

1/6 is best

375

Efficacy of sodium metabisulfite in reducing trypsin inhibitor and improving the nutritional value of underheated soybeans for weanling pigs. K. L. Herkelman*, G. L. Cromwell, and T. S. Stahly. University of Kentucky, Lexington.

Two 28-d experiments involving 288 Yorkshire-Hampshire weanling pigs (initial weight, 6.7 kg, initial age, 28 d) were conducted to evaluate the effects of sodium metabisulfite (SMBS) level on the nutritional value of underheated soybeans. In both experiments, pigs were fed fortified corn-soybean (or soybean meal)-dried whey (15%) diets containing 17% CP and .91% lysine. SMBS was added to the ground soybeans prior to heating them in an autoclave for 20 minutes at 121°C. In Exp. 1, four replications of six pigs/pen were fed five corn-soybean diets with SMBS added to the soybeans at levels of 0, .25, .5, 1.0 or 2.0%. Diet 6 was corn-soybean meal. In Exp. 2, six replications of six pigs/pen were fed three corn-soybean diets in which SMBS was added to the soybeans at levels of 0, .5 or 1.0%. Diet 4 was corn-soybean meal. In both experiments, trypsin inhibitor (TI) activity of the soybeans decreased with increasing level of SMBS, but TI activity at the highest level of SMBS was still higher than the TI of soybean meal. In Exp. 1, daily gain and feed/gain improved quadratically ($P < .05$) as the level of SMBS increased. Similar responses to SMBS occurred in Exp. 2, except that gain was linear ($P < .05$). In Exp. 1, performance of pigs fed the highest level of SMBS was not different ($P > .25$) from pigs fed soybean meal, but in Exp. 2, pigs fed the highest level of SMBS gained slower and less efficiently ($P < .01$) than those fed soybean meal. The results indicate that SMBS inactivates some of the TI of underheated soybeans and improves their nutritional value for weanling pigs. The 1% level of SMBS seemed to be the most efficacious level.

Level of SMBS, %:	Soybeans					Soybean meal	
	0	.25	.50	1.0	2.0		
TI, mg/g	Exp. 1	9.3	7.9	5.5	5.5	5.0	2.5
	Exp. 2	11.9	--	8.9	4.0	--	3.0
Daily gain, g	Exp. 1	175	174	209	223	220	241
	Exp. 2	154	--	191	200	--	313
Feed/gain	Exp. 1	3.03	3.30	2.39	2.30	2.32	2.18
	Exp. 2	3.15	--	2.54	2.46	--	1.99

Key Words: Pigs, Soybeans, Sodium Metabisulfite

375

Use of whey protein concentrate, dried buttermilk and porcine plasma protein to replace dried skim milk in diets for weanling pigs. B.T. Richert, J.D. Hancock, R.H. Hines, and K.S. Burton*, Kansas State University, Manhattan.

One hundred thirty-two weanling pigs (3.8 kg avg BW) were used in a 28-d growth assay to determine the effects of replacing dried skim milk (DSM) with whey protein concentrate (WPC), dried buttermilk (DBM) and spray-dried porcine plasma (SDPP) in diets for weanling pigs. The control diet contained 20% DSM, 20% dried whey and 3% soybean oil. All diets were formulated to 1.4% lysine, 25% lactose, 5% fat, .9% Ca and .8% P. These diets were fed from d 0 to 14, and a common diet (20% whey, 5% fish meal, 1.25% lysine, .85% Ca and .75% P) was fed from d 14 to 28. For d 0 to 14, pigs fed SDPP had greater ADG ($P < .01$) and ADFI ($P < .01$) than pigs fed WPC and DBM. However, pigs consuming SDPP had the poorest G/F ($P < .02$). Pigs fed WPC had greater ADFI ($P < .03$) than those fed DBM, but DBM supported greater G/F ($P < .07$). During d 14 to 28, there were no differences in ADG and ADFI. Pigs fed WPC and DBM had greater G/F ($P < .01$) than those given SDPP. Overall (d 0 to 28), ADG was not affected by diet ($P > .10$). Pigs consuming SDPP had superior ADFI ($P < .06$) and inferior G/F ($P < .04$) compared to pigs given WPC and DBM. Considering overall growth performance (d 0 to 28), WPC, DBM and SDPP are acceptable substitutes for DSM in diets for early-weaned pigs.

Item	DSM	WPC	DBM	SDPP	CV
d 0 to 14					
ADG, g	242	244	225	278	11.6
ADFI, g	245	252	216	299	9.4
G/F	.99	.97	1.04	.92	5.8
d 14 to 28					
ADG, g	435	454	444	432	6.4
ADFI, g	688	697	678	690	7.2
G/F	.63	.65	.66	.63	2.9
d 0 to 28					
ADG, g	338	349	335	355	7.6
ADFI, g	467	474	447	495	7.0
G/F	.73	.74	.75	.72	3.0

differences in ADG and ADFI. Pigs fed WPC and DBM had greater G/F ($P < .01$) than those given SDPP. Overall (d 0 to 28), ADG was not affected by diet ($P > .10$). Pigs consuming SDPP had superior ADFI ($P < .06$) and inferior G/F ($P < .04$) compared to pigs given WPC and DBM. Considering overall growth performance (d 0 to 28), WPC, DBM and SDPP are acceptable substitutes for DSM in diets for early-weaned pigs.

Key Words: Milk Products, Plasma Protein, Piglets

374

Starter pig growth performance is influenced by dietary soybean meal level when switched from a milk-based diet. K.G. Friesen, R.D. Goodband*, J.L. Nelssen, L.J. Kats, and M.D. Tokach. Kansas State University, Manhattan.

One-hundred and four pigs (initially 5.3 kg and 21 d of age) were utilized to determine the effect of soybean meal level during phase I (d 0-14) on growth performance in the early-weaned pig. The experiment was designed as a randomized complete block, consisting of four dietary treatments: 0, 7.5, 15, and 22.5% soybean meal (SBM). The diets were formulated to contain 1.5% lysine and 24.4% lactose. All four diets contained 20% dried whey and 8.9% spray dried porcine plasma, with soybean meal and lactose replacing dried skim milk on a lysine and lactose basis. From d 14-35 (phase II), all pigs were fed a common (1.25% lysine) corn-soybean meal diet containing 10% dried whey and 2.5% spray dried blood meal. Growth performance was not effected ($P > .10$) d 0-14 post-weaning. However, pigs fed the control diet (0% SBM) had a numerical increase in ADG compared to the pigs fed the diets containing soybean meal. When pigs were fed a common diet d 14-21, ADG tended ($P < .11$) to linearly decrease in pigs that had been fed low levels of SBM compared to pigs that had been fed a 22.5% SBM diet d 0-14. This decrease in ADG was not a prolonged response, as ADG increased after d 21. Numerical decreases in gain to feed ratio (G/F) d 14-21 correspond with the linear ($P < .11$) decreases in ADG indicating poor utilization of SBM. Overall (d 0-35), ADG was not effected ($P > .10$) by SBM inclusion in the starter diet. However, as the level of SBM increased in the starter diet, ADFI was linearly and quadratically decreased ($P < .05$) for the entire 35 d trial. Gain to feed ratio (d 0-35) showed a linear and quadratic ($P < .05$) increase, with G/F maximized in pigs fed a 15% SBM diet from d 0-14 post-weaning. These data suggest that SBM has to be included in starter diets to avoid depressed growth performance when pigs are switched from an all milk protein diet to a diet containing SBM in phase I and II, respectively.

SBM, %	0	7.5	15.0	22.5	CV
d 0-14					
ADG, g	364	352	345	347	11.2
ADFI, g	367	388	350	378	10.6
G/F	.99	.91	.99	.92	6.8
d 14-21					
ADG, g	249	280	273	315	21.5
ADFI, g	948	866	776	803	12.9
G/F	.26	.32	.35	.39	18.8
d 0-35					
ADG, g	430	422	418	424	5.7
ADFI, g ^{a,b}	640	621	585	609	5.2
G/F ^{a,b}	.67	.68	.71	.70	4.1

^aLinear effect of SBM ($P < .05$). ^bQuadratic effect of SBM ($P < .05$).
KEY WORDS: Starter Pigs, Soy Protein, Growth Performance.

376

Effects of various combinations of spray-dried porcine plasma and spray-dried blood meal in Phase I diets on early weaned pig performance. L. J. Kats*, M. D. Tokach, R. D. Goodband, J. L. Nelssen and J. L. Laurin, Kansas State University, Manhattan.

A total of 298 weanling pigs (initially 5.5 kg and 19-d of age) was used in a 25-d growth trial to determine the influence of spray-dried porcine plasma:spray-dried blood meal (SDPP:SDBM) combinations on starter pig performance. Pigs were allotted by weight to 8 replicates of 5 treatments. The control diet during Phase I (d 0 - 14) contained 10% SDPP and 20% dried whey and was formulated to 1.5% lysine. Either 25, 50, 75 or 100% of the SDPP was replaced with SDBM on a lysine basis to form the five dietary treatments. Therefore, the SDPP:SDBM combination diets (100:0, 75:25, 50:50, 25:75 or 0:100) contained 10, 7.5, 5.0, 2.5 or 0% SDPP and 0, 1.63, 3.25, 4.8 or 6.5% SDBM, respectively. All Phase I diets contained at least .81% isoleucine and 37% methionine. A common, 1.25% lysine diet containing 10% dried whey and 2.5% SDBM was fed to all pigs during Phase II (d 14 - 25). There was a quadratic response for ADG ($P < .06$) and feed efficiency ($P < .09$) during Phase I with pigs fed diets containing a combination of SDPP and SDBM having superior performance compared to pigs fed diets containing either SDPP or SDBM alone. Daily gain was maximized during Phase I for pigs receiving the 75:25 SDPP:SDBM combination. Phase II and overall performance was not influenced by Phase I diet. In conclusion, diet cost can be reduced and growth performance improved by using combinations of SDPP and SDBM in Phase I, rather than SDPP alone.

Item	Porcine Plasma:Blood Meal Combination					CV, %
	100:0	75:25	50:50	25:75	0:100	
d 0-14						
ADG, g ^a	235	263	244	246	235	8.8
ADFI, g	289	307	293	282	285	6.9
G/F ^b	.81	.86	.83	.87	.82	6.6
d 0-25						
ADG, g	327	347	337	340	335	5.3
ADFI, g	461	490	483	474	475	5.1
G/F	.71	.71	.70	.72	.70	3.2

^a Quadratic response ($P < .06$).
^b Quadratic response ($P < .09$).

Key Words: Starter pig, Blood meal, Porcine plasma.