# To Determine the Active and Inactive Hours for Sound Sows When Housed in Individual Pens

## A.S. Leaflet R2550

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### Summary and Implications

There are currently no analgesic drugs specifically approved for pain relief in livestock by the U.S Food and Drug Administration (FDA). Therefore, the objective of this study was to (1) identify the active hours of sound sows and (2) use this information to watch these active hours of the same sows when lame and after pain mitigation treatments. To avoid confounding injury due to aggression, twelve, clinically normal, mixed-parity, crossbred sows were purchased from a commercial producer in Iowa and housed in individual pens at Iowa State University. One 12 v black and white CCTV camera was affixed above the pen. Video was captured onto a DVR at 10 frames per second in black and white mode. Scoring of video began at 0600 and ended at 1800 and two postures (***active*** and ***inactive***), ***out of pen*** or ***unknown*** were collected. All behavioral data were expressed as percentages and were subjected to a square root arcsine transformation process to normalize the distribution. Transformed data were analyzed using the PROC MIXED procedure in SAS®. A P value of $P \leq 0.05$ was considered to be significant. No differences were observed for out of pen ($P = 0.24$) or unknown ($P = 0.71$) for the sows. There was a difference for the time spent active ($P = 0.0003$) versus inactive ($P = 0.0052$) over the 12-h for sows. Sows were most active at 0800 (59 %) and at 1600 (66 %) which corresponded to the feeding schedule. The least active hours were 0600, 0700, and 1700 h respectively. In conclusion the critical active hours for these sows were around feeding schedules. Therefore, it is beneficial to watch from 0800 to 1659 to capture when the sows are most active in their home pen environment.

### Introduction

There are currently no analgesic drugs specifically approved for pain relief in livestock by the U.S Food and Drug Administration (FDA). FDA Guidance Document 123 for the development of effectiveness data for non-steroidal anti-inflammatory drugs (NSAIDs) states that "validated methods of pain assessment must be used in order for a drug to be indicated for pain relief in the target species." The identification and validation of robust, repeatable pain measurements is therefore fundamental for the development and approval of effective analgesic drug regimens for use in livestock. Research to address our limited knowledge in this area is, therefore, essential to formulating science-based recommendations.

The U.S. swine industry is experiencing increasing culling and mortality rates of sows in commercial pork production operations. Research has identified hoof lesions as the prevalent lesion associated with culling of sows. A logical next step to assist swine producers in lameness detection, treatment, and prevention at the herd level is to validate the sows' behavioral repertoire, activity levels and pain management.

Therefore, the objective of this study was to (1) identify the active hours of sound sows and (2) use this information to watch these active hours of the same sows when lame and after pain mitigation treatments.

### Materials and Methods

***Animals and housing:*** To avoid confounding injury due to aggression, twelve, clinically normal, mixed-parity, crossbred sows were purchased from a commercial producer in Iowa and housed in individual pens at Iowa State University. Sows were acclimated for 7 d before any treatments were applied. This project was approved by the ISU IACUC. Each pen measured 3.72 m length x 1.36 m width x 1.24 m height. A rubber mat (2.36 m length x 2 cm height x 1.36 m width) was provided for sow comfort. All sows were feed twice a day (0800 and 1600 h) by hand onto a raised concrete step (55 cm length x 55 cm in width x 24 cm depth) within their pen. Sows had *ad libitum* access to water via one nipple waterer that was positioned over a grate. Metal fences (1.18 m height x 76 cm width) were affixed at the end of each home pen and lights were on a 12:12 light dark cycle (light hours were between 0600 and 1800). The research was conducted in a warm summer month (June 2009).

***Behavioral equipment and acquisition:*** Sow postures were collected on 12 sows in their home pens one day before the chemical inducement of lameness. Scoring of video began at 0600 and ended at 1800. One 12 v black and white CCTV camera (Model WV-CP484, Panasonic® Matsushita Co Ltd., Japan) was affixed above the pen (2.87 m above the pen floor). Video was captured onto a DVR (RECO-204, Darim Vision®, USA) at 10 frames per second in black and white mode. Video was then remuxed (defined as changing the recorded format of film into a useable format for the computer) using Video ReDo® (DRD Systems, Inc.) and placed onto DVDs. The acquisition of two postures (***active*** and ***inactive***), ***out of pen*** (defined as when the sow had been removed from her home pen by a caretaker to habituate her

to a variety of tests that were used for lameness detection) or ***unknown*** when the video feed had been lost and the screen was blank were collected. ***Active*** was defined as standing, this included any upright postures (walking, standing; Figure 1). ***Inactive*** posture was defined as sitting or lying postures (both lateral and sternal; Figure 2).

**Figure 1. Active postures defined as any upright postures (walking and standing).**

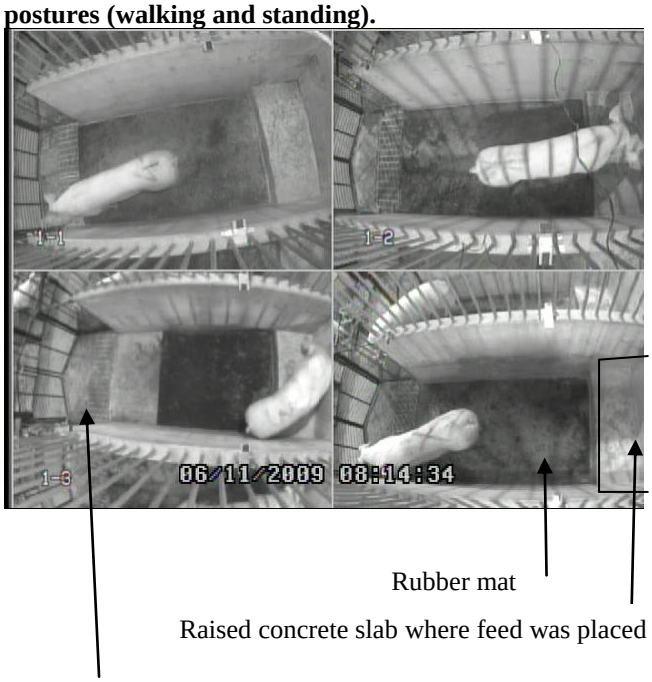


**Figure 2. Inactive posture defined as sitting or lying postures (both lateral and sternal).**


***Statistical Analysis:*** All behavioral data were expressed as percentages and were subjected to a square root arcsine transformation process to achieve a normal distribution. Transformed data were analyzed using the PROC MIXED procedure in SAS® (SAS Inst. Inc., Cary, NC) software for parametric data. The experimental unit was the home pen (containing one sow). Class statement included home pen (n = 12), and hour (0600 through to 1759). The model-included the parameter of interest and hour. A *P* value of $P \leq$ was considered to be significant.

## Results and Discussion

No differences were found for out of pen ($P = 0.24$) or unknown ($P = 0.71$) between sows. There was a difference for the time spent active ($P = 0.0003$) versus inactive ($P = 0.0052$) over the 12-h for sows. Sows were most active at 0800 (59 %) and at 1600 (66 %) which corresponded to the feeding schedule. The least active hours were 0600, 0700, and 1700 h respectively (Table 1). In conclusion, the critical active hours for these sows were around feeding schedules. Therefore, it is beneficial to watch from 0800 to 1659 to capture when the sows are most active in their home pen environment.

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**Table 1. Active and inactive postures for crossbred sows in their home pen when sound between 0600 and 1800 h in June 2009.**

| | Measures | | | |
|---|---|---|---|---|
| ***Hours*** | **Active** | **Inactive** | **Out of pen** | **Unknown** |
| 0600 | 13.92 + 7.33[a] | 86.08 + 8.44[a] | 0.00 + 3.76 | 0.00 + 2.15 |
| 0700 | 19.80 + 7.33 [a,c] | 71.10 + 8.44[b] | 0.00 + 3.76 | 9.1 + 2.15 |
| 0800 | 58.60 + 7.33[b] | 36.99 + 8.44[c] | 4.41 + 3.76 | 0.00 + 2.15 |
| 0900 | 27.52 + 7.33[c,d] | 63.55 + 8.44[d] | 8.93 + 3.76 | 0.00 + 2.15 |
| 1000 | 32.14 + 7.33[d] | 55.08 + 8.44[d] | 8.18 + 3.76 | 4.6 + 2.15 |
| 1100 | 28.42 + 7.33[d] | 55.44 + 8.44[d] | 13.36 + 3.76 | 2.78 + 2.15 |
| 1200 | 38.10 + 7.33[e] | 53.09 + 8.44[e,f] | 4.12 + 3.76 | 4.69 + 2.15 |
| 1300 | 50.88 + 8.11[b] | 47.94 + 9.33[f] | 1.18 + 4.15 | 0.00 + 2.38 |
| 1400 | 30.60 + 8.11[d,e] | 69.40 + 9.33[b] | 0.00 + 3.76 | 0.00 + 2.38 |
| 1500 | 30.77 + 8.11[d, e] | 67.16 + 9.33[b] | 0.00 + 3.76 | 2.07 + 2.38 |
| 1600 | 65.58 + 8.11[b] | 34.42 + 9.33[c] | 0.00 + 3.76 | 0.00 + 2.38 |
| 1700 | 20. 16 + 8.60[a,c] | 79.84 + 9.89[a,b] | 0.00 + 4.41 | 0.00 + 2.39 |
| ***P*-values** | 0.0003 | 0.0052 | 0.24 | 0.71 |

**Superscripts within a column differ at $P \leq 0.05$.**