

Correlation of individual behavioral responses to different environmental stressors by group housed sows

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Group housed sows experience increased environmental complexity compared to sows housed in a more traditional gestation stall system. This study examined 52 multi-parious group housed sows of the same genetic line in order to determine variability between sows in their responses to a given environmental stressor and the correlation between responses to different stressors by individual sows. An operationally based score was given to each sow based on their response to human proximity and touch and their ease of transport to the novel arena. Upon entering the arena, the sow was observed for five minutes for exploratory behavior and then for an additional five minutes after the introduction of a blue rubber exercise ball. Sows which were easier to transport were also more receptive of human proximity and contact. Sows which were easier to transport also displayed shorter durations of sham chewing in the novel arena, while sows which were more receptive of humans spent less time lying down while in the novel arena. Sows which showed greater durations of exploratory behaviors also demonstrated shorter latencies to approach the novel object.

Goals: To design a battery of behavioral tests that takes the first step towards identifying animals best suited for pen gestation. Individual differences between sows in their reaction to environmental stressors such as human handling, unknown environs, and novel objects are measured to see if an animal's ability to cope with different novel stressors is correlated.

Materials and methods: This study examined 52 sows at approximately week two of gestation. All animals were multi-parious sows of the same genetic line (PIC 1050) and have been housed in a pre-implantation pen gestation system with electronic sow feeding at University of Pennsylvania, New Bolton Center swine facility since they were gilts. Weekly breeding groups of ~10 animals were added to the dynamic group 3 to 5 days following first insemination. The first trial measured the sows' response to human proximity and touch. The sows were then moved toward a novel arena, during which they were given an operationally defined ease of transport score based on hesitation, stopping, and response to human encouragement. The novel arena was an 8x17 cement floor, separated into a grid of 12 squares. Each sow was video recorded (Sony HandyCam SX45 Camcorder) for five minutes for exploratory behavior, and then for a final five minutes after the introduction of a blue rubber exercise ball (55 cm diameter). Video data was subsequently analyzed (Noldus Observer XT 11® program) for the number of lines crossed, the latency to make contact with the object, and for the duration of sham chewing, exploratory behaviors (nosing the wall, floor, gate, or ball), and lying down. After examining each measurement for skewness and kurtosis, the data was normalized and assessed via parametric Pearson's correlations.

Results: Sows which were easier to transport were also more receptive of human proximity and contact ($r(52) = 0.43, p < 0.002$). Sows which were easier to transport also displayed shorter durations of sham chewing in the novel arena (Fig. 1), while sows which were more receptive of humans spent less time lying down while in the novel arena (Fig. 2). Sows which showed greater durations of exploratory behaviors also demonstrated shorter latencies to approach the novel object ($r(43) = -0.3, p < 0.05$).

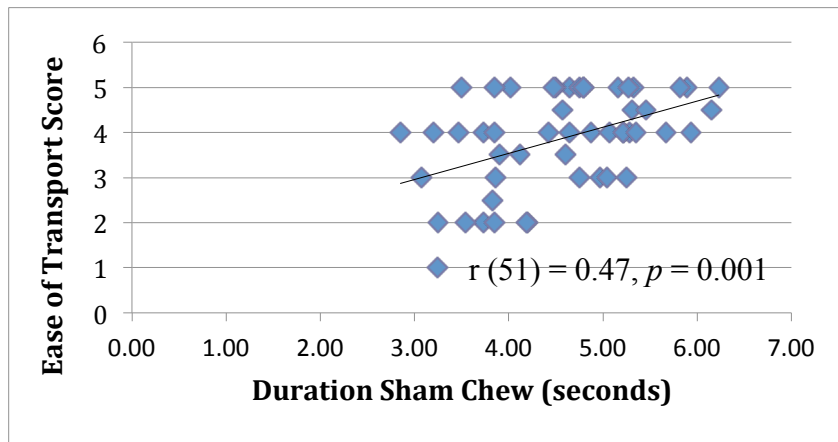


Figure 1. Duration of sham chewing in the novel arena versus ease of transport score. Ease of transport score increases with increasing difficulty to move the sow.

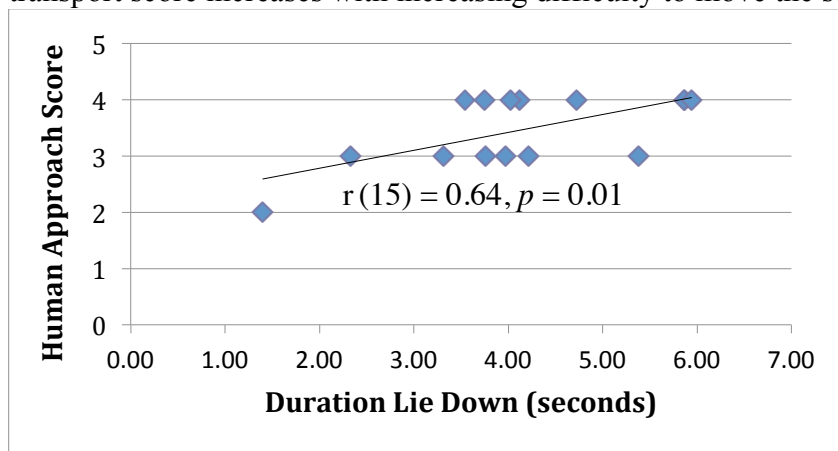


Figure 2. Duration of lying down in the novel arena versus human approach score. Human approach score increases with increasing avoidance of human approach and contact.

Summary: While the majority of gestating sows remain housed in individual stalls, both legislative initiatives and market forces are moving producers to consider group housing of these animals. Sow lines in common use have been selected over the past several decades for success in stalls and without regard to the traits necessary for high welfare and productivity in pen gestation. Certain behavioral phenotypes might confer advantages to sows that allow them to best cope with the environmental and social complexities of group housing. The variability between sows in their responses to a given environmental stressor and the correlation between responses to different stressors by individual sows provides the opportunity to define behavioral phenotypes within this group of genetically similar sows. Subsequent research needs to provide a comparable focus on responses to social stressors as well as examine if these behavioral phenotypes correlate with measures of success in pen gestation. This work on coping with environmental stressors provides an initial step towards identifying animals best suited for pen gestation. It also highlights the need for veterinarians and producers alike to remain diligent in their management of gestating sows in group housing as individuals.