HEALTHYPIGUT Report Summary

Project ID: QLK5-CT-2000-00522
Funded under: FP5-LIFE QUALITY
Country: United Kingdom

Effect of early weaning on immune development

The effect of early weaning at 21 days and immune challenge on immune development and function was studied. Lactating sows (large white x landrace) were selected from a commercial pig farm and at 19 days of age there piglets were randomly allocated into two groups. Group 1 remained on the sow throughout the remainder of the study, whilst those in group 2 were weaned and transferred to the Langford weaner pig facility at 21 days of age. Piglets (n=6 per group) from each group were killed at 19, 21, 23, 27 and 33 days of age. Tissue samples were collected from the small intestine, spleen and mesenteric lymph node for cell isolation and immunohistology. Cell and tissue samples were analysed.

In the present study showed that weaning at 21 days of age resulted in little or no changes in the proportion of T cell populations in the small intestinal lamina propria. Polyclonal T cell activation of isolated lamina propria did result in significantly reduced live CD4+CD8+ DP lymphocytes compared with un-weaned controls at 2 days post-weaning (23 days of age)

It is surprising that in the present study weaning (introduction of new dietary antigens, potential increased exposure to pathogens) had little effect on the small intestinal lamina propria cell populations as measured by T cell phenotype, ability to produce IL-2 & IL-4 following polyclonal activation and activation induced cell death. This contrasts with our earlier studies in which we have reported that weaning is associated with a transient reduction in the ability of intraepithelial lymphocytes to respond to mitogens, and splenic T cells to secrete IL-2.

We have also shown that weaning triggers an accumulation of CD2+ cells into the intestinal lamina propria and this led us to postulate that this may be due to the re-localisation of systemic T cells to the gut (for review see Stokes et al 2001). At that time we reasoned that this might lead to the local secretion of Th1 type cytokines and that this could provide a mechanism for the observed changes in gut morphology normally observed at weaning.

No changes in gut morphology (crypt, villus height etc) were observed in the present study. To date we have been unable to provide an explanation for these profound differences in response to weaning. The results provided in the presenting study highlighting immunological differences between pigs reared on "closed" organic farms and those under more conventional conditions highlight the sensitivity of the mucosal immune system to a variety of factors such as disease (eg Porcine circovirus 2), environment and genotype. Further studies are required to unravel these critical effects.

Related information

Result In Brief
Antibiotic-free pig farming

Reported by