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Major reproductive disorders in sheep and goats and its management

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ABSTRACTS

Reproductive disorders are among the most important factors limiting productivity and profitability in sheep and goat production systems. These disorders arise from infectious, nutritional, endocrine, genetic, and management-related causes and may affect females, males, or neonates at different stages of the reproductive cycle. Major conditions such as anestrus, early embryonic mortality, abortion, dystocia, pregnancy toxaemia, postpartum uterine infections, neonatal losses, and male infertility contribute to significant reproductive wastage. Effective control requires accurate diagnosis, appropriate treatment, and, most importantly, herd-level preventive management. This chapter provides a comprehensive, disease-wise overview of major reproductive disorders in sheep and goats, emphasizing their clinical features, diagnosis, treatment, and preventive strategies for improving reproductive efficiency.

Keywords: Sheep; Goats; Reproductive disorders; Fertility; Abortion; Dystocia; Pregnancy toxaemia; Reproductive management.

INTRODUCTION

Reproductive efficiency is a critical determinant of productivity, profitability, and genetic progress in sheep and goat production systems (Noakes et al., 2018). Successful reproduction directly influences flock replacement rate, meat and milk yield, fiber production, and overall herd sustainability. Even minor disturbances in reproductive performance—such as delayed puberty, reduced conception rates, abortion, dystocia, or neonatal mortality—can result in substantial economic losses through decreased offspring output, increased veterinary intervention, prolonged non-productive periods, and premature culling of breeding animals. Sheep and goats are seasonal polyestrous breeders, predominantly short-day breeders, and their reproductive activity is closely regulated by photoperiod, nutritional status, body condition, and endocrine balance. Physiological characteristics such as relatively short estrous cycles, variable ovulation rates, and cotyledonary placentation make

small ruminants particularly susceptible to hormonal disturbances, placental infections, and pregnancy loss. Reproductive disorders may occur at any stage of the reproductive cycle, including pre-breeding infertility, early embryonic mortality, abortion, parturient complications, postpartum uterine disease, male infertility, and neonatal disorders. The etiology of reproductive disorders is multifactorial and includes infectious agents, nutritional and mineral deficiencies, endocrine dysfunctions, genetic abnormalities, and management-related stressors. Many of these conditions are preventable through appropriate nutrition, biosecurity, breeding management, and early diagnosis. Effective control therefore requires a herd-level approach rather than treatment of individual animals alone. This chapter presents a concise, disease-wise overview of the major reproductive disorders in sheep and goats, emphasizing their clinical features, diagnosis, treatment, and preventive management for practical application in field and research settings.

REPRODUCTIVE DISORDERS IN EWES AND DOES

Anestrus and subfertility: Anestrus and subfertility are common reproductive disorders in sheep and goats and represent a major cause of reduced reproductive efficiency. Anestrus is defined as the absence of observable estrous cycles, whereas subfertility refers to reduced conception despite normal mating. These conditions are strongly influenced by seasonality, nutrition, endocrine balance, uterine health, and management practices, and may occur in both young and adult females.

Clinical signs

- Absence or irregular expression of estrus
- Silent heat or weak estrus signs
- Repeat breeding despite normal mating
- Prolonged breeding season
- Low conception, lambing, or kidding rates
- Delayed puberty in young females
- Poor or declining body condition (in many cases)

Diagnosis

- Evaluation of breeding and estrus records
- Body condition scoring and nutritional assessment
- Transrectal or transabdominal ultrasonography to assess:
    - Ovarian activity (follicles, corpus luteum)
    - Uterine pathology
- Serum progesterone estimation to confirm ovulation and luteal function
- Vaginal examination and uterine cytology to detect subclinical infections

Treatment

- Correction of negative energy balance through improved feeding
- Mineral supplementation (selenium, copper, zinc, iodine as per deficiency)
- Hormonal therapy in selected cases:
    - Progesterone-based protocols to induce cyclicity
    - Prostaglandin $F_{2\alpha}$ in animals with functional corpus luteum
- Appropriate antimicrobial therapy for confirmed uterine infections

Management

- Maintain optimal body condition score (2.5–3.0)
- Strategic use of the ram or buck effect to stimulate estrus
- Avoid breeding during periods of nutritional stress
- Pre-breeding reproductive examination of females
- Accurate recording of estrus, mating, and conception data

Early Embryonic Mortality in Sheep and Goats: Early embryonic mortality refers to the loss of the embryo within the first three to four weeks after fertilization, before pregnancy can be reliably confirmed (Sahu et al., 2025). It is a major but often unnoticed cause of reproductive inefficiency in sheep and goats and contributes significantly to repeat breeding, extended inter-lambing or inter-kidding intervals, and reduced flock fertility. The condition is commonly associated with hormonal insufficiency, uterine environment disturbances, nutritional stress, and early infectious insults.

Clinical signs

- Apparent conception followed by return to estrus
- Repeat breeding at normal or irregular intervals
- Prolonged breeding season
- Low overall conception rate at flock level
- Absence of visible abortion or fetal expulsion

Diagnosis

- Indirect diagnosis based on breeding and estrus records
- Early pregnancy diagnosis failure on ultrasonography
- Low serum progesterone indicating luteal insufficiency
- Exclusion of anestrus, male infertility, and overt uterine disease

Treatment

- No direct therapeutic intervention for individual cases

- Address underlying endocrine or nutritional causes

Management

- Ensure adequate energy and protein intake during breeding and early gestation
- Maintain optimal body condition at mating
- Minimize stress (transport, heat, handling) during first 30 days post-mating
- Control uterine infections prior to breeding
- Use fertile, sound rams and bucks

Abortion in Sheep and Goats: Abortion is defined as the termination of pregnancy after implantation and before fetal viability and represents one of the most economically devastating reproductive disorders in sheep and goats. Abortions may occur sporadically or as abortion storms affecting a large proportion of the flock, most commonly during mid to late gestation. Infectious causes predominate, many of which have significant zoonotic implications.

Clinical signs

- Expulsion of dead fetus or stillbirth
- Retained placenta
- Vaginal discharge before or after abortion
- Reduced milk yield and systemic illness in some dams
- Multiple abortions within a short period (abortion storm)

Diagnosis

- Collection and examination of aborted fetus and placenta
- Laboratory confirmation using:
    - Bacteriology and culture
    - PCR
    - Serology
- Flock history and abortion pattern analysis

Treatment

- Isolation of aborting animals
- Supportive therapy (fluids, NSAIDs) if systemic signs present
- Antibiotic therapy only in selected bacterial infections
- Treatment generally unrewarding during abortion outbreaks

Management

- Immediate removal and safe disposal of aborted materials
- Strict hygiene and disinfection of lambing/kidding areas
- Flock-level diagnosis to identify causative agent
- Vaccination where available and recommended
- Test-and-cull strategies for regulated diseases
- Use of personal protective equipment due to zoonotic risk

Pseudopregnancy (Cloudburst / Hydrometra) in Goats and Sheep: Pseudopregnancy, also known as hydrometra or cloudburst, is a reproductive disorder characterized by accumulation of sterile fluid within the uterus in the presence of a persistent functional corpus luteum. The condition is most commonly observed in goats and only occasionally in sheep. It mimics true pregnancy and often goes unnoticed until the expected time of parturition, when no fetus is delivered.

Clinical signs

- Progressive abdominal enlargement resembling pregnancy
- Absence of fetal movements
- Prolonged anoestrus
- Failure to kid or lamb at expected term
- Sudden discharge of large volumes of clear or amber fluid from the vulva (cloudburst)

Diagnosis

- Transabdominal ultrasonography showing fluid-filled uterus without fetus or placentomes
- Persistently elevated serum progesterone levels
- History of mating without subsequent parturition

Treatment

- Prostaglandin $F_{2\alpha}$ or its analogues to induce luteolysis
- Repeat prostaglandin injection after 10–11 days in chronic cases
- Oxytocin may be used after luteolysis to assist uterine evacuation
- Manual drainage alone is contraindicated due to high recurrence rate

Management

- Early pregnancy diagnosis (30–45 days post-mating)
- Avoid indiscriminate or repeated use of progesterone-based synchronization protocols
- Maintain accurate breeding and kidding records

- Culling of animals with recurrent pseudopregnancy

Dystocia (Ring womb) in Sheep and Goats: Dystocia refers to difficulty in parturition and is a major cause of perinatal mortality in sheep and goats. It may arise from fetal factors such as malpresentation, multiple foetuses, or fetomaternal disproportion, as well as maternal factors including uterine inertia and failure of cervical dilation. Ring womb, a specific and common cause of dystocia in small ruminants, is characterized by incomplete or absent cervical dilation at the onset of labor.

Clinical signs

- Prolonged first or second stage of labor
- Repeated straining without delivery of fetus
- Exhaustion and distress of the dam
- Cervix admitting only one or two fingers on vaginal examination (ring womb)

Diagnosis

- Careful vaginal examination to assess cervical dilation, fetal position, and uterine tone
- Differentiation from uterine inertia or fetal malpresentation

Treatment

- Manual correction of fetal malposition and controlled traction where possible
- Limited response to medical therapy in ring womb:
    - Oxytocin and calcium supplementation (often ineffective)
- Caesarean section is the treatment of choice in non-responsive or advanced cases

Management

- Adequate nutrition during late gestation
- Avoid breeding animals with a previous history of ring womb
- Close monitoring during lambing and kidding
- Timely obstetrical intervention to reduce fetal and maternal losses

Pregnancy Toxaemia (Twinning Lamb Disease): Pregnancy toxaemia, also known as twinning lamb disease, is a metabolic disorder of late gestation that occurs primarily in ewes and does carrying multiple foetuses. The condition results from a severe negative energy balance during the last 4–6 weeks of pregnancy, when fetal glucose demand increases rapidly and exceeds maternal energy intake. It is more common in over conditioned, underfed, or suddenly stressed animals and is associated with high maternal and fetal mortality if not treated promptly.

Clinical signs

- Occurs in late gestation, especially in twin- or triplet-bearing females

- Reduced appetite progressing to complete anorexia
- Depression, separation from flock, dullness
- Neurological signs:
    - Incoordination, tremors
    - Star-gazing, blindness
    - Recumbency and coma in advanced cases
- Ketone odour on breath
- Death within a few days if untreated

Diagnosis

- History of late pregnancy with multiple foetuses
- Clinical signs consistent with ketosis
- Detection of ketone bodies in urine, blood, or milk
- Hypoglycaemia and elevated blood β-hydroxybutyrate
- Ultrasonography to confirm multiple foetuses and fetal viability

Fig. 1: Three feus delivered died due to protracted case of dystocia; doe was recumbent for weeks due to hypoglycaemia

Treatment

- Early cases:
    - Oral propylene glycol or glycerol as glucose precursors
    - High-energy oral feeds
- Moderate to severe cases:
    - Intravenous glucose or dextrose solutions
    - B-complex vitamins
    - Correction of dehydration and electrolyte imbalance
- Advanced cases:
    - Induction of parturition or caesarean section to save dam
- Prognosis poor in recumbent animals with neurological signs

Management

- Prevent negative energy balance in late gestation
- Separate and preferentially feed twin- and triplet-bearing females
- Provide high-energy, palatable concentrates during last trimester
- Avoid sudden feed changes and stress
- Maintain optimal body condition (avoid obesity and emaciation)
- Regular monitoring of late-pregnant animals for early signs

Fetal Mummification in Sheep and Goats: Fetal mummification is a reproductive disorder characterized by death of the fetus in utero followed by dehydration and shrinkage, without expulsion from the uterus. It occurs when fetal death takes place after placentation, while the cervix remains closed and the corpus luteum continues to function, maintaining progesterone dominance. Fetal mummification is relatively uncommon in sheep and goats but is of clinical importance due to prolonged gestation, infertility, and economic loss.

Clinical signs

- Prolonged gestation with failure to lamb or kid at expected time
- Absence of signs of parturition
- Anestrus or irregular estrous cycles
- Reduced abdominal enlargement over time
- Occasionally, hard mass palpable per rectum or abdomen

Diagnosis

- Transabdominal ultrasonography showing:

  - Absence of fetal heartbeat
  - Dehydrated, hyperechoic fetal structures
  - Lack of placental fluid
- Persistently elevated serum progesterone
- History of missed parturition date

Fig. 2: Mummified fetus attached with dried fetal mem branes (Sahu et al., 2024)

Treatment

- Prostaglandin $F_{2\alpha}$ or analogues to induce luteolysis
- Repeat prostaglandin injection after 10–11 days if required
- Oxytocin may be used following luteolysis to assist uterine evacuation
- Surgical removal rarely required

Management

- Early pregnancy diagnosis and follow-up ultrasonography
- Prompt treatment to prevent prolonged infertility
- Investigation and correction of underlying causes:
  - Infectious agents
  - Nutritional deficiencies
- Maintain proper breeding records

- Culling of animals with recurrent fetal mummification

Retained Fetal Membranes (RFM) in Sheep and Goats: Retained fetal membranes refer to the failure of expulsion of the placenta within 24 hours after parturition. Although less common in sheep and goats than in cattle, RFM is an important postpartum disorder because it predisposes affected animals to uterine infection, delayed involution, reduced fertility, and systemic illness. The condition is frequently associated with dystocia, abortion, pregnancy toxaemia, hypocalcaemia, selenium deficiency, and infectious placentitis.

Clinical signs

- Placental tissues hanging from the vulva beyond 24 hours postpartum
- Foul-smelling vaginal discharge (in complicated cases)
- Reduced appetite and milk yield
- Fever and depression if metritis develops

Diagnosis

- History of recent parturition
- Visual confirmation of retained placental tissues
- Clinical examination for systemic involvement

Treatment

- Avoid forceful manual removal of placenta
- Oxytocin administration within the first 24 hours postpartum
- Systemic antimicrobials if signs of infection are present
- NSAIDs and supportive therapy in systemically affected animals

Management

- Adequate selenium and vitamin E supplementation
- Balanced calcium nutrition during late gestation
- Prompt correction of dystocia and metabolic disorders
- Maintain hygienic lambing and kidding environments
- Close postpartum monitoring

Metritis and Endometritis: Metritis and endometritis are postpartum uterine infections that impair uterine involution and subsequent fertility. Metritis is an acute infection involving the deeper uterine layers and systemic illness, whereas endometritis is a more chronic or subclinical inflammation limited to the endometrium. These conditions commonly follow retained fetal membranes, dystocia, traumatic delivery, or unhygienic obstetrical practices.

Clinical signs

- Fetid, purulent, or watery vaginal discharge
- Fever, anorexia, depression (metritis)
- Delayed return to estrus
- Reduced conception rate

Diagnosis

- Clinical examination and vaginal inspection
- Ultrasonography showing fluid-filled uterus or thickened uterine wall
- History of difficult parturition or RFM

Treatment

- Systemic broad-spectrum antimicrobials based on severity
- NSAIDs for control of inflammation and toxemia
- Prostaglandin $F_{2\alpha}$ in luteal-dependent uterine infections
- Supportive therapy including fluids when required

Management

- Strict hygiene during lambing and kidding
- Early treatment of retained fetal membranes
- Adequate nutrition and mineral supplementation
- Postpartum reproductive monitoring before rebreeding

Pyometra: Pyometra, hydrometra, and mucometra are uterine disorders characterized by accumulation of pus, watery fluid, or mucus within the uterus, respectively, under the influence of a persistent functional corpus luteum. These conditions are more common in goats than sheep and are important causes of prolonged anoestrus and infertility. They often follow postpartum uterine infection, pseudopregnancy, or early embryonic mortality with failure of luteolysis.

Clinical signs

- Prolonged anestrus
- Absence of estrus behavior despite normal body condition
- Occasionally enlarged abdomen (hydrometra)
- Intermittent vaginal discharge (more common in pyometra)
- Reduced fertility and failure to conceive

Diagnosis

- Transabdominal ultrasonography:
    - Fluid-filled uterus with echogenic contents (pyometra)
    - Anechoic fluid (hydrometra)
- Elevated serum progesterone indicating persistent corpus luteum
- History of infertility or previous pseudopregnancy

Treatment

- Prostaglandin $F_{2\alpha}$ or analogues to induce luteolysis and uterine evacuation
- Repeat prostaglandin after 10–11 days in chronic cases
- Systemic antibiotics in pyometra with systemic signs
- Oxytocin as adjunct therapy after luteolysis

Management

- Early diagnosis through routine ultrasonography
- Avoid indiscriminate hormonal treatments
- Prompt treatment of postpartum uterine infections
- Culling of animals with recurrent uterine pathology

Cervico-Vaginal Prolapse in Ewes: Cervico-vaginal prolapse is a reproductive disorder characterized by protrusion of the vaginal wall, often involving the cervix, through the vulva. It is most commonly observed in late gestation, particularly during the last 4–6 weeks of pregnancy, and is more prevalent in ewes than in does. The condition is associated with increased intra-abdominal pressure and hormonal influences causing relaxation of pelvic tissues. Cervico-vaginal prolapse is of major concern due to its recurrent nature and its association with dystocia, vaginal trauma, and reduced lifetime reproductive performance.

Clinical signs

- Protrusion of vaginal tissue through the vulva, initially intermittent and later permanent
- Prolapsed tissue appears pink to red, oedematous, and may become dry or traumatized
- Prolapse worsens when the ewe lies down and partially reduces on standing (early cases)
- Straining and discomfort
- Secondary complications:
    - Ulceration, necrosis, or infection of exposed tissue
    - Urination difficulty in severe cases

Diagnosis

- Based on visual inspection and clinical examination
- Assessment of severity and viability of prolapsed tissue
- Differentiation from uterine prolapse (occurs postpartum)

Treatment

- Epidural anesthesia to reduce straining
- Thorough cleaning and lubrication of prolapsed tissue
- Gentle replacement of vaginal tissue
- Retention methods:
    - Vulvar sutures (Bühner or purse-string)
    - Vaginal retainers or harnesses
- Systemic antibiotics and NSAIDs if tissue is traumatized
- Removal of sutures or retainers at onset of parturition

Management

- Immediate treatment to prevent tissue damage
- Avoid excessive concentrate feeding in late gestation
- Correct obesity and prevent over conditioning
- Provide adequate exercise to late-pregnant ewes
- Do not breed affected ewes again due to high recurrence and genetic predisposition
- Culling recommended in recurrent or severe cases

Congenital Goitre: Congenital goitre is a developmental disorder of newborn kids and lambs characterized by enlargement of the thyroid gland due to iodine deficiency or impaired thyroid hormone synthesis during gestation. Although clinically expressed in neonates, it is fundamentally a maternal nutritional reproductive disorder, reflecting inadequate iodine and sometimes selenium intake of the pregnant ewe or doe. The condition leads to poor neonatal viability and increased perinatal mortality.

Clinical signs

- Enlarged thyroid gland visible or palpable in the neck
- Weak, lethargic neonates
- Sparse or absent hair coat
- Poor suckling reflex
- Hypothermia and increased neonatal mortality

- Prolonged gestation and dystocia in severe cases

Diagnosis

- Clinical examination of affected neonates
- History of iodine-deficient diets or regions
- Presence of goitrogenic plants in feed
- Postmortem confirmation of enlarged thyroid gland

Fig. 3: Congenital goitre in kid with atrichiasis

Treatment

- Oral iodine supplementation to mildly affected neonates
- Supportive care:
    - Warming
    - Assisted colostrum feeding
- Prognosis poor in severely affected neonates

Management

- Adequate iodine supplementation to pregnant dams
- Selenium supplementation where deficiency exists
- Avoid feeding goitrogenic plants during gestation
- Use balanced mineral mixtures throughout pregnancy

Stillbirths and Weak Lamb/Kid Syndrome: Stillbirths and weak lamb or kid syndrome are major contributors to reduced reproductive output in sheep and goats. These conditions are closely linked to maternal factors such as dystocia, placental insufficiency, pregnancy toxaemia, mineral deficiencies, and infectious diseases. Weak neonates that survive birth often succumb within the first few days due to hypothermia, starvation, or infection.

Clinical signs

- Stillborn foetuses at term
- Neonates unable to stand or suckle
- Low birth weight
- Hypothermia and lethargy
- Increased early neonatal mortality

Diagnosis

- Review of parturition history and gestation length
- Assessment of maternal nutrition and health
- Examination of neonates for congenital abnormalities
- Evaluation of colostrum intake

Treatment

- Immediate warming of weak neonates
- Assisted colostrum feeding within first 2 hours of life
- Oral or parenteral glucose in hypoglycaemic neonates
- Antibiotics only when septicaemia is suspected

Management

- Adequate maternal nutrition during late gestation
- Prevention and early treatment of pregnancy toxaemia
- Close supervision during lambing and kidding
- Clean birthing environment
- Effective colostrum management protocols

REPRODUCTIVE DISORDERS IN RAMS AND BUCKS

Epididymitis and Orchitis in Rams and Bucks: Epididymitis and orchitis are major infectious reproductive disorders of male sheep and goats and are among the most important causes of flock-level infertility. Epididymitis involves inflammation of the epididymis, whereas orchitis affects the testicular parenchyma; both conditions often occur together and result in impaired sperm

maturation, obstruction of sperm transport, and reduced semen quality. These conditions are particularly significant because a single affected male can compromise the fertility of a large number of females.

Clinical signs

- Swelling, enlargement, or hardening of one or both testes
- Pain on palpation in acute cases
- Asymmetrical scrotum
- Reduced libido
- Poor conception rates in mated females
- Chronic cases: testicular atrophy and fibrosis

Diagnosis

- Clinical examination and palpation of testes and epididymis
- Measurement of scrotal circumference
- Semen examination showing poor motility, low concentration, or abnormal sperm
- Serological testing in suspected infectious cases

Treatment

- Treatment is usually unrewarding in chronic cases
- Systemic antibiotics may be attempted in early acute cases
- Anti-inflammatory drugs to reduce pain and inflammation
- Fertility rarely restored once fibrosis develops

Management

- Immediate isolation of affected males
- Culling of infected or chronically affected animals
- Strict biosecurity to prevent spread
- Avoid sharing breeding males between flocks
- Regular pre-breeding examination of all rams and bucks

Testicular Degeneration and Hypoplasia: Testicular degeneration and hypoplasia are non-infectious conditions resulting in reduced spermatogenesis and subfertility or infertility in rams and bucks. Hypoplasia is a congenital condition characterized by incomplete testicular development, whereas degeneration is an acquired condition caused by heat stress, nutritional deficiencies, systemic illness, advancing age, or prolonged fever. These disorders often go unnoticed until poor flock fertility is observed.

Clinical signs

- Small, soft, or flabby testes
- Reduced scrotal circumference
- Decreased libido
- Low sperm concentration and poor semen quality
- Reduced conception rate in females

Diagnosis

- Palpation of testes and scrotal circumference measurement
- Semen evaluation for sperm concentration, motility, and morphology
- History of heat stress, illness, or nutritional deficiency

Treatment

- No effective treatment for congenital hypoplasia
- Limited improvement in reversible degeneration after removal of cause
- Nutritional correction and management of systemic illness

Management

- Do not use males with testicular hypoplasia for breeding
- Protect breeding males from heat stress
- Provide adequate nutrition and mineral supplementation
- Conduct routine breeding soundness examination before breeding season
- Replace aging or subfertility males promptly

FUTURE PERSPECTIVES AND CONCLUSION

Reproductive disorders continue to limit productivity and sustainability in sheep and goat production systems due to multifactorial influences including infections, nutritional imbalances, endocrine disturbances, genetics, and management stress. Disorders such as anestrus, embryonic mortality, abortion, dystocia, pregnancy toxaemia, uterine infections, neonatal mortality, and male infertility cause substantial economic loss. Future progress depends on herd-level preventive programs integrating molecular diagnostics, ultrasonography, precision nutrition, strategic mineral supplementation, and genetic selection for fertility and resilience. Climate-adaptive management, strengthened biosecurity, farmer training, and routine reproductive monitoring are critical. An integrated preventive reproductive health framework offers the most reliable pathway to enhanced fertility, improved animal welfare, and long-term sustainability in small ruminant production systems.

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