Sows on Straw: Meeting the Challenges

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The search for viable alternatives to the gestation crate for dry sows has lead many producers to consider a return to straw based systems. Although such systems can provide many benefits for the sow and the producer, they are not without risks. Most of these systems incorporate group housing and it was problems associated with group housing that drove the development and adoption of the now conventional stall systems for dry sows. The big challenge, then, is how to incorporate the benefits of both group housing and stall housing into an economically viable operation. This paper will identify some of the welfare and production challenges of housing sows on straw and discusses some ways to overcome the problems. Results from research and experience with hoop structures at the University of Manitoba Glenlea Research Station will be discussed along with examples of other successful straw-based systems.

What's wrong with gestation stalls? Sow stalls do provide many benefits. They are conducive to a large animal to herdsperson ratio. Sows can be rapidly identified by location, individually fed according to need, readily relocated without concern for aggression or fighting associated with mixing strange sows, and easily treated when necessary. However, stall housing is expensive, both in original construction costs and in the requirement for controlling the barn environment. Limit feeding of sows in gestation stalls often leads to agitation and stereotypic behaviors. Long-term confinement of sows in stalls seriously restricts their movements, social interactions and other behaviors important for the sow's welfare and health.

Why consider straw systems for sows? Group housing systems can be successfully managed without using straw or other bedding material. However, there are distinct advantages to strawed systems. The insulative value of straw and the ability to lie in groups enables sows to be housed in lower cost structures without supplemental heat. They allow expression of many normal behaviors important to the sows' well being, including exercise, foraging, social interactions and choice of lying and dunging areas. The ability to move around freely can enhance muscle tone and lower the incidence of leg and hoof problems which can translate into fewer cullings for lameness and shorter farrowing times. Properly managed straw systems may provide health benefits for producer and sow alike, especially in terms of air quality and the overall benefits of exercise and improved welfare for the sow. As well, straw systems are often more acceptable to municipalities than the large slurry based systems because of less nuisance odour and perceived lower environmental impact.

What are the challenges to housing sows on straw? While each housing system has unique characteristics, the most common challenges relate to the group housing of sows. These include the natural aggression and fighting when sows are mixed, difficulties of attending to sows as individuals - be it feeding to condition, separating out for treatment or rebreeding, or removing them to the farrowing unit. Therefore, the overall challenge is to reap the benefits of group housing on straw without compromising welfare, reproductive performance or production efficiency.

Characteristics of Successful Straw Systems for Sows

- **Negative social interactions are minimal.** Pigs in groups naturally establish a social hierarchy. This is accomplished by what is termed competitive dominance social encounters (e.g. fighting) and is maintained largely by avoidance behavior of the less dominant animals. Once established, the hierarchy can be quite stable as long as space and resources are not limited and no new animals are introduced into the group. However, because pregnant sows are usually limit fed, most of the aggression and bullying in group systems is associated with group feeding. Invariably, if left unchecked, the result is bullied thin sows and dominant fat sows. One of the ways around this serious problem is with individual feeding, which will be discussed under a separate section.
- **Sows have sufficient space to clearly establish separate functional areas and can choose their preferred area and environment at most times.** The stable social hierarchy is also dependent on having sufficient space of the appropriate quality so that individual sows can choose how and where to spend their time. This includes a pen/housing layout that is at least 16 feet across so that lower ranking sows can easily reach their destination without encountering a more dominant pen mate. Otherwise, more dominant sows may situate themselves so that other sows cannot access water or the sleeping area without coming too close. The lower ranking sows may then end up isolated from essential resources and suffer accordingly. Space allowance of 25 to 28 square feet per sow is recommended.
- **The stockperson has the ability to treat sows individually and to maintain them in the appropriate body condition.** Most often this entails some type of individual feeding system, but also allows for separation of sick or problem sows.
- **The stockperson likes working with group sows, has good pig husbandry skills and is willing to observe and respond to the sows' behavior.** It is often claimed that one of the big advantages to gestation stalls is that they require less animal management expertise to be successful. Group systems, however, whether or not they incorporate straw, require good stockmanship skills if they are going to be operated successfully. Regular observation of sows and attention to signs of problems or individual animal needs is essential for animal well being and economic viability.

- **Reproductive performance and production efficiency is not compromised.** Obviously, sows on straw must be able to reproduce at least as well as those in conventional crate systems. As well, the cost of operating the straw system must be in line or lower than other systems in order to be viable. Avoid mixing sows at key phases of reproduction. For example, bred sows are introduced into the system immediately after mating or 4 weeks later so as not to disrupt the important period of embryo placement and implantation.
- **Sows and bred gilts are grouped separately and according to requirements for body conditioning and parity.**
- **There must be an economical source of good quality straw.** Particularly for those straw systems which depend upon the straw's insulative properties to help sows deal with cold and inclimate weather, 200 to 350 kg of straw per sow can be used. Straw needs to be good quality and free from molds.
- **Group sizes and facility design allow for mixing or introduction of sows with minimal distress.** Various strategies can be used to lower the level of aggressive encounters. These include: partial partitions in large group settings that provide sows the ability to escape unwanted social encounters; mixing pens and small group introduction into large-group pens; using stalls for the first month of gestation before mixing sows which also improves embryo survival; grouping animals of similar size and parity; and maintaining stable groups once they are established.

Dynamic vs. Static Group Housing

In **dynamic group systems** sows are routinely removed for farrowing and new animals added to the larger resident group following weaning or as replacements. The regrouping that occurs disrupts the stable hierarchy and subjects sows to aggression and social interactions they may wish to avoid. Even though overt aggression and fighting usually subside within 24 to 48 hours of regrouping it does not mean that all sows then consider each other as group mates. Unrest and distress can become chronic for some sows. Particularly low ranking sows are more often displaced while standing and resting, as well as feeding, and are more likely to be threatened or bitten by more dominant sows. Because dominance entails having priority of access to resources, as resources become increasingly limited, the competition and exertion of dominance becomes increasingly intense. Therefore, in group systems, as long as feed/water, space for feeding, standing walking and resting are readily available, then competition for these resources will be minimal. Thus, it is critical in such systems that enough space is available so that submissive/low-ranking sows can avoid an aggressor or escape "strangers". Studies have demonstrated that partial stalls for feeding and/or subdividing the sleeping area with partitions can result in fewer aggressive interactions and improved health and welfare.

With **static group housing** there is no mixing of sows once the group is formed. Such groups are relatively stable. However, it may decrease space utilization since if a sow is removed from a group, another sow cannot be put into its place.

Concepts in Group Housing

Basically, sows can be housed in large or small groups. Within these group systems they can be fed either as a group or as individuals. Following are examples of some straw based group system concepts with some of the advantages and challenges.

Large Group Systems are designed for more than 10 to 12 sows per group. They may operate with 30 to more than 200 sows in a group facility. Large groups with ample and varied space may actually fight less than smaller groups.

A) Individual feeding is often considered the key to truly successful group housing.

i) **ESF (Electronic Sow Feeder)** Earlier generations of ESFs proved problematic. They were associated with aggression and vulva biting while sows lined up impatiently for their turn in the feeding compartment or dominant sows attempted to regain entry after finishing their limited ration allocation. More recent designs have overcome some of these serious problems and have sows emitting away from the entrance to the feeder. Having straw as part of the system provides foraging material for those animals waiting to eat as well as those who may find their allotment somewhat less than satisfying. Each ESF can individually feed 40 to 45 sows. Groups of 200 or more sows can be successfully accommodated with multiple ESFs.

Advantages to the ESF

- Can provide excellent method to individually feed large groups of sows.
- The feeding compartment/stall protects each sow during feeding so she is not bullied and receives her full feed allotment.
- ESFs can be programmed to allot different amounts of ration based on animal's identification.
- The requirement for individual animal identification facilitates accurate monitoring and recording of performance for culling decisions and evaluation of individual and herd efficiency.
- Less labor devoted to feeding sows and time can be spent observing and working with sows as needed.
- Particularly well suited to straw based systems which provide the foraging material that complements the ESF systems.

Cautions with ESFs

- High levels of aggression behind the feeder can still be a problem, even on straw, as sows wait their turn.
- With larger groups, it may be difficult to monitor and check individual animals. May be easier for a sow to have an undetected problem or go unfed.
- Can be expensive, especially if no local supplier or technical support.
- Prompt service for mechanical or computer problems may be difficult to obtain.
- Transponders can get lost and therefore a back-up system for sow identification is required.
- A system is needed for feeding sows when the ESF is not functioning due to feeder problems or power outages.
- A separate training area is required before introducing new animals into the system. It can take several days to more than a week for sows to learn to use the ESF properly.
- Some sows are not trainable and cannot be kept with the ESF system.
- ESFs cannot be used in 'cold' barns where ambient temperatures are near or below freezing.

ii) **ii) Individual Feed Stalls** can offer a cost effective way of providing individual feed allocation and the daily opportunity to closely observe each sow. They are known to be effective in systems for up to 70 sows per group, although they are more often associated with smaller group housing. Feed stalls can offer total or partial protection for the sow during feeding. When feed is allocated in one drop, stalls that totally isolate the sow from aggressors will better meet the sows needs and eliminate the 'fat' and 'thin' sow syndrome.

Advantages to feed stalls

- Give each sow opportunity to eat without bother from aggressors, especially when using 'lock-in' stalls.
- Allows sows to express their normal desire to eat simultaneously with other sows in the group.
- Less expensive than ESF.
- Can feed as individuals and observe that each sow is eating well. This helps to identify sows requiring attention before they go off feed completely.
- Well suited to low cost and 'cold' housing.
- Allows sows to be physically active at times not feeding.
- Can use automated feed drops to feed all sows simultaneously.

Cautions with feed stalls

- System most effective when sows can be locked into the stalls during feeding. Otherwise fast eating dominant sows will either nip at sows still eating or push their way into open stalls.
- True individual feed allocation can only be done by hand feeding since sows will not always use the same feed stall.

- Where sows have free access to feeding stalls, stalls must be narrow enough to discourage sows from lying down and resting in them.
- The space for the stalls becomes dedicated and may be relatively expensive because of the limited use.
- More labor required for feeding than with ESF.

B) Group Feeding. A great deal of the problems associated with group housing of sows can be linked with group feeding. Competition between sows for the limited feed resources during pregnancy can lead to daily aggression and fighting. Dominant or faster eating sows can bully less assertive sows and consume part of their ration. The resulting group profile can include high levels of aggressive and avoidance behavior, inconsistent sow body condition and reproductive performance.
Three key features for successful group feeding are: adequate space for feeding; sufficient feed so that there is less need to fight; and a static social group of sows of similar size and parity.

Advantages to group feeding
- Usually lower cost than individual feeder systems.
- Feeding space need not be dedicated only to feeding.
- Allows sows to eat with the rest of their social group.
- Herdsperson can easily detect any animal not readily coming for feed and take appropriate action.
- Can be effectively combined with short-term use of gestation stalls at the beginning or end of pregnancy.

Cautions with group feeding
- Sows need to be grouped carefully for body condition and size as well as gestation and parity status.
- Sows cannot be fed according to their individual needs, unless an alternative feeding strategy is available.
- An alternative feeding strategy would be needed to deal with any animals becoming too fat or too thin. Likewise, sows tending to be very aggressive towards other group members as well as those overly timid sows may need to be managed separately.
- Some sow breeds are more predisposed to group housing and group feeding. Others may manage well within the housing system but need individual feeding attention in order to thrive.
- A specific or dedicated feeding area with ample space per sow works best for floor feeding. However, this may be costly, depending on the type of structure being used.
- Dropping feed onto space used for other functions such as resting may lead to increased aggression at feeding time.

Large Group Straw Based Systems that Work

Swedish System. For several years Sweden and Switzerland have had some of the most extensive livestock welfare legislation. Housing for pigs must be straw based, with natural light and ventilation. Sows are group housed, including farrowing and lactation, with minimal mixing of groups throughout their productive life. One successful system incorporates breeding and gestation for sows in groups of 70 or more with individual feeding. The physical structure is a conventional insulated naturally ventilated barn. Boar pens are located at one end and feed stalls run the length of the center alley.

There are several farms in Canada and the U.S.A based on the Swedish model. Depending on the farrowing group sizes, the gestation barns are most often operated as controlled dynamic groups. Farrowing groups of 12 sows are removed and weaned sows or replacement animals introduced into the larger group. Strategies for managing dynamic groups, as discussed earlier, are integral to the success of these systems. Individual feeding stalls that can be locked, and are narrow enough to discourage lying down, provide a means for individual sow attention as well as a way to keep animals separate for a brief time.

At least one of the Canadian farms uses ESFs with their system. Although quite successful, there is still the need to have the capability to segregate individuals and to deal promptly with any feeder problems.

Hoop Shelters can readily be set up as lower cost versions of the Swedish system. There are few or no requirements for supplemental heat, mechanical ventilation or lighting. When individual feeding stalls are used, the hoop shelter can provide the welfare benefits of the strawed group system as well as the individual feeding and attention benefits associated with gestation stalls.

Research at the University of Manitoba Glenlea Research Station compared sows in groups of 30 in hoop shelters to those maintained in the conventional gestation barn over 5 parities. Results demonstrated that the housing concept of the shelter with individual feeding can be a successful alternative housing for pregnant sows. Reproductive performance of the sows in the shelter was similar or marginally better than for the conventional housed sows. Others have made similar observations with properly managed grouped sows on straw, particularly where there is no competition for feed resources. The benefits of exercise, straw or foraging material and normal social interactions can translate into better muscle tone, fewer culls for foot and leg problems and shorter farrowing times.

The straw and the ability to lie with group mates enabled the sows to withstand winter temperatures without supplemental heat. However, the feed intake in order to keep the sows in appropriate body condition maybe at least 5 to 10% greater than in controlled confinement barns. Prolonged extreme cold can be a

challenge not easily met by some sows kept in hoop shelters. Over a three week period when temperatures did not exceed -19°C, some of the sows had difficulty maintaining appropriate weight gain and most sows did not seem overly enthusiastic about leaving the strawed resting area for the concrete slab and metal feed stalls.

Following the study, the concept was incorporated into renovation of a barn with group pens for 15 sows each and individual feeding stalls. This had the benefits of the shelter system, but in an insulated barn. Therefore, less straw is required and the animals are able to maintain a comfortable barn temperature without increasing feed intake.

The Rosebank Model refers to a system for upwards of 1000 sows that has found success at several Hutterite Colonies in Manitoba. Buildings are large insulated structures designed to provide separate eating, dunging and strawed resting areas for sows kept in groups of 25 to 50. Unlike the previous two examples these systems employ group feeding on concrete pads dedicated to this function. Weaned sows or replacement animals are placed in fairly uniform groups for breeding and remain in these groups throughout most of gestation. For about the last three weeks sows may be placed in gestation crates where they are individually fed and monitored prior to entering the farrowing crates. Unlike many group feeding systems, the use of a separate and spacious concrete feeding pad seems to provoke very little aggression at feeding time. Sows appear to remain in uniform body condition within the groups throughout pregnancy. The final weeks in gestation stalls allow the sows to become accustomed to the confinement of the crates before farrowing and facilitates providing any individual attention a sow may require. However, as with any group feeding and housing system, it is still difficult to monitor and check individual animals during much of gestation. As well, the potential for high levels of aggression at feeding is still present.

Small to Medium Group Systems

These are designed for groups of 3 to 10 sows. Groups of 3 to 5 animals were convention before gestation stalls and are still common in smaller herds and for replacement gilts. Most often animals are mixed once, stable groups formed and they remain static throughout pregnancy. If an animal must be removed, a new animal cannot be introduced into the group.

As with large group systems, best results are more readily achievable with individual feeding. The techniques for individual feeding incorporate some type of feeding stall since ESFs are impractical for small groups. One feeding system that has received favorable attention is the "trickle" feeders. The feeding stalls extend just beyond the sow's shoulder thereby using less pen space. To overcome the potential problem with fast eaters trying to bully in on their neighbor's ration, the feed is dispensed in a trickle. When the system operates

correctly, the speed of feed delivery is matched to the fastest eating sow. In this way instead of finishing quickly, her feeding time is extended. This gives the slower eating sows the opportunity to complete their meal undisturbed.

In conclusion, there are many other variations on these basic themes for housing groups of sows on straw. In all cases success is based upon careful attention to the pigs' inherent nature and providing the environment in which they can establish thriving social groups, yet meet their individual needs for appropriate nutrient intake and reproduction.