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The Basics of Heat (Estrus) Detection in Cattle

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Artificial insemination (AI) and embryo transplant (ET) management programs are highly dependent upon accurate heat detection procedures to achieve successful results. Conducting two to three daily visual heat-detection observations of the cattle herd during the AI breeding season could lead to economic benefits to beef and dairy producers. Efficient heat detection, however, is time-consuming, labor-intensive, and requires good management and recordkeeping. Undetected heats in an AI program play a significant role in lowering reproductive efficiency by increasing the number of "open days," which in turn results in longer calving intervals and ultimately reduces the net return to the producer. The purpose of this publication is to provide an overview of a successful heat detection protocol within an AI breeding program.

What is "heat"?

"Heat," or estrus, is the period of time that occurs, on the average, every three weeks (18–24 days) in sexually mature, non-pregnant female cattle, when they are receptive to mounting or riding actively by a bull or other cows. As an egg develops in the cow's ovary, the sex hormone estrogen (produced by the ovary) causes changes to the animal's reproductive, circulatory, and nervous system. Physical mounting, or "standing heat," occurs within the first 12–18 hours after the onset of heat. A cow is fertile only when an egg is released (ovulation) near the end of standing heat and around 6–10 hours thereafter. A second sex hormone, progesterone (produced by the corpus luteum, or yellow body, on the ovary), is secreted after ovulation and prevents future egg production or signs of heat for the next 18–24 days or, if fertilization occurs, for the duration of pregnancy. These hormonal changes in the cow allow only a very small window of opportunity for successful insemination (Fig. 1), and pinpointing exactly when that occurs during a cow's three-week cycle depends on accurate detection of the onset of "standing heat."

Signs of heat

The best indicator of a cow or heifer in estrus, or heat, is when she allows other herd mates to mount while she remains standing. Usually the animal in heat is restless and will ride other animals in the vicinity; however, cows that mount or ride others may not necessarily be in estrus. Only animals that remain standing for mounting are in estrus.

Secondary signs of heat that a producer may observe to determine whether an animal is definitely in heat include:

- roughened tail-head; if a cow has been ridden by other animals, the hair on her tail-head could be standing up or completely missing
- dirty streaks and marks on lower hips, sides, or shoulders; in wet weather or areas, the forefeet of rider animals may leave muddy traces on the sides and hips of cows in heat
- nervousness and restlessness; the cow may bawl and travel long distances in search of a bull, and it may ride or mount other animals
- grouping together; animals coming into heat will usually congregate in small groups (three to five animals)
- clear mucus discharge; some animals in heat will have a clear, thick mucus discharge from her vagina; if she mounts other animals, the discharge may be smeared on her rump by her tail
- swollen vulva; when cows are restrained, check the vulva lips for swelling, reddening (bright cherry pink), and mucus discharge as an indicator for estrus
- a bloody discharge at the end of estrus usually indicates a missed heat; observe this animal for return to heat in 18–24 days.

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Heat detection aids

Several aids are available for use in detecting standing heat; however, none are substitutes for visual observation. If a producer is not able to observe the herd at least two or three times a day during the AI breeding season, the following could be helpful in detecting standing heat.

Chin-ball markers on vasectomized bulls

One of the most effective ways of determining heat is to attach this halter device under the chin of a vasectomized bull. The marker consists of a paint reservoir with a steel ball valve, similar to a ballpoint pen. When bull rides another animal, the chin ball marker is activated, and paint marks are left on the in-heat animal's back.

Adhesive heat pads

These plastic detector devices are glued to the high spot between the hipbones along the backbone. Prolonged pressure from mounting animals will trigger either a visual change to the pad (usually a red paint capsule bursts) or an audible signal will be emitted. The animal must be ridden for a minimum of three seconds before the detector is activated. Using this device on animals in areas with low-lying trees will cause limb-rubbing leading to false positives.

Tailhead chalking

This is mainly used by the dairy industry to locate riding cows in large, confined herds. Tailheads are marked daily by an AI technician. If the chalk is rubbed off by the next observation, this indicates the cow was ridden and is possibly in heat. Accurate recordkeeping is needed to verify cycling animals. Different colors of chalk are usually used to mark different strings of production.

Recordkeeping

Dates are kept on individual cow cards, barn charts, or breeding wheels to anticipate when an animal is expected to come into heat.

Pedometer

This device is used along with a computer to determine how far an animal has walked. Animals in heat are usually restless and may walk long distances.

Top ten recommendations for heat-detection program success

1. Implement an animal numbering system or other identification code to be able to track individual animals throughout their life cycle.
2. Develop a good recordkeeping program and update information frequently.
3. Establish standard operating procedures (SOP). Designate someone to be in charge of the heat-detection program and record information including animal identification, time of observation- and location of all mounting activity.
4. Conduct visual observation for heat at least two to three times a day for a minimum of 30 minutes early morning, noon, and early evening.
5. Set aside a heat-detection pasture. Ranches planning a short AI breeding season should move cattle to be inseminated to the detection pasture two weeks before the start of program. This allows cattle to establish a routine for grazing, watering, and any supplemental feeding.
6. Watch for animal grouping activity. Cattle approaching heat usually alter their normal behavior when entering estrus and commonly congregate together.
7. Use heat-detection aids wisely. These aids should be used only as a supplement and should not replace visual observation.
8. Synchronize with prostaglandins. The use of hormone treatment increases the probability of detecting cycling cattle. Develop a program to catch the animals that return to estrus 18–24 days later.
9. Treat sore feet immediately. Lame cattle will not mount or permit herd mates to ride them, decreasing your chances of detecting their heats.
10. Always follow herd protocol and document all activities.

Summary

Efficient estrus detection requires a little extra effort and management. Cattle come into estrus at all times of the day, may not be very active in hot weather, and remain in heat for only a short period of time (roughly 12–18 hours), making it difficult to observe. Allowing animals to interact in small groups (three to five) with two to three visual observations per day for heat will increase the chances of catching cycling animals. The use of synchronization and heat-detection aids can greatly shorten

the time spent observing heat but will not benefit a non-cycling herd. Cycling cows require management that pays attention to details, supplies high-quality nutrition, and provides exceptional cow comfort, including hoof health. Most ranches would benefit both economically and labor-wise by reducing the number of days open, decreasing culling rates due to non-pregnant females, and shortening their calving interval.

Reference

ABS Global. A.I. Management Manual. 1996. DeForest, WI.

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Figure 1. Heat detection and timing of insemination in cattle.