International Journal of Veterinary Sciences and Animal Husbandry 2025; 10(9): 163-167

ISSN: 2456-2912
NAAS Rating (2025): 4.61
VET 2025; 10(9): 163-167

www.veterinarypaper.com
Received: 11-08-2025
Accepted: 08-09-2025

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Diseases transmitted through semen in bovine and its preventive measures

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DOI: https://www.doi.org/10.22271/veterinary.2025.v10.i9c.2548

Abstract
Production of animal husbandry is commonplace and easily undertaken which makes it prone to losses due to diminution to productivity and worsening of fertility. In this modern technological time, the use of Artificial Insemination has undoubtedly increased and its aids in improvement of genetics but the disease-free sperms are a primary condition for its use. The processes that must take place to ensure the semen stays healthy, must include measures to cross the entire collection and processing, storage and use, control the entire collection process. This review article tries to explain any and all repro diseases resulting from semen exposures as well as potential and protective methods to lessen the negative effects on reproduction productivity and the livestock economy which are resulting from the diseases.

Keywords: Semen, diseases, artificial insemination, prevention

1. Introduction
Bulls have kept for breeding since the ancient times and bulls are also important for breeding as they are used in cattle production. They also serve as an important breeding risk factor in the epidemiology of reproductive diseases. A male does not only serve the purpose of a gamete donor, but also assist in the spread of an infectious agents which can negatively impact fertility and the productivity of the herd. The semen, regardless of the medium used in natural services or cryopreserved for artificial insemination contain a wide range of pathogens in the form of bacteria, viruses, and protozoa. The most economically important reproductive diseases which can be found in semen are Brucellosis, Vibriosis, Foot and mouth disease, Infectious Bovine Rhinotracheitis and Trichomoniasis (Given and Marley, 2008) [5].

The bovine semen act as a potential source or vehicle of many infectious pathogens depend on the multiple factors. Main key factors such as infectivity, virulence and the rate of prevalence of the causative organism as well as pathogen's stability to the heat which determine whether it can survive in semen processing and cryopreservation. Some other factors like incubation period, duration of the infectious phase and the frequency of exposure to susceptible females influence the epidemiological dynamics of diseases spread. A bull's reproductive tract can harbor the pathogens and shed during the ejaculate. In some rare cases, leakage or migration of infected blood cells into reproductive tract serves as additional source of contamination. Such infections may result in the detection of pathogen's DNA or RNA in semen, isolation of infectious pathogens from semen or presence of a sufficient numbers of pathogens are sufficient to transmission the diseases in the susceptible cattle via natural mating or artificial insemination. Whenever we discuss about the diagnosis of the infectious agents with the help of molecular technique its mandatory the pathogen's DNA or RNA. The presence of DNA or RNA does not invariably imply venereal transmission, since many pathogens may be present in no-viable forms that incapable of transmit the infection. Other than molecular techniques, some other serum based diagnostic tests like ELISA can also employ to assess the health status of breeding bulls. However, these tests do not always give a clear-cut indication of semen contamination, pathogens persist in the reproductive tract in the latent, persistent form of infections pose the greatest risk, as they increase the duration of pathogen shedding and

thereby enhance the potential for disease transmission.

Its suggested that pathogens transmitted via semen, not only spread the infection but also affect the fertility of the breeding bulls. Among those organism, some are causative agents of different pathological conditions such as orchitis, epididymis or vesiculitis which are hugely produce the harmful impact on semen and sperm quality, ejaculate composition. Some other pathogenic organisms have the pawer to penetrate the spermatozoa and reduce the motility, damaging the acrosome part of sperm and also reduce the fertilization rate. If these pathogenic organisms persist in the semen content, they pass through the different parts of reproductive system and transmitted to the healthy animals via ejaculation. The consequences of these infections in natural breeding systems are often economically devasting, manifesting as conception failure, early embryonic death, repeat breeding, abortion, placental retention and in some severe cases infertility in animals also seen. These reproductive consequences not only reduce productivity but also increase the cost of maintaining breeding farm with employing practices like culling, replacement and veterinary management (Given and Marley, 2008) [5].

Genetic upliftment through artificial insemination now days has emerged as a powerful tool to mitigate the risk of venereal diseases transmission in production systems. By enabling the widespread use of semen from genetically superior but pathogen free bulls, AI facilitates genetic improvement while simultaneously minimizing the risk of infectious disease introduction. Rigorous semen screening for diseases, protocols for inactivation of pathogens and strictly adhere to the international standards are the key point to ensuring biosafety in AI programs. Furthermore, AI allows for the strategic management of breeding by limiting direct animal to animal contact thereby reducing opportunities for spread of pathogens. Despites these advantages, vigilance remains necessary, as certain pathogens exhibit resistance to freezing and can survive cryopreservation posing potential risks if not adequately controlled.

The breeding bulls have double roles in the farms as they act as a vector for genetic upliftment/improvement via AI and also act as reservoir of pathogenic organisms underscores the importance of continuous surveillance, advanced diagnostic strategies and effective control measures. A detailed understating of pathogenesis of the organisms in the male reproductive tract along with application of modern diagnostic techniques provide a comprehensive framework to prevent the diseases transmission. Below is a summary of bacterial, viral and protozoal diseases transmitted through semen in Table 1, Table 2 and Table 3 respectively (Kaya *et al.*, 2021) [8].

Table 1: Bovine Bacterial diseases transmitted through semen

Disease	Causative organism	OIE list (A/B)
Brucellosis	*Brucella spp.*	B
Campylobacteriosis	*C. fetus sp. venerealis*	B
Leptospirosis	*Leptospira spp.*	B
Tuberculosis	*Mycobacterium bovis*	B
Johne's disease	*Mycobacterium paratuberculosis*	B
Contagious bovine Pleuropneumonia (CBPP)	*Mycoplasma mycoides sp. mycoides*	A
Query fever	*Coxiella burnetti*	B

Kaya *et al.*, 2021 [8]

Table 2: Bovine Viral diseases transmitted through semen

Disease	Causative organism	OIE List (A/B)
Foot and mouth disease	*Picorna virus*	A
Infectious bovine rhinotracheitis (IBR)	*Bovine herpes virus-1*	B
Lumpy skin disease	*Pox virus*	A
Bluetongue	Orbivirus	A
Enzootic bovine leukosis	*Bovine leukaemia virus*	B
Bovine viral diarrhea	*Pestivirus*	-
Schmallenberg virus	*Orthobunyavirus*	-
Rinderpest	*Morbillivirus*	A
Malignant catharral fever	*Bovine herpes virus-3*	B

Kaya *et al.*, 2021 [8]

Table 3: Bovine Protozoan diseases that are spread via semen

Disease	Causative organism	OIE List (A/B)
Trichomoniasis	*T. fetus ssp venerealis*	B
Neosporosis	*Neospora caninum*	-

Kaya *et al.*, 2021 [8]

2. Preventive Measures

The utilizing the stringent preventive strategies is essential to reduce the harmful impact of venereal pathogen transmission those are transited through semen. Its mandatory to testing of breeding bulls for specific diseases before entering the AI centres or using for breeding purpose. Primitive diagnosis of *Trichomoniasis faetus* infection, one of the most significant protozoan pathogen associated with reproductive tract of bovine. Diagnosis of Trichomoniasis in bovine relies on the demonstration of living, motile organism in preputial washing or scrapings (Taylor *et al.*, 1994) [11]. For the accurate and enhanced diagnosis, vigorous scraping of the preputial epithelium is recommended to detect the organism in very low concentration also.

Bulls those used for the breeding/AI should follow the strict biosecurity protocols. In ideal conditions, breeding bulls originated from herds with no history of reproductive diseases and always follows the testing protocol during the quarantine period. Diagnostic examination includes direct microscopy of pathogens and for confirmation testing via culture should be done to ensure the *T. faetus* infection. To maintain ongoing biosecurity, bulls admitted into AI centres should undergo semi-annual testing should be done to confirm the continued disease-free status.

One of the major challenges in preventing venereal disease transmission is the resilience of *T. faetus.* This organism is generally unaffected by the antibiotics. As a result, if a bull is diagnosed as positive, all frozen semen stocks or at minimum those collected since the last negative test must be destroyed to eliminate the risk of transmission (Parez, 1984) [10]. Additional consideration arises with the importation of semen, where risk assessment should take into account factors such as place of origin, breed and health history of bull and testing protocols implemented by AI centre, particular attention must be paid to the number and reliability of pre-entry and annual tests conducted to detect the organism.

All these preventive measures highlight the necessity of combating rigorous diagnostic testing, biosecurity protocols and ongoing surveillance to safeguard cattle reproduction. By ensuring that only disease-free bulls can contribute semen for artificial insemination, the livestock industry can effectively reduce the incidence of venereal infections and protect both fertility and productivity in breeding herds (CSS, 2014) [3].

2.1 Minimum standards for production of bovine frozen semen as per the Government of India

Artificial insemination (AI) using frozen semen has emerged as the most effective tool worldwide for achieving genetic improvement in livestock through the dissemination of superior germplasm. However, the success of AI programs depends critically on the quality of semen employed. This objective can only be realized when frozen semen strictly conforms to established quality standards. To ensure this, breeding bulls selected for AI programs must not only meet prescribed quality norms but also be free from infectious diseases, while semen collection, processing, and storage must follow standardized protocols. Adherence to these guidelines is fundamental for the production and distribution of high-quality semen that can support reproductive efficiency and genetic advancement. Conversely, any deviation from these minimum standards may result in the production of inferior semen, rendering it unsuitable for use in AI centres and undermining the goals of herd improvement.

2.2 Physical Examination: Before procuring new bulls for the breeding purpose at semen station, a through physical examination should be done by a qualified veterinarian. This examination helps to access the any abnormalities or symptoms of venereal transmitted diseases that could compromise the semen quality or total heard health. Before entering to the semen station, the breeding bulls must be certified from the qualified veterinarian that the semen is free from all venereal diseases.

2.4 Quarantine

A minimum period of 60 days i.e. called quarantine period is required before entering of the new bulls to the breeding farms or semen station. The entry of the bulls is strictly limited after the result of diagnostic tests. During this period the bulls should be kept in the isolated chamber away from semen station with all facilities. Dedicated manpower, equipment and feeding or cleaning tools must be used exclusively for quarantined animals to prevent cross contamination. While in quarantine, entered bulls undergo diagnostic screening for major contagious diseases including tuberculosis, Paratuberculosis, Brucellosis, Campylobacteriosis and Trichomoniasis. Although, Paratuberculosis is not a sexually transmitted disease but it is included in the Minimum standard protocols (MSP) due to its significant impact on herd production and animal's health. Bulls those are found positive on testing should be remove from herd immediately (Kaya *et al.*, 2021) [8].

Quarantine guidelines

A. Quarantine guidelines for adult breeding bulls with unknown diseases status

- In case adult breeding bulls, the period should be at least minimum 60 days or it can be long enough to allow at least two consecutive tests with a minimum interval of 30 days interval. It's very specific in cases of Tuberculosis and Paratuberculosis, the interval should not be more than 62 days between two tests.
- It's always advisable to shifting bull from the quarantine that should be move within 30 days from the date when the last test was performed and all bulls were negative.
- In cases of positive bulls during period, the bulls should be immediately removed from the herd and remaining bull should be kept under extended quarantine.
- Extended quarantine for a period of minimum 60 or long enough to allow at least two tests for the diseases mentioned above to be performed, from the day last positive bull was culled/removed. Performed one test within the 30 days of the extended quarantine.
- In rare cases, if the breeding bulls found positive during extended quarantine period, immediately remove the individual positive animals and in groups, remove all positive bulls.

B. Quarantine guidelines for adult breeding bulls with known health status

- In adult animals, those health status is known already, minimum 30 days or long enough to allow at least one test for all MSP diseases
- Shifting of bulls from the quarantine within 30 days of the last negative test.
- In cases of positive bulls during period, the bulls should be immediately removed from the herd and remaining bull should be kept under extended quarantine.
- Extended quarantine for a period of minimum 60 or long enough to allow at least two tests for the diseases mentioned above to be performed, from the day last positive bull was culled/removed. Performed one test within the 30 days of the extended quarantine.
- In rare cases, if the breeding bulls found positive during extended quarantine period, immediately remove the individual positive animals and in groups, remove all positive bulls.

C. Quarantine guidelines for calves having age more than 2 months

- In calves have age more than 2 months, quarantine period should be minimum 60 days or sufficient to allow at least two tests for each of the MSP diseases to be performed with a minimum interval of 30 days between the tests. In case of TB a PTB the interval between the test should not be more than 62 days.
- Shifting of calves from quarantine, within 30 days of negative results.
- In cases of positive bulls during period, the bulls should be immediately removed from the herd and remaining bull should be kept under extended quarantine.
- In case of TB and JD, remove the positive calf and put all the remaining calves under extended quarantine.
- In case of genital campylobacteriosis and Trichomoniasis tests conducted only one calves older than 6 months.
- Remove the positive calf and put all the remaining calves under extended quarantine.
- In Brucellosis positive, remove the positive calf irrespective of age and put all the remaining calves under extended quarantine or if the positive calf is less than 9 months old, isolate the calf till it is 9 months old age.
- Extended quarantine for a period of minimum 60 days from the day last positive calf was remove. Perform one test within the last 30 days of the extended period.
- If the calf found positive, immediately remove the positive individual animals from the herd and in groups remove all bulls in the group in which positive was delectate.

2.5 Testing of bulls

During quarantine period, diagnosis or testing of breeding bulls for different pathogenic organism is a crucial step to

maintain the biosecurity in semen station. According to WOAH guidelines, all breeding bulls must be free from TB, JD Brucellosis, Campylobacteriosis and Trichomoniasis before entering and use for the artificial programs. One-time testing during quarantine period is not enough to clearance of the organisms; bulls those are rearing in the breeding farms must undergo regular re-testing at regular interval to confirm their diseases free status. This regular screening is critical to maintaining the overall health of the semen station and ensuring the safe and high-quality semen productio.

Details of the diagnostic testing for Specific disease

Disease	Suitable diagnostic test	Suitable sample
Brucellosis	**ELISA**	**Serum**
Tuberculosis	PPD for Tuberculin test-DTH	Serum
Paratuberculosis	PPD for Jhonin tes-DTH	Serum
FMD	ELISA	Serum
Trichomonas	Microscopic demonstration of organism	Preputial washing
Campylobacteriosis	Microscopic demonstration of organism	Preputial washing

2.6 Vaccination schedule

To maintaining the health of breeding bulls and semen quality, vaccination is the most and best preventive measure. In the breeding farms, bulls should be vaccinated on regular basis. Specific vaccination against any diseases is carried out only done when outbreaks occur or where there is evidence of disease prevalence. For better quality production of semen, vaccination is ideally performed on rets days or should be done on immediately after semen collection (BonDurant, 2005) [2].

2.7 Community level biosecurity

The responsibility of semen stations has more responsibility as compared to individual breeding herd. As a broader preventive strategy, ring vaccination programs must be done in the surrounding 10 km radius of the semen station. This preventive strategy approach can strengthen regional biosecurity, minimizes the risk of diseases transmission in the peripheral livestock populations and provide additional protective layer (Thibier and Guerin, 2000) [12].

2.8 Culling policy in different specific diseases

Disease	Colling policy of breeding bulls
Food and mouth disease	Retain in the herd
Brucellosis	Castrate and remove from breeding herd
Tuberculosis	Remove from breeding herd
Paratuberculosis	Remove form breeding herd
Campylobacteriosis	Treat and retain in breeding farm
Trichomoniasis	Treat and retain in breeding farm

2.9 Housing

For the prevention of the transmission of pathogenic organism through semen it is necessary to maintain proper hygiene and should take the preventive ensure to ensure the check the transmission**.** For breeding bulls, housing should be cleaned by disinfectant compound containing glutaraldehyde. Formalin or phenyl-based compounds should never be used for the disinfectant in breeding bull's house because they cause eye irritation and also have the carcinogenic property. Weekly spraying of Sodium Carbonate (4%) solution shall also be practiced. Floor of the breeding house should be cleaned and sterilized by at once a year by a blowlamp or by burning straws. Affected breeding bulls immediately should be separated from the healthy animals for the safety of other healthy ones (Bielanski, 2007) [1].

3. Conclusion

In case of bovine the infertility can arise from the various pathogenic organism such as bacteria, virus, parasites are present in the reproductive tract and semen. However, implementation of solid, science-based control and preventive measures have potential to reduce the risk of contamination of semen and transmission of semen borne-diseases. Strictly bound to the international standards such as World organisation for Animal Health and the Certified Semen services ensures the least probability of pathogen dissemination. Key preventive strategies include strict quarantine of breeding bulls prior to introduction into any herds, comprehensive diagnostic testing during the quarantine period and regular screening of semen donors. Always prefer young bulls for breeding and donor purposes to reduce the risk of exposure of infection. In addition, ensure proper and timely vaccination and enforcing strict personal hygiene standard should be follows to get the superior quality of semen. Ultimately the consistent application of these preventive and biosecurity protocols not only protect the genetic potential disseminated through AI but also contribute to sustainable livestock production, complete herd health and long-time economic gains.

Conflict of Interest
Not available

Financial Support
Not available

Reference

1. Bielanski A. Disinfection procedures for controlling microorganisms in the semen and embryos of human and farm animals. Theriogenology. 2007;68:1-22.
2. BonDurant RH. Venereal diseases of cattle: Natural history, diagnosis, and the role of vaccines in their control. Vet Clin North Am Food Anim Pract. 2005;21:383-408.
3. CSS. CSS minimum requirements for disease control of semen produced for AI; 2014, p. 1-15.
4. Department of Animal Husbandry and Dairying, Government of India. Minimum standards of bovine frozen semen (Revised 2022); 2022, p. 1-156.
5. Given MD, Marley MSD. Pathogens that cause infertility of bulls or transmission via semen. Theriogenology. 2008;70(3):504-507.
6. Given MD, Riddell KP, Edmondson MA, Walz PZ, Gard JA. Epidemiology of prolonged testicular infection with bovine viral diarrhea virus. Vet Microbiol. 2009;20:4251.
7. Given MD. Risks of disease transmission through semen in cattle. Animal. 2018;12:165-171.
8. Kaya C, Akar M, Burcu E. Diseases transmission via semen in cattle: Importance and control strategies. J Anatol Environ Anim Sci. 2021;6(3):409-413.
9. OIE. Terrestrial Animal Health Code. Paris: Office of International Epizootics; 2017. Available from: http://www.oie.int/international-standard-setting/terrestrialcode/accessonline/
10. Parez M. The most important genital diseases of cattle (control, treatment and the hygiene of semen collection). In: Proc. 11th Conf. OIE Regional Commission for

Europe, Vienna. 1984 Sep 25-28;4(2):175-203.
11. Taylor MA, Marshall RN, Stack M. Morphological differentiation of Tritrichomonas foetus from other protozoa of the bovine reproductive tract. Br Vet J. 1994;150(1):73-80.
12. Thibier M, Guerin B. Hygienic aspects of storage and use of semen for artificial insemination. Anim Reprod Sci. 2000;62(1-3).

How to Cite This Article
Jatav M, Chouraisa R, Verma P, Sachan R. Diseases transmitted through semen in bovine and its preventive measures. International Journal of Veterinary Sciences and Animal Husbandry. 2025;10(9):163-167.