

# Artificially reared piglets exhibit gut dysfunction at maternal separation and at transition from milk replacer to weaner diet.

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Artificial rearing (AR), i.e. maternal separation of piglets at an early age (d3) and feeding a milk replacer until 3 weeks of age, is being practiced to handle supernumerary piglets. Fragmentary data are available how gut function matures pre-and post-weaning in AR piglets, hence this study was designed to deliver a more comprehensive insight, including a comparison between LBW and normal birth weight (NBW) piglets. Here, the histo-morphology and mucosal fluxes for FITC-dextran 4kDa (FD4) and horseradish peroxidase (HRP) were determined in the jejunum of LBW and NNB piglets. Per birth weight category, 6 piglets were sampled at d5, d8, d20 (weaning), d22, d25, d32 and d48 of age in AR piglets. These were compared with age-matched controls that remained with the sow until weaning (CON), which were sampled at d1, d3, d8, d20 (weaning), d22, d25, d32 and d48 of age. Data were separately analysed per day by a general linear model with rearing system and birth weight category as fixed factors, together with their interaction. Additional *t*-tests were done to evaluate specific hypotheses. Following maternal separation at d3 in AR piglets, villus length was significantly reduced at d8 (versus CON). Irrespective of rearing system, villus length was reduced at d22 and d25 compared to d20 (day of weaning). Yet, villi of AR piglets were also significantly smaller at d22 (versus CON). Villus width was significantly increased at d20 and d22, and crypts were deeper at d8, d20, and d22 in AR piglets (versus CON). Weaning also resulted in an increased FD4 flux at d22 compared to d20 (day of weaning). Nevertheless, the FD4 and HRP fluxes were significantly higher at d20, d22, d25, and d32 in AR animals (versus CON). Crypt depth, FD4 fluxes and HRP fluxes were higher, and villus length was reduced on d5 in AR piglets compared to CON piglets at d3. Conclusively, AR induced villus atrophy and a decreased barrier function both at maternal separation and at weaning. Most remarkably, AR piglets were characterized by long-lasting barrier malfunction in the post-weaning phase.