FACTORS ASSOCIATED WITH IN-TRANSIT LOSSES

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ABSTRACT

A number of factors are known to affect the amount of stress that pigs experience during transport. Stressful conditions during transport, handling and holding may lead to in-transit losses including death, increases in the number of subject animals and reductions in meat quality [Clark, 1979; Lambooj, 2000; Tarrant, 1989]. For this paper, the term "in-transit losses" will be used to describe the death of a healthy market pig between the time it leaves the farm up to the time it reaches the processing line at the packing plant. The purpose of the research was to describe the in-transit losses experienced in market pigs in Ontario and to identify the association between losses, distance, weather, and phase of marketing. In 2001, 0.17% or 17 out of every 10,000 pigs marketed died during transport. The farm where the pig originated explained 55% of the variation in this loss. The packer and transporter explained 25% and 19% respectively. Most of the losses occurred in the summer. Both temperature and humidity were related to in-transit losses. Distance was not related to losses.

INTRODUCTION

In-transit losses are of concern to each of the marketing sectors; the producer, transporter and packer. In Ontario there is an In-Transit Loss Committee with representatives from Ontario Pork and each of the marketing sectors. In an effort to reduce the losses, they recommended that research be conducted in Ontario to determine the factors associated with these losses. Although there has been extensive research conducted in the United Kingdom, similar research has not been conducted in North America. Both the weather and the distances traveled in Ontario differ from that in the UK. Therefore this research will have significant practical implications to the transport of Ontario pigs. It is likely that the results will also relate to other areas of North America with similar conditions.

DESCRIPTION OF LOSSES

Ontario Pork collects data about market pigs based on booking numbers. Each booking number described the number of pigs marketed from one or more producers on trucks owned by a given transport company and delivered to one packer. The booking number has an associated expected time of arrival at the packers. Weather data including hourly temperature and humidity recordings was purchased from Environment Canada and a similar source from the United States. The weather station closest to the packers was used to represent the

environmental conditions for a given group of pigs. Mixed model analyses were used to determine the association between various factors and the in-transit loss ratio. This ratio was measured as the number of in-transit losses divided by the total number of pigs that were included in the booking number.

In 2001, there were 4,760,213 finisher pigs marketed in Ontario and of those 7,969 pigs died during transport. This amounts to a loss of 0.17% or 17 pigs in every 10,000. A subject pig is one which is recognized as being abnormal or ill at some point during the transport chain. A report is generated when a subject pig is identified. If the pig dies during transport, then an in-transit loss report is created. If the pig continues through the transport chain and is processed at the packers, then the original subject information is discarded. Of the in-transit losses, 15% of the pigs were identified as subject pigs sometime during the transport chain. However, because subject pigs are not individually identified, this may be an inflated value. It may be that 15% of the time a pig was identified as subject on a booking number where a pig ultimately died. There is a complicated flow of pigs from farm to packer. Many farms will use more than one transport company and many transport companies deliver pigs to multiple packers.

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Producer

In-transit losses varied by producer, transporter and packer but the largest amount of variation was due to the producer. In other words, the farm of origin explained more of the variation or change in the amount of in-transit loss than the transporter or packer. Ten percent of producers lose at least 4 pigs per 1,000 pigs marketed, whereas 25% of the producers did not have any in-transit losses.

Thus we expect that a transporter might deliver one producer's pigs and expect no losses but when that same transporter delivers another producer's pigs, some pigs will die. The design of the facilities at each point of loading and unloading and the pre-transport management of pigs on the farm can also affect the levels of stress in pigs [Grandin and Lambooj, 2000]. Genotype, together with stressful ante-mortem handling, significantly affects the tendency for PSE, while DFD is affected less by genetics and mainly by transport conditions. Pigs are extremely susceptible to motion sickness, which can lead to vomiting and death through choking [Bradshaw, 1996]. Current Codes of Practice recommend that pigs have feed withdrawn 3-4 hours prior to loading [Canadian Agri-Food Research Council, 2001]. Other sources recommend withholding of feed for 16-24 hours before slaughter, or depending on distance to packing plant or assembly yard, stopping feeding the night before transport [Lambooj, 2000]. Feed and water withdrawal times have been identified as a critical area in need of research in the Transport Codes of Practice [Canadian Agri-Food Research Council, 2001].

Transporters

Factors associated directly with the transporters only explained 19% of the variation of in-transit losses, although 55% of the losses occur on the truck and appear to be a direct result of this phase of marketing. It appears that the losses are relatively consistent across transport companies. A number of factors are known to affect the amount of stress that pigs experience during transport. These include loading density, weather, microclimate in the truck, and duration and route of transport [Lambooj, 2000; Warris, 1998]. Truck design and transport routes that result in frequent stopping can significantly influence the microclimate in trucks. Current Codes of Practice recommend a 25% reduction in loading density of pigs in hot humid weather. Genotype, together with stressful ante-mortem handling, significantly affects the tendency for PSE, while DFD is affected less by genetics and mainly by transport conditions [Warris, 1998]. To date, the interactions of loading density with weather conditions has not been investigated under Ontario climatic conditions.

Packers

Factors associated directly with the packers explained 25% of the variation of in-transit losses. Ten percent of packers had losses of at least 0.21% whereas 25% of packers had losses of 0.02% or less. Trucks having to wait in the yard at the packers prior to unloading increases the temperature stress to the pigs. These animals are at the end of the travel time and, without flow of air to the truck, may be exposed to high temperatures especially on very hot summer days. Stress increases when fighting occurs after groups of unfamiliar animals are mixed in holding pens at assembly yards and packing plants. The management of pigs at packing plants can also affect the levels of stress in pigs [Broom, Grandin, Lambooj, 2000]. Stress and fatigue before slaughter can lead to physiological changes in muscle tissue (acidification and energy stores) that result in post-mortem reductions in meat quality. Stress before slaughter can also affect the microbiological contamination of carcasses.

Weather

Most of the in-transit losses occurred in the summer. Although the yearly average losses were 0.17%, once temperature reached 20^{o}C the losses were 0.4%. Between 26 and 28 ^{o}C, the losses were 0.6%, and above 28 ^{o}C, they were 0.76%. The impact of temperature and humidity combined to increase these losses. The impact of an environmental temperature of 28^{o}C and a humidity level of at least 60% was the same as a temperature of 36^{o}C and a humidity level of less than 30%. At high humidity levels, losses occurred at lower environmental temperatures. Pigs have difficulty maintaining body temperature in hot conditions [Lambooj, 2000]. The stress and excitement of handling increases heat production rates making transported pigs even more susceptible to heat stress, with some genotypes being much more sensitive than others [Murray, 1998; Schrama, 1996]. Most livestock trailers do not have mechanical ventilation and require truck movement for air flow through the animal compartment [Lambooj, 2000].

CONCLUSIONS

In 2001, in-transit losses were experienced by 17 of every 10,000 market pigs. The majority of these losses occurred in the summer when a combination of moderate temperatures with high humidity or high temperatures with lower humidity both likely caused stress to the pig during transport. There is a lot of farm-to-farm variation in in-transit losses. Further research must focus on the cause of the losses in these problem farms. Clearly a major factor causing in-transit losses is the environmental conditions during the summer. We need to conduct further research under Ontario conditions to determine how to reduce this stress to the pigs.

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