Effects of transport duration on the health and welfare of early weaned pigs

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SUMMARY

Due to the physiological differences between weaned piglets and market hogs, additional data on their response to transport are needed for age-specific evidence-based recommendations. A cohort study was conducted to observe weaned piglets undergoing short duration (SD, <3 h), or long duration (LD, >30 h) commercial summertime transport events. Piglets transported for a long duration (LD) were weaned up to six days before transport, while piglets transported for a short duration (SD) were weaned the morning of transport. Physiological changes suggesting some detrimental impact on welfare were observed in piglets exposed to both transport durations. Piglets exposed to long duration transport had greater weight loss, and had higher values of hematocrit indicating dehydration after transport, while piglets exposed to short duration transport had higher values of multiple blood indicators of muscle fatigue and stress. A greater proportion of LD piglets were observed feeding and drinking at arrival and spent more time eating at 3-4 days after transport than SD piglets. The results were also influenced by differences in weaning time, as LD piglets were weaned before transport and SD piglets were weaned at the time of loading and transport. Lesion severity increased in SD piglets compared to LD piglets in the ear, skin and tail regions assessed, likely due to weaning timeline and associated aggression.

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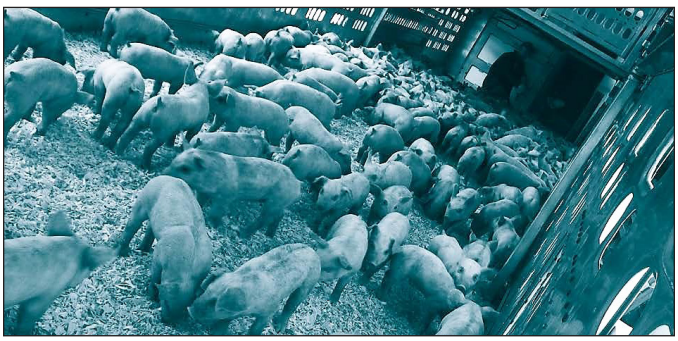
Changes in serum cortisol (stress hormone), lesions, and lameness were measured in piglets that either did or did not undergo weaning at 21d in a commercial facility, and compared these results to similar data collected from the aforementioned transport study. A marked increase in serum cortisol was observed in piglets that underwent weaning, compared to those that did not, lasting from 1h to 72h after weaning. In the transport study, serum cortisol measured after weaning and transport were relatively low, and most similar to non-weaned piglets, suggesting a possible moderating effect of transport on cortisol levels.

INTRODUCTION

While a considerable amount of research has been done on the effects of transport on market hogs, there is a lack of evidence available on the impact of transport on weaned piglets. The current body of weaned piglet transport research is too limited to inform transport recommendations specific to the weaned piglet age-group. The potential impact that appropriate, evidence-based recommendations could have for this younger population is significant given that millions of piglets are transported annually in Canada. Current transport regulations have been predominantly informed by investigations on the impact of transport on market hogs, with emphasis on the stress response and pork quality. The differences between finished hogs and weaned piglets, such as their physiological vulnerabilities, thermoneutral zone limits, proximity to weaning and proximity to slaughter, suggest that recommendations appropriate for one population may not benefit the other. As such, this project evaluates the impact of transport on the health and welfare of weaned piglets to provide evidence for this age group. The evaluation of transport duration using commercial farm and transport procedures including differences in the timeline of weaning and transport, as reported here, provides a valuable perspective to a research area where controlled studies (small groups of pigs under controlled/artificial transport conditions) have been traditionally employed.



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EXPERIMENTAL PROCEDURES

A cohort study was conducted to observe weaned piglets in four short-duration (SD, <3 h), and four long-duration (LD, >30 h) commercial summertime transport events. Piglets transported for a long duration were weaned up to six days before transport, while piglets transported for a short duration were weaned the morning of transport. Sixty focal piglets per LD transport event and 50 per SD transport event were chosen for data collection to measure mortality, injury, weight change, hematological or biochemical changes in hydration, muscle injury and stress response. Data collection on the 440 focal piglets out of 11,434 total transported piglets occurred the morning of the day before transport (T0), at arrival (T1) and approximately 3 to 4 d (78 to 93 h) after arrival at the nursery barn (T2). Behaviour at arrival (T1a) was collected on non-focal piglets (short transport group: n=160, long transport group: n=242), while the subset of focal piglets had weights collected, injury assessments completed, and behaviour video recorded on the day of arrival (T1b) and 3-4 days later (T2).

Next, changes in serum cortisol levels, lesions, and lameness were measured in piglets that either did or did not undergo weaning at 21d in a commercial facility, and compared these results to similar data collected from the above-mentioned transport study.

RESULTS AND DISCUSSION

The incidence of lameness between T0 and T1 was low across both short and long transport durations (1.84% of the 435 focal piglets scored) with all lameness cases identified as mild in severity. Lesions on ears and skin were more prevalent than other injury types after transport (T1) and may have been related to mixing aggression associated with weaning rather than transport alone. Hematological and biochemical differences were present between groups at T1. LD piglets had increased hematocrit levels compared with SD piglets ($P = 0.01$), suggesting increased body water losses. SD piglets showed greater levels of muscle injury compared with LD piglets including elevated aspartate aminotransferase ($P < 0.01$) and creatine kinase ($P < 0.01$). However, these parameters were within normal reference ranges for piglets of this age group. Indicators of physiological stress response including cortisol and neutrophil to lymphocyte ratios were elevated in SD piglets compared with LD piglets ($P = 0.02$ and $P < 0.01$, respectively). The results of this study demonstrate that both short and long transport durations can result in detectable physiological changes in weaned piglets.

A greater proportion of LD piglets were observed feeding at T1a (35.8% vs 0.0%; P<0.001), and piglets exposed to LD transport had greater odds of feeding compared to piglets exposed to SD transport at T1b (IRR: 9.2, 95% CI: 4.3-19.9, P<0.001) and T2 (IRR: 2.1, 95% CI: 1.8-2.4, P<0.001). Similarly, a greater proportion of LD piglets were observed drinking at T1a (13.9% vs 9.2%; P=0.005) and piglets exposed to LD transport had greater odds of drinking at T1b (IRR: 2.0, 95% CI: 1.3-2.9, P=0.001). Sitting was performed more by SD piglets at T1a (P=0.01), but piglets exposed to LD transport had greater odds of sitting at T1b (IRR: 2.5, 95% CI: 1.4-4.6, P=0.003). Short transport piglets lay down more at T1a (20.0% vs 0.0%; P<0.001) and piglets exposed to SD transport had greater odds of lying observed at T2 (IRR: 1.4, 95% CI: 1.4-1.5, P<0.001). Lesion severity increased in SD piglets compared to LD piglets in the ear, skin and tail regions assessed, likely due to weaning timeline and associated aggression.

A marked increase in serum cortisol was observed in piglets that underwent weaning, compared to those that did not, lasting from 1h to 72h after weaning. In the transport study, values collected after weaning and transport were relatively low, and most similar to non-weaned piglets, suggesting a possible moderating effect of transport on cortisol levels. The patterns of injury (lesions and lameness) observed suggest that lesion scores are more indicative of weaning, and gait scoring may be the most specific indicator of transport-related injury.

IMPLICATIONS

Transport has an impact on piglet stress whether long or short duration transport is undertaken. However, LD transport did not negatively impact piglets compared to SD under Canadian summer conditions. This study observed impacts of both transport duration and proximity to weaning on piglet welfare indicators and supports further investigation of the interaction between weaning and transport departure times. Based on increased hematocrit levels and piglet behaviour following transport, weaned piglets undergoing long transport days after weaning may benefit from having access to feed and water during transport. How to provide water and feed during transport also needs to be determined.

Cortisol levels in piglets after transport were lower than those in animals that were weaned and not transported. This indicates that the stress of transport and weaning are not additive, and suggests a possible mitigating effect of transport which merits further research.

The characterization of interior trailer conditions during the Canadian winter season and the impacts of these conditions on newly weaned piglets during and after transport will be studied in the final year of this project.

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