Effects of gestation sow grouping practices on aggression and production

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In many parts of North America, the swine industry is working on the transition of gestation sow housing from individual stalls to open groups. When designing a group housing system, there are different management choices regarding group dynamics and time of mixing. Producers must decide whether to implement static (one-mixing event) or dynamic groups (multiple mixing events) and whether to mix sows soon after breeding (pre-implantation) or later in gestation (post-implantation).

One main concern with any type of group housing is the aggression performed when mixing unfamiliar sows into a group, as they compete to form a social hierarchy. Ongoing aggression is another related concern. Depending on management (i.e. grouping dynamics, feeding system, space allowance, etc.), varying levels of ongoing aggression may be experienced throughout gestation. In both cases, the aggression causes stress and has the possibility to impact sow productivity. It is therefore important to understand how different grouping practices influence sow aggression, and how to manage these systems to optimize productivity and wellbeing.

Study Design and Housing

The study was conducted at the Prairie Swine Centre (Saskatoon, SK), with financial support from Swine Innovation Porc (SIP) and Agriculture and Agrifood Canada. Three grouping treatments were compared in gestation: Control (Con): sows housed in stalls for 35 days after breeding, then moved to static groups; Static (Sta): sows mixed into static groups 1-8 days after breeding; and Dynamic (Dyn): sows mixed into dynamic groups 1-8 days after breeding with monthly mixing events (8-10 sows removed and replaced). Sows were housed in mixed parity groups, including gilts, with 25 sows per pen.

Free access stalls were used for the morning feeding after which all sows were removed from stalls and locked out in the common loafing area for the rest of the day. The loafing areas contained two nipple drinkers, two point-source enrichments and provided a space allowance of 2.08 m2/sow.

Mixing Aggression

To observe the behaviour of sows at mixing, video cameras were set to record the event, with frequency of aggression recorded in the first 30 min using scan sampling. In addition, skin lesions on the front, middle and hind regions were scored (using a scale of 0-3; where 0 indicates no lesions and 3, more than 10 lesions) before mixing and 24 hrs after mixing.

Within the first half hour of mixing, sows in the Sta groups spent more time in reciprocal, or mutual, fights than Con or Dyn sows. This suggests a greater intensity of fighting in the Sta sows compared to other treatments. However, Con sows, which were mixed later in gestation, had a more lesions in mid and hind regions and in total, in the 24 hrs following mixing. Overall, the highest number of lesions was found on the front region, reflecting reciprocal fighting, and the lowest number in the hind region.

Ongoing Aggression

Skin lesions were evaluated at three additional timepoints throughout gestation. Lesion scores later in gestation were greater in Dyn groups (Fig. 1), and Dyn sows had higher lesions overall than both Con and Sta, indicating higher levels of ongoing aggression in Dyn groups.

Lameness was also recorded during gestation (i.e. visible signs of lameness apparent in at least one leg) at the same evaluation timepoints as skin lesions. We found that Dyn sows had a higher incidence of lameness throughout gestation than Con or Sta sows (38%, 24% and 22% respectively).

Production

Body weight, backfat thickness, and body condition were measured for each sow at the beginning and end of gestation. The difference between the initial and final measurements showed no effects of grouping practices on sow body condition.

Farrowing rates, calculated as the number of sows that farrowed divided by the number of sows bred, for Con, Dyn and Sta treatments were 81%, 88% and 62%, respectively. The higher levels of aggression seen in the first half hour post-mixing may explain the reduced farrowing rate in Sta sows, but other management factors may also have contributed (e.g. seasonal effects). Because of the small herd size, sow enrollment took place over 14 months and treatments were not fully balanced for season.

In terms of litter quality, numerically, Dyn sows had fewer total born, live born, and still born piglets compared to Con and Sta sows, but it was not statistically significant. There was also an interesting correlation; sows with more lesions in the hind body region late in gestation had fewer still born piglets.

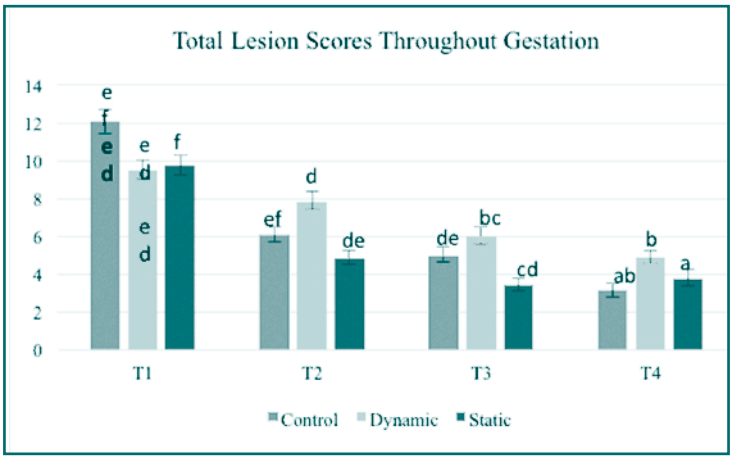

Figure 1. Total lesion scores by grouping treatment throughout gestation. Fresh lesions were scored at four different timepoints. T1: 24 hours post-mixing, T2: ~day 63 of gestation, T3: ~day 91 of gestation, T4: at movement to farrowing. Bars having different letters across timepoints (T1, T2, T3, T4) denotes a statistically significant difference (p<0.05).

> "Dynamic mixing may serve as a viable alternative to group housing for pork producers"

Impact of Social Status

The social ranking of sows was determined in two feed competition tests during gestation. Dominant sows in the Con and Sta treatments had significantly lower lameness than subordinate sows in the same groups (Table 1). Looking across all social rankings, sows in the Dynamic groups had high incidences of lameness.

Subordinate sows in the Dyn and Sta groups tended to have lower farrowing rates than intermediate and dominant sows, while farrowing rates in the Con group were similar across all social ranks. These results suggest that a more stable group is established by mixing late in gestation with effects of social pressure more evident in groups mixed early in gestation.

Overall Conclusions

Static sows had a higher frequency of reciprocal aggression within the first 30 minutes of mixing while Control sows had higher lesions 24 hours post-mixing. Throughout gestation, Dynamic sows received more skin lesions and had a higher incidence of lameness. Thus, the initial mixing aggression was less intense in Dynamic groups but showed evidence of ongoing, or chronic, aggression. Although this did not affect farrowing rate, it suggests that the welfare of sows housed in dynamic groups may be compromised and may result in higher culling rates. Thus, dynamic mixing may serve as a viable alternative to group housing for pork producers provided that management strategies are refined to mitigate the effects of ongoing aggression.

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Table 1. Percent (%) of sows observed with lameness and farrowing rate by grouping treatment* and social status. All P-values are chi-squared.**

Item	Control			P.	Dynamic			P.	Static			P.
	Sub	Int	Dom	Value	Sub	Int	Dom	Value	Sub	Int	Dom	Value
n	33	32	9		39	21	13		29	34	9	
Lameness (%)	45.45	21.88	0.00	0.013	43.59	38.10	23.08	0.420	41.38	11.76	0.00	0.004
Farrowing rate (%)	81.82	81.25	77.78	0.963	87.18	100.00	100.00	0.096	48.28	61.76	88.89	0.090

*Grouping treatments were Control: 25 sows mixed at ~35 days after breeding into static groups, Dynamic: 25 sows mixed 1-8 d after breeding into dynamic groups, Static: 25 sows mixed 1-8 d after breeding into static groups.
**Social status determined for sows in each group as Dom: dominant, Int: intermediate, or Sub: subordinate based on two feed competition tests.