

# STANDING ESTRUS



## Standing estrus (heat) and heat detection aids in cattle

By Ashleigh Muth-Spurlock, Ph.D., instructor, LSU AgCenter and LSU School of Animal Sciences

### Introduction

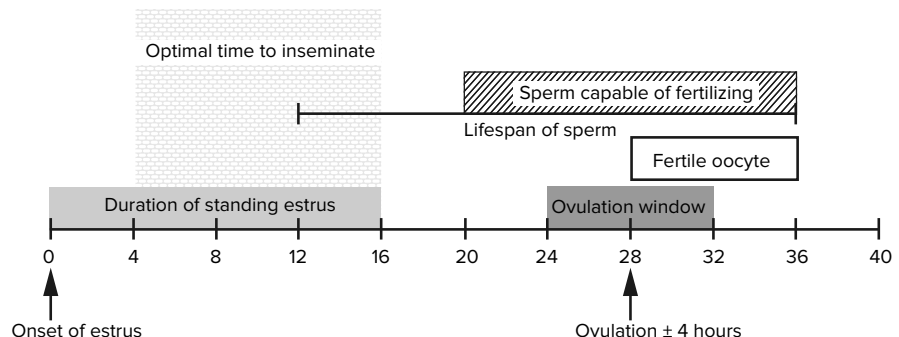
Standing estrus, also referred to as heat, is a brief period within a female's reproductive (estrous) cycle during which she will allow herself to be mounted. In cattle, the estrous cycle is approximately 21 days in length but can range from 17 to 24 days in length. The period of standing estrus, however, is extremely short, lasting only about 16 hours in beef cattle, although this too is variable and can range anywhere from 6 to 24 hours.

Inaccurate detection of standing estrus in breeding females is often the culprit behind less successful artificial insemination programs. Heat-detection aids can significantly improve the likelihood of identifying females in standing estrus.

### The importance of estrus detection

Females not in standing estrus near the time of insemination are unlikely to conceive. Cows ovulate 24 to 32 hours after the onset of estrus, and the fertile lifespan of the oocyte (egg) after ovulation is approximately 8 hours. Bull spermatozoa can survive in the female tract for 20 to 24 hours, but they are not capable of fertilizing an oocyte until they have spent approximately 8 hours in the female tract. These various timepoints are why detection of standing estrus is critical to the success of artificial insemination and embryo transfer programs. Should a female be bred too early, the spermatozoa will have died before ovulation occurred. If a female is bred too late, either the oocyte is no longer capable of becoming fertilized or the spermatozoa were not able to undergo the changes necessary for oocyte penetration before the oocyte degenerated. Knowing when a female has entered into her period of standing estrus allows the proper timing of insemination so that these timepoints overlap and increase the likelihood fertilization (Figure 1).

**Figure 1. Proper timing of insemination.**



### Detecting standing estrus

Visual observation is the most common method of heat detection. The only definitive sign that a heifer or cow is sexually receptive and at the optimal time for insemination is standing still while another animal attempts to mount her. Beef females are mounted an average of 50 times per estrus period, whereas dairy females are mounted an average of 14 times per estrus period. With each mounting event lasting eight

seconds at most, beef and dairy females in estrus can only be observed standing to be mounted for 6.5 and 1.9 minutes per estrus period, respectively. For this reason, it is extremely important that cows be monitored as frequently as possible for anywhere from 30 minutes to 2 hours per observation period depending on herd number and land expanse. In fact, when observed for estrus four times per day (6 a.m., 12 p.m.,

6 p.m. and 12 a.m.), nearly 20% more females were detected in estrus than when observed only two times per day (at 6 a.m. and 6 p.m.). Females are also more likely to exhibit estrus behaviors during periods of darkness, so if heat detection can only be performed twice per day it is recommended to do so early in the morning and as late in the evening as is practical.

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## Secondary signs of estrus

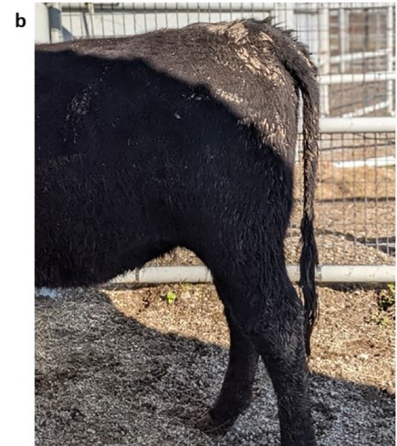
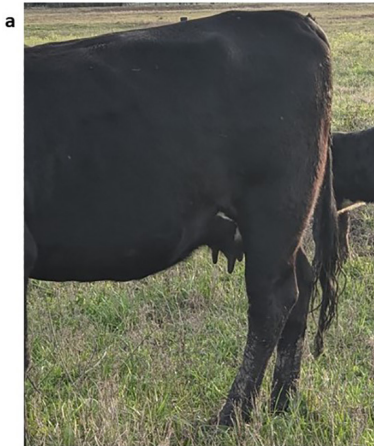
Fortunately, the onset of standing estrus occurs gradually, coincident with an increased concentration of estradiol. Various behaviors and other physical changes can be observed that indicate that a female is coming into standing heat and should be monitored closely for standing estrus. These behaviors include an increase in vocalization and restlessness, a decrease in appetite, smelling the vulva of other cows, resting her chin on another cow's rump and attempting to mount other cows. However, she will not allow herself to be mounted. The increase in estradiol also induces changes to the reproductive tract, some of which can be visualized. These changes include a reddened, moist and slightly swollen vulva (Figure 2), as well as a clear mucus discharge, either present on the vulva (Figure 3) or smeared onto her tail or flank. There are also several physical indications that mounting behavior may have taken place. These include hair on the tailhead being roughed up (standing up instead of lying flat) (Figure 4), patches of missing hair on the tailhead or flanks that have been rubbed off (Figure 5) and, if pastures are a little muddy, you may notice mud on both the left and right of an animal's flanks (Figure 6). Unfortunately, some of these behaviors and physical indicators can also be observed in females that have just finished their period of standing estrus (Figure 7). All females exhibiting secondary signs of estrus should be closely monitored over the following 48 hours for standing estrus. A record should be made of any female that did not exhibit standing estrus within that 48-hour period, and those females should be closely monitored for their subsequent heat beginning 17 days from their recorded secondary signs.



**Figure 2. Swollen vulva.**



**Figure 3. Clear vaginal mucus.**



**Figure 4. A comparison of (a) smooth hair on a tailhead and (b) hair on a tailhead that has been roughed up, an indication that she has been mounted.**



**Figure 5. Missing hair on flanks.**



**Figure 6. Mud on flanks.**

## Secondary signs of estrus (cont.)

Figure 7. Timeline of expression of secondary signs of estrus.

Coming into estrus 6-12 hours	Standing estrus 6-24 hours	Going out of estrus 6-18 hours	Out of estrus 1-3 days
	Stands to be mounted		
Increased vocalizations			
Increased movement and restlessness			
Vulva is swollen, moist and red			
	Clear mucus discharge from vulva		
	Smelling of vulva and chin resting on rump		
	Attempts to ride other cows (those females may or may not be near estrus)		
	Congregate (sexually active group)		
		Missing hair on flanks	
			Thin bloody discharge

## Heat detection aids

For many producers, performing heat detection more than twice daily is not feasible. There are several estrus detection aids on the market that can be used in conjunction with visual observations to

increase the number of females detected in estrus. These aids create (or remove) a mark on an animal only when a standing mount has been performed. This mark can be visualized at the subsequent heat

check and identifies animals that exhibited standing estrus between observation periods. These heat detection aids vary in their method of application, method and ease of detection, and cost.

## Marker animals

Marker animals, also called teaser or gomer bulls, are animals that have undergone an alteration to prevent pregnancy (Figure 9). These animals are extremely effective at detecting standing estrus and can be especially useful as they are more adept at detecting females that exhibit short or weakened heats or when very few females are in estrus concurrently, compared to other heat detection aids. Bulls selected to be altered

should have a mild temperament, be of moderate adult size and possess a strong libido. Additionally, the selection of a virgin bull decreases the risk of venereal disease transmission. Alteration should be performed several months prior to the start of breeding season to allow for an adequate recovery period. Marker animals are usually equipped with a chin-ball marker, which leaves marks on the back and rump of mounted females (Figure 8).

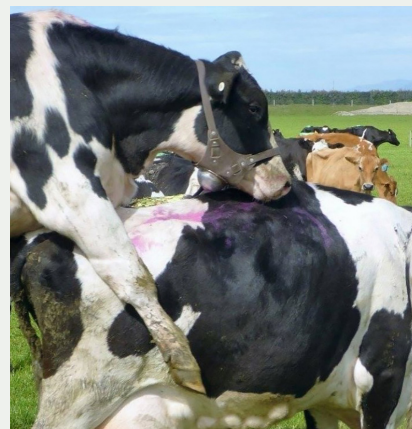


Figure 8. Teaser bull marking a female with a chinball marker (image used with permission from Teaserbull Company: [teaserbulls.co.nz](http://teaserbulls.co.nz)).

## Marker animals (cont.)

**Figure 9. Marker animals.**

Teaser animal	Procedure	Advantages	Disadvantages
Vasectomized bull	Portion of each ductus (vas) deferens is surgically removed, sterilizing the bull.	<ul style="list-style-type: none"> <li>• Relatively simple surgical procedure.</li> <li>• Penetration allows and libido to be maintained.</li> <li>• Stimulation from penetration increases conception rates to AI.</li> </ul>	<ul style="list-style-type: none"> <li>• Possibility of transmission of venereal disease.</li> </ul>
Epididymectomized bull	The tail of the epididymis is surgically removed, sterilizing the bull.	<ul style="list-style-type: none"> <li>• Simplest surgical procedure.</li> <li>• Penetration allows for libido to be maintained.</li> <li>• Stimulation from penetration increases conception rates to AI.</li> </ul>	<ul style="list-style-type: none"> <li>• Possibility of transmission of venereal disease.</li> </ul>
Penile-deviated bull "sidewinder"	The prepuce and penis are surgically relocated towards the left or right flank.	<ul style="list-style-type: none"> <li>• No penetration so no transmission of venereal disease.</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of penile stimulation may decrease libido.</li> <li>• Reports of some bulls adapting their mounts (side-mounting) and penetrating females, so a sterilization procedure is also recommended.</li> </ul>
Penopexy	The penis is surgically fixed in place, preventing protrusion of the penis.	<ul style="list-style-type: none"> <li>• No penetration, so no transmission of venereal disease.</li> </ul>	<ul style="list-style-type: none"> <li>• Erections are uncomfortable, resulting in diminished libido.</li> </ul>
Preputial pouch	The prepuce is surgically closed, and an opening (fistula) on the underline of the sheath is created to allow urine to escape.	<ul style="list-style-type: none"> <li>• Longer working life (no discomfort experienced with an erection).</li> <li>• No penetration so no transmission of venereal disease.</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of penile stimulation may decrease libido.</li> <li>• If fistula is too large, the penis may protrude through (sterilization procedure is also recommended).</li> <li>• Not recommended in <i>Bos indicus</i> breeds with pendulous sheaths.</li> </ul>
Androgenized female	Female (cull cow) treated with hormones to increase libido.	<ul style="list-style-type: none"> <li>• No bull is required.</li> <li>• More affordable than surgical alteration of a bull.</li> </ul>	<ul style="list-style-type: none"> <li>• Considered extra-label use.</li> <li>• Veterinarian must be consulted.</li> </ul>

## Mounting-activity detectors

Mounting-activity detectors are applied to the female's rump and undergo a visual change when mounting occurs. There are several commercially available aids that differ in application, change upon

activation, cost and accuracy of detection (Figure 10). Most of these devices require minimal time to apply, and, with the exception of the chinball marker, do not require a marker animal. It is worth

mentioning that a few of these aids require more skill in interpretation than others. The electronic monitoring systems are the only system that can entirely replace visual observations.

**Figure 10. Mounting activity detectors.**

Type of mounting activity detector	Application Method <sup>†</sup> , <sup>‡</sup>	Detection Method	Cost	Considerations
<b>Chin ball marker</b> <ul style="list-style-type: none"> <li>Kow-Ball</li> <li>CHINMARK</li> </ul>	Fill the harness with marking fluid (Kow-Ball) or place a crayon (CHINMARK) and fit the marker animal with the chin harness.	Chin-resting lifts the reservoir ball up and allows marking ink to flow out of the harness and onto the back and flank of the mounted female.	<ul style="list-style-type: none"> <li>Harness: \$70-150</li> <li>Crayon: \$20</li> <li>1 gallon marking ink: \$60</li> </ul>	<ul style="list-style-type: none"> <li>Leather harness may break.</li> <li>Reservoir needs to be refilled with ink, requiring regular handling of marker animal.</li> <li>Females can be marked when attempting to walk away from a mount or when marker animal is chin-resting, so interpretation of markings requires some skill.</li> </ul>
<b>Tail marker (crayon, chalk, paint)</b> <ul style="list-style-type: none"> <li>BOViPAINT</li> <li>Detect-Her</li> <li>Tell Tail</li> <li>PAINTSTIK</li> <li>QUIK SHOT</li> </ul>	Apply a line approximately 2-3 inches wide and 6-8 inches long across the tailhead both with and against the direction of the hair.	Friction from being mounted removes the marker from the tailhead.	<ul style="list-style-type: none"> <li>\$0.20 per head</li> </ul>	<ul style="list-style-type: none"> <li>Markings can be rubbed off by low-hanging obstructions and can be washed off in heavy rains.</li> <li>May need to be reapplied, requiring more frequent handlings.</li> <li>Markings can be applied too thick and estrus mountings won't rub it off.</li> </ul>
<b>Paint capsule</b> <ul style="list-style-type: none"> <li>KAMAR HeatMount</li> <li>KAMAR QuickStick</li> <li>Heat Seeker</li> </ul>	The indicator is either applied with an adhesive or has its own adhesive (QuickStick).	The indicator begins white. Mounts lasting longer than 3 seconds trigger a pressure device that releases a fluorescent paint.	<ul style="list-style-type: none"> <li>\$1-2 per head</li> </ul>	<ul style="list-style-type: none"> <li>Not as prominent as other aids, so it is a little less noticeable.</li> <li>Detectors can become dislodged (less likely with applied adhesive).</li> </ul>
<b>Scratch-off</b> <ul style="list-style-type: none"> <li>Estroprotect</li> <li>BOViFLAG</li> <li>ScratchE</li> </ul>	Indicators are placed between the hip and tailhead.	Mounting activity scratches off surface ink, revealing a fluorescent indicator.	<ul style="list-style-type: none"> <li>\$1-2 per head</li> </ul>	<ul style="list-style-type: none"> <li>Markings can be rubbed off by low hanging obstructions</li> <li>Detectors can become dislodged.</li> </ul>
<b>Electronic</b> <ul style="list-style-type: none"> <li>HeatWatch II</li> <li>Accubreed Cloud</li> </ul>	An envelope with a pressure-sensitive transmitter is adhered to tailhead.	Data from each mount (time, duration) is sent to a receiver, which can be accessed from any smart device.	<ul style="list-style-type: none"> <li>System and required inputs (envelopes, adhesives) cost several thousand dollars.</li> </ul>	<ul style="list-style-type: none"> <li>Envelope can become dislodged.</li> <li>Transmitters can fall out of envelopes.</li> <li>Transmitters can lose charge.</li> </ul>

<sup>†</sup> The tailhead should be combed (and long hair may be clipped) prior to application to remove debris and shedding hair.

<sup>‡</sup> Indicators with pre-applied adhesives should be warmed prior to application for optimal adhesion.

## Management considerations

In order to maximize detection, cows must be easily identified and visualized. Animal identification (ear tag or brand) should be legible, and observers should be able to get close enough to accurately interpret the visual aid or have binoculars. There should be adequate space to allow for cow-cow interaction. Crowded areas cause a reduction in estrus behaviors, so checking for heat in confined spaces, such as a holding pen, is not recommended. Presence of feed can also minimize the expression of estrus behaviors, so it is not recommended to perform estrus detection at feed bunks.

A large group of females should be housed together (not crowded) for maximal estrus detection. Mounting activity increases when multiple females are in heat simultaneously, which increases the accuracy of estrus

detection. Additionally, it is important that your females are structurally sound. Lamé animals will not mount or stand to be mounted due to the discomfort.

Observers should be trained and not pressed for time. Animal identification, all behaviors witnessed, and time of observation should be recorded. These records can be used to predict future heats. This prediction allows observers to know when to begin paying closer attention to females near their next estrus period. Females that do not enter back into estrus are good candidates for pregnancy tests.

Labor toward estrus detection can also be reduced with the implementation of a synchronization protocol. Synchronization protocols can either concentrate estrus detection into a period of five to seven days or remove the need for estrus detection entirely.

## Summary

Accurate detection of estrus is critical to a successful breeding season. Visual observation of estrus behavior is the most effective method of heat detection, and the more frequent the observations the better. However, it is often not feasible to observe the herd more than twice daily and, in those instances, there are a variety of commercially available heat detection aids that can be used to identify animals that stood to be mounted in between visual observations.

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- Reference to trade or brand names does not constitute an endorsement or imply discrimination against other similar products.*



Luke Laborde, Interim LSU Vice President for Agriculture  
Louisiana State University Agricultural Center  
Louisiana Agricultural Experiment Station  
Louisiana Cooperative Extension Service  
LSU College of Agriculture

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