With the move towards group sow housing systems in North America, developing management practices that optimise sow performance and longevity in these systems will be critical to the success and long term profitability of swine operations. A variety of group gestation systems have been developed, each a different level of competition sows must cope with. How well an individual sow copes in each system will depend on the housing type and management, but also on the animal’s individual temperament.

Two key temperament characteristics in animals are known as the active/passive and confident/fearful dimensions. Traits related to these characteristics are considered important for influencing how an individual responds to, and copes with, environmental challenges. This study aimed to better understand the effects of the gestation housing environment on sow behaviour, the interactions between housing environment and sow temperament and their influence on sow welfare and longevity. A better understanding of these interactions may help determine optimal management strategies for sows in different group housing systems, and whether the selection of sows based on temperament may be beneficial.

**Study design**

Studies took place at the University of Manitoba’s Glenlea swine research unit, which uses electronic sow feeders (ESF) in two identical 50 sow, farrow to finish barns. One barn houses gestating sows on partially slatted concrete floors, and the other has straw bedded pens, otherwise the two farms are identical in building layout, pen design, sow management and genetics, enabling a controlled comparison of conventional and alternative floor systems. Sow behaviour and productivity were monitored over two gestations. A total of 284 sows were studied, 138 in the unbedded system, 146 in the straw bedded system, and over a range of parities (0-9, average 2.9) representative of the herd demographics. A total of 12 breeding groups were studied (6 per system), with group sizes ranging from 21-30 sows. Sows were transferred to group gestation pens at 35 days gestation (week 7), where they remained until seven days before (week 16). Measures of sow condition, body injury and lameness were taken over the course of each gestation to determine how each sow was coping in the system. Individual sow body weight, backfat depth and body condition score (BCS) was measured at week 8 of gestation and at week 20. Sows were gait scored from 0 (not lame) to 3 (severely lame) to assess lameness at four time points, (weeks 7, 8 and 16 of gestation, and week 20 at weaning, following breeding). Additionally, at weeks 8 and 16 of gestation, sows were assessed for body injury by examining scratches and lesions on the body.

**Temperament testing**

The temperament of sows was assessed using specially designed test pens at 8 weeks of gestation, using four behavioural tests: 1) the open door test (ODT); 2) the novel object test (NOT); 3) the pig approaching human (PAH); and 4) human approaching pig test (HAP). The tests are described as follows:

**ODT:** The time taken for pigs to exit a test pen is measured after the door is opened, up to a maximum time of three minutes (Fig. 1).

**NOT:** The time taken for a pig to contact unfamiliar objects placed in a pen is measured, along with the total frequency and duration of contacts with novel objects (Fig. 2).

**PAH:** Pigs are placed individually in a test pen. A human enters the pen and stands in a set location, away from the pig, for a maximum of three minutes, the time taken for the pig to make contact with the human, the number of contacts made, and the duration of time the pig spends within one meter of the human is recorded (Fig. 3).

**HAP:** Pigs are placed individually in a test pen. A human, unfamiliar to the pig enters the pen and approaches the pig slowly. The response of the pig is recorded on a scale of 1-4, (1- fearful, 4 – pig allows human to approach and interacts), (Fig. 4).
The ODT and NOT are considered indicators of the active-passive dimension of temperament, with active animals being quicker to exit the test pen, and to approach and make contact with unfamiliar objects than passive individuals. The PAH and HAP tests were used to evaluate the confident-fearful dimension, with more fearful individuals taking longer to approach a human in the PAH, or actively avoiding human interaction in the HAP test. This relationship is shown in table 1.

### Table 1 Relationship between pig behaviour and temperament

<table>
<thead>
<tr>
<th>Behaviour</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test</td>
<td></td>
</tr>
<tr>
<td>ODT</td>
<td>fast</td>
</tr>
<tr>
<td>NOT</td>
<td>fast to contact</td>
</tr>
<tr>
<td>Test</td>
<td>Calm</td>
</tr>
<tr>
<td>PAH</td>
<td>high approach</td>
</tr>
<tr>
<td>HAP</td>
<td>high score</td>
</tr>
</tbody>
</table>

**Results**

**Sow behaviour**

Sows in the concrete and straw bedded housing systems showed significant differences in their behaviour during the ODT, NOT and HAP tests. Overall, sows in the straw bedded system showed more active temperament traits, being faster to exit the home pen in the ODT ($P<0.0001$), and making contact with objects more frequently in the NOT test ($P<0.001$), compared to sows housed in the concrete system. Sows housed in the straw bedded system also had a lower HAP score, which could indicate more fearful behaviour, or alternatively these sows were just not interested in the human.

Factor analysis, a data reduction technique, was used to analyse the behavioural responses of sows and compare the sow temperament characteristics between the two housing environments. This analysis indicated that in straw bedded systems, the active/passive temperament dimension was more important (accounted for the greatest amount of variation), while in the concrete system, the confident/fearful dimension was more important.

**Sow condition, injury and lameness**

Sows housed in the straw bedded system had a significantly higher body injury score throughout gestation than sows in the concrete system ($P<0.001$). Across both systems, younger sows had higher levels of body injury score than older sows ($P<0.001$). Sows housed in the straw bedded system had a greater reduction in BSC over lactation, as measured from weeks 20 to 16, than those housed in the unbedded system ($P<0.001$). Younger sows showed a greater reduction in sow BCS than older sows ($P<0.001$), over weeks 20 to 16.

Over the course of the study, a greater number of sows became lame in the concrete system than in the straw bedded system (Table 2).

The incidence of lame sows was also positively correlated to the severity of body injury score measured at 8 weeks of gestation in the concrete system ($P<0.005$), but not in the straw-bedded system.

**Relationships between sow temperament and sow longevity**

The severity of body injury as measured at 16 weeks of gestation was positively correlated to different temperament dimensions across the two systems. In the concrete system, body injury was related to active/passive traits, with active sows having more injuries ($P<0.05$), and in the straw-bedded system, body injury was related to confident/fearful traits, with confident sows having higher injury scores ($P<0.05$).

In the straw-bedded system, but not the concrete system, passive sows had a greater reduction in BCS during lactation ($P<0.05$) than active sows. There was no relationship between temperament and the incidence of lameness in sows in either of the ESF systems.

**The Bottom Line**

Individual sows vary in temperament, and these traits can be successfully determined through simple on-farm behaviour tests. Housing environment has a strong influence on the behavioural responses of sows, and can interact with temperament to influence how well sows cope under different management systems.

In both of the housing systems studied here, temperament traits were correlated to the severity of body injury score. Body injury scores are a measure of aggression between sows, and the results indicate that temperament is thus linked to aggressive behaviour. This finding is in agreement with previous research. However, it is interesting to note that the temperament traits related to injury score differed between the two housing systems, providing further evidence for the importance of the interaction between housing and temperament. Floor type in the two housing systems also had a significant influence on the incidence of lame sows. This demonstrates the importance of floor type in sow longevity, and the value of using alternative floor types that provide greater comfort to sows, such as straw or rubber.

With continued research, our understanding of the interaction between sow temperament and housing system will improve, and specific handling and management protocols for sows under different housing environments could be developed. In addition, genetic selection of sows with more suitable temperament types can become a component of sow replacement schemes, helping to reduce aggression and improve production and longevity in group housing systems.

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