

## Animal Well-Being



# Group Housing Systems: Floor Space Allowance and Group Size

The statements and opinions expressed in this article are those of the author(s).

## Objectives

1. Describe the basis for making a decision on space allowance for grouped sows.
2. Compare already existing recommendations and present guidelines for space allowance.
3. Describe the management benefits of both small and large groups.
4. Outline how different sized groups may be more suitable for different systems of management.

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## Introduction

Whether constructing a new barn, or converting an older one, space allowance and group size decisions are critical to designing a building system suitable for group housing sows. They represent an interaction between the biology of the animal and its expression in the design of the facility. Sufficient space must be allowed for the animals to function well and in sufficient comfort to ensure good productivity and longevity. Group size is particularly important when considering gestating sows as, unlike finishing pigs, the animals will be restricted in the key resource of feed. The social dynamics of the group will be important for how well the sows function. Because there is a variety of feeding and management systems used for group housing sows, space allowance and group size decisions will reflect some of the unique properties of each system.

## Space Allowance

Questions concerning the minimum space requirements for intensively kept pigs in relation to their welfare have been an issue of interest for many decades [1]. For sows in gestation stalls, one need only consider the physical aspects of their space, that is, the space required while in each posture and the space required to change postures. However, in groups, we must also provide space to accommodate normal movement for maintenance behaviors such as feeding, drinking, dunging, and social interactions with others [2]. The physical space allowance is relatively easy to calculate, by using a simple allometric equation, which takes the sows' body mass into consideration (linear measures such as length and width are proportional to the body weight of the animal to the 1/3 power). Allometric equations are often used to describe animal growth functions and

can also be used to estimate space requirements [3]. Animals occupy space in three dimensions, but because the height of the available space is not usually a constraint, only the two dimensional area measurements are usually considered [3]. Thus, allometric equations of the form  $\text{area} = kW^{2/3}$ , where  $k$  = a constant and  $W$  = live-weight, can be used to estimate the space an animal occupies as a consequence of its mass [3]. The assumptions of using such an equation are that all animals are the same shape and that this is consistent over time. This is very general, however, the equation is thought to err on the side of caution. In general, providing additional space will result, to some degree, to improve animal welfare.

Calculating the appropriate requirements for maintenance and social behavior is more difficult, which is why specific recommendations remain scientifically undefined. Part of the reason that identifying social space allowance is so complex is because space potentially interacts with many aspects of the animals' environment. The interaction between space allowance and thermoregulation is particularly important as it affects the animals' abilities to dissipate heat in summer, and retain heat in winter.

The most common outcome that is measured as an indicator in space studies is the occurrence of aggressive interactions. An important factor regarding sow behavior is the maintenance of a social hierarchy, and in order to avoid aggressive interactions sows need to be able to maintain individual personal space – which can be very difficult in a confined environment such as a sow barn. Space for avoidance of potential aggressors or escape from attack is vital for the welfare of low-ranking animals in group housing [2].

### **Basis for Space Allowance**

The basis for recommendations of space allowance generally relies on the outcomes of scientific studies which measure factors such as aggression, competition, physiological responses and productivity. Finding the optimal space allowance for grouped sows is key to maximizing efficiency within a swine operation. Appropriate individual space allowance for sows kept in groups remains scientifically undefined [2]. Early scientific literature concluded that sows should be able to distance themselves at least 4-5 body lengths from one another in systems where new sows are regularly introduced [4]. It has been suggested that the reason for these recommendations is that newly introduced sows may be chased for an average of 65 ft by resident sows in a dynamic system [5]. The current literature provides an array of studies investigating different space allowances (e.g. 10.6 sq ft, 21.2 sq ft, 31.8 sq ft/sow [6]; 22.3 sq ft/sow [7], and 21.2 sq ft, 25.4 sq ft, 38.2 sq ft, 50.9 sq ft/sow [2]). Often, it is difficult to directly compare the studies due to different parity composition, systems, management practices, group size etc. Overall, less space appears to result in more aggression and more injuries within both ESF and individual feeding stall systems, while more space increases exploratory behavior [8]. In general, studies conducted under production conditions imply that spacious accommodation reduces the aggression at regrouping and general health during gestation, but it is difficult to identify the point at which crowding begins. The decision as to how much space to provide lies between two extremes: 1) more space is better for the sows but beyond a certain level, no additional benefits will be accrued, and producers will decrease their efficiency; 2) insufficient space will affect productivity, behavior, and welfare.

Studies have shown an advantage of providing 25 or more sq ft per sow compared to only 15 sq ft [9] in terms of several production parameters. In terms of productivity and injury scores, there was no advantage of providing more than 25 sq ft [10]. However, there have been few studies examining allowances between 15 and 20 sq ft per sow. Using behavior assessment only, there was little difference over the range of 17 to 30 sq ft for sows [11]. Grow-finish pigs exhibit a change in lying posture, indicative of comfort, when floor space allowance exceeds a k value of 0.039 [12]. Applying this value to a 550lb sow would yield a space allowance of approximately 16.6 sq ft.

When calculating space allowance, it is generally considered by the scientific community that more space is better. However, in a commercial setting, it is important to find the breaking point below which sows experience adverse effects. Many other countries have used group housing systems for decades, so perhaps North America can benefit from lessons learned.

### **Recommendations for Loafing Area**

All gestation sows have been group housed in the U.K. and Sweden for over a decade, and the rest of the European Union will be restricting use of stalls from 4 weeks after service until 1 week before the expected time of farrowing from January 2013

[13]. However, a number of EU member countries may go beyond this recommendation, for example the Netherlands are moving to restrict use of stalls from 5 days post insemination until farrowing. The European legislation and existing recommendations from other countries regarding loafing areas (free space areas) in many instances have separate recommendations for gilts and sows, based on the size of the animals.

The European Union directive provides space values of 17 sq ft for gilts and 24 sq ft for sows. When the number of sows or gilts in the group is less than 6 individuals, the minimal space allowance will be increased by 10% [14]. The space per animal can also be reduced by 10 % when the group is bigger than 40 animals [14]. There is little indication that these values were scientifically determined under production conditions, leading some producers to believe that the European values may be excessive. Canada is undertaking a revision of its code of practice for pigs and is considering allowances ranging from 15 to 24 sq ft, depending on animal and group size. Ultimately, space recommendations will always be difficult to establish as requirements encompass many different factors, such as: physical space related to animal size, behavioral space that animals must share, and the need for establishing a social hierarchy.

Our recommendations for minimum space allowances for group housed animals are 15-18 sq ft for gilts, 19-24 sq ft for mature sows, and 18-23 sq ft for mixed (gilts and sows) groups. However, it is important to bear in mind that, where possible, it would be best to provide more space per animal, and certain factors will affect the application of these ranges of values.

### **Variances for Space Allowance**

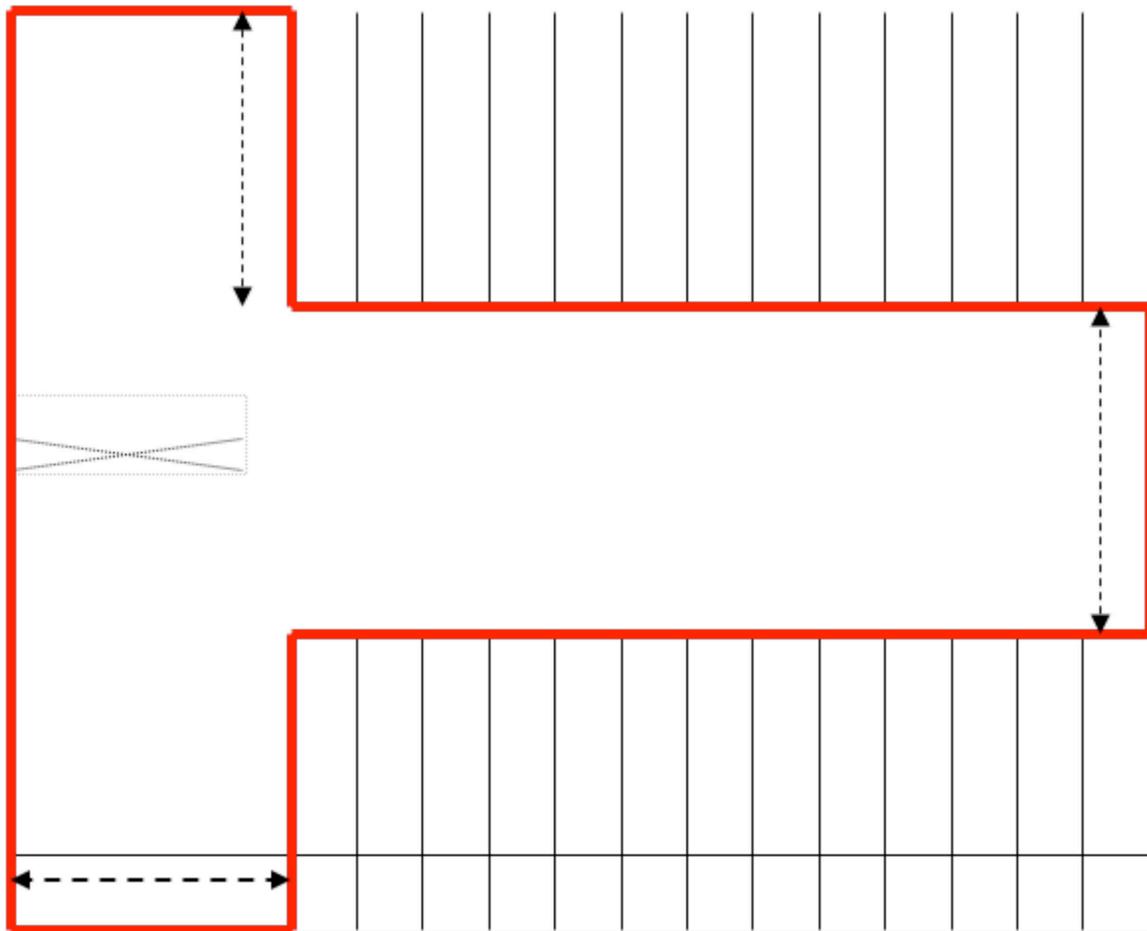
*Group size.* Where space allowance recommendations are applied, there are adjustments that can be made with regard to group size. For example, in groups of < 10, producers should utilize the upper limits of the space allowances, whereas in groups of > 40 the lower limits can be used.

*Mixing pens.* Aggression is usually at its most intense when new groups of sows are formed. Large mixing pens, or more complex pens (increased dividers and hiding areas) may be beneficial during the first 1-2 days after new groups are formed. Once the aggression has reduced and the hierarchy is formed, the group can be moved into a smaller pen. This would be particularly beneficial to younger, smaller sows/gilts.

*Dynamic pens.* Managing dynamic sow groups (small groups added into a larger group at different times) is generally considered to be more difficult than static groups (all sows enter the group on same day). Dynamic groups will initiate another day of aggression each time sows are added, but productivity effects are variable. Because of this recurrent aggression, dynamic pens should be planned using the upper ranges of the space recommendations.

*Housing System.* The configuration of the housing system can affect the amount of space required by sows. For stall and free-access stall systems designs (Figure 1), a minimal distance is recommended between the back of a row of stalls and the stalls or wall opposite them. This allows sows to back out of the stalls or walk past other sows with minimal interference. This minimal 'alley' width is recommended to be at least 10 ft in Denmark, but in France a width of 7 ft is used. For systems using full length

stalls (eg. free access), this can add considerably to the floor space requirement. Similarly, this minimal distance of 7-10 ft is also applied to the 'T' (Figure 1) or 'L' section of certain free access stall systems. In these systems a resting area, often solid floored or bedded, is provided at the end of two banks of feeding stalls. To facilitate movement of sows in this area, it is recommended that its minimal dimension be at least 10 ft.



**Figure 1. A 'T-pen' configuration, showing an alley between two rows of stalls and a solid floor loafing area at the end of the pen. I-pen configurations are identical, but minus the pen wide loafing area at the end of the pen.**

*Pregnancy Loss.* Pregnancy loss between mating and confirmation of pregnancy often runs between five and 15%. For systems that move sows into groups after the pregnancy check, pig flow would allow them to reduce the space needed for the breeding cohort due to the loss of some sows. For systems that mix shortly after mating, they can use smaller pens after the non-pregnant sows are removed. This reduction should not be applied at the beginning of gestation, in anticipation of the loss of sows, as space restriction at this point may aggravate re-grouping aggression. There is always the question of what to do with sows that are moved into gestation groups and are then discovered not to be pregnant. In this case, producers would normally remove the sow, re-breed, and introduce her to the following breeding group.

#### **Quality of Space**

Despite the importance of space allowance, it is not the only consideration when designing the pig space for a group housing system. Both the quantity and quality of space are important. Re-grouping aggression, in both static and dynamic systems, can be reduced by providing areas for escape. Unfamiliar animals are often relegated to separate lying areas for several weeks after entering a group, and this can be accommodated by dividing the resting area into several zones by partitions. As sows prefer to lie against walls, the pen divisions will increase the amount of preferred lying area in a pen.

The quality of space is also improved by providing for increased comfort. Slatted floors should be well maintained and have appro-

priate slat and slot widths. Recommendations from the European Union are for  $\geq 80$ mm for slat width, and  $\leq 20$ mm for gap width [13]. Solid floors are more comfortable than slatted, and comfort can be improved with the provision of rubber mats [15] or bedding. Comfortable floors in the loafing area will result in more sows leaving their feeding and free-access stalls and obtaining the exercise desired in a loose housing system. Concrete slats have been shown to negatively affect leg disorders and the gait of pigs [16]. This results partly from a decreased traction of the foot, displacing the animal's center of gravity and resulting in more forward and backward slips [17]. However, the persistent contact with a hard surface, the abrasive quality and slipperiness of the concrete and the width of the slats all contribute to negatively influence sow hoof and leg health.

Another means of improving the quality of space is to encourage movement by the placement of resources. Providing a water source outside of feeding and free access stalls will encourage more exercise. Similarly, if bedding is not used in the 'T' or 'L' section of a free access system, provision of a straw rack to stimulate exploratory behavior, would entice animals out of their free access stalls on a more frequent basis.

## Group Size

Deciding on a group size is a fundamental consideration in the selection and development of a group sow housing system that is right for your herd. The decision will be influenced the most by the overall herd size and choice of feeding system. A wide range of group sizes can be utilized, and each has its own advantages.

### Advantages of smaller groups

*Ease of individual sow identification and hands-on management.* Smaller group sizes are conducive to ease of 'hands-on' individual sow management in a group setting, which for some stockpersons may be the preferred method of management. With fewer animals per group, visually locating individual sows is facilitated. The smaller pen space and the reduced number of animals to maneuver around make it possible to perform a variety of routine management tasks with relative ease in the group setting, such as performing pregnancy and estrus checks with or without the use of a boar, and treating or removing sows from the group. Providing good gate systems are in place, removing a sow from the group is doable as a one-person task.

*Sub-grouping for nutritional management.* Each sow has its individual nutritional requirement in terms of both the amount and composition of its ideal feed. With the exception of ESF, all of the group housing feeding systems provide the same amount and type of feed to every sow in the pen. Some free-access systems allow supplemental hand feeding to needy sows, but the basic drop is the same for all. If groups are comprised of an entire breeding cohort (all sows bred during one week), they will include sows with very different nutrition needs. Sorting a cohort by nutritional needs is critical for proper nutritional management under such systems, and this creates smaller group sizes.

*Sub-grouping based on competitiveness.* Within a breeding cohort, some animals, particularly gilts and 1st parity sows, are unable to compete with the larger, more dominant sows. In competitive feeding systems such as floor feeding and feeding stalls (non-gated), it is advantageous to form smaller sub-groups based on an animal's ability to compete. This division will be largely based on body size, which is generally reflective of parity. For ESF systems, the ability to compete for access to the feeding station is dependent upon experience with the system. In this case, penning gilts separate from the remainder of the breeding cohort is often advantageous.

The combination of sorting for nutritional needs and competitiveness, will generally result in at least three groups for floor feeding and feeding stalls (non-gated): gilts, thin sows and fat sows. For free access stalls, two groups based on nutritional needs (low and high intake) may suffice. For ESF, two groups based on experience with the feeding system (gilts vs sows) are generally advisable. Again, sorting creates smaller group sizes within the herd.

*Static group management.* Groups may be managed as either static or dynamic social groups. Static groups are formed by placing all sows into the group on the same day, and no sows are ever added to the group for the remainder of their gestation [18]. Dynamic groups will add sows from a subsequent breeding cohort to an existing group, although this results in additional aggression. Static grouping is desirable, and this often results in smaller group sizes than would occur if dynamic grouping is practiced.

Within the context of a 2400-sow herd, breeding approximately 120 animals per week, we would expect group sizes of 40 or less for the more competitive systems. Reducing group size further, to perhaps 20 sows per group (6 groups/week) would further improve nutritional management and competitiveness. The advantage of improved animal handling may require even smaller groups.

### Advantages of larger groups

*Single unit management.* Large groups enable a large number of sows to be managed as one unit, with common vaccination, pregnancy testing and sorting dates. Rather than moving several groups of animals to farrowing, having all sows from a breeding cohort together means that only one group has to be moved. Similarly, record keeping can be based on a single large group rather than several small ones.

*Facilitates the use of technology for optimal management.* Working with sows in larger groups does present more challenging conditions for individual sow observation and treatment. However, operating a large group system provides an opportunity for utilization of technology to manage sows, and to use the technology more efficiently. The Electronic Sow Feeding (ESF) system is ideally suited for the management of large groups of sows. Each sow has an RFID (radio frequency identification) tag in their ear which is read by the ESF feeding station, and gives her access to her daily meal. Sophisticated programs are now available with ESF systems

able to provide a variety of automated real-time sow management options. Information can be provided daily on individual sow feed consumption, time of day and the frequency of movement to the feed station, and stage of gestation per sow. Provided the correct penning is constructed, the ESF system can be programmed to sort sows out of the large groups when required for timely management, such as movement to farrowing accommodation or vaccination. Future developments that will become available include utilizing the ESF to help in group heat detection and identifying returns to estrus quickly. Through positioning a boar pen next to the feed station, the ESF system will mark and sort sows that are showing interest in the boar [19]. ESF systems are a large capital investment. Therefore, operating this system with large groups enables distribution of the capital cost over a large number of sows. Furthermore, operating large groups with ESF can also reduce the overall building capital cost, because sows use a shared feeding space [20], and fewer internal pen divisions are required for large groups.

*More efficient use of space.* As discussed in the above section on space allowance, when sows are kept in groups of 40 sows or greater, there is a reduced quantity of space required per sow. Therefore large group housing of sows has an advantage in helping to maximize the number of sows to be housed within a defined space, a useful consideration when planning conversion of existing facilities to group housing for sows. The large area provided per pen also allows for the development of large functional areas, such as separate lying and dunging areas. These are beneficial for encouraging the formation of social sub-grouping which has been found to take place within large groups [14]. The larger pen space is also

beneficial for providing sufficient escape space during aggressive encounters. With one feeding station for a large number of sows, ESF systems can actually improve space utilization of a pen, enabling a greater number of sows to be housed within a space than if using a feeding system with individual stall feeders [20].

### Group size and feeding system

*Competitive feeding systems.* Floor feeding, feeding stalls (non-gated) and trickle feeding stalls, are three types of competitive feeding systems. A competitive feeding system is defined as when an individual sow can obtain more feed by winning a fight [21]. In these systems the dominant sows, who are also usually the larger and older sows, have an advantage over the often smaller and younger subordinate animals [22]. Dominate sows will obtain a greater quantity of feed through aggressive encounters. Adopting grouping strategies is important to ensure the success of these systems. For competitive systems sub-grouping should be based on both feed requirements and competitiveness. Generally three or more groups will result as illustrated in figure 2.

*Floor feeding.* The daily quantity of feed is spread over the floor for sows to feed. There is no protection provided to the sows during feeding, making this the most competitive of the feeding systems. Sub-grouping based on nutritional needs ensures the correct nutritional management and quantity of feed can be provided to the group in the daily feed drops. Sub-grouping further to create uniform groups by grouping sows by similar size and also parity helps even out the competition within a group, thus helping promote a more even feed intake among sows [20].

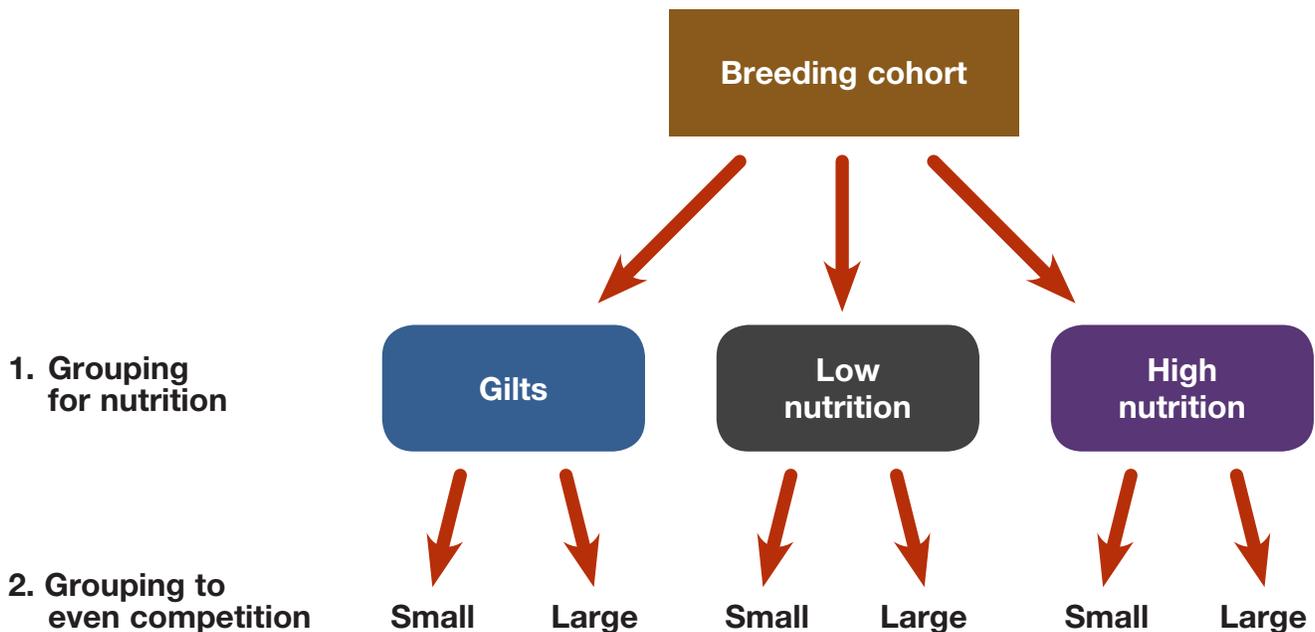


Figure 2. Divisions of sub-grouping for dividing a breeding cohort into groups based on nutritional requirements and competitiveness.

*Feeding stalls (non-gated).* The daily allowance of feed per animal is dropped between dividers, often into a feed trough. The short stalls afford some degree of physical protection to each sow to defend her feeding spot. Different system designs are available and the stalls can vary in length, from short (covering the head and/or shoulders), to long (covering the full body length). A longer stall length awards greater physical protection for the sow, leading to less aggression and more even feed intake [23, 24], although the risk of vulva biting may increase. However, as the stalls are non-gated, there is still the opportunity for dominant individuals to force subordinates out of their stall position and obtain a greater share of feed. As with floor feeding, creating uniform groups of similar size and parity is an effective method for evening out competition within this system. Because all sows in a group receive the same size of feed drop, sub-grouping based on nutritional requirements affords greater control over delivering the correct diet to sows.

*Trickle feeding.* The daily allowance of feed per animal is trickled at a set rate over an extended period of time onto a defined feeding area. Often this is into a feed trough, or a solid portion of the floor. Non-gated stalls divide up feeding spaces and provide some protection per animal, as with short stalls. Additionally, adopting the correct trickle feed rate for the group helps keep individuals within their feeding positions, reducing movement and aggression. The trickle rate at which feed is dispensed should be set to as slow, or slightly slower, than the rate of the slowest eating sow in the group. This ensures if a faster eating sow decides to leave her stall area to displace another, there should be no feed accumulated in the trough for her to obtain. This removes the advantage of displacing another sow, which helps to discourage this behavior. Because of the additional measures of control the divisions and trickle rate provide, social sub-grouping according to competitiveness may not be required. As with the other two systems, sub-grouping animals based on nutritional requirements is necessary. Trickle feeding must be well managed to reduce displacements, and grouping animals based on eating speed can be a more important consideration for success. Gilts in particular should be penned separately from sows as they often have a slower eating speed [25].

Overall, it is difficult to create such uniform groups with large group sizes, and thus smaller grouping is really needed to manage the competitive feeding systems. To help produce groups of even body condition, housing sows in breeding stalls for up to 35 days prior to moving to groups should be utilized as it provides the opportunity to even sows out in body size.

### **Non-competitive feeding systems**

The two non-competitive feeding systems are free-access stalls and ESF. With non-competitive feeding systems sows do not have to compete for food and are provided individual protection while they eat.

*Free-access stalls.* With free-access stalls sows are protected within an individual stall for feeding but have the ability to leave the stall when desired to access a common loafing area. The stalls are gated

and therefore other sows cannot displace a sow from her stall. As individual feed protection is provided, larger group sizes can be used with confidence that sows will be able to consume their full daily feed. Because this system operates a single feed drop per stall, sub-grouping sows within a breeding cohort should be based on their nutritional requirements. The feed drop may be set to the minimum requirement of feed for the group, and individual sows requiring extra can be locked in and hand fed additional feed.

Social grouping of sows in free-access stalls may also be desirable to encourage greater utilization of the common loafing area. It has been observed that primarily the older, larger, more dominant sows use the loafing area, and some small sows never leave the stalls during gestation [26]. Social pressure and the desire of subordinates to avoid dominant sows is one likely cause for individuals failing to use the free space. Grouping sows by size and parity can help remove the social pressure and encourage sows to utilize this free space. Smaller sows and gilts may also find it more difficult to open the stall gates, reducing their frequency of exiting stalls. Therefore, grouping by size facilitates the ability for producers to keep a closer eye on particular pen groups of smaller animals that may have difficulty opening the gates.

*Electronic sow feeders.* As explained previously, the ESF system in particular should be operated with large group sizes to utilize the capacity of the stations to feed sows individually. ESF systems are the only system to offer true individual feed control for group-housed sows. Sows are fed individually within a protective feeding station and the system can be programmed to deliver a feed meeting the precise requirements of that sow, such as different diet blends for those differing in nutritional status, and differences in the quantity of feed dispensed. The flexibility of the ESF system means sub-grouping based on nutritional needs and body condition is not necessary and therefore large herds can often maintain large static groups in an ESF system.

Most ESF systems on the market can comfortably be stocked at 60 sows per feeding station. To achieve group sizes larger than what one ESF station can accommodate, additional stations can be added to the group as required. For smaller herd sizes, managing large dynamic groups will enable the capacity of the ESF to be utilized. In addition, the programming of the ESF helps in the management of dynamic groups allowing various nutritional needs of individuals within the group to be met, along with sorting sows for routine management when required. The number of sows that can be successfully accommodated by a feeding station depends on the speed of animal throughput. This is largely influenced by the operating mechanism of the exit gates, speed of feed consumption by the sow, and the extent of sows recycling through the feeder. Feeder designs with exit gates manually operated by sows can result in a slower throughput than electronically operated gates that will open and encourage sows to leave upon completion of feeding [20]. Many ESF designs now operate with electronically retractable feed bowls to further encourage sows that have eaten to leave the station. Addition of an anti-lying bar running inside the length of the feed

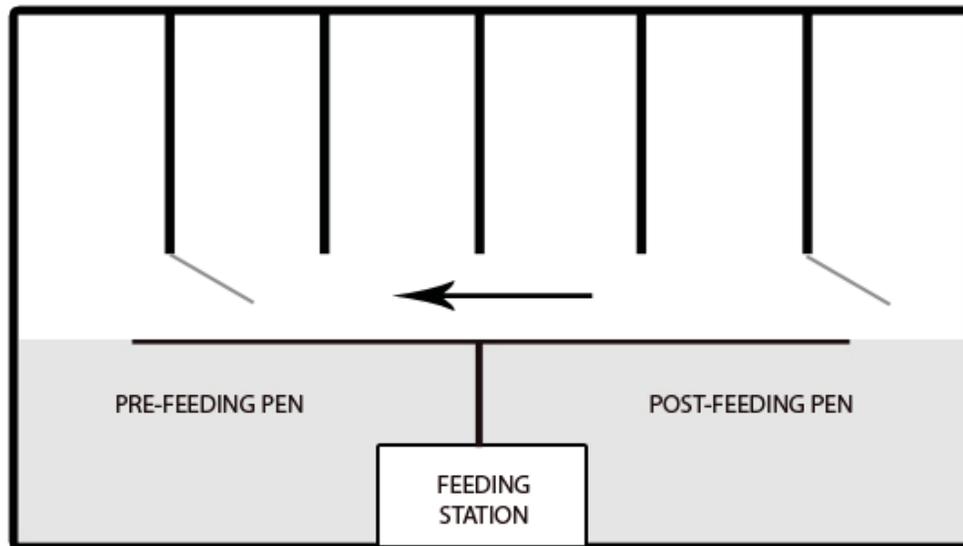
station is recommended to discourage sows from sleeping in the feed station [20].

While ESF systems provide individual protection during feeding, the ESF feeds sequentially and competition will ensue as a feeding order is formed [27]. Therefore it is of great importance to ensure the system is not overstocked. Overstocking increases competition at the feeder entry, increasing aggression, heightening sow stress and the potential for injury and lameness. The older, more dominant sows gain access to the feeding station earlier in the daily cycle and the younger and subordinates later in the day [7, 18]. As a result, it is the subordinate sows that will suffer the greatest due to overstocking an ESF station as they may miss getting their feed before the daily cycle resets. Gilts in particular can suffer in this system if they are not properly trained to use the system or are experiencing social pressure from larger sows. Therefore it is recommended to group gilts together for ESF systems. If larger sows do need to be kept in groups with gilts for space utilization, maintaining a higher ratio of gilts to sows, for example 80% gilts, 20% sows, can help avoid problems from social pressure.

*ESF: Maximizing throughput and controlling for recycling through the station.* The throughput for an ESF station can be maximized by encouraging sows to speed up their eating rate. The addition of water to feed is one technique that can significantly speed up the eating rate of sows [28]. Setting the feed drop rate to that of the fastest eating sow will help increase the throughput of the faster eating sows (sows eating quickly and leaving the station immediately), while the slower eating sows have the option to remain in the feeding station for their maximum time allowance to consume all feed if required. Observations at commercial barns using ESF systems determined that when allotted eight minutes feeding time, no sows successfully managed to consume their daily ration in one visit. Recycling through the station and injuries from tail and vulva biting

were significantly greater than when sows were allotted 15 minutes to consume their daily ration [29]. Therefore pushing for increased capacity can become counterproductive beyond a certain point. Taking time to observe sow behavior at the feeder (bouts of aggression, number of animals queuing throughout the day, number and severity of vulva lesions) is a useful observation in conjunction with computed data from the ESF on feeder entry to evaluate good running of the system.

Some degree of recycling through the feed station will occur in most ESF systems, and an average of three times per day has been observed with smaller group sizes [30]. It may be characteristic of a few sows to consume their daily ration over multiple feeds per day. However, sows who repeatedly enter the feeding station after having consumed their daily ration, in the hope of obtaining more feed, become a nuisance. Queuing to reenter can prevent other sows from entering the ESF to the extent that some sows within the group may miss daily feeds. Recycling through the station reduces the ability of the feeding station to cater for all sows; therefore the ESF system design should control for recycling. The single pass system is one design that is available to control recycling (Figure 3). Having entered the feeding station, sows exit into a separate yard area which sows must navigate round to enter the main pen to enter back into the feeding station. This design creates distinct areas and discourages sows from automatically trying to re-enter the feeder. Addition of water in the exit yard area provides a further incentive for sows to remain there for an extended period of time. Additional designs to help control for recycling include I.D. controlled entrance gates, preventing sows reentering the ESF that have already consumed all their daily feed. Automatically controlled feed troughs that swing out, or open for sows only if they are due their daily feed can discourage recycling as sows troughs will remain closed for sows that have already consumed their feed.



**Figure 3. The single-pass system to minimize recycling in an ESF feeding system.**

## Summary

When considering group housing, there are a number of considerations which will affect space requirements and group size. In general, more space will be favorable for the sows, but must be tempered with cost efficiencies. Nevertheless, greater space is generally preferred for sows after regrouping, for small groups, and in various stall feeding systems. The degree to which a breeding cohort is sub-divided is based on the feeding system. In all systems other than ESF, cohorts must be divided based on nutritional requirements. In the more competitive systems, they should also be divided based on body size and experience within group systems.

**Disclaimer:** Reference to commercial products or trade names is made with the understanding that no discrimination is intended of those not mentioned and no endorsement by the authors or National Pork Board is implied for those mentioned.

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