

Spray dried porcine plasma protein enhances food intake, growth rate and efficiency of gain in mice. J. E. Thomson, E. E. Jones and E. J. Eison. North Carolina State University, Raleigh.

total of 108 mice were weaned at 21 d and allotted to one of four dietary treatments: 1) control (modification of AIN-76 ni-purified diet, dried skim milk replacing casein), 2) control + 4% spray dried porcine plasma protein (SDPP), 3) control + 8% SDPP, and 4) control + 12% SDPP. Lysine, methionine, threonine, and sodium were held constant across treatments. ADG for males increased with level of SDPP up to 8% from d 0-7, 7-14 and for entire 21d. ADG was greater for females receiving 12% SDPP than control females from d 0-7. ADG for males d 14-21 was not affected by treatment. ADFI was similar for males and females and increased linearly ($P < .0002$) with level of SDPP in all periods. G/F increased with increasing levels of SDPP from d 0-7 ($P < .0002$) and d 0-14 ($P < .05$). From d 14-21, however, G/F crossed with increasing SDPP level ($P < .005$). Female G/F responded only to the 12% level of SDPP from d 0-7 (quadratic response, $P < .05$), while male G/F increased linearly with SDPP level. G/F for the entire trial was unaffected by treatment among females, but, male G/F increased linearly with SDPP levels. Total wet livor weight increased quadratically with increasing SDPP levels for males (891, 1446, 1664, 1674 mg; .03) and females (969, 946, 1023, 1201 mg; $P < .02$). Liver weight/body weight was not affected by treatment in females ($P = .24$). The effect of treatment on liver weight/body weight approached significance ($P < .07$) in females. Male liver weight/body weight and liver weight/body weight responded quadratically to increasing SDPP levels ($P < .03$, $P < .03$). Epididymal and ovarian fat pads were unaffected by treatment. Our results indicate that mice respond to dietary inclusion of SDPP with increases in ADFI, ADG and G/F during the period immediately post weaning and may, therefore, serve as appropriate models for pig response to SDPP. Reductions in G/F on d 14-21 may have been the result of greater hepatic energy demand.

Key Words: Mice, Porcine plasma, Livor weight

340 The effect of increasing level of lactose in a porcine plasma-based diet for the early weaned pig. K.Q. Owen, J.L. Nelsens, M.D. Tokach, R.D. Goodband, S.S. Dritz, and L.J. Kauts*. Kansas State University, Manhattan.

A total of 367 weaning pigs (initially 5.3 kg and 21 d of age) was used in a 28 d growth assay to determine the appropriate level of lactose needed in a phase I diet containing spray-dried porcine plasma (SDPP). Pigs were blocked by weight and randomly assigned to one of six experimental diets: a positive control, or five diets calculated to contain 7, 11, 15, 19, or 23% lactose. The positive control diet was a high nutrient density diet (HNDD) containing 7.5% SDPP, 1.75% spray-dried blood meal (SDBM), and 20% dried whey. The five experimental diets were achieved by adding lactose to a basal diet containing 10% dried whey, 7.5% SDPP, and 1.75% SDBM. Total lactose levels of 7, 11, 15, 19, or 23% were achieved by adding 0, 4, 8, 12, or 16% lactose, respectively, to the basal diet. Dried whey was assumed to contain 72% lactose. All diets contained 1.5% lysine, .9% calcium, and .8% phosphorus. Pigs were fed these diets in a pelleted form from d 0 to 14 postweaning. On d 14, all pigs were switched to a common phase II diet formulated to 1.25% lysine and containing 10% dried whey and 2.5% SDBM. Pigs were fed this diet in a meal form for the remainder of the trial (d 14 to 28 postweaning). During phase I, a linear increase ($P < .01$) in ADG, ADFI, and G/F was observed. Pigs receiving the diet containing 23% lactose had higher ADG ($P < .01$) and ADFI ($P < .10$) than pigs receiving the HNDD. However, there were no differences in G/F between pigs fed these two treatments. During phase II, there were no differences in ADG and G/F, but a linear improvement ($P < .05$) was observed for daily feed intake with increasing lactose fed in phase I. During the entire trial, a linear improvement ($P < .01$) was observed in ADG, ADFI, and G/F with increasing lactose level. Furthermore, pigs consuming the diet containing 23% lactose had higher ADG ($P < .05$) and consumed more feed per day ($P < .05$) when compared to pigs offered the HNDD. In conclusion, starter pig performance was improved linearly as lactose level increased from 7 to 23% in a nursery diet containing spray-dried porcine plasma.

Item	HNDD	Dietary Lactose, %					CV
		7	11	15	19	23	
0-7 ADG, g ^{a,b}	159	133	151	165	172	192	20.4
G/F ^a	.83	.67	.85	.85	.86	.90	14.5
0-14 ADG, g ^{a,b}	231	200	209	245	236	263	12.5
G/F ^a	.88	.80	.81	.90	.87	.91	13.6
0-14-28 ADG, g	458	440	472	458	449	485	9.3
G/F	.66	.64	.67	.65	.64	.66	5.0
0-28 ADG, g ^{a,b}	349	322	340	354	345	376	7.3
G/F ^a	.72	.68	.71	.72	.70	.72	3.6

^aLinear effect of lactose ($P < .01$). ^bHNDD vs 23% lactose ($P < .05$).

Key Words: Lactose, Pigs, Growth performance.

Optimal dietary sequence in a phase feeding program for early weaned (9±1 d) pigs. S.S. Dritz*, J.L. Nelsens, M.D. Tokach, R.D. Goodband, K.Q. Owen, L.J. Kauts, and B.T. Richert. Kansas State University, Manhattan.

Two hundred forty weaning pigs (initially 3.27±.68 kg BW and 9±1 d) were used in a 21 d growth trial to evaluate the influence of four dietary sequences on growth performance. The trial was designed as a randomized complete block with five replicates of four dietary sequences (12 pigs/pen). Three diets were used to form the four dietary sequences. Diet A was formulated to contain 1.7% lysine, 7.5% spray-dried porcine plasma (SDPP), 1.75% spray-dried blood meal (SDBM), 3% spray-dried egg protein, 20% dried whey, and 10% dried skim milk. Diet B was formulated to contain 1.4% lysine, 2.5% SDPP, 2.5% SDBM, and 20% dried whey. Diet C was formulated to contain 1.25% lysine, 2.5% SDBM, and 10% dried whey. The four dietary sequences were as follows: AAB, AAC, ABB, and ABC with each letter indicating diet fed d 0 to 7, d 7 to 14, and d 14 to 21 postweaning, respectively. Data were analyzed using a repeated measures analysis of variance. From d 0 to 7 postweaning, ADG, ADFI, and feed efficiency (G/F) were 112 g, 134 g, and .836, respectively. Pigs fed diet B from d 7 to 14 had numerically lower ADG than pigs that remained on diet A. Pigs fed diet B from d 14 to 21 had higher ADG ($P < .05$) compared to pigs fed diet C. Pigs fed dietary sequences AAB or ABB were 11% heavier on d 21 ($P < .05$) than pigs fed dietary sequences AAC or ABC. In conclusion, dietary sequences AAB and ABB provided identical performance d 0 to 21 postweaning; however, utilization of a transition diet (B) from d 7 to 14 postweaning substantially reduced feed cost/kg of gain for pigs weaned at 9 d of age.

Item		Dietary Sequence				CV
		AAB	AAC	ABB	ABC	
d 7 to 14	ADG, g ^a	275	279	252	221	14.0
	ADFI, g	298	295	302	284	7.7
	G/F	.923	.946	.834	.778	18.9
d 14 to 21	ADG, g ^b	342	266	363	292	14.0
	ADFI, g ^c	372	335	436	378	7.7
	G/F	.919	.794	.832	.772	18.9
d 21	Wt, kg ^b	8.39	7.83	8.39	7.79	9.4
d 0 to 21	Cost/kg gain, \$ ^d	.730	.695	.615	.509	

^aAAB or AAC vs ABC ($P < .05$). ^bAAB or ABB vs AAC or ABC ($P < .05$).

^cABB vs AAB, AAC, or ABC ($P < .05$) ABC vs AAC ($P < .09$).

^dDiet costs: A, \$3.88/kg; B, \$3.44/kg; C, \$2.22/kg.

Key words: Pigs, Dietary Sequence

The effect of increasing dietary methionine in a plasma-based diet on performance of the early weaned pig. K.Q. Owen*, J.L. Nelsens, R.D. Goodband, M.D. Tokach, L.J. Kauts, and K.G. Friesen. Kansas State University, Manhattan.

A total of 216 pigs (initially 4.9 kg and 21 d of age) was used in a 35 d growth trial to determine the effect of dietary methionine on growth performance for the early weaned pig when fed a porcine plasma-based diet. Pigs were blocked by weight, ancestry, and sex in a randomized complete block design resulting in six pigs per pen and a total of six pens per treatment. Experimental diets were fed from d 0 to 21 postweaning (phase I). The control diet was corn-soybean meal based, included 10% spray-dried porcine plasma (SDPP), 20% dried whey, 3% lactose, and 1.75% spray-dried blood meal (SDBM), and formulated to contain 1.6% lysine and .28% methionine. DL-methionine replaced sucrose in the control diet to achieve the experimental dietary methionine levels of .28, .32, .36, .40, .44, and .48%. Corresponding digestible methionine levels were .225, .265, .305, .345, .385, and .425%. Each diet contained .52% cystine and .07% added choline. On d 21, all pigs were switched to a common phase II (d 21 to 35 postweaning) diet containing 10% dried whey and 2.5% SDBM and formulated to contain 1.25% lysine and .30% methionine. Blood samples were collected on d 7, 14, and 21 to determine plasma urea N (PUN). During phase I, ADG, ADFI, and feed efficiency (G/F) were improved quadratically ($P < .01$) when dietary methionine increased with maximum performance being obtained between .40 and .44% dietary methionine. Average daily gain was not affected during phase II. However, during phase II, a quadratic ($P < .10$) response was observed for ADFI and G/F due to methionine level fed during phase I. On d 7 and 14, PUN was reduced quadratically ($P < .01$) as dietary methionine increased. Pigs fed .40% dietary methionine had the lowest numeric PUN concentration on d 14 compared to the other treatments. Cumulative (d 0 to 35) ADG and ADFI were improved quadratically ($P < .01$) and maximized between .40 and .44% dietary methionine. In conclusion, a porcine plasma-based diet must contain .40 to .44% dietary methionine to maximize growth performance from d 0 to 14 postweaning.

Item		Dietary Methionine, %						CV
		.28	.32	.36	.40	.44	.48	
d 0-14	ADG, g ^{a,c}	180	263	309	318	346	313	9.2
	G/F ^{a,c}	.80	.90	.97	.99	.98	.97	5.4
d 0-21	ADG, g ^{a,c}	244	336	358	372	395	363	7.7
	G/F ^{a,c}	.76	.85	.86	.91	.89	.87	4.8
d 21-35	ADG, g ^a	467	508	485	499	477	489	11.9
	G/F ^{b,d}	.63	.61	.54	.57	.57	.57	8.3
d 0-35	ADG, g ^{a,c}	336	404	408	422	427	413	8.2
	G/F	.68	.71	.68	.71	.71	.70	4.3
d 7	PUN, mg/dL ^{a,c}	13.16	7.68	5.87	5.45	5.48	5.34	39.6
d 14	PUN, mg/dL ^{a,c}	8.79	7.42	5.67	4.45	4.95	4.48	20.1
d 21	PUN, mg/dL ^a	10.25	8.72	8.61	7.28	9.33	6.60	22.1

^aLinear effect of dietary methionine ($P < .01$) and ($P < .10$), respectively.

^cQuadratic effect of dietary methionine ($P < .01$) and ($P < .10$), respectively.

Key Words: Methionine, Pigs, Growth performance.