

PORK SAFETY

Title: Employing phage therapy to reduce lairage associated increases in *Salmonella* infections and shedding – NPB #06-167

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Scientific Abstract

Contamination of meat and meat products with foodborne pathogens is usually the result of the carcass coming in contact with the feces of an infected animal during processing. In the case of *Salmonella*, several recent studies have reported that pigs become rapidly infected with the organism during transport and lairage due to *Salmonella* contaminated trailers and holding pens. These infections serve to increase the likelihood of carcass contamination by amplifying the amount of bacteria that enters the processing facility. We conducted a series of experiments to test whether phage therapy could be used to counteract *Salmonella* infections at this crucial period. Fifteen anti-*Salmonella* phage were isolated from various Indiana wastewater treatment facilities and characterized by electron microscopy. In preparation for administration to pigs, the viruses were microencapsulated using a sodium alginate-lysine method. Preliminary experiments done with small pigs (20-30 pounds) indicated that administration of the anti-*Salmonella* phage cocktail at the time of inoculation with *Salmonella enterica* Typhimurium reduced the extent of infection by 99.0-99.9% (2-3 log growth) in the tonsils, ileum, and cecum as compared to mock-treated pigs. To test the efficacy of phage therapy in a more production-like setting, we inoculated four market weight pigs (in three replicates) with *Salmonella enterica* Typhimurium and allowed the infected pigs to contaminate a holding pen for 48 hours. At 48 hours post-inoculation, 16 naïve pigs were introduced to the contaminated environment. Eight pigs were administered the anti-*Salmonella* phage cocktail (orally) while the other eight pigs were mock-treated. All pigs were euthanized at six hours. Treatment with the anti-*Salmonella* phage cocktail significantly reduced cecal infections (95%, $P < .05$) while showing a strong tendency to reduce ileal infection (90%, $P = .06$). Taken together, these data indicate that phage therapy can be used as an effective anti-*Salmonella* intervention strategy to combat holding and lairage-associated increases in *Salmonella* infections.

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