



# pork industry handbook

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MICHIGAN STATE UNIVERSITY EXTENSION

## Estrus or Heat Detection (Key words: Estrus, Heat Detection, Pigs)

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### Introduction

There are many reasons why producers may want to use artificial insemination (A.I.) within their breeding programs. Regardless of the motivation, it is important to realize that A.I. requires a higher level of management than natural service due to the fact that A.I. technicians undertake many of the functions that are normally performed by the boar. The most important of these is detection of estrus or "heat". Poor heat detection results in improper timing of matings which, in turn, leads to low farrowing rates and small litters. Consequently, the first step in using A.I. effectively is proper detection of estrus. This requires a thorough understanding of what estrus is and the procedures used for its detection.

### Estrus

Estrus is the period of sexual receptivity in swine. The average duration of estrus is 38 hours for gilts and 53 hours for sows. However, these values can vary considerably among different farms and within the same operation. Because of this variation, it is not unusual to observe heat periods as short as 18 hours or as long as 96 hours. Gilts tend to be more unpredictable than sows in the expression of estrus. During estrus, anatomical and behavioral changes occur in females due to increased production of the hormone estrogen. The nature and timing of these physiological changes serve as the basis for procedures for accurately identifying sexually receptive females.

### Detection of Estrus

Detection of estrus is a critical factor in the successful implementation of A.I. in swine. Identification of the physiological signs of estrus is not difficult. These include increased activity and vocalizations, swelling of the vulva and enlargement of the clitoris, the presence of a sticky discharge, and elevation of the ears and immobilization in response to manual back pressure. However, estrus often is missed or misdiagnosed because many of these signs are overlooked. Accurate and efficient identification of estrus requires two things: (a) a thorough knowledge of the chronological order in which these signs occur as females enter their period of sexual receptivity and (b) the establishment of heat detection procedures that enhance the expression of estrous behavior.

The first sign that females are coming into heat is an increase in activity and vocalizations. When housed in crates, sows commonly move backward and forward or from side to side within the crate and often attempt to nibble or nose females in adjacent crates. In addition, they sometimes will paw at the front door of the crate and "chant" to animals in crates beside them. When housed in pens, characteristic activities include sniffing, nuzzling the rear and fore flanks, and attempting to mount or ride other females. Remember that sows attempting to mount or those actually riding other females may not be in heat, but are either just coming in to, or going out of, their period of sexual receptivity.

Reddening and swelling of the vulva usually accompanies or occurs shortly after the increase in activity. The change in the size and color of the vulva is the result of an

increase in blood flow and retention of fluids in the female external genitalia. As a result, the external lips of the vulva often are pushed outward exposing a portion of its inner lining which is highly vascular. Due to these changes, the opening to the vagina often appears to increase in size. In contrast, in females that are not in heat, the external lips of the vulva are curled inward and block the opening to the vagina giving it a small, puckered appearance.

Reliance only on the appearance of the vulva as an indication of sexual receptivity and the cue for breeding is a common mistake associated with A.I. The size and color change of the vulva actually is greatest just prior to the time when females will "stand" for breeding or exhibit the immobilization reflex. In addition, reddening and swelling of the vulva often do not appear to occur in older parity sows during estrus. It is common for the skin around the vulva to become stretched or loose during farrowing. Thus, in older sows, even though the physiological changes which normally cause swelling and reddening still occur, the change in color and size are masked by loose, flabby skin around the vulva. The appearance of red, swollen vulvas should be recorded on breeding records and used as a reminder by breeding technicians to spend additional time over the next few days examining those sows or gilts for the immobilization response.

The presence of a "sticky" discharge and enlargement of the clitoris are changes that usually occur immediately before and during the standing reflex. The clitoris is a small, fingerlike structure located inside the base of the vulva in the crease formed by the two lips. When females are in heat, the clitoris is engorged with blood which causes it to protrude outward and have a bright red color. When females are not in heat, the clitoris is flat and has a pale, light pink color. To observe the clitoris, it is necessary to pull the external lips of the vulva apart. This exposes the internal fold where the lips join and the clitoris is located. Mucus obtained from the inside lining of the vulva from sows that are not in heat has a slimy or slick feel to it. Just prior to the initiation of the standing reflex, the consistency of the mucus changes and becomes tacky or sticky. This change in composition is caused by hormonal changes that normally occur during sexual receptivity.

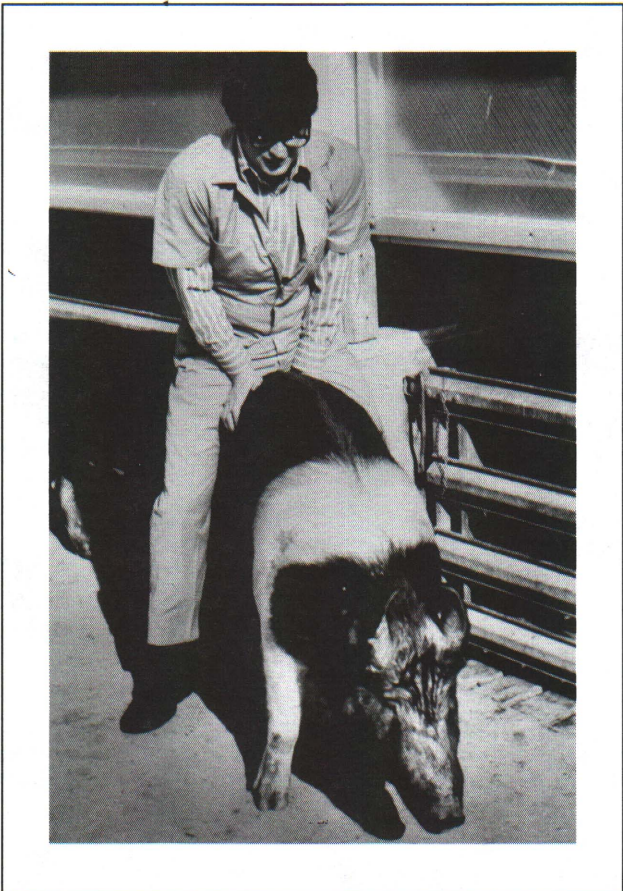
Assessment of the consistency of the mucus commonly is referred to as the "thumb check". The thumb check is performed by wiping the inside lining of the vulva with the thumb to obtain a sample of mucus. Next, the thumb and index finger are pressed together and slowly pulled apart. The sample is considered sticky or tacky if small strands of mucus remain connected to both the thumb and the index finger as they are drawn apart. In most cases, an engorged clitoris and sticky mucus are good indications that the female is in standing heat or within 6 to 20 hours of exhibiting the immobilization reflex.

The best indication that sows are sexually receptive and ready to be inseminated is the occurrence of the standing reflex or immobilization response (Figure 1). When provided with the appropriate stimuli, receptive females initiate isometric contractions of most skeletal muscles. This results in the female remaining rigid or "locked up" in anticipation of being mounted by a boar for

breeding. Often the ears of sows and gilts become erect during the standing reflex. This is commonly called the "ear popping" response and is easy to observe in breeds which have erect ears, such as Yorkshires. When breeds with floppy ears attempt the same activity, the ears obviously will not become erect, but a twitching motion at the base of the ear can be observed.

Using a boar in combination with the back pressure test is the most accurate method of finding females in heat. Researchers have shown that the presence of a boar increases the chance of identifying estrous females by 30% to 40%. Pheromones produced by boars are the most potent and effective inducer of the standing reflex in receptive females. For sows housed in crates, running a boar in front of sows while a breeding technician applies back pressure is a common and effective method of estrus detection. Sows in crates that are in heat will move forward and assume the standing reflex as the boar moves in front of the crate. In addition, when pressure is applied, females that are truly in heat actually push back when they feel pressure. This is a natural response as she prepares herself to be mounted by the boar for breeding.

Sows in crates that actually try to move away from back pressure, even though they may exhibit other positive signs, probably are not in estrus. In pens, sows will move to the front of the pen as the boar passes by. If back pressure is applied and the sow is in heat, she will exhibit the standing reflex. If back pressure is applied and the



**Figure 1. Method of detecting estrus in females. Note the erect ears and rigid stance with pressure applied to the back in the presence of the boar.**

sow is not in heat, she usually will run away from the back pressure in an attempt to escape. Estrous females housed in pens will sometimes attempt to follow the movement of a boar as he passes in front of their pen because sexually receptive females seek out males in contrast to males actually finding sows that are in heat. Direct physical contact by introducing the boar into a pen of females provides the best stimulation for estrus detection and is useful for checking sows who do not exhibit a standing reflex, but exhibit other signs of estrus.

The timing of boar exposure to sows and gilts can influence the accurate detection of the standing reflex. Because it involves isometric muscle contractions, maintenance of the standing reflex requires considerable energy. As a result, estrous females exhibiting the standing reflex can become fatigued. If a female becomes fatigued, she usually cannot resume a standing reflex for several hours. Consequently, boar exposure during estrus detection should be restricted to small groups of sows, either 5 to 10 crates or 1 to 2 pens. These small groups should be examined carefully for identification of receptive females. Exposure of the boar to larger groups of females could result in detection errors due to estrous females becoming fatigued and not exhibiting standing reflex when checked with the back pressure test.

Research has demonstrated that estrus detection is more accurate with boars that are at least 12 months of age compared with younger males. Increased production of pheromones is believed to be the reason for this difference. The behavior of the boar during heat checking also influences the efficiency of estrus detection. Ideally, boars should move slowly from crate to crate (or pen to pen) pausing a few seconds in front of each to sniff or nuzzle with sows. This behavior can be taught to a certain extent. During the first few times a boar is used for heat detection, placement of a small amount of feed in front of sow crates encourages this type of behavior. Boars will pause in front of the crates and eat the feed. After several days, this practice can be stopped and boars will still move slowly among crates searching for feed.

The boar(s) used for estrus detection need not be genetically superior boars that produce sperm for insemination. The heat check boars can be raised on the farm and need not be superior quality, provided they are healthy. As heat checkers, they should be vasectomized or epididectomized to prevent them from accidentally impregnating females.

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