Influence of gestation housing system on sow health and the transfer of maternal immunity to the neonate

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Although the conventional housing on slatted floor remains predominant in European pig farms, a variety of alternative housing systems exists for gestating sows. The consequences of these different environments on health of the mothers and on the immunity they transfer to their progeny remain poorly known. This study aimed at determining the influence of two contrasted housing systems during gestation on welfare and health traits of gestating sows, as well as on the cellular and humoral immunity transferred to the neonate through mammary secretions.

Gestating sows were raised in groups of 24 individuals in a conventional system on slat (C, n=18) or in larger pens enriched with straw bedding (E, n=19). Approximately 10 days before farrowing (gestation day (DG) 105), sows from both systems were transferred to farrowing units with similar conventional crates. Lameness of sows was assessed during the transfer. Saliva was collected for cortisol assay on the morning of DG 35 and 105. Blood was collected on DG 105 for leukocyte count, haptoglobin, oxidative stress, immunoglobulin (Ig) G and A measurements. Mammary secretions were collected at farrowing (1-2 h after the birth of the first piglet) and 4 days later (L4, milk collection after 1 ml oxytocin administration) for cell numeration, and IgG and IgA content analysis. On L4, two piglets per litter were blood sampled for IgG measurement.

Salivary cortisol concentration was lower in E than C sows at both DG35 and 105 ($P < 0.001$). At DG105, E sows had lower blood granulocyte counts (-17%, $P < 0.001$) and hydroperoxyde concentration (-19%, $P < 0.01$). The biological antioxidant potential, haptoglobin, IgG and IgA concentrations did not differ ($P > 0.10$) between the two groups of sows. At the transfer to farrowing stalls, lameness was significantly more prevalent in C than E sows (18 vs 2%, $P < 0.001$). The absolute numbers of total cells, and among them of immune CD45+ cells, per ml of mammary secretion were similar in E and C sows in colostrum but greater in E than C sows at L4 (+125%, $P < 0.05$). Concentrations of IgG in colostrum, IgA in milk at L4, and IgG in piglet blood at L4 were similar in C and E animals.

To conclude, cortisol, lameness frequency, granulocyte counts and oxidative stress markers indicated that health and welfare of sows were greater in the E system. These differences during gestation did not affect the transfer of cellular and humoral immunity to the piglets via colostrum, but might have affected the transfer of cellular immune components in the milk afterwards. Research has received funding from the EU FP7 Prohealth project (no. 613574).