RESEARCH ABSTRACT

PORK SAFETY

Title: Characterizing the Origin and Transfer of Antibiotic Resistance in Swine Herds
NPB #00-050

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Date Received: 9/5/2001

Abstract:
Sows and pigs were used to characterize the origin, transfer and persistence of bacterial resistance in swine. Effects of previous sow exposure to antibiotics and subsequent use of antibiotics in their pigs on resistance of *Salmonella enterica* Typhimurium, *Enterococcus faecalis*, and *E. coli* were determined. Eight pregnant sows were divided into two groups, with four sows receiving oxytetracycline via the feed and 4 sows receiving no antibiotics. Fecal samples were obtained from the sows prior to antibiotic exposure, and at 1-week intervals until the pigs were weaned. Pigs were weaned at 21 days of age and challenged intranasally with a *Salmonella* Typhimurium isolate containing a nalidixic acid resistance marker. Pigs from each sow treatment group were then divided equally between a subtherapeutic antibiotic treatment regimen or exclusion of antibiotics. Pigs on the antibiotic treatment received apramycin at 150 g/ton of feed, beginning 7 days postweaning and lasting for 14 days, followed by oxytetracycline at 50 g/ton throughout the grow/finish period. At 81 days of age, each treatment group was further divided into high sanitation or low sanitation regimens. Fecal samples were obtained from the pigs while on the sows and at 2, 7, 14, 30, 60, 114 and 115 days postweaning. The *Salmonella* challenge organism, *E.coli* and *E. faecalis* were recovered from fecal samples and tested against both apramycin and oxytetracycline to determine the effects on resistance patterns, using a minimum inhibitory concentration (MIC) analysis. PCR and electroporation techniques were used to characterize genetic resistance elements and determine if resistance genes were located on bacterial chromosomes or plasmids. Treatments affected antibiotic resistance to a greater extent in *E.coli*, compared to *Salmonella* Typhimurium and *Enterococcus faecalis.* The greatest resistance to apramycin occurred in *E. coli* isolates from nursing pigs on sows that had earlier exposure to tetracyclines, and from pigs treated with apramycin during the postweaning period. Resistance to oxytetracycline was consistently high throughout the study in isolates from all pigs and sows, including those with no previous exposure to that drug; however, resistance was greater in isolates from nursing pigs derived from sows with previous antibiotic exposure. Genes responsible for apramycin resistance were found in approximately 90% of resistant isolates and their location was determined to be on bacterial plasmids.