Review Article

Reproductive Disorders in Small Ruminants in India - Review

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Citation: Vijay Kadam, Abhijit Barate, Tejas Shende, Vidya Nimbalkar, Gokul Sonawane, Mahesh Rangnekar, Sanjay Bhalerao, Shalaka Salvekar. Reproductive Disorders in Small Ruminants in India - Review. Int J Adv Interdis Res 2025, 05, e016.

Received : 15 Oct 2025
Revised : 07 Nov 2025
Accepted : 13 Nov 2025
Published : 20 Dec 2025

Abstract: Reproductive efficiency is a critical determinant of productivity in small ruminants, particularly sheep and goats, which are integral to the livelihood of rural farmers in India. However, various reproductive disorders significantly impact fertility, kidding/lambing rates, and overall herd profitability. This review highlights the prevalence, etiology, clinical manifestations, and management of reproductive disorders in small ruminants across different regions of India. Common disorders include ovarian abnormalities (e.g., cysts, hypoplasia), uterine infections (endometritis, pyometra), anestrus, repeat breeding, dystocia, abortions, and post-partum complications. Infectious agents such as *Brucella melitensis*, *Chlamydia, Campylobacter*, and *Toxoplasma gondii* are major contributors to abortion and infertility, while non-infectious causes include nutritional deficiencies, environmental stress, anatomical defects, and poor herd management. Studies from abattoirs and field surveys indicate variable prevalence across states, with reproductive disorders reported in up to 25–30% of examined animals in some regions. The widespread impact of these disorders underscores the need for integrated control strategies, including disease surveillance, targeted vaccination, improved nutrition, timely diagnosis, and better reproductive management practices. Addressing these issues is essential for enhancing reproductive performance, improving farm incomes, and supporting sustainable small ruminant production in India.

Keywords: Small ruminants, Sheep, Goat, reproductive, disorder.

INTRODUCTION

Small ruminants, particularly sheep and goats, play a vital role in the rural economy of India, contributing significantly to income generation, nutrition, and livelihood security for millions of smallholder farmers. India ranks among the world's largest producers of sheep and goat populations, with these animals

adapted to diverse agro-climatic zones and reared under varied management systems. Despite their resilience and economic importance, the reproductive efficiency of small ruminants in India remains suboptimal, primarily due to a wide range of reproductive disorders that adversely affect fertility, productivity, and herd replacement rates.

Reproductive disorders in sheep and goats encompass a variety of conditions, including anestrus, repeat breeding, abortions, dystocia, endometritis, pyometra, and ovarian cysts [1]. These issues may arise from infectious agents such as *Brucella melitensis*, *Chlamydia* spp., *Campylobacter* spp., and *Toxoplasma gondii*, as well as from non-infectious causes like nutritional imbalances, hormonal disturbances, anatomical defects, poor husbandry practices, and environmental stressors. The prevalence and type of reproductive disorders can vary significantly across regions, influenced by breed, season, disease burden, and management systems.

The economic impact of these disorders is considerable, resulting in reduced birth rates, extended kidding/lambing intervals, increased veterinary costs, and premature culling. Despite their importance, reproductive disorders in small ruminants remain underreported and under diagnosed, particularly in rural and resource-limited settings. Therefore, a comprehensive understanding of the types, causes, regional prevalence, and risk factors associated with reproductive disorders is essential for developing effective diagnostic, preventive, and management strategies.

Common Reproductive disorders in Small Ruminants:

1. Ovarian Abnormalities

Ovarian abnormalities are a significant contributor to reproductive inefficiency in small ruminants (sheep and goats) in India, especially in areas where nutrition, health care, and breeding management are suboptimal. These disorders interfere with the normal estrous cycle, ovulation, and hormonal balance, often resulting in infertility, irregular estrus, or complete anestrus.

Types of Ovarian Abnormalities

Follicular Cysts is caused by failure of dominant follicles to ovulate. It leads to persistent estrus, nymphomania, or silent heat. It is often associated with hormonal imbalance, stress, or postpartum uterine infections. Luteal Cysts can result from luteinization of unruptured follicles.It secrete progesterone, suppressing estrus and ovulation.Ovarian Hypoplasia or Aplasia is caused due to underdevelopment or absence of ovarian tissue.It is usually congenital and leads to permanent infertility. Ovaro-bursal Adhesions is fibrous tissue formation between ovaries and surrounding structures due to inflammation or trauma.It prevents ovum pickup and reduces fertility. Ovarian Atrophy / Degeneration is often seen in malnourished animals or those with chronic systemic illness. In this ovaries become inactive, leading to anestrus.

Causes and Risk Factors: Nutritional Deficiencies of energy, protein, and

minerals (especially selenium, zinc, iodine, and vitamin A) affect follicular development. Endocrine Imbalance leads to disruption of LH/FSH due to stress or disease. Postpartum Uterine Infections may interfere with ovarian function via inflammatory mediators. Genetic Defects such as ovarian hypoplasia are hereditary. Stress and Poor Management such as transport, heat, or overcrowding can disrupt ovarian cycles.

Diagnosis: Diagnosis is made on the basis of clinical signs such as Anestrus, nymphomania, or irregular estrus behavior. Ultrasonography is gold standard for identifying cysts, adhesions, or ovarian inactivity. Hormonal assays such as Progesterone and estrogen levels help in differentiating cyst types.

Treatment: Hormonal Therapy can be used in the treatment of different types of cyst. Follicular cysts is treated with GnRH analogs [2] (e.g., Buserelin or Lecirelin) to induce LH surge and ovulation.Luteal cysts is treated with $PGF_2\alpha$ (e.g., Cloprostenol)[2] to induce luteolysis and return to estrus. In Anestrus due to inactive ovaries combination of GnRH + PMSG (eCG) or CIDR (Controlled Internal Drug Release) device may help restart cycles [3]. Nutritional Support can be given by providing balanced ration with adequate energy, protein, and micronutrients (e.g., mineral mixture containing Cu, Zn, Mn, Se, I) [4].Supplement Vitamin A and E to support follicular development and hormone synthesis. Surgical Interventionis rarely performed in field conditions, but may be necessary for ovaro-bursal adhesions or tumorous growths.

Prevention Strategies : Balanced Nutrition to maintain proper body condition score (BCS) and supply critical trace minerals through mineral supplementation. Early detection of estrus abnormalities aids timely intervention. Good Postpartum Care prevent uterine infections which can suppress ovarian function. Controlled Breeding Practices to avoid inbreeding and use proven fertile males. Stress management will provide shade, minimize transport stress, and avoid overcrowding. Periodic reproductive examination, especially in repeat breeders or non-cycling females. Ovarian abnormalities are a hidden yet important cause of infertility in small ruminants in India. Since clinical signs are often subtle, especially in field conditions, proactive reproductive monitoring, improved nutritional management, and access to basic hormonal therapies can significantly improve reproductive outcomes. Strengthening farmer awareness and veterinary capacity at the grassroots level is key to preventing and treating these disorders effectively.

2. Uterine Infections Leading to Reproductive Disorders in Small Ruminants

Uterine infections are a major cause of reproductive failure in small ruminants such as sheep and goats, particularly in low-input systems where hygienic practices and veterinary interventions are limited. These infections impair fertility by altering the uterine environment, disrupting hormonal function, and hindering embryo implantation and development. In India, uterine infections are frequently observed in post-partum animals, animals with poor nutritional

status, or those subjected to unhygienic birthing and breeding practices.

Types of Uterine Infections

Endometritis is inflammation of the endometrium (inner lining of the uterus).It commonly occurs post-partum due to retained placenta or dystocia.Is is often subclinical, leading to repeat breeding and delayed conception. Metritis is more severe infection involving all layers of the uterus.It usually occurs within a week after parturition.Signs include fever, foul-smelling discharge, anorexia, and systemic illness. Pyometra is accumulation of pus in the uterus with a persistent corpus luteum (CL). Cervix remains closed, so there is no discharge externally.The animal fails to return to estrus, leading to prolonged infertility.Mucometra / Hydrometra (Pseudopregnancy) is accumulation of sterile mucus or fluid in the uterus.Seen more frequently in goats and can mimic pregnancy.

Causative Agents: Uterine infections in small ruminants are caused by a variety of bacteria, fungi, and in some cases, protozoa [5]. Common pathogens include *Escherichia coli, Arcanobacterium pyogenes, Staphylococcus spp.,Streptococcus spp.,Brucella melitensis, Chlamydia spp.,Mycoplasma spp.,*Fungal agents like Aspergillus are rare [5, 6]. Infections may enter the uterus during parturition (especially dystocia or assisted delivery), Retention of placenta, Breeding (natural or artificial insemination using contaminated instruments), Abortions caused by infectious agents.

Impact on Reproduction: Uterine infections can result in Repeat breeding, Anestrus due to progesterone dominance (pyometra), early embryonic death, Abortions, Delayed uterine involution post-partum, Infertility or permanent sterility in chronic cases.

Diagnosis: Diagnosis is based on history and clinical Signs which helps to identify Repeat breeding, abnormal vaginal discharge, absence of estrus. Per-vaginal Examination showing discharge, enlarged uterus. Ultrasonography is useful to differentiate pyometra, mucometra, and pregnancy. Uterine Cytology and Culture helps to identify specific pathogens and guide antibiotic therapy.

Treatment Options: Antibiotic Therapy incudes intrauterine or systemic antibiotics (e.g., oxytetracycline, cephalosporins) based on culture and sensitivity. $PGF_2\alpha$ (Prostaglandin) lyse the corpus luteum, opens the cervix, and facilitates uterine drainage in pyometra [7, 8]. Oxytocin or Ecbolic agents stimulate uterine contractions and expel contents[8]. Uterine Lavage with sterile saline or mild antiseptics (under veterinary supervision) in valuable animals [9]. Supportive therapy includes anti-inflammatory drugs and fluid therapy in severe infections (e.g., metritis).

Prevention and Control: Clean environment and hands during kidding/lambing. Prompt Management of Retained Placenta or Dystocia. Post-partum Monitoring: to detect and treat uterine infections early. Avoidance of Contaminated Instruments during AI or manual breeding. Test and cull infected animals having Brucella or chlamydia infection. Do vaccination where

available. Adequate energy, protein, and minerals (especially selenium and vitamin E) to enhance uterine immunity and recovery.

3. Abortions and Stillbirths Leading to Reproductive Disorders in Small Ruminants in India:

Abortion and stillbirth are major reproductive disorders affecting the productivity and profitability of sheep and goat farming in India. These events lead to direct economic losses through the loss of offspring and indirect losses through reduced conception rates, increased inter-kidding/lambing intervals, and possible long-term infertility in affected females. The causes are multifactorial and can vary based on region, season, breed, and management practices.

Definitions: Abortion is the premature expulsion of the fetus before it is viable, typically after mid-gestation. Stillbirth is birth of a fully developed fetus that dies during or just before parturition.

Causes of Abortion and Stillbirth in Small Ruminants

1. Infectious Causes (Primary Cause in India): These are the most significant contributors [1, 10-12] to abortions in Indian flocks and herds (Table1). Infections are usually introduced through contaminated feed, water, contact with infected animals, or via vertical transmission.

Table 1: The most significant contributors to abortions in Indian flocks and herd

S.No	Pathogen	Disease	Effects
1	*Brucella melitensis*	Brucellosis	Late-term abortion, retained placenta, infertility. Zoonotic risk.
2	*Chlamydia abortus*	Enzootic abortion	Late-term abortion, weak kids/lambs.
3	*Toxoplasma gondii*	Toxoplasmosis	Abortion, stillbirth, or birth of weak neonates.
4	*Campylobacter spp.*	Campylobacteriosis	Mid to late-term abortion; hepatic lesions in fetus.
5	*Coxiella burnetii*	Q Fever	Abortion storms, zoonotic risk.
6	*Salmonella spp.*	Salmonellosis	Abortion with systemic signs.
7	*Bluetongue virus*	Viral infection	Abortion, teratogenic effects, especially in sheep.
8	*Border Disease Virus*	Pestivirus	Congenital abnormalities, mummification, abortion (mostly sheep).

2. Non-Infectious Causes: Nutritional deficiencies of selenium, iodine, copper, and vitamin A or E can lead to embryonic death and abortions. Trauma or Stress due to transport stress, handling during late pregnancy, overcrowding. Toxic Plants and Mycotoxins ingestion of certain weeds, fungal toxins in feed (e.g. aflatoxins) can cause abortion. Hormonal Imbalances or Genetic Defects leading to failure in progesterone maintenance of pregnancy or chromosomal abnormalities. Poor Management Practices leading to

Inbreeding, poor breeding selection, use of infected breeding males [13, 14].

Consequences of Abortion and Stillbirths are loss of fetus/lamb/kid, Extended kidding/lambing intervals, Reduced lifetime productivity, Retained placenta, uterine infections (leading to further infertility),Zoonotic risk in handlers (e.g., brucellosis, Q fever) and Psychological and financial stress to farmers.

Diagnosis: Based on history & clinical signs showing abortions, weak newborns, retained placenta. Gross Examination of fetus & placenta showing liver lesions toxoplasmosis/campylobacter), necrosis, mummification. Laboratory Test such as Serology (RBPT, ELISA) for Brucella[15]. PCR/IFA for Chlamydia, Coxiella, Toxoplasma [16]. Histopathology of aborted fetus. Bacterial culture from fetal tissues or placenta.

Treatment and Management: No treatment once abortion occurs, but supportive care and treatment of secondary uterine infections (e.g., antibiotics) may be needed. Remove aborted materials and disinfect area to prevent spread. In case of infectious abortions, isolate affected animals and implement strict biosecurity.

Prevention Strategies: Vaccination against Brucella melitensis Rev 1 vaccine for goats [17].Vaccines for Chlamydia, Q fever, toxoplasmosis exist but are limited in use in India. Regular screening for Brucella and other abortifacients. Culling of seropositive animals in chronic outbreaks. Follow biosecurity measures by avoiding mixing new or untested animals [18]. Proper disposal of aborted fetuses and placental membranes. Disinfection of lambing/kidding areas. Balanced diet with essential minerals (selenium, iodine, zinc, copper).Avoid moldy or contaminated feed. Avoid using males from infected flocks. Maintain proper breeding records and avoid inbreeding. Educating farmers on handling aborted materials using gloves, masks, and proper hygiene

4. Repeat Breeding Leading to Reproductive Disorders in Small Ruminants:

Repeat breeding is a significant reproductive problem in small ruminants (sheep and goats), where apparently healthy and cyclic females fail to conceive after three or more consecutive natural services or artificial inseminations, despite the absence of detectable anatomical or infectious abnormalities. This condition contributes to prolonged kidding/lambing intervals, reduced lifetime productivity, and economic losses in Indian smallholder systems where veterinary resources and diagnostic tools are often limited.

Causes of Repeat Breeding in Sheep and Goats:

1. Hormonal and Functional Disorders: Delayed ovulation where ovulation occurs after mating, resulting in fertilization failure. Anovulatory estrus in which

the female shows estrus signs without actual ovulation. Progesterone deficiency (luteal insufficiency) leading to inadequate support for embryo survival post-fertilization [12]. Silent heat where estrus goes undetected; mistimed breeding leads to fertilization failure[12, 19].

2. Uterine Infections/Subclinical Endometritis: Inflammation of the uterine lining can interfere with implantation or cause early embryonic loss [5, 6, 20]. Infections may not show visible discharge, making diagnosis difficult in field conditions.

3. Ovarian Dysfunction: Cystic ovaries or inactive ovaries affect ovulation and the estrous cycle. Seen commonly in animals with poor nutrition or postpartum complications.

4. Nutritional Deficiencies: Imbalances in energy, protein, and key minerals (especially selenium, zinc, copper, iodine) impair reproductive function. Vitamin A and E deficiency are particularly linked with repeat breeding due to poor embryo survival.

5. Poor Breeding Practices: Improper timing of mating or artificial insemination. Use of subfertile or infected breeding males. Inbreeding, especially in closed flock systems, leading to reduced conception rates.

6. Environmental and Management Factors: Heat stress, poor housing, high parasite load. Stress during estrus or early pregnancy can result in embryonic mortality.

Diagnosis of Repeat Breeding: History taking indicates number of services, estrus intervals, management practices. Clinical examination shows body condition score, reproductive tract palpation. Vaginal cytology or discharge analysis to detect subclinical endometritis. Ultrasonography evaluation of ovarian activity and uterine condition. Hormone profiling (where available) of Progesterone levels to assess luteal function. Semen quality check (in case of natural service) to rule out male factor infertility.

Management and Treatment: GnRH administration at estrus to correct delayed ovulation and induce timely ovulation. Progesterone therapy or CIDR devices for luteal support or to induce cyclicity in inactive ovaries. $PGF_2\alpha$ is administered in cases where silent heat or persistent CL is suspected. Intrauterine or systemic antibiotics in suspected cases of subclinical endometritis. It should be based on bacterial culture and sensitivity if possible. Supplementation with balanced mineral mixture (Ca, P, Zn, Se, vitamins A, D, and E during pre-breeding period. Use proven fertile males; rotate breeding bucks/rams periodically. Correct timing of mating—usually 12–18 hours after the onset of standing estrus. Avoid inbreeding & use record-based mating.

Prevention of Repeat Breeding: Regular reproductive monitoring of females, especially after parturition. Postpartum care to prevent uterine infections. Maintain proper nutritional and mineral supplementation year-round. Follow

estrus detection protocols and avoid stress during breeding. Train farmers and extension workers in correct heat detection and breeding timing.

5. Infections Leading to Reproductive Disorders in Small Ruminants in India

Infectious diseases are a major cause of reproductive disorders in small ruminants [1, 10-12] (Table 2), especially under traditional and extensive management systems where veterinary access and biosecurity measures are limited. These infections lead to abortion, infertility, stillbirth, weak offspring, anestrus, and prolonged inter-kidding/lambing intervals.

Routes of Infection: Venereal Transmission: e.g., Campylobacter, Mycoplasma. Contaminated feed/water, aborted tissues (e.g., Brucella, Toxoplasma, Listeria).Vector-Borne diseases like Bluetongue via Culicoides flies. Zoonotic diseases like Brucella, Q Fever, Toxoplasma can affect humans handling animals or aborted materials.

Clinical Signs & Reproductive Consequences include Abortions (mid or late gestation), Stillbirths or birth of weak kids/lambs, Repeat breeding or infertility, Prolonged anestrus, Low conception rates, Retained placenta and Metritis and endometritis following infection

Table 2: Common Infectious Agents and Their Effects on Reproduction

S.No	Infectious Agent	Disease	Reproductive Effects	Remarks
1	*Brucella melitensis*	Brucellosis	Late-term abortions, retained placenta, infertility, weak kids	Zoonotic, endemic in several Indian states
2	*Chlamydia abortus*	Enzootic Abortion	Late-term abortion, stillbirth, weak neonates	May cause abortion storms
3	*Toxoplasma gondii*	Toxoplasmosis	Embryonic death, mummification, stillbirth	Transmitted via cats; prevalent in grazing areas
4	*Campylobacter spp.*	Campylobacteriosis	Abortion (mid- to late-term), stillbirth	Venereal and oral transmission
5	*Coxiella burnetii*	Q Fever	Abortion, premature delivery, retained placenta	Zoonotic; shed in placenta, feces, milk
6	*Salmonella spp.*	Salmonellosis	Abortion, systemic illness	Associated with poor hygiene, contaminated feed
7	*Mycoplasma spp.*	Mycoplasmosis	Infertility, abortions, neonatal mortality	Seen in arid/semi-arid zones
8	*Bluetongue virus*	Bluetongue	Abortion, fetal malformations, infertility (in rams)	Vector-borne (via Culicoides midges)
9	*Border Disease Virus*	Border Disease	Early embryonic loss, congenital abnormalities	Affects sheep; related to BVD in cattle
10	*Listeria monocytogenes*	Listeriosis	Late-term abortion, septicemia in newborns	Associated with silage feeding in goats

Diagnosis: History and Clinical Examination showing abortions in multiple animals, retained placenta, abnormal vaginal discharge, Laboratory Tests like Serology: ELISA, RBPT, MAT (Brucella, Toxoplasma, Chlamydia),PCR/RT-PCR: Highly sensitive, used for Q Fever, Chlamydia, Bluetongue, Culture from placenta, vaginal swabs, fetal tissues, Histopathology of Fetal organs and placenta (e.g., liver necrosis in campylobacteriosis)

Control and Prevention Strategies: Vaccination against diseases like Brucellosis (Rev-1 vaccine) can be used for goats [17], Bluetongue: Serotype-specific vaccines available in endemic zones, Limited vaccines for Chlamydia, Salmonella (mostly in research or under restricted use), Biosecurity Measures includes isolation of new or aborted animals [18]. Proper disposal of aborted fetuses and placentas. Cleaning and disinfection of kidding/lambing pens. Use of protective gear (gloves, boots, masks) while handling infected materials. Control of Culicoides flies (for bluetongue) .Reduce cat access to feed storage areas (Toxoplasma).Regular testing of breeding animals (especially bucks/rams and replacements).Serological surveillance in high-risk areas or after abortion outbreaks

6. Non-Infectious Agents Leading to Reproductive Disorders in Small Ruminants in India

While infectious diseases are often the primary focus in reproductive health management, non-infectious agents play a substantial and sometimes overlooked role in causing reproductive disorders in sheep and goats. In Indian small ruminant production systems especially in extensive and semi-intensive settings; nutritional deficiencies, hormonal imbalances, genetic issues, managemental errors, and environmental stressors are significant contributors to reduced reproductive efficiency.

Major Non-Infectious Causes of Reproductive Disorders

1. Nutritional Deficiencies: Proper nutrition is essential for normal reproductive function. Deficiencies in key nutrients can lead to infertility, anestrus, abortion, poor conception rates, and weak offspring (Table 3).

Table 3: Impact of Nutrient Deficiencies on Animal Reproduction

S.No	Nutrient	Deficiency Effects
1	Energy/Protein	Delayed puberty, poor estrus expression, anestrus, embryonic mortality
2	Vitamin A	Early embryonic death, abortion, weak kids/lambs, retained placenta
3	Vitamin E & Selenium	Retained placenta, abortions, weak offspring, white muscle disease
4	Calcium & Phosphorus	Uterine inertia, dystocia, retained placenta
5	Iodine	Goiter in neonates, abortions, stillbirths
6	Zinc & Copper	Poor libido in males, delayed estrus, poor conception

2. Hormonal Imbalances: Progesterone deficiency leading to failure of implantation and maintenance of pregnancy. Delayed or absent ovulation leading to repeat breeding. Anovulatory cycles with no corpus luteum formation, resulting in infertility. Persistent CL prevents the return to estrus. These issues may arise due to endocrine gland dysfunction, stress, poor body condition, or postpartum complications.

3. Genetic Disorders and Inbreeding: Congenital anomalies like Mummified fetus, stillbirth, intersex conditions. Poor reproductive performance in inbred flocks (e.g., low conception, early embryonic loss).Inbreeding is common in village flocks due to lack of structured breeding programs.

4. Managemental Errors : Managemental practices play a crucial role in determining reproductive efficiency in livestock. Errors such as improper heat detection, inappropriate male-to-female ratios, poor semen handling during artificial insemination, and incorrect timing of mating can significantly reduce conception rates and lead to repeat breeding (Table 4).

Table 4: Managemental Errors Affecting Reproductive Performance in Livestock.

S.No	Error	Reproductive Impact
1	Improper heat detection	Mating at the wrong time → repeat breeding
2	Inadequate male:female ratio	Missed matings, poor conception
3	Poor semen handling (AI)	Low conception in artificial insemination programs
4	Mating too early or too late	Premature service → uterine immaturity or failure to conceive
5	Excessive kidding/lambing frequency	Reproductive fatigue, increased infertility

5. Environmental and Seasonal Stressors: Heat stress in summer months in India leads to poor estrus expression, embryonic mortality, and low semen quality in males. Cold stress affects neonate survival and may delay postpartum estrus in ewes and does. Transport and handling stress can induce abortion or prevent implantation.

6. Toxins and Plant Poisoning: Certain plants contain phytoestrogens (e.g., clover) that mimic estrogen and interfere with normal cycles. Mycotoxins (from moldy feed) such as aflatoxins and zearalenone cause abortions, embryonic loss, and infertility. Nitrate or urea toxicity in fodder can cause abortion and death

Common Reproductive Disorders Linked to Non-Infectious Causes:

1. Anestrus
2. Repeat breeding
3. Early embryonic death
4. Delayed puberty
5. Abortion and stillbirth (non-infectious origin)

6. Retained placenta
7. Low birth weight and neonatal mortality
8. Infertility in males (due to nutrition, stress, heat)

Preventive and Management Strategies

Provide mineral mixtures and vitamin supplements, especially during breeding and late gestation. Avoid moldy or spoiled feed. Timely mating, estrus detection training. Avoid inbreeding. Hormonal Treatments which includes CIDR, $PGF_2\alpha$, GnRH for estrus synchronization and correction of cycle issues. Reduce Stress and Improve Housing by providing Shade, ventilation, proper handling to reduce heat and transport stress. Avoid Plant and Chemical Toxins by monitoring grazing fields and fodder quality. Training of farmers on nutrition, heat detection, mating practices, and postpartum care.

Non-infectious agents are major but often underestimated contributors to reproductive inefficiency in small ruminants[13, 14]. Poor nutrition, hormonal dysfunction, management errors, and environmental stressors collectively reduce conception rates, increase abortion risks, and lower productivity. A holistic approach that includes good nutrition, stress reduction, breeding management, and education is essential to prevent non-infectious reproductive disorders and improve the reproductive success of sheep and goats in diverse Indian production systems.

CONCLUSION

Reproductive disorders are a major limiting factor in the productivity of sheep and goats in India. A wide range of genital tract abnormalities, including ovarian cysts and uterine conditions such as endometritis, pyometra, and hydrometra, are commonly reported in field investigations and abattoir surveys. These conditions are frequently exacerbated by non-infectious factors such as nutritional deficiencies, poor management practices, seasonal and environmental stress, inadequate veterinary support, and limited farmer awareness. Collectively, these factors contribute to reduced fertility, prolonged inter-kidding intervals, abortions, retained fetal membranes, and increased economic losses. Effective control of reproductive disorders in small ruminants requires an integrated approach combining improved nutrition and management, strengthened veterinary services, farmer education, and focused research to better understand disease prevalence, economic impact, and feasible intervention strategies under diverse agro-ecological conditions.

ACKNOWLEDGEMENT

Authors are thankful to Associate Dean, KNP College of Veterinary Science Shirwal for supporting the research and necessary facilities.

REFERENCES

[1] Ali S, Zhao Z, Zhen G, Kang JZ, Yi PZ. Reproductive problems in small ruminants (sheep and goats): a substantial economic loss in the world. Large Animal Review. 2019;25(6):215-23.

[2] Medan MS, Watanabe G, Sasaki K, Taya K. Transrectal ultrasonic diagnosis of ovarian follicular cysts in goats and treatment with GnRH. Domestic animal endocrinology. 2004 Aug 1;27(2):115-24.

[3] Waqas MS, Tibary A. Manipulation of ovarian function in sheep and goats. Clinical Theriogenology. 2025 Feb 14;17:24-35.

[4] Chaves AS, Silva F, Valentim R, Quintas H. Body condition in small ruminants—Effects of nutrition on the hypothalamic–pituitary–gonad axis and ovarian activity that controls reproduction. Physiologia. 2024 May 16;4(2):213-25.

[5] Beena V, Pawaiya RV, Gururaj K, Singh DD, Mishra AK, Gangwar NK, Gupta VK, Singh R, Sharma AK, Karikalan M, Kumar A. Molecular etiopathology of naturally occurring reproductive diseases in female goats. Veterinary World. 2017 Aug 22;10(8):964.

[6] Aziz ZS, Albukhaty S, Abbood HK. Prevalence and antibiotic resistance pattern of certain types of bacterial flora in uterine ewe's samples. Karbala International Journal of Modern Science. 2017 Dec 1;3(4):259-66.

[7] Shyamkumar TS. Expression Profiling Of PGE2 And PGF2α Receptors In The Uterus And Corpus Luteum Of Bitches With Pyometra. PG Thesis, Vet. Pharmacology, IVRI.

[8] Das J, Kalita MK, Patowary P, Dutta P, Rana T. Pyometra. Elements of Reproduction and Reproductive Diseases of Goats. 2025 Jan 6:405-13.

[9] Jesse FF, Tukiran N, Hambali IU, Lila MA, Chung EL, Abba Y, Bitrus AA, Peter ID, Norsidin MJ. Review on clinical management involving post-partum diseases in ruminants. Adv. Anim. Vet. Sci. 2019;7(7):574-82.

[10] Menzies PI. Control of important causes of infectious abortion in sheep and goats. Veterinary Clinics: Food Animal Practice. 2011 Mar 1;27(1):81-93.

[11] Gojam A, Tulu D. Infectious causes of abortion and its associated risk factor in sheep and goat in Ethiopia. Int J Vet Sci Technol. 2020;4:7-12.

[12] Jainudeen MR, Hafez ES. Reproductive failure in females. Reproduction in farm animals. 2000 Mar 1:259-78.

[13] Yadav R, Yadav P, Singh G, Kumar S, Dutt R, Pandey AK. Non-infectious causes of abortion in livestock animals-A. International Journal of Livestock Research. 2021;11(2):1-3.

[14] Esmaeili H, Joghataei SM. Abortion in Goats: Differential Diagnosis. InEncyclopedia of Livestock Medicine for Large Animal and Poultry Production 2025 Jul 26 (pp. 1-11). Cham: Springer Nature Switzerland.

[15] Legesse A, Mekuriaw A, Gelaye E, Abayneh T, Getachew B, Weldemedhin W, Tesgera T, Deresse G, Birhanu K. Comparative evaluation of RBPT, I-ELISA, and CFT for the diagnosis of brucellosis and PCR detection of Brucella species from Ethiopian sheep, goats, and cattle sera. BMC microbiology. 2023 Aug 10;23(1):216.

[16] Masala G, Porcu R, Madau L, Tanda A, Ibba B, Satta G, Tola S. Survey of ovine and caprine toxoplasmosis by IFAT and PCR assays in Sardinia, Italy. Veterinary parasitology. 2003 Nov 3;117(1-2):15-21.

[17] Rodolakis A. Zoonoses in goats: how to control them. Small Ruminant Research. 2014 Sep 1;121(1):12-20.

[18] Bayne JE, Waters KM. Biosecurity for reproductive disease prevention in sheep and goats. Veterinary Clinics: Food Animal Practice. 2025 Mar 1;41(1):71-82.

[19] Sultana J, Paul SR, Arafath MS, Alam MH, Hossain MS, Moniruzzaman M. Early pregnancy detection in ruminants: challenges and innovations. Journal of Reproduction and Development. 2025;71(5):238-48.

[20] Beena V, Pawaiya RV, Shivasharanappa N, Gururaj K, Gupta VK, Gangwar NK, Singh DD, Karikalan M, Sharma AK, Kumar H, Kumar A. Occurrence of pathological conditions in the female genitalia of goats. Indian Journal of Veterinary Pathology. 2015; 39(3):197-201