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Re-Grouping and Timing of Re-Grouping

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One of the greatest objections to group housing of sows is the fear of aggression among the animals. The vast majority of aggression in groups of sows occurs either at the time of re-grouping, or during the daily feeding. Re-grouping aggression may be intense, but is generally short-lived and contributes to acute stress. Feeding aggression is repeated daily and can be considered a chronic source of tension and stress within the group. The issue of feeding aggression has previously been addressed in our discussion of feeding systems. In this article we will examine re-grouping aggression and its impact on management and productivity.

Why do sows fight when re-grouped?

Our reluctance to keep sows in groups seems somewhat misplaced as in the wild pigs live quite harmoniously in groups of numerous sows and their litters (Gonyou, 2001). The difference between commercial production and living in the wild is that sows in the wild rarely, if ever, incorporate new sows into their group. If any sow attempts to join a group, she will be attacked by the resident sows and forced to leave. That is really what happens when we mix sows in commercial conditions: the resident sows attempt to drive away the intruders (Fig. 1). Difficulties arise because the new animals cannot leave (Mendl and Held, 2001). Although we often attribute the aggression of newly mixed pigs to the need to establish their dominance order, that is likely a secondary aspect of the aggression. Subordinate animals cannot just submit and accept a low position in the dominance hierarchy; they must also find a way to be tolerated within the group.

The key to remaining in the group is to stay on the periphery. Moore et al., (1993) and Kraus and Hoy (2011) studied the lying position of sows after new animals were added to an established group. The new animals slept together, apart from the resident animals for several weeks after being introduced. Gradually they were able to integrate into the main group. Once established, the stability of a group of sows is maintained more by avoidance than by aggression (Jensen, 1982). Maintaining separate sleeping areas contributes to this avoidance.

Within a well managed group housing operation, many animals within a group will be familiar with each other from their previous gestation period. Sows are able to remember previous pen-mates even after several weeks of separation during farrowing and nursing (Arey, 1999). Consequently, when sows are grouped for a subsequent gestation period, the group consists of previously acquainted sows (an established group) and a number of new animals. The new animals will generally be gilts or 1st parity animals recently added to the breeding herd. Thus, the challenge often associated with younger animals, being the least able to dominate, is confounded by the fact that they are also new. Younger animals (Strawford et al., 2008) and newly introduced animals (Moore et al., 1993) end up sleeping in the least preferred areas of the pen.



Figure 1. Sows fighting at mixing (Photograph courtesy of Dr Emma Baxter)

How much do sows fight, and how severe are the injuries?

Re-grouping aggression is described as intense but short-lived. Fighting is greatest during the first three to four hours after mixing, and decreases to very low levels by 3-4 days after re-grouping. Reports differ in how aggression is has been defined, but the average number of fights during the initial three hours is generally less than three per animal (Moore et al., 1993, Strawford et al., 2008, Kraus and Hoy, 2011). Extrapolating the data of Kraus and Hoy (2011) we estimate that new sows added to a pre-existing group of familiar

animals will fight less than 30 times during the first four days. The length of fights have been found to range from eight to 420 seconds but average at around 70 seconds (Arey, 1999). In the first three hours after mixing, the average time spent fighting by sows was reported to be 68 seconds by Strawford et al., (2008). A very similar value was reported by Moore et al., (1993) for new sows in a group, but new gilts were much lower, fought for a shorter duration. In general, new sows are involved in more aggression (Kraus and Hoy, 2011), and older animals fight more than younger ones (Moore et al., 1993).

Fighting is sometimes assessed by the degree of injuries received over a period of time. Hodgkiss et al., (1998) reported that only 0.16% of injuries received (when studying sows in an ESF system) were considered severe, and of the severe injuries, half were to the vulva. The vast majority of injuries due to aggression are in the form of surface scratches to the skin, generally on the neck and shoulder. However, the incidence of scratches is greater for younger, smaller animals (Hodgkiss et al., 1998) even though they are involved in less fighting than older sows (Strawford et al., 2008).

It needs to be recognized that most reports on aggression and injuries report average values for either the entire group of animals, or particular sub-groups (such as gilts or newly introduced animals). The extremes in terms of number of fights, time spent fighting and severity of injuries may not be reported. Nevertheless, it can be said that the majority of sows in a group are involved in few fights and for a short period of time after regrouping.

Reducing aggression at re-grouping

We want to approach this challenge from a behavioural perspective, and will categorize methods to reduce re-grouping aggression according to the behaviour of the animals. The first approach is to reduce aggression by increasing familiarity among the sows. Whenever sows are grouped following breeding, you will have some sows that were housed together during their previous gestation, and those that were not. Gilts will almost always be unfamiliar with the older sows in a breeding cohort. In a study at the Prairie Swine Centre we formed groups entirely of familiar animals or groups that included a number of unfamiliar sows (not housed together previously). The familiar sows did fight, but the fights were very short and produced few injuries. Fighting decreased rapidly over the first few days together. We observed the same pattern among sows that were grouped at weaning and then stalled for breeding. When placed into gestation groups they appeared to re-familiarize themselves with each other quickly and then aggression stopped (Rioja-Lang et al. 2011). Pre-



Figure 2. Mild, average, and severe injuries from post-grouping

mixing unfamiliar sows in a specially dedicated mixing pen can see levels of aggression reduced after 1-2 days together. These mixing pens tend to be larger in size, and more complex (contain dividers) thereby allowing individuals to retreat. Durrell et al., (2002) pre-mixed unfamiliar animals that were added to an already familiar group, and found that there was less aggression in the post-breeding mixing. However, because most of the aggression is directed towards the unfamiliar animals, it appears that adding just a few new animals to a group is detrimental (O'Connell., 2004). The conclusion is that if unfamiliar animals are part of a group, they should make up more than 10% of that group.

The second approach to reducing aggression at re-grouping is to control the amount and layout of the space and allow animals a means to escape from an attacking sow. We found that providing escape stalls within the pen greatly reduced the injuries due to fighting. Free access feeding stalls will provide such an escape. An intermediate means of providing separate space for new sows is to divide the pen into sub-sections so that unfamiliar sows will claim one of them as their own (Sequin et al., 2006). Unfamiliar sows in a large group tend to form a new group of their own for lying. However, these sub-sections must be large enough to allow several

The time course of implantation

After breeding, we wait to confirm that a sow is pregnant by the absence of a return to estrus at 21 days, or a positive ultrasound test at about 28 days after breeding. We are quick to attribute any loss of pregnancy during this time to stress, such as regrouping of the animals. Einarsson et al (1996) suggested that several types of stress could affect pregnancy during this time, such as food deprivation and poor thermal conditions, as well as social regrouping. To understand what is happening during this period of time he reviewed the process of implantation.

Embryos enter the uterus 2-3 days after breeding and must then migrate throughout the uterine horns to evenly distribute themselves. This migration continues up to approximately day 12 post-breeding, and then follows the process of attachment or implantation which occurs from about day 13 to day 18 after breeding.

In an effort to determine when pregnancy was most susceptible to stress, he injected a number of sows with ACTH (a hormone produced in response to stress) for 5 day periods at different times up to 20 days after breeding. Although he did not detect a significant effect on embryo survival, the lowest level was observed for animals injected between days 11-15 after breeding. Several other papers have suggested that this might be the period of greatest susceptibility to pregnancy loss.



sows to lie together. Small subsections may become a form of trap as animals flee from a fight. Finally, providing more space is a means of allowing animals to avoid an unfamiliar animal, flee from a fight, or rest on the periphery of the group. The shape of the pen may help in allowing sows to avoid one another, and flee from a fight. Rectangular pen shapes appear to be more use than square pens and in allowing sows to avoid one another, pen shape could play a more important role than space allowance (Barnett et al., 1993).



Figure 3. Occurrence of injuries by late gestation

A third approach to reducing aggression is to attempt to create a stable social structure. Small groups (less than 8-10 sows) will form stable, linear hierarchies but mid-sized groups are less stable. However, pigs in large groups (over 40-60) develop a different social strategy in which they tolerate other animals rather than having to try to dominate them (Turner et al., 2001; Samarakone et al., 2009). Replacement gilts previously housed in large groups may be better prepared for group housing as sows. An alternative means of preparing gilts for life in groups is to frequently re-group them during development. Such animals are less likely to be aggressive once they join a sow group (Bolhuis et al., 2004; van Putten and Buré, 1997). Generally groups made up of a range of body weights will form a more stable social hierarchy, but the subordinate animals may be at too great a disadvantage in a competitive feeding system. However, several studies have examined using one or more clearly dominant animals in a group to try to suppress aggression. Our attempt to do so with large, higher parity sows in a group of younger animals did not reduce aggression. Reports on the use of a boar to suppress aggression in a group of sows have produced mixed results (Luescher et al., Sequin et al., 2006).

Several miscellaneous methods have been used to reduce aggression when re-grouping. Barnett et al (1994) reported that it was best to group animals late in the day just before the lights are turned off. Feeding the animals a double portion of their diet just before mixing can also be effective. Finally, Hemsworth et al (2006) and Strawford et al (2008) reported that sows that are several weeks pregnant fight less when regrouped than those that have recently been bred.

When to Re-group

Considerable variation exists in the time at which sows are regrouped both in legislation and commercial practice. The range includes forming groups immediately after weaning until after pregnancy is confirmed by ultrasound (typically 35 days post-breeding). Physiological studies, in which stress is applied at different times during this period have generally failed to generate a significant difference in loss of embryos, although the period from 10-15 days post-breeding seems the most sensitive period (Einarsson et al., 1996). This period coincides with the time when embryos are migrating within the uterine horns prior to implantation.

In a survey of commercial farms it was reported that excellent productivity could be obtained regardless of the time of re-grouping on well managed operations (Spoolder et al., 2009). However, of the farms with poorer productivity, the largest proportion re-grouped their animals between 7 and 21 days post-breeding. Again, this coincides with the period of embryo migration. Some producers have found that if you re-group prior to implantation, it is critical to do so within 2-3 days of breeding (ten Beek, 2011). Our experience with an ESF



Pigs in the wild

When one considers that sows in the wild live almost entirely in social groups, it seems a bit odd that there is so much concern over keeping sows in groups in commercial production. There are three types of social groups among wild pigs. Boars are solitary and only join a group of sows during the breeding season. A second group consists of a peri-parturient sow and her litter. It lasts from a few days before farrowing until about ten days after the birth of the piglets. This group remains in or in close proximity to the farrowing nest, but rejoins the main group as the piglets become mobile. The primary social group is called a sounder, and consists of several sows and their adolescent offspring. The sows are likely to be closely related, probably sisters, and have lived together their entire lives with the exception of the period when they separate to give birth. Herein lays the difference between wild and commercial conditions. Wild sows never come together to form a new social group. They remain with their litter mates, or other females from their mother's sounder, for their entire lives. The only time that they 'join' a new group is when their mother rejoins her sounder when they are 10 days of age, and aggression is virtually non-existent. In fact, mixing pigs at 10 days of age results in very little aggression in commercial production as well.

The key point is not that sows in the wild live in groups, but rather that they never form new groups. In commercial production we form new groups nearly every reproductive cycle. Many species live in social groups of closely related individuals, and most of these will try to exclude any unrelated newcomers to the group. Stookey and Gonyou (1998) demonstrated that it is not lack of relatedness that results in aggression among newly mixed pigs, but lack of previous familiarity. One method to reduce the aggression that occurs when forming groups of sows is to recombine animals that were together during their last gestation. Unfortunately, complete familiarity within a group is impractical to achieve as we must bring in new gilts and incorporate sows that have changed breeding groups due to failed breedings. Complete integration of a group of unfamiliar animals into a familiar group often takes several weeks, although aggression usually subsides within a couple of days (Moore et al, 1993).

system at the Elstow research facility was that regrouping at 7-9 days post-breeding resulted in a 5% reduction in farrowing rate compared to waiting until 35 days (Gonyou et al., 2006). Lastly, another alternative is to wean sows directly into group housing. Despite the concerns of mixing sows at weaning, this area has not been investigated extensively and there may be benefits which are generally overlooked.

Einarsson et al. (1996) examined three sources of stress that could be key to the question of how to manage re-grouping during the critical time period. Heat stress will affect farrowing rate regardless of the system, but re-grouping in hot weather probably adds to the problem. Re-grouping in the cool of the day, or the use of cooling devices, should help to alleviate the problem. Aggression is often considered the reason for the loss in productivity, but again, research has failed to demonstrate this clearly. Nonetheless, managing to reduce regrouping aggression, as outlined above, should be practiced for animal welfare as well as potential production effects. The final stressor considered for reduction in embryo survival and farrowing rate is reduced feed intake. Several days of very limited intake can affect embryo survival. In competitive systems, such as floor feeding and short stalls, subordinate animals may be subject to reduce intake during the critical period of implantation. Similarly, in a heavily stocked ESF system, subordinate animals and those less familiar with the system may go several days with below optimum intake. Only the free access stall is likely to guarantee adequate nutrition for all. Therefore, re-grouping sows prior to implantation may be more detrimental in competitive and ESF systems than in free access stalls.

In summary, the critical period for loss of pregnancy appears to be 7-21 days after breeding. Re-grouping at that time may affect productivity if management is poor or average. Systems that manage heat stress, re-grouping aggression and feed intake well will probably still achieve acceptable productivity.



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