164 **The effect of spray-dried animal plasma fractions on performance of newly weaned pigs.** E.M. Weaver*, L.E. Russell, and M.D. Drew, American Protein Corporation, Inc., Ames, Iowa

Previous work has demonstrated that spray-dried animal plasma (SDAP, AP 920™) improves the feed intake and growth rate of the weaned pig. However, the causative factor(s) in SDAP have yet to be identified. This experiment was conducted to evaluate the effects of three molecular weight class fractions of SDAP on growth performance of weaned pigs. The fractions consisted primarily of globulin protein, albumin, and the low molecular weight component. One hundred newly weaned pigs (6.7 kg) were utilized in a 35 d experiment. The pigs were assigned to 5 dietary treatments on the basis of weight, gender, and ancestry. Each experimental diet was fed to 2 replicate pens of 10 pigs/pen from d 0 to 14 postweaning and then all pigs were fed a common diet (wheat, barley, soybean meal, 5% whey) from d 15 to 35 postweaning. The treatments consisted of: 1) CONTROL (Wheat, casein, canola oil (3%), dried whey (20%) basal diet); 2) Basal diet + 8% spray-dried animal plasma (SDAP); 3) Basal diet + 2% low molecular weight plasma fraction (LMW); 4) Basal diet + 4.6% (ALB); 5) Basal diet + 2.7% high molecular weight plasma fraction (IgG). Wheat and the appropriate fraction replaced casein in the experimental diets. The experimental starter and common diets were prepared in meal form and formulated to contain lysine and methionine concentrations of 1.55%, .55% and 1.15%, .31%, respectively. ADG, ADFI, and G:F ratio for pigs fed the 5 dietary treatments were: (d 0-7) 51, 115, 49, 103, and 111 g/d; 118, 184, 119, 170, and 175 g/d; .44, .62, .41, .60, and .63; (d 0-14) 198, 223, 117, 212, and 218 g/d; 247, 300, 185, 294, and 284 g/d; .82, .73, .62, .72, and .76. The addition of SDAP, ALB or IgG improved ADG, ADFI, and G/F ratio from d 0-7 postweaning compared to the CONTROL, or diet containing LMW ($P < .05$). ADG and ADFI from d 8-14, d 0-14, and d 0-35 postweaning were similar among pigs fed the CONTROL, SDAP, ALB, or IgG ($P < .05$). The addition of LMW resulted in poorer pig performance (d 0-14 and d 0-35 postweaning) than pigs fed the CONTROL, SDAP, ALB, or IgG ($P < .05$). This data indicates that the dietary addition of the primary protein components of plasma (IgG and ALB) result in improved pig performance in the first week postweaning, while the LMW component depresses growth performance.

Key Words: Weaned pigs, spray-dried animal plasma, plasma fractions

165 **Effects of various fractions of spray-dried porcine plasma on performance of early weaned pigs.** K.Q. Owen, J. L. Nelssen*, R.D. Goodband, M. D. Tokach, K. G. Friesen, B. T. Richert, J. W. Smith, and L. E. Russell†, Kansas State University, Manhattan, and †American Protein Inc., Des Moines.

Two experiments were conducted to determine the influence of various fractions of spray-dried porcine plasma on performance of the early weaned pig. In Exp. 1, 216 (initially 4.5 kg and 21-d of age) pigs were used to evaluate three fractions of spray-dried porcine plasma. Pigs were blocked by weight, sex, and litter and allotted to one of five diets (six pigs/pen and six pens/treatment). Spray-dried porcine plasma was separated into three components: IgG, low molecular weight peptides (< 10,000 MW), and albumen. A negative control diet containing corn, soybean meal and dried skim milk was formulated with the three other dietary treatments being obtained by replacing dried skim milk with one of the three plasma fractions on an equal lysine basis. A positive control diet (1.5% lysine and .42% methionine) was formulated to contain 7.5% spray-dried porcine plasma (SDPP), 1.75% spray-dried blood meal (SDBM), and 25% dried whey (DW). A common diet was fed during phase II (d 14 to 35 postweaning) that was corn-soybean meal based (1.25% lysine) and contained 2.5% spray-dried blood meal and 10% dried whey. From d 0 to 14 postweaning, pigs fed the IgG diet had higher ADG ($P < .07$) than pigs fed the negative control, low molecular weight, or albumen diet. Average daily gain was similar for pigs fed the IgG and plasma-based diets. However, pigs fed the plasma-based diet had the poorest feed efficiency compared to the other dietary treatments ($P < .10$). During phase II and the overall trial, no differences were noted for any of the response criteria. In Exp. 2, 168 pigs (initially 3.2 kg and 10 d of age) were used to evaluate the IgG and albumen fractions of spray-dried porcine plasma. Pigs were blocked by weight and allotted to one of four dietary treatments (six pigs/pen and seven pens/treatment). A positive control diet (1.7% lysine and .46% methionine) was formulated to contain 25% dried whey, 12% lactose, 10% spray-dried porcine plasma, and 6% select menhaden fish meal. The two other dietary treatments were obtained as described in Exp. 1. A common diet was fed from d 21 to 35 postweaning. From d 0 to 21 and d 0 to 35 postweaning, pigs fed either of the two plasma (IgG or albumen) fractions had similar performance to pigs fed the plasma-based diet, but, superior performance to pigs fed the milk-based diet ($P < .08$). Feed efficiency was not effected for the entire nursery phase. This data suggest the need for further research evaluating the IgG and albumen fractions of spray-dried porcine plasma for high nutrient dense diets fed to the early weaned pig.

Exp. 1	Milk	Plasma	LMW	IgG	Albumen	CV
d 0 - 14						
ADG, g	237[a]	278[bc]	251[a]	299[b]	261[ac]	10.0
G/F	.97[a]	.87[c]	.99[a]	.95[ab]	.92[b]	4.6

[abc]Rows with different superscript differ ($P < .10$).

Exp. 2		Milk	Plasma	IgG	Albumen	CV
d 0 - 21	ADG, g	204[a]	227[ab]	254[b]	231[ab]	13.3
	G/F	.81	.84	.88	.87	10.9
d 0 - 35	ADG, g	272[a]	286[ab]	304[b]	295[b]	7.6
	G/F	.70	.69	.71	.73	5.4

[ab]Rows with different superscript differ ($P < .10$).

Key Words: Pigs, Growth performance, Fractions.

166 **Assessment of three fractions of spray-dried porcine plasma on performance of early-weaned pigs.** **J.L. Pierce*, G.L. Cromwell, M.D. Lindemann, and R.D. Coffey, University of Kentucky, Lexington.**

Two experiments involving 160 pigs were conducted to assess several factors found in spray-dried porcine plasma (SDPP). Three fractions (provided by American Protein Corp., Ames, IA) consisted of primarily IgG (50% IgG in Exp. 1, 57% IgG in Exp. 2), albumin (90%), and a low molecular weight fraction (LMW). The SDPP (AP 920™) contained 22.5% IgG, 48% albumin, and .5% LMW. Pigs were weaned at 21 d (6.1 kg initial BW) and moved to an off-site, environmentally-controlled nursery with elevated, woven wire-floored pens (1.5 m^2/pen). There were four replicates of four pigs/pen in each experiment. In Exp. 1, a basal diet (Diet 1) consisted of corn, soybean meal, soy protein concentrate (SPC, Profine E™, Central Soya, Decatur, IN), dried whey, corn oil, minerals, and vitamins. In Diet 2, SDPP was added at 8%. The IgG, albumin, and LMW fractions were added in Diets 3, 4, and 5 to approximate the amounts of IgG, albumin, and LMW components in SDPP. The SDPP and the fractions were substituted for SPC. Lysine, S-amino acids, Na, and ME were maintained at 1.40%, .84%, .50%, and 1.49 Mcal ME/kg in all diets. All diets contained antibacterials (Aureomix-500™ and $CuSO_4$, 250 ppm Cu). ADG, ADFI, and F/G for pigs fed the five diets were, respectively: (Wk 0-1) 141, 229, 241, 150, 119 g/d; 311, 462, 410, 283, 300 g/d; 2.35, 2.08, 1.99, 2.16, 2.77; (Wk 0-3) 328, 337, 319, 299, 296 g/d; 568, 631, 546, 493, 544 g/d; 1.74, 1.82, 1.73, 1.71, 1.85. Growth rate and feed intake were increased ($P<.01$) by SDPP and by the IgG fraction during Wk 1, but the responses were lost by the end of Wk 2 and 3. In Exp. 2, the basal (Diet 1), 8% SDPP (Diet 2), and three levels of the IgG fraction (Diets 3-5) were fed. The three levels of IgG contributed approximately 40, 80, and 120% of the IgG provided by the SDPP. ADG, ADFI, and F/G were: (Wk 0-1) 162, 272, 228, 273, 273 g/d; 216, 376, 291, 347, 317 g/d; 1.37, 1.42, 1.28, 1.30, 1.18; (Wk 0-3) 363, 371, 372, 382, 413 g/d; 525, 590, 548, 563, 572 g/d; 1.46, 1.59, 1.49, 1.50, 1.40. The SDPP and IgG fraction increased weight gain and feed intake ($P<.01$) during Wk 1, and the intermediate level of IgG seemed to maximize the response. The responses to SDPP were less by the end of Wk 3, but the responses were maintained with the highest level of IgG. The beneficial effects from SDPP appear to be associated with the IgG fraction.

Key Words: Pig, Plasma Protein, Immunoglobulin

167 **Growth responses of pigs to dietary plasma protein (PP) additions as influenced by pig antigen exposure and PP source.** T.S. Stahly, D.R. Cook*, S.G. Swenson, N.H. Williams and D.R. Zimmerman, Iowa State University, Ames.

Two experiments were conducted to determine the impact of 1) antigen exposure (AE) and 2) dietary plasma protein source on growth responses of pigs to dietary PP additions. In experiment one, pigs from a single genetic strain (HDxYL) and source of origin (pigs possessed antibody titers for mycoplasma hyopneumonia, actinobacillus pleuropneumonia and transmissible gastroenteritis) were reared via a conventional and a medicated-early-weaning scheme to create a high and low degree of AE, respectively. Within each AE group, 40 gilts (19 d of age and 5.9 kg BW) were randomly allotted, from outcome groups based on pig weights, to a 1.7% lysine, corn-soy-20% dried whey-5% dried skim milk diet that contained 0 or 6% PP. The PP was substituted on an isolysine basis for soybean meal. Pigs were penned in groups of four and were self-fed diets for 20 days. Feeding PP resulted in greater feed intakes (536 vs 450 g/d), greater daily BW gains (327 vs 245 g/d) and improved gain:feed ratios (.602 vs .532) in high AE pigs, but not in low AE pigs (582 vs 573 g/d; 409 vs 400 g/d; .704 vs .694, respectively) resulting in a PP x AE interaction ($P<.06$). In experiment two, PP was derived from high (H) and low (L) AE pigs which were reared as described above. Ten sets of three littermate barrows from the original genetic strain and source of origin were reared via a conventional scheme, weaned at 20 days of age and individually-penned at their site of origin. Within a litter, pigs were self-fed 1.5% lysine, corn-soy-20% dried whey-10% casein diets that contained 0 or 4% added PP derived from H- or L-AE pigs, from 6.0 to 9.5 kg BW, and then all pigs were placed on the 0% PP diet until 17.1 kg BW. The PP was substituted on an isolysine basis for casein. The H- and L-PP sources contained 13.0 and 11.2% immunoglobulin G and 72 and 68% protein, respectively. From 6.0 to 9.5 kg BW, feeding H- and L-PP resulted in greater feed intakes (311, 321 vs 304 g/d, $P<.01$), daily BW gains (227, 241 vs 178 g/d, $P<.01$) and gain:feed ratios (.735, .753 vs .593, $P<.10$) regardless of PP source. After dietary PP withdrawal, pigs previously fed PP consumed less feed (801, 780 vs 941 g/d, $P<.05$) and gained BW slower (569, 520 vs 641 g/d, $P<.01$) than pigs initially fed the 0% PP diet. Over the entire study, pigs fed PP gained weight faster (391, 377 vs 350 g/d, $P<.05$) than pigs fed the 0% PP diet. Based on these data, dietary PP enhances rate and efficiency of growth in pigs with a high degree of AE, but not in pigs with a low degree of AE.

Pigs, Plasma protein, Antigen exposure

Key Words: