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Repeat Breeding and Its Treatment in Farm Animal

Chirayu N. Patel*, Richakumari M. Patel
Department of Veterinary Gynaecology and Obstetrics, College of Veterinary Science & Animal Husbandry, Kamdhenu University, Anand-388001
Corresponding author: *richa13022001@gmail.com*
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Introduction

Repeat breeding is one of the most common and reproductive problems faced by dairy farmers. A cow that looks healthy, comes in heat regularly and has calved before but still fails to conceive even after three or more successful inseminations is called a repeat breeder. Such animals appear normal externally, but silently affect farm economics by increasing veterinary expenses, prolonging calving intervals, reducing milk production, wasting valuable semen doses and economic loses.

What is Repeat Breeding?

A repeat breeder animal is one that:

- Comes in heat normally (Normal oestrous cycle)
- Has calved at least once
- Has been successfully inseminated 3 or more times with good-quality semen
- Has no any reproductive abnormalities
- Shows no palpable defects in the reproductive tract

Repeat breeding occurs primarily due to two major reproductive failures. In some animals, fertilization does not take place (fertilization failure), even though the cow shows normal heat signs and is inseminated properly. This may happen because of poor-quality eggs or sperm, improper timing of insemination, hormonal imbalance, infections in the reproductive tract or management errors. In other cases, fertilization does occur, but the embryo fails to survive beyond the early stages of development. This early embryonic death can result from uterine infections, low progesterone levels, stress, nutritional deficiencies, heat stress or genetic defects (anuploedy) in the embryo. Together, these two failures, lack of fertilization and early

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embryonic loss form the core reasons behind repeat breeding in dairy animals (Diskin and Morris, 2008).

Repeat breeding occurs mainly due to two outcomes: fertilization failure and early embryonic death. These outcomes arise from a variety of factors, including genetic or congenital defects in the ova or spermatozoa infections or inflammatory conditions of the reproductive tract, hormonal imbalances affecting ovulation and uterine function and poor management or nutritional deficiencies (Mandefro and Negash, 2014). All these factors interfere with normal fertilization or disrupt early embryonic development, ultimately leading to repeat breeding.

1. Genetic or Congenital Problems

- Defective chromosomes
- Genetic mutations
- Aging of the ova or sperm

When the genetic material is abnormal, the embryo fails to develop even if fertilization occurs.

2. Infections of the Reproductive Tract

Inflammation of the uterus, cervix or vagina creates a hostile environment for sperm, Venereal diseases like Vibriosis, Trichomoniasis, IBR/IPV, Brucellosis and certain Mycoplasma infections can also cause early embryonic death.

3. Hormonal Imbalance

Proper timing of ovulation and adequate progesterone levels are essential for pregnancy.

Common hormonal issues include:

- Delayed ovulation
- Cystic ovaries
- Poor LH release
- Low progesterone
- Deficiency of oxytocin (Singh *et al*., 2017)

These disturbances affect ovulation, sperm transport, fertilization and embryo survival.

4. Poor Management Practices

- Poor heat detection
- Insemination at wrong time
- Improper semen storage or thawing
- Rough insemination technique
- Stress due to handling, heat or transport

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- High crude protein diet
- Negative energy balance

(Westwood *et al*., 2002)

These factors cause aging of ovum or sperm, early embryo loss or uterine enviromental problems.

Early Embryonic Death: A Silent Problem

Early embryonic death (within16 days after AI) is often unnoticed because the cow returns to heat normally.

Causes of Early embryonic death

- Heat stress
- Malnutrition
- Progesterone deficiency
- Uterine infection
- Genetic abnormalities

Management with respect to cause

- The most common approach to manage repeat breeding is pre-AI and post-AI antibiotic therapy. Typically, 10 lakh IU penicillin or 1 g strepto-penicillin is dissolved in 20-30 ml distilled water, while some veterinarians use ampicillin-cloxacillin (250 mg) or gentamicin (200 mg/5 ml) in 30 ml water.
- An alternative method is intrauterine infusion of 150 ml of 1% Lugol's iodine, administered 6 hours before or after insemination.
- Pre-AI treatment is given 5-6 hours before AI, while post-AI treatment is given 3-6 hours after AI. Additionally, parenteral strepto-penicillin (2.5 g) is administered on day 4 and day 10 (Khair *et al*., 2018), coinciding with embryo movement into the uterus and zona hatching, ensuring effective control of uterine infection.
- To reduce embryonic mortality from heat stress, inseminated cows should be kept in a cool environment with ample shade and water for 15 days post-AI (Ferreira *et al*., 2011).

1. **Progesterone deficiency:**
    - The corpus luteum produces progesterone and if it is poorly formed or under-functioning, pregnancy failure may occur.
    - To support luteal deficiency, progesterone supplementation is given 3-5 days after insemination and continued for 2-3 weeks, improving conception rates.

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- Alternatively, hCG (2000 IU IM or 1000 IU IV) on day 5 post-oestrus induces ovulation of the dominant follicle and forms an accessory corpus luteum, increasing progesterone levels and reducing embryonic mortality often more effectively than progesterone alone.
- Additionally, GnRH (Buserelin 10 µg or 2.5 ml) on day 11 post-insemination helps reduce embryonic loss by lowering oestradiol and subsequent PGF2α release during early pregnancy (Kharche *et al*., 2007), giving the embryo more time to produce interferon-tau for maternal recognition of pregnancy.

2. **Deficiency of oxytocin:**
   - The lack of tonicity of uterus in an oestrous animal may be due to deficiency of oxytocin. These animals may pass large quantity of urine when examined per rectally (Kharche *et al*., 2007).
   - 30-50 IU oxytocin should be injected intramuscularly after insemination.
3. **Poor Management in AI**
   - Avoid exciting the animal 15 minutes before, during and after AI, as adrenaline reduces oxytocin and sperm transport.
   - In cattle, gently massage the clitoris 2-3 times after AI to aid sperm movement and ovulation.
   - Pour cold water on the back post-AI to stimulate abdominal and uterine muscle contractions for sperm transport.
   - Allow 15 minutes of rest after AI for sperm to reach the utero-tubal junction.
   - Advise owners to check vulvar mucosa for pus-flakes for three days; treat endometritis in the next cycle if present.
   - Thaw frozen semen properly and inseminate within a few minutes.
   - Use correct AI technique: deposit semen just past the anterior cervix or in the uterine body to prevent genital trauma. (López-Gatius, 2012)
4. **Energy Deficiency and Fertility:**
   - If energy deficiency is suspected, give 20% dextrose IV 1-2 hours before AI.
   - Animals should be in **positive energy balance**; underfeeding can cause delayed ovulation, anovulation and early embryonic death. Concentrate feed should contain 2% mineral mixture.
   - Energy deficiency affects fertility through:
     - **GnRH system:** Poor nutrition reduces FSH and LH secretion, leading to delayed ovulation, anovulation, or embryonic death.

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- **Metabolic regulators:** Negative energy balance lowers glucose, insulin, and IGF-1, while increasing Non-Esterified Fatty Acids (NEFA), affecting gonadotropin secretion and follicle development. NEFAs may also be directly toxic to follicles and oocytes.

5. **Suggested line of treatment**
   - On the day of oestrus, ciprofloxacin and tinidazole combination should be given intrauterine for 3 to 5 days. Insemination should not be done in this cycle.
   - In the next cycle, 500 ml. 20% dextrose should be given intravenously two hours prior to insemination.
   - Immediately after AI, 1500 IU hCG or 2.5 ml. receptal should be injected.
   - 30 IU oxytocin should be given intramuscularly if atonicity of uterus is suspected.
   - After 5 days of insemination, 500 mg progesterone (2 ml, duraprogen) should be given intramuscularly and repeated again on day 10.
   - Parenteral antibiotic (preferably Streptopenicillin) should be given on day 5 and on day 10.
6. **Crude Protein and Fertility:**

- High dietary Crude Protein (CP), especially Rumen Degradable Protein (RDP), increases ammonia and urea in blood and uterus, which can harm sperm, impair uterine function and reduce embryo survival.
- 20% CPDM increases the risk of retained fetal membranes, dystocia and postpartum metritis compared to 13% CP.
- Inclusion of undegraded Rumen Protein (UDP) like soybean or fish meal can mitigate RDP's negative effects.
- Protein in silage and barley is mostly degradable, whereas soybean and fish meal provide more UDP.

Summary

Repeat breeding is a multifactorial problem. To control it:

- Ensure proper heat detection
- Use high-quality semen
- Improve AI timing and technique
- Manage stress and heat
- Treat hidden uterine infections
- Correct hormonal issues
- Provide balanced nutrition

Early diagnosis and targeted treatment can significantly improve conception rates.

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Conclusion

Repeat breeding remains one of the most challenging reproductive issues for farmers and veterinarians. With the right combination of **management, nutrition, disease control and hormonal therapy**, fertility can be restored in many cases. Healthy cows, accurate heat detection, hygienic AI practices and a stress-free environment are key to reducing repeat breeder cases and improving overall herd productivity.

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