



Livestock Infertility and Its Impact

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There are many causes of infertility in farm animals, such as nutrition, physical disorders and infections, which may occur individually or simultaneously. Whether it is the cost of raising cattle or the loss of cash due to fewer cattle on the market, the financial loss can be very profitable. If the next calving season continues, more losses will occur, resulting in higher production costs and lighter calving the following year.

Major infertilities are anoestrus and repeat breeding.

Types of infertility

Anestrus

- Anestrus is considered as a problem when cows are not seen in heat. Failure to observe heat and heat detection must always be ruled out as the primary problem. Review the heat detection procedures and heat detection efficiency with the producer. Pregnancy can be a prominent cause of anestrus and must always be ruled out before anything else.
- **Ovarian Atrophy** : Ovarian atrophy is caused from nutritional problems and is most often seen in dairy cows with high production.

Non-Infectious Infertility

1. Managemental Causes: Breeding health can be judged from the conception rate within the herd. High conception rates within the herd can be maintained to certain extent by making adequate provisions for timely services from high fertile bulls over a suitably long period of time to give enough chance to the cows to express their fertility at proper time. The conception rate of a herd should be estimated as the percentage of females becoming pregnant to the first service. The conception ability of the individual animals and of the herd thus can be known and is not vitiated by the presence of individuals having sporadic type of transient forms of infertility. It is possible to ascertain the accuracy of the conception rate by subjecting all females to pregnancy diagnosis within 6 to 8 weeks after service. A satisfactory conception rate in a herd can only be maintained with the high degree of breeding fitness in majority of animals in the herd. It is usually observed that draught type breeds have better conception rates than the dairy type.

2. Nutritional infertility: Post partum nutrition is most important for fertility. If TDN is low both prepartum and postpartum, fertility suffers. Vitamin A had no effect on fertility, but may cause irregular cycles. Vitamin D deficiency suppresses signs of estrus and delays ovulation. Vitamin E deficiency may cause reproduction problems.

If the Blood Urea Nitrogen (BUN) is greater than 20 mg/dl cows may have low conception rates. The high BUN is from excess dietary protein. True anoestrus, lack of ovarian activity may be caused by anemia due to anaplasmosis, internal or external parasites, and deficiency of protein, iron, copper, cobalt or selenium. Impaired reproduction is also found in phosphorus deficiency, energy deficiency, cows losing flesh due to high production and/or underfeeding. Selenium or vitamin E deficiency may be associated with metritis.

Vitamins and minerals are often suspected in infertility and anestrus but little hard evidence supports these claims.

3. Hormonal infertility

- **Silent Heat**: Silent heat is generally not a problem and usually is manifested by unobserved heats by farmer. However, the first postpartum heat is normally silent, because there are no estrogen receptors. This is a result of the low postpartum progesterone.
- **Delayed Ovulation**: If a cow ovulates more than 18 hours after end of heat, then ovulation is said to be delayed. This may be diagnosed by palpation and can be treated with GnRH. This only occurs in < 2% of cows and is more likely to be a heat detection problem.

Infectious Infertility

1. Repeat breeder: A repeat breeder is defined as a cow that has calved before, is less than 10 years old, has normal heat cycles, has no palpable abnormalities has been bred 3 or more times and is not pregnant. Also if you look at fertility expectations in normal animals you see that 9% of normal cows would be repeat breeders. We normally assume a problem exists when the incidence is 10-15 %.

2. Fertilization failure: In normal heifers 100 % fertilization has been found one day after breeding. This drops to 85 % in cows, and to 60-70 % in repeat breeders. Therefore, repeat breeders seem to have more of a fertilization failure. If embryos are fertilized and transferred, one can have normal pregnancy rates. Release of PGF from inflammatory conditions such as mastitis can cause luteolysis and pregnancy loss. Inability to prevent PGF release (shown experimentally in a repeat breeder in response to oxytocin administration) causes return to estrus.

3. Metritis

Inflammation of the uterus is known as metritis. Cows normally have a red-to-brown discharge during the first two weeks after calving. If discharge persists beyond 2 weeks or if the discharge is foul-smelling, this is evidence of metritis. Possible factors involved are retained placenta, injury to the reproductive tract can occur due to a difficult calving or excessive force used to assist at calving. Injuries can also occur at the time of breeding or uterine treatment. Post breeding infusion in these cows is not routinely helpful.

4. Pyometra: A pyometra is a uterus filled with pus that has a closed cervix and a corpus luteum on the ovary. The pus prevents the normal luteolytic mechanism from happening. This results in anestrus. The fluid in the uterus mimics a pregnancy, so the cow do not return to heat. Treatment for this condition is administration of prostaglandin to lyse the corpus luteum.

Abortions

1. Definition and incidence: Abortion is defined as fetal death and expulsion between 42 (an estimated time of attachment) and 260 days (the age at which a fetus is capable of surviving outside the uterus) of gestation. The condition does not include fetal maceration and mummification. Pregnancies lost before 42 days are usually referred to as early embryonic deaths, whereas a calf that is born dead between 260 days and full term is defined a stillbirth. Abortion is the most important condition that limits cow's ability to produce a calf and considerably erodes the profit. The greatest risk of fetal loss is during the first trimester of gestation and then progressively decreases as gestation advances with a slight increase in the risk toward the last month of gestation.

2. Causes: infectious and non-infectious: Either infectious or non-infectious agents may cause abortion. The infectious causes include bacterial, mycotic, viral, and protozoal. Historically, it has been suggested that 50-65%, 20-25%, and 15-25% of infectious abortions

were caused by bacterial, fungal, and viral causes respectively. The non-infectious causes include nutritional factors, chemicals, drugs, toxins, poisonous plants, and hormonal agents. .

Infectious causes of abortion

(1) Bacterial: Bacterial abortions result from brucellosis, leptospirosis, campylobacteriosis (vibriosis), listeriosis, *Haemophilus somnus* complex, and ureaplasmosis. Bacteria like Salmonella, Actinomyces, Escherichia coli, Streptococcus, Staphylococcus, Bacillus, Pseudomonas, Proteus, Pasteurella, Nocardia, and chlamydia species, as determined by the microbiological findings, can cause abortion. All these organisms and few others that are not listed have been isolated from sporadic cases of abortion. These are secondary to either a septicemia in the dam or ascending infection through the vagina and cervix or due to persistent endometritis.

Brucellosis: Bovine brucellosis is the well known and most controversial infection of the bovine reproductive system. Brucellosis generally has been thought of as a cattle disease, but it is also seen in swine, sheep, goats, dogs, horses, and wildlife, and can be readily transmitted to humans. The disease represents a real occupational hazard for veterinarians, slaughter men, and cattle producers.

Brucellosis is caused by the bacterium *Brucella abortus*. The organism has an affinity for certain body tissues such as the udder, uterus, lymph nodes, testicles, and accessory sex glands. Because of its affinity for the uterus, abortion is the usual sign of the disease.

Leptospirosis: Leptospirosis is a contagious, bacterial disease of animals and humans. In cattle, horses, pigs, sheep, goats, and dogs, it has been characterized by a wide variety of conditions including fever, icterus (jaundice), hemoglobinuria (bloody urine), abortion, and death. However, the concept of this disease has recently changed. It is used to be considered a highly fatal disease, but is now thought to be a widespread, mostly subclinical infection of many species of wild and domestic animals.

Signs of leptospirosis in cattle range from mild, unapparent infections to acute infections that end in death. Clinical signs that precede abortions may suggest leptospirosis, highest abortion rate occurs in the last 3 months of gestation.

IBR (Infectious Bovine Rhinotracheitis or "Red Nose"): Infectious Bovine Rhinotracheitis virus is the cause of respiratory disease of cattle. However, in cows and heifers, this virus can also cause vulvovaginitis (inflammation of the vulva and vagina) and abortion. Abortion typically occurs about 20 to 45 days after infection. The control of IBR infections can be accomplished by the use of vaccines.

(2) BVD (Bovine Virus Diarrhea): Bovine Virus Diarrhea virus infection can cause abortion, weak calves at birth, calves with brain damage (cerebellar hypoplasia) or other abnormalities of fetal development. Clinical signs in newborn calves infected with BVD can include fever, nasal discharge, diarrhoea and inability to move about normally (ataxia).

A diagnosis of BVD virus infection requires laboratory examination of the fetus or calf. A blood test may aid in the identification of infected cattle.

Non-Infectious Causes of Abortion

- **Nutritional :** Starvation may result in placental insufficiency and abortion, however, it rarely occurs in a modern dairy practice. Vitamin A deficiency has been suggested to result in thickening and degeneration of placenta and abortion in late gestation. Iodine deficiency has also been suggested as a cause of abortion.
- **Chemicals, drugs, and toxins :** Toxic agents may also cause abortions or early embryonic deaths. Cattle are susceptible to fertilizer nitrites and nitrates or the nitrates found in plants under certain conditions (e.g. drought-stress). If a cow is exposed to sufficiently high levels of nitrates/ nitrites (-.55 % or greater nitrate in forage), abortions may occur, especially in late gestation. Mycotoxins from the fungal agents are suspected to cause abortion. Bacterial endotoxin is responsible for sporadic abortions.

Important point to improve fertility: When reproductive efficiency reduces there is need to take help of veterinarian, artificial insemination (AI) technician, feed company representative and other resource people to troubleshoot the causes and determine solutions to the problem.

1. Management causes of infertility

- On-site studies and fertility clinics conducted by veterinarians will provide information on fertility. This will also help plan future breeding and production in the livestock sector. As reproduction is directly related with production, better fertility will reduce the production loss and improve the economy of dairy industry.
- Use of advance scientific knowledge to reach root causes of the problem and use of technologies like synchronization of estrous, ultrasonography, culture and antibiotic sensitivity test for diagnosis etc by field workers will help to improve fertility status.
- For the maintenance of high breeding efficiency, it is primarily essential to maintain good level of general health, and thus prevent the onset of debilitating diseases. Animals do resist field by field veterinarians will adverse influences which might interfere with the genital functions, but the resistance is largely dependant on the inherent power of constitutional fitness to a great extent.

2. Endocrinological (Hormonal imbalance) infertility: Feeding on leaves/waste should be avoided. If ovulation is delayed, consult your veterinarian for help. The use of hormones should be limited and used only when unavoidable.

3. Infectious Infertility: Keep records of herd vaccinations, movement of cattle to and from other areas, and management and history of bulls. Keep records of the cow's reproductive history, including number of abortions, pregnancy rate, and estimated calving date. Whenever an abortion occurs, identify the aborted cow and isolate her from the rest of the herd. This helps prevent infection.