EFFECTS OF SPRAY-DRIED ANIMAL PLASMA SOURCE ON WEANLING PIG PERFORMANCE[1]

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Summary

Three studies were conducted to evaluate the effects of different spray-dried animal plasma (SDAP) sources on weanling pig performance. For this study, different sources of SDAP were obtained from each of the four largest marketers. In each experiment, a different lot of each of the four plasma sources was used. Pigs were fed either a control diet or one of four diets containing different plasma sources added at 5.0 % of the total diet. The results of these experiments suggest that larger differences occur between lots or batches of SDAP then between sources of SDAP, when weanling pig performance is used as the response criterion. More research must be done to determine the factors responsible for the differences between batches of SDAP.

(Key Words: Starter Pigs, Spray-Dried Animal Plasma, Performance.)

Introduction

Spray-dried animal plasma has become an important ingredient in starter diets for early-weaned pigs, because studies have shown that it increases ADG and ADFI. Different sources of SDAP are now available for use in commercial diets. Producers and nutritionists frequently ask which plasma source to use. To date, relatively few trials have been conducted comparing different lots or sources of SDAP. Therefore, the objective of these experiments was to evaluate different batches and sources of SDAP and determine if differences occurred when starter pig performance was used as the response criterion.

Procedures

In all experiments, pigs (PIC) were blocked by initial weight, equalized for sex, and allotted randomly to one of five dietary treatments. The trials were divided into two phases, with the experimental diets fed from d 0 to 14 after weaning. The control pigs were fed a corn-soybean meal-based diet in a meal form containing 15% dried whey (Table 1). Other experimental diets contained different sources of SDAP replacing soybean meal in the control diet on an equal lysine basis. Diets contained no added medications or growth-promotional zinc oxide. From d 14 to 28 after weaning, a common corn-soybean meal diet containing no SDAP was fed in a meal form (Table 1).

Pigs were weighed and feed disappearance was determined on d 0, 7, 14, 21, and 28 after weaning to calculate ADG, ADFI, and F/G. Data were analyzed in a randomized complete block design with pen as the experimental unit.

In Exp. 1, 190 early-weaned pigs (averaging 17 d of age and 10.1 lb) were housed at the Kansas State University Segregated Early-Weaning facility. This nursery contained 4 × 4 ft pens with a self-feeder and one nipple waterer in each pen to provide ad

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libitum access to feed and water. There were four or five pigs per pen, and pens within a replication had the same number of pigs per pen. Each treatment had eight replications. In Exp. 2, 200 weanling pigs (averaging 21 d of age and 13.4 lb) were housed at the Kansas State University Swine Teaching and Research Center in 5 × 5 ft pens and were provided ad libitum access to feed and water. There were eight replications per treatment with six pigs per pen. In Exp. 3, 170 weanling pigs (averaging 18 d of age and 12.7 lb) were housed in the same facilities as Exp. 1. There were seven replications per treatment and four or five pigs per pen.

Results and Discussion

Experiment 1. From d 0 to 7 after weaning, all pigs fed SDAP (regardless of source) had greater (P<.01) ADG and ADFI than pigs fed the control diet (Table 2). Pigs fed diets containing SDAP sources 3 and 4 had higher (P< .02) ADG than pigs fed sources 1 and 2. Pigs fed SDAP source 3 also had greater feed intake (P<.01) than pigs fed diets containing plasma sources 1 and 2, and pigs fed diets containing plasma source 4 had intermediate ADFI. From d 0 to 14 after weaning, all pigs fed SDAP had (P<.03) increased ADG and ADFI compared to the control pigs. Pigs fed SDAP source 4 had greater ADG (P<.02) and ADFI (P<.01) compared to pigs fed the control diet, and pigs fed sources 1, 2, and 3 had intermediate ADG and ADFI. No differences were observed in pig performance from d 14 to 28, and overall performance was not affected by the diet fed from d 0 to 14.

Experiment 2. From d 0 to 7 after weaning, pigs fed diets containing SDAP had improved (P< .04) ADG, ADFI, and F/G compared with pigs fed the control diet (Table 3). Pigs fed the diet containing SDAP source 2 also had greater ADFI (P< .05) than pigs fed the control diet. Feed efficiency for pigs fed SDAP sources 1, 2, and, 4 was better (P< .02) than that of pigs fed the control diet. From d 0 to 14, pigs fed the control diet had increased ADG compared to pigs fed diets containing plasma sources 2 and 3, and pigs fed plasma sources 1 and 4 had intermediate gains. Pigs fed the diet containing plasma source 2 also had decreased F/G compared to pigs fed the control diet, and pigs fed diets containing plasma sources 1, 3, and 4 had intermediate F/G. No differences were observed in pig performance from d 14 to 28. From d 0 to 28, performance was not affected by the diet fed from d 0 to 14.

Experiment 3. From d 0 to 7 after weaning, pigs fed SDAP had improved (P<.02) ADG, ADFI, and F/G compared with pigs fed the control diet (Table 4). Pigs fed SDAP from sources 1 and 4, had greater (P<.01) ADG and ADFI than pigs fed the control diet, and pigs fed plasma sources 2 and 3 had intermediate ADG and ADFI. From d 0 to 14, pigs fed SDAP sources 1 and 4 had improved ADG compared to pigs fed the control diet, and pigs fed plasma sources 2 and 3 had intermediate gains. Average daily feed intake was greatest for pigs fed plasma sources 1, 2, and 4, and pigs fed plasma from source 3 had intakes similar to those of pigs fed the control diet. From d 0 to 14, no differences occurred in feed efficiency. No differences were observed in pig performance from d 14 to 28, and overall growth performance was not affected by the diet fed from d 0 to 14.

These results confirm earlier research demonstrating increased pig growth performance when spray-dried animal plasma is added to starter diets. However, the results of these experiments also suggest that pig growth performance from d 0 to 7 after weaning may be affected by variation within sources of SDAP used in the diet. These results also suggest that greater differences occur between lots or batches of spray-dried animal plasma from the same supplier than between sources from the different suppliers. None of the plasma sources tested consistently provided the best growth performance. We have begun further research to try to determine the factors responsible for the differences observed between lots of SDAP.

Table 1. Compositions of Experimental Diets

Ingredient, %	Day 0 to 14[a] Control	Day 0 to 14[a] 5% SDAP	Day 14 to 28[b]
Corn	44.64	51.47	53.79
Soybean meal (46.5% C.P.)	34.04	22.18	25.86
Spray-dried animal plasma	--	5.00	--
Dried whey	15.00	15.00	10.00
Soy oil	3.00	3.00	3.00
Monocalcium P (21% P)	1.40	1.32	1.89
Limestone	.95	1.00	0.81
Salt	.30	.30	0.25
Vitamin premix	.25	.25	0.25
L-lysine HCl	.15	.15	0.15
Trace mineral	.15	.15	0.15
DL-methionine	.10	.13	0.10
Zinc oxide	--	--	0.25
Medication[c]	--	--	1.00
Spray-dried blood cells	--	--	2.50

[a]Formulated to contain 1.4% lysine, .90% Ca, and .80% P.
[b]Fed in meal form to all pigs and formulated to contain 1.35% lysine, .85% Ca, and .75% P.
[c]Provided 50 g/ton carbadox.

Table 2. Effects of Plasma Source on Weanling Pig Growth Performance (Exp. 1)[a]

Item	Control	Plasma Source 1	Plasma Source 2	Plasma Source 3	Plasma Source 4	SEM
Day 0 to 7						
ADG[b], lb	.04[c]	.17[d]	.20[d]	.28[e]	.26[e]	.031
ADFI[b], lb	.17[c]	.26[d]	.30[d]	.37[e]	.34d[de]	.026
F/G	2.04	1.78	1.61	1.37	1.46	4.25
Day 0 to 14						
ADG[b], lb	.28[d]	.36[cd]	.33[cd]	.34[cd]	.38[c]	.026
ADFI[b], lb	.39[d]	.47[cd]	.47[cd]	.47[cd]	.54c	.029
F/G	1.44	1.34	1.41	1.40	1.45	.065
Day 14 to 27						
ADG, lb	.79	.94	.97	.97	.91	.048
ADFI, lb	1.54	1.60	1.55	1.40	1.54	.070
F/G	1.53	1.66	1.61	1.44	1.66	.080
Day 0 to 27						
ADG[b], lb	.53	.64	.64	.64	.64	.033
ADFI, lb	.94	1.01	.99	.92	1.02	.042
F/G	1.50	1.51	1.55	1.43	1.59	.058

[a]A total of 190 weanling pigs initially 10.1 lb and 17 days of age.
[b]Control vs. the mean of SDAP source 1, 2, 3 and 4 (P>.05).
[cde]Means in the same row with different superscripts differ (P<.05).

Table 3. Effects of Plasma Source on Weanling Pig Growth Performance (Exp. 2)[a]

Item	Control	Plasma Source 1	2	3	4	SEM
Day 0 to 7						
ADG[b], lb	.28[c]	.43[d]	.42[d]	.36[d]	.42[d]	.028
ADFI[b], lb	.49[c]	.60[cd]	.62[d]	.58[cd]	.55[cd]	.038
F/G[b]	1.90[c]	1.42[d]	1.53[d]	1.60[cd]	1.35[d]	.110
Day 0 to 14						
ADG, lb	.54[c]	.51[cd]	.45[d]	.45[d]	.47[cd]	.026
ADFI, lb	.75	.76	.73	.69	.69	.033
F/G	1.40[c]	1.50[cd]	1.65[d]	1.54[cd]	1.50[cd]	.058
Day 14 to 28						
ADG, lb	1.28	1.27	1.27	1.32	1.24	.032
ADFI, lb	1.85	1.85	1.83	1.88	1.82	.040
F/G	1.45	1.46	1.44	1.43	1.47	.032
Day 0 to 28						
ADG, lb	.91	.89	.86	.88	.86	.024
ADFI, lb	1.30	1.31	1.28	1.28	1.25	.032
F/G	1.43	1.47	1.49	1.45	1.47	.031

[a]A total of 200 weanling pigs initially 13.4 lb and 21 days of age.
[b]Control vs. the mean of SDAP source 1, 2, 3 and 4 (P<.05).
[cde]Means in the same row with different superscripts differ (P<.05).

Table 4. Effects of Plasma Source on Weanling Pig Growth Performance (Exp. 3)[a]

Item	Control	Plasma Source 1	2	3	4	SEM
Day 0 to 7						
ADG[b], lb	.09[c]	.24[d]	.17[cd]	.14[cd]	.24[d]	.039
ADFI[b], lb	.22[c]	.33[de]	.30[cde]	.25[cd]	.35[e]	.032
F/G[b]	5.09[c]	1.39[d]	2.11[cd]	2.10[cd]	1.88[d]	1.22
Day 0 to 14						
ADG, lb	.35[c]	.48[d]	.41[cd]	.35[c]	.44[cd]	.043
ADFI, lb	.51[c]	.64[d]	.57[cd]	.51[c]	.63[d]	.042
F/G	1.46	1.34	1.47	1.43	1.47	.091
Day 14 to 28						
ADG, lb	1.17	1.16	1.14	1.11	1.15	.066
ADFI, lb	1.63	1.62	1.69	1.58	1.62	.056
F/G	1.40	1.39	1.58	1.43	1.41	.096
Day 0 to 28						
ADG, lb	.76	.82	.77	.74	.80	.044
ADFI, lb	1.07	1.13	1.13	1.04	1.12	.043
F/G	1.41	1.38	1.50	1.41	1.42	.053

[a]A total of 170 weanling pigs (initially 12.8 lb) with four or five pigs per pen and seven pens per treatment.
[b]Control vs. the mean of SDAP sources 1, 2, 3, and 4 (P <.05).
[c,d,e]Means in same row with different superscripts differ (P<.05).