

Title: Protecting low ranking sows in group-housing systems – NPB 11-044

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Abstract

Two studies were conducted to evaluate strategies to protect low ranking sows in group-housing systems. In the first study, the strategy of using feeding stalls to protect low ranking sows was examined at the University of Minnesota's Research and Outreach Center. One hundred and fifty sows (Landrace x Yorkshire, parity 1 to 9) that were housed in pens (15 sows/pen, 2.2 m²/sow) with individual feeding stalls were used. Sows were mixed in pens at weaning. The control pen allowed sows to access feeding stalls only for feeding during the initial 48 h of mixing, and the treatment pen allowed sows to access feeding stalls continuously. From the third day of mixing through the remainder of the gestation period, all sows had continuous access to feeding stalls. In the second study, the effect of group size on the well-being and performance of low ranking sows was evaluated on a commercial 5,000-sow farm. One hundred fifty pregnant sows (Camborough, PIC USA, parity 1 to 6) were allocated to 4 large pens (26 sows/pen) and 8 small pens (6 sows/pen) at 35 d post-mating. Both large and small pens provided the same floor space allowance (1.5 m² per sow) and sows were fed on the solid portion of partially slatted floors. In both studies, aggressive interactions among sows after mixing were recorded, and a rank index was calculated for each sow based on outcomes of aggression. Sows were categorized as high, middle and low ranking sows according to their rank indices. Data were analyzed using the Mixed and Glimmix model of SAS.

Characteristics of low ranking sows: Low ranking sows were younger (parity 1.5 vs. 3.9, SE = 0.23; $P < 0.001$) with lower body weight (221 vs. 241 kg, SE = 5.0; $P < 0.001$), fought less frequently (40 vs. 60 fights/sow/6h, SE = 3.8; $P < 0.001$), lost more fights (76 vs. 19%, SE = 4.4; $P < 0.001$) at mixing, and more fearful ($P = 0.01$) than high ranking sows. In the group housing system with floor feeding, low ranking sows sustained more skin lesions before farrowing ($P = 0.01$), and gained less weight (33 vs. 50 kg, SE = 5.6; $P < 0.001$) during gestation, resulting in lower body weight (251 vs. 268 kg, SE = 6.0; $P = 0.01$) and poor condition (2.9 vs. 3.0 SE = 0.05; $P = 0.08$) before farrowing than high ranking sows. Body conditions and back fat thickness at mixing, cortisol concentrations, and heart rates were not associated with social rank of sows.

Effects of group size on the well-being and performance of low ranking sows: Within the group housing system with floor feeding, sows in small groups had lower skin lesion scores after mixing (11.8 vs. 14.6, SE = 1.0; $P < 0.001$) and before farrowing (5.6 vs. 8.3, SE = 0.63; $P = 0.01$), and had higher farrowing rates (97.9 vs. 87.4%, Chi-square = 4.2; $P = 0.40$) than sows in large pens, indicating that small groups were better than large groups for the well-being and performance of sows.

Using feeding stalls to protect low ranking sows: Low ranking sows used the feeding stalls more

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frequently (27.2% vs. 6.9% of observation time, SE = 4.75; $P < 0.001$) than high ranking sows during the initial 4 h after mixing when fighting was intense, suggesting that low ranking sows used feeding stalls as hiding places to avoid attacks from unfamiliar sows. Continuous stall access reduced fighting frequency (37.9 vs. 49.9 fights/sow/6h, SE = 3.1; $P < 0.001$) in the pen, and consequently, reduced skin lesions (10.5 vs. 12.6, SE = 0.68; $P = 0.01$) of low ranking sows. *Well-being and performance of offspring*: No significant difference (all $P > 0.23$) was observed in birth weight (1.6 vs. 1.5 kg, SE = 0.04), weaning weight (9.3 vs. 8.8 kg, SE = 0.39), and number of piglets weaned (9.0 vs. 8.4, SE = 0.46) between piglets that were born to low ranking sows and high ranking sows. Piglets born to low ranking sows fought frequently as (1.7 vs. 2.1 fights/pig/2h, SE = 0.38) and won more fights (23.1 vs. 18.6%, SE = 2.27; $P = 0.01$) than piglets born to high ranking sows when mixed with other litters. These results suggest that maternal social rank did not affect the growth performance and behavior of offspring during lactation. In conclusion, the well-being of low ranking sows was comprised in the group-housing with floor feeding, as indicated by less weight gain during gestation, lower body weight and more skin lesions at farrowing compared with high ranking sows. Small group size appears better than large group size for sow well-being and performance because sows in small groups had fewer skin lesions and higher farrowing rate. In the group-housing system with individual feeding stalls, low ranking sows used feeding stalls as hiding places to escape from fighting during the initial mixing period, which reduced skin lesions of low ranking sows. Behavioral characteristics of low ranking sows did not reflect on their offspring, and maternal social rank did not affect the growth performance of piglets during lactation.