Effects of long-distance transport in the health and welfare of early-weaned pigs

H. Golightly[1], T. O'Sullivan[1], Y. Seddon[2] and J.A. Brown[3,4]

Jennifer Brown

Yolande Seddon

SUMMARY

The Canadian swine industry relies heavily on the transport of weaned pigs. Recently, the maximum acceptable transport time for pigs in Canada has been decreased from 36 to 28 hours. Weaning is a stressful period for pigs and pigs are often transported at the same time that they are weaned. This project examined the effects of long and short transport durations under Canadian commercial conditions on the health and welfare of piglets.

Data from four loads of each duration were collected in summer 2019. The physiological responses of weaned piglets undergoing short duration (<2 h; SD), and long duration (<36 h; LD) transport were compared at three time points: before loading (T0), immediately after transport (T1) and 3 days after arrival at nursery sites (T2).

For each time point, 60 LD and 50 SD piglets were weighed, and lesion and gait scores were recorded. Results indicate that LD piglets lost weight during transport, while SD piglets did not. The SD piglets showed a large increase in cortisol levels, indicating stress, during transport whereas levels in LD piglets were higher at loading and decreased during long transport. Differences in weaning timeline between LD and SD piglets also influenced measures of stress and lesion scores making interpretation difficult. While both the LD and SD piglets showed signs of transport stress, mortality levels were low (0.06%) and did not differ significantly between treatments.

Further analysis of behaviour during transport and in nursery pens is underway and will provide additional insights on the effect of transport on weaner pig health and welfare.

INTRODUCTION

Approximately 120,000 iso-wean pigs are placed in US swine barns each week with weaned pigs being transported across Canada or into the US with travel durations ranging from one to over 36 hours. The maximum acceptable transport time allowable for pigs without feed, water or rest in Canada was recently reduced to 28 hours (Canadian Health of Animals Regulation, C.R.C. 296), brining it inline with U.S. regulations.

During transport, piglets experience numerous stressors, including feed and water deprivation, handling at loading and unloading, extreme temperatures (depending on season), vibrations and noise. In light of concerns over feed and water deprivation, long transport times are often under the most scrutiny. In a country of large geographical area such as Canada, a full understanding of the effects of long transports and ways to mitigate any negative effects is required. Additionally, weaning is a very stressful period for pigs resulting from separation from the sow, diet change, mixing with unfamiliar pigs, and a novel environment. Weaning stress typically results in low feed intake for > 24hrs following weaning.
More information is needed on the effects of long transport, including food and water deprivation, on piglet welfare during and after transport. This information is important to help identify best practices for transport, to provide a basis for transport policy and to set directions for future study and improvement.

EXPERIMENTAL PROCEDURES

Two commercial farms were selected based on transport distance between the sow and nursery barns; long duration transports (LD) were a maximum transport time of 36 hours, whereas short duration transports (SD) were between one and two hours. Each treatment had four replicates.

The LD piglets were transported in a 4-deck potbelly trailer in one of three compartments: the upper-back (C-UB), bottom-front (C-BF), or bottom-middle (belly) (C-B), which represent a range of different environmental conditions. The SD piglets were transported in a flat deck trailer and were loaded onto the main deck, which was comparable in size and stocking density to the C-BF of the LD potbelly trailer.

1 Department of Population Medicine, Ontario Veterinary College, University of Guelph, 50 Stone Rd E, Guelph, ON N1G 2W1
2 Department of Large Animal Clinical Sciences, Western College of Veterinary Medicine, University of Saskatchewan, 52 Campus Drive, Saskatoon, SK S7N 5B4
3 Prairie Swine Centre Inc, PO Box 21057, 2105 – 8th Street East, Saskatoon, SK S7H 5N9
4 Department of Animal and Poultry Science, University of Saskatchewan, 51 Campus Dr, Saskatoon, SK S7N 5A8

Monitoring equipment on the interior and exterior of the LD and SD trailers recorded temperature (T, °C) and relative humidity (RH, %) in five-minute intervals throughout transport. In addition, we collected piglet data at three time points: the morning before loading for transport (T0), immediately after transport (T1) and 78 – 93 h (3 days) after arrival to the nursery barns (T2).

To assess piglet behaviour during transport, time-lapse photography was used to identify pigs postures (standing, lying, sitting). When piglets arrived at their destinations, video recorded observations at arrival and three days later focused on: feeding, drinking, postures, aggression and damaging behaviours.

RESULTS AND DISCUSSION

Effects of long transport durations on weaner pigs

Transport temperature

Average values for interior environmental conditions (T, RH, and THI) were different between transport lengths. Interior compartment conditions for SD groups were on average, warmer and more humid than for LD groups.

LD compartment loggers, measured temperatures under 24°C for 46.5% of total transport time, falling below the recognized thermoneutral zone for this age group (National Farm Animal Care Council, 2014). This proportion was smaller for the SD group, with temperatures below 24°C for 36.0% of the time (Table 1).

Hot compartment temperatures were less frequent, with LD and SD loads recording 6.8% and 0% of time, respectively, at temperatures greater than 30°C. The most extreme interior temperatures (both cold and hot) were recorded during the LD transports (6.08°C and 42.59°C, both in the C-UB compartment).

The temperature results suggest that pigs undergoing LD transport experienced a greater thermoregulatory challenge than those in SD transports.

Piglet weights

After adjusting for sex and pre-transport weight, piglets from the LD group weighed significantly less than piglets from the SD group at T1 (immediately after transport) but no difference was found at T2, 72 h following arrival ((Table 2). Relative to their average weights at T0, SD piglets gained 0.1% of their body weight between T0 and T1, while LD piglets lost 6.2%. There were no significant differences in body weights among the LD compartments after transport.

Mortality and injury assessments

Of the total number of pigs loaded, no piglets died in SD transports (0/2,034) and 7 piglets died during LD transports (7/11,434 = 0.06%); however, due to the low frequency of these events no association was found between transport duration and odds of death during transport.

IMPLICATIONS

Effects of long transport durations on weaner pigs

SD piglets appear to have had a greater stress response compared to LD, possibly related to SD piglets' exposure to multiple stressors (weaning, loading and transport) with limited time to recover. The LD piglets were weaned up to 6 days prior to transport and may have habituated to conditions during transport. Significant differences existed between treatments regarding weight change, hydration, stress, physical strain, and injury after transport. Average trailer temperatures where within pigs' thermal comfort zone throughout the course of this project (summer months). Additional research, across seasons, where thermal conditions are much colder and more likely to pose a greater thermoregulatory challenge is needed.

ACKOWLEDGEMENTS

Funding for this project is provided by Swine Innovation Porc through the Canadian Agricultural Partnership. The authors would also like to acknowledge the strategic program funding provided by Sask Pork, Alberta Pork, Ontario Pork, the Manitoba Pork Council and the Saskatchewan Agriculture Development Fund. In addition, we also wish to acknowledge the support of the production and research technicians at Prairie Swine Centre that make it possible to conduct this research.

Table 1. Results of average exterior and compartment temperature (T; °C), relative humidity (RH; %) and temperature-humidity index (THI)a value comparisons between duration groups

		SD				LD				
Location	Variable	N	Mean	Min	Max	N	Mean	Min	Max	P-Value b
Exterior	T	164	22.28	19.09	25.63	4028	18.77	6.60	36.09	<0.0001
	RH	164	70.73	49.69	97.42	4028	68.30	24.45	100.61	0.0265
	THI	163	69.85	64.95	75.68	4028	63.71	44.58	80.84	<0.0001
Interior	T	164	24.29	29.61	27.12	12093	22.84	6.08	41.59	<0.0001
	RH	164	62.72	47.22	82.67	12093	55.49	18.64	92.16	<0.0001
	THI	164	72.06	66.92	76.44	12093	68.79	44.71	88.09	<0.0001

[a] Calculated using the equation: THI = (1.8 * T + 32) - [(0.55 - 0.0055 * RH) * (1.8 * T - 26)]. bMean values were compared using a two-sample t-test with Satterthwaite P-values reported due to unequal variances between duration groups.

Table 2. Least squares means and standard errors (SE)1 of piglet weights (kg) at each study timepoint.[2]

Fixed Effects	**F Value**	**Pr > F**
Sex	4.95	0.027
Pre-transport weight	3456.63	<0.0001
Time	334.77	<0.0001
Duration	16.58	0.007
Duration*Time	23.62	<0.0001
Least Squares Means[1]	**Estimate**	**SE**
	Sex	
Male	6.14	0.034
Female	6.21	0.034
	Duration	
Long	6.05	0.042
Short	6.30	0.043
	Time	
Arrival	5.90	0.034
72hrs post-arrival	6.45	0.034
	Duration*Time	
Long: arrival	5.70	0.047
Short: arrival	6.10	0.049
Long: 72hrs	6.40	0.047
Short: 72hrs	6.50	0.049

1 Results of the mixed multivariable linear regression model with random and fixed effects. 2N=440, 435 weights analyzed at the arrival timepoint due to sampling error in the 4th short duration replicate.