

Better Handling, Better Pork

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■ Introduction

Major factors impacting behavioral and physiological responses of the pig during handling and transport include genetics, slaughter weight, environmental conditions (temperature and humidity), health status, marketing strategy, time off feed, pre-transport experiences, facility design, and the nature of the handling method. (Ritter et al., 2005).

Even the “best” handling and transportation conditions will cause significant changes in the pigs’ physiology, their behavior and consequently negatively impact pig performance and the quality of the pork delivered to the consuming public.

■ Cost of Animal Handling

US Industry statistics report an average Dead on Arrival (DOA) at processing plants for 2004 of 0.23% of pigs marketed. However, the actual losses vary significantly by producer, ranging from less than 0.10% to over 2%. In addition for each head marketed, problems with meat color have been estimated to cost \$0.43, for bruising \$0.08 and for pale, soft and exudative (PSE) meat \$0.90 (TQA, 2005).

This results in a total lost opportunity of \$2.44 US per finisher head per year. However, these direct financial impacts represent only a small fraction of the true cost of marketing and pig transportation stress. There are many other lost efficiencies, increased costs and risks associated with pig transportation.

On the farm the negative impacts due to poor handling and transport systems have yet to be fully explored let alone economically quantified. These losses range from reduced care and concern for the animals (Hemsworth, 2003),

high employee turnover and physical injury. As indicated by the fact that over 30 percent of employee injuries within finishing operations are animal handling related and the vast majority of these injuries occur during sorting and loading of pigs. Many of these inflictions are very severe, especially injuries to the knees and back.

Due to the Humane Slaughter Act and increased prioritization of humane handling by both authorities and customers alike swine processing plants have developed detailed programs to ensure humane handling of livestock. These programs include education/training for employees, performance monitoring systems, third party audit programs and facility improvement plans.

To improve the humane handling of fatigued pigs, many processing facilities have devoted highly trained personnel to their lairage department which has significantly increased production labor costs and staffing needs. However, the specialized practices required to properly unload and handle these animals are exhausting and physically challenging for plant personnel. In addition, the equipment necessary to properly handle these animals requires the processing facility to make a significant investment in not only capital expenditures but also for maintenance.

Fatigued and dead pigs disrupt the standard animal flow resulting in reduced processing plant and transportation efficiencies. Therefore many processors are now not only charging the cost of a DOA animal back to the producer, but are also charging the cost for an animal received in a compromised state regardless of whether the animal is processed for consumption or rendered as a byproduct. Many are also charging a handling fee to offset the extra labor cost, loss in efficiencies and liability associated with handling a compromised animal.

However, these costs and losses in efficiencies are all secondary to the **ethical obligations and moral responsibilities** we have to the animals under our care and to the consumers trusting the pork industry to produce, transport and process our animals in a humane and compassionate manner.

■ **Additive Stressor Models: How does this relate to handling, load out and transportation?**

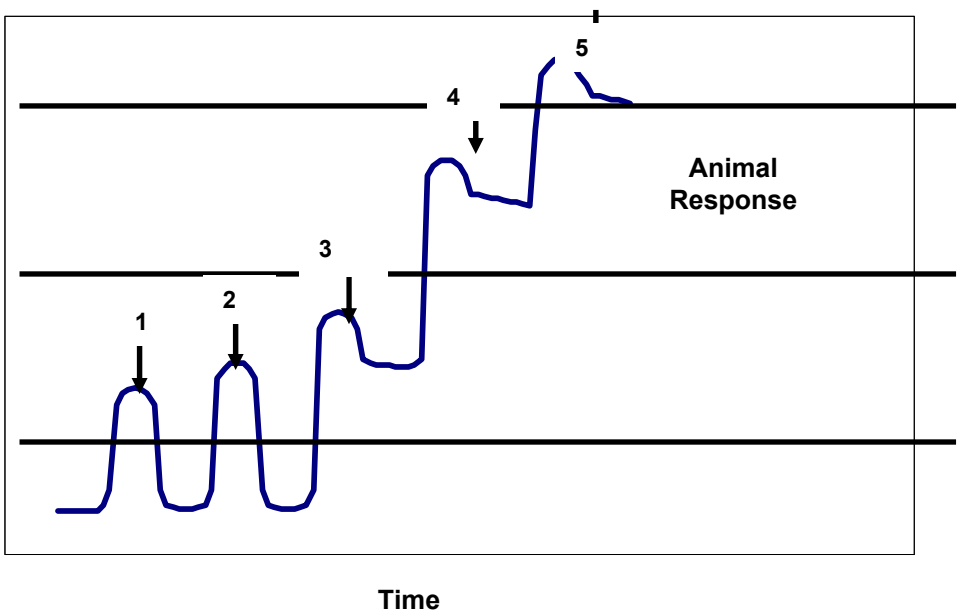
In all methods of production, the pig is subjected to many internal and external stressors throughout its life. Stressors that impact an animal vary in time, intensity and mode (Broom and Johnson, 1993). However the body has developed physiological mechanisms to adapt to various stressors that are neutral, negative or positive in regards to animal well-being. It is only when the stress level exceeds the body's capacity to cope that the pigs' well-being is

compromised. The inability to cope will result in loss of efficiency and long term harm with the ultimate extreme being death (Moberg and Mench, 2000).

The initial response to stress (acute) is the release of the hormones epinephrine and norepinephrine into the blood stream from the adrenal glands. The release of these hormones causes an increase in heart rate, blood pressure, respiration rate and internal rectal and skin temperature, to identify only a few physiological changes (Knowles and Warris, 2000). In the slightly longer term a pigs' response to stress is mediated mainly through the hypothalamic-pituitary- adrenal (HPA) axis. A glucocorticoid called cortisol is produced and released in response to an extremely wide range of stressors (Knowles and Warris, 2000) which can negatively impact the pigs' immune system, making the individual pig more susceptible to disease and infection. In addition cortisol can affect the final meat quality.

Research has demonstrated that the process of handling and transportation can be visualized as "additive stressors". Over a given period of time, the pig is exposed to one stressor after another and the animal does not have time for its body to return to baseline. Each time a new stressor is added the stress response of the animal continues to become more intense. At some point, if the animal does not have time to recover, then the ultimate end-point will be death (Figure 1).

Figure 1. Responses to a series of stimuli which, individually, have moderate effects but which can be lethal in combination. 1 = Movement from home pen along alleyway, 2 = Electric prod use 3 = Loading 4 = Transport 5 = Unloading. Adapted from Broom and Johnson (1993)



■ **The Pig: Its Behavior and Basic Anatomical Features**

To provide a safe and efficient system to market pigs it is of utmost importance to have a thorough understanding of their composition and physical attributes, since the way a pig behaves is dictated by the cues received from its environment, utilizing its basic sensory capabilities.

In brief, a pig has a wide peripheral vision of approximately 310 degrees, which provides a panoramic view of the world. However, of these 310 degrees, pigs have approximately a 12 degree field of best vision (Heffner and Heffner, 1992). Like other animals, the pig does have a blind spot directly behind them and are only moderate judges of distance. Therefore people, changes in illumination intensities, moving objects, and contrast in color will result in animal hesitation and balking (Grandin, 1989).

The auditory system of the pig has a range of frequency detection between 40 Hz and 40kHz, which is slightly higher frequency compared to humans (Heffner and Heffner, 1990). Loud, high pitched noises seem to be aversive to pigs (Talling et al., 1996), including high pitched vocalizations emitted by pigs experiencing traumatic events.

Pigs have an acute sense of smell and as such use a wide range of olfactory cues in their behavior (Curtis et al., 2001). Finally, touch is detected through nerve endings in the skin and subcutaneous tissue; the snout is the primary organ of touch for the pig. However, the foot pad of the pig will identify changes in flooring texture and the pig will hesitate at surfaces to which it is not accustomed.

In addition, pigs are social creatures that desire to remain in groups; preferring to maintain visual, if not physical contact with their pen mates. If isolated, pigs can become highly agitated, and the resulting excitement of the individual animal will negatively impact the behavior of an entire group. This can certainly be detrimental during times of pig movement or loadout.

■ **Animal Handling at Marketing**

Animal “movement is accomplished by making the target location, or route to it, more attractive than the starting location” (Gonyou, 1993). Pigs are motivated by many factors including natural curiosity, pig odors, pig sounds, conspecifics, food and fear (McGlone et al. 2004).

Handling and Loadout: The pig and caretaker interaction

Caretakers can be your greatest asset or your greatest liability. Good animal handlers who understand animal behavior, the production system and their impact on pork quality can minimize the impact of poor design. However, the best facility design can be rendered inadequate by poor animal handling.

The animal handler's primary objective is to minimize the animal's level of fear and therefore their negative stress by maximizing positive interactions while encouraging the animal to move to the target location. This is accomplished by understanding the animal's point of balance and how to manipulate the edge of the flight zone. The majority of pigs can be moved simply by understanding and utilizing the point of balance without ever employing a moving aid (Grandin, 2006).

■ Handling, Loading and Transportation Systems

Traditional handling, loading and transportation systems have been either poorly planned or not planned during in the design and construction of the pork production system. Therefore, during handling and marketing opportunities the industry is forced to rely heavily on negative motivators or repulsive forces, most notably fear and pain, to move the animal.

Instead, all production, transportation and processing facilities **MUST** be designed based on the behavioral and physiological attributes of the pig. The goal of any handling and loading system should be to provide a continuous unidirectional flow of pigs from the pen to the trailer and trailer into the plant, with minimal amount of stress on the animal. However, due to the inherent variation in production facilities, management styles, transportation systems and processor requirements there will never be a single ideal marketing system design or handling procedure.

Design Factors Impacting Animal Movement

The majority of the market pigs in North America are raised in confinement facilities with barren environments and limited interaction opportunities for environmental enrichment or human interaction. Pigs kept in barren environments have been shown to display a high degree of reactivity to novel stimuli and in some case be disturbed by them (Stolba and Wood-Gush, 1980). Therefore, pigs load and transport best in a highly controlled, consistent environment that eliminates distractions and mimics the features of the home pen. This control should include all major and minor aspects of the animals' environment, such as chute width, ramp slope, wall coloration, lighting, flooring material, airflow patterns, etc.

Attempting to control all factors in the animals physical environment minimizes the impact of the one (or more) factor(s) that at the time of marketing is undesirable, such as an unusual wind pattern in a naturally ventilated finishing barn, or rain on the top of the trailer creating high levels of noise.

■ **Assessing Marketing Procedures to Ensure Swine Well-Being**

To maintain a high level of success requires constant vigilance and evaluation of the system to identify areas for improvement. This requires a collaborative effort of the producer, the transport company and processing facility. At a minimum, the factors that should be continuously monitored (TQA, 2005) are average live weight, load time (on a per pig basis), death loss (in transit and at the plant), non-ambulatory pigs and an identified reason (lame, fatigued, etc).

Additional information including loading personnel, driver, trailer identification, prod usage, slips/falls percentage and chute integrity can be useful for continually improving the loading system.

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