

ANIMAL WELFARE

Title: Evaluation of the effect of group size and structure on welfare of gestating sows in pens with electronic sow feeders (ESFs) – **NPB #03-098**

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Date Received: January 18, 2005

Abstract: The welfare of 400 pregnant sows (Yorkshire X Landrace crossbreds, 146 – 294 kg body weight and parities of 0-7) housed in dynamic, two-time mixing and static groups of different sizes in pens with ESF was evaluated in terms of salivary cortisol concentrations, injuries and behavior along with their production performance and longevity to study the effect of group size and structure on sow welfare. The economic implications of changing group sizes and structure were also studied. The study was conducted at SROC, Waseca, of the University of Minnesota. A fortnightly weaning system was followed in the unit and it consisted of 20-30 animals per weaning batch allotted to pens with ESF. Four weaning batches were introduced at bi-weekly intervals to a large pen with two ESFs and 6 water bowls formed by combining 2 adjacent pens to form the dynamic grouping treatment. The two-time mixing treatment was formed by adding 2 weaning batches at bi-weekly interval and 2 such pens were maintained. Static group of single weaning batch was accommodated in one half of a pen and 4 such batches were maintained. Behavior data using video camera and time-lapse VCR, and saliva samples were collected from 15 randomly identified focal sows from each batch newly added batch. Injury levels of all sows were assessed. Saliva collection and injury level assessment were performed the day before, day after and 2 weeks after introduction. Behavior data were collected on the day, day after and 2 weeks after introduction. The body weight and backfat thickness of all sows were assessed on the day of weaning and at 109 days of gestation. Video tapes were analyzed for agonistic non-agonistic, postural and stereotypic behaviors using the software “Observer” and saliva samples were analyzed for cortisol concentration using RIA. Productivity parameters and longevity were assessed based on the PigChamp records of the unit. The initial investment, loss if any due the modification and extra labor requirement in the grouping treatments calculated. Labor requirement was calculated using the time allotted for routine operations in each grouping treatment during the study period. The data were analyzed using descriptive statistics, repeated measures of ANOVA, spearman rank correlations, ANOVA and 2-sample proportion tests.

These research results were submitted in fulfillment of checkoff funded research projects. This report is published directly as submitted by the project's principal investigator. This report has not been peer reviewed

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The salivary cortisol concentrations of sows housed in the three grouping treatments were similar. The dynamic group had the highest ($P < 0.05$) TIS. The cortisol concentration and TIS were higher ($P < 0.05$) at day after mixing compared with those at 2 weeks after mixing. The TIS was significantly ($P < 0.05$) different among the treatments at 2 weeks after mixing with the dynamic group treatment having higher ($P < 0.05$) score than the static. The number of queuing was higher ($P < 0.05$) in the two-time mixing group. The proportion of time spent lying and standing were lower ($P < 0.01$) in the dynamic group compared to the other two treatments. The average number of non-agonistic social interaction was lower ($P < 0.05$) in the dynamic group and the proportion of time spent walking was less ($P < 0.01$) in the dynamic group. Grouping treatment had no effect on number of total aggressions and proportion of time spent on queuing, stereotypies, sitting and non-social physical interactions / exploration. The proportion of time spent queuing was lesser ($P < 0.01$) at mixing day compared to that 2 weeks later among the grouping treatments. The proportion of time spent walking was less ($P < 0.001$) on the day following mixing. The proportions of time spent on stereotypies and standing were the highest ($P < 0.001$) at 2 weeks post-mixing. The numbers of total aggression, queuing and non-agonistic social interactions and proportion of time spent on non-social physical interactions, sitting and lying were similar at different time points of observation. The proportions of time spent lying was higher ($P < 0.05$) in the static group on the day following mixing compared to the dynamic group. The proportion of time spent walking was less ($P < 0.05$) in the dynamic group on the day of mixing and two weeks later. The grouping treatments at different time points of observations were similar in proportions of time spent standing, sitting, stereotypic behavior, non-social physical interactions and queuing. The numbers of total aggression, queuing and non-agonistic social interactions did not vary with the time point of observation among the grouping treatments. Cortisol concentration and TIS were positively correlated ($P < 0.05$) in dynamic and two-time mixing groups. Total aggression was positively correlated ($P < 0.05$) with number of queuing in the all the systems. The total aggression was positively correlated ($P < 0.05$) with queue duration in all the treatments. The farrowing performance and longevity of sows in the grouping treatments were similar. The time required for routine management was higher in the dynamic group and there was little difference in cost of penning or space used among the treatments. The higher TIS and lower number of non-agonistic social interactions observed in this study indicated that the welfare of sows in the dynamic group was compromised compared to the other grouping treatments. Aggression at mixing and competition for feeder entry appeared to be the major threats to the welfare of sows in group systems with ESF, regardless of the difference in group size and structure. Pen and feeder designs require modifications to reduce aggression at mixing and hunger in order to improve the welfare of sows in pens with ESF.