

Reducing Losses from Farm Gate to Packer

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▪ Introduction

Ten years ago, Dr. Vivian Tarrant (Tarrant 1989) ended a review on the effect of pre-slaughter handling, transport and chilling on meat quality and yield with the statement,

“It is concluded that events during the 24 h surrounding slaughter are probably the most important of the entire production cycle.”

A number of economically important losses can be partially or completely corrected through careful selection of pigs and by adjusting pig management during the 24 hours prior to slaughter.

▪ What Are the Losses?

There are a number of very obvious sources of economic loss attributed to the period from the time a producer groups his pigs for shipping until slaughter.

1. Pig Deaths

Of 2.1 million pigs slaughtered in Alberta in 1996, deaths during transit to the abattoir and lairage at the abattoir were 0.1% and 0.04%, respectively (Personal Communication from Ron Landry). Although, at a glance, the total death losses (1.4 per 1000) seem very low, this does not seem low to the producer, who may have several deaths in a single load.

2. Loss in Carcass Weight

According to Warriss (1995), live weight losses begin almost immediately after feed is withdrawn, and continues at a rate of between 0.12 to 0.20% per hour (2.9 to 4.8% in 24 hours). Actual loss in carcass weight begins sometime between 9 and 18 hours after the last meal. Carcass losses account for up to one third of total losses over the first 24 hours and up to one half of total losses between 24 and 48 hours. In the first 24 hours of feed withdrawal, a 1% loss in carcass weight can occur.

3. PSE/DFD Pork

In Alberta approximately 13% of pigs produce loin muscles that are PSE (pale, soft and exudative) and a somewhat higher number of loins exhibit one of these traits, either pale, soft or exudative (Murray and Johnson, 1998). Approximately 10% of loins are darker and 5% are firmer and dryer than normal. Each PSE pork chop loses approximately 3% more drip than normal. It has been estimated that the PSE condition decreases the value of a pig carcass by about \$5.

4. Physical Injury / Bruising

In a 1994 U.S. audit, 1-2% of hams and shoulders had at least superficial bruising (Morgan et al. 1994). The overall cost of bruising within Canadian pigs is not well established.

▪ Pig Stressors

The stressors contributing to the above-mentioned losses, all of which tend to have both physical and psychological components, are mentioned briefly below. Guidelines for handling animals and design of facilities are presented in much more detail in the Agriculture and Agri-Food Canada recommended code of practice for handling pigs (Connor 1993) or at the website of Dr. Temple Grandin (Grandin 1999).

1. Facility Design

Ramps and chutes should have solid sides, a slope of no more than 20° (Lambooij et al. 1993) and non-slippery surfaces. The loading ramp and sides should both be flush with the truck. For a pig, the bruise hazard zone is the area between 12 and 30 inches from the floor, and therefore gates, pens, ramps, chutes and transport vehicles should have no sharp or protruding objects. Pigs should have access to water while held on the farm or at the packing plant.

2. Environment

Temperature/Humidity

Adequate ventilation during transit is very important. High temperature and humidity in the transport vehicle increase stress, and are often associated with increased frequencies of transit deaths and PSE pork. Although Warriss (1998) indicates that the temperature within the vehicle should not exceed 30°C in order to remain within the pig's thermoneutral zone, others (Honkavaara 1989; Connor 1993) suggest that a temperature between 15 and 25°C is preferred. Transport in the hottest part of a summer day should be avoided.

Lighting and Other Distractions

Bright lights, reflections, flapping objects, drain grates and dogs distract or frighten pigs and should be avoided. Loading confinement hogs at night or with a shade over the ramp may reduce stress levels.

Sounds and smells

Pigs have very sensitive ears, and therefore even yelling is stressful to them (Geverink et al. 1998a). Unusual smells often inhibit the movement of pigs. During unloading, a bit of truck bedding can be sprinkled on the chute.

Vibrations

Pigs are subject of motion sickness (Bradshaw et al. 1996). More vibration during transit is associated with higher levels of stress indicators.

3. Physical Abuse

Hogs should be permitted to move at their own pace to prevent pileups. Handlers must remain aware that a simple kick to move a pig can ruin a ham. In general, the use of electric prods, sticks or other hard objects is not recommended. Canvas slappers, applied to something other than the pigs, along with hurdles (push boards) are very effective for moving hogs.

4. Stocking Density

Pigs should have adequate space to lie down during transit and lairage. The stocking density recommended in Canada ranges from 0.34 to 0.41 m²/100kg liveweight, depending on the temperature. Giving pigs more space during the short transport (2.5 hours) does not result in them lying down (Gade and Christensen 1998). On the contrary, there is continuous disturbance from other pigs and at lower densities pigs have difficulty maintaining balance, particularly when the vehicle negotiates bends or poor road surfaces. Adequate pen space of 0.46m²/100kg liveweight (Connor 1993) or 0.55m²/113kg pig (Grandin 1999)

should be provided for overnight holding at assembly areas and at packing plants.

5. Mixing

Pigs are very territorial animals. The mixing of unfamiliar pigs is extremely stressful and results in a high degree of fighting. This combination of stressful conditions and fighting causes skin damage and exacerbates carcass shrink (Murray and Jones 1994). Therefore there should be an attempt to limit the amount of mixing.

▪ Feed Withdrawal and Rest after Transport

There is, by necessity, a period of time between when pigs last eat and when they are slaughtered. If pigs were loaded immediately after eating, the minimum time until slaughter would probably be no less than 1.5 hours. A general consensus of research findings indicates that, in order to optimize pork quality, pigs transported for a short distance should not be slaughtered earlier than 2-3 hours after arrival at the abattoir (Warriss et al. 1992).

Meat packers strongly desire pigs which have been without feed overnight prior to slaughter (Schoonderwoerd 1997). This period of time permits more efficient scheduling of pigs for slaughter, decreases the gut fill and the amount of distension of the gastro-intestinal tract resulting in less bacterial contamination of carcasses and decreases the frequency of PSE pork.

On the other hand, since at the time of loading it is not known when a particular pig last ate, pigs are often held off feed well in excess of 24 hours. Feed withdrawal periods in excess of 24 hours, especially if pigs are mixed, not only decrease carcass weight, but also increase the chances of producing DFD pork (Murray et al. 1989, Murray and Jones 1994). The goal then is to determine the minimum time of feed withdrawal, which satisfies packer concerns. This is not known precisely at present, it is probably somewhere between 10 and 18 hours.

▪ Pre-Disposition to Stress

Although all pigs are susceptible to the stressors mentioned above, pigs that carry a genetic defect in a gene called the halothane gene are much more susceptible than others. These pigs are very prone to die during transport or lairage and to produce PSE pork. Within Alberta approximately 50% of transit and lairage deaths have been attributed to pigs which carry this gene (Murray

and Johnson 1998). Pigs which are stress susceptible because they carry the halothane gene can be eliminated by careful selection of breeding stock.

▪ **Conditioning to Stressors**

Pigs that experience regular moving and handling during the finishing period are easier to move and are less likely to be subjected to rough handling during the pre-slaughter period (Geverink et al. 1998b).

▪ **Conclusions/Implications**

The economic impact of pig transit and lairage deaths, bruising, lost carcass yield and PSE/DFD pork can be minimized, firstly, by refraining from the use of stress susceptible pigs and, secondly, by limiting the amount and impact of stress during the 24 hours prior to slaughter. The impact of pre-slaughter stress can be limited by careful consideration of:

- -Facility design (pens, chutes, ramps, flooring, gates, transport vehicles).
- -Pig environment (temperature, humidity, lighting, smells, sounds).
- -Humane handling practices, as well as conditioning pigs to handling.
- -Stocking density.
- -Mixing of unfamiliar pigs.
- -Total time of feed/water withdrawal during transport and lairage.
- -Rest in lairage after transport.

This requires that all of those who handle and/or transport pigs during the period from the farm to slaughter adhere to these principles.

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