

## ANIMAL WELFARE

**Title:** Effect of Timing of grouping of sows during early gestation on welfare and performance of sows and group pens with electronic sow feeders – **NPB #08-154** REVISED

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### Introduction

The primary source for social stress in group-housed sows is the interaction with other sows. Different factors such as group size, space allowance, social hierarchy and resource-availability may influence the interaction between sows in a group that causes social stress. In many breeding herds, sows are grouped following breeding. Mixing/regrouping of unfamiliar pigs is often followed by aggression to establish social hierarchy (de Groot et al., 2001). Social stress has been reported to adversely affect immunocompetence, growth and reproductive performance (von Borell, 1994). The aggressive interactions consequent mixing of unfamiliar sows lead to severe injuries and may adversely affect sow longevity (Anil., et al., 2005).

Ekkel et al., (1995) showed that health, welfare, and production performance of pigs were improved when pigs were housed without regrouping. It has been suggested that the adverse effects of stress on reproduction are pronounced during estrus cycle and in early pregnancy, especially during implantation (Moberg, 1985). The stress during implantation stage (12 to 24 d after breeding) and early embryonic development is suggested to lower conception rate and litter size in group housed sows (Safranski, 2003). Cortisol is considered as the mediator of the effect of stress on reproduction (Turner et al., 2002). There are also indications that corticotrophin releasing factor and arginine vasopressin may suppress the secretion of lutenizing hormone by central mechanisms in the brain without the involvement of cortisol (Tilbrook et al., 2002). Arey and Edwards (1998) reported a lower litter size for sows mixed at weaning compared to sows grouped 4 wk post-weaning (11.8 vs. 12.4).

Anil et al., (2003) reported no difference in terms of farrowing rate among the sows bred and maintained in stalls for 28 d and then transferred to pens with electronic sow feeder (ESF) for the rest of gestation compared to sows bred and reared in pens with ESF. Olsson and Svendsen (1997) reported lower farrowing rates in sows regrouped every third week during pregnancy than sows not regrouped. Similarly, te Brake and Bressers (1990) reported that sows mixed at 17 days (approx. 10 days after first service) had a higher return rate and lower litter size than those moved after 10 days or 31 days (4 vs. 11 vs. 3% and 10.8 vs. 10.5 vs. 11.4 for days 10, 17 and 31 respectively).

However, a recent review of experimental studies (Turner et al., 2005) proposed that reproduction in female pigs is resistant to the effects of acute or repeated acute stress or acute or repeated acute elevation of cortisol. Turner et al., (2002) suggest that stress needs to be severe and prolonged to affect reproduction. This has been supported by Kongsted (2006) who found no

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convincing relationship between reproductive performance and indicators of social stress and fear in sows. However, the author has cautioned that the finding does not exclude such a possibility altogether and that the lack of relationship could be due to the inefficiency of the applied indicators to express variation in levels of social stress.

It is likely that the negative effects of regrouping on reproduction are dependent on the presence of concurrent stressors (Soede et al., 2006). Tsuma et al., (1996) reported no effect on embryo survival in sows mixed at 11 d of pregnancy compared to unmixed sows. Van Wettere et al., (2008) reported that mixing gilts in small group of 6 animals during pre-implantation period (first 10 d of gestation) does not affect embryo development or survival up to 26 d of gestation. However, this study did not measure compromise in welfare in terms of behavioral and physiological indicators or the effect of grouping during implantation period. Soede et al., (2007) demonstrated no detrimental effects on reproductive performance in stall-housed gilts when exposed to acute stressors such as mixing for half an hour, avoiding visual/physical contact in stalls, nose slinging for 5 min and unpredictable feeding events during days 3, 4, 9, 10 and 14 of gestation. Soede et al., (2006) reported that weekly regrouping of gilts in groups of 4 for 6 weeks, starting 15 d before insemination did not impair reproductive performance in terms of pregnancy rate, ovulation rate and embryo survival compared to stable groups. Cassar et al., (2008) reported no significant effect on farrowing rate or subsequent litter size when 15 sows in different stages of gestation (2, 7, 14, 21 and 28 d) were grouped together. However, this study also did not quantify the behavioral and physiological indicators of stress at the time of grouping.

Mixing/grouping is unavoidable to make efficient use of the available resources in commercial herds. Further, the shift in swine housing systems in the US from stalls to group pens also warrants detailed exploration of this issue to provide valid recommendations to the producers on the timing of grouping to minimize the adverse effect of stress on performance of sows.

Although previous studies have addressed the effect of stress on performance of sows it is not clear whether it is the timing, duration, intensity or type of stress that is crucial in determining the embryo survivability. The cause of any possible effect on sow reproductive performance may be mediated through aggression and consequent stress. Nevertheless, many previous studies have failed to explore the link between a compromise in welfare in terms of physiological and behavioral indicators and reproductive performance. Further, most of the previous studies have focused on small groups of sows which unrepresentative of the current industry methods. Similarly, the effect of stages of gestation at mixing on reproductive performance, although explored in many studies, is yet to be clarified with certainty. Therefore, it is important to understand the extent of compromise in welfare due to mixing/grouping during early gestation (peri-implantation period) that affects the process of implantation and subsequent reproductive performance of the sows.