

Strategies to Improve Herd Fertility and Conception Rate in Bovines

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Introduction

Herds witnessing low pregnancy rates faces an array of possible cow and management inefficiencies. Reduced health and compromised immune function, poor estrus detection system, improper heifer management, extended anovulatory periods, improper nutritional management, and increased early and late embryonic mortality, are some of the key factors that lead to low conception rate in the dairy herd.

Conception rate has historically been used as a key indicator of the reproductive success of many dairy herds. It can be defined as the number of services needed to establish a viable pregnancy (Cook *et al*, 2009). The desired pregnancy depends on a combination of numerous factors that can impact an individual cow's ability to conceive, consequently affecting the herd's overall performance. Conception rate provide the essential data for determining pregnancy rate, with higher rates leading to increased expected annual income per cow. Conversely, pregnancy losses incur significant expenses and economic losses to the farmers.

Factors affecting conception rate

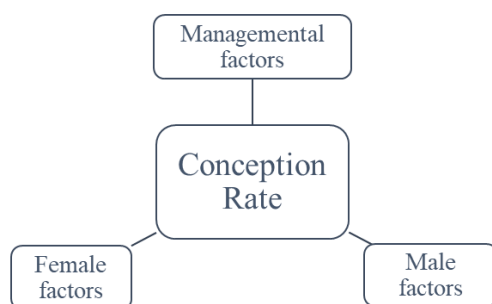


Fig 1 Factors affecting conception rate in bovines

- 1. Uterine health:** The intrauterine environment plays a crucial role and serves as an indicator for subsequent fertility outcomes. Cows with uterine infection in the early postpartum period generally have lower conception rates at subsequent breeding upto 20% (Arthur *et al.*, 2019).

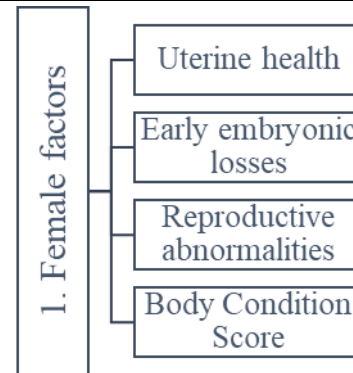


Fig 2 Female factors affecting conception rate in bovines

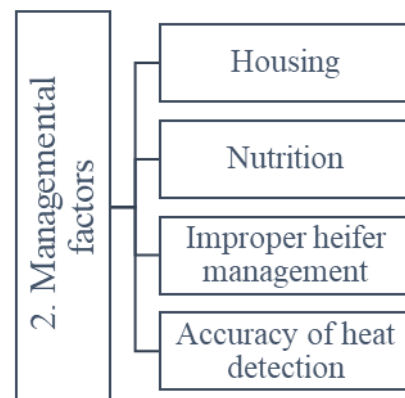


Fig 3 Managemental factors affecting conception rate in bovines

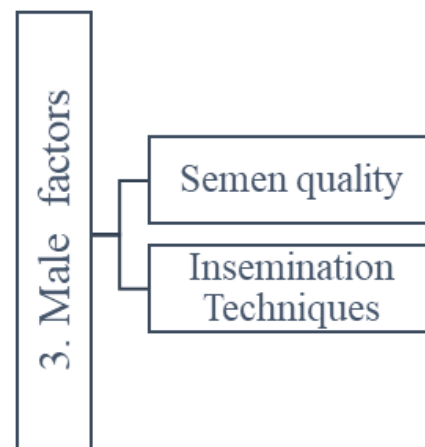


Fig 4 Male factors affecting conception rate in bovines

- 2. Accuracy of heat detection:** Successful fertilization highly depends on the time interval from insemination to ovulation. If insemination is

done too early, the sperm will have aged by the time ovulation occurs, making it incapable of fertilizing the ovum; if insemination is done too late, the egg will have aged and there is less chance of fertilization and the formation of a viable embryo. Therefore, the low heat detection efficiency in farms (between 50 and 60 percent) will frequently lead to a higher rate of pregnancy failure because of inadequate fertilization (Scheifers *et al.*, 2010)

3. **Body condition score:** Body condition score (BCS) is the best method of monitoring energy balance in adult dairy cattle (Arthur *et al.*, 2019). There are strong links between BCS and reproductive performance, with BCS at calving and mating tending to be positively associated with reproductive performance and increased loss of BCS being negatively associated.
4. **Improper heifer management:** Rearing heifer replacements is one of the biggest costs on a dairy farm, so lack of quality heifers in the replacement stock will lead to long term reproductive and productive losses due to increased culling rates (Arthur *et al.*, 2019). Therefore, heifer management in herd necessitates the need of good reproductive performance in their first and subsequent breeding seasons.
5. **Reproductive abnormalities:** Cows with any reproductive abnormality, such as dystocia or endometritis, may have only a short time to restore normal function before the start of the breeding season (specially reared under a planned breeding system). It is thus obvious that a high proportion of cattle in planned breeding systems in herds fail to show oestrus before the start of the breeding season. Improper diagnosis and management of anestrus and cystic ovarian diseases are also a major cause of reduced conception rates on the farm (Butler *et al.*, 1984).
6. **Early embryonic losses:** Reproductive losses post fertilization (i.e., 6 to 16 days after insemination) are observed as a first return to heat. In heifers, this will typically reduce conception rates by a further 20 to 25 percent, but reductions of 40 to 50 percent in conception rate or more can occur in cows. Therefore, the main constraint on the conception rate in the dairy herd is the rate of early embryonic death that occurs before day 21 post-insemination.
7. **Nutrition:** Nutritional status of animals can affect fertility (Lucy, 2012). Negative energy balance due to poor nutritional management causes sub-fertility during the 6-week postpartum period i.e.

the period of recovery of energy balance particularly during the first 2-5 estrous cycles postpartum, may lead to metabolic diseases and ultimately cause reproductive losses (Roche, 2006). Optimum nutritional conditions are also necessary both at the level of the oocyte and embryo for follicle growth and optimum conditions for embryo survival.

8. **Housing:** The housing system has an impact on estrus behavior expression. Comfortable and planned housing allows cattle to interact throughout the day and provides more opportunity for mounting and standing behavior to be expressed which enable to identify estrus cow easily.
9. **Semen quality:** Semen quality is the key factor to be considered as impacting the pregnancy rate to first service. The importance of semen handling and processing to achieve threshold or above threshold number of sperms to the ovum necessary to maximize both fertilization rate and embryo quality for a general population of bulls. For artificial insemination to be carried out for the optimum conception rates the semen quality should be checked accurately (Youngquist and Threlfall, 2006).
10. **Insemination Techniques:** One of the most significant contributions to the successful application of AI in cattle breeding has been made by the highly trained inseminator. The efficiency of cow insemination depends, on the ability of the inseminator to deliver the semen to the appropriate site in the reproductive tract at the appropriate stage of estrus.

Recommendations to improve conception rate

- Effective veterinary intervention is essential for optimizing conception rates, with a focus on preventing post-calving disorders rather than relying solely on treatment after they have already manifested. The incidence of metritis and subclinical endometritis be reduced so that cows entering the breeding period are most fertile and can respond to the programmed system of reproductive management.
- A Successful heat detection methods and subsequent proper timing of insemination should be required in increasing reproductive efficiency and conception rates (Muller *et al.*, 2018).
- Technique and site of semen deposition is the sole of factor to achieve pregnancy, which inseminators have to give an attention.

- Managements of heifer replacements is essential to produce quality heifers that will have long and productive lives, for this regular monitoring is essential.
- Consecutive weight measurements can be used to calculate the rate of weight gain, at 3 months (weaning), 11–12 months (puberty), 14–15 months (breeding), and 22 months (precalving), the recommended targets for live weight for heifers should be 20% of mature live weight, 50% of mature live weight, 60% of mature live weight and 90% of mature live weight respectively (Arthur *et al.*, 2019).
- Formulation of ration should be balanced such that it fullfills the dry matter requiriment of the animal (2-2.5 kg/100kg body weight for cattle and 2.5-3 kg/100kg body weight for buffalo and crossbred cow per animal per day). Additionally salt and mineral mixture should also be given @ 1% of concentrate mixture.
- Cows with anovulatory anoestrous are recommended that they should be treated with a synchronisation programme followed by timed AI, so that synchronised cattle are inseminated on the first day of the breeding season in a planned breeding system (Cook, J., 2009).
- Regular training sessions and workshops are necessary to enhance the skills of inseminators. Additionally, it is crucial to strengthen the extension system and raise awareness among cattle owners about identifying and timely reporting signs of estrus in their animals.
- Extension service should also ensure that farmers get adequate information on the input required to benefit from dairy cows and from those of higher genetic merit.
- To maximize the effectiveness of insemination, post breeding heat detection (detection or return heats) must be high.

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