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Review Article

**PHYSIOLOGY AND CAUSES OF RETENTION OF FETAL
MEMBRANE IN DAIRY COWS: AN OVERVIEW**Udmale Akashdeep Rohidas*¹, Dr. Vishal .V. Pande², Aboli Girme³ and Neha.D. Kulkarni⁴,
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Kaniya-388435. Gujarat.⁴ Sanjivani College of Pharmaceutical Education & Research, Kopargaon,
Department of Pharmaceutics (P.G).**Abstract:**

Cows affected with retained placenta are at a higher risk of developing puerperal metritis. Retained fetal membranes (RFM) in cattle have adverse effect on fertility and production. Understanding the pathophysiology and causes of RFM is important for managing this disease. The hormonal processes that lead to normal placental expulsion or the separation are multifactorial and begin before parturition. A variety of risk factor, including early or induced parturition, dystocia, hormonal imbalance, and immunosuppression can interrupt these normal processes and result in retention of the placenta. Current research does not support the efficacy of much commonly practiced treatment for RFM. Systematic administration of antibiotics can be beneficial for the treating metritis after RFM, but antibiotic administration has not been shown to significantly improve future reproduction in the cows with RFM. The Polyherbal oral therapy is protects cattle from puerperal disease and enhance placental release after delivery. Herbal therapy is not costly and it having the minimum side effect. Herbal remedies bear a high potential to treat postpartum uterine diseases in cows. Various herbs are reported to for retention of fetal membrane.

Key Words: Cattle, placental detachment, Causes.

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INTRODUCTION:

Placenta is the essential organ for premature transfer the essential nutrients and oxygen from dam to the fetus. The retention of fetal membrane is defined as the failure of expulsion of fetal membranes. The retention of fetal membrane (RFM) is the hormonal process that resulting the normal expulsion or the separation of placenta. The normal placental separation is the multifactorial and begins before the parturition. The retained placenta is the most common problem facing in the world wide. Retention of fetal membrane (RFM) which results to adverse health effect that ultimately affect the reproductive performance in the animal. In one study it is observed that 66% cattle will pass the placenta within 6 hours after parturition [1]. The retained fetal membrane usually causes cow delay the next pregnancy for 2-6 months, late calving date in the following year. The infertility related to retained placenta which result to from intrauterine infection which is not cleared and results in late pregnancy or cattle become totally infertile. If the placenta is not detached from the caruncles oxytocin will not hasten its passage. However, only 5 of the 13 included studies found decreased milk production associated with RFM [15]. It should be noted that a variety of factors, including case definitions, other associated diseases, and culling risk, complicate the interpretation of impact of RFM on both reproduction and milk production. The basic knowledge of the placental anatomy and physiology is helpful to understand causes of RFM and formulate treatment plans accordingly. This review focuses on the normal placental detachment physiology, basic causes and risk factors for RFM and various herbs to cure this disorder. Herbs helps in retention of fetal membranes and act as uterine tonic, help to the separation of placenta & its expulsion from the uterine cavity as well as the elimination of bacterial contamination of the uterus.

PHYSIOLOGY OF PLACENTAL DETACHMENT IN CATTLE

Cattle body consisting the cotyledonary type of placenta which is formed by the fetal cotyledons and the maternal cruncles forming the newer form of structure is called palcentomes when more than 1 villi are present at site of the connection which results to form the cytyledons. When collagens are enriched at the connection sites then collagens which play a very important role for the separation of cruncles from cotyledons at the time of fetal membrane expulsion [16].

At the normal events of parturition placental enzymes play an important role initially for the conversion of progesterone into the estrogen [17]. After the

conversion into estrogen which result the concentration of estrogen goes on increases the sensitivity of receptor for oxytocin on the myometrium will increased the concentration of prostaglandin F2 alpha (PGF2 α) [18]. The increased prostaglandin initiates myometrium contraction resulting in the breakdown of carpus luteum (CL), this condition is called luteolysis [19]. Breakdown CL resulting the secretion of relaxing hormone which results into the decreasing progesterone levels [20].

Relaxation and decline of progesterone hormone are responsible for increase the collagenase activity. Relaxin causes the breakdown of collagen, resulting in softening of cervix and relaxation of the pelvic ligaments. On the other hand during the pregnancy progesterone shows the inhibitory action on myometrial contraction and collagenase activity which resulting the level of progesterone at the site of parturition shows the activity of enzyme which are necessary for the separation of placental membrane [21].

The normal process of placental membrane separation is multifactorial and which is start before the process of parturition (Fig 1). It clearly indicated that the serotonin is responsible for normal attachment of placental membrane in cattle [22]. The higher concentration level of fetal and placental serotonin might help for maintenance of placental attachment and the cell proliferation during the process of pregnancy [22] and inhibiting the activity of proteinase or the matrix of metalloproteinase (MMP) activity [16]. The monamine oxidase (MAO) enzyme system close the parturition which result in the metabolization and subsequent decreasing in serotonin, which results in placental separation and parturition [22].

On the other hand the change in hormonal environment which is responsible for enzymatic breakdown of cotyledon caruncle linkages which activate the maternal immune response against the fetal membrane can play an important role in breakdown of the placenta. Chemotatic activity of leukocytes is increased in the caws which possess normal expulsion of placenta [23-15] the cytokine interleukin-8 enzyme which play an important role for the chemoattractant of neutrophil in the cotyledon

in the process of parturition [25]. Majorly the trophoblast cells activate the immunological response through major histocompatibility protein that helps in separation of placenta. The level of this type of protein increase during the last trimester [25].

The labor is characterized feature of increasing level of prostaglandin along with oxytocin and generation of high level contraction of inside the uterus which is important for natural expulsion of placenta. The contraction of uterus is stop at third stage of parturition which results in complete expulsion of fetal membrane in cattle. [19-29]. Till today the role of contraction of uterus in the separation of fetal membrane is not cleared. At the time of releasing the fetus from uterus result in decreasing the blood circulation within placenta,

subsequently shrinkage of villi takes place [14]. Forcefully contraction of uterus result in disconnection between cruncles and cotyledons, even through the absence of any harm to villi of fetal membrane separation is not a mechanical process [30]. Now currently it is thought that contraction of uterus is playing an important role in the expulsion of fetal membrane; because the primary myometrial contraction is not an important for the prerequisite of retained fetal membrane in cows [5-31].

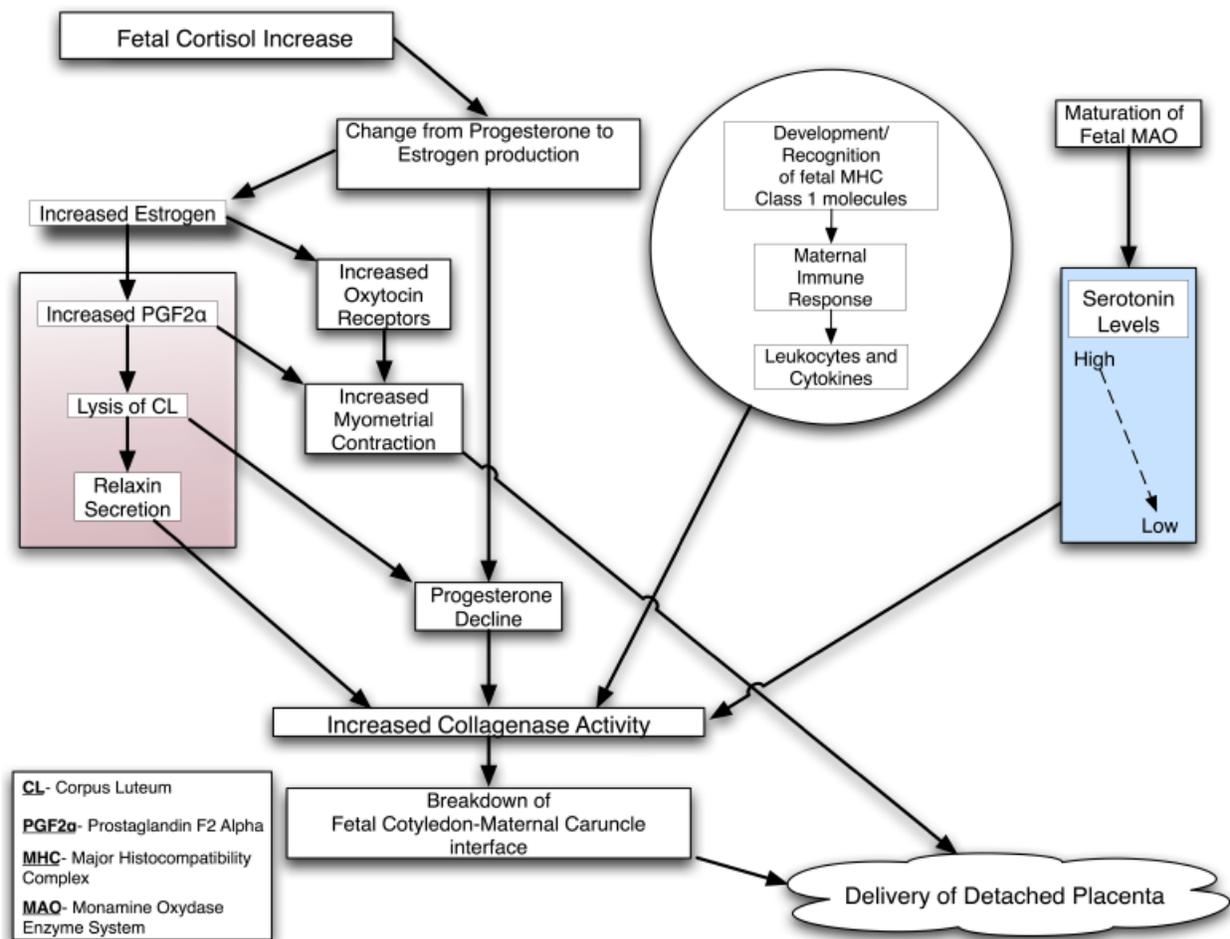


Fig 1. Physiologic processes leading to the detachment of the placenta in cattle.

CAUSES OF RETENTION OF FETAL MEMBRANE (RFM)

There are the numbers of factors which are responsible for RFM are induction of parturition.

1. Shortened gestation period [33], abortion of fetus [34,35] twin fetus [33-36] difficult in birth [34-37] fetotomy [34-38] are the basic causes of RFM.

2. Mineral and vitamin deficiency like vitamin E, selenium and vitamin A and selenium, nutritional deficiencies [39-40].

3. The RFM is also caused by infection causing diseases like the bovine viral diarrhea and immunosuppression [14].

4. The complex process of multiple hormones and biochemical events leads in these events disturbance to causes the RFM [23-25-42].

5. The cows which are suffer from RFM as the subsequent to normal delivery the basic reason behind that is decreases the amount of activity

of leukocytes prior to parturition process [23-25].

6. Specially, the cow suffering from RFM were found that reduction in the chemotaxis activity of neutrophils from the 1 week before to 1 week after parturition and decreases chemotaxis activity from 2 weeks before and 2 week after the parturition [25].

7. Decreasing the concentration of estrogen and superoxide dismutase was found to be RFM [43].

8. According to veterinary science it is also proposed that reducing level of antioxidant activity of placenta which results in decreasing the production of estrogen and also decreasing level of PGF 2α which results in the production and accumulation of arachidonic and linoleic acid within the placental tissue [43].

9. On the basis of Animal study it was found that cow treated with vitamin E and untreated cows found that overall vitamin E supplementation decreases the chances of retention of fetal membrane in cattle [45].

10. The differences in the protease enzyme activity within placentomes in retained and nonretained placentas play as an important role in RFM.

e.g. cotyledon collagens is decreased and type III collagen persists in the RFM [45].

11. The cows suffering from RFM having decreasing the activity of MMP-9 and also lack of some forms of MMP-2 [21].

12. The induction of labor with the help of dexametasone with or without prostaglandin, which causes the higher risk of RFM, but the exact mechanism is not clear [48].

13. Activity of antioxidant enzyme decreases during the pregnancy also causing the retention of fetal membrane in cattle [43,44].

14. In the cow calcium play an important role for the collagenase activity but the decreasing calcium level causing hypocalcemia is the another cause for RFM [56].

15. In addition, the serious injury to uterus might result in increasing secretion of heparin from the mast cell at the site of injury. Secretion of heparin result that inhibition of collagenase and causing delay of involution of uterus and both of these factors result into RFM [49,57].

16. After the cesarean type of delivery in case cattle with the treatment of nonsteroidal anti-inflammatory drug (flunixin meglumine) this drug increases the chances of RFM [58].

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