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# Induction of Parturition in Dairy Cattle

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The parturition (calving) is a joyful and significant event for the livestock owner. Several externally visible changes occur in dairy cattle when parturition is approaching. In dairy cattle, induction of parturition (or premature initiation of calving) is required for pathological and management reasons. Maintenance of pregnancy in dairy cattle is dependent on an all time adequate concentrations of circulating blood progesterone. Any parturition induction regime in dairy cattle must fulfill some basic criteria. Induction of parturition in dairy cattle can be achieved with the exogenous administration of corticosteroids or prostaglandins or a combination of these both.

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**P**arturition is the process of delivery of the fully grown fetus on the completion of the normal pregnancy period in cattle. The parturition (calving) is a joyful and important event for the livestock owner as by this act of his cattle he would start getting financial returns in terms of milk sale.

Several externally visible changes occur in dairy cattle when parturition is approaching. The most important external change of approaching parturition is seen in pelvic ligaments, udder, vulvar regions. Several behavioral changes may also be noticed. The extent and intensity of symptoms vary between individual animals and also between consecutive parturitions in the same animal. It may be noted that these symptoms are only useful indications as to the approximate time of parturition and do not guarantee about the exact time of parturition.

In dairy cattle, the pelvic ligaments tend to become relaxed as parturition approaches. There is sinking of croop ligaments and muscles and raising of the tail head. The vulva becomes oedematous, flaccid and enlarged. The udder becomes enlarged and edematous. A tenacious vaginal mucus discharge

may be seen in cattle due to liquefaction of the cervical seal. As parturition approaches, there is restlessness, abdominal discomfort and loss of appetite.

Successful parturition depends upon two mechanical processes – the ability of the uterus to contract, and the capacity of the cervix to dilate for any passage of the fetus.

In dairy cattle, induction of parturition (or premature initiation of calving) is sometimes requested by the farmer to prevent excessive udder edema and distension. At other times, the farmer complains that the gestation period of a cow is nearly complete but she is not showing any symptoms of calving. Sometimes the pregnant cow falls sick by some disease or weakness, goes recumbent and it is felt by the farmer/ clinician that the cow will not be able to carry the pregnancy to full term. Pathological reasons for induction of parturition include hydrops of fetal membranes, prepubic tendon rupture and cow ill health. Personnel are readily available during initiation of calving work and assistance is more likely to be given even when not absolutely necessary. Planned deliveries allow closer attendance at parturition and reduce accidental

deaths by dystocia. When calving is initiated prematurely for any reason, there are increased incidences of retained placenta. Accurate knowledge of breeding date is necessary in cases of initiation of calving to ensure calf survivability. Calves born upto 1-2 weeks premature have near to normal survivability rates. Calves born more than 2 weeks premature have low viability.

Any parturition induction regime in dairy cattle must fulfill some primary criteria as following:

- a. The calf must be surviving and the cow must give milk normally
- b. The method must be reliable and time of calving must be predictable
- c. The methodology must be safe with no adverse effect on either the cow or her calf

Maintenance of pregnancy in dairy cattle is dependent on an all time adequate concentrations of circulating blood progesterone. Pregnancy will be maintained if required concentration of blood progesterone is present, either endogenously or exogenously. It is thus clear that all attempts to terminate pregnancy and initiate calving, must focus to directly or indirectly eliminate the sources of progesterone.

The Corpus Luteum on the



ovary is the main source of progesterone in cattle during pregnancy. The minor sources include the placenta and the adrenal glands.

The presence of a functional corpus luteum is essential for maintenance of pregnancy during the first five months and the ninth month of gestation. However, from sixth to eighth month (i.e. from about 150 to 250 days), pregnancy in dairy cattle will sustain even in the absence of a functional corpus luteum. This is because during this period placental progesterone production is sufficient to maintain pregnancy.

Calving can be induced in dairy cattle with the exogenous administration of corticosteroids or prostaglandins or a combination of these both.

Treatment of the pregnant cattle with Prostaglandin  $F_{2\alpha}$  ( $PGF_{2\alpha}$ ) results in leutolysis in any stage of gestation in cattle. However, during sixth to eighth month of pregnancy, leutolysis may appear to be incomplete. Sufficient progesterone remains to maintain the pregnancy. The clinician/ farmer may observe the pregnant cow to undergo some cervical dilation and some abdominal discomfort, but then cow returns to normal course of gestation and survives the pregnancy. Formation of a new corpus luteum may also occur in such instances.

Glucocorticoids (such as Dexamethasone) reduce placental secretion of progesterone. However leutolysis does not occur by treatment of glucocorticoids. In the ninth month, glucocorticoid treatment increases the production of estradiol and  $PGF_{2\alpha}$  from the placenta.  $PGF_{2\alpha}$  in turn results in leutolysis and calving occurs. It is thus clear that the glucocorticoids can play a role in initiation of calving only when the placental unit is fully functional. So, in cases of fetal mummification or fetal maceration, a treatment with glucocorticoids will not result in initiation of calving.

Thus from the above discussion, we can summarize that, during the first five months of pregnancy, the leutolytic effect of prostaglandins will initiate calving (or abortion). During the sixth to eighth month of gestation, a combination administration of prostaglandins and glucocorticoids will result in elimination of luteal and placental sources of progesterone, and thus initiate calving (abortion). In the final month of pregnancy, either prostaglandin or glucocorticoid treatment alone will initiate calving (parturition).

When corticosteroids (such as dexametasone) are used for the purpose of initiation of calving, they are given as a single intramuscular injection within the 2 weeks of normal

term. The interval from injection to calving is on an average 48 hours. In some cases cows may not calve in 72 hours following injection. In such cases the injection may be repeated.

When estrogen is supplemented at the time of corticosteroid treatments, the average time to calve may be several hours lesser in comparison to when corticosteroid used alone.

Initiation of calving with prostalands (such as  $PGF_{2\alpha}$ ) or prostaglandin analogues (such as cloprostenol) gives very similar results as that with glucocorticoids.

Following calving, the cow should be allowed to lick and nurse her young one. Undue excitement should be avoided. Some cows have a strong instinct and may object to shifting of the new born. The roughage fed should be of good quality. The feed fed should be laxative and easily digestible. Cattle that have retained placenta must be treated properly. Proper post partum hygiene should be maintained. Uterine discharges must be properly cleaned. Cattle that develop post partum uterine infection, mammary infections or metabolic diseases like ketosis or milk fever must be properly referred to qualified veterinarian. The cow and calf must be protected from adverse climatic conditions. □

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