EFFECT OF *LACTOBACILLUS ACIDOPHILUS* ON THE PERFORMANCE OF EARLY-WEANED PIGS

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Story in Brief

Two trials using 24 pigs in Trial 1 and 72 pigs in trial 2 were conducted to determine the effectiveness of a selected strain (from swine) of *L. acidophilus* for improving growth performance of early-weaned pigs. Pigs were weaned at approximately 21 days of age (20-22 days) and randomly allotted to two treatments: 0 and 1 x 10^{10} colony-forming units per day in Trial 1 and three treatments: 0, 1 x 10^{9} and 1 x 10^{10} colony-forming units per day in Trial 2. All pigs were fed standard prestarter diet containing 1.35% lysine, 10% dried skim milk and 20% edible whey. Trial duration was 14 days and 10 days in Trial 1 and in Trial 2, respectively. In Trial 1, average daily gains were slightly reduced by administrating *L. acidophilus*. Average daily feed intake and feed efficiency were not affected by treatment. In Trial 2, all parameters were similar for pigs fed the control and two different doses of *L. acidophilus* diets (1 x 10^{9} and 1 x 10^{10} colony-forming units per day). None of the pigs in control or treatment groups exhibited any signs of scours in either feeding trials, indicating that enteric pathogens such as enteropathogenic *Escherichia coli* were not a problemin this study. Results from this study suggest that *L. acidophilus* RP32 does not improve performance of early-weaned pigs when a dried skim milk and whey based prestarter diet was fed to early-weaned pigs not experiencing enteric diseases.

(Key Words: *Lactobacillus acidophilus*, Early-weaning pig.)

Introduction

Direct fed microbials have been suggested as an alternative to the use of feed antibiotics, but variable results have been reported. Use of probiotics containing lactobacilli has been shown to improve gain and feed efficiency in swine (Hale and Newton, 1979). Other researchers (Cline et al., 1976; Mahan and Newland, 1976) have observed no response in swine. It has been suggested that the administration of lactobacilli supresses *E.* coli, a normal

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and abundant bacterial inhabitant of the digestive tract (Sandine et al., 1972). The objective of this research was to determine the effectiveness of a strain of *L. acidophilus* RP32 isolated from the Oklahoma State University swine herd for improving the growth rate and efficiency of feed utilization of early-weaned pigs.

Materials and Methods

In the first trial, 24 pigs weaned at approximately 21 days of age were used to determine the effect of *L. acidophilus* on performance of early-weaned pigs. Treatments were: 1) standard prestarter control diet (Table 1) and 2) the control diet with 1 x 10^{10} *L. acidophilus*. The piglets were fed 10ml of sterile non-fat skim milk without (treatment 1) and with (treatment 2) *L. acidophilus* RP32 via syringe. Pigs were housed in individual metabolism crates in an environmentally controlled nursery room. In the second trial, 72 pigs weaned at approximately 22 days of age were used to determine the effect of two different concentrations of *L. acidophilus* RP32 on performance of early-weaned pigs. Treatments were: 1) standard prestarter control diet (Table 2), 2) the control diet with 1 x 10^{9} *L. acidophilus* and 3) the control diet with 1 x 10^{10} *L. acidophilus*. Pigs were housed in pens (six pigs per pen) measuring 3.8 by 5.0 feet on a raised, woven wire floor in an environmentally controlled nursery. Pigs had ad libitum access to both feed and water. In both trials, diet was formulated to contain 1.35% lysine, 10% dried skim milk and 20% whey. Small vials of frozen concentrated cultures of *L.* acidophilus RP32 containing the correct number of colony-forming units (CFU) for a one day feeding for each treatment were prepared and kept frozen until the day of feeding. The frozen culture for each feeding was thawed and diluted with 100ml of non-fat skim milk prior to being thoroughly mixed with an amount of feed estimated to be slightly greater than the amount of feed that the appropriate group would eat in one day. The amount of feed that was mixed daily was adjusted based on the previous daily intake. The number of CFU, however, remained constant throughout the trial. Feed left in the feeder from the previous day's feeding was removed and weighed. Six hours after mixing the feed with the *L. acidophilus* RP32, samples were taken and analyzed for the stability of *L. acidophilus* in the diet. Trial duration was 14 days in Trial 1 and 10 days in Trial 2, respectively. The culture of *L. acidophilus* used in these trials was selected for its ability to inhibit the growth of enteropathogenic *E. coli* in laboratory media. Several strains of *L. acidophilus* of pig origin were compared. Strain RP32 exerted the greatest amount of inhibition of the *E. coli*.

Table 1. Composition of experimental diet[a].

Ingredient	diet
Dried skim milk	10.0
Dried whey	20.0
Corn, ground	43.01
Soybean meal, 44%	20.0
Soybean oil	4.0
Lysine, Hcl	.29
Flavor 792[b]	.1
Copper sulfate	.1
Vitamin-trace mineral mix[c]	.5
Dicalcium phosphate	2.0
Total	100.0
Calculated Analysis:	
ME(Kcal/lb)	1523.7
Crude protein,%	18.86
Lysine,%	1.35
Tryptophan,%	.25
Threonine,%	.83
Methionine + Cystine,%	.63
Calcium,%	.95
Phosphate,%	.88

[a]As fed basis.
[b]Flavor 792, Flavor Hut Corp. St. Charles, IL.
[c]Supplied 2,000 IU vitamin A, 200 IU vitamin D, 8.5 IU vitamin E, 10 mg pantothenic acid, 13.5 mg niacin, 2.0 mg riboflavin, .007 mg vitamin B_{12}, 129 mg choline, .05 mg selenium, .01 mg manganese, .05 mg zinc, .05 g iron, .05 g copper, .11 mg iodine per lb of feed.

Results and Discussion

In Trial 1, average daily gains were reduced ($P<.08$) by the administration of *L. acidophilus* (Table 2). This results are consistent with those reported by Pollman et al. (1980), who observed that average daily gain was reduced by the *L. acidophilus* inoculum. Kornegay et al. (1990) reported that growing-finishing pigs fed *L. acidophilus* had a 1.9% reduction in average daily gain ($P<.08$) and a 5.8% reduction in average daily feed intake ($P<.01$). Average daily feed intake and feed efficiency were similar for pigs fed the control diet and *L. acidophilus* diets (1×10^{10} CFU per day).

In Trial 2, average daily gain, average daily feed intake and feed efficiency were not significantly affected by feeding the two levels of *L. acidophilus*. This study suggests that *L. acidophilus* RP32 does not improve performance of early-weaned pigs fed a dried skim milk and whey based prestarter diet.

Table 2. Least squares means for average daily gain, average daily feed intake and feed efficiency for early-weaned pigs fed *L. acidophilus*[a].

Item	Treatment			SE
	Control	*Lactobacillus acidophilus*		
		1×10^9	1×10^{10}	
		Trial 1		
Initial wt, lb	12.17		11.98	
Final wt, lb	20.98		19.27	.74
ADG, lb	.62[b]		.52[c]	.03
ADFI, lb	.70		.63	.04
Gain:feed	.89		.83	.03
		Trial 2		
Initial wt, lb	13.59	13.39	13.48	.02
Final wt, lb	16.93	16.29	16.90	.24
ADG, lb	.33	.29	.34	.02
ADFI, lb	.47	.45	.50	.03
Gain:feed	.77	.69	.78	.03

[a] Least squares means.
[b,c] Means in the same row with different superscripts differ ($P < .08$).

There was no scouring in pigs in the control group or groups that received *L. acidophilus* in either trial. This indicates that enteric pathogens caused little or no problems in the early-weaned pigs used in this study. This also may explain the lack of beneficial effect from the *L. acidophilus*.

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