CHAPTER-12

Oestrus/Heat Detection –
signs of heat (visual and behavioural), standing heat, methods of heat detection, heat expectancy chart

Objectives

1. To understand the estrus/heat symptoms in dairy animals
2. To know about the commonly used tools/methods for detection of estrus

Introduction

Among the several components of the reproduction management, estrus detection is one of the crucial as it contributes towards the ultimate pregnancy rate and the survival of the embryo. Each missed heat is a missed opportunity. Inadequate estrus detection results in reduced conception rate and reduced life time productivity. The symptoms of estrus vary with animal species and even within same species individual animals may show variations in exhibition of estrus signs. Attaining higher estrus detection efficiency and accuracy is important key to improve individual animal along with overall herd fertility. From the inception of dairying several tools have been developed and employed for estrus detection but with varied success rate. The selection of proper estrus detection method for a particular dairy farm is dependent on several factors like scale of operation, availability of man power, type of animals etc. and a single aid cannot be used invariably. The present chapter summarizes the presently available tools to detect estrus and their detection efficiency and accuracy rates in modern dairying.

What is estrus and how it is manifested?

Estrus in cow is fairly well defined period when she exhibit sexual desire and receptivity to the male. It is the behavioural strategy of the female to ensure, mating close to the time of the ovulation to achieve a successful conception. The term estrus derived from a Greek word 'Oistros', meaning 'gatfly', whose buzzing during summer cause the cow to frenzied behaviour. The cow at estrus also shows certain changes under the influence of ovarian steroid hormones on the behavioural centre of the brain.

During the normal bovine estrus cycle there are visible changes in the ovary, for instance: close to estrus, the preovulatory follicle grows to a larger size producing noticeable amounts of estradiol. These increasing estrogen, in turn, promote behavioural estrus and

the release of LH to cause ovulation. Blood estradiol concentration reaches its highest level at the same time as the maximum behaviour score.

Symptoms of estrus

The best indicator of a cow or heifer in estrus is when she allows other herd mates to mount while she remains standing. Thus the primary and surest sign of estrus in a herd of animals is "standing to be mounted by other animals". However the cow or buffalo in estrus exhibit several other signs that can be considered as secondary signs, which include grouping together (animals coming into heat will usually congregate in small groups), smelling other females, trailing other females, bellowing, depressed appetite, nervous and excitable behavior, roughed up tail hair, vulva swelling and reddening, clear vaginal mucous discharge, mucous smeared on rump etc.

A major difference between buffalo and cattle in estrus expression is that in buffaloes behavioural signs of estrus are less overt and homosexual behaviour rarely observed in buffaloes. Acceptance of the male is considered as the most reliable estrus indicator in buffalo. Frequent urination, bellowing, vulval swelling, mucus discharge are salient estrus signs in buffalo, but their expression is weak and vary from season to season. In the absence of bull, the main behavioural signs are restlessness, bellowing and frequent voiding of small quantities of urine, but these are not consistently exhibited by all animals. When a bull is present, however, the bull will show increasing interest in a cow that is approaching estrus, and the cow will stand to be mounted by the bull during estrus.

Methods of heat detection

1. ***Visual observation*:** It is the simplest method to detect an animal in heat and with proper guideline and training it can be the most effective. This method involves the visual appraisal of the cardinal symptoms of heat and for this animals have to be regularly observed. Depending upon breed, the oestrus period lasts for 12-16 hrs with the range of 2-30 hrs. It is best to fix the time of detection in the early morning (before morning milking) and late evening (after the feeding). During heat detection, observing a single behaviour cannot be conclusive in predicting a true heat and thereby a proceeding ovulation. Different scoring system has been developed for estrus detection in which different score has been assigned for particular behaviours according to their frequency and reliability to predict estrus.

2. **Record:** Visual detection of heat will be more effective if the history of the animals can be made available as with this the observer can pay more attention on the animals anticipated for estrus. This can maximize the accuracy of estrus detection provided if the records are kept in daily basis.

3. **Heat expectancy chart:** It is a modified record keeping system which includes generation of a list of cattle that should cycle during a given time so that an animal proceeding for oestrus can be identified well in advance. 'Breeding Wheel', 'Herdex record system' or 'Computer generated action list' are different modified version of the 'Heat expectancy chart' with almost same principle of action.

4. **Marker animals:** Marker or Heat detector animals can improve heat detection if they are used with proper precision and supplemented with visual observation. Surgically altered bulls or androgenized cows can serve the purpose of marker animal effectively. This method is most effective in stall tied herd where a bull parading is the most effective way of detecting a heat. Using a surgically altered bull in heat detection also shorten the post partum interval in cows by some unknown male effect. Generally the marker animals are equipped with different marker device such as Chin-ball marker, which left mark on the back of the female animal preceding an oestrus with an attempt to mount them. This device can only be effective if aided by a regular visual appraisal of heat.

5. **Pressure sensing devices:** These devices are generated to record the mounting and stand to be mounted behaviour of the animals which gone unnoticed otherwise. It include Mount detectors which rub off, change colour, light up or send a signal to computer when pressure is applied on it by the mounting animals. Among them the most cheap and easy to use is tail head painting or chalking. There are different livestock marking crayon or heat detector paints available for this purpose. Paints or chalks are applied 18-21cm long and 5-6 cm wide on the rump 12-15 cm behind the level of tuber coxae and extended posteriorly on either side of the midline. The animals, standing to be mounted, show the symptom of rubbed off chalk or paint. Several commercially available devices are also evolved based on the above principle of heat detection such as capsule embedded on fabric patch, colour patch covered with scratch off surface, device containing audible signal emitter. Sometime lower branches of tree or farm house equipments rub off or activate the device giving false positive detection.

6. **Activity monitoring by Pedometry:** During oestrus the activity of the cow increased upto 2-3 folds than during diestrus and this can serve as an important indicator of oestrus. Based upon this principle, Pedometer is generated to record the increased activity. Pedometers are devices that contain motion switches to detect increased activity and a recorder to quantify activity. These devices are attached to the animals on neck or leg or sometime implanted subcutaneously. Sometime these devices are incorporated into the electronic identifying tags of the animals. Data stored in the recorder are either retrieved by observation of the visual signals emitted (flash light) or through computerised counter connected by rediotelemetry.

7. **Video cameras and recording:** This system has been extensively used in research for continuous monitoring of the animals and yet to accepted as economically viable system in commercialized dairy. The device can only be effective if the animals can be identified from a distance and if the records are reviewed daily by experts. With the advent of infra red cameras this system of heat detection is showing lot of opportunities to be explored.

8. **Recording and evaluation of vocalisation:** During periestrual period there is an evidence of increased vocalisation which is most predominant in tethered animals. This behaviour can also be used as a good predictor of animals in heat. A radio microphone system harnessed in neck of the animals can record and transmit the signals to a stationary receiver which can be further analysed by recording algorithm. Recently a work has been carried out in NDRI, Karnal showed clear difference between the vocalisation pattern of estrus and non estrus cows.

9. **Trained dogs and electric nose:** Sometime dogs are used to detect the animals in heat by the specific odour they emit around oestrus and they can detect estrus with 80% accuracy (Kiddy *et al*., 1978) but they are not preferred as they can inflict injuries through biting. Depending upon this principle attempts has been made to develop automatic electronic detector of pheromones associated with estrus (Lane and Wathes, 1998).

10. **Rectal palpation of the genitalia:** The stage of the oestrus cycle can easily be detected by rectal palpation if the detector has a sound knowledge of the tract and ovary characteristics at different stage of the cycle. With the introduction of ultrasonography in animal reproduction, understanding of follicular dynamics during the different phase of estrous cycle has been delineated.

11. **Rheological properties of cervical mucus:** The physical and rheological properties of the cervical mucus changes in relation to the stage of estrus and the altered hormonal milieu. The most important characteristics of the cervical mucus includes the colour, appearance, pH and other rheological properties like spinnbarkeit value, flow elasticity, viscosity, thixotrophy, arborisation pattern and the sperm receptivity.

12. **Milk and plasma progesterone detection:** Under experimental conditions, detection of milk or blood plasma progesterone can be used to monitor oestrus in animals. There is sharp decline found in milk progesterone from e”10 ng/ml to d” 3 ng/ml and plasma progesterone from e” 7 ng/ml to d” 0.05 ng/ml during estrus. Therefore it can be a good aid to oestrus detection but the main constraint is the cost involve with the kit

Activities

1. Go to nearby dairy farm and observe the estrus signs
2. Discuss with the farmers about the method they use for heat detection

Review Questions

1. What are the primary signs of estrus in dairy animals?
2. Do you know which method is commonly used in India to detect estrus in dairy animals?