

## **Appendix 12: An Introduction to Managing Dry Sows in a Loose Housing System**

### **Introduction:**

European legislation banning the use of stalls and tethers for gestating sows, together with increasing concern among consumers in North America has led Ontario producers to consider the merits of alternative housing systems for gestating sows.

The most common alternative for gestating sows is to keep them in groups in a loose housing situation. However, there are many risk factors that need to be considered before sows are placed in a loose housing situation. These factors influence the behaviour of sows in groups and can contribute to fighting (aggression) which is detrimental to the individual sow, and to the group as a whole. Risk factors need to be audited on a regular basis in order to measure the success (or failure) of the loose housing facility.

### **The major risk factors associated with loose housing are:**

- 1. Mixing**
- 2. Competition for Feed and Water**
- 3. Space Allowance and Pen design**

The key to the success of a loose housing system will be the ability of stockpeople to identify when risk factors are affecting the behaviour of sows in a group and the ability of stockpeople to take appropriate action to eliminate the risk. This booklet is intended as a guide for stockpeople in dealing with the successful management of sows in groups through a review of some of the recent published literature.

### **An Introduction to Sow Behaviour:**

#### **Establishing a Dominance Order:**

Sows living in a group generally establish a dominance hierarchy based on the subordinate sow's avoidance of more dominant animals. The formation of the group order may take one to two days depending on group size, sow weight and sow parity. Aggressive behaviour is most commonly seen during the development of the dominance order, usually involving the extremely dominant and extremely subordinate sows.

Researchers have analyzed the behaviour of sows during the establishment of the dominance order and have described several definite behaviours which signal either dominance (fight) or submission (flight). "Head-to-body knock" by a dominant sow was shown to be slightly more aggressive than "head-to-head knock." Both behaviours will signal a retreat by a subordinate sow. A retreat or avoidance were signaled by a head tilt. "Nose-to-nose" was considered to be mildly aggressive for one of the pair, especially if there had been some prior interaction between the two sows.

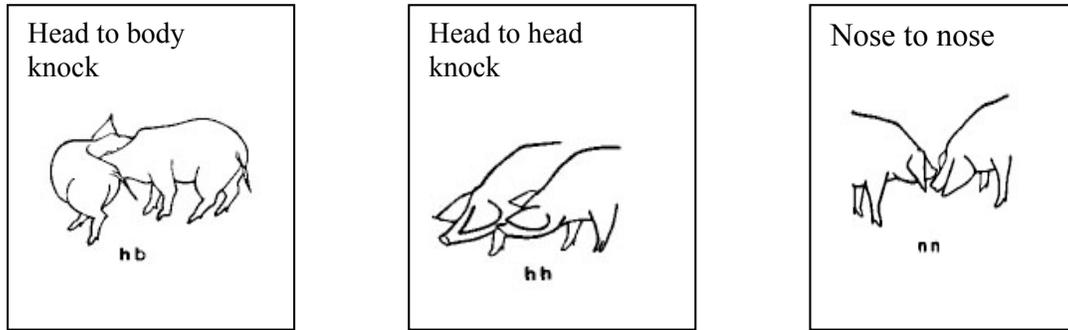


Figure 1: Behaviour patterns of sows (Jensen, 1980).

Once the dominance order is established, it is often easier to identify relative dominance rankings between sows in the group by observing subordinate sows' avoidance of more dominant animals, rather than by observing aggressive behaviour of more dominant individuals. Sows learn to recognize signs from more dominant sows and avoid or escape to a neutral or protected area.

Once established, the dominance order allows sows to avoid frequent bouts of aggressive interaction. The dominance order will be relatively unaffected by a separation period, i.e., farrowing. Sows may recognize each other after being housed in individual farrowing crates for up to 6 weeks (Arey, 1999).

In a loose housing system, pen design and space allowance can contribute to increased bouts of aggression, when sows are not provided with enough options to avoid more dominant animals. Flight distance (see below) is critical to reduce aggressive encounters.

**Flight Distance:**

Flight distance is defined as the distance required for an individual sow to get far enough away from a dominant sow to avoid injury. Research has shown that, in a straw bedded pen, the distance that subordinate sows were pursued by the dominant sow varied from 0 to 20 m (66'), with the majority of the encounters (75%) resulting in a chase by the dominant sow of less than 2.5 m (8'2") (Pig Welfare Advisory Group).

The amount of available flight distance can be shortened if physical barriers are provided. Sows can hide behind these barriers and thus avoid confrontation with the dominant sow. Ideally, barriers should be flexible or constructed with round edges to reduce the risk of injury.

## **Group Size and Composition**

In the wild (wild boar, feral and free-ranging pigs), the primary social grouping of pigs consists of two to four sows, their most recent litters and young offspring from earlier litters (Gonyou, 2001). In these groups, sows are closely related, usually mothers and daughters and siblings.

In larger groups in a controlled environment, it is believed that sows will form smaller subgroups. It is more difficult for sows to form a stable hierarchy in larger groups; this can lead to increased aggressive behaviour (fighting, vulva biting) especially when resources (feed, water and space) are at a premium (Rizvi et al., 1998).

Signs of insufficient space allowance would include increased fighting, aggressive behaviours and the presence (lying) of new sows in dunging area at all times (Moore et al., 1993).

### **Risk Factors:**

#### **1. Mixing:**

The most common source of injury in loose-housed sows arises from aggression when sows are mixed.

Producers can choose to keep sows in **stable groups**, moving these units through the production cycle (farrowing-breeding-gestation-farrowing) or sows can be kept in larger, **dynamic groups**, with sows being added and removed on a regular basis – usually weekly.

Both arrangements involve the mixing of unfamiliar sows, although a dynamic group system will involve mixing sows on a more regular basis. The introduction of new sows, or the initial formation of a stable group will result in increased levels of aggression while the sows establish a dominance hierarchy within the group. Producers and barn managers should always be present to oversee the mixing of new sows and should be familiar with the signs of sow aggression.

Sow to sow aggression and the establishment of a dominance hierarchy should abate within the first 24 hours after mixing. The causes of continued aggression within a group after 24 hours should be investigated. (Research has indicated that establishing a social hierarchy in a group of ten pigs takes 24 hrs.)

Below are some strategies that can be employed to reduce the level and interval of aggression when mixing sows.

### *Training of gilts:*

Research in the Netherlands (van Putten and Buré, 1997) has shown that re-grouping and re-penning gilts before five or six months of age improved their social skills and reduced fighting when mixed later, at higher weights. The assumption was that this activity gave the gilts the opportunity to learn the signs of dominance in other pigs and to learn how to fight efficiently, to break off fights or to avoid fights altogether. The experiment took place over three years and involved mixing and re-penning groups of 8 gilts 2, 3 or 4 times. The number of fights recorded decreased with the increasing number of times animals were re-grouped; gilts re-grouped 4 times fought less than gilts re-grouped 3 times and gilts re-grouped 3 times fought less than gilts grouped 2 times.

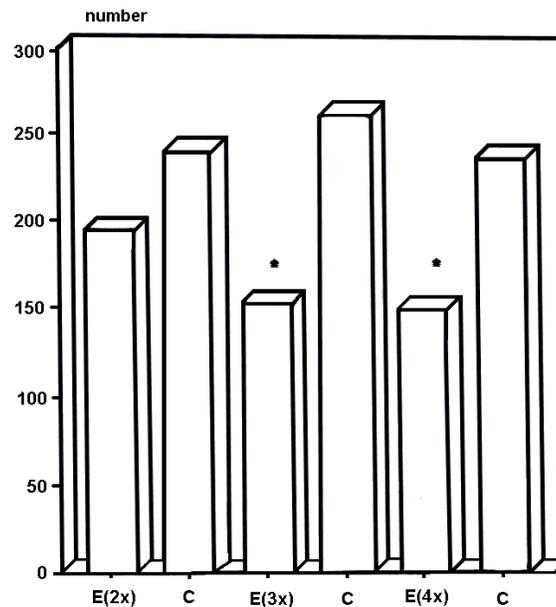


Figure 2: The average number of agonistic (aggressive or defensive social interactions) encounters during 24 hours of observation of experimental groups of pigs (E). The experimental groups were re-grouped either 2, 3 or 4 times. C represents the control group. (van Putten and Buré, 1997).

The handling and exercise involved with the re-grouping and re-penning (gilts had to walk some distance to their new pens) contributed to the overall experience of the gilts, making them easier to handle and less fearful of new situations (van Putten and Buré, 1997).

### *Introducing sub-groups into a larger, dynamic group:*

When unfamiliar sows, known as the sub-group, are added to an already existing group of sows, there are several options that can help to reduce the fighting that can occur.

- The sub-group should not be smaller than 3 sows.
- Pre-mixing small groups of sows prior to their introduction into the larger group has been shown to strengthen sub-group behaviour and to reduce aggression between sub-group members (Durrell et al. 2003).

- Break up the laying area with divisions to form a specific area for the sub-group.
- The sub-group can be kept in a penned-in area within the main group. The pen should provide an area where sows can see each other and can establish nose to nose contact. This allows the sows to become familiar with the new sows through smell and touch across the barrier. Similarly, housing new sows in a pen adjacent to their new group, provides the same type of discovery.

The addition of fresh straw at mixing will only delay the establishment of a dominance hierarchy and, therefore, fighting among sows.

## **2. Competition for Feed and Water:**

### *Social Facilitation of Eating:*

In the wild, sows will spend most of their time rooting and looking for food. Subsequently, domesticated sows are motivated to eat throughout the day.

Sows are also stimulated to begin eating when adjacent sows begin to eat (Gonyou, 2001). This is known as social facilitation and can lead to fighting when feed resources are limited. Social facilitation is of critical concern in systems with electronic sow feeders, since there is the potential for one sow to be eating at any given time (Jensen et al., 2000). This means that the stimulus to eat is present for all the sows in the group throughout the day.

Sows also drink immediately after eating; lack of drinkers or available trough space can also lead to aggression.

### *Reducing Competition for Feed and Water:*

One of the major challenges when group housing sows is to minimize the aggression that can occur at feeding time (Anderson, 1999). This is of critical importance since competition for food and/or water will lead to aggression in intensively kept sows. Aggression can reduce the feeding time of sows and therefore effect weight gains, etc.

Pens should be designed where all individuals are allowed access to food and may complete eating their ration without being displaced by others. Insufficient feed and water access places timid sows at risk.

Researchers in England conducted a survey of 211 farms which employed several loose housing designs and feeding regimes (Risvi et al. 1998). These researchers observed that

feeding sows once a day, rather than twice a day or ad libitum, increased the risk of vulva biting two-fold, whereas feeding twice a day reduced the risk three fold. Vulva biting occurred when a sow approached a pen mate from the rear or when the pen mate steps back towards the snout of a sow which leads to a bite. Vulva biting seldom ends in a fight, but vulva biting is recognized as an aggressive behaviour in sows.

Research indicates that the number of water (nipple) drinkers may be a cause of aggression among sows (Rizvi et al. 1998). Nipple drinkers should be checked regularly to ensure that they are functioning properly or water can be available from a trough. The recommended water flow rates for gestating sows range from 1.5 to 2 litres per minute and is dependent on the temperature.

The type of feed can also effect the level of aggression. Less aggression is seen with wet feed (Anderson, 1999).

Low ranking sows will spend less time at the trough; they avoid aggressive encounters at the expense of food intake. In the UK, it is recommended that low ranking sows be removed for individual feeding.

#### *Electronic Sow Feeders:*

The use of electronic sow feeders (esf's) poses a different type of risk, as mentioned above (social facilitation). The issue is not so much the number and location of the feeder, but controlling the behaviour of the sows that may be frustrated due to the sequential feeding. Groups with esf's should be closely monitored, especially in larger groups, when groups are first formed and when new animals are added. Dominant sows will eat first and often return to the feeder to remove any feed left by other sows (Gonyou, 2001).

The addition of un-chopped straw or other suitable roughage has been shown to reduce the levels of aggression where esf's are used (Jensen et al., 2000). Straw or roughage must be added in sufficient amounts so that it does not become the focal point of fighting between competing sows. Straw must be clean and of good quality to make it attractive to the sows.

The provision of two distinct meals of chopped corn silage on the floor has been shown to reduce the incidence of vulva biting (van Putten and van de Burgwal, 1990). The chopped corn silage allows the sows to eat simultaneously and therefore relieves some of the frustration due to social facilitation. van Putten and van de de Burgwal also found that vulva biting was reduced when gilts were trained to use the feeding station before they were introduced into the main group and when an area was reserved for them (see mixing below).

Jensen et al., (2000) found that starting the feeding cycle in the late evening for overnight feeding reduced the pressure at the electronic feeders and led to reduced levels of aggression, due to the sows choosing to rest versus waiting in line at the feeder. Night

feeding can only be successful if the barn is kept quiet and free of disturbance throughout the day. All maintenance and other work has to be done during the night, so the sows can rest during the day.

Socialization of gilts has been shown to reduce aggression and may be a useful strategy for systems with electronic sow feeders.

#### *Trickle feeding:*

This method is in use in Europe and research is underway in the US to evaluate this delivery system. In trickle feeding, all sows are fed simultaneously and receive the same amount of feed. Sows are fed in a slow manner; the feed delivery is timed to the rate of eating of the slowest-eating sow. Sows quickly learn there is nothing to be gained by stealing a neighbor's feed.

A supply auger fills a dispenser with feed for two sows. A second lower dispensing auger trickles the feed out into each feeding position. This slow method of feed delivery 'fixes' the sows in place, eliminating competition. Thus all sows in the group grow at an equal rate and maintain their condition

### **3. Space Allowance and Pen Design:**

Pen design - providing sows with places to rest, places to hide from dominant sows and enough space to escape from aggressive sows – has more influence on the level of aggression in loose housed stalls than space allowance. Rectangular pens are recommended versus square pens of equal square footage and stocking density.

Flooring must be non-slip to provide suitable traction for sows, especially for submissive sows.

#### *Feeding Stalls:*

Anderson et al., (1999) found that full length body partitions reduced overall aggression at feeding time the most, while shoulder length partitions reduced aggression somewhat and was preferred over no partition. The length of the partition also influenced feeding time, with sows spending more time eating when a full length partition was used. However, the presence of full body partitions led to an increase in bites toward the vulva. This was offset with the installation of a gate across the back of the partitions, effectively isolating the sow for the duration of feeding.

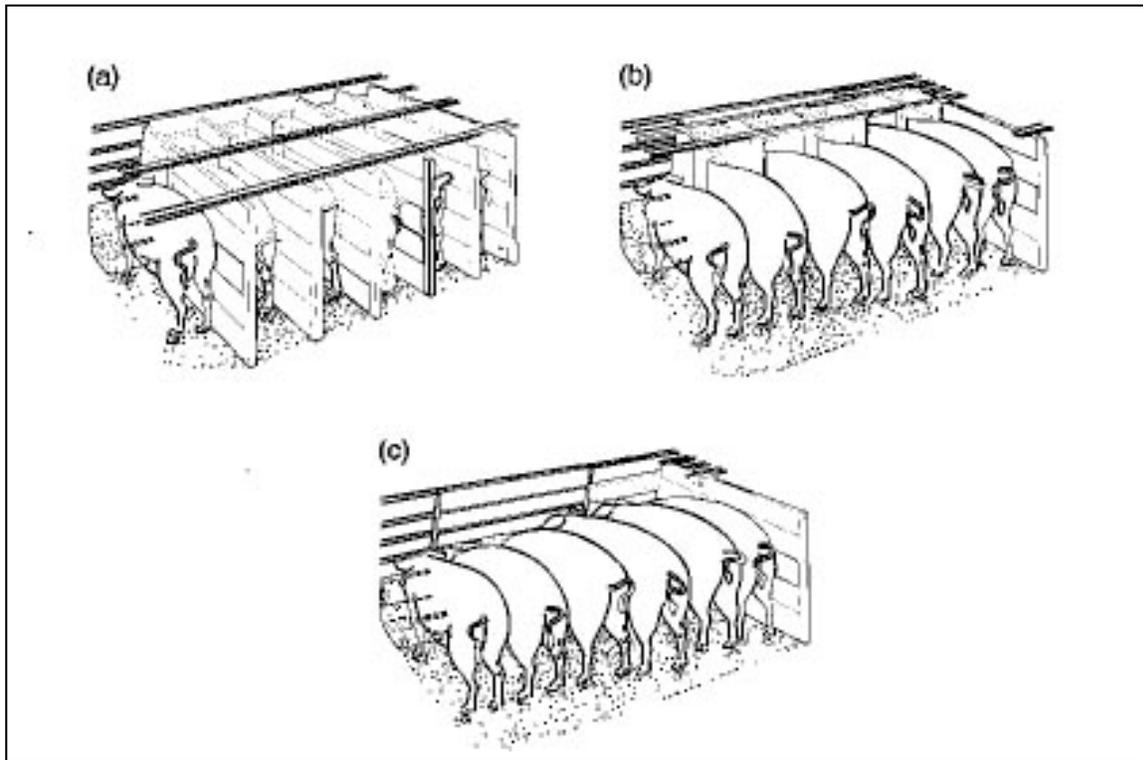


Figure 3: Diagram showing types of feeding stalls for loose housed sows: (a) full body, (b) shoulder partitions, (c) no partitions (Anderson, 1999).

Barnett et al., (1992) found that the provision of partial feeding stalls {(b) in Figure 3} reduced aggression during the first 90 minutes after aggression.

*Space Allowance:*

Although pen design may be considered to be the most critical factor influencing the level of aggression in the loose housing environment (by providing the sow with the opportunity to retreat from dominant sows) the provision of enough space allowance is still a major consideration. Recommended space allowance vary depending on the system used (i.e., with or without bedding, feeding stalls, type of flooring, etc.). The following table provides some examples of recommended space allowances.

Source	Recommended Space Allowance for a > 250 kg (> 550lb) sow	
	m <sup>2</sup>	sq ft
Canadian Code of Practice	2.3	25
UK	3.5	37.5
New Zealand Code of Practice	1.4	15

Table 1: Some recommended space allowances for sows in groups.

Stocking densities should not be calculated based on space allowance entirely, but must be derived from considering the risk factors (mixing, competition for feed and water, space allowance and pen design) outlined in this guide.

## **Managing the Dominance Order - Body Condition Scoring:**

Stockpeople need to learn to recognize and identify sows along the dominance spectrum – which sows advance and which chose to retreat. An effective way of managing the shifting dominance order is to establish an acceptable body score for sows in your groups, and take action (separate) sows which fall below the acceptable score.

The scoring technique provided below is simple and can be quickly learned. After a little practice, several people can independently condition score a group of sows and achieve a close measure of agreement.

### **Suggested scoring guide**

A scale from 1 (emaciated) to 5 (obese) is used in the scoring system which combines both visual appraisal and feel. Visual appraisal alone is not good enough: handling the sow is essential to get an accurate assessment of condition.

Figure 4 shows the various locations on the sow's body which can be palpated to determine body condition (source: Queensland Government, Department of Primary Industries).

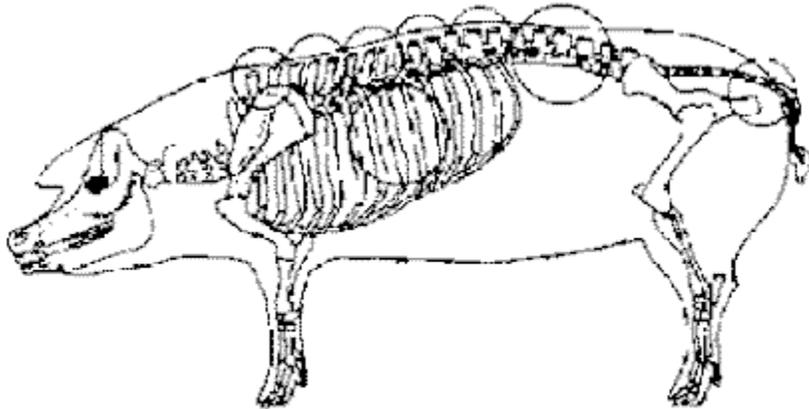


Figure 4: Palpation points for body condition scoring.

In practice very few extreme (1 or 5) scores are found in well managed pig herds, while scores of 1 or 4 will be rarely seen. The majority of sows should fall into the middle scoring range (2 or 3). To cover this middle range adequately, half scores may be used (1.5 to 3.5).

**Table 1. Condition scoring guide**

Score	Appearance	Pelvic Bones	Loin	Ribs
1	Emaciated	Very prominent. Deep cavity around tail head.	Vertebrae are prominent and sharp. Very narrow loin. Hollow flank.	Individual ribs are very prominent.
2	Thin	Obvious with slight cover.	Narrow loin. Flank rather hollow. Slight cover on spine, but prominent vertebrae.	Rib cage less apparent but individual ribs easily detected with slight pressure.
3	Ideal	Covered but felt with pressure.	Spine covered and rounded.	Ribs are covered but can be felt with pressure.
4	Fat	Only felt with firm pressure. No cavity around tail.	Difficult to feel vertebrae. Flank filled.	Rib cage not visible and difficult to feel.
5	Obese	Impossible to feel and huge fat deposits (hanging skin and fat).	Thick fat cover, impossible to feel bones. Flank full and rounded.	Thick fat cover, not possible to feel ribs.

If, for example, satisfactory performance is obtained when brood sows are in condition 2 or 2.5 at service and 3 at farrowing then they should be fed to maintain these standards.

This booklet provides an overview of the risks to sows involved when sows are kept in groups. There are, of course, other factors to consider when keeping sows in groups, including:

- Worker health and safety
- Reproductive performance
- Economic competitiveness
- Environmental impact
- Food safety risks.

A successful transition to keeping sows in groups will necessitate a careful study and review of all of these factors.

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Research is currently being conducted in North America to investigate further the best methods and housing parameters to keep sows in groups. Producers are encouraged to contact their producer organization, agriculture department staff, veterinarian and university faculty to keep up to date on new findings relative to the keeping of sows in groups.

Further reading:

Pig Welfare Advisory Group:

<http://www.defra.gov.uk/animalh/welfare/publications/booklets/pb3084/pwag2toc.htm>

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