AS 660 ASL R2916

2014

How Lameness Affects the Time to Approach Feed in Multiparous Sows

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A.S. Leaflet R2916

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Summary and Implications

The objective of this study was to compare the time it took for sows to approach feed during different lameness states. Twenty-one, clinically healthy, mixed-parity, crossbred sows (220.4 ± 21.3 kg) were used. The sow was the experimental unit and a cross-over design with 3 (days) x 2 (hooves) factorial arrangement of treatments was used. Each sow served as her own control and treatment. On induction day, 10 mg of amphotericin B was injected in the distal interphalangeal joint space in both claws of one hind hoof. The sows were limited fed and latency to approach the first feeding in the home pen after feed presentation was measured on ***D-1*** (1 day before induction), ***D+1*** (1 day after injection of amphotericin B to induce lameness), and ***D+6*** days (6 days after the induction of lameness). Video recordings were continuously collected on the three days from the hours 0600 to 1800 and later analyzed by a single trained observer. Data were analyzed using the PROC MIXED procedure in SAS. A P value of ≤ 0.05 was considered to be significant. A total of 14% of sows were classified as did not approach on the D+1. Not including sows that did not approach, sows took approximately 5 seconds longer to approach feed on D+1 compared to D-1 ($P = 0.0013$), but latency to approach feed did not differ between D-1 and D+6 ($P = 0.80$) In conclusion, when sows were lame they took longer to approach feed relative to D-1 and D+6. With this difference being small, time to approach feed may not be a sensitive behavioral bench mark for producers to use on farm to distinguish between sound and lame sows.

Introduction

Sow lameness is an animal well-being challenge. It has been ranked as the number 3 reason for culling sows; comprising 15% of the culls marketed in the U.S. Analyzing animal behavior is one tool that can be used to evaluate animal well-being. Researchers have reported that lameness may contribute to sow behavioral changes, for example fewer rising attempts, less time spent standing, and eating, with more time invested in lying. Currently, producers assess sow lameness using subjective gait scoring systems, which have been shown to be variable in their application and outcome. A logical next step is to provide behavioral benchmarks that producers could use at the individual sow level to assess lameness severity. Therefore, the objective of this study was to compare the latency for sows to approach feed during different lameness states, which could arise due to changes in appetite or reluctance to bear weight on a painful limb.

Materials and Methods

Animals and Housing: This project was approved by the Iowa State University Institutional Animal Care and Use Committee. Twenty-one, healthy, mixed-parity, crossbred sows (220.44 ± 21.27 kg) were purchased from a commercial producer in Iowa. To avoid injury due to aggression, sows were housed in individual pens measuring 3.7 m length x 1.4 m width x 1.2 m height. A rubber mat was provided for sow comfort. All sows were fed twice daily to meet dietary requirements. Each sow received her daily ration by hand and feed was placed onto a raised concrete step within each home pen. Sows had *ad libitum* access to water via one nipple waterer positioned over a grate. Metal fences were affixed at the end of each home pen and lights were on a 12:12 light dark cycle (light hours were 0600 to 1800). Sows were acclimated for 10 days before treatments were applied. The research was conducted July-November 2011.

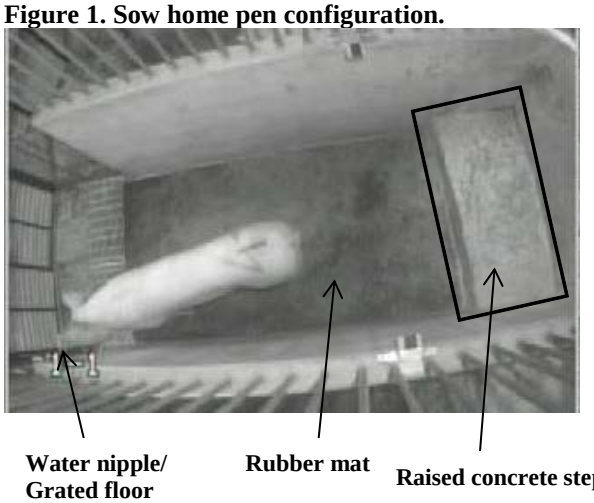
Experimental Design and Treatments: The sow was the experimental unit. Two trials were conducted with 12 sows in trial 1 and 9 sows in trial 2. A cross over design with a 3 (days) x 2 (hooves) factorial arrangement of treatments were compared. Three day treatments consisted of ***D-1*** (sound phase; one day before induction of lameness), ***D+1*** (most lame phase; 1 day after induction of lameness occurred with amphotericin B) and ***D+6*** (resolution phase; 6 days after the induction of lameness). Two hind hoof treatments consisted of ***left*** vs. ***right*** hind hooves. Each sow served as her own control. After completion of the first round, sows were given a 7-d rest period before induction was repeated on the non-induced hoof.

Induction of Lameness: Before induction feed and water were withheld 18 h and 1 h respectively prior to anesthesia to reduce vomiting and aspiration risk. All sows were restrained in a standing position using a pig snare and then

anesthetized using a combination of Xylazine (4.4 mg/kg), Ketamine HCl (2.2 mg/kg), and Tiletamine HCL and Zolazepam in combination (Telazol®;4.4 mg/kg) administered IM. The assigned claws to be injected were washed with mild soap and water to remove obvious fecal contamination, scrubbed for 3 min with iodine based surgical scrub using 10 x 10 cm sterile gauze pad, and rinsed with 70% isopropyl alcohol until no evidence of the surgical scrub remains. Ten mg of amphotericin B were injected in the distal interphalagneal joint space in both claws of one hind hoof. All sows were monitored continuously until sows could stand on their own and eat.

Behavior Collection: All sows were video-recorded in their home pens continually over the three treatment days between 0600 and 1800 (Figure 1). Filming speed was 30 frames per second. One 12 V Close Circuit Television (CCTV) camera (Model WV-CP484, Matsushita Co. Ltd.), was positioned centrally (2.9 m from the front of the pen) using an elbow bracket at a height of 2.8 m from the floor. Video was captured digitally utilizing a Noldus portable lab (Noldus Information Technology, Wageninger, NL).

Figure 1. Sow home pen configuration.



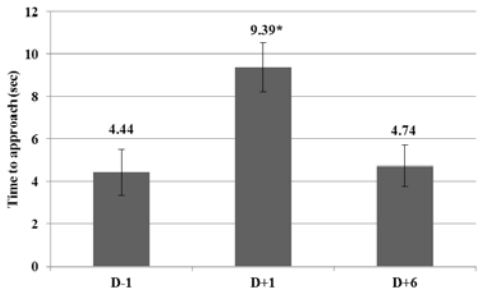
Behavior: The latency to approach feed was collected for each sow during D-1, D+1 and D+6. The response to first feeding was observed to eliminate possible variance caused by the time of day or time in which the sow had last been fed. ***Latency to approach*** was defined as the time elapsed from when the caretaker placed feed onto the raised concrete step until the sow's head was positioned over the raised concrete step and feed. The caretaker placed feed on the step from outside the pen, and hence the sow was undisturbed in her pen during the behavior observations. Behavior data was collected from video by a single trained observer using continuous sampling. Sows that did not approach the feed unassisted (did not approach prior to 1800 or were encouraged to feed) were defined as ***did not approach***. These results are presented as a percentage of sows on each data collection day; they were not included in the statistical model.

Statistical Analysis: PROC UNIVARIATE determined that the data was normal. Data were analyzed using the PROC MIXED procedure in SAS for parametric data. Main effects of hoof injected, trial, round, and day, were compared. A random statement of sow(group), sow(day*trial) and sow(round*trial) was used. A P value of ≤ 0.05 was considered significant and PDIFF was used to determine differences.

Results and Discussion

Four feeding events were ***did not approach.*** Three feeding events were from D+1, and 1 feeding was from a D+6. Sows took longer to approach feed on D+1 (Figure 2; $P = 0.0013$), D-1 and D+6 did not differ ($P = 0.80$). No differences were observed for sows that had lameness induced in the left vs. right hind hoof ($P = 0.64$) or between first and second rounds of induction ($P = 0.17$). However, trial 1 sows took less time to approach compared to trial 2 sows (4.44 ± 0.91 vs. 7.94 ± 1.22 sec; $P = 0.04$).

Figure 2. Average time (seconds) for sows to approach the morning feed on D-1, D+1 and D+6 ($P = 0.0013$).



In conclusion, when sows were lame they took longer to approach (~5 sec) feed relative to D-1 and D+6. A total of 14% of sows were classified as did not approach on D+1. Due to this small differences, time to approach feed may not be a sensitive behavioral bench mark for producers to use on farm to distinguish between sound and lame sows.

Acknowledgements

This project is supported by Agriculture and Food Research Initiative competitive grant no. 2011-67021-30369 from the USDA National Institute of Food and Agriculture and by the National Pork Board. Thanks to Becky Parsons, Monique Pairis-Garcia, Jessie Colpoys, Alex Folkmann, Brittney Nelson, and Ashley Woodley for animal care.