

## Normal and Abnormal Behaviors of Swine Under Production Conditions

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### Objectives

- Understand sensory capacities of swine;
- Describe normal behavioral patterns of swine;
- Understand abnormal behaviors and possible causes under production conditions.

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### Sensory Capacity of Pigs

A pig's eyes are bigger and more functional than people often think [1]. The eye of a pig is about 24 mm in diameter, similar to a human's eye. The total optical power of the pig eye is estimated to be 78 diopters, which is greater than the optical power of humans at 60 diopters. So, pigs are likely nearsighted compared to humans. Pigs have approximately 310° vision, and the ability to detect colors. The retina of a pig contains two types of cones which are sensitive to blue and green-yellow light. Thus, the pig is believed to have dichromatic color vision (bluish and yellowish) and can identify blue better than any other colors. In terms of lighting preferences, pigs prefer well-lit areas to dark areas. So, it is easier to move pigs to a lighter area than a darker area [2].

Pigs also have a very sensitive sense of smell [1]. Sows identify their piglets through smell, and in turn, piglets find their dam and locate teats through olfactory clues. Piglets can recognize their dam's feces by 7 days of age. In a group, pigs can recognize pen-mates and dominant individuals mainly using olfactory cues [3]. The strong sense of smell in pigs has been used in swine production, such as using an odor masking agent to suppress aggression among pigs [4].

Pigs have a sense of taste that is similar to humans, and can discriminate between sweet, sour, salty, and bitter tastes [1]. Pigs prefer sweet to sour taste and will reject bitter food [5]. Sweet, meaty, and cheesy are the preferred flavors to pigs. Sweetener additives can be used to encourage newly weaned piglets to consume solid feed [5,6].

The hearing range of pigs is also similar to humans, but with greater sensitivity in the ultrasonic range [1]. Pigs frequently use audio cues to communicate with each other. Sows emit a series of grunts, varying in frequency, tone and magnitude to call their piglets and indicate imminent letdown of milk [7,8]. Lactating sows also respond to alarm calls of piglets [9]. Loud, sudden noises can stress pigs and interfere with the farrowing process. Playing recorded nursing grunts to sows can stimulate and synchronize nursing in a room [7].

### Normal behavioral patterns of swine

Normal behavior in pigs refers to behaviors that are observed in pigs under natural conditions. These behaviors promote biological functions in pigs, such as survival and reproduction [10]. Since rearing environments for commercial production are different from natural conditions, indoor raised pigs do not display the entire repertoire of behaviors they perform under natural conditions. For example, free-ranged pigs spent 35-55% of their time foraging for food [11], while indoor housed pigs do not forage because food is

readily available. The benefit and impact of performing the full spectrum of natural behaviors is not the focus of this article. Instead, this article discusses behaviors in pigs for indoor commercial production in order to help pork producers improve animal care by applying behavioral knowledge.

## **Farrowing and nursing behavior**

On average, sows spend 2 to 4 hours giving birth to a litter, with an interval of 15 to 20 minutes between each piglet. However, there is large variation in farrowing duration (45 min to 12 hour) and inter-birth intervals (5 to 85 min) among individual sows [12,13]. During farrowing, sows spend 85% of their time lying on their side [14].

At birth, piglets can present normally in either a 'nose first' or 'hind legs first' position. 'Broadside on' is considered a malpresentation. Piglets can get on their feet within a few minutes and successfully suckle milk within 45 min after birth. Birth order may affect piglet survival and growth [15]. Later-born piglets usually have less vigor, suckle later, obtain less colostrum, and have poor teat order compared to piglets born earlier. In addition, later-born piglets have a high risk of being stillborn or being born enveloped in afterbirth [15].

Nursing tends to be continuous at farrowing, and later becomes rhythmic [7,8]. A sow nurses her piglets approximately once per hour [16]. Nursing is usually synchronized among sows in the same room, meaning that sows within a room usually nurse at approximately the same time. Each nursing takes about 3 min, but the actual time of milk letdown only lasts 20 to 30 sec. On average, each piglet obtains about 0.7 oz (20 ml) of milk at each nursing [7,8].

## **Resting behavior**

Pigs spend the majority of their time resting or lying. On average, grow-finish pigs spend 75 to 85% of their time lying, and 5 to 10% eating, with the remainder of their time involving in other activities such as walking, sitting, rooting/nosing, and drinking [3]. Within the thermal comfort zone (i.e. the temperature range when pigs spend the least energy to maintain their body temperatures), lying on their side (lateral lying) is the predominant posture, with about 40 to 50% of pigs touching each other [17]. When temperatures are below the comfort zone, pigs adopt a sternal lying posture (on their chest and stomach) and huddle together to reduce the exposed skin surface area for heat loss. Under very cold conditions, pigs may lie on top of each other to keep warm. Above the upper limit of the thermal comfort zone, pigs change their lying position from sternal to lateral with legs stretching out and avoid contact with other pigs. Under extremely hot conditions, pigs increase their respiratory rate (panting) to dissipate heat through evaporation from the respiratory tract.

## **Eating and drinking behavior**

On average, pigs eat 10 to 25 meals per day, with younger pigs having more meals than older pigs [18]. Nursery pigs can eat 20 to 25 meals per day, while finisher pigs may eat only 10 to 15 meals per day. As pigs grow, they eat faster, so older pigs spend less time eating compared to younger pigs [18,19]. Eating events peak in the morning and evening. Even though pigs will eat during the night, the number and duration of meals is less than during the day [18,19]. When feeder space is limited, pigs will increase the amount of time spent eating during the night, which changes their diurnal (daily) pattern of eating behavior [20]. For example, diurnal variation in eating behavior is reduced when there are 20 pigs per feeder space, and is completely diminished with 30 pigs per feeder space, compared to 10 pigs per feeder space [20]. Increasing the length of the light period can also increase the number of meals and diminish the diurnal variation in eating behavior in pigs [Gonyou, unpublished data].

Eating behavior can be socially facilitated. When a hungry pig is eating adjacent to a satiated pig, the satiated pig typically starts eating [21]. Furthermore, pigs in adjacent pens tend to eat at the same time. However, when feeders are close together without protective dividers, pigs will avoid eating together and are aggressive towards other pigs that are eating next to them [21]. Pigs learn what to eat and where to eat from other pigs. Pigs that have observed other pigs eating a novel diet are more likely to eat the novel diet than pigs that have not. In addition, pigs that have observed other pigs eating from one of three feeder troughs will eat from the same feeder if given a choice [22].

Within the thermal comfort zone, drinking behavior usually occurs within 10 min of eating, hence the number of times per day that a pig drinks is similar to the number of eating events [3]. Grow-finish pigs usually spend 20 to 30 min drinking per day, with 15 to 30 second for each drink. Under conditions of heat stress, however, pigs spend more time drinking as well as playing with the drinker. Pigs with diarrhea will also consume more water. Thus, excessive water consumption can be used as an animal based welfare measure to monitor the

thermal comfort and health status of pigs.

## Excretory behavior

Pigs like to excrete in cool and wet areas, and lie in warm and dry areas. Pigs often drink, urinate, and defecate in close proximity of each other [23]. Because pigs take an unstable stance when they are excreting, they tend to excrete in a place that is away from commotion, and most commonly in a corner or against a wall. In most pens, the majority of the commotion is near the feeding areas so pigs tend to excrete away from feeders. If water is spilled, the pigs lie away from that area and then use it as an excretory area. So, pigs usually create the dunging area near drinkers. Pigs also like to excrete along the opening partitions between pens due to either drafts or the natural marking behavior when they see other pigs in the next pen [24]. Both higher room temperatures and a higher stocking density can cause pigs to foul the pen [24,25].

## Abnormal behaviors and possible causes under production conditions

In contrast to normal behaviors, abnormal behaviors refer to behaviors in pigs that have not been seen under natural conditions. Abnormal behaviors are considered an indicator of poor welfare in pigs under production conditions. In many cases, abnormal behaviors compromise the production performance or health of pigs.

## Piglet savaging

'Piglet savaging' is the behavior that gilts or sows kill their piglets after birth, and has been categorized as cannibalism. The incidence of piglet savaging was reported as 0.3% in farrowing sows and gilts, with a higher frequency observed in gilts than in sows [26]. Gilts that savaged at their first farrowing were at higher risk of savaging in their next farrowing compared to gilts that did not savage in their first farrowing. Continuous lighting in the farrowing room may reduce incidence of piglet savaging in gilts [26].

## Belly-nosing

Belly-nosing has been categorized as a stereotypy. Stereotypies are defined as repetitive, non-functional behaviors. Belly-nosing is most often seen in early weaned piglets, and peaks at 3 to 7 days after weaning [27,28]. It is considered to be caused by stress associated with early weaning. Piglets that are weaned at 2 weeks of age display 2 to 5 times more belly-nosing than piglets that are weaned at 4 weeks of age. Early weaned piglets can spend 15 to 25 min per day engaging in belly-nosing. Prolonged belly-nosing can result in lesions on the recipient pig. Pigs performing belly-nosing usually spend less time eating and grow slower than their counterparts [27]. Liquid feeding has been reported to reduce belly-nosing and improve growth rate in newly weaned pigs [29]. Compared to nipple drinkers, bowl drinkers have been reported to reduce belly nosing as well [30]. Belly-nosing can also be observed in grow-finish pigs, but the incidence is much lower compared with nursery pigs [31].

## Oral, nasal, and facial behaviors

Oral, nasal, and facial behaviors (ONF) are also considered stereotypic behaviors. Oral, nasal, and facial behaviors are most often seen in pregnant sows and can be associated with limit feeding and barren environments [32]. Gestating sows in stalls may spend 30% of their time performing ONF behavior. Compared to sows in gestation stalls, group-housed sows have been reported to spend less time engaging in ONF [33]. However, Daily and McGlone [34] did not find differences in ONF performed by sows kept on pastures or indoors in stalls. They argued that ONF maybe natural pre- and post-feeding appetitive and consummatory chewing and rooting activities, and not necessarily indicate poor welfare in sows. Although the motivation and consequence of ONF is still under debate, ONF has been perceived as a behavioral indicator of poor welfare. Feeding sows ad libitum with diets containing high fiber decreases the incidence of ONF in sows housed both in stalls and in pens [35,36].

## Tailbiting

Tailbiting, which is more often observed in grow-finish pigs than in any other production stages, is the most damaging abnormal behavior in pigs. The incidence of tailbiting in grow-finish pigs with normal tails has been reported to be 9%, which is higher than the 3% reported for tail-docked pigs [37]. Tailbiting is categorized as cannibalism in pigs. Causes of tailbiting are not well understood, but are known to be related to several factors including malnutrition, discomfort, and lack of environmental enrichment [38,39]. Low salt diets, draft or high air speed, high NH<sub>3</sub> or CO<sub>2</sub> concentrations, limited feeder and/or drinker space, and over-crowding have all been reported to be associated with tail biting [38].

Since tail biting can be caused by multiple factors, there are no specific solutions to the problem. In practice, victim pigs are usually removed once their tails become injured. Timely removal of both tail biters and victim pigs is important in preventing an outbreak of tail biting in a pen. Once tail biters have tasted blood from the tails of victim pigs, it is hard to stop them from biting more tails because pigs prefer the taste of blood. Continued tail biting becomes rewarding and the frequency of tail biting behavior will increase[39].

## Behaviors in sick and compromised pigs

Sick and compromised pigs usually display behaviors that are different from healthy animals [40]. Typical sickness behaviors in swine include reduced feeding, drinking, and interactions with pen mates, and increased resting, huddling, and shivering. Sick pigs are less successful in competing in a group, so these pigs should be moved to a hospital pen and receive individual care[40].

## Summary

Pigs have well-developed senses of vision, smell, hearing and taste. In general, pigs prefer well-lit areas and sweet taste. They rely on olfactory and auditory cues to recognize and communicate with other pigs. Under good management conditions (provision of adequate feed and space), pigs display diurnal patterns of feeding and activities. Improper management and environments could cause changes in behavioral patterns, and may induce abnormal behaviors. Understanding the sensory capabilities and normal behavioral patterns of pigs will help us prevent the occurrence of abnormal behaviors in swine production.

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## Frequently Asked Questions

1. If I see that most pigs in a pen are lying in a sternal position, does that mean that the pigs are cold?

Yes. When the pigs are in their thermal comfort zone, lying on their side is the predominant posture, so, the majority of pigs should lie this way instead of lying sternal. When the barn is cold, pigs tend to lie on their chest and belly and snuggle their legs under their body in order to preserve body heat by reducing heat loss from exposed body surface.

2. How do I know when a pig is sick?

When pigs are sick, they are usually very quiet and do not eat or drink as much as other pigs. Pigs normally eat and drink more frequently in the early morning and the late afternoon. So walking through the barn at the beginning and the end of the daily chores can help you efficiently spot sick pigs.

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