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## Effect of a probiotic on prevention of salmonellosis in pigs

### Abstract

An experiment was conducted to determine if a commercial probiotic compound could be used to bring about competitive exclusion of Salmonella organisms. The probiotic material was added to the feed of one group of pigs and was not added to the feed of a control group. Both groups of pigs were dosed orally with  $10^6$  CFU of Salmonella cholerasuis. All pigs were affected; however, the treated group demonstrated less illness than the control group.; Swine Day, Manhattan, KS, November 17, 1988

### Keywords

Swine day, 1988; Kansas Agricultural Experiment Station contribution; no. 88-149-S; Report of progress (Kansas State University. Agricultural Experiment Station and Cooperative Extension Service); 556; Swine; Probiotic; Salmonellosis; Competitive exclusion

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**K****S****U****EFFECT OF A PROBIOTIC ON PREVENTION  
OF SALMONELLOSIS IN PIGS****K. B. Beeman,<sup>1</sup> D.E. Erickson,<sup>2</sup>  
and B. J. Henning<sup>1</sup>**

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**Summary**

An experiment was conducted to determine if a commercial probiotic compound could be used to bring about competitive exclusion of Salmonella organisms. The probiotic material<sup>3</sup> was added to the feed of one group of pigs and was not added to the feed of a control group. Both groups of pigs were dosed orally with 10<sup>6</sup> CFU of Salmonella cholerasuis. All pigs were affected; however, the treated group demonstrated less illness than the control group.

(Key Words: Probiotic; Salmonellosis, Competitive Exclusion.)

**Introduction**

Salmonellosis is a disease that commonly affects young, stressed pigs especially at times of weaning, transportation, and feed change. Kansas State University researchers reported that antibiotics can successfully control Salmonella infections but antibiotic resistance by pathogens is creating a need for alternate methods of disease control in swine. A Finnish researcher, Esko Nurmi has shown that normally occurring intestinal organisms when given to young chickens inhabit the intestine and competitively exclude pathogens such as Salmonella and other disease-producing organisms. Research reports from Nebraska indicate that Streptococcus faecium when fed to pigs reduces symptoms of pathological disturbance caused by three strains of E. coli.

**Procedures**

Twenty crossbred pigs (40 lb initial weight) from the University of Nebraska SPF swine herd were divided into two groups of 10 pigs each. Fecal samples were obtained from pigs selected at random in each pen and cultured for bacteria. No Salmonella was isolated, but Streptococcus faecium was found to be a part of the normal intestinal flora of pigs in both pens. The treated group was fed 4 lb of a probiotic material<sup>3</sup> per ton of feed. Diet composition is given in Table 1.

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<sup>3</sup>Star Laboratories product containing Lactobacillus acidophilus, Lactobacillus casei, Bifidobacterium bifidus, Streptococcus faecium, and Bacillus subtilis.

Table 1. Diet Composition<sup>a</sup>

Item	Amount, %
Milo	75.2
Soybean meal	21.5
Limestone	.8
Dical	1.1
Salt	.3
Trace mineral- vitamin premix	1.1

<sup>a</sup>Nebraska Swine Nutrition Guide.

A strict shower-in/shower-out sanitation protocol was followed, with plastic rain suits worn for this purpose and scrubbed with disinfectant between treatment rooms. Salmonella isolates from animals submitted to the Kansas State University Diagnostic Lab were obtained. The porcine strain of Salmonella choleraesuis, variety Kuensendorf, was chosen for this experiment, since it is the most frequent serotype causing disease in swine. This organism differs from some other pathogens in that it causes systemic disease, as well as infection of the intestine. All of the animals were orally inoculated with Salmonella 5 days after initiation of the probiotic treatment. The pigs were given 4 ml containing a total of 10<sup>6</sup> CFU Salmonella.

### Results

Animals were observed frequently and approximately 68 hr postinoculation, pigs in both control and probiotic-treated rooms appeared slightly depressed and anorectic. The control pigs seemed more distressed than the treated pigs, ate less (Table 2), and huddled in the corner away from the caretaker during pen cleaning.

Table 2. Feed Consumption (approximations)

Treatment group	Feed Intake, lb/day	
	Before inoculation	Postinoculation (68-100 lb)
Controls	3 <sup>a</sup>	1/2
Treated	3 <sup>a</sup>	2

<sup>a</sup>A slight amount of waste was observed.

Temperatures of the control pigs were all in the 107-108°F range. Blood samples were drawn and results indicated bacterial septicemia.

Probiotic-treated pigs consumed most of their ration, and their temperatures ranged from 105-107°F. Blood samples from these pigs also demonstrated bacterial septicemia.

Both groups of pigs gradually became less depressed, and their appetites improved.

Necropsies indicated enlarged mesenteric lymph glands in all pigs, and Salmonella was isolated from each group.

### Discussion

The data from this experiment indicate that too large a dose of pathogenic Salmonella was administered to successfully evaluate the protective nature for the probiotic material. Also, the preinoculation finding of Streptococcus faecium as a part of the normal flora in both groups of pigs suggests that competitive exclusion may have played a role in both groups of pigs.

Most animals develop clinical salmonellosis as a result of stress, mismanagement, transportation, or withholding from feed, probably resulting in death of the normal flora of the gut and thereby excluding any protection from normal flora. The use of commercial probiotic material may be helpful in these instances, although the results of this experiment were inconclusive.



A meats judging team evaluates hams in the new meats laboratory in Weber Hall.