

## The Issue

Sows can be kept in different types of housing during pregnancy. Three main categories of housing are discussed below, along with their key advantages and disadvantages in relation to sow welfare. While the general categories of gestation stall, group pen, and free-range system can be identified, there is considerable variation within each of these categories. Welfare outcomes are not only a product of interactions between housing type and sow, but involve many other factors, such as stock handling techniques, genetics, the sows' previous experience, feeding practices, flooring and bedding types, and climate.<sup>1</sup>

The use of gestation stalls has become increasingly controversial.<sup>1,2</sup> Legislative and ballot initiatives in some US states have limited their use. In addition, current or scheduled bans on gestation stall use are in place in many countries, although the implementation of those bans is uneven.<sup>3</sup> Some major foodservice companies, distributors, and retailers have indicated their intent to purchase from producers who do not use gestation stalls. Consumer acceptance of the gestation stall, as demonstrated by responses to surveys and during focus groups, is often found to be lower<sup>4,5,6</sup> with preference shown for products from non-gestation stall systems.<sup>7</sup> However, it is unclear how well consumer intent translates to purchasing behavior.

## Gestation Stall

A gestation stall is an individual pen. Dimensions vary but are typically approximately 6.5 feet long and 2.5 feet wide, to allow the sows to lie on their side without their udders protruding from the stall.<sup>8,9</sup> Facilities with older installations may include stalls of narrower widths.

### *Advantages*

**Individual Access to Resources**—Stall housing allows each sow to be given an individually tailored diet<sup>10,11</sup> and secure access to water. Enrichment materials, such as straw or balls, chains and ropes also may be provided, although this is not common in most installations.

**Accessibility**—In facilities providing front and rear alleys for viewing sows, individual housing makes it easy to identify, inspect and intervene on behalf of specific sows, such as for veterinary treatment.<sup>1,10</sup>

**Protection from Aggression**—Stall-housed sows are unlikely to receive injuries associated with physical aggression, but agonistic interactions may still occur between adjacent animals.<sup>12</sup>

### *Disadvantages*

**Behavioral Restriction**— Stall-housed sows are less active,<sup>13</sup> and spend more time sitting and standing and less time walking than sows housed in pens.<sup>11</sup> Sows in gestation stalls can stand-up and lie down, but are prevented from turning around and performing behaviors such as communal lying and movement to preferred micro-environments.

**Confinement Injuries**—Stall-housed sows may have a higher incidence of injuries such as pressure sores, ulcers, and abrasions.<sup>14,15,16</sup>

**Stereotypy**—Sows in stalls may perform more stereotypic behaviors such as biting, chewing, licking, and rubbing than sows housed in the other systems.<sup>11,17,18,19,20</sup>

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### *Refinements*

Stalls can be improved by providing straw<sup>21</sup> or mats.<sup>22</sup> Stall design can also be modified to allow turning<sup>23</sup> and/or to provide more space,<sup>24</sup> and larger accommodations are associated with lower injury rates for larger sows.<sup>25</sup>

### **Group Pen**

Group pens are enclosures that hold a group of sows. They vary considerably in design with indoor pens on slatted floors being the predominant system in the United States. Alternative systems such as hoop barns<sup>26</sup> or with straw bedding<sup>16</sup> are also available in suitable climates. Across various systems, group sizes range from four or five pigs to more than two hundred.

### *Advantages*

Behavioral Opportunities—Grouped sows have increased behavioral opportunities, such as the ability to move around the enclosure<sup>27</sup> and opportunities for full-body social interactions.

### *Disadvantages*

Aggression Injuries—Because grouped sows can make full-body contact, scratch and bite injuries<sup>14,15,28,29</sup> and, sometimes, lameness<sup>30,31,32</sup> are more common, especially for subordinate sows.<sup>33,34</sup> Aggression injuries are associated with the addition of novel sows to the pen,<sup>1</sup> competition for resources,<sup>1</sup> and crowding<sup>35</sup>

Body Condition—If competition for feed is not well-controlled, dominant sows may become overweight and middle-ranking and subordinate sows underweight.<sup>1,36,37,38</sup>

### *Refinements*

Additional benefits may be conferred by providing environmental enrichments. For example provision of straw<sup>21</sup> and objects to manipulate<sup>39</sup> supports investigative behaviors and may also reduce aggression and reduce rates of injuries. Aggression resulting from mixing usually lasts for about two days, and can be reduced by appropriate management such as forming and maintaining stable groups,<sup>40</sup> grouping sows similar in size,<sup>41</sup> and providing sub-areas in the pens (e.g., with walls) and/or room to retreat (depending on system this may be 7 feet, 3 inches<sup>38,42,43,44,45</sup> or more<sup>34</sup> per sow). Providing a source of fiber<sup>44</sup> or satiety-inducing diet or feeding *ad libitum* for the first 48 hours may also reduce aggression.

Feed must be delivered by a system that manages competition for food among sows to avoid high levels of aggression. These systems include:

- Simultaneously feeding in multiple areas within the pen to limit the ability of dominant sows to monopolize food.<sup>36</sup>
- Simultaneous feeding into stanchions or free-access stalls, to allow all sows to eat without harassment. Free-access stalls can also provide a retreat space for subordinate sows. Feeding of tailored diets is possible with manual feeding.<sup>38</sup>
- Using an electronic sow feeder that admits sows one at a time and provides a tailored diet based on a radio-frequency identification tag (RFID) inserted into the sow's ear.<sup>46</sup>
- Using multiple feedings spaced closely together in time so that dominant sows became satiated and other sows can access food.<sup>47</sup>
- Trickle feeding so that all feeding sites are equally attractive and aggression would be unproductive.<sup>10</sup>

## Free Range

Free range is defined as sows having access to an outdoor area for at least 80% of their production cycle.<sup>48,49</sup>

### *Advantages*

Reduced Aggression—Space allowance in outdoor housing systems is generally larger so aggression between sows is less likely to occur.

Behavioral Opportunities—Depending on the system, free-range sows may have additional behavioral opportunities, such as grazing, rooting soil, and wallowing.

Noise/Ammonia—In contrast to indoor housing, outdoor areas will provide reduced exposure to machine noise<sup>50</sup> and have less accumulation of ammonia.<sup>51</sup>

### *Disadvantages*

Parasites—Sows with outdoor access tend to have more parasites,<sup>52</sup> such as helminths.<sup>53</sup>

Other Environmental Hazards—Depending on the location, sows may be more exposed to climatic extremes, predation, activity-based injuries, disease vectors, and other hazards.

### *Refinements*

Free-range systems may require refinements that allow swine to cope with extremes of temperature, such as wallowing areas<sup>54</sup> and/or deep bedded pens.

## Non-Distinguishing Findings

Many traditional welfare indicators do not consistently favor one housing system over another. These include: measures of stress<sup>1,11</sup> (e.g. cortisol) and overall productivity.<sup>10,11,29,20</sup> Some welfare outcomes vary between systems due to specific variables, such as lameness that is high when bedding is not provided, regardless of enclosure size and type.<sup>11</sup>

## Summary

Gestation sow housing systems vary in their advantages and disadvantages regarding the welfare of the sow. When comparing housing systems for pregnant sows, making a definitive welfare judgment requires assigning weights to an array of contributing welfare indicators including, but not limited to, type, severity and incidence of injuries; behavioral and social opportunities; and exposure to parasites, disease, and harmful or aversive stimuli.<sup>55</sup> As no universally accepted weighting system exists, there is no clear consensus as to which is the superior system across all situations. However, the public is generally more critical of gestation stall housing than other systems, which has led to voluntary and mandatory transition to alternative housing systems by some producers.<sup>1</sup> As such there is an ongoing need to develop an array of housing systems that suit local conditions,<sup>45</sup> effectively provide enhanced opportunities for the sows to move and interact socially, and avoid an unacceptable increase in negative outcomes such as injury associated with aggression<sup>1</sup> or exposure to environmental hazards.

**Visual Summary**

Indicators	Stall	Group Pen		Free Range
Environmental Noise and ammonia				
Exposure to climate				
Exposure to predators				
Exposure to parasites				
Sow's access to food ration		Non-Competitive	Competitive	
Productivity				
Sow Lameness				If pasture quality is protected
Sow Mobility				
Injuries	Depends on stall width; abrasions, ulcers	Lacerations		
Sow Behavioral Diversity				
Foraging Opportunities				
Inter-Sow Aggression		Non-Competitive	Competitive	

*Non-Competitive= Electronic sow feeder, free-access stall*

*Competitive= trickle feeding, floor feeding, non-gated feeding stalls*

<b>Good</b>	<b>Some Risk</b>	<b>Increased Risk</b>	<b>Poor</b>	<b>Insuff. Data</b>
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