# Identifying Sow Lameness Using an Embedded Microcomputer Based Force Plate System in a Commercial Setting

## A.S. Leaflet R3026

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### Summary and Implications

The objective of this study was to determine if an embedded microcomputer based force plate system (force plate) could adequately detect lameness among breeding herd females in a commercial environment. The force plate was installed in a group sow housing system for 21 days. Force distribution measurements were obtained for each sow limb daily; these were then compared to visual lameness observations. During the 21 day period minor adjustments were made to the force plate system. Results indicate that the force plate measurement was not different from the visual observations taken for lameness. This provides evidence that the force plate can withstand the destructive nature of sows, and provide a non-biased lameness detection model.

### Introduction

Sow longevity is a key factor in sow herd profitability. Currently lameness is the third most common reason for culling breeding sows. Although lameness is a prevalent condition, its identification can be difficult, mostly due to the lack of individual animal observation combined with the lack of a common criterion for lameness assessment. Additionally, lameness identification by direct observation depends on the training and experience of the observer. Therefore, a more objective and repeatable lameness detection device is needed. The force plate has been shown to be able to detect lameness in sows in a lab based setting when lameness was induced. Therefore, the objective of this study was to determine if the force plate could adequately detect lameness among breeding herd female in a commercial environment.

### Materials and Methods

***Force plate***: The force plate consists of four quadrants (front right, front left, rear right and rear left), with a non-slip surface, each capable of recording the force applied by a sows foot once per second. The force plate was installed under one of two electronic sow feeders (ESF) in a dynamic group setting, consisting of 120 multiparous sows for 21 days. Force readings were recorded once all four feet were on the correct quadrants during the sows eating period. As sows move around, if she applied no weight onto a quadrant, then those data points were deleted. If a side (two adjacent quadrants) of the force plate had less than 10 lbs. of force applied to it, these data points were removed. The force measurements for each sow were averaged over the course of her daily visit to the ESF feeder. From these values the average force distribution was recorded per sow per day. Each day values where used to determine if the sow was sound or lame using a 10% differential in a sow's weight distribution between the rear legs. Additionally, sows were visually evaluated using a 0 to 3 lameness assessment scale (0 = normal and 3= severely lame) on a weekly interval, and then classified as non-lame (score = ≤ 1) or lame (score ≥ 2).

### Results and Discussion

The force plate required minor maintenance including the calibration of quadrants and tightening of screws. One plate did need to be replaced as the quadrant closest to the feed and water trough had a portion of the non-slip coating removed. Future prototypes will focus on fixing this issue.

The visual lameness assessment was compared to the average lameness status of the sows according to the force plate for each week. Within the population, 15% of sows were classified as lame throughout the study and there was no difference in lameness classification between the visual scoring and the force plate. Both the force plate and visual score did show a slight increase in the sows classified as lame on week 1 compared to week 2, but there was no significant difference in the number of lame sows between weeks 2 and 3. These results indicate that the force plate could be used to detect lameness in sows in a commercial environment. Future research is needed to increase the accuracy of the lameness detection of the force plate.

### Acknowledgments

A portion of this project was supported by the National Pork Checkoff, National Pork Board, Des Moines, IA; Iowa Pork Producers Association, Des Moines, IA; and the Iowa Livestock Health Advisory Council (ILHAC), Des Moines, IA. The authors would like to thank New Bolton Center, School of Veterinary Medicine, and University of Pennsylvania for their collaboration during this project.