THE EFFECTS OF SUBSTITUTING DEPROTEINIZED WHEY OR PURE LACTOSE FOR DRIED WHEY ON STARTER PIG PERFORMANCE [1]

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Summary

A study was conducted to evaluate the effects of replacing all or half of spray-dried, edible-grade whey with deproteinized whey or pure lactose on starter pig performance. No differences in pig performance were observed. Therefore, high quality deproteinized whey and lactose are effective replacements for the lactose provided by dried whey in starter pig diets.

(Key Words: Starter, Whey, Lactose, Performance.)

Introduction

Research reported in the 1993 Kansas State Swine Day report (pg. 46) demonstrated the need for lactose in starter pig diets. This trial showed a linear improvement in pig performance in phase I with increasing lactose (7 to 23%). With the importance of lactose as a nutrient in starter pig diets, the next question to evaluate is alternative lactose sources. Dried whey (edible grade) has become a standard in the swine industry. One of the lactose-containing by-products developed recently is deproteinized whey. Therefore, the objective of this experiment was to compare performance of pigs fed diets containing edible-grade dried whey, pure lactose, and deproteinized whey.

Procedures

A total of 180 weanling pigs (initially 9.1 lb and 22.1 d of age) was used in a 35-d growth assay to evaluate the effects of lactose source on starter pig performance. Allotted by initial weight as well as sex, pigs were fed one of five dietary treatments.

The experiment was divided into two phases. In the first phase (d 0 to 14 post-weaning), experimental diets were fed. The experimental diets were formulated to contain 1.6% lysine, .44% methionine, .9% Ca, and .8% P. The control diet contained 6.7% spray-dried plasma protein, 1.75% spray-dried blood meal, and 25% dried whey. Additional diets were based on lactose source replacing half or all the lactose provided by dried whey in the control diet. Therefore, experimental diets used the following ingredients or combinations to provide 18% total lactose: 25% dried whey, 12.5% dried whey and 9% pure lactose, 18% pure lactose, 12.5% dried whey and 10.9% deproteinized whey, and 21.7% deproteinized whey. Dried whey, lactose, and deproteinized whey were assumed to contain 72, 100, and 83% lactose, respectfully. Pure lactose and deproteinized whey contain no amino acids. Therefore, casein was used to replace the protein fraction of dried whey on an equal lysine basis in diets containing pure lactose and deproteinized whey. The experimental diets were fed in a pelleted form.

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During phase II (d 14 to 35 postweaning) of the trial, a common diet was fed to all pigs. Formulated to contain 1.3% lysine, .36% methionine, .9% Ca, and .8%, the phase II diet contained 10% dried whey and 2.5% spray-dried blood meal. This diet was fed in a meal form.

Pigs were housed in an environmentally controlled nursery with six pigs per pen (4 × 5 ft) and six pens per treatment. Pigs had ad libitum access to fed and water. Feed disappearance was measured and pigs were weighed on d 7, 14, 21, 28, and 35 to calculate ADG, ADFI, and F/G.

Results and Discussion

From d 0 to 7 postweaning, lactose source had no effect on ADG, ADFI, or F/G. However, from d 7 to 14 postweaning, pigs fed the diet containing 12.5% dried whey and 9% pure lactose had decreased ADG compared with pigs fed any other lactose source. Average daily feed intake was increased from d 7 to 14 for pigs fed the diet containing of 25% dried whey compared to those fed any other lactose source. Pigs fed diets containing 25% dried whey or 12.5% dried whey in combination with 9% pure lactose had improved F/G compared to pigs fed any other lactose source. From d 0 to 14 postweaning, no difference in ADG or ADFI were observed. However, F/G was improved for pigs fed diets containing 25% dried whey or 12.5% dried whey and 9% pure lactose compared to pigs fed diets containing 18% pure lactose or 12.5% dried whey and 10.85% deproteinized whey.

During phase II (d 14 to 35 postweaning), when pigs were fed a common diet, no differences were observed from dietary treatment fed during phase I. Moreover, no differences were shown for the overall trial (d 0 to 35) as a result of dietary lactose source fed in phase I.

In conclusion, deproteinized whey and pure lactose are effective replacements for the lactose in dried whey in the phase 1 diet. However, further research is needed to evaluate the effects of replacing the protein fraction of dried whey. In addition, research is needed to determine the effects of substituting deproteinized whey in phase 2 diets.

Table 1. Composition of Experimental Diets[a]

Ingredients, %[c]	Lactose sources, phase I					Phase II[b]
	25% Dried whey	12.5% Dried whey + 9% lactose	18% Lactose	12.5% Dried whey + 10.9% deproteinized whey	21.7% Deproteinized whey	
Corn	37.30	38.47	39.68	36.64	36.01	54.47
Soybean meal (48 % CP)	19.85	19.85	19.85	19.85	19.85	24.97
Porcine plasma	6.70	6.70	6.70	6.70	6.70	-
Casein	--	1.78	3.55	1.85	3.70	-
Soybean oil	5.00	5.00	5.00	5.00	5.00	3.00
Dried whey	25.00	12.50	--	12.50	--	10.00
Pure lactose	--	9.00	18.00	--	--	-
Deproteinized whey	--	--	--	10.85	21.70	-
Spray-dried blood meal	1.75	1.75	1.75	1.75	1.75	2.50
Monocalcium phosphate	1.31	1.67	2.03	1.69	2.04	1.91
Limestone	.98	1.05	1.13	1.04	1.13	1.00
Antibiotic	1.00	1.00	1.00	1.00	10.00	1.00
L-lysine·HCl	.10	.10	.10	.10	.10	.15
DL-methionine	.14	.14	.14	.15	--	.10
Vitamin premix	.25	.25	.25	.25	.25	.25
Trace mineral premix	.15	.15	.15	.15	.15	.15
Zinc oxide	.38	.38	.38	.38	.38	.25
Salt	.10	.20	.30	.10	.10	.25
Total	100.00	100.00	100.00	100.00	100.00	100.00

[a]Phase I diets were formulated to contain 1.6% lysine, .44% methionine, .9% calcium, and .8% phosphorus.
[b]Phase II diet was formulated to contain 1.30% lysine, .36% methionine, .9% calcium, and .8% phosphorus.

Table 2. Effects of Lactose Ingredient Source on Starter Pig Performance[a]

Item	Lactose source					CV
	25% Dried whey	12.5% Dried whey 9% lactose	18% Lactose	12.5% Dried whey 10.9% deproteinized whey	21.7% Deproteinized whey	
D 0 to 7						
ADG, lb	.59	.54	.57	.48	.58	21.3
ADFI, lb	.55	.49	.49	.44	.47	17.1
F/G	.95	.90	.87	.97	.81	15.8
D 7 to 14						
ADG, lb	.93[c]	.82[b]	.92[c]	.91[c]	.98[c]	7.5
ADFI, lb	1.13[b]	1.00[c]	1.00[c]	1.00[c]	1.01[c]	8.3
F/G	1.21[b]	1.22[b]	1.09[c]	1.09[c]	1.03[c]	5.3
D 0 to 14						
ADG, lb	.76	.68	.75	.70	.78	11.1
ADFI, lb	.84	.75	.75	.72	.74	10.0
F/G	1.11[c]	1.09[c]	1.00[bd]	1.04[cd]	.95[b]	6.1
D 14 to 35						
ADG, lb	1.09	1.05	1.09	1.10	1.07	5.9
ADFI, lb	1.86	1.71	1.82	1.82	1.81	6.5
F/G	1.70	1.63	1.68	1.66	1.70	5.1
D 0 to 35						
ADG, lb	.96	.90	.95	.94	.95	5.7
ADFI, lb	1.45	1.32	1.39	1.38	1.38	6.0
F/G	1.51	1.46	1.46	1.47	1.45	4.0

[a]Means represent a total of 180 pigs (initially 9.05 lb and 22.1 d of age) with 6 pigs per pen and 6 replicate pens per treatment.
[b,c,d]Means on the same row with different subscripts differ ($P < .05$).