377 **Optimum blood meal level for the Phase II starter diet.** L. J. Kats, M. D. Tokach*, J. L. Nelssen and R. D. Goodband. Kansas State University, Manhattan.

A total of 744 weanling pigs (initially 5.8 kg and 22-d of age) was used in a 28-d growth trial to determine the appropriate level of spray-dried porcine blood meal for the phase II (d 7-28 postweaning) starter diet. Pigs were blocked by weight and sex into nine replications of 13 or 14 pigs/pen. During Phase I (d 0-7 postweaning), all pigs were fed a 1.5% lysine diet containing 37.5% dried whey and 7.5% porcine plasma. On d 7, pigs were switched to the phase II diets which contained 10% dried whey and either 0, 1, 2, 3, 4 or 5% spray-dried blood meal. Phase II diets were formulated to contain 1.25% lysine and at least .30% methionine and .68% isoleucine. During Phase I, ADG, ADFI and G/F were 155 g, 172 g, and .78, respectively. There was a quadratic (P<.01) response, to blood meal level during the first week of Phase II (d 7-14) and the overall Phase II period (d 7-28). The addition of blood meal to the Phase II diet increased (P<.05) ADG, ADFI and G/F compared to the control diet (0% spray-dried blood meal). In this trial, the optimum level of spray-dried blood meal in the Phase II diet appears to be 2%.

		Spray-dried Blood Meal, %						
Item		0	1	2	3	4	5	CV, %
d 7-14	ADG, g[a,b,c]	119	155	197	182	194	186	22.9
	ADFI, g[a,c]	252	269	291	278	294	287	11.8
	G/F[a,b,c]	.40	.55	.64	.61	.63	.65	22.4
d 7-28	ADG, g[a,c]	272	302	311	306	300	300	8.6
	ADFI, g[a]	444	464	476	460	476	472	7.2
	G/F[a,b,c]	.60	.65	.64	.66	.62	.63	3.8

[a,c] Linear effect of blood meal (P<.01, .05, respectively).
[b] Quadratic effect of blood meal (P<.01).
[c] Control vs blood meal (P<.01, .05, respectively).

Key Words: Weanling pig, Spray-dried blood meal, Starter diet.

378 **Extrusion processing of cereal grains and soybean meal for weanling p** B.T. Richert, J.D. Hancock, R.H. Hines, and T.L. Gugle*, Kansas S University, Manhattan.

Three hundred seventy-two pigs (12.9 kg avg BW) were used in two experiments determine the effects of extruding corn (C), sorghum (S) and (or) soybean meal (SB on growth performance and nutrient digestibility. All diets were fed in three pha with Phase I diets (d 0 to 10) containing 1.5% lysine, .9% Ca, .8% P, 10% porc plasma protein, 30% dried whey and 3% soybean oil, Phase II diets (d 10 to 24) hav 1.25% lysine, .8% Ca, .7% P, 20% dried whey and 3% soybean oil, and Phase III d (d 24 to 38) containing 1.1% lysine, .8% Ca, .7% P and 3% soybean oil. Extrusion in an Insta-Pro® extruder, with extrusion temperatures of 84°C for soybean m (ESBM), 64°C for corn (EC) and 63°C for sorghum (ES) in Exp. 1, and 60°C ESBM, 66°C for EC and 56°C for ES in Exp. 2. The ESBM, EC and ES were adjus to 18% moisture before extrusion. Diets were pelleted in Phases I, II, and III for E 1, and pelleted for Phase I and fed in meal form for Phases II and III of Exp Treatments in Exp. 1 were: C-SBM, EC-SBM, EC-ESBM, S-SBM, ES-SBM and ESBM. In Phase I, ADG was not affected (P > .21), but gain/feed (G/F) was increa by 13% (1.003 vs .888) when dietary ingredients were extruded (P < .001). Howe for phase I and II extrusion of cereal grains depressed ADG (P < .002) and ADFI < .001). Overall (d 0 to 38), pigs fed C treatments had greater ADG and ADFI t pigs fed S treatments (P < .001). Pigs fed E grain had depressed growth performa but adding ESBM partially restored performance. Treatments in Exp. 2 were: C-SB C-ESBM, EC-SBM, EC-ESBM, S-SBM, S-ESBM, ES-SBM and ES-ESBM. For d 1 10, pigs fed diets with S ate more feed (P < .006) and had greater ADG (P < .008) t pigs fed diets with C. Overall (d 0 to 38), grain source did not affect gro performance (P < .47) and E of C and S decreased ADG and ADFI (P < Extrusion of SBM improved ADG and ADFI in diets with ground C and S, decreased ADG and ADFI in diets with EC and ES (P < .02). Considering b experiments, extrusion of cereal grains may be of benefit for d 0 to 10 post-weanin pelleted diets, but not for the entire nursery period (d 0 to 38). Diets containing gro grain with ESBM had greater feed intake and, consequently, small increases in AD

Item	C-SBM	C-ESBM	EC-SBM	EC-ESBM	S-SBM	S-ESBM	ES-SBM	ES-ESBM	CV
Exp. 1, d 0 to 38									
ADG, g	467	—	334	422	372	—	285	372	10.2
G/F	.697	—	.671	.712	.661	—	.667	.691	4.8
Exp. 2, d 0 to 38									
ADG, g	353	390	385	337	397	409	358	331	8.7
G/F	.638	.642	.654	.648	.653	.640	.648	.647	3.9

Key Words: Extrusion, Sorghum, Pigs

379 **The effect of extruded soybean products on intestinal morphology, *E. coli* sero-types and immunological responses in starter pigs.** D.F. Li*, W.M. She, S.Y. Qiao, J.L. Nelssen, G.R. Stoner and R.D. Goodband. Beijing Agricultural University and Kansas State University, Manhattan.

Two trials with one hundred and forty eight pigs weaned at 35 d of age were conducted to evaluate the effect of extrusion of soybean products on gut morphology, *E. coli* profiles and immunological responses. All pigs were fed a corn-soybean meal diet containing 3% soy oil and 1.25% lysine for the 5 week trial. In Trial 1, the four treatments were solvent extracted soybean meal with high, urease (HUS), extruded solvent extracted soybean meal with high urease (EHUS), extruded solvent extracted soybean meal with low urease (ELUS), and extruded pressed soybean meal (EPS). The dam of pigs were fed a commercial corn-soybean diet throughout gestation and lactation. Skin fold thickness following intradermal injection of extracts of the corresponding proteins and xylose absorption were measured on 8 d postweaning. At 45 d of age, twelve pigs were killed and samples of ileal digesta and small intestine were obtained. Villus height and crypt depth were measured. In Trial 2, milk protein (MP), extruded full fat soybean (EFFS), solvent extracted soybean meal with low urease (LUS), and ELUS were included. Fecal samples were collected by rectal massage. Sero-type for pathogenic *E. coli* (0149:K91, 0139:K82, 0141:K85, 0138:K81) and total number of bacteria were measured. Results indicate that pigs fed diets containing ELUS had a higher (P<.05) rate of gain, higher xylose absorption, longer villus height, higher ileal N digestibility and decreased skin-fold thickness when compared with those fed HUS. Pigs fed EHUS and EPS had higher (P<.05) ADG and villus height than those fed HUS. Pigs fed diets containing EFFS and ELUS had higher numbers of pathogenic coliforms (colonies/plates) than those fed the milk protein diet. The ratio of pathogenic coliforms over total bacteria was higher for LUS than ELUS, and the number of four sero-types of *E. coli* were higher on d 8 than on d 1 postweaning. Pigs fed EFFS had greater incidence of diarrhea than those fed milk protein and ELUS. In summary, extrusion of solvent extracted soybean meal can improve ileal N digestibility, gut morphology, and coliform profiles in 35 d weaned pigs.

Key Words: Extrusion, Immunology, Soybean meal

380 Effect of medium chain triglyceride on energy metabolism and survival in neonatal piglets. S. H. Chiang* and H. F. Lee, Tunghai University, Taiwan, Republic of China

Two experiments were conducted to determine the effect of medium chain triglyceride (MCT) on energy metabolism and survival in neonatal piglets. In experiment 1, 20 6-d old crossbred piglets (2.2 kg) from 7 litters were individually reared in metabolism cages equipped with milk bottle clamps and excreta collection trays. Following the 16-d adjustment period, piglets were allotted within litter to 4 treatments(4-6 piglets/treatment) and were fed with artificial nipples milk replacers containing 0, 5, 10 or 20% MCT. Feces and urine were collected for 10 d to determine the effect of MCT on nitrogen and energy metabolism in piglets. In experiment 2, 248 crossbred neonatal piglets from 23 litters were allotted to 2 treatments by birth weight within litter and were dosed with 6ml/kg.75 of either MCT or saline twice (14 and 26 h of age). After each dosing, piglets were returned t sow, and the growth and mortality of piglets at 1, 2, 3, 7, 14 and 28 d of age were observed. Medium chain triglyceride did not (P>.05) affect the digestibilities of dry matter, nitrogen and energy, and nitrogen retention of piglets, but it increased digestible energy (DE; linearly, P<.01 and quadratically, P<.05), metabolizable energy (ME; linearly, P <.01) and nitrogen corrected metabolizable energy (MEn; linearly, P<.01) of diets. The determined gross energy, DE, ME and MEn of MCT were 8279, 8693, 7867 and 7778 kcal/kg, respectively. The growth of piglets from birth to 28 d of age were not affected (P>.05) by dosed MCT. Dosed MCT did not affect (P>.05) the mortality of small (<1 kg) and medium (1-1.5 kg) piglets, but it increased (P<.05) the mortality o large (>1.5 kg) piglets during 0-7 and 0-28 d of age. In summary, MCT could be used as an energy source for piglets, however, dosing MCT to neonatal piglets could neither affect their growth nor improve their survival from birth to weaning.

Key Words: Piglets, Medium chain triglyceride, Survival