

Review Article

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## Repeat Breeding: A Dent to Dairy Farm Economy

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### ABSTRACT

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Cattle and buffalo are major livestock species for milk production contributing significantly to the economy of our country. High conception rates are crucial in a successful dairy farm to obtain a calf a year and sustained milk production. However, Repeat breeding continues to pose a major threat to economy of a successful farm. The main causes that convert high milk yielding dairy cattle and buffaloes into repeaters are mainly conception failure and early fetal death which may further have varying infectious and non-infectious etiologies, thereby severely disrupting the income.

### Introduction

Cow or buffalo having healthy and serviceable reproductive tract fails to conceive even after three or four artificial inseminations is known as repeat breeder. It results in financial crisis due to decrease in lactation yield, increased medical expenses, calving time, insemination cost and killing rate in cattle and buffalo (Ariane Bonneville-Hébert *et al.*, 2011) (Aghamiri *et al.*, 2020). The major challenge in today's dairy farming is attaining gestation in high yielding cattle in prompt and reasonable expensive way (K A Weigel, 2004). Repeat breeding is one of most crucial genital tract disorder in cattle and

buffalo which varies with fecundate failure, early fetal death, region, management and environment. Various investigations have recorded that many components results in repeat breeding syndrome like genital tract infections, any anatomical dys functioning of genital tract, hormonal imbalance and host defense mechanisms against semen (Asaduzzaman *et al.*, 2016). However age, parity, body condition score and high milk production may also influence the manifestation of repeat breeding in cattle. Out of all climatic conditions is the vital element responsible for repeat breeding in cattle and buffalo as heat stress decrease time and vigor of estrus signs results in silent ovulation

(Singh *et al.*, 2017) (Amjad Khan *et al.*, 2016). While RB is multifactor syndrome but the quality of egg plays an important role in manifestation of this disease as poor quality egg results in low conception rate and early fetal loss (Roberta Machado Ferreira, 2016). However the particular etiologies of RB are not transparent (Muhammad Yusuf *et al.*, 2010). The prevalence of repeat breeding is much greater in crossbred cows (17.57%) as compared to buffaloes (12.74%) and indigenous cows (8.64%) (Shailendra Verma *et al.*, 2018). Prolificacy issue in buffaloes are not frequently identified, a very few cases of RB syndrome are investigated as buffaloes are more adoptive to the hot climate conditions as compare to cows (Saraswat and Purohit, 2016). Early embryonic loss occurs in first 42 days of gestation during which implantation and growth of organs takes place. At day 17 upto 80%, between day 17 and 42 near about 10-15% and after day 42, 5% embryonic mortality happens. High yielding and beneficial dairy is based on the good reproductive health of dairy cattle (Rashed Khan Barson *et al.*, 2019). Endocrine secretions of uterus have pessimistic affect due to reduced progesterone and estradiol concentrations in blood of high milk yielding dairy cattle (Dagvajamts, BADRAKH, 2020).

The major challenge in today's dairy farming is attaining gestation in high yielding cattle in prompt and reasonable expensive way (Weigel, 2004). This review article addresses some of the direct or indirect factors responsible for repeat breeding in dairy cattle

### **Predisposing factors for repeat breeding in dairy cattle**

Various factors are responsible repeat breeding in dairy cattle which includes number of calving, reproductive tract infections, milk yield and semen quality and poor fecundity described below.

### **Calving season**

Dairy cattle and buffaloes are seasonal breeder animals which show reduced breeding interest in hot season which is reflected by decreased estrus cycle functioning and low fertilization rate. Few researchers describe that temperature has adverse effect on fertility traits in dairy cattle. Incidence of peak calving during monsoon and cold season indicates the highest fertility of dairy animals during months of September to December in India (Abayawasna *et al.*, 2011). LH and progesterone secretion is reduced due to high level of blood prolactin during summer season. The gestation rate and fetal death rates in buffaloes were 58.0% and 7.3% during breeding season (Francesco *et al.*, 2012) whereas Nyman *et al.*, (2018) reported 90% breeding rate and 29% embryonic death in cattle. Ideal corpus luteum and progesterone level of blood are essential for maintaining pregnancy that reveals the highest occurrence of fetal death and results in repeat breeding (Saraswat and Purohit, 2016).

### **Metabolic disorders**

High yielding dairy cattle require good quality feed to meet their requirement for maintenance and milk production. The poor feed quality results in high burden of metabolic disorders due to negative energy balance like subclinical ketosis. Body condition score is also associated with repeat breeding (Asaduzzaman *et al.*, 2016). Metabolic disorders have negative effects on prolificacy.

### **Peri-Parturient Diseases**

Uterine involution includes reduction in size of uterus and removal of remnants of caruncles and renewal of endometrium. Post-partum uterine conditions support the

microbial infections resulting in delayed uterine involution. Unnatural calving and post partum diseases like endometritis, metritis, dystocia and retained placental membranes are connected with low productivity and fertility results in repeat breeding (Sheldon *et al.*, 2008). Negative energy balance results in dysfunctioning of host immune system (Adnane *et al.*, 2017) and delayed uterine involution which can raise the post-partum uterine diseases (Abuelo *et al.*, 2014).

### **Order of Parity and Age of Female**

There is remarkable 0.6 times reduction in rate of fertilization in high yielding dairy cattle and 0.75 times higher than median parity cows (Hay *et al.*, 2019). The occurrence of RB syndrome is high i.e. 17.07% in age group of 4 to 6 years and lowest in 6 to <8 (14.15%) years. It is reported that age has negative impact on prolificacy of animal (Nishi *et al.*, 2018). Both remarkable and non-remarkable effect of parity is observed in buffalo (Thirunavukkarasu and Kathiaravan, 2009).

### **Nutrition**

Nutrition plays a crucial role in preservation of animal health and fertility. The connection of reproduction and nutrition is matter of rising significance and their relation has been investigated to have involvement for reproduction potential (Ibtisham *et al.*, 2018). Micro nutrients such as Cu, Co, Zn, Fe, Se, I, Mo, Mn and some macro elements like K, Ca, Na, Cl, P are found to be very essential for normal livestock growth and performance. Normally roughages and green fodder are deficient in micro and macro minerals (Satapathy *et al.*, 2018). Imbalances and inadequacy of these minerals results in reproductive tract disorder that's why minerals are crucial for vigorous fertility of animal (Ibtisham *et al.*, 2018).

### **Causes of repeat breeding in dairy cattle**

The causes of repeat breeding syndrome are multi-factor. Etiology of RB is categorized in several ways but failure of fertilization and early fetal death had been precedent classification of causes of repeat breeding. Both male and female, environment and management factors are responsible for repeat breeding which are discussed below.

### **Female factor responsible for RB**

#### **Ovulation disruption**

Failure and delay in release of ova and cysts on ovary contributes in conception failure. The prevalence of cystic ovaries ranges between 2.7% to 15.1% in cow (Cattaneo *et al.*, 2014) and 0.5%–1.48% in buffalo (Raju *et al.*, 2007).

#### **Other Ovarian Pathologies**

Fallopian tube blockage inhibits the fertilization because of hydrosalpinx, pyosalpinx, salpingitis and any growth in fallopian tube. The incidence of oviduct abnormalities varies between 6-15% of adult cows (Kumar and Singh, 2018) and 0.04% to 6.4% in buffaloes (Modi *et al.*, 2011) (Vala *et al.*, 2011).

#### **Metritis and Endometritis**

There are very high chances of microbial contamination within fifteen days of calving due to opening of cervix in cattle. But it is observed that cows are very effective in removing contaminants from uterus but due to high milk production and negative energy balance cows fail to remove the debris and contaminants from uterus resulting into metritis, endometritis. Near about 40% dairy cattle suffer from puerperal problems (Opsomer and Kruif, 2009). Gahlot *et al.*,

(2016) studied that prevalence of clinical endometritis was 16.67%.

The quality of oocyte plays an important role in implantation. The impact of post partum diseases on egg quality is not recognized.

### **Male factors responsible for RB**

Bulls for breeding purposes are selected at early age, trained for semen donation. Selected bulls are culled at any age due to fertility problems which may be hereditary, climatic and poor management of bulls. Similarly as in dairy cows/buffalo environment has major impact on fertility of bull (Khatun *et al.*, 2013). Other factors include collection interval and collection frequency. A single bull can be used for mating 40 cows and thousands of cows by means of artificial insemination that's why fertility of bull is very important. Subfertile bulls can adversely affect the financial conditions and maintenance of livestock/dairy farm (Kastelic, 2013). Quality of semen can arise to repeat breeding syndrome in dairy cattle. Semen quality is most important factor effecting conception rates to artificial insemination and natural mating (Kumar *et al.*, 2014).

As with time use of AI increases in cows and buffaloes most crucial observations for maximum fecundity includes insemination technique, time of insemination and site of semen deposition. AI conception rate depends upon the expertise of the technician ranges amid 25.40% to 37.83% in buffaloes (Sharma *et al.*, 2008) and 46.15% to 54.91% in cows (Potdar *et al.*, 2018).

### **Early Embryonic Death**

The death of fetus within first 15 to 21 days of artificial insemination or natural mating is known as early embryonic death. The etiology

of early fetal mortality can be divided into infectious and non-infectious types. About 70% EED occurs due to non-infectious causes (Vanroose *et al.*, 2000). Non-infectious causes include chromosomal abnormality, hormonal balance, disturbance in mother-fetus interactions and inbreeding etc. 20% of total early fetal loss occurs due to chromosomal abnormality in dairy cows (Shah, 2019) (King, 1990). Progesterone produced by the CL is essential for the establishment and maintenance of pregnancy and deficiency of progesterone results into early embryonic death which does not occur frequently. Infectious causes may be due to proliferation of some specific and non-specific bacteria, virus and protozoa which results into unfavorable conditions of uterus for implantation of fetus.

The incidence of EED ranges between 20-50% embryonic and fetal death has been observed in apparently normal healthy animals of all domestic species including bovines (Arthur *et al.*, 1989).

### **Management strategies for repeat breeder cow and buffalo**

As mentioned earlier climate play important role in fertility of cows and buffaloes during hot humid season cool surrounding should generate through plantation. Good quality feed should be fed should be fed to the animals as per recommendations of bureau of Indian standards. Mineral mixture supplements are essential at the rate of 2% of ration to full fill the daily requirement of animal. Cull the animals with any congenital reproductive anomaly. Do not inseminate the heifer which is under weight that is less than 300kg. Only veterinary doctors/ veterinary technician should be allowed to do AI and do not allow any layman to do the same (Bilby and Jordan, 2009).

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