

Popular Article

Factors affecting Conception Rate in Cattle and Buffaloes: An Overview

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Introduction

Conception rate (CR) is a measure of a cow's fertility at breeding. It is expressed as a percentage and calculated by dividing the number of pregnant cows by the total number of inseminations in the herd multiplied by 100. Respectable overall rates are 50-55% and should be highest at first service. The CR at first service is also the indicator of the overall CR because all cows are in this calculation, including problem breeders culled later in their lactation. Conception rates are confounded by such factors as the physiologic fertility of the cows, semen quality, time of insemination, and insemination techniques. It is not an easy variable to improve, other than to make sure good-quality semen is being properly inserted into a healthy uterus. CR is one of the best indicators of the reproduction efficiency of a herd or farm; hence, good record-keeping is essential.

Factors affecting conception rate

a. Estrus detection

Identification of the proper time of estrus is one of the crucial factors that can

result in improper timing of insemination and that results in suboptimal conception rates. Faulty detection of estrus generally occurs in herds that breed a large number of cows and buffaloes on the basis of ancillary signs of estrus. The consequences of improper timing of estrus detection lead to too early or too late natural mating (NS) or artificial insemination (AI), because by this time spermatozoa and ovulated oocyte become aged, leading to fertilization failure or embryonic mortality. In small-scale livestock, owners can easily identify their oestrus cows easily based on the external signs by visual observation; nevertheless, teaser bull parading has no parallel. Oestrus animals show many signs, such as bellowing, restlessness, mounting over other animals, standing to be mounded, oedema of the vulva, cervical mucus discharge, etc. Among the oestrus signs, the most important is standing to mount (standing heat) and clear cervical mucus discharge through the vulva. Homosexual behaviour seen in cattle is rare in buffalo. In Buffalo, absence of mounting behaviour and scanty or no mucus discharge limits the detection of improper estrus by visual observation, and hence, teaser bull is essential to identify the proper time of estrus. A serum or milk progesterone assay can help to study the reproductive status of

cows on the day they were inseminated. The serum and milk progesterone concentrations are <1 ng/ml and < 3 to 6 ng/ml, respectively, on the day of oestrus in cows and buffaloes. When progesterone levels are high in milk samples obtained on the day of breeding, the cow is not in oestrus, and insemination is likely to fail in the absence of ovulation.

b. Timing of Insemination

For a better conception rate, cows should be bred at a time that will ensure that healthy, viable spermatozoa are present at the site of fertilization when the fertilized oocyte arrives within 24 hours following ovulation. Thus, to accurately “time” the insemination, one needs to predict when ovulation will occur. Standing estrus behaviour is the most reliable sign for predicting when cows will reach the optimum time of estrus and ovulation and, therefore, when they should be inseminated. This is based on the fact that ovulation occurs 24 to 30 hours after the animal first stands to be mounted. The animal should be bred after 12 hours of beginning of standing heat (mid to late oestrus) for better conception rates, .e., the AM-PM schedule must be followed for insemination.

c. Insemination Technique

Faulty insemination technique is a one of the major factors that causing low conception rate in many herds and field condition. Deposition of post-thaw semen at the body of the uterus is critical as compared to deposition of semen at mid part of the cervix. The major difference between AI technicians with high conception rates and those with low rates is depending upon the site of semen deposition. The conception rate is 10%

higher for semen deposited in the body of the uterus as compared to intra-cervical insemination. Proper hygienic practice is of paramount importance at the time of insemination.

d. Semen Quality

In order to maximize the conception rate in cows and buffaloes, good-quality semen must be used during the time of insemination. Semen quality at the time of insemination is dependent on the quality of semen at the time it was produced or purchased, storage conditions, thawing procedures, and handling techniques.

e. Thawing of cryopreserved semen straw

Frozen semen is essential to thaw before practicing AI to bring it on body temperature from ultra-low temperature (-196°C). Semen straw should be thawed at a temperature between 35 to 37°C for 30 seconds in water.

f. Milk Production

The conception rate may decrease with the increase in milk production, though controversial reports are available in the literature, some suggesting an effect and others no effect. It seems reasonable to conclude that excellent nutritional and reproductive management may effectively compensate for any negative effect that high milk production has on reproduction.

g. Age of the animal

Conception rates are around 10% higher in heifers as compared to parous cows or buffaloes and are higher in primiparous cows than that of the older cows that attained the 4th or more parities.

h. Temperament of animal at the time of Insemination

Temperament of animal during AI period is important and influences the conception rate of animal. Some animals remain docile, and some are more aggressive during the time of insemination. Viciousness may adversely affect the conception.

i. Stress

Low conception rates are observed when temperature and humidity are high. Heat stress on the day of breeding and the day after seems to be the cause of the conception failures, which may be due to fertilization failure or early embryonic mortality. Conducive environmental temperature is required up to 7 days post-AI or breeding. Efforts should be made to reduce the thermal stress during hotter months by providing shade, a cold-water bath, and sufficient green fodder for animals. Similarly, during winter, dam's cold shock to spermatozoa after thawing should be avoided by taking extra care, as spermatozoa are more sensitive to temperature shock. Stress related to undernutrition, transport, disease, overcrowding, etc. should be avoided necessarily to ensure timely pregnancy establishment.

j. Health disorders and postpartum complications

In many cows, the search for factors causing low conception rates begins in the calving area. Failure to provide a neat and clean environment and/or failure to practice good hygiene when examining and assisting cows at calving leads to retention of the foetal membrane and postpartum uterine infection. These disorders slow down the normal postpartum events such as uterine involution, ovarian rebound, and resumption of cyclicity. If delaying in

postpartum reproductive tract repair processes could reduce conception rates, especially if they do not receive timely and effective treatment. The key to maximising conception rates lies in the prevention of disorders rather than treatment on occurrence.

h. Interval from Calving to Breeding

Conception rates are reduced in cows bred before 45 to 60 days after calving. A voluntary waiting period of 50–60 days after calving is recommended.