulates within the walls of placenta making it oedematus. It does not cause dystocia but is frequently associated with abortion or stillbirth.

Dropsy of the Fetal sacs

Fluid may abnormally accumulate within the fetal sacs like amnion or allantochorion. Former is called *Hydramnios / dropsy or hydrops of the amnion* while the later is called *Hydrallantois / dropsy or hydrops of the allantois.*

HYDRAMNIOS OR DROPSY OF THE AMNION

Abnormal accumulation of fluid within the amniotic sac is called hydramnios. It is characterized by gradual enlargement of the amniotic sac and is associated with abnormal fetus. At midgestation in bovines the amniotic fluid is watery and slightly yellow. Its quantity increases very slowly until the last month of pregnancy when it doubles. From midgestation onward the amniotic fluid becomes viscid because the earlier watery fluid is either swallowed or absorbed into the fetal lungs. Defective fetuses fail to swallow the amniotic fluid and the later accumulates tremendously (5 – 30 gallons) giving rise to the condition. This pathological condition occurs commonly in cattle, occasionally in sheep and rarely in pigs and carnivores. This malady has not been reported in horses.

Causes

- ✓ **Hereditary or genetic condition resulting in defective fetus such as;**
  - o Small brachygnathic calves in Angus cattle.
  - o Muscle contracture monster in red Danish cattle associated with Hydramnion.
  - o Aplasia or hypoplasia of pituitary in Guernsey cattle.
  - o A lethal muscle contractue in sheep.
  - o Hydramnion associated with hydrocephalic Hereford calves.

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✓ **Hydramnios associated with congenitally deformed fetuses / conceptuses**

Congenital malformation of the fetus may be caused by various factors like Nutrition, Endocrine imbalance, environmental stress, radiations and miss manipulation during rectal palpation. Such fetuses include;

- Schistosomus refluxus
- Persomus elumbus,
- Anencephaly in human beings
- Amorphous globosus
- Double monsters

Symptoms

- Major symptom of the hydramnios is the enlarged abdomen particularly during the last month or last few weeks of pregnancy.
- Often the condition is confused with twin pregnancy and goes unnoticed till parturition when large quantities of syrupy and viscid fluid are voided.
- Dystocia follows owing to defected fetus and uterine inertia.

Diagnosis

Because this condition develops slowly and gradually over a period of time, it is usually not diagnosed till parturition when large quantities of fluid are voided. Rectal palpation may reveal atonic, enlarged and fluctuating uterus. However, with the aid of ultrasonography the defected fetus can be diagnosed and related to the concurrently enlarging abdomen.

Treatment

The following treatment protocol may be followed;

- Mild cases be allowed to complete term but they should be kept under intensive care.
- In severe cases, induction of abortion be the top priority of veterinarian. Judicious use of abortifacient like large doses of estrogens (8 – 10 mg), $PGF_{2\alpha}$, Stilbestrol (50 – 100 mg) and glucocorticoids can induce abortion. Oxytocin is of no value as uterus is atonic and diseased.
- If cervix doesn't open, laprotomy or Cesarean section should be adopted. Before this operation the uterine fluid should be aspirated using trocar and rubber tube. Removal should be gradual over a period of about 24 hours to avoid shock.

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HYDRALLANTOIS OR DROPSY OF THE ALLANTOIS

An abnormal accumulation of large quantities of plasma like fluid within the allantoic sac is called hydrallantois. It is characterized by rapid enlargement of the allantoic sac and abdomen usually over a period of about 5 – 20 days or so. Nearly 20 – 50 gallons of fluid may collect in the uterus and the entire weight of the uterus, fluid and the fetus may reach up to 350 – 550 pounds. This malady occurs owing to pathological condition of the uterus and is not concerned with the defected fetus. Most of the craunclcs are poorly vascularized and nonfunctional. The remaining are inflamed and edematous. Some portions of the placenta are necrotic. However, the conceptuses are usually normal.

Hydrallantois occurs 10 -15 times more than hydramnios and it makes around 85 – 90 % of the bovine dropsical conditions. Both together make about 7 % of the uterine pathological conditions.

Etiology

Any thing that can occasion inflammation of the uterus can cause hydrallantois. The possible factors can be the following;

- Latent inflammation of the uterus due to previous dystocia, traction and laceration.
- Extreme underfeeding and starvation that makes uterus more susceptible. Defciency of vast majority of nutrients with particular reference to Vitamin A. Vit-A deficiency causes keratinization of the endometrium and damage to the placentoms.
- The incidence is frequent in twin pregnancies.
- Cystic kidneys, hydronephrosis and dysfunction of the fetal renal tubules can cause it.
- Frequency is higher in pleuripara than primipara or heifers. It can occur in heifers which have lack of craunclcs. Older females don't have enough number of craunclcs.
- A variety of infectious agents including bacteria, virus, fungai and protozoa can cause inflammation and damage to the uterus leading to this condition.

Signs & Symptoms

Signs & symptoms depend upon the severity of the condition and stage of pregnancy.

1. Mild cases with 10 – 20 gallons of fluid may go unnoticed till parturition when a large quantity of clear, watery, amber fluid is voided.
2. There is very rapid distension of the abdomen over a brief period of time.
3. Abortion, with the expulsion of dead fetus may occur at any stage of pregnancy.
4. Parturition / abortion may be accompanied with dystocia.
5. Retention of afterbirth and metritis usually follow.

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6. The extremely distended abdomen shows that either the breeding record is wrong or there are twins.
7. Rectal palpation reveals thick and atonic uterus with whirling arteries if fetus alive. However, fetus is out of reach and cannot be felt.
8. In advanced cases there is anorexia, lack of rumination, constipation, indigestion, bloat and slow and stiff gait. The animal is cautious with weak but rapid pulse (90 – 140 /min). Temperature is usually normal.
9. Cow loses body condition, assumes sternal recumbency and towards the end becomes unable to rise.
10. Dislocation of the hip and ventral hernia due to rupture of the prepubic tendon my come about.
11. In rare cases rupture of the uterus may be the aftermath

Diagnosis

It depends upon the signs & symptoms which again rely on the severity of the condition.

Treatment

Treatment varies with the duration and severity of the condition. The following steps may be adopted;

- In slowly progressing mild cases watch the animal closely and wait for parturition. Provide ready assistance in case of dystocia.
- In rapidly developing severe cases attempts should be made to terminate the pregnancy through the judicious and effective use of ecbolics like estrogens (8 – 10 mg), $PGF_{2\alpha}$, Stilbestrol (50 – 100 mg) and glucocorticoids. Oxytocin is of no value as uterus is atonic and diseased.
- If cervix is open and dead fetus is accessible, pull it out after proper lubrication. If the dead fetus is accessible but not tractable perform fetotomy.
- In case the fetus is not approachable but the Dam is worthwhile resort to Cesarean section.
- If the animal is recumbent and has dislocation of hip complicated by other factors then slaughter is recommended as the chances of recovery are negligible.

Difference between Hydramnion and Hydrallantois

Hyrdamnios	Hydrallantois
It makes 5 -10 % of the uterine dropsical conditions.	It makes 85 -90 % of the uterine dropsical conditions.

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Abnormal development is slow over a period of weeks & months.	Abnormal enlargement is rapid over a brief period of 5 – 20 days.
It is associated with genetically or congenitally defected fetus.	It is associated with the inflammation of uterus. Fetus is usually normal.
Abdominal wall is pear shaped and less tense.	Abdominal wall is round, distended and tense.
Fetus and placentomes can be palpated per rectum.	Fetus and placentomes cannot be palpated per rectum.
Sporadic in incidence	Usually sporadic but frequency higher in inbred herds.
Amniotic fluid is syrupy, viscid and often contains meconium.	Allantoic fluid is watery, clear, amber and plasma like.
Placenta, allantochorion and placentomes are normal.	Placenta and allantochorion are inflamed and edematous. Placentomes are inflamed and hypertrophied.
After removing fluid by aminocentesis the amnion refills very slowly.	After removing fluid by allantocentesis the allantoic sac refills very rapidly.
After Cesaren section fluid doesn't accumulate in the amnion.	After Cesaren section fluid accumulate in the allantoic sac.
Frequency of retained placenta and metritis is very lower.	Frequency of retained placenta and metritis is higher.
Uterine rupture, abdominal hernia and hip dislocation are extremely rare.	Uterine rupture, abdominal hernia and hip dislocation almost common out come.
Prognosis fair to good for life and fertility.	Prognosis poor for life and fertility.

Prolapse

The term proplapse is derived from a Latin word *prolapsus* meaning falling down or descending and refers to the protrusion or eversion mostly of the structures of abdominal or pelvic cavities through vulvo-vaginal and anal openings. Prolapse of vagina, uterus, urinary bladder, rectum, perivaginal fat and rarely intestines occurs in different mammalian species.

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Prolapse of Vagina

Protrusion or eversion of vagina through the vulval opening is called vaginal prolapse. Floor, lateral walls, roof of vagina or the entire vagina including cervix may come out with varied degrees of severity including one which is mild and only visible when the animal is sitting and recedes as the animal rises to one which is soiled, inflamed, necrotic, gangrenous and hanging up to the hocks or even below. This malady occurs in all species particularly larger breeds of cattle like Holsteins, Herefords and Brown Swiss cattle. Incidence is occasional in ewe and Doe. Frequency of prolapse is higher during the last trimester of pregnancy and possibility increases as parturition approaches. Occasionally prolapse as early as $4^{th} - 5^{th}$ month of gestation has been seen in cattle. Evidence of postpartum utero-vaginal prolapse is also available. Mild vaginal prolapse is common in bitch during estrus.

Causes

Different causes of prolapse are enumerated as under;

1. Condition is hereditary or genetic in Hereford cattle and Boxer and Bulldog breeds of dogs.
2. Large quantities of estrogens secreted during the last few months / weeks of gestation cause relaxation of the pelvic ligaments, adjacent structures, vagina and vulva thereby favouring prolapse.
3. Abdominal pressure in case of gluttonous individuals and that of gravid uterus pushes out the relaxed vaginal floor.
4. Incidence is higher in cows with naturally elevated levels of estrogens.
5. Frequency is higher in confined animals with atonic and flabby reproductive tracts than those which are regularly exercised or grazed and have tonic and tense reproductive tracts.
6. Higher incidence in undernourished, weak, pluriparous and older females is also due to atonic, flabby and stretched reproductive tracts.
7. Any previous dystocia that led to traction, laceration and scarring in the musculature also decreases tone and contractibility of the reproductive tract and favoures prolapse.
8. Mouldy ration containing high quantities of estrogens cause relaxation of the ligaments and pelvis and bring about prolapse. Subterrenian clover rich in estrogens caused prolapse in Australia.
9. Use of stilbestrol, estrogens and other steroids for fattening cattle can cause prolapse.

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Signs & Symptoms

These depend upon the severity of the condition and include the following;

1. In mild cases a small portion of the vagina is visible while the animal is sitting but vanishes as the animal rises.
2. In severe cases the entire vagina along with cervix is hanging from the vulva and is soiled, inflamed, edematous, necrotic and gangrenous.
3. There may be vulvitis, cervicitis.
4. There may be mild, intermittent or severe and continuous straining depending upon the severity of the condition.
5. In septic and complicated cases there may be anorexia, weakness and temperature.

Treatment

Treatment of vaginal prolapse differs with species, severity of the condition and the time lapse between the occurrence and the treatment is instituted. It's recommended that the treatment should start with the most conservative and the simplest approach failing which the modern techniques should be resorted to. A single or combination of different methods may be used. The following treatment guidelines may be followed;

A) In mild cases when the prolapsed organ recedes itself as the animal rises;
- Place the animal on an inclined plane with its rear elevated.
- Avoid constipation by giving slight laxative diet like fresh fodder or foliage.
- Avoid overfeeding particularly during pregnancy.
- Avoid steroid therapy and exclude estrogen rich aliment (like mouldy food, sweet clover etc) from the routine diet.
- Give injection of 10 – 50 mg of progesterone or 500 mg of repositol progesterone once every ten days.

B) In moderate cases when the prolapsed vagina is just inflamed and edematous but not severely damaged the following strategy may be adopted;
- Wash the organ with non irritant antiseptic solution (bismuth formic iodide in a pint of mineral oil) and if edematous gently massage or squeeze to remove the fluid. If not feasible to remove fluid by message then give minor cuts in the inflamed and edematous mucosa to drain the fluid and make the organ reducible.
- Replace the prolapsed vagina using both the hands and arms lubricated with soap or an antiseptic solution.

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- After replacing the vagina make all the efforts to preclude its relapse either by applying rope or an iron truss or by loosely suturing the vulval lips with nylon or silk suture.
- Place suppositories (antibiotic tablets) to prevent infection and pessaries (smooth & round objects like wine or pepsi bottle etc) to avoid recurrence of prolapse.
- The activity of replacing the prolapsed vagina should preferably be carried out under epidural anesthesia. To avoid severe straining use epidural anesthesia (lignocane, abocaine, xylocaine etc).
- Adopt all the precautionary measures mentioned above in the case of mild prolapse.

C) In severe vaginal prolapse when the organ is vastly damaged, necrotic or even gangrenous then amputate or totally excise the damaged vagina.

N.B: Animals with hereditary background and those with recurrent prolapse be culled or slaughtered.

Prolapse of Uterus

Protrusion or eversion of the uterus through vulval opening is called uterine prolapse. Mostly it occurs after parturition usually from just after parturition to several hours after parturition. In rare cases it occurs from 48 – 72 hours after parturition or afterwards. It is most commonly seen in cow and ewe, occasionally in sow and rarely in dogs, cats and mares. If vaginal prolapse occurs prepartum then uterine prolapse follows postpartum. Both vaginal and uterine prolapse be differentiated from each other.

Signs & Symptoms

- The prolapsed uterus is hanging from the vulval opening. One or both of the horns may be out.
- In moderate and early diagnosed cases the uterus is hanging downing and is not so damaged.
- In long standing cases the uterus may be soiled, inflamed, edematous, necrotic or even gangrenous.
- If prolapsed uterus is vastly and severely damaged then the animal displays the following additional signs;

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- Anorexia, restlessness tenesmus & pain.
- Rapid but weak pulse.

- Rapid and shallow breathing with respiratory grunt.
- Subnormal body temperature.
- Recumbency and prostration

Diagnosis

It depends upon the signs & symptoms

Treatment

It depends upon the severity of the condition and the time lapse between protrusion of the organ and commencement of treatment. However it includes the following;

- In uncomplicated cases wash the uterus with non irritant antiseptic solution like bismuth formic iodide and replace it with both the hands and arms. Use antibiotics to check infection and pessaries to preclude relapse of prolapse.
- If owner pays immediate heed to the prolapse and wraps the uterus with towel/cloth and calls on the doctor, complications can be avoided and condition can be treated successfully.
- In complicated and vastly damaged cases, remove the mucus membrane, amputate the necrotic parts or even perform hysterectomy. Such operations should be carried out under epidural anesthesia.
- After any such minor or major surgery wash the organ with antiseptics and use broad spectrum antibiotics.

Uterine Torsion

Uterine torsion is one of the important accidents of the pregnancy and is encountered in all species of the animals. It occurs more in dairy cattle, occasionally in beef cattle, sheep, goat, dog, cat, and rarely in mare and sow. " It refers to the twisting or revolution of the uterus along its long axis and may involve any part of the uterus (Multipara like dog) or entire uterus (Bovines)". In Bovines, Caprines and Ovines the gravid horn lies in the form of U-shaped tube with vagina on one end and ovarian attachment on the other end. In Unipara (Cattle, Buffalo) due to strong intercornual ligament both the gravid and non-gravid horns may be involved in the torsion. Torsion involving both the horns does not occur in dogs and cats. Uterine torsion is rare in mare where broad ligament prevents the torsion.

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Incidence of torsion is higher in advance pregnancy and particularly during the 1st or 2nd stage of labour. Sometimes uterine horn containing pus may suffer torsion. Degree of twist may range from 45° – 90° which is unimportant as it cause no problem. Torsion of 180° – 360° or 240° – 360° is the usual cause of dystocia and

needs prompt attention. In extremely rare cases torsion of 720° may occur. Torsion may be clockwise (right side) or counter clockwise (left side).

Causes

Probable causes of uterine torsion may be the following;

- Lesser curvature is supported by the ligament and greater curvature of the uterus rests on the abdominal floor, it is somewhat suspended from above.
- Sitting and standing stance of the female. While cow sits it kneels on the fore legs with the rear legs extended. Similarly when cow rises it extends the rear legs first and kneels on the fore legs. In both the situations, uterus is suspended and rocked about that rotates the uterus mostly sideways which is twisting or torsion.
- Confinement of the animals leads to atony of the uterus and torsion.
- Underfeeding or poor nutrition weakens uterine musculature and leads to torsion.
- Fetal movements particularly during the first or second stage of labour.
- Violence such as rolling, running on bumpy ground and transportation.
- Lack of fetal fluids.
- It is more common in pluriparous and polytocous animals.
- Deep capacious abdomen particularly in case of greedy and gluttonous animals.

Signs & Symptoms

These include the following;

- At parturition the animal appears to be in first stage of labour but actually the labour had started much before and parturition might have been prevented by torsion.
- Vulva is sometimes pulled forward.
- In long standing cases where the fetus has died and both fetus and uterus have undergone ischemic and necrotic changes the animal may show the following signs;

- Restlessness, anorexia and dry muzzle.
- Rapid and shallow breathing with respiratory grunt.
- Low and weak pulse.
- Slightly elevated temperature.
- Occasionally purulent or bloody discharge from yulva.
- Signs of pain and colic.

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- Rectal palpation reveals spiral fold in the direction of the twist.

Diagnosis

It depends upon the signs and symptoms and rectal palpation to detect the twist. It is strongly recommended to perform rectal palpation when an animal shows unsuccessful labour efforts and other symptoms indicative of torsion.

Treatment

Uterine torsion can be relieved by one or combination of the following strategies;

- Correction through rectal palpation
- Correction through vaginal palpation
- Correction through Schaffers method
- Correction through laprotomy and Cesaren Section

Correction through rectal palpation

Rectal palpation to correct the torsion should be the first priority. After proper lubrication insert the arm and try to approach the fetus. Grasp the fetus if possible and then rotate it in the direction of the twist by forcing it through its legs, head or gently pressing the eyeballs.

Correction through vaginalpalpation

If animal is in the act of parturition and cervix is open then lubricate the arm with non-irritant antiseptic and pass into the vagina. Try to grasp the fetus and rotate it to undo the twist. Rectal palpation is preferred to vaginal method.

Schaffers method of Uterine torsion correction

It is the most conservative, easy, safe, cost-effective and reliable method of torsion correction. It involves rotating the animal on the ground and requires the following items to be arranged before employing this technique;

- Grassy ground or ground bedded with paddy, straw, burlaps or sackcloth.
- About 3 – 6 assistants.
- 2 or 3 pieces of rope with reasonable length.
- A strong wooden plank about 10 – 12 feet long and 10 – 12 inches wide.

Procedure

- Perform rectal palpation and determine the direction of the twist.
- Lay the animal on lateral recumbency in the direction of the twist.

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- Tie the fore legs together and hind legs together in the form of 8 shaped knot. Never tie the fore & rear legs together as they will hinder rotation and needed pressure on the abdomen.
- Place the wooden plank against the abdomen with its lower end on the ground and its centre resting on the abdomen. One assistant stands on the plank at its lower end so that plank is pressed onto the animal's abdomen. Other assistants while keeping the neck of the animal extended and fore & rear legs in their place, rotate the animal carefully in the direction of the twist.
- After few rotations check rectally whether or not the twist has been relieved. If twist has been undone then let the animal stand and help it in its efforts to expel the fetus.

Correction through laprotomy and Cesaren Section

If Schaffers technique has failed to relieve torsion then resort to laprotomy or Cesaren Section. Decide the fate of the dam depending upon the future fertility probability.

INDUCTION OF PARTURITION/ABORTION

Induction of parturition refers to termination of pregnancy at any stage of gestation. If termination of pregnancy takes place before 235 days (cattle) of parturition when fetus is immature and cannot survive outside the uterus then term induction of abortion is used. If termination occurs after day 235 of gestation by which time fetus is viable in vitro then it is called induction of parturition. Generally both induction of parturition & induction of abortion are used interchangeably and synonymously.

Termination of pregnancy is sometimes advised on various grounds in the livestock farming. There can be so many reasons/indications to terminate pregnancy but economics is the base of all the reasons. Some of the reasons are;

Therapeutic reason: When any disease or damage threatens life of the dam then it is recommended to terminate pregnancy.. For example fractures, nerve paralysis, injury due to accident, dropsical conditions, acute infections and other diseases.

Managemental reasons: One of the managemental reasons is estrus and parturition synchronization. Either the early pregnancy is terminated so that female may be bred again along with other females or to induce parturition at suitable time beyond days 235 to synchronize parturition with the rest of the herd for sanitary reasons. Other Managemental reasons include seasonal factors like fodder scarcity,

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inclement weather conditions like high or low temperature, high humidity, insects and increased disease and parasitic risk.

Genetic preservation: In case a superior cow has been accidentally bred to some inferior or scrub breed then it is recommended to induce abortion to avoid genetically inferior calf and its raising cost.

To avoid possible dystocia: If female has been bred unconsciously or accidentally to some larger breed or too early after puberty or parturition then there is the increased likelihood of dystocia. Induce abortion to avoid dystocia. Inducing parturition few weeks prior will avoid dystocia because fetus will be of normal or almost size and not oversized.

To ensure 12 months calving interval: In well managed herd with well planned pregnancy termination techniques it is recommended to induce parturition beyond day 235 to have reasonable time for uterine involution and recovery. Thus animal will be bred in time.

NB: Induction abortion or parturition should only be adopted when fruitful or unavoidable. Abortions are often desirable in beef cattle while in the feedlot.

Techniques/Methods of Abortion or Parturition Induction

A variety of techniques is available. Selection of the suitable technique depends upon the species, duration of pregnancy, reason of induction and desire of the owner. Following techniques can be used to induce parturition;

Douching with antiseptic solutions: Douching uterus with 1 – 2 % lugol solution, 200 ppm chlorine solution or dilute acetic acid causes abortion.

Estrogens: Large and repeated doses of injectable estrogens will surely induce abortion at any stage of gestation. Stilbestrol @ 500 – 1000 mg for four days or 50 – 150 mg daily for several days, Estradiol @ 10 – 20 mg every 2 – 4 days will induce parturition. Estrogens be continued till abortion.

Glucocorticoids: Moderate to larger doses of glucocorticoids can induce abortion particularly during the last trimester of pregnancy. Flumethasone @ 5 mg and Dexamethasone @ 10 mg for 4 – 8 days usually causes abortion.

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N.B: Estrogens and particularly glucocorticoids cause retention of placenta and metritis. Future fertility may be affected.

Safe Drugs: Drugs like triamcinolone acetonide & Estradiol benzoate alone or in combination with glucocorticoids induce abortion/parturition without any complications of dystocia, retained afterbirth and metritis. Future breeding is almost secure.

Manual removal of corpus luteum of pregnancy: Pregnancy can be terminated by manually removing CL. This method requires skill and should be used before 4th or 5th month of pregnancy and preferably before 3rd month of pregnancy as ovaries are drawn ahead afterwards. Abortion occurs within 3 – 5 days. Cow should be observed closely. There is risk of damage to the ovaries and uterus and adhesion with the viscera. Estrogens should be preferred to this method.

Manual rupture of amniotic sac: Through rectal palpation amniotic sac can be ruptured from 30 – 50 days of pregnancy in cow and 17 – 30 days in mare. After 60 days it is impossible to destroy amniotic sac due to its rigidity.

Dystocia

Dystocia is a Greek word meaning difficult birth. When first or especially the 2nd stage of labour is prolonged and it becomes difficult or impossible for dam to expel the fetus without external aid the condition is termed as dystocia. Contrary to this is normal, physiological and unassisted birth called Eutocia. Dystocia occurs in all the species with higher incidence in larger dairy breeds of cattle like Holsteins, Herefords, Brown Swiss, Sahiwal and Red Sindhi and buffalo such as Murrah, Nili Ravi and Kundi. It also occurs in sheep, goat, mare, dog & cat.

Causes

Dystocia is caused by a variety of causes which can be categorized into;

- Predisposing causes
- Exciting causes
- Maternal Causes
- Fetal Causes

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Predisposing causes

These are the causes of dystocia that predispose the female to dystocia or simply these are the factors that pave ground for dystocia and come into play at any time during pregnancy usually much before the completion of the gestation period. In other words they will make parturition difficult with varied amount of severity. These include the following;

Heredity: Frequency is higher in certain breeds than others like Holstein and Brown Swiss.

Nutrition: Undernutrition or starvation weakens the entire body as well as uterine musculature. Similarly deficiency of Vit-A and Ca decreases uterine tone and favour dystocia. Over fattening the pregnant females can cause fat deposition in the vagina and result in dystocia.

Age of the Dam: Breeding heifers in their very early age or older cows in their senility favours dystocia. In the former dystocia occurs because of small pelvis and in the later dystocia occurs owing to poor or worn out uterine musculature.

Improper dry period: Proper dry period (60 days) is essential not only for optimum production but for uterine involution and musculatuire recovery. Breeding at the first estrus favours dystocia.

Body size: It is recommended that dairy heifers be bred by body size. It means those heifers that have not gained proper body size and weight even at the time of puberty should not be bred and should be given more time to mature.

Sire – Dam disproportion: Both the parents should be of the same size and weight. Cross between small and large breeds will predispose dystocia.

Confinement: Confinement is an important factor that can predispose dystocia. Lack of exercise makes the uterus atonic or flaccid and favours dystocia.

Infection: Infection can be the predisposing or exciting cause of dystocia. Chronic infection may be the predisposing cause of dystocia.

Exciting causes

These are the causes that are usually visible at the time of dystocia and include the following;

Small Pelvis: Animals with pelvic area lesser than 200 sq cm suffer from dystocia more frequently than those with pelvic area larger than 200 sq cm.

Hydrallantois and Hydramnios: Both of these conditions cause dystocia in most of the cases.

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Persistent Mullerian ducts: Persistent hymen and mullerian ducts cause stenosis of the vagina and eventually dystocia.

Scarring: Scarring of the birth canal due to injuries at previous dystocia can cause dystocia.

Double Cervix and double Uteri: Both of these conditions cause dystocia.

Traumatic Causes: Trauma to the genital tract or any other organ like traumatic pericarditis, traumatic peritonitis, ventral hernia, rupture of prepubic tendon, uterine torsion and uterine rupture can cause dystocia.

Uterine Inertia: Uterine inertia whether primary or secondary is one of the predominant causes of dystocia.

Twinning: It is one of the factors causing dystocia.

Paralysis: Gluteal paralysis, Obturator paralysis and Peroneal paralysis can cause serious dystocia.

Maternal causes

These causes are due to fault on the mother side and include the following;

- Uterine torsion
- Closed cervix
- Persistent mullerian ducts
- Double cervix
- Double uterus
- Perivaginal fat
- Uterine inertia
- Hydramnios & Hydrallantois
- Paralysis due to damage to the nerve
- Vaginal, anal and Cystic Prolapse
- Fractures
- Congenital hypoplasia of birth canal
- Tumors

Fetal causes

These causes are due to fault on the fetal side and include the following;

- Oversized fetus
- Dead fetus
- Abnormal fetus like fetus with ascites, hydrocephalus and Anasarca.

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- Monster like Schistomus reflexus, persomus elumbus, double monsters and conjoined twins
- Achondroplasia and ankylosis
- Abnormal presentation and position
- Abnormal posture like flexion of the fore or hind limbs, deviation of the head, neck or tail.

N.B: The Same factor can be a common cause e.g. predisposing causes may be the maternal causes or an exciting cause can be both exciting as well as maternal cause like Uterine torsion is both the maternal as well as exciting cause Or Anasarca, monsters and those with postural abnormalities can be the exciting as well as fetal causes. It means a single cause can belong to more than one category.

Sign & Symptoms

These include the following;

- Animal is conscious and under stress
- The time of parturition is prolonged
- There is straining and efforts to expel the fetus but difficult
- Restlessness
- Live or dead fetus may be partially visible and entangled in the birth canal
- Placenta and parts of the fetus may be visible

Treatment / Handling of Dystocia

In order to treat / handle dystocia the knowledge of basic causes and their treatment is vital on the part of Veterinarian/Owner. These will help prevent dystocia or avoid complications. In case dystocia has occurred the following procedure should be followed;

History: Take complete history from the owner/attendant. History should include the following information;

- When the female under question was bred and to which breed?
- Whether the gestation period is complete or not?
- How long the animal has been struggling to expel the fetus? What is the nature of straining i.e. weak or strong?
- Whether there was normal parturition or dystocia in the past and how was that treated?
- Any problem particularly during the last trimester of pregnancy e.g. prolapse, disease.
- Any previous dystocia?
- Were there efforts by any one to relieve dystocia?

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General Examination: Veterinarian ought to examine the patient cursorily but thoroughly to explore the cause of dystocia. Examination should be with the view that;

- What is the general condition of the animal whether normal, weak or exhausted?
- Whether the patient is standing, sitting or recumbent?
- Is there any paralysis due to nerve damage or mineral deficiency?
- What is the temperature, respiration and pulse?
- Nature of vulval discharges whether watery, mucoid, mucopurulent or bloody.
- Condition of the placenta, fetus or uterus is accessible.

Specific Examination: Specific examination is actually the detailed examination of genital tract and the fetus. It aims at exploring the nature of the complexity and provision of better working conditions. It is based on expertise of the Veterinarian. It includes the following important steps;

- The operator should be well prepared and dressed
- Properly restrain the animal
- Shift the patient to comfortable working conditions. It means protect the animal and Veterinarian from inclement weather conditions like hot, cold, winds, contamination, dark. Animal should be handled on properly bedded ground. Plenty of warm or cold water (as per requirement) should be available.
- It is better to have the animal in standing position. If sitting or recumbent then try to stand the animal. It can be achieved by giving an epidural injection of 2 % xylocaine or procaine solution (6 – 10 ml) or 5 % Cyclaine (3 – 8). It will prevent pain, straining, defecation, urination and tail swishing etc. If animal cannot stand then elevate the rear of the animal.
- Perform rectal or vaginal palpation to get an idea of the severity of the condition. It will help detect whether the birth canal is dry, slippery, inflamed, edematous, necrotic, twisted or is there any tumor or previous attempts by quacks to deliver the fetus. Based on information obtained through rectal palpation, the following step(s) or treatment protocol may be adopted;
- In case cervix is closed then give injection of Estrogens or Stilbestrol. Check after half hour whether the cervix is open. If still closed then give another injection of estrogen and again check after half an hour. If cervix is open then give injection of oxytocin and assist the animal in its efforts to expel the fetus.
- If animal yet fails to expel the normal live fetus then see for any abnormality of presentation, position or posture and correct it. Defects in presentation, position and postures can be amended through mutation. Mutation involves repulsion,

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rotation, version and extension of the fetus either manually or with the aid of obstetrical instruments. After correction, help the animal in its efforts to expel the fetus i.e. apply gentle traction which should be synchronous with uterine and abdominal contractions. If normal and healthy fetus is still not coming out then perform Cesaren section.

- If fetus is abnormal or dead and cannot be pulled out manually then perform fetotomy If abnormal or dead fetus is not accessible then perform laprotomy.
- Recommend slaughter in case;
  - If fetus is dead and decaying
  - Survival of the Dam or its future breeding is questionable
  - Therapeutic cost is more than the total value of the fetus and the Dam

Accidents / Injuries of PUERPERIUM

Puerperium is simply defined as "time period from parturition till the involution of the uterus is complete". Involution of the uterus in bovines is complete by about the day 60th following parturition. At the completion of involution, uterus is restored to its earlier non-pregnant state i.e. its size is reduced, tone is restored, endometrium is repaired and its glands are re-formed. In short, uterus is ready for the next cycle and pregnancy. An animal encounters a number of problems ranging from mild injuries to very severe paralytic, metabolic and infectious diseases. A list of possible injuries/ accidents that are likely to occur is given below;

1. Postpartum haemorrhage
2. Lacerations and contusions of the birth canal and its adjacent structure
3. Haematoma of Vagina & Vulva
4. Contusions of the pelvic structures
5. Rupture of gastrocnemius muscle
6. Rupture of Uterus, Cervix, Vagina, Vulva & Perineum
7. Rupture of Pelvic & Abdominal organs
8. Prolapse of Abdominal and Visceral organs
9. ☑ Metabolic Diseases of puerperal period
10. Puerperal infections

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Postpartum Haemorrhage

Major or minor damage to the blood vessels of reproductive tract and its associated structures of the pelvic cavity including broad ligament occurs after parturition and leads to variable degree of bleeding within and outside the pelvic cavity. This bleeding or haemorrhage may be caused by a number of factors which include;

- Contusion or damage to the blood vessels occurs when pelvic cavity is small and normal sized fetus is extracted through traction. Laceration of the birth canal leads to bleeding.
- Damage to the blood vessels occurs when the fetus is oversized or edematous or emphysematous and is pulled out by force.
- Damage to the blood vessels may occur when any prominence or tuberosity tears the blood vessels particularly during abnormal presentation, position or posture.
- Haemorrhage is sometimes caused by mishandeling of the operator during his efforts to relieve dystocia.
- Injudicious use of obstetrical / surgical instruments while correcting dystocia may cause scanty or profuse bleeding.
- Premature removal of fetal membranes or forced separation of placenta in the event of retained placenta usually causes bleeding.
- Haemorrhage may occur during, before or after correction of torsion, prolapse, fetotomy and Cesarean section mostly in young heifers.
- Sweet clover or estrogenic diet aggravates the situation.

Sign/Symptoms

Voiding of blood or unusually blood stained fetus, hands and instruments suggest haemorrhage. Other symptoms include weakness, depression, rapid pulse & respiration, pale mucus membranes and occasionally death. Mares show signs of colic, swelling, pain, high pulse, prostration and death. Hematoma may occur due to rupture of the blood vessels of broad ligaments.

Treatment

- Most of the slight bleedings need no treatment and heal automatically.
- Moderate to severing bleeding can be stopped by clamping, ligating, cauterizing or suturing.
- Injection of oxytocin (20 – 50) and an injection of calcium gluconate (500ml) can enhance blood coagulation and prevent bleeding.
- Parentral injections of broad spectrum antibiotics should be used to check infection.

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Lacerations and Contusions of the Birth Canal and its Adjacent Structure

Visible tearing or underlying deep apparently invisible damage to the birth canal occurs during parturition and dystocia. Usually the degree of damage during normal parturition is minor and of no concern. However, dystocia accompanied with traction and particularly fetotomy results in a reasonable tearing and damage to the reproductive tract and its surrounding structures. The chances of laceration in primiparous females (heifers) are more as compared to pluriparous females.

Causes: Fetal oversize, constricted birth canal, fetal mal-presentation, position and posture, undue traction, rough handling and damage caused by obstetrical / surgical instruments usually leads to a variable degree of laceration of the genital tract and its associated structures.

Sign & Symptoms: Close observation of the genital tract reveals variable degrees of tearing and if severe the animal exhibits additional signs of anorexia, pain, straining, elevated temperature, rapid pulse etc.

Treatment: Minor tearing needs no treatment but moderate to severe laceration needs prompt suturing and local and parentral antibiotic therapy.

Haemotoma

Collection of blood in an abnormal cavity is called hematoma. It occasionally occurs in all species with comparably higher frequency in mare & sow. Damage to the blood vessels during parturition and dystocia may cause hematoma within the birth canal, broad ligament and vulva. Rarely it is protruding between the vulval lips. It is often confused with tumors, prolapsed vagina or bladder. Vaginal hematomas are detected during examination of the genital tract. Usually it disappears within few days however; blood can be aspirated with syringe. If hematoma is harder then give incision and remove the clotted blood. Wash with antiseptic solution and suture. Local and broad spectrum antibiotics prevent suspected infection.

Contusion Of The Maternal Pelvic Structures

Dystocia, forced extraction, fetotomy, parturition while lying down and persistent pressure on particular side /organ can cause hematoma and contusion of most of the organs particularly the pelvic nerves leading to paralysis of certain parts of the body. Neuronal paralyses include the following;

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the fetlock / hock joint. The affected leg cannot bear weight of the corresponding side and is pulled up.

Cause

Peroneal nerve courses through the thigh muscles, passes over the dorsolateral condyle of the tibia & fibula and innervates the muscles (long & lateral digital extensors, peroneus tertius & anterior tibial muscles) below the knee / hock joint. These muscles flex the hock and extend the digits. Injury to peroneal nerve results in an anesthesia/desensitization of the cranial surface of the fetlock & metatarsus.

Sign & Symptoms

There is knuckling and dropping of the fetlock/hock.
There is difficulty in rising, standing and walking.
The affected leg is unable to lift weight and is pulled up.

Prognosis: Prognosis is good if paralysis is unilateral and attended soon.

Treatment

- Good nursing
- Transfer the animal from stanchion to open, soft & comfortable place.
- For several days animals should be assisted in their efforts to rise.
- Affected cows should not be allowed to struggle/exert while rising.
- Neurotonic like xanthene can be used but of little value.

N.B: Brachial / radial nerve paralysis also occurs in animals confined in stanchion where fore limb is caught in the manger and is extended forcefully.

Rupture of the Organs of Uro-genital tract, Alimentary canal & Others

☑ Rupture of Gastrocnemius muscle

Zenker's degeneration of gastrocnemius muscle due to selenium deficiency followed by rupture of the gastrocnemius muscle occurs in animals. Selenium deficient soils predispose the rupture while exertion or struggling during dystocia & milk fever brings about the actual rupture. Incidence is higher in confined and unexercised animals (females).

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Sign & Symptoms

These include;

- Flaccid, swollen and tender gastrocnemius muscle.
- Clear-cut breakage in the said muscle may be evident.
- The animal cannot support body on that particular side.

Treatment

Mild cases that can rise will heal in several weeks if confined and braces and splinters applied to the affected part. Severe cases ought to be slaughtered. Selenium injection prevents the rupture in Se^{+} deficient areas.

☑ Rupture of Uterus, Cervix & Vagina

Rupture of uterus, cervix and vagina can occur in all species particularly during dystocia. Mishandling, too much traction and surgical instruments can cause tearing of the said organs.

Causes

- Dystocia with fetal emphysema
- Uterine torsion
- Forced extraction
- Fatigue of the operator
- Rupture caused by obstetrical/surgical instruments
- Rupture may be caused by fetal bones during mal-presentation, mal-position & mal-posture.
- Excessive perivaginal fat can also cause rupture particularly of the floor of the vagina.
- Dry fetus & birth canal during dystocia favour rupture.
- Injection of oxytocin/pituitrin during dystocia especially with closed cervix causes rupture.
- Spontaneous rupture without any apparent cause may occur.

Sign & Symptoms

Sign & symptoms vary depending upon the organ involved, size of the rupture, character of the rupture (regular, irregular, horizontal or vertical), nature of uterine contents and amount of uterine contents escaped into the peritoneum and abdominal cavity. However some indications of the rupture include;

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- Presence of urinary bladder in the vagina
- Intestine present on the pelvic floor
- Clear-cut visible rupture in the vagina
- Bleeding may also suggest some degree of rupture

Rupture of cervix and particularly the uterus may exhibit the following general symptoms;

- Anorexia, restlessness, lack of rumination & rumen contraction
- Elevated pulse, respirations & cold extremities
- Temperature normal or subnormal
- In case infected material escapes into the abdominal cavity due to uterine rupture then animal exhibits signs of septisemia like high temperature, hyperemic conjuctiva, peritonitis, gastritis, enteritis and colic. In such conditions shock, prostration and death may occur in 1 – 2 days.

Treatment

- Simple or minor rupture of vagina needs no treatment in cow however, in mare it be promptly stitched due to the likelihood of recto-vaginal fistula.
- If the rupture is ahead in the vagina, then vagina or cervix should be gently drawn back to make the operation easier.
- If rupture of uterus is confirmed, the uterus be sutured in situ or pulled back and sutured with catgut.
- If site of rupture of uterus is not accessible or the infected material / fetus has dropped into the abdominal cavity then laprotomy should be performed.
- Clean the abdominal cavity and uterus of contamination. If any part of the uterus is vastly damaged due to infection then amputate the uterus or even perform hysterectomy.
- Laprotomy should be performed either under general or lumber-segmental regional anesthesia.
- It is better to suture vagina/cervix under epidural anesthesia.
- A full course of local and parenteral broad spectrum antibiotics should follow the laporotomy.

N.B: Future breeding in such animal is either questionable or lost.

☑ Rupture of Vulva & Perineum

Rupture of vulva and perineum mostly occurs in mare, occasionally cattle (heifer) and rarely sheep when either parturition is violent or too much traction is applied. Rupture usually occurs when;

- Fetus is large or vulva is small and traction is applied
- Pulling the fetus forcefully when vulva is not properly dilated
- Pulling the fetus forcefully in case of mal-presentation, position or posture
- Dry fetus & birth canal favour rupture of the entire genital tract

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Treatment

- Simply suture the torn organs if not inflamed or edematous
- In the event of inflammation & edema, wait until the inflammation and edema have subsided and then suture.
- Rupture can be prevented by properly and timely attending the animals while in parturition. Proper lubrication, mutation and episiotomy (in certain cases) help avoid the rupture.
- Local & general antibiotics help healing and prevent complications.

☑ Rupture of the pelvic & abdominal organs

Rarely the rupture of rectum, intestines, urinary bladder and diaphragm occurs in cow and mare due to severe dystocia and concurrent complications. Ru pture of such organs usually ends fatally because the conditions have usually worsened by the time the rupture is diagnosed and attended. Rupture of rectum in mare is comparably diagnosed earlier due to voiding of feces via vulva. It can be corrected timely & effectively. Antibiotic therapy should follow any successful correction.

Prolapse of Pelvic & Abdominal Organs

Prolapse, protrusion or eversion of the vagina, uterus, perivaginal fat, rectum, urinary bladder and intestines occurs in animals particularly during parturition and puerperium. Reduction or correction of the prolapsed organs is imperative not only from the viewpoint of breeding but also due to the standpoint of life of an animal. Prolapse of Vagina & Uterus has already been explained, the others are discussed below.

☑ Prolapse of intestines

Invagination or protrusion of intestines is the rare incidence. Intestines may invaginate into the ruptured uterus and come out through vulva or prolapse may occur through ruptured vagina. Some time intestines just project out into the uterus or vagina. Exertion or violence with ruptured reproductive tract especially during dystocia favours intestinal prolapse but fortunately this mishap is rare. Condition should be differentiated from Schistosomus Reflexus which is a monster with exposed abdomen.

Prognosis: Prognosis is usually poor, because by the time the condition is diagnosed the prolapsed intestines have already been much contaminated and damaged.

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Treatment

Prolapsed intestines should be thoroughly cleaned and washed with antiseptic solution. The extensively damaged or necrotized parts should be excised and the ends approximated with absorbable suture. The intestines should be replaced either through the ruptured organ or through laprotomy. A full antibiotic course should follow the reduction to check infection and trigger healing.

☑ Prolapse of Rectum

Protrusion of the rectum particularly during dystocia may occur in all species. Slight protrusion is common but severe prolapse is rare. The incidence is much higher in mare due to violent parturition and relaxed pelvic structures especially the anal sphincter. In mare 2 – 3 feet rectum may come out which is fatal.

Treatment

Treatment includes washing of the prolapsed rectum and replacement. Prolapse can be avoided by pressing the anus with towel during parturition. Purse-string suture can avoid relapse or prolapse of the rectum. Light antibiotic therapy prevents infection.

☑ Prolapse of Urinary Bladder

Protrusion of the urinary bladder through the ruptured vaginal floor occurs in all animals particularly large domestic animals. It occurs before, during or after parturition. It should be differentiated from eversion of bladder, vulval tumors, cysts, a mass of protruding vaginal fat, and hematomas. Dystocia ruptures vaginal floor and induces prolapse of bladder.

Treatment

Clean and wash the bladder with antiseptics. Any urine present in the bladder should be withdrawn with syringe. The clean and empty urinary bladder be gently pushed back through the ruptured vaginal floor and the later sutured.

☑ Eversion of the Urinary Bladder

Eversion is a condition in which inside of a hollow/tubular organ becomes outside or interior of an organ is exposed externally. Eversion of urinary bladder usually occurs in mare in which urethra is large and parturition violent. Incidence in cattle is rare. It occurs before, during or after parturition.

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Diagnosis

Pear shaped everted bladder with visible openings of two ureters and folded surface may be seen on the intact vaginal floor. Very rarely intestines may be within the

everted urinary bladder. Sometimes the organs is vastly inflamed and damaged. It rarely hinders normal parturition.

Treatment

Wash the organ with antiseptics and if necessary excise the severely damaged/ necrotized parts. Then with fingers or very soft, lubricated and blunt knob push the bladder into the urethral opening of the vaginal floor gently. The whole activity should preferably be carried out under epidural anesthesia. Antibiotic therapy should follow the replacement.

☑ Prolapse of Perivaginal Fat

Presence of a lumpy mass of fats on the vaginal floor may be seen particularly during forced extraction of the fetus. This usually happens in obese dairy & beef cattle. Mass of fats be differentiated from prolapsed urinary bladder. This mass of fats can easily be cut off without bleeding. The vaginal floor if ruptured should be approximated. Epidural anesthesia facilitates operation.

Metabolic Diseases of the Puerperal Period

Diseases/maladies caused by an impaired metabolism are called metabolic diseases. Such diseases are caused either by an excess, deficiency or an abnormal utilization of a nutrient or metabolite. For example hypervitaminosis-A, Selenium, Zinc & Manganese toxicity and nitrate & urea toxicities are due to excessive consumption of the said materials. Hypocalcemia, hypomagnesaemia and ketosis are due deficiency of the concerned nutrients. Similarly over production of ammonia, methane, acids and bases during metabolism is an example of abnormal or unusual utilization of the nutrients. All the conditions are metabolic diseases. Important metabolic diseases of puerperium are discussed below.

☑ Milk Fever / Parturient Paresis

It is an important metabolic disease of cattle especially the dairy cows and is of great economic concern. Mostly cows up to four years of age or above are affected by this malady. It occurs before, during or within 72 hours after parturition. It is characterized by sudden fall in the blood Ca^{+} from normal level of 8 – 12 mg/100ml to 3 – 7 mg/100ml with the predominant symptoms of anorexia, cold extremities and titanic contraction especially of the neck.

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Causes

Reduction in the blood calcium level may be caused by one or more of the following factors;

- During the later part of gestation much of the calcium is shunted towards fetal growth.
- After parturition much of the blood calcium is added to the colostrum which results in drop in the normal blood calcium level.
- Dietary deficiency or excess especially towards the end of gestation results in hypocalcaemia. Experts are of the view that too excess of Ca^+ is more detrimental than its deficiency and is the actual cause of milk fever. According to them excess of calcium suppresses parathormone and elevates calcitonin. Calcitonin then adds all the Ca^+ to its storage sites with the resultant hypocalcemia.

Sign & Symptoms

These include the following;

- Anorexia
- Cold extremities
- Subnormal body temperature
- Stiff gait, staggering and incordination
- Inability to rise and typical "S" shaped curve in the neck
- Failure of pupil to contract when exposed to strong flash of light
- Suppression of urination and defecation
- Constipation
- Slight rumen tympany
- Cessation of parturition
- Comma and death within 6 – 24 hrs if treatment not instituted well in time. Very rarely, animal recovers automatically and spontaneously.

Diagnosis

Diagnosis is based on signs and symptoms and quick response to calcium therapy.

Prognosis: Prognosis is always good provided treatment is instituted earlier.

Treatment

Slow intravenous injection of 750 – 1500 ml of calcium borogluconate. Preferably half dose should be given IV and very slowly within 15 – 20 minutes. For best results the remaining half dose should be injected subcutaneously. Injection can be repeated if necessary.

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Prophylaxis

Following points can be considered to avoid milk fever.

- Balance diet
- Partial milking for the first few days after parturition
- Avoid mineral supplementation during last trimester of gestation and early lactation
- Avoid legumes (clover & alfalfa) during last trimester of gestation and early lactation. If legume feeding unavoidable, add 2.5 – 5 % monosodium phosphate to grain ration to have 1:1 Ca^+: P ratio and not 1: 3 – 7 which leads to milk fever.

☑ Bovine Ketosis

Ketosis is an important metabolic disease especially of dairy cattle mostly occurring between 10 – 60 days after parturition. It sometimes occurs within first 10 days after parturition. Incidence before parturition is rare. The malady is characterized by hypoglycemia, ketonemia and ketonuria. Blood glucose falls from a normal level of 40 – 60 mg/100 ml to 40 – 18 mg/100 ml whereas blood ketone (acetoacetic acid, β-hydroxy butyric acid & acetone) level rises from a normal value of 2 – 15 mg/100 ml to 15 – 75 mg/100 ml. It results in heavy economic loss in the form of loss of body weight, drop in the milk yield and therapeutic cost.

Causes

Ketosis is caused by reduction in the circulating blood glucose which is again caused by;

- Dietary deficiency of carbohydrates especially during pregnancy and lactation
- Deficiency of glucocorticoids, glucagon and ACTH

Types of Bovine Ketosis

Bovine ketosis has been classified on two grounds;

(A) Primary or Secondary Ketosis

Primary Spontaneous Ketosis: Ketosis occurs without any apparent cause perhaps due to hereditary predisposition.

Primary Nutritional Ketosis: Here ketosis occurs due to actual deficiency of carbohydrates in the diet.

Secondary Ketosis: In this type, generation of ketone bodies occurs secondary to other disease like metritis, mastitis, displacement of abomasums, traumatic gastritis etc and not due deficiency of carbohydrates or genetic reasons.

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(B) Based on the site of Ketogenesis

Based on the site of ketone bodies production ketosis is of the following three types;

Alimentary Ketosis: Increase in the blood ketone bodies occurs due to high level of ketone bodies or their precursor in the feed like silage high in butyrates.

Hepatic Ketosis: In this type of ketosis liver produces extra ketone bodies as during diabetes mellitus and peak of heavy lactation when fats are mobilized from their reserves and utilized for energy generation.

Mammary Ketosis: Ketosis due to production of certain ketone bodies by the mammary glands e.g. Acetoacetate produced during heavy lactation.

Signs & Symptoms

Affected animals display either digestive symptoms or nervous symptoms or both.

Digestive Symptoms: These include anorexia, constipation and gradual loss of body weight with concurrent drop in the milk yield. Breath of the affected animals feels sugar like due to acetone in it.

Nervous Symptoms: In severe ketosis animal shows signs like nervousness, trembling, incordination and staggering gait.

Diagnosis

Milk and urine of the suspected animals should be treated with Ross Reagent. Development of purple colour indicates ketosis. Measurement of blood glucose level is an additional help. Signs/symptoms don't provide any solid ground for diagnosis.

Treatment

A single or combination of the following can be used to treat the condition.

- 500 – 1000 ml of 40 % glucose solution via slow intravenous injection
- Several thousands ml of 25 % glucose solution in the form of an IV drip
- Intravenous injection of glucocorticoids (contraindicated in viral diseases)
- An intramuscular injection of ACTH @ 200 – 600 international units (IU)
- Sodium propionate @ 1/4 – 3/4 pounds daily either in the feed or an oral drench.

Prophylaxis: Balance diet with increased level of carbohydrates as per requirements of the animal will prevent the disease.

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☑ Ketosis/Pregnancy Disease in Ewes

Ketosis or hypoglycemia in sheep usually occurs during the last 2 – 4 weeks of gestation. Incidence is more in females bearing twins/triplets and those which are thin & weak. However, disease can affect the healthy ones due to confinement or lack of exercise. The condition is characterized by fall in the blood glucose level with concurrent rise in the blood and urine ketone bodies. Course of the disease is 2 – 6 days. Condition similarly affects the goats but incidence is rare.

Causes

- Deficiency of carbohydrates in the diet
- Sheep bearing twins or triplets are more susceptible due to high demand

Signs & Symptoms

General symptoms: These include, dullness, anorexia, paresis or inability to rise and occasionally abortion.

Nervous Symptoms: These include incordination, staggering gait, walking in circle, head pressing and drawing head backward to one side. In some advance cases fetus dies and Ewe recovers.

Diagnosis

Reaction of milk & urine with the Ross Reagent and development of purple color is an indication of ketosis. Sign/symptoms also help identify the condition. Disease must be differentiated from Listeriosis which simulates the condition with respect to nervous symptoms. The key difference between the two is that in Ketosis the legs of the sheep are very rigid but in Listeriosis legs are not rigid.

Treatment

One or combination of the following can be used to treat the disease;

- An injection of 200 ml of 40 % glucose intravenously
- Intravenous injection of glucocorticoids (contraindicated in viral diseases)
- ACTH @ 50 – 100 IU per head intramuscularly
- Increase carbohydrates, grains & molasses in the feed

Prophylaxis: Balance diet with increased level of carbohydrates as per requirements of the animal will prevent the disease.

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☑ Grass Tetany

It is a metabolic disease of beef and dairy cattle characterized by reduction in the blood calcium and magnesium levels or fall in the magnesium concentration alone.

Pregnant and heavily lactating females grazing on lush green fertilized grasses/ pastures and early wheat pastures are primarily affected by grass tetany. Environmental and transportation stress during puerperium and early lactation predisposes the condition.

Causes

- Dietary deficiency of Ca^+ & Mg^+
- Pasture growing on soils deficient in Ca^+ or Mg^+ or both
- High potassium and trans-aconitate content in the feed/pasture antagonizes magnesium and thereby its loss from the body
- High demand of pregnancy and lactation and various kinds of stresses
- Incidence is higher in spring & fall and less in summer

Signs & Symptoms

Signs & symptoms are similar to those of milk fever if hypocalcemia alone. Signs & Symptoms particular to hypomagnesaemia include;

- Trismus or locked jaw
- Hyperesthesia or oversensitivity to the environment or surroundings, animal is excitable and aggressive
- Tachycardia or increased heart beat
- Nystagmus or involuntary, jerky and repetitive movements of the eye ball
- Erect ears
- Tetany of the hind limbs
- Tremours and twitching of the muscles that may progress to general spasm & convulsions

Diagnosis

It depends upon the sign/symptoms and analyses of the feed & blood for Mg^+ concentration. Disease is more gradual than milk fever.

Prognosis: Prognosis is good if treated well in time.

Treatment

- In case of hypocalcaemia, slow intravenous injection of 750 – 1500 ml of calcium borogluconate. Preferably half dose should be given IV and very slowly within 15 – 20 minutes. For best results the remaining half dose should be injected subcutaneously. Injection can be repeated if necessary.
- Immediately remove from pasture.

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- Feed good quality alfalfa hay, mixture of bone meal, calcium diphosphate and luxury levels of magnesium oxide, magnesium sulphate or magnesium carbonate up to 60 – 120 grams daily.
- An injection of 200 – 500 ml of 10 – 25 % $MgSO_4$ solution subcutaneously.

☑ Tetany Or Eclampsia in Mare

Hypocalcaemia or reduction in the blood calcium level rarely occurs in mare. Heavily lactating mares grazing lush green pastures suffer from hypocalcaemia usually within several days after parturition. Stress due to unusual handling, transportation and change in the surroundings predisposes eclampsia in mares. Condition is similar to milk fever and grass tetany in cow.

Causes

Dietary deficiency, heavy demand of lactation and antagonism due to excess of K^+ are the root causes of hypocalcaemic tetany in mare.

Signs & Symptoms

Affected mares display the following sign & symptoms;

- Restlessness
- Rapid breathing
- Starring eyes
- Trembling, muscular twitching, trismus and colonic spasm
- Profuse sweating and cyanotic mucus membranes
- In advanced cases animals fail to stand
- Tetany of the most muscles, prostration, convulsions and death 12 – 48 hrs

Diagnosis

It depends upon the sign/symptoms and analyses of the feed & blood for Ca^+ concentration. It should be differentiated from tetany

Treatment

An injection of calcium gluconate or chloral hydrates or sodium pentobrbital

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☑ Puerperal Tetany, Eclampsia Or Hypocalcaemia In Dogs & Cats

Hypocalcaemia has been reported to occur in dogs mostly three weeks after parturition but can occur before, during and six weeks after parturition. Mostly small

and medium sized breeds are affected. Blood calcium level falls from a normal value of 9 – 12 mg/100ml to 5 – 7 mg/100ml.

Causes

- Dietary deficiency of Ca^{+}.
- High demand of pregnancy and lactation and various kinds of stresses.

Signs & Symptoms

These include;

- Rapid and laboured breathing
- Rapid pulse & elevated body temperature
- Dry mouth and scalara
- Congested mucus membranes
- Restlessness, nervousness and whining
- Stiffness of limbs, incoordination and staggering gait
- Champing, dilated pupils
- Colonic spasm and convulsions

Diagnosis

It depends upon the signs/symptoms and blood assay for calcium concentration.

Prognosis: Prognosis is good if treated well in time.

Treatment

- An injection of 10 % calcium gluconate @ 5 – 10 ml/head IV, IP or subcutaneously
- Injection of sodium pentobarbital. Relapse is common with calcium gluconate than sodium pentobarbital
- Pups should be weaned if old enough
- Prednisolone (5 mg) & hydrocortisone (25 mg) will prevent relapse

N.B: The disease is same in cat but rarely occur.

☑ Postparturient Haemoglobinuria

Haemoglobinuria is an abnormal condition in which hemoglobin is released into the urine following rupture of erythrocytes in the blood stream. It is an uncommon disease of high producing older dairy cows occurring mostly 2 – 4 weeks post calving. It is characterized by hemoglobinemia, hemoglobinuria and anemia.

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Causes

Major cause of the malady is reduction in the blood phosphorus level from a normal value of 4 – 6 mg/100ml to 0.5 – 1.5 mg/100ml. Turnips, rape, kale, beet pulp and cabbage are thought to cause this condition perhaps the said feeds are deficient in phosphorus.

Signs & Symptoms

These include the following;

- Anorexia, weakness, dehydration, pale mucus membranes & constipation.
- High pulse & respiration.
- In severe cases prostration & death occurs within 3 – 5 days. In mild cases animal may recover after several weeks.

Diagnosis

Diagnosis is based on sign/symptoms, time of occurrence of the disease and therapeutic response to phosphorus containing substances. Condition should be differentiated from leptospirosis & pyelonephritis.

Treatment

- Intravenous injection of phosphorus containing substances.
- Oral administration of monosodium phosphate, bone meal and dicalcium phosphate.
- Blood transfusion.

Puerperal Infections (Uterine Infections & Diseases)

☑ Retention of Placenta/Retention of Afterbirths

Retention of placenta is a condition in which placenta, following abortion or parturition fails to cast off. High producing dairy cows frequently suffer from retention of afterbirths. Normally placenta is shed within 3 – 8 hrs after parturition and if not shed within 12 hour postcalving the condition is termed as Retained Placenta. Actually maternal & fetal villi due to various reasons fail to separate. For placenta to cast off there must be certain degree of degeneration and necrosis of maternal crypts (craunclés) and fetal cotyledons failing which this condition results.

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Causes

Failure of separation of crauncles & codyledons is the actual cause of retention of placenta which is further occasioned by the following conditions;

- Heredity- condition is frequent in daughters of parents with more cases of RFM.
- Immature placentomes as in abortion the fetal-maternal villi are firmly attached.
- Hyperemia or increased blood supply to the placentomes.
- Presence of necrotic tissue/epithelium in the fetal and maternal crypts or placentomes.
- Failure of uterine contractions due to uterine inertia, lack of oxytocin, low carotene intake or deficiency of vitamin-A, lack of iodine and hypothyroidism causes this condition.
- Inflammatory conditions like endometritis, placentitis, cotyledonitis etc cause retention of fetal membranes.
- Deficiency of progesterone or excess of estrogens & other steroids (cortisol).
- Separation of calf immediately after calving causes this condition due to failure of oxytocin release from neurohypophysis.
- Incidence is more after the birth of male fetus or twins with male co-twin.
- Abortions or premature births are often followed by retention of placenta.
- Infections like brucilosis, tuberculosis, vibriosis, moulds like aspergilus & mucor. Other microbs such as streptococcus dysglactiae, E-coli, staphylococcus, psedomonos aeruginosa and cornybacterium pyogens frequently cause this condition.

Signs & Symptoms

These include the following;

- Placenta hanging down the vulva.
- Occasionally placenta is retained within the uterus or pelvic cavity.
- Usually 75 – 80 % cases don't show any marked illness but severe patients display the following additional symptoms;
  - Anorexia, depression, high temperature, high pulse, drop in milk yield & loss of body weight.
  - Severely infected cases may show straining, grunting, pains and paresis.
  - After 24 hours placenta begins to macerate and fetid and putrid order emanates from the decaying tissue. Blood stained mucopurulent vaginal discharge may follow the untreated severely infected cases.

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Diagnosis

Diagnosis is based on the signs/symptoms and general and specific examination of the animal. History of breeding, parturition and vaginal bleeding also suggest the likelihood of retained fetal membranes (RFM).

Prognosis

Prognosis is good if treated earlier else there is prospect of infertility or even sterility.

Treatment

If placenta is dragging on the ground it be cut up to the hock level. It is recommended to remove placenta within first 24 – 48 hrs otherwise it would undergo sepsis and removal would be difficult for the next 10 – 12 days. Anyhow, following treatment protocol should be followed;

Hormonal therapy

- Intramuscular injection of Stilbestrol @ 20 – 35 mg/head, esrtadiol @ 1 – 4 mg/head and ergonovine @ 1 – 3 mg/hed twice or thrice daily for few days.
- Steroid therapy should be followed by an injection of oxytocin provided cervix is open.

Manual removal of placenta

In case placenta fails to shed after hormonal therapy then manual attempts can be made to remove placenta. Robert is for manual removal while Arthur is against it. According to Arthur manual removal complicates the situation. How ever, before attempting to remove placenta manually the operator must be well dressed and prepared. He should wear gloves, sleeves, dangri & gumboots. The manual removal be carried out as described below;

- The animal should be under comfortable environmental conditions. Plenty of hot/cold water should be available.
- Perineum of the animal should be washed with antiseptic solution.
- For easy and effective operation epidural anesthesia should be used.
- Rectal and vaginal palpation should be performed. Any fetal bones should be taken out and fluid/pus should be siphoned off.
- Insert the hand into the vagina, gently drag the uterus backward and approach the attachment points or placentomes. Now gently massage and squeeze the placentomes and separate crauncles & cotyledons. If placenta doesn't readily detach, leave it and don't separate forcefully. Again visit after 2 – 3 days and make another attempt. Remove it if it is easily separable otherwise not and revisit and try again. Within few attempt it would be feasible to completely take placenta out.
- After removing placenta wash the inside if reproductive tract with antiseptic solution. Local antiseptics like charcoal, boric acid, acriflavin, bismuth

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subnitrate, bismuth formic iodide, chlorine preparations and dettol soap can be used to check infection.

- Broad spectrum parenteral antibiotics like penicillin, streptomycin, oxytetracyclin, sulphanilamide, sulphathiazol, sulphamerazine, sulphamethazene can be used to preclude any likely infections.
- In severe cases females should not be bred for the next 90 days to avoid infertility.

☑ Septic metritis after Parturition

This infectious disease occurs in all species usually 1 – 10 days postpartum and is characterized by fetid, red watery uterine discharge that is very toxic and depressing to the animal. Disease usually follows fetal emphysema, severe uterine torsion, prolonged dystocia and other conditions associated with uterine inertia. Disease may follow improper manual removal of placenta, fetotomy, prolapsed but contaminated uterus and other unsanitary conditions. Disease may extend from necrotic vaginitis. Disease should be treated earlier otherwise infertility or sterility will result. Course of the disease is usually 2 – 6 days which is followed either recovery or death.

Causes

Various microorganisms like coliform organisms, cornybacterium pyogen, hemolytic staphylococci, hemolytic streptococci, pseudomonas aeruginosa and rarely clostridia either severally or collectively occasion this disease.

Signs & Symptoms

Sign/symptoms are similar in all the species and include the following;

- There is anorexia, dullness, rapid pulse (80 -120 beats/min), elevated body temperature initially.
- In severe cases temperature may be normal or subnormal. Animal may show shivering, cold extremities, sunken eyes, rough skin and rapid loss of weight.
- There may be peritonitis, abdominal distension, moderate tympany, arched back, stiff gait, tense abdominal muscles and respiratory grunt due to peritonitis.
- In severe cases there is atony of GIT, drop in the milk yield or even agalactia. Faeces may be hard and black or oily fetid & liquid.
- Rough rectal palpation causes straining and pain.
- Animal also shows arthritic symptoms like swelling and stiffness of joints.
- Disease may be accompanied with acute laminitis and pneumonia.
- Ketosis may occur due toxemia.
- Pyemia, liver, lung and brain abscess may occur.

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Diagnosis

It is based on the sign/symptoms and general and specific examination of the patient. However, disease should be differentiated from traumatic gastritis, gastroenteritis, haemorrhagic septisemia, parturient paresis, laminitis that may cause paralysis.

Treatment

Treatment should be conservative. Fetal membranes should be removed carefully. If fluid or pus is present it should be siphoned off. Injection of penicillin @ 3000 – 6000 IU/Ib daily, streptomycin @ 5 mg/1000 Ib twice daily and sulfamethazene/ sulfamerazene @ 1 – 1.5 grams/Ib (IV, IP & Subcut) will cure the condition especially if treatment instituted earlier. Supportive therapy with saline, dextrose and blood will help improve the condition. After parturition or dystocia 2 – 4 mg estradiol and then 3 -5 ml oxytocin will prevent such complications.

☑ Postpuerperal Metritis

It is a chronic inflammatory condition of the uterus affecting all the species usually from 2 – 8 weeks after parturition or more. It is characterized by reddish brown or gray mucopurulent, fetid vulval discharge that later on turns creamy yellow. This chronic condition may persist for months. Following parturition 100 % of the animals have some degree of infection which is usually eliminated at first estrus unless other factors complicate the condition.

Causes

- Retained fetal membranes and forced separation of placenta.
- Dystocia.
- Unhygienic conditions usually during parturition.
- Bacterial, viral, fungal and other infections.

Signs & Symptoms

It usually occurs after retention of placenta. Condition is milder or resistance of the animal is higher. Symptoms include;

- Reddish brown or grey vaginal discharge.
- Rectal palpation reveals inflamed crauncles, large, thick & heavy uterus.
- Half to several gallons of pus/fluid may be present in the uterus.
- Gradual drop in the milk yield and body weight occurs.

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Diagnosis

It is based on the sign/symptoms and detailed examination of the patient.

Prognosis:

Prognosis is good. Animal may recover without any treatment but takes longer time delays conception. Neglected cases may develop pyometra and subsequent infertility.

Treatment

Treatment should be started as early as possible. The following guidelines b followed;

- Siphon off pus or exudates present in the uterus. If pus is thick then introduce enzyme streptodornase or pancreatic trypsin which will digest or dilute the pus.
- Gently douche the uterus with several gallons of hot (120 – 130 F^0) solution of chlorine, potassium prmegnate, Lysol etc.
- Local antibiotics in the form of suppositories should be placed after douching.
- Give injection of Stilbestrol @ 20 – 40 mg /animal or estradiol @ 2 – 4 mg/animal for 3 – 4 days. Avoid larger doses else cystic ovaries may result.
- In extremely complicated cases laprotomy or hysterectomy may be resorted to.

☑ Postpartum Metritis Syndrome

It is a sanitary problem especially of the large herd associated with confinement. It is characterized by inflammation of the uterus with yellowish pus discharge for months, delayed involution, lower rate of conception and increased calving interval usually from 13 – 17 months or so. Some cases develop persistent pyometra. Syndrome is a sanitary problem of barns, free stalls, exercise yard and especially calving stalls. All the females develop metritis and even all the calves suffer scours and dies unless preventive measures or early treatment adopted.

Causes

A large number of bacterial, viral, fungal and other microorganisms have been isolated from discharges. Ultimately cornybacterium pyogen becomes the dominant cause of the malady.

Signs & Symptoms

These include;

- It more often follows retained placenta or dystocia.
- It occurs as an outbreak.
- Yellowish discharges from the vulva.
- Calves develop scours& die.

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Diagnosis

It is based on sign/symptoms and prevalent unhygienic milieu.

Treatment

Treatment protocol includes the following;

- Immediately separate healthy animals from the affected ones.
- Transfer the animal to pasture or some open place and then treat according to the severity of the condition. In case of retained placenta, remove placenta and douche uterus with antiseptics. Local and general antibiotics will cure the condition. Affected calves be treated with antidiarrhoeals and antibiotics.

Prophylaxis:

As syndrome is a sanitary problem it can effectively be prevented through the following measures;

- Transfer pregnant cows to open place or pasture prior to parturition.
- Portable calving boxes (10 x 10 feet) away from housing sheds can ensure sanitary environment.
- Vaccination is helpful but sanitary environment is the best solution.

☑ Puerperal Laminitis

Inflammation of the Lamina of the hoof is called laminitis which does occur during puerperium mostly associated with inflammatory conditions of the reproductive tract. It occurs in cow, ewe, sow and mare. It mostly occurs following retained placenta and septic metritis. Condition is characterized by painful and hot hooves with increased pulsation in the hoof artery. Animals are reluctant to stand or walk. Treatment includes cold application (ice packs) to the affected hooves and primary treatment of the root causes (metritis & RFM). Antihistamines & antibiotics play key role in recovery.

☑ Puerperal Tetanus

Muscular spasm or tetanic contraction of the muscle occurs in all species mostly cow and mare. It usually occurs 1 – 4 weeks after parturition. During puerperium retention of placenta and utero-vaginal prolapse may occur. When animal is sitting, the retained placenta or prolapsed vagina may get soiled and if the environment contains spores or organisms of tetanus (clostridium tetany) the later may enter into the body and cause tetany. Unsanitary handling during dystocia or parturition causes tetanus. Tetanus antitoxin and vaccination against clostridium tetany cures this condition. Prognosis is poor.

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☑ Uterine Abscess

Collection of pus within the lumen of uterus is called pyometra whereas collection of pus within the wall of the uterus is called uterine abscess. Malady occurs in all species mostly cow & mare. It mostly follows retained fetal membranes, metritis & dystocia. Initially it is not visible and becomes evident with the passage of time. Rectal palpation reveals a big fluctuating mass in the wall of the uterus. Later on uterus distends down and becomes inaccessible. Treatment includes incision of the abscess and aspiration of the pus followed by irrigation with antiseptics and then local and parenteral antibiotic therapy. Future breeding is affected in most of the cases.

☑ Postpuerperal Cervicitis

Inflammation of the cervix is called cervicitis. It occurs in all species mostly after dystocia, traction and retention of placenta. Inflammation of the cervix is more likely to occur because of profuse blood supply to the cervix and vast surface area of the mucus membranes of the cervix. Infection of the uterus & vagina may extend to the cervix. Contaminated hands & gloves may spread infection. Treatment includes removal of the fluid followed by local and general antibiotic therapy.

☑ Postpuerperal Vaginitis & Vulvitis

Inflammation of vagina is called vaginitis while inflammation of vulva is called vulvitis. These inflammations occur during puerperium either alone or as an accompaniment with other conditions like metritis and retained fetal membranes. These are of the following two types;

- Necrotic Vaginitis and Vulvitis
- Catarrhal Vaginitis and Vulvitis

▣ Necrotic Vaginitis and Vulvitis

This inflammatory condition occurs in dairy and beef cattle with small pelvis or large fetus. Such animals suffer dystocia that leads to trauma, laceration and contusions of the birth canal particularly cervix, vagina and vulva. Condition is usually observed 1 – 4 days after parturition and last for 1 – 2 weeks depending upon the severity of the condition. Severe contusion and laceration may cause necrosis of the affected parts. It may sometimes result from douching the genital tract with irritant antiseptics.

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Causes

Stenotic birth canal and oversized fetus cause dystocia and thereby inflammation. Microorganisms may be the primary or secondary cause of vulvo-vaginitis.

Signs & Symptoms

These include the following;

- Anorexia, loss of weight, high pulse, moderately elevated temperature, arched back and elevated tail.
- Fetid, reddish watery fluid may be present in the vulva & vagina.
- There may be mild or severe straining during urination or defecation.
- Vulva and vagina are swollen due to perivulvar / perivaginal phlegmon.
- There may be wind sucking into the vagina.
- Parting of the vulval lips reveals necrotic, diphteric inflammation of vulvo-vagina.
- Inserting hands into the inflamed vagina causes bleeding and pain. In severe cases cervix & vagina may be distended with pus.

Diagnosis

It depends upon the sign/symptoms and thorough examination of the animal and reproductive tract. However, disease should be differentiated from retained fetal membranes, rabies and other straining conditions.

Prognosis

Prognosis is fair to good in milder cases provided treated earlier. In case of constant straining and extensive necrosis, animal gets debilitated. It may lead to death or at least stenosis of the birth canal that result in infertility.

Treatment

Following points should be adopted to cure the disease;

- First of all carefully remove all the fluid or pus present in the vulvo-vaginal cavity. In case of pain or straining give epidural anesthesia. Xylocaine, lidocaine or cobefrin are the local anesthetic of choice. For greater efficacy combine local anesthetics with adrenalin. Tranquilizers are helpful in preventing pain & tenesmus.
- Oily bland antiseptics containing 4 – 6 ounce of bismuth formic iodide and other broad spectrum antibiotics can be applied locally.
- Stilbestrol, estrogens and sulfonamides should be used till recovery.
- In milder cases ointments containing local anesthetics like butesin picrate or benzocaine should be used.
- In case of wind sucking the dorsal 2/3 of the vulva should be sutured.
- Pain and straining should be effectively controlled to avoid weight loss, early exhaustion or even death.

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- At next parturition manual dilation of the vulva is advised. In case of severe stenosis, artificial insemination & Cesarean section are recommended for next breeding.

Catarrhal Vaginitis and Vulvitis

This form of vulvo-vaginitis also occurs in dairy and beef cattle during puerperium and is characterized by persistent mucopurulent vaginal discharge for longer period of time. Affection usually follows retention of placenta, puerperal metritis and injuries to the vulva during dystocia. Treatment includes removal of fluids from the genital tract followed by douching with 200 ppm chlorine solution, potassium permagnate, Lysol and other broad spectrum local & general antibiotics. Stilbestrol and estrogens will help increase motility and early recovery. Treatment be repeated at 1 – 3 day interval.

Paraplegia of the Parturient Cow
or
"Downer Cow Syndrome"

Paraplegia is a syndrome like condition in which a cow becomes paralyzed and fails to rise, stand or walk due to multiple factors. Either legs or entire body of the cow gets paralyzed particularly during later part of gestation, calving or following parturition. Immediate and complete recovery is inevitable for future production and reproduction. A check-list of the probable causes of paraplegia is described below;

- Metabolic or nutritional diseases which include hypocalcaemia or milk fever, grass tetany, ketosis and other toxicity conditions cause paraplegia or paralysis of the cows.
- Extreme debility, cachexia or weakness due to starvation and parasites.
- Zanker's degeneration of muscles occurs due to deficiency of selenium, vitamin-A, poor quality hay and lack of exercise.
- Rupture of the gastrocnemius muscles occurs due to deficiency selenium. It causes complete or partial paralysis.
- Paralysis of the hips, thighs and lower legs results due to damage to the gluteal nerves, obturator nerve and peroneal/tibial nerves. Damage to the radial nerves causes paralysis of the front legs.
- Traumatic, physical injuries, fractures and dislocation of the hips result in partial or complete paralysis of the affected females.
- Inflammatory conditions like tendonitis, arthritis, muscle asthenia, ischemia, phlebitis, thrombosis & contusions result in some degree of paralysis of the legs.

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- Haemorrhage, anemia, shock, rupture of uterine vessels, laceration of genital tract, transportation in advance pregnancy and violence during foaling restrict animal movement either partially or completely.
- Infectious conditions like coccidiosis, anaplasmosis, leptospirosis, septic metritis, RFM, septic mastitis and septic arthritis paralyze the animal. Similarly shipping fever, blackleg, anthrax, necrobacilosis, rabies, listeriosis and meningitis severely affect the animals and cause paralysis. Other non-inflammatory conditions like peritonitis, pericarditis, traumatic gastritis, enteritis and acute laminitis cause partial or complete paralysis.
- Digestive disturbances like diarrohea, toxiaemia and poisoning with fern, sweet clover, locoweeds, broomstick and poisoning with urea, nitrates and other chemicals cause paralysis.
- Exhaustion due to dystocia and lack of exercise hinder female's ability to rise or move.
- Miscellaneous causes of paraplegia include dropsy of the fetus & fetal membranes, spastic syndrome, severe albuminuria & uremia.

Diagnosis

It depends upon the sign/symptoms, time of occurrence and therapeutic response to drugs or nutrients. Infectious diseases are accompanied with high temperature while hypocalcaemia, hypomagnesaemia and ketosis quickly respond to Ca^{+}, Mg^{+} & glucose respectively.

Treatment/Control

Following measure should be taken to avoid or treat paraplegia;

- Conditions should be treated severally and in accordance with the nature of the disease or prevalent condition.
- Balance diet with particular focus on hypocalcaemia, grass tetany and ketosis during gestation, at parturition and during puerperium will prevent paralysis owing to these conditions. Adequate level of vitamin-A, E & selenium will also help avoid paralysis.
- Non-slippery ground, ready assistance at dystocia and gentle handling will not only prevent fractures & dislocations but also lacerations and injuries during dystocia and subsequent inflammatory and infectious diseases.
- Treatment strategy should conform to the causative factors. Traumatic & infectious conditions be treated with broad spectrum antibiotics. Supportive therapy against anemia, exhaustion and weakness should include blood transfusion, normal saline, dextrose and multi-nutrient therapy.

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→ Balance Diet
→ Bs antibiotics
→ Supportive therapy

INFERTILITY

Infertility is one of the most important economic constraints in the business of livestock production & reproduction. Reduction in the breeding potential of an animal is called infertility whereas absolute inability to reproduce is called sterility. In other words, a cow is said to be infertile if she fails to yield a viable and healthy calf over a period of twelve months and a male/bull is said to be infertile if it fails to deposit or ejaculate enough number of normal fertile spermatozoa. Repeated or prolonged estrus, delayed conception, prolonged gestation, abortion, weak calves, high calf mortality, increased therapeutic cost on reproduction and delayed puberty are the landmarks of female infertility. Likewise disability to produce, deposit or ejaculate normal semen with enough number of fertile spermatozoa on the part of the male/bull is called male infertility.

A large number of factors can impair fertility both in males & females. Some of the factors are common to both the opposite sexes while others are peculiar to either male or female.

Female Infertility

Important factors causing female infertility are discussed below;

Infection

Infectious causes of infertility are common to both male & female. These include the following;

☑ Trichomoniasis

Trichmoniasis is a venereal and zoonotic disease affecting both males and females. It is caused by a flagellate protozoan parasite called trichomonas. Different strains of trichomonas affect different species. For example trichomonas fetus and T. vaginalis affect cattle while trichomonas suis affects pigs. Primary indication of trichomoniasis is early abortion usually 1 – 16 weeks of gestation. Spread occurs through contamination of food & environment and through coitus.

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Cause

Various strains of trichomonas cause infection in different host species. In cattle trichomonas fetus & T.vaginalis occasion infection.

Signs & Symptoms

The only reliable sign is repeated early abortion. Recurrent estrus should carefully be inquired into to explore the eventual cause.

Diagnosis

It is based on sign/symptoms and concurrent microscopic examination of vaginal, fetal & preputual fluids/secretions for trichomonas.

Prognosis

Prognosis is fair to good depending upon treatment and effective control of the disease.

Treatment/Control

Best way to control trichomoniasis is to stop natural service and use infection free semen in artificial insemination. Few months' sexual rest eliminates infection in cows and therefore treatment is not necessary. However, much heed should be paid to the bull as it is 50 % of the herd. For quicker recovery, the following lines of treatment can be adopted;

- Apply bovoflavin (trypaflavin – a protozocidal element) ointment to the penis & prepuce of the infected bull.
- Intravenous injection of sodium iodide.
- Apply hydrogen peroxide locally to the prepuce.
- Wash the prepuce with trichomonicidials like sodium perborate, 1 % lugol solution & sodium hypochloride.
- Chronically and severely affected bulls should be discarded.

☑ Vibriosis

Vibriosis is a venereal and zoonotic disease of all the animal species. Buffalos and cattle especially dairy breeds are affected by vibriosis. This disease is characterized by infertility in the form of abortion mostly from 4 – 7 months and increased number of services per conception. Occasionally early embryonic death may occur. It causes undulating fever, placental infection and abortion in humans.

Cause

Vibriosis is caused by bacteria called vibriofetus. It is a gram negative motile or immotile, short comma shaped, rods or double spiral or fillamentus bacteria. It grows slowly and scantily on most laboratory media but proliferates extensively in the reproductive tracts of both males & females. Vibriofetus venerealis invades the uterus seven days following natural service. It remains there for 13 months and is eliminated.

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Signs & Symptoms

- Sometimes infection fails to establish either due to increased resistance of the host or lesser number of pathogens invading the reproductive tract.
- Early embryonic death occurs but pregnancy continues for 3 – 8 months.
- There may be endometritis & salphingitis.
- Fertilization or conception fails to occur for 2 – 6 months to sometimes 12 months.
- Prolonged estrus cycle usually from 27 – 53 day (cow) & 25 - 60 to 100 days (mare) following first service to infected bull.
- Abortion mostly occurring from 4 – 7 months.
- Loss of libido in affected bulls.

Diagnosis

It is based on the following points;

- History and breeding record of the affected animals.
- Thorough examination of the cow & bull including agglutination tests on vaginal mucus and smegma. This is not a systemic disease so antibodies are only present in the vaginal/cervical mucus, smegma & fetal fluids and not in the blood.
- Culture of the vaginal mucus, smegma, semen & tissues of aborted fetus for the isolation of pathogen.
- Breed a bull to 2 or more virgin heifers and collect vaginal mucus for culture after 15 – 30 days.
- Differentiate between Vibriofetus venerealis & Vibriofetus intestinalis. V.intestinalis is the common cause of abortion in sheep and causes sporadic abortion in cattle. V.intestinalis rarely causes infertility in cattle.

Prognosis

Prognosis is usually favorable as infertility is temporary and after 3 – 6 months most of the infected cows develop immunity and conceive. Most cows conceive after sexual rest. In young bulls infection is transient and disappears when removed from service.

Treatment/Control

Following lines of treatment should be adopted;

- Genital contact between the infected & non-infected animals should be prevented and artificial insemination be adopted instead of natural breeding. A.I should be continued for 2 – 3 years to have better results.
- Add streptomycin or penicillin to the semen to kill the pathogens.

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- Vaccination with Vibrin, Bo-Vibrio & Trivib can protect the animals. Annual single dose about 30 – 120 days prior to breeding season is effective.
- Intrauterine infusion of 1 gm of streptomycin or penicillin in aqueous oily base is very effective is given within 24 hours after service.
- Young bulls under five years of age are affected transiently and recover soon if removed from service. However, mature bulls usually over five years of age never develop immunity and if recovered are re-infected. Such bulls be discarded.

☑ Brucellosis (contagious/infectious abortion or bangs disease)

Brucellosis, the dominant cause of worldwide cattle abortion is a venereal and zoonotic disease of live stock. It is characterized by abortion mostly from the 6^{th} – 9^{th} month of pregnancy in cattle. It is one of the major causes of bovine infertility and economic loss. Spread occurs through the ingestion of contaminated material as well as through coitus and artificial insemination. Humans contract infection through the ingestion of contaminated milk as well as touch with the contaminated material like vaginal secretions. It causes undulating fever in humans.

Cause

Etiological agent of this disease is a small, immotile, gram negative, rod shaped, intracellular bacteria called "Brucella". Its different strains cause brucellosis in different animals like B.abortus, B.canis and B.suis infect cattle, dog & swine respectively. The pathogen can easily be destroyed by disinfectants, desiccation, sunlight, putrefaction and pasteurization. Cold and moist environment favours the pathogen.

Signs & Symptoms

The cardinal symptom of brucellosis is abortion from 6 – 9 month or third trimester of pregnancy. The abortion is preceded by swelling of the udder, vulva and other signs of natural parturition. Fetal membranes are edematous, hemorrhagic, leathery & necrotic. Retention of placenta, metritis and infertility are the consequences.

Diagnosis

Effective diagnosis is based on the following;

- Signs and symptoms.
- History of the herd for previous brucellosis.
- Culture and isolation of the organism from fetal lungs, stomach, placenta & other fluids. Culture of semen and milk is also valuable for ascertaining the

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cause. Serological tests, heat inactivation and complement fixation are recent advances in the diagnosis.

Treatment/Control

Antiseptics and antibiotics though effective provide temporary relief. Spread of the disease be prevented through the use of infection free bull & semen and the effective and timely disposal of the infected materials. The infected fetus and belongings should either be incinerated or buried deep in the soil to avoid contamination of the environment. Reliable control can be achieved through sanitation, vaccination of the calves and testing and disposal of the reactors/carriers.

☑ Granular Venereal Disease

(Nodular Venereal Disease, Infectious Vaginitis & Vulvitis)

It is disease of the reproductive tract of both males and females characterized by appearance of papules & pustules in the vulva, prepuce and on the penis. In males the term vulvitis is not befitting and balano-posthitis is more appropriate. Condition generally doesn't cause serious damage unless severely complicated and extended to the other parts of the reproductive tract.

Cause

The exact cause of the malady is not known. Some presume it to be bacterial, other think it to be viral while others are of the view that it is reaction of mucosa to the irritant chemicals.

Signs & Symptoms

Presence of small pustules in the undersides of vulval lips mostly around the clitoris in females and in the preputual cavity & on the penis in males.

Diagnosis

It is based on the sign/symptoms and previous history of the herds.

Treatment/Control

There is no specific treatment. Application of local antibiotics like penicillin, streptomycin, sulfonamides and parenteral antibiotics along with good nursing and management is recommended. Artificial insemination and sexual rest helps to eradicate the disease.

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☑ Infectious Pustular Vulvo-vaginitis (IBR-IPV)

(Vesicular Venereal Disease, Genital Cowpox)

It is a viral disease characterized by the appearance of pustules and vesicles in the vulva, prepuce and on the penis. It also affects the respiratory system which usually occasions abortion. The disease is caused by herpes virus and mostly occurs as an outbreak. Heifers are usually affected and spread occurs through touch, contaminated genital discharges, inseminators and bulls. Treatment includes good hygiene, sanitation and sexual rest. IBR-IPV vaccine gives effective control. Severe cases don't permit treatment. Local & general antibiotics check secondarily bacterial invasion.

☑ Specific Bovine Venereal Epididymitis & Vaginitis "Epivag"

It is a chronic viral disease of cattle characterized by severe mucopurulent vaginal discharge, permanent adhesion of fallopian tubes and hardening & swelling of epididymis in bull. Disease is transmitted through coitus.

Cause

Causative agent is a virus similar to IBR-IPV.

Signs & Symptoms

These include the following;

- Incubation period is 2 – 8 days.
- During active stage there is egg-white, opaque or yellow vaginal discharge.
- On examination, inside of the vulva & vagina reveals diffusely reddened areas but there are no ulcers, vesicles & granular lesions.
- In males, there is balano-posthitis, enlargement & hardening of epididymis mostly the tail.
- Seminal vesicles may get enlarged.
- Adhesion between scrotum & epididymis.
- Testicular degeneration & atrophy may occur.

Diagnosis

Diagnosis depends upon the sign & symptoms. Diagnosis in the herd is easy as compared to individuals. Herds may recover but 15 – 25 % individuals permanently become sterile due to adhesions.

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Treatment/Control

There is no cure for viral affections but effective prevention is quite easy through artificial insemination. Local treatment with antibiotics to avoid bacterial invasion and vaccination to avoid this viral infection is prerequisite.

Hormonal Causes/Disturbances

Hormonal disturbances causing infertility/sterility are secondary to the basic nutritional, hereditary & other stress inducing factors. Actual cause is the deficiency of leutinizing hormone (LH) that may be real or an apparent deficiency. Ingestion or injection of various steroids causes hormonal disturbances. Hormonal disturbances are manifested in the form of cystic ovaries, failure of estrum (anestrum), failure of ovulation & fertilization, multiple ovulations and repeat breeders.

☑ Cystic Ovaries

Cystic ovaries are primarily a problem of high producing dairy cows like Holstein, Guernsey, Sahiwal & Red Sindhi breeds. Incidence is much higher in stabled and closely confined breeds of all ages from puberty to senility with peak occurrence from $2^{nd} - 5^{th}$ parturition.

Ovaries are said to be cystic when they contain one or more fluid filled structures with the size larger than 2.5 cm and persist for longer than ten days. Cysts are of the following two types;

Follicular cysts: Cysts are said to be follicular cysts when they retain granulosa cells and secrete estrogens. Animals show recurrent heat and are nymphomaniac.

Luteal cysts: Cysts are said to be luteal cysts when they contain only lutein tissue and secrete less or more progesterone. Animals are anestrus.

Etiology

Causative factors that contribute to cystic ovary formation comprehend;

- Heredity/breeds
- Lack of exercise
- Incidence is higher in winter
- High protein diet
- High milk yield
- Ingestion/injection of estrogen, androgens & other steroids
- Alfalfa hay, sweet clover & mouldy ration may cause this condition. When incidence is higher than 30 % and heredity is ruled out, the dietary involvement should be suspected.

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- All of the above factors affect LH availability to the mature follicle that later on turns into cyst.

Signs & Symptoms

It occurs in non-pregnant females usually from 15 – 45 days postpartum. Cows with follicular cysts display the following symptoms;

- Affected cows repeatedly come into heat.
- Some constantly remain in heat and are called nymphomaniac.
- Nymphomaniac cows mount on the other cows frequently and are therefore called "Bullers".
- All the ligaments, particularly the sacrosciatic ligament relax. Head of the tail looks elevated due to sinking down of the surrounding muscles. This elevated tail head is called "sterility hump".
- Females with follicular cysts lose weight as they are under stress, mount on other females and remain off feed.
- They may suffer dislocation of hip and fractures.
- Genital organs are edematous and atonic. Vulva is swollen and vaginal prolapse may occur.
- Secrete mucus that is tougher than normal estrus. External Os of cervix remains dilated, sometimes may be 5 – 6 inches large.
- Hydrometra & mucometra may develop in longstanding cystic conditions.

Cow with luteal cysts don't come into heat and are characterized as "anestrus'.

Diagnosis

It depends upon the sign and symptoms.

Prognosis

Earlier the diagnosis & treatment better will be the prognosis.

Treatment/Control

The following treatment protocol should be adopted to cure the condition;

- Cysts can be removed manually but extreme care & expertise is prerequisite. Several attempts may be required to rupture the cyst.
- Injection of chorionic gonadotropic hormone @ 5000 & 10000 IU (IM) can remove the cyst. It rarely causes anaphylactic shock that is usually not fatal.
- Vetrophin, a sheep pituitary extract is also effective to break cyst.
- In a study, 67 % cows conceived after an injection of 750 – 1500 mg of repositol progesterone.
- FSH & PMSG bring no satisfactory result.

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☑ Failure of Ovulation / Delayed Ovulation

It is the minor cause of infertility and accounts nearly less than 3 %. It is characterized by either failure or delay in the release of ovum due to apparent or actual deficiency of leutinizing hormone. Either the pituitary doesn't release LH or the target tissue (Graafian follicle) lacks LH receptors. In either situation the rupture of preovulatory follicle doesn't happen in due time. Female is bred/inseminated based on its estrus behavior. However, conception doesn't occur and the spermatozoa die much before an ovum release. Occasionally owing to earlier breeding/insemination fertilization does not occur and condition is spoken of as delayed ovulation. Breeding/insemination in the 2nd half of the estrus is desirable. Poor nutrition or imbalance diet contributes to delayed ovulation.

Condition can be diagnosed by palpating the mature follicle on the ovary usually 24 – 48 hrs post-estrus. An injection of Estrogens & Stilbestrol facilitates ovulation.

☑ Infertility due to Multiple Ovulations

Multiple ovulations refer to the release of more than one ovum in monotocuous/ uniparous species like cow & mare. Too excess of FSH causes growth & development of the many follicles and ultimately ovulation. Conception rate associated with single ovulation is 57.5 % while it is 6 % with multiple ovulations. Multiple ovulations are associated with faulty or defective ova that are either not fertilized or if fertilized the zygote or embryo suffers death. Multiple ovulations can be detected through rectal palpation of the ovaries. Presence of more than one corpus lutea with single birth is an indication of multiple ovulations.

☑ Failure of Estrus/Anestrum

Anestrum is a condition in which females fail to come into heat. This behavioral manifestation is the most common single cause of infertility and the principal symptom of many conditions that affect estrus cycle. It can be pre-service, post-service and postpartum anestrum. In heifers, anestrum is a herd problem particularly when nutrition is imbalance or faulty. All the anestrus females can be generally categorized into two classes which include;

- Class-I Anestrus Cows
- Class-II Anestrus Cows

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Class-I Anestrus Cows

These are the anestrus cows that have functional corpus luteum and don't come into heat. The following conditions may be associated with anestrum caused by functional corpus luteum;

Anestrum due to pregnancy

Female is actually pregnant but the owner's breeding record is incorrect. He assumes females to be non-pregnant. Rectal palpation should be performed to check whether the female is pregnant or not. Abortifacient should never be administered prior to rectal palpation and confirmation as non-pregnant. If genital tract feels healthy & normal then wait for six weeks by which time pregnancy diagnosis is comparably easier.

Anestrum due to pathological conditions/uterine gross pathology

This type of anestrum is associated with pyometra, mucometra, mummification & maceration. Zygote, embryo or fetus meets death but corpus luteum persists and leads to the aforesaid pathological conditions. $PGF_{2\alpha}$ secretion doesn't occur, CL persists & anestrum results.

Anestrum due to early embryonic death & abortion

Embryonic death before the mid estrus cycle is usually followed by absorption or abortion and then next estrus cycle. However, death after the mid estrus is occasionally followed by retained CL & anestrum. Death of the embryo up to 90 – 120 days may be followed by abortion and persistent CL. Embryo is small and goes unnoticed. Trichomoniasis, vibriosis and trauma to the uterus or embryo by faulty handling are the usual causes of early embryonic deaths.

Diagnosis

Complete history, breeding records, thorough general and specific examination of the genital tract is required to identify the exact cause of anestrum. Palpation of the ovary is perquisite to detect retained corpus luteum.

Treatment/Control

After the functional CL has been confirmed, an injection of 40 – 100 mg of Stilbestrol and 4 – 10 mg of estradiol can help dissolve CL and regulate estrus cycle. Treatment can be repeated within 2 – 4 days if necessary. Manual removal of CL with much care can also be practiced.

Class-II Anestrus Cows

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Anestrus cows of this category don't have functional corpus luteum. They are thought to be anestrus by virtue of the following conditions;

Apparent anestrum or failure of estrum

Apparent anestrum is a misnomer because females come into heat but most of them don't show heat symptoms, have weak or subestrum or the normal estrus goes

unnoticed. Cows in advanced age, arthritis, foot rot and other painful diseases don't show heat symptoms. Weakest estrum or totally silent estrum is the usual feature of buffaloes. Normal estrus may go unobserved due to various reasons. When livestock are turned out for grazing and when they are not carefully watched for heat on daily basis, the normal and even strong estrus goes unnoticed. The other contributing factor is the short estrus duration (8 – 12 hrs & instead of 18 hrs) particularly in tropical livestock. The zebu breeds have usual estrus duration of 12 – 13 hrs with the most predominant duration of about 5 – 8 hours. Under such circumstances due to many reasons the estrus goes unnoticed.

Small or inactive Ovaries

Certain females have poorly developed ovaries due to which either they don't come into heat or there is silent or subnormal heat. There occurs problem with folliculogenesis and ovulation. Uterus retains its tone as opposed to true anestrum due to functional CL. Presence of blood in the mucus indicates previous ovulation.

Anestrum due to debility or marked loss of weight

The following points may be concerned with the weakness and anestrum;

- Low plane of nutrition including deficiency of carbohydrates, proteins & lipids results in debility & subsequent anestrum. Improper management aggravates the situation.
- Ecto & Endo parasites, chronically debilitating diseases like tuberculosis, lymphocytoma, chronic acetonemia, displaced abomasums, and chronic traumatic gastritis cause gradual debility and associated anestrum.
- Senility, loss of teeth, inclement weather (temperature, sunlight, humidity) conditions and lack of exercise do contribute to the debility and resultant anestrum.

Miscellaneous factors

Cystic ovaries (luteal cysts), delayed ovulation, freemartinism, unilateral or bilateral aplasia or hypoplasia of the tubular reproductive tract may occasion anestrum in one or the other way.

Treatment/Control

Every condition be treated accordingly. It means estrus detection should be effect, debility be overcome and diseases should be treated accordingly. Animals with severe developmental defects should be discarded.

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Nutritional Causes of Anestrum

Infertility or sterility due to nutritional factors is usually characterized by failure of estrum or cessation of estrus cycle, failure of conception and early embryonic death. Very few of the nutrients directly or specifically affect fertility unless there is extreme starvation and inanition. Obesity also affects the estrum or fertility. Symptoms of deficiency or toxicity differ in different species. The following account explains the role of nutrition in infertility;

Deficiency of proteins, carbohydrates & lipids

Severe deficiency of the three major organic components causes overall weakness or debility which delays puberty and upsets ovarian cyclicity. Excess of lipids causes obesity and hinder ovulation.

Deficiency of Vitamins

Of nutritional factors, vitamin-A is the principal cause of infertility in livestock. Its deficiency occasions keratinization of the endometrium which disrupts placentomes, crauncles and endometrial glands. As a result $PGF_{2\alpha}$ is not formed which affects cyclicity, fetal implantation and nutritional requirements are affected which cause fetal death and abortion. Deficiency of vitamin-A in the form of lack of green feed is displayed as night blindness, lacrimation, anorexia, diarrohea, abortion and stillbirths. Vitamin E & D are thought to have some role in infertility. Vitamin B-complex deficiency in non-ruminants affects general health and thereby estrus cycle. B-complex deficiency is not the problem in polygastrics.

Deficiency of Minerals

Amongst minerals, phosphorus & trace elements especially manganese (Mn), cobalt (Co), copper (Cu), iron (Fe) & iodine (I) influence fertility. Phosphorus deficiency occurs when there is deficiency of proteins, grasses and fodders are dead & dry and soil is deficient in phosphorus. Symptoms of "P" deficiency include silent & irregular heat, failure of estrum, delayed puberty, stillbirths but no abortions. Oral supply of 10 – 12 gm is recommended. Manganese is needed for oxidative reactions in the cells. Cobalt, iron & copper are required for RBCs & bacterial growth in the rumen. Lack of iodine causes premature births and birth of weak and dead calves. Mineral supplements at recommended levels help prevent mineral deficiencies but excess should be avoided.

Hereditary & Congenital Causes (defects) of Infertility

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Hereditary or genetic causes (defects) of infertility/sterility are due to defects in the chromatin material or genes whereas congenital anomalies affecting fertility are not

due to genes but a large number of other factors including infections, hormones, radiations, environmental stress and other diseases induce abnormalities during antenatal development that either cause infertility or even sterility. A list of hereditary and congenital factors that induce infertility/sterility is discussed below.

Aplasia of gonads

It is a condition in which primary sex organs (testes & ovaries) are missing. It can be unilateral or bilateral. Animals are infertile when affected unilaterally but permanently sterile when affected bilaterally. The situation can be both genetic and congenital.

Hypoplasia of gonads & tubular genital tract

Hypoplasia refers to the improper or underdevelopment of an organ. If primary sex organs & other tubular tract are underdeveloped the animal will either be infertile or sterile depending upon the severity of the condition. The animal is usually sterile when the reproductive tract of an adult animal is juvenile.

Developmental defects in the tubular portion

There can be so many defects in different segments of the tubular genitalia. Theses include missing parts of the oviduct, uterus & vagina, uterus didlphys, double uteri, cervix; double Os of cervix, a band in the cervix, lack of cervical rings, persistent Mullerian ducts, imperforate hymen, lack of endometrial glands, hermaphrodites etc.

Repeat Breeder Cow

Repeat breeding is the most evident manifestation of infertility that demands prompt attention to render livestock farming profitable. A repeat breeder cow is one which has normal or nearly normal estrus cycles, normal estrus periods and has been bred two or more times to a fertile bull yet failed to conceive. The clinical examination of the animal fails to reveal any definite cause or lesions to explain the failure of conception.

Based on etiological factors repeat breeding is of the following two types;

- Repeat breeding due to failure of fertilization
- Repeat breeding due to early embryonic death

Repeat breeding due to failure of fertilization

Failure of fertilization in normally cycling females can be occasioned by a variety of factors. These factors are briefed as under;

- Genetic and congenital/acquired structural defects

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If any part of the oviduct, uterus and vagina is absent or poorly developed that doesn't ensure timely transport of the gametes or has environment that is non conducive for gametes, fertilization does not occur and female repeats breeding.

- Delayed ovulation
  Delayed ovulation, earlier breeding or insemination prevents encounter of ovum & spermatozoa and hence fertilization.
- Multiple ovulations
  Multiple ovulations with abnormal ova may also lead to failure of fertilization.
- Defects of Gametes
  Defects of ovum & sperm whether genetic or acquired result in failure of fertilization.
- Handling of Semen
  Improper handling of semen like thawing, storage, extension etc damages the semen and prevents fertilization.

Failure of fertilization in either of the above cases results in recurrent estrus cycle.

Repeat breeding due to early embryonic death

Early embryonic death usually before the mid of an estrus cycle results in re-cycling of the female. A variety of causative factors occasion the death of zygote or early embryo. Some of the these etiological agents are being described as under;

- Pathological causes of embryonic death
  Inflammation of the reproductive, pyometra, mucometra, uterine abscess and several other conditions may cause death of the zygote/embryo and subsequent estrus.
- Manual damage to the zygote/embryo
  Rough and careless palpation of the genital tract may lead to early embryonic death and recurrent heat.
- Infection of the genital tract
  Persistent infections due to trichomonas fetus, vibrofetus, brucella, E.coli, cornybacterium pyogen, pseudomonas aeruginosa etc render the uterine environment hostile to zygote/embryo. Zygote or embryo cannot survive in such a diseased milieu and dies.
- Heredity
  Chromosome translocation in Swedish Red & White breed produced heterozygous individuals. Daughters of Sires which were heterozygous for translocation had higher incidence of early embryonic deaths and recurrent estrus.
- Endocrine dysfunction

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Lack of progesterone, LH & endometrial glands or excess of estrogens causes early embryonic death followed by estrus.

- **Nutrition**
  Deficiency of vitamin-A particularly causes embryonic death and next estrus. Extreme imbalance of carbohydrates, proteins, lipids, vitamins and minerals also disrupts the entire metabolism and embryonic death or abortion.
- **Environmental stress**
  Environmental stress in the form of heat, cold and transportation may also induce death or abortion and subsequent estrus.
- **Toxic chemicals and plants**
  Ingestion of toxic chemicals like urea, nitrates & pesticides and toxic plants like fern, clover, locoweeds, broomwood and mouldy feeds cause several health problems including abortion and embryonic death which is followed by estrus cycle.

Treatment/Control

Diagnosis and treatment of the repeat breeder cow is very difficult. Thorough knowledge of the physiology and pathology of the reproductive tract is imperative on the part of the veterinarian. There is no one way solution to this problem. Treatment should be according to the nature of the cause. Some of the problem/abnormalities are curable while the others are incurable but diagnosis of the exact cause is difficult. Best hygiene, management, balance diet, vaccination and artificial insemination can help cure repeat breeder females provided there is no structural defect in the genital tract.

Male Infertility

Male is 50 % of the herd and therefore should be ideally fertile to have maximum reproductive performance from the females. A male is said to be infertile when its sexual proclivity is reduced, it ejaculates semen with lesser number of spermatozoa or if spermatozoa are abnormal. Inability to breed naturally on the part of the male is also infertility. A male is said to be sterile if it doesn't produce enough number of normal spermatozoa or if semen with normal spermatozoa cannot be obtained from it through any possible means.

Reproductive or sexual health of the males can be maintained comparably easier than the females because male genital organs can be palpated or examined easily. Similarly, quality & quantity of semen can also be assessed and fertility status judged. Male fertility can well be secured through proper care and management but if any part or organ of the male reproductive system is severely impaired it cannot be

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restored to its ideal functional state. About 36 – 48 % of the breeding bulls are slaughtered annually.

Infertility in males can generally be categorized into two major groups which are explained below.

Reduced to complete lack of sexual desire or ability to copulate (Impotentia Coeundi)

Males suffering from this type of infertility produce normal semen but cannot deposit it in the female reproductive tract due to reduced sexual urge or several other defects. A detail of the factors is given below.

Frequency of Service

Increasing or decreasing the number of services affects male fertility. One ejaculation or service per week gives maximum results. When number of ejaculations increases, the quality and quantity of semen deteriorates and fertility decreases. No ejaculation or service per week is also a form of infertility.

Masturbation/Onanism

Self stimulation is one of the vices that affect fertility in nearly all species.

Viciousness

Closely confined or ill treated males do not perform well and their ability to make a female pregnant falls.

Slowness in breeding

Males that have not been adequately trained or stimulated prior to ejaculation or ones that have encountered any painful accident (like high temperature) during sexual act perform slowly which is infertility.

Nutrition

A low plane of nutrition causes weakness and thereby reduces their sexual desire whereas too high plane of nutrition causes obesity that affects their movements.

Age

Too young or too old males cannot perform optimally. Young males don't have fully functional reproductive apparatus whereas old or senile males have atrophied sex organs with poor musculature that affects sexual performance.

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Structural soundness

General health and structural soundness are the important aspects of fertility. Poor health can affect libido, mating ability and semen production and quality. Bulls should

have functional legs, joints & hips so that they may thrust properly. Extremely straight rear legs hinder thrusting and appropriate deposition of the semen. Adequate angulation of the legs is prerequisite for good performance on the part of the bull.

Scrotal circumference

Appropriate size of the testes is important for semen production. Larger the testicular size more would be the sperm forming tissue and vice versa. Measurement of the scrotal circumference should be the routine farm operation to have maximum fertility.

Psychic factors

Males that experience sexual activities in their surroundings develop better psychological, physiological and structural apparatus than those which don't.

Breed/Heredity

Some breeds have more potential to breed and yield best quality semen than others under the same environmental conditions.

Coital injuries of the male animals

These include the following;

- Penis may get injured during mating due to hot artificial vagina, kicking at the penis and breaking of penis while thrusting.
- Fractures of the legs and hip dislocation render the male unfit for mating that's infertility.

Inflammation of the reproductive organs

Inflammation of the reproductive organs lowers libido and therefore fertility is reduced. A variety of factors like infections, irritant chemicals, hot water in the artificial vagina and inflammation of prepuce (posthitis) & penis (balanitis) caused by smegma lays stress on the male animals and distract them mentally, affecting fertility.

Infection

Infections like vibriosis, trichomoniasis, brucellosis and others impose stress on the males and bring about varied degrees of infertility.

Abnormalities / problems of the penis

These include the following;

- Some males cannot protrude penises (phemosis) due to narrowing/constriction of the prepuce due various reasons.
- Some males cannot withdraw penises (paraphemosis) due to widening of the prepuce and malfunctioning of the retractor penis muscles.
- A penis may abnormally be attached to the prepuce by a fibrous ring called "frenulum".

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- Penis may be spirally, ventrally or laterally deviated which fails to deposit or ejaculate semen.
- Diphalus or double penises may be present that hinder copulation.
- Tumors, adhesion of penis in the sigmoid flexure, abscess of penis and chronic prolapse of prepuce disturbs male breeding and fertility.

Miscellaneous causes of male infertility

Hernia (inguinal, ventral, umbilical & scrotal), premature erection, loss of sensory innervation of the glans penis, hypoplasia of testes, torsion of testes, inbreeding and urinary calculi affect normal male breeding in one or the other way.

Inability/reduced ability to fertilize due to pathology of testes (Impotentia Generandi)

In this category of male infertility fault lies with the production of semen. Testes of the affected males produce semen which bears one or more of the following abnormalities.

- Semen may totally lack spermatozoa a condition called azoospermia.
- Semen may have reduced number of spermatozoa a condition called oligospermia.
- Spermatozoa may bear numerous structural defects like taillesness, double tails, spiral or coiled tail, corked screw tail, no heads, double heads, large or small heads, lack of hydrolyzing enzymes in the acrosome, no motility or an abnormal motility and chromosomal abnormalities that lead to embryonic deaths. All these male germ cell defects are responsible for either failure of fertilization or an early embryonic death. These male infertility problems are mostly reflected as female infertility. However, thorough probe into the mater will reveal the actual cause.

The aforesaid semen abnormalities may be caused by inflammatory & infectious processes in the testes or other parts of male genital tract or there may be genetic background behind these germ cell abnormalities like gene translocation, monosomy, trisomy, polyploidy, polyspermy and deletion.

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Terminology

Obstetrics: It is branch of surgery dealing with the care and management of females particularly during gestation, parturition and puerperium (post partum period).

Gynecology: It is the study of the diseases of female reproductive system including genetic and congenital anomalies that may be structural or functional. It also encompasses various maladies of infectious and non-infectious origin.

Embryo: An organism during its earliest phases of development from fertilization till the species become recognizable is called embryo.

Hereditary & congenital: Hereditary traits/ defects are those that are due to the involvement of chromatin material / genes while congenital features/defects are those that are due to factors other than the genes or chromatin material but occur antenatally. Non-genetic changes occurring postnatally are called acquired traits/defects.

Non-disjunction: A chromosomal abnormality in which chromosomes fail to normally segregate during meosis.

Translocation: A chromosomal abnormality in which any gene or tiny part of the chromosomes detaches from the major portion and relocate on the other chromosome or at different locus on the same chromosome.

Deletion: A chromosomal abnormality in which any gene or tiny part of the chromosomes detaches from the parent chromosome and get lost leaving deficit of the corresponding traits/genes.

Abortion: An expulsion of the non-viable fetus at any stage of gestation or dead fetus up to the stage at which fetus if born cannot survive.

Premature birth: Birth of the calf beyond 235 days of gestation up to the completion of gestation is called premature birth.

Stillbirth: Birth of the dead fetus at the completion of the gestation period is called stillbirth.

Corpus luteum: A mature functional tissue/structure formed at the point of rupture of graaffian follicle and which secretes progesterone to keep pregnancy is called CL.

Corpus hemorrhagicum: A newly formed immature corpus luteum that looks like blood stain and is later on transformed into functional CL is called corpus hemorrhagicum.

Corpus albican: A regressing corpus luteum usually from 16th day of estrus cycle (in cow) and onward in case conception didn't occur.

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Venereal Disease: A disease that spreads via sex or infected semen is called venereal disease like vibriosis, trichomoniasis etc.