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Effect of bacillus subtilus on sow and baby pig performance and bacterial populations

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Abstract

A Bacillus subtilus probiotic was tested using a total of 52 sows and 516 baby pigs to determine the effect on enteric colibacillosis control and on host bacterial population. The probiotic did not affect sow or baby pig performance nor influence host bacterial populations of the digestive tract.; Swine Day, Manhattan, KS, November 15, 1984

Keywords

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EFFECT OF BACILLUS SUBTILUS ON SOW AND BABY PIG PERFORMANCE AND BACTERIAL POPULATIONS

Robert R. LaForge and D. Steven Pollmann

Summary

A Bacillus subtilus probiotic was tested using a total of 52 sows and 516 baby pigs to determine the effect on enteric colibacillosis control and on host bacterial population. The probiotic did not affect sow or baby pig performance nor influence host bacterial populations of the digestive tract.

Introduction

Of the infectious causes of mortality in nursing pigs, neonatal diarrhea is the most common, accounting for approximately 11% of these deaths. In 1981 it was estimated that 30 million pigs were affected by enteritis costing the swine industry over $2 million a year.

A possible method of controlling enteritis with the use of probiotics has been theorized. Though Lactobacillus cultures are presently the most common probiotic, they tend to easily lose their viability when introduced into feed. Bacillus subtilus is a spore-forming bacteria with an indefinite shelf-life currently being marketed as a possible alternative to lactobacillus cultures and antibiotics. It has been proposed that the Bacillus subtilus cultures will increase the natural Lactobacillus populations while suppressing intestinal coliform populations. In this study we investigated the effect of Bacillus subtilus on sow and baby pig performance and on the bacterial populations of the sow and newborn pig.

Procedures

Sows were divided into two groups: treated (+) and control (-). Treated sows received 5 g of the Bacillus[1] product per head per day top-dressed on their feed starting approximately 14 days pre-farrowing and continuing through until 14 days post-farrowing. Control sows did not receive any of the product.

The litter of each individual sow was allotted into two groups: treated (+) and control (-). Treated baby pigs received 1 g of the Bacillus product mixed with 1 ml of safflower oil given orally using a 20 ml syringe and 8 cm of tygon tubing. Control pigs received only 1 ml of safflower oil. This was done within 24 hr of birth and after the pigs were processed. Odd-numbered ear-notched pigs received the product, whereas, even-numbered ear-notched pigs were controls. Thus, there were four baby pig treatments: (+) sow (+) pig, (+) sow (-) pig, (-) sow (+) pig, and (-) sow (-) pig.

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[1]Floramate®, PBI Gordon, Kansas City, MO.

Grab fecal samples were taken weekly from the sows throughout the experiment for a total of five collection periods. Fifty-seven baby pigs were sacrificed and the bacteria from five sections of their gastrointestinal tract were cultured. Sacrificed pigs were at three ages: within 1 day of birth, 2 days, and 6 days old. Bacteria quantitated from the sow feces and from the baby pigs were Bacillus subtilus, Lactobacillus, and Escherichia coli.

Results and Discussion

Neither feeding the Bacillus subtilus to sows nor to baby pigs had any effect on sow performance (table 1) or baby pig performance (table 2).

Although the bacillus numbers were higher in the treated sows, it had no effect on E. coli or Lactobacillus populations in the feces. On the day of farrowing E. coli populations increased by approximately ten to one hundred times.

The bacillus also had no effect on E. coli or Lactobacillus in the five sites of the gastrointestinal tract of baby pigs examined. Perhaps, the most important conclusion was that the Bacillus did not seem to be germinating until the cecum. This may have been due to a number of factors. The calcium carbonate carrier for the spores may have inhibited the germination of the Bacillus. If this is the case, then it would be necessary to use a different carrier. Another possible solution may be to germinate the Bacillus before giving it to baby pigs. It may have been possible that there was no significant enteritis problem during the time of the experiments. If this was true, then there would be nothing for the bacillus to respond to and so no effect on performance would be observed.

This initial study on the use of Bacillus as a probiotic revealed some possible problems with the product as it is currently used and should open the way for further research.

Table 1. Sow Performance With (+) or Without (-) Bacillus Subtilus

Item	(+) Treated	(-) Control	SE
Number born alive	10.02	10.25	.54
Number born dead	.55	.56	.19
Number mummies	.34	.28	.13
Average birth weight, lb	3.12	3.16	.11
Percent birth survival	94.82	96.14	1.6
Average scour score	1.12	1.17	.04
Number weaned	8.23	8.38	.45
Pig weaning weight, lb	11.78	11.79	.47
Sow average lactation daily feed intake, lb	12.8	12.1	.40
Sow lactation loss, lb	21.85	21.69	4.3

Table 2. Effect of Bacillus Subtilus on Baby Pig Performance

Item	Sow treatment:	Control (-)		Treated (+)		
	Pig treatment:	Control (-)	Treated (+)	Control (-)	Treated (+)	SE
No. pigs initial[a]		110	125	107	117	
Birth weight, lb		2.9	2.9	2.9	2.9	.22
Survival rate, %		85.5	88.0	86.9	85.5	
Weaning weight, lb		11.7	11.2	11.5	11.7	.42

[a]Does not include those pigs that were sacrificed.