Evidence-based swine welfare: Where are we and where are we going?

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Evidence-based swine welfare: Where are we and where are we going?

Abstract

Behavior, ethology and welfare

Animal welfare is not a term that arose in science to express a scientific concept; rather, it arose in Western civilization to express ethical concern regarding the treatment of animals. There are three schools of welfare, and which school an individual subscribes to will often influence the philosophical definitions of welfare to which they subscribe. The first school is a feeling based school, which would include some reference to the importance of ascertaining what an animal feels in terms of pleasure, suffering, distress, and pain. The second school is a functioning-based school in which there is a focus on the fitness and health of animals. The third school is a nature-based school that values the natural behaviors of animals under natural conditions. The idea of feelings being important for welfare was developed by Duncan 1 and Duncan and Dawkins,2 and then the suggestion was made that, in fact, feelings were the only thing that mattered.3 In turn, because of these various schools of thought, animal welfare researchers are still unable to agree on one animal welfare definition, but the measures that can be used to help assess how an animal is coping within defined parameters have been agreed upon. Animal welfare is an issue that involves several scientific disciplines that are part of the animal sciences, which include performance, physiology, anatomy, health, and behavior.4 Perhaps the discipline that has been most closely associated with welfare is the study of animal behavior, known as ethology.4 The term applied ethology is often used to designate the subdiscipline of studying the behavior of animals that are managed in some way by humans. Gonyou4 noted, "Applied ethology involving agricultural species has become so closely associated with the scientific study of animal welfare that some use the terms behavior, ethology and welfare as virtual synonyms." 4 The objective of this paper will be to discuss three case studies using pig behavior that may be used on farm by a swine practitioner.

Disciplines

Animal Sciences | Behavior and Ethology | Large or Food Animal and Equine Medicine

Comments

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Behavior, ethology and welfare
Animal welfare is not a term that arose in science to express a scientific concept; rather, it arose in Western civilization to express ethical concern regarding the treatment of animals. There are three schools of welfare, and which school an individual subscribes to will often influence the philosophical definitions of welfare to which they subscribe. The first school is a feeling based school, which would include some reference to the importance of ascertaining what an animal feels in terms of pleasure, suffering, distress, and pain. The second school is a functioning-based school in which there is a focus on the fitness and health of animals. The third school is a nature-based school that values the natural behaviors of animals under natural conditions. The idea of feelings being important for welfare was developed by Duncan and then the suggestion was made that, in fact, feelings were the only thing that mattered. In turn, because of these various schools of thought, animal welfare researchers are still unable to agree on one animal welfare definition, but the measures that can be used to help assess how an animal is coping within defined parameters have been agreed upon. Animal welfare is an issue that involves several scientific disciplines that are part of the animal sciences, which include performance, physiology, anatomy, health, and behavior. Perhaps the discipline that has been most closely associated with welfare is the study of animal behavior, known as ethology. The term applied ethology is often used to designate the subdiscipline of studying the behavior of animals that are managed in some way by humans. Gonyou noted, “Applied ethology involving agricultural species has become so closely associated with the scientific study of animal welfare that some use the terms behavior, ethology and welfare as virtual synonyms.” The objective of this paper will be to discuss three case studies using pig behavior that may be used on farm by a swine practitioner.

Case example one: Pain management in pigs
Setting the scene
Science-based guidance for the industry on optimal housing, management and treatment of lame pigs is deficient. There are no approved drug treatments for analgesia use in lame swine, and the identification and validation of robust, repeatable pain measurements is fundamental for the development of effective analgesic drug regimens and management strategies for use in lame pigs. Research to address the limited knowledge in this area is essential to formulating science-based recommendations for pig producers. This will become especially important if legislative actions succeed in preventing downed animals from entering the human food chain (Prevention of Farm Animal Cruelty Act and the Healthy School Meals Act) regardless of etiology.

Pain and behavior
In veterinary medicine, changes in an animal’s behavior are often used as the first clinical signs of illness, injury or pain. Good stockpeople develop an “eye” for the animals in their care, and become highly skilled at picking up subtle changes in behavior patterns at the individual animal or pen level. Animal behavior is a key parameter to evaluate animal welfare since it accurately reflects the animal’s integrated response to its situation but the characteristics of subjective emotional states such as fear and pain sensation or perception are such that they can only be measured indirectly in humans or animals. Pain is defined by the International Association for the Study of Pain (IASP) as “an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage.” The IASP adds, “The inability to communicate verbally does not negate the possibility that an individual is experiencing pain and is in need of appropriate pain-relieving treatment.” This is an important point, especially when discussing pain in animals, and even more so in food-producing animals, such as pigs. Animals can visibly communicate their pain to us only through physical signs. Behavior commonly associated with pain in swine include: vocalization, abnormal standing posture, decreased body weight, reluctance to move, decreased appetite, restlessness, head turning and limping. Furthermore, when a pig is lame the stride length shortens, movements are more “stiff” and the animal has a lowered ability to accelerate and change direction. Locomotor disorders can be associated with...
Technologies to detect lameness pain in pigs - Iowa State University (ISU)

Numerical rating scoring and visual analog scoring systems are common in production systems, but are highly subjective with varying degrees of inter- and intra-observer correlation. Therefore, the swine intensives study laboratory at ISU was created in 2009. The aim of this laboratory is to validate repeatable, objective and robust tools that can be implemented on farms to assist in detecting and treating lameness pain in pigs (http://vetmed.iastate.edu/research/labs/SwineLab). Behavior in home pens, behavioral kinematics whilst walking and standing and reactions that indicate sensitivity to pain allow us a non-invasive analysis of pain lameness that can be correlated with the other diagnostic tools (ie performance, anatomy, health and physiology).

Practical application

The long-term goal is to validate objective tools to assess pain. These tools will be used to develop management strategies and to screen analgesics that have shown efficacy in other species for pharmacokinetic profiles in swine. This would allow for treatment in a production setting, and to establish efficacious analgesic drug regimens for various painful production outcomes in pigs, and to determine refinements to housing to facilitate convalescence and comfort in lame swine. In response to the urgent need for pain-mitigation strategies in American livestock production, the primary objective of this proposal is to further evaluate an innovative lameness model in pigs and the effect of pain mitigation strategies including environmental modification and analgesic drug administration. Furthermore, management of convalescent swine through the use of hospital pens, establishing humane endpoints and appropriate euthanasia techniques has been explored by our team.16,17 Refinements to environments for the welfare of convalescent swine has been identified as a research need to the US pork industry and for welfare certification programs.

Case study two: Sow motivation-Purdue University

Setting the scene

Animal welfare and the housing of farm animals is a growing consumer, legislation and industry concern.18 The use of gestation stalls to house pregnant sows has been under particular scrutiny, as stalls cause physical and social restriction, as well as a lack of stimulation for the animal.19,20 One way to improve the welfare of sows housed in non-stimulating environments is to provide environmental enrichment. The definition of environmental enrichment varies within the literature;21,22 however, Elmore et al.,23 have proposed the following definition of environmental enrichment: that environmental enrichment be defined as biologically relevant22 additions to the environment that allow coping with stressors23 by promoting species-specific (ie. ‘natural’) behavior25,26 and may be linked to the experience of positive affective states in animals.27,28 Environmental enrichment has the potential to increase sow welfare, as enrichments can provide an outlet for exploratory and highly motivated behaviors, such as nest building prior to farrowing;29,30 lead to a reduction in abnormal behavior, such as stereotypies;31 reduce chronic hunger by increasing gut fill;32 and increase thermal and flooring comfort.33,34

Measuring motivation

Motivation studies can help us determine which behaviors and resources are important to pigs, leading to changes in housing and husbandry, which improve animal welfare.35,36 Investigation into the motivation of pigs frequently utilizes operant conditioning techniques and multiple motivation models have been used, most commonly elasticity of demand.37,38,39 Elasticity is generally a poor measure of motivation for a number of reasons,40,41 while reservation price (or the highest price paid) is considered to be a more robust measure.

Practical application

Elmore et al.,42 investigated whether the motivation of gestating sows for access to an enriched group pen (containing a rubber mat, straw, compost and cotton ropes), and their behavior while in the pen, would differ due to social status. Motivation was measured using an operant panel and behavioral measures. Dominant and subordinate sows were equally and moderately motivated for access to an enriched group pen. However, dominant sows were more aggressive and spent more time using enrichments upon entrance to the pen, while subordinate sows were more frequently displaced from enrichments and were less active. Subordinate sows increased their use of enrichments the following morning during non-peak times. These findings demonstrate that regardless of social status, sows were able to access enrichments and valued an enriched group pen. Sow social status has the potential to greatly alter the effectiveness of enrichments in group settings and will become an increasingly important consideration as scientists, caretakers and veterinarians explore welfare friendly alternatives to barren sow housing.
Case study three: Drinking behavior of nursery pigs

Setting the scene
Scientific recommendations for delivering vaccines orally within the water supply are critical. Recommendations should not only include the medicinal values but must also address the pigs drinking behavior i.e. “when is the best time to provide the medicine based on when pigs prefer to drink?” Water has often been defined as the “the forgotten nutrient” in regards to the limited attention it has received in comparison to detailed research and application for other dietary nutrients. Water is the most essential nutrient for life and an inadequate supply can result in devastating consequences such as overheating, dehydration, and in the extreme case, death. Knowledge on correct placement for key resources to facilitate unhindered drinking for nursery aged pigs is limited. Farm animals form a social hierarchy or rank order that can affect accessibility to key resources within their pen. In competitive situations, higher ranked animals might have more access to water. Many factors need to be considered when optimizing drinking availability to the pig. Drinking system design, and the optimal ratio of pigs to the water resource are all critical considerations. Current recommendations on the ratio of drinker to the number of nursery pigs are 1:15 in the United Kingdom and 1:10 in the United States but there is limited science to support these recommendations.

Drinking behavior
Drinking is defined as voluntary oral ingestion of liquids and refers to the total consumption of water; which includes water which is often contained in feed. Pigs may drink to satisfy their physiological need for water and it has been reported that pigs will additionally drink to relieve a feeling of hunger. It has been well documented that pigs are prandial drinkers and that there is a clear relationship between feeding and drinking along with preferred times of the day when pigs will drink.

Technologies to determine drinking behavior in the nursery pig – ISU
In one study two treatments were compared in a crossover design: withheld (WH), pigs did not have access to water for 15 hours, and control (c), pigs had ad libitum access to water. One camera was positioned over each drinker to record visits lasting ≥ 5 seconds between 7:00 am and 1:00 pm on 2 consecutive days. One meter was installed on each water line to record water disappearance. All pigs from both treatments visited the nipple cup drinker during the 6-hour observation period. Control pigs made fewer total visits and spent less time at the nipple cup drinker than WH pigs. The WH pigs spent longer at the water nipple and visited more often than the C pigs only for the first hour after water was restored. Water disappearance was greater for the WH pigs.

Practical application
Timing of water based vaccines becomes an important consideration if the vaccine is only active for a defined period of time. Therefore, understanding temporal drinking patterns of nursery aged pigs is critical to ensure all pigs have the opportunity to drink and therefore receive the vaccine. Sequential behavioral projects can now provide recommendations of whether to withdraw water prior to the application of a water based vaccine and if a group of 25 nursery aged pigs are able to visit the drinking source for a 5 second visit and receive a water based vaccine if the application begins at 0700 and concludes at 1300-hours.

Conclusions
Both basic and applied pig research has either been completed or is on-going that incorporates behavior as a key measurement. Used judiciously, analyzed correctly and interpreted and applied professionally, behavior is a critical component of evidence based swine welfare research. Behavior will become increasingly important to guide the practicing veterinarian into providing state of the art care and attention, which in turn will positively impact the overall health of the pig.

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