Fermented Soybean Meal for Weaned Piglets

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SUMMARY

Soybean meal contains a variety of anti-nutritional factors which limit its inclusion into the diets of young piglets. It has been shown that fermentation of soybean meal (fSBM) effectively removes trypsin inhibitors, oligosaccharides and phytic acid and improves digestibility of nutrients, including amino acids.

These improvements however, are not consistently observed (Song et al. 2010), and work is required which determines reasons for the variability among fSBM produced from different plants. Preliminary results from this research project indicate pigs receiving approximately 17% HP5010 fSBM in their diets had reduced body weight relative to the pigs receiving a comparable amount of a commercial SBM product, Hamlet 300.

INTRODUCTION

There is some evidence in the literature of improvements in feed efficiency when fSBM replaced SBM in the diet of nursery pigs. However, in many of these experiments the fSBM is used as only a partial replacement of the SBM, being used as an additive to a typical post-weaning diet. For example, Jones et al. (2010) and Gebru (2010) observed an improvement in feed efficiency when either 3.75 or 7.5% fSBM (Jones et al. 2010) or 5% fSBM (Gebru 2010) was included in the diet of post-weaning piglets. Other work has indicated that while the inclusion of fSBM in the diet of post-weaning piglets is "better" (based on performance and health indicators) than a diet with a high inclusion of SBM, piglets still do better when receiving a diet with reduced levels of soy proteins (Song et al. 2010). This suggests that optimization of the fermentation procedure is required. The objective of this project was to determine if there are differences in palatability and nutrient content of fSBM from different sources and if these differences can be attributed to specific processing methods.

"There was no evidence that the fSBM used in this experiment was superior to a standard SBM in improving growth or feed intake of the newly weaned pig."

MATERIALS AND METHODS

This study was designed to examine eight different treatments including five different fermented soybean meals (fSBM), obtained from China, standard 46% soybean meal (SBM), or the commercial products, Pepsoygen and Hamlet protein. Each week, 100 or 120 piglets, (~50% barrows, 50% gilts) were weaned at 3 weeks of age, (approximately 6 kg BW) being selected from the 130 to 160 piglets produced on a weekly basis. Piglets were assigned to treatment, ensuring equal numbers of males and females and average weight per treatment. They were then assigned at 4 or 5 pigs per pen, depending on selection pool size with either 3/2 barrows/gilts or 2/3 barrows/gilts or 2/2 barrows/gilts per pen.

Piglets were fed diets in 3 phases. Phases were 3, 18 and 14 days for phase 1, 2, 3 respectively and diets were formulated to meet all requirements of pigs of each weight range. The control diet contained the standard SBM and was formulated to contain 22% SBM in the finished diet. Individual fSBM's were substituted so that CP, NE and the lysine/NE ratio was comparable in all diets, and we assumed the AA/CP ratio was constant in all the SBM ingredients.

Diet palatability

Because diet palatability was estimated in the initial 24 hours post weaning, the time between the process of weaning and introduction to the phase 1 diet had to be consistent among pigs and rooms.

Therefore all piglets were removed from the sows at the same time (time recorded) weighed, randomized and placed into experimental pens with diets weighed into the feeders (time recorded).

RESULTS AND DISCUSSIONS

On day 14 and 21, pigs receiving approximately 17% HP5010 fSBM in their diets had reduced body weight relative to the pigs receiving a comparable amount of a commercial SBM product, Hamlet 300. Average daily gain was consistently highest on the soybean meal diet (treatment 1), this achieved significance, relative to the HP5010 on days 10 to 14 ($P < 0.05$). Differences in feed intake followed a similar pattern. A significant treatment effect was only observed during the d 15 to 21 period when a difference between the soybean meal and HP5010 diet was observed. Piglets receiving the control diet had higher feed intake relative to those receiving the HP5010 fSBM in their diet ($P < 0.05$). Although only speculative, since there were no significant treatment effects, some of these results may indicate reduced palatability with the fSBM product. The number of piglets with evidence of diet consumption during the initial 48 hours post-weaning was numerically increased on the soybean meal diet, relative to the fSBM supplemented diet.

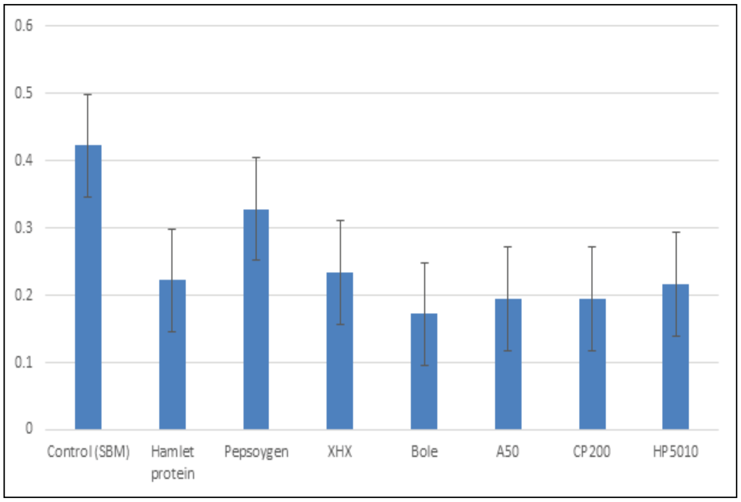

Figure 1. The proportion of piglets (mean ± SEM) exhibiting evidence of feed intake in the initial 46 hours post-weaning. Effect of treatment , P = 0.29.

CONCLUSIONS

There was no evidence in this experiment that fSBM was superior to a standard SBM in improving growth or feed intake of the newly weaned pig. Further work is required to determine potential reasons for the lack of response in this experiment.

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Table 1. Performance of post-weaning piglets receiving diets containing diets with fSBM replacing a standard SBM

		Experimental fSBM								
	SBM control	Hamlet	Pep	XHX	Bole	A50	CP200	HP5010	SEM	P-value
Body weight, kg										
d 0	6.37	6.45	6.45	6.38	6.39	6.42	6.5	6.46	0.05	0.39
d 3	6.15	6.27	6.20	6.25	6.07	6.11	6.23	6.13	0.07	0.27
d 9	6.56	6.79	6.64	6.69	6.51	6.53	6.64	6.51	0.10	0.33
d 14	7.70ab	8.17a	7.54ab	7.78ab	7.58ab	7.56ab	7.56ab	7.18b	0.21	0.07
d 21	10.20ab	10.60a	9.75ab	10.20ab	9.79ab	9.69ab	9.59ab	9.05b	0.29	0.02
d 28	13.40	13.6	13.10	13.40	12.70	12.80	12.40	12.10	0.43	0.12
d 35	17.90	18.30	18.00	18.20	17.30	17.20	17.30	16.50	0.61	0.42
Average daily gain, g/d										
d 0-3	-73.7	-57.6	-82.8	-42.8	-107.8	-104.1	-93.0	-111.8	19.30	0.098
d 4-21	232.2a	227.8a	202.7ab	218.1ab	203.3ab	192.3ab	186.0ab	168.1b	14.2	0.02
d 22-35	551.8	549.6	589.1	570.9	535.3	534.7	547.7	535.2	29.8	0.85
Average daily feed intake, g/d										
d 0-3	50.8	46.7	39.9	55.6	37.8	40.7	42.6	46.8	7.8	0.70
d 4-21	287.0	290.2	266.7	283.1	284.8	255.9	261.1	236.1	12.8	0.06
d 22-35	809.7	833.4	845.0	869.2	819.9	812.1	85.8	749.1	50.8	0.80
Feed conversion										
d 0-3	-2.46	-1.91	-0.62	-18.95	-5.31	51.6	4.69	-1.15	22.3	0.46
d 4-21	0.81a	0.78ab	0.76ab	0.77ab	0.71b	0.75ab	0.71b	0.71ab	0.02	0.02
d 22-35	0.69	0.67	0.70	0.66	0.66	0.68	0.70	0.74	0.03	0.41