

A Comparative Study of Hoof Lesion Presence in Sows When Housed in Individual Stalls: How Does Parity Affect This?

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Summary and Implications

Lameness has been incorrectly labeled as a “*cow and not a sow*” concern, and this has possibly arisen due to the majority of sows being far more stationary over their productive lifetime compared to dairy cows. Therefore, the objectives of this study were record hoof lesion frequency, proportion, type and severity from sows housed in gestation stalls during a one month period. A total of 30 sows were used (Yorkshire [n = 3], Duroc [n = 14] and Yorkshire x Duroc crosses [n = 13]). All sows were individually housed in stalls that had concrete flooring and manure fell into a holding pit. Sows were feed at 0600 h once a day a commercially available ground feed. Caretakers observed all sows twice daily, at 0600 h and 1600 h. Hoof lesion and severity was scored (medial and lateral toes, dew claws and the sole) and recorded once a week by a single observer using the FeetFirst lesion scoring guide produced by the FeetFirst™ Team. Lesion severity was scored as, one (mild), two (moderate) and three (severe) which occurred on any anatomical area of the hoof (toes, dew claw, heel and sole). **Lesion severity** scores was reported numerically (actual number of hooves involved) and presented as a proportion of the total number of hooves in the study. **Lesion type** was defined as toe growth, dew claw, heel overgrowth and erosion, heel sole crack, white line, cracked wall horizontal and cracked wall vertical (FeetFirst™ Team, 2009). Lesion type was reported numerically (actual number of hooves) and presented as a frequency and proportion of the total number of hooves in the study. On average, 50.8 % of the sows had at least one hoof lesion. Lesion severity was predominantly categorized as a level one (mild). The most common lesion type was cracked wall vertical. There were a greater percentage of recorded lesions on the hooves from parity two sows compared to parity three and parity one sows over the weeks measured, but these frequencies were not significantly different ($P > 0.05$). In conclusion, it is important for producers to closely monitor parity two sows

for hoof lesions, as they seem to be at a higher risk for obtaining lesions.

Introduction

Lameness has been incorrectly labeled as a “*cow and not a sow*” concern, and this has possibly arisen due to the majority of sows being far more stationary over their productive lifetime compared to dairy cows. A precise number of affected gilts and sows classified as lame at this time remain unknown, but a few studies have begun addressing what can affect hoof health, for example dietary manipulations, flooring structures and genetics. Second, what type of lesions affects the hoof remains relatively unknown. Therefore, the objectives of this study were to record hoof lesion frequency, proportion, type and severity from sows housed in gestation stalls during a one month period.

Materials and Methods

Animals and location: The project was approved by Iowa State University’s Institutional Animal Care and Use Committee (log number; 7-08-6586-S). A total of 30 sows were used (Yorkshire [n = 3], Duroc [n = 14] and Yorkshire x Duroc crosses [n = 13]). There were 10 parity one sows (158.8 kg to 204.1 kg), 10 parity two sows (181.4 to 226.8 kg), and 10 parity three sows (204.1 to 249.5 kg) respectively. Sows ranged from their first to fifth week of gestation. Sows were obtained from a single source farm that had a history of producing pigs serologically negative for PRRSV (Porcine Reproductive and Respiratory Syndrome virus) and *Mycoplasma hyopneumoniae*. The study was conducted in the months of July and August, 2008 at the Lauren Christensen Swine Research facility in central Iowa.

Diet, housing and husbandry: All sows were individually housed in stalls (2.1 m in length x 0.6 m wide x 1.1 m height; Eastern Iowa Pork Inc., Earlville, IA). Concrete flooring was under each stall, and manure fell into a holding pit that was 61 cm deep. The environmental temperature was regulated by large fans suspended from the ceiling. Sows were feed at 0600 h once a day a commercially available ground feed (1450 kcal per kg, 13 % crude protein) formulated to meet requirements (NRC, 1998). Ground feed was provided in a water/feed combination trough (61 cm length x 33 cm width x 10 cm height) with a capacity of 8.2 kg per pen. Caretakers observed all sows twice daily, at 0600 h and 1600 h.

Climate: Ambient temperatures were recorded using a weather station (WPS Series, Texas Weather, Dallas, TX)

located in Madrid IA. Measurements were recorded at 20 min intervals. Over the trial average temperatures were 24.5 °C, relative humidity 71.8 %, resulting in a Temperature Humidity Index of 73.3. Average wind velocity was 5.2 km / h with a total precipitation of 20.7 cm respectively.

Treatments and experimental design: A total of 30 stalls were used during this trial (containing a sow) and the sow was the experimental unit. The sow was selected for inclusion in this study based on (1) parity, (2) stage of gestation for sows and (3) breed.

Hoof lesions: Hoof lesion and severity was scored (medial and lateral toes, dew claws and the sole) and recorded once a week by a single observer using the FeetFirst lesion scoring guide produced by the FeetFirst™ Team. On the second day of the trial (d 2), one assistant lifted and cupped each hoof of each sow so that the observer could observe the hoof sole while sows were in the standing position. This procedure was used to observe all four hooves on each sow and this process was repeated over the next four consecutive weeks (every Tuesday). The category “*any lesion*” was defined as the sum of hooves with any type of lesion that appeared on any anatomical area of the hoof (toes, dew claw, heel and sole). For example, the number of parity one (P1) sow hooves that had any type of lesion was 18 (13 lesions with severity level one and 5 lesions with a severity of 2), and there were a total of 40 hooves for parity one sows. Therefore to determine hoof lesion incidence the following calculation was used,

18 P1 sows had any type of lesion on their hooves / total of 40 hooves for P1 sows = $0.45 * 100 = 45.0\%$

Lesion severity was scored as, one (mild), two (moderate) and three (severe) which occurred on any anatomical area of the hoof (toes, dew claw, heel and sole). Written descriptions for lesion severity categories by lesion type can be found on a lesion scoring guide from Zinpro Corp. (Zinpro Corporation, Eden Prairie, MN). Lesion severity scores was reported numerically (actual number of hooves involved) and presented as a proportion of the total number of hooves in the study.

Lesion type was defined as hoof growth, dew claw, heel overgrowth and erosion, heel sole crack, white line, cracked wall horizontal and cracked wall vertical (FeetFirst™ Team, 2009). Lesion type was reported numerically (actual number of hooves) and presented as a frequency and proportion of the total number of hooves in the study.

Statistical Analysis: For frequency and proportion of lesions on each hoof over the month, data is presented descriptively. To evaluate group differences in lesion numbers and frequencies Chi Square test were performed. However due to the small number of experimental animals

and the small number of lesions observed this was only possible for ‘any lesions’ and ‘cracked wall vertical’.

Results and Discussion

On average, 50.8 % (61 hooves / total of 120 hooves) of the sows had at least one hoof lesion. Lesion severity was predominantly categorized as a level one (mild). The most common lesion type was cracked wall vertical (Table 1). There were a greater percentage of recorded lesions on the hooves from parity two sows compared to parity three and parity one sows over the weeks measured, but these frequencies were not significantly different ($P > .05$). Lesion severity was predominantly categorized as a level one (mild) regardless of sow parity. Predominate lesion type for any parity sow was cracked wall vertical (Table 2). In conclusion, it is important for producers to closely monitor parity two sows for hoof lesions, as they seem to be at a higher risk for obtaining lesions.

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Table 1. Foot lesion frequency, proportion, type and severity from sows over three parities one when housed in individual accommodations¹.

	Total No. (%)	Parity 1 No. (%)	Parity 2 No. (%)	Parity 3 No. (%)
Sows				
No. of sows	30	10	10	10
No. of feet	120	40	40	40
Any lesion[§]	61 (50.8)	18 (45.0)	23 (57.5)	20 (50.0)
Lesion severity[^]				
One (mild)	48 (40.0)	13 (32.5)	19 (47.5)	16 (40.0)
Two (moderate)	12 (10.0)	5 (12.5)	3 (7.5)	4 (10.0)
Three (severe)	1 (0.8)	0	1 (2.5)	0
Lesion type[*]				
Toe growth	5 (4.2)	0	4 (10.0)	1 (2.5)
Dew claw	11 (9.2)	7 (20.0)	2 (5.0)	2 (5.0)
Heel overgrowth and erosion	15 (12.5)	4 (10.0)	5 (12.5)	6 (15.0)
Heel-sole crack	8 (6.7)	1 (2.5)	3 (7.5)	4 (10.0)
White line	1 (0.8)	0	1 (2.5)	0
Cracked wall horizontal	11 (9.2)	1 (2.5)	4 (10.0)	6 (15.0)
Cracked wall vertical	31 (25.8)	9 (22.5)	12 (30.0)	10 (25.0)

¹Data was collected over four consecutive weeks in July and August, 2008 at the Lauren Christensen Swine Research facility in central Iowa.

Foot lesions were collected once a week by one observer using the FeetFirst lesion scoring guide produced by the FeetFirst Team.

[#]The number of feet that were affected with a lesion.

[§]The category “any lesion” was defined as the sum of feet with any type of lesion that appeared on any anatomical area of the foot (toes, dew claw, heel and sole) and was reported numerically (actual number of feet) and as a percentage.

[^]The lesion severity were one (mild), two (moderate) and three (severe). Lesion severity were reported numerically (actual number of feet) and presented as a proportion of the total number of feet in the study.

^{*}Lesion type were defined as toe growth, dew claw, heel overgrowth and erosion, heel sole crack, white line, cracked wall horizontal and cracked wall vertical respectively (FeetFirst Team, 2008). Lesion type were reported numerically (actual number of feet) and presented as a proportion of the total number of feet in the study.

Table 2. The mean score for feet erosions during four weeks for parity of sows housed in individual accommodations¹.

Parity	Lesion type²						
	TG	DC	HOE	HSC	WL	CWH	CWV
1	0.00*	0.07	0.03	0.01	0.00	0.01	0.15
2	0.06	0.03	0.04	0.02	0.04	0.08	0.13
3	0.01	0.02	0.05	0.03	0.00	0.06	0.10

¹Data was collected over four consecutive weeks in July and August, 2008 at the Lauren Christensen Swine Research facility in central Iowa.

Foot lesions were collected once a week by one observer using the FeetFirst lesion scoring guide produced by the FeetFirst Team.

²Lesion type were defined as toe growth (TG), dew claw (DC), heel overgrowth and erosion (HOE), heel sole crack (HSC), white line (WL), cracked wall horizontal (CWH) and cracked wall vertical (CWV) respectively (FeetFirst Team, 2008).

³The mean lesion score (0 = none, 1 = mild, 2 = intermediate and 3 = severe) was attained by averaging the four week records for each hoof and these figures were used to calculate mean lesion score for each parity, breed and hoof pair.