

Recent Advances In The Detection Of Pregnancy In Bovine: Mini Review

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ABSTRACT

An early and correct detection of pregnancy is the key for better reproductive output in livestock. It shortens the calving interval and maintains a postnatal unproductive interval close to two months. Most widely bred cattle in India, buffalo, is identified for issues related to long calving gap and anestrus. Many techniques of pregnancy detection are followed in cattle, but none of these is categorized as the reliable pregnancy analysis method because of low sensitivity and specificity. This review highlights regular pregnancy diagnosis techniques available for cattle and the efficacy of the modern techniques in recognizing pregnancy markers.

1. INTRODUCTION

Dairy animals have emerged as a very important segment for establishment of a more comprehensive agriculture system in India. The country is consecrated with a large diversity of 43 native animal breeds and 13 buffalo breeds which are present over hundreds of years due to their suitability for precise purposes in the confined environment. But, increasing population, changing living habitats, vast urbanization and environmental changes are establishing many challenges in their breeding systems.

An early and exact finding of pregnancy is an important measure for superior reproductive output in animals like sheep, buffaloes and cows. Dairy farmers require recognizing non-pregnancy at the initial stage for re-breed the animal at earliest. The initial period of embryogenesis in cattle has been known for nearly 42 days after insemination.^[1] A lot of methods of pregnancy diagnosis are being adept in cattle species; but neither of these is recognized as the perfect pregnancy detection method due to the limits they possess. The innovation of molecular techniques such as proteomics and their usefulness in cattle research has presented various options for scientists to target pregnancy biomarkers in the cattle.

Detection of pregnancy by different techniques

The rationale for investigating dairy animal for pregnancy is not to confirm pregnancy, but to evaluate the non-pregnant so that they can be inseminated again or treated.^[2,3] A wide range of procedures have been used to detect pregnancy in livestock and each has its own importance and drawbacks. When deciding which method is to use, it is considered that the non-pregnant cattle can be identified at earliest which is more important.

Non-return to oestrus

It is the most simple and cheapest mean of pregnancy analysis which does not need veterinary participation. If oestrus signs are not observed around 3 weeks after insemination, the cattle are generally assumed to be pregnant. Non-pregnant cattle can be identified at initial stage (24 days after insemination) and can be inseminated without delay. However, non-return to oestrus has a major shortcoming as it classifies incorrectly a big number of animals (nearly 30%) as pregnant even they are barren. After 42 days of service enhances the accuracy as further heats can be seen but still the accuracy remains low with around 20% of non-pregnant cattle are diagnosed to be pregnant.

Rectal palpation

Palpation of the reproductive system per rectum method involves palpation of the uterine through the rectal wall and detection of its content. It is a method used for more than 100 years and is the common mean to judge the pregnancy. The use of breeding records is necessary to increase the correctness of the analysis and accelerate the palpation procedure. The earliest time when the fetal bladder can be detected is the 28th day after insemination in heifers or the 32nd-35th day in multiparous cows.^[4] However, a drawback of this method is that it requires extensive clinical practice from a veterinarian. The method is not suitable for rapid early diagnosis of twin pregnancies, assessment of fetal viability and sex.^[5]

Role of ultrasonography

Pregnancy detection with ultrasonography provides an edge over rectal palpation due to its advantage of detecting initial existence of embryo with more precision.^[6,7] In this method, pregnancy is determined by imaging amniotic fluid, placentome and fetus. Trained veterinarians can also find out age of the fetus accurately using trans-rectal ultrasonography between 25 and 90 days of gestation. Ultrasonography is a minimally invasive, efficient and accurate process to analyze of pregnancy^[8,9] and also reduces the occurrence of abortions due to palpation. In comparison to other methods, ultrasonography is more expensive method of pregnancy diagnosis.

Through measurements of progesterone

Analysis of progesterone level is an indirect method to diagnose pregnancy in various dairy animals including sheep, goats and buffaloes.^[10] Progesterone (P4) is a steroid hormone created by the corpus luteum on the ovary which is produced after ovulation of the oocyte and is critical for the founding and continuation of pregnancy.^[11] It is involved in stimulating production of various endometrial secretions that are required for embryonic development.^[12,13] The difference in progesterone levels between pregnant and non-pregnant cows has been demonstrated in plasma^[14] and milk.^[15] Cattle estrous cycle indicates that the blood, plasma or milk progesterone levels increases after estrus and if the cattle are pregnant, it continues to be elevated up to day 21 after fertilization.^[16] The accuracy of positive pregnancy diagnosis has been evaluated as 60-100% for milk progesterone while diagnosis of non-pregnant cattle was found to be 81-100%.^[17-19]

Estrone sulfate

Another pregnancy marker, estrone sulfate, a steroid hormone, is produced by the conceptus and is present chiefly in the cattle placentomes.^[20] It can be detected after three months of pregnancy in dairy animals^[21,22] and though its delayed period of diagnosis confines its use in

livestock. Also, its serum and milk concentrations are varied with the effect of various factors such as weight, genetic makeup and environmental conditions.[42-44]

2. CONCLUSION

New techniques to analyze non-pregnant livestock soon after insemination will be very significant to enhance reproductive output and productivity on dairy farm business. Farmers and veterinarians have been dependent on rectal palpation for determining pregnancy in their livestock, but current advances in technology have extended the options significantly. The latest advancement in pregnancy detection is to use milk, serum or blood as samples. Pregnant cattle possess elevated levels of some pregnancy specific proteins, in their blood or serum. But, one drawback of these procedures is that the protein levels remain elevated for a long period of two months even after calving. Therefore, a postpartum gap becomes necessary to use these methods to diagnose accurately. Also, these tests are not suitable to analyze age or sex of a fetus. Future research for pregnancy detection in cattle may someday conquer these boundaries thereby enhancing reproductive output.

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