Effects of Pre-Sorting Prior to Loading on Transport Losses of the Market Weight Pigs during Loading and Unloading

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Summary and Implications

The objective of this study was to determine the effects Therefore, the objective of this study was to determine the effects of pre-sorting on stress responses at the time of loading and unloading and how it impacts transport losses in the market weight pig. This study took place between December and March. Thirty three loads of mixed sex market weight pigs (n = 5802) from three conventional grow-finish sites were used in a randomized complete block design. Each site had two rooms with both treatment groups represented in each room. The large pen, pre-sorted (**LPS**) treatment had 292 pigs/pen ($0.67 m^2*pig^{-1}$). LPS pigs were sorted from pen mates ~18 h prior to loading. The large pen, not pre-sorted treatment (**LNPS**) also had 292 pigs/pen ($0.67 m^2*pig^{-1}$). LNPS pigs were sorted from pen mates at the time of marketing. Pigs were moved in groups of four to six using sort boards and electric prods, when necessary. Treatments were randomly assigned to a trailer deck (~0.41 m^2*pig^{-1}). Straight deck trailers were used and pigs were transported ~1 h to a commercial harvest facility. During loading and unloading, the number of pigs displaying open mouth breathing (OMB), skin discoloration (SD), and muscle tremors (MT) were recorded. At the plant, dead and non-ambulatory pigs were recorded during unloading, and total losses were defined as the sum of dead and non-ambulatory pigs at the plant. Data was analyzed using Proc Glimmix of SAS. Statistical analysis could not be run on the incidence of deads on arrival (DOA) because there were too many zeros in the dataset. LPS had two DOA's (0.07%) and there were no DOA's in the LNPS treatment. LPS pigs had lower ($P \leq 0.0001$) OMB and SD during loading compared to LNPS pigs. There were no ($P > 0.05$) differences for MT or non-ambulatory at loading or for stress responses at unloading. No ($P > 0.05$) differences between treatments for fatigued, injured, total non-ambulatory or total losses existed. In conclusion, pre-sorting market weight pigs had some effect on reduced OMB and SD on farm; however, there were no differences for OMB, SD and MT or transport losses at the plant.

Introduction

The term "transport losses" refers to pigs that die or become non-ambulatory (fatigued or injured) at any stage of the marketing process, defined as movement from the grower-finisher environment to stunning at the abattoir. In 2006, transport losses were estimated to cost the U.S. swine industry $46 million. The etiology of transport losses is a multi-factorial problem, involving the pig, people, facility design, transportation and season. Reducing or eliminating one of these potential stressors placed upon a pig at the time of marketing may in turn reduce the incidence of transport losses. One management tool that can be implemented is pre-sorting market weight pigs from pen mates prior to load out. Therefore, the objective of this study was to determine the effects of pre-sorting on stress responses at the time of loading and unloading and how it impacts transport losses in the market weight pig.

Materials and Methods

Animals and Location: This project was approved by the Iowa State University Institute for Animal Care and Use Committee. A total of 5,802 finisher pigs (crossbred commercial) were used and data collection occurred from December 23, 2008 to March 25, 2009.

Housing: Research was conducted on three commercial grow-finisher sites at a Midwest integrator. All sites were identical in their system design, were equipped with natural ventilation systems which included side-curtains and had the same management. Pigs were checked daily (between 0800 and 1100 h) to ensure the health of the pigs and maintenance of the facility. Pens (7.32 m long x 2.93 m wide) were divided by metal piping gates (0.88 m high). Flooring was cement slatted (2.54 cm wide x 131.45 cm long). Feed was delivered on demand to a wet / dry feeder (1.4 m high x 43.18 cm wide x 1.52 m long; with a 12 cm deep pan). All pigs were fed a standard finishing diet (CP 14.57 %; ME 720 kcal / kg; Lysine 0.74 %) that met the pigs' requirements (NRC, 1998) and water flow rates were 1.5 L/min, which is within the recommended guidelines for grow-finish pigs (Iowa State University Extension, 1992).

Treatments: Each finisher site had two, 1200 hd rooms. Within each room, one side of the aisle was set-up with the large pen, not-pre-sorted treatment (**LNPS**), while the other side was set-up with the large pen, pre-sorted (**LPS**)

treatment. Therefore, both treatments were represented in each room. Each large pen configuration housed 292 pigs/pen, providing 0.67 m^2 of floor space. Back gates of 8 consecutive pens were opened allowing pigs' access to 9 pens. Space was not adjusted after first pull, and thus both treatments would have higher floor space allowances as pigs were removed from the facility. All pens were mixed sexed. In both treatments, pigs were marked on the back by a caretaker of the facility using an animal safe spray marker (Prima Spray-on, Prima Tech, NC, USA) 2-d prior to loading. In LPS pens, market weight pigs were sorted from pen mates ~18 h prior to marketing by a four person crew. In LNPS pens, marked pigs were sorted from pen mates at the time of marketing by the same four person crew.

Pig Handling and Loading. A total of 33 semi-loads transported these pigs from the grow-finisher site to a packing plant. Pigs were moved in groups of four to six from their home pen to the semi, using sort boards and electric prods, when necessary, by the same four man loading crew. Average load weight per pig was 120.3 kg. Pigs were 203 ± 18 d of age at the time of marketing.

Trucks, Trailers, and Transport Conditions: The trailers used were owned and operated by the integrator. All trailers used in the study were of similar design and dimensions. Trailers were a straight floor, double deck trailer composed of aluminum. Each trailer was divided into 4 upper deck compartments and 5 lower deck compartments. The trailer's internal ramp was constructed of aluminum utilizing a dimond pattern for traction and wave type cleating spaced 20.3 cm apart. Cleats were 4.5 cm high and 5.1 cm wide. All compartments on the trailer were stocked according to the current standard operating procedure for this production system (~0.41 m^2 / pig; 180 pigs/load). After the truck was loaded, pigs were transported 84.8 ± 7.2 km to the packing plant. During loading, treatments were alternatively assigned to trailer decks and both facility designs were represented on each trailer load of pigs.

Measures: Responses were recorded by four trained observers during loading (two at the farm) and unloading (two at the plant). During loading and unloading, the number of pigs displaying open mouth breathing (OMB), skin discoloration (SD) and muscle tremors (MT) were recorded. At loading, the number of non-ambulatory pigs and the number of pigs not loaded were recorded. At the plant, dead and non-ambulatory pigs were recorded up to the weight scale. Non-ambulatory pigs were the summation of fatigued or injured. Total losses were defined as the summation of dead and non-ambulatory pigs at the plant.

Statistical Analysis: The experimental unit was the trailer deck of finisher pigs (LNPS [n = 33] LPS [n = 33]). PROC Glimmix (SAS) were used to analyze the data. Farm (three sites), date (ten days), load (33 loads) and treatment (LNPS vs. LPS) were used in the class statement. The statistical model for the performance and welfare parameters of interest included treatment and the number of pigs loaded was used as a linear covariate. The random statement was farm nested within date and date by farm by trailer nested within load. A P value of ≤ 0.05 was considered to be significant and I-Link was performed to transform values for means and standard errors.

Results and Discussion

LPS pigs had lower ($P \leq 0.0001$) percentages of OMB and SD during loading compared to LNPS pigs while MT was similar between groups (Table 1). Importantly, farm of origin did not impact treatment ($P > 0.05$). There were no differences ($P > 0.05$) however, between treatments for MT and non ambulatory pigs on farm (Table 1).

Table 1. Least squared means (SE) for treatment on physical signs of stress and losses at the time of marketing from the farm.

	Treatment		
Measure, %	**LNPS**	**LPS**	***P*-values**
OMB	12.25 ± 1.71	6.11 ± 0.91	< 0.0001
SD	15.25 ± 3.67	8.08 ± 1.97	< 0.0001
MT	0.17 ± 0.97	0.09 ± 0.06	0.23
Non-ambulatory	0.03 ± 0.03	0.06 ± 0.04	0.53

At the plant, there were no ($P > 0.05$) differences for any stress responses between treatments at unloading. There were no ($P > 0.05$) differences between treatments for fatigued, injured, or total losses at the plant (Table 2). Statistical analysis could not be run on the incidence of deads on arrival (DOA) because there were too many zeros in the dataset. LPS had two DOA's (0.07%) and there were no DOA's in the LNPS treatment. In conclusion, pre-sorting market weight pigs had some effect on reducing stress responses on farm at the time of loading. However; pre-sorting pigs did not affect stress responses or transport losses at the plant during the cooler months in the Midwest.

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Table 2. Least squared means (SE) for treatment on physical signs of stress and total losses at the time of marketing at the packing plant.

	Treatment		
Measure, %	**LNPS**	**LPS**	***P*-values**
OMB	0.28 ± 0.10	0.33 ± 0.12	0.69
SD	0.07 ± 0.05	0.11 ± 0.06	0.45
MT	0.26 ± 0.11	0.25 ± 0.11	0.96
Non-ambulatory[a]	0.28 ± 0.09	0.26 ± 0.09	0.88
Injured	0.14 ± 0.07	0.13 ± 0.07	0.88
Fatigued	0.14 ± 0.07	0.13 ± 0.06	0.94
Total losses[b]	0.28 ± 0.09	0.33 ± 0.10	0.68

[a]Non-ambulatory pigs were a summation of fatigued or injured.
[b]Total losses were defined as the summation of dead and non-ambulatory pigs at the plant. Note; LPS had two DOA's (0.07%) and there were no DOA's in the LNPS treatment.