

Does the early life environment and piglets health effect hair cortisol, dehydroepiandrosterone (DHEA) and the cortisol:DHEA ratio?

Résumé :

Different management practices may impact the development of chronic stress in swine and can negatively impact productivity and welfare. To date, no reliable measures exist to inform on chronic stress. Higher concentrations of cortisol, lower concentrations of dehydroepiandrosterone (DHEA), and a higher cortisol:DHEA ratio in hair have been suggested as biomarkers of chronic stress. Piglets undergo rapid neurodevelopment in the four weeks and (to a lesser extent) from four to twelve weeks of life with experiences during this period having lifelong effects on stress responses. The goal of this study was to determine if different early life management practices influenced hair cortisol, DHEA, and the cortisol:DHEA ratio. At birth piglets (n=40 litters over 4 batches) were either raised in standard environments (1 metal chain in 4.32m² farrowing pens) or received burlap and rope to shape oral behaviours, extra space (6m² farrowing pens) to promote social development, and positive human contact to reduce fear of humans. At weaning piglets (n=236 piglets) were either kept in the same treatment (with 9 pigs/pen for extra space (0.39m²/pig) vs 12 pigs/pen for standard spacing (0.29m²/pig)) or were switched to the opposite treatment group. At 12 weeks of age all pigs were raised in standard conditions until slaughter. Hair (n=192 pigs) was shaved two weeks post-weaning (reflecting the farrowing period) and 14 weeks of age (reflecting post-weaning to 12 weeks of age) and the concentrations of hair cortisol, DHEA, and the cortisol:DHEA ratio were measured. Health and productivity measures were taken throughout life. Individual stress responses were assessed using restraints tests at 1, 8, 14 and 20 weeks of age to determine individual stress responses. Early life treatments did not influence hair hormone concentrations or average daily gain. Piglets with lameness pre-weaning had a higher cortisol:DHEA ratio in hair representing the pre-weaning period (healthy: 1.04 ± 0.12 , lame: 1.77 ± 0.23 , $p=0.004$). It is possible that the cortisol:DHEA ratio may be a valuable biomarker of lameness induced stress in piglets. The lack of treatment effects suggest that hair hormones are not sensitive enough to inform on housing differences, or that the treatments did not differ enough to alter stress physiology. Further investigation comparing hair hormones and individual stress variability will assist in determining the value of hair hormones to measure welfare.