RESEARCH ABSTRACT

SWINE HEALTH

**Title:** Environmental Factors that Induce the Expression of Receptors for F18+ Enterotoxigenic *Escherichia coli* - **NPB #03-090**

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**Abstract:** Some pigs are susceptible to F18+ the enterotoxigenic *Escherichia coli* (ETEC) that produce F18 fimbriae by genetic heritage, while others are inherently resistant to that organism. Those that inherit the gene for susceptibility become at risk to disease at weaning. The factor or factors that render these pigs at risk at weaning are only partly understood, but appear to involve expression of the F18 receptor to which the fimbriae attach in colonizing the piglet intestines. In the current study, we sought to identify the environmental cues responsible for expression or activation of the F18 receptor. We reasoned that these environmental cues might be furnished by bacteria of the intestinal flora or constituents of the weanling diet, or both. Either the change to the weanling diet results in a change in the types of bacteria that inhabit the pig's intestines and these bacteria affect disease susceptibility, or the high starch content of the weanling diet has a physiological effect on the pig intestines that results in increased susceptibility to infection and diarrhea. For this study, pigs were reared germ-free from birth for three weeks then given sterile weanling pig feed, a defined population of intestinal bacteria reflective of the intestinal flora, or both. One week later, pigs were challenge-inoculated with F18+ ETEC. None of the pigs developed diarrhea. However, when we measured the number of the pathogenic bacteria in the intestines of pigs receiving either the intestinal bacteria or the sterile weanling pig diet, we observed a significant increase. Further, when we measured the ability of F18+ *E. coli* to adhere to the brush border surface of intestinal epithelial cells from pigs given either a bacterial flora or the weanling diet, we observed an increased ability for the pathogenic bacteria to adhere. The observations of this study suggest that changes in diet and microbial flora at the time of weaning both contribute to susceptibility of pigs to enterotoxigenic *E. coli*. These and subsequent studies may lead to recommendations for the alteration of the weanling diet to reduce susceptibility to colibacillosis without compromising pig performance.