Effect of Grouping Sows by Parity in ESF Housing on Welfare and Productivity

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While group housing can provide benefits to the sow related to increased fitness and freedom of movement, sows can also experience increased aggression and limited access to feed if the groups are improperly managed. ESF systems have the benefit of controlling individual feed portions and sows generally have low aggression due to limited feed competition; however, young or subordinate sows may experience competition for access to the feeder throughout gestation. Low-ranking sows in ESF systems receive more aggression and injuries, reduced production, gain access to the ESF later in the daily feeding cycle, and are displaced from feeding more often. In static groups, high-ranking sows eat earlier in the feeding cycle and for longer. The use of ESF systems is becoming more common in North America, therefore information on how to manage low-ranking sows in these systems is needed, and will benefit sow welfare and productivity.

The study objectives were to:

1) Determine if younger sows (parity 1 or 2) will receive less aggression and injury during gestation when managed in uniform parity groups than in mixed groups, and what impact this has on production.
2) Determine the effect of mixed and uniform parity grouping treatments on sow feeding behavior, measures of welfare and productivity.

By examining different grouping strategies, this study explores a range of management practises that can be used in ESF systems.

Methodology

Uniform low, medium and high parity groups were formed during gestation, and compared to control groups of mixed parity. Groups consisted of 60 sows each, with one ESF feeder per group. Low parity treatment groups were comprised of parity 2 sows, medium groups included parities 3-4, and high parity included sows over parity 5. The control group consisted of parities 2-8. Sows were mixed at 5 weeks gestation. They were placed in a mixing pen for 1 week, and then moved to gestation pens until farrowing. The ESF system (Nedap Velos, NL) recorded daily feeding behaviours and feed amounts throughout gestation. Body condition scores, sow weights, skin lesion and gait scores were taken periodically throughout gestation. As well, sow backfat thickness was measured on a sub-sample of 20% of sows, equally distributed across parity and treatment. Standard production measures at farrowing were collected, as were piglet weights from a sub-sample (27%) of litters. Sows with lameness score ≥2 were removed from the study and placed in relief pens and provided care based on the farm's procedures. All sow removals due to lameness or other health considerations were recorded. For the data collection to timeline see Figure 1.

Results and Discussion

Feeding behaviour

The average daily meal length per sow ranged from 15 to 20 minutes. No significant difference was found in feeding duration among the treatments, however the uniform low parity group initially took longer to eat (20 min). After

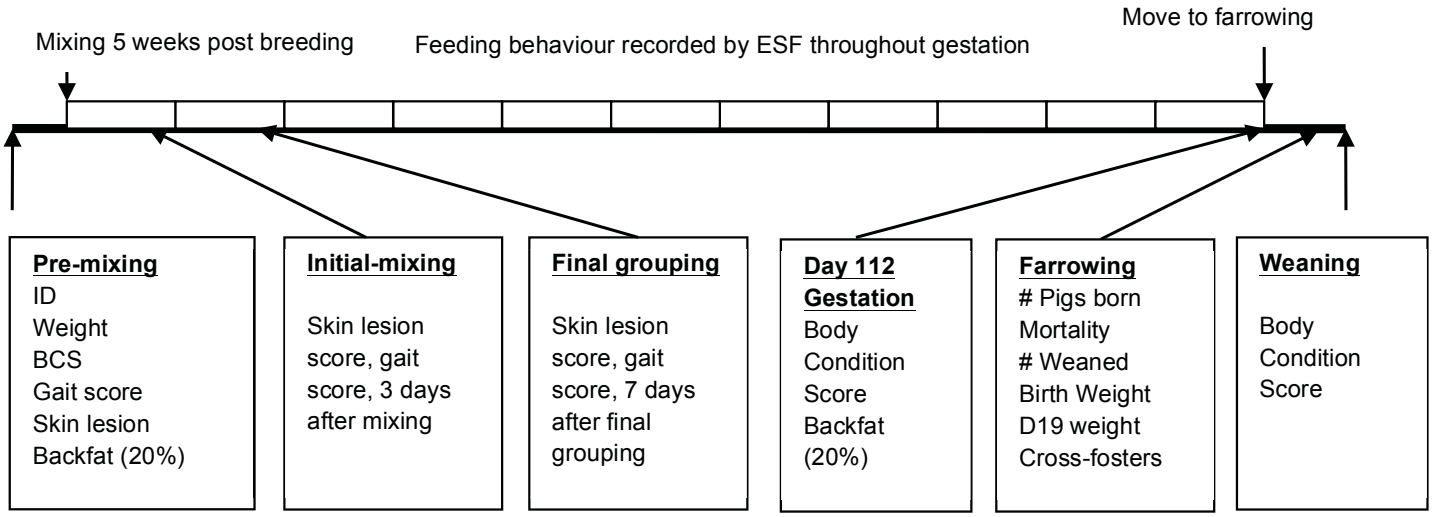

Figure 1. Timeline of experimental procedures used for data collection.

Table 1. Changes in sow backfat (mm) between 5 and 15 weeks gestation, showing interactions among treatments within parity score, (n = 262).

Parity Score*									
1		2				3			P- value
Treatment		Treatment				Treatment			
Mixed	Low	Mixed	Low	Medium	High	Mixed	Medium	High	
-4.12a	0.22bc	-0.45bc	0.99c	0.87c	0.50bc	0.17bc	1.99bc	-0.64b	<0.05

**Within a parity score, where superscripts differ, P<0.05*

two weeks in ESF, feeding times for the low parity group had reduced to 17 minutes. The longer initial feeding times for young sows may reflect their lack of familiarity with the system, or greater time spent exploring the feeder.

Correlations between feeding time and sow weight and parity showed that sows with higher bodyweight (r = 0.13, P<0.01) and parity (r = 0.07, P<0.01) fed later in the daily feeding cycle. Previous studies found the opposite, with younger sows eating significantly later in the daily feeding cycle than old or intermediate sows. The reasons behind this difference are unclear, and further analysis is planned.

Backfat was used as a performance indicator in this study. It was found that sows with a greater backfat thickness entered the ESF earlier in the feeding cycle (r_s=-0.14, P<0.05) and had a longer feeding duration (r_s=0.15, P<0.05). These results indicate that the more successful sows eat earlier in the feeding cycle, and have a longer feeding duration.

Effects of grouping on sow production

Among the treatments, there were no significant differences in the total number of piglets born alive or mummified piglets. Differences were found in the number of stillborn piglets, pre-weaning mortality up to 5 days of age and the number of piglets weaned (P<0.05). Uniform high parity sows had fewer total piglets born, higher piglet mortality and fewer piglets weaned. This is likely due to differences in productivity due to sow age, rather than a result of the treatment. Ongoing analysis will examine differences in the number of sows removed per treatment over the course of gestation due to low BCS, injury and lameness.

Backfat

There were significant interactions between treatment and parity score on changes in backfat recorded between 5 and 15 weeks gestation (Table 1). Young sows (parity 2) lost 4.12 mm of backfat on average when in mixed groups, while in the uniform treatment these sows had an average gain of 0.22 mm. Although parity 3 and 4 sows did not fare significantly better in uniform groups, these sows did show positive gains in backfat instead of loss when in uniform groups. High parity sows were the only ones to gain back fat in the mixed group, which indicates that high parity sows may be dominating access to the ESF system, reducing the ability of younger parity sows to feed at regular intervals, or at preferred times of day in mixed groups.

> "Well-being of younger sows may be better in uniform groups, and that competition may be less in uniform groups"

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Effects of group type (mixed vs uniform) on sow welfare

Sow lameness

Sows in the mixed parity group had a significantly greater increase in lameness between the pre-mixing assessment and day 3 after mixing (P<0.01), and also during the period from premixing to seven days after final grouping (P<0.05), compared to the uniform treatment groups. This indicates there was a greater risk of lameness following mixing when sows were housed in mixed parity groups, and that housing sows in uniform groups helped to reduce the severity of lameness that developed as a result of mixing.

Lesion scores

In all groups, lesion scores increased from premixing to five days post-mixing, and then decreased. This indicates there was little ongoing aggression or injury due to competition for ESF entry once the group hierarchy was established. Lesion score data suggests that injuries from aggression were largely related to sow age, with younger sows receiving more injuries. Sows in the uniform low parity group had the highest injury scores. Medium and mixed parity groups had intermediate lesion scores, and groups of uniform high parity sows had the lowest level of injuries at day 5 following mixing (P<0.001).

The Bottom Line

Housing sows in uniform groups helped to reduce the severity of lameness developing as a result of mixing. The increases in backfat over gestation also suggest that the well-being of younger sows may be better in uniform groups, and competition may be less in uniform groups. The practice of managing gilts separately is already a common practice, and the results indicate that parity 1 and 2 sows may also benefit from this practice. While productivity of sows in uniform groups was equivalent to that of mixed groups, the study followed sows through one gestation, *there may be longer term effects on sow longevity*. Additional research would be needed to confirm this. The higher injury scores found in low parity sows appear to be related to the social ability of younger pigs, rather than grouping, and thus management practices that improve sociability of gilts (e.g. increased socialisation by repeated mixing before breeding) may be a further area of research to be examined.

Results suggest that housing sows in uniform groups in ESF systems may be a positive strategy for the management of group housed sows. The large herd (≥ 6,000 sows) sizes found in North America make it possible to consider grouping sows by parity in these systems.