THE USE OF A NEW HIGH EFICIENCY SOYBEAN MEAL AND FULL FAT SOYBEAN MEAL TO IMPROVE THE PERORMANCE OF POULTRY FEEDING

S.B. NEOH & L.E. NG

Presented at the

11th Asian Australian Animal Production Congress, 2004

5-9 September 2004 Hotel Nikko,
Kuala Lumpur, Malaysia

By Dr. Soon-Bin NEOH
Soon Soon Oilmills, Malaysia.

The use of a new High Efficiency Soybean Meal and Full Fat Soybean Meal to improve the performance of poultry feeding.

Neoh, S. B. & L. E. Ng

Soon Soon Oilmills, Prai, Malaysia

Summary

A new high efficiency soybean meal and full fat soybean meal produced by changes in processing technology has been proven to significantly improve weight gain and FCR in broilers and improve egg production, egg mass and hatchability in layers and breeders. Scientific evaluation using Protein Efficiency Ratio (PER) testing and Apparent Metabolizable Energy (AME) testing show that these products have significantly higher PER and AME when compared with other soybean meals. Furthermore by substituting soybean meal and vegetable oil with this new high efficiency full fat soybean meal in isocaloric and isonitrogenous diets further improved FCR and weight gain in broilers and increased egg size in layers and breeders. A possible explanation for this improved performance is that better quality feed ingredients create a lighter more efficient viscera system which releases more net nutrients for growth and reproduction. This hypothesis is supported by feeding trials.

Keywords: High Efficiency soybean meal, PER, AME

Introduction

Soybean meal and full fat soybean meal production methods have remain unchanged for the past 50 years. Basically soybeans are extracted by hexane and the resulting meal is desolventised and toasted to remove the residue hexane and deactivate the antinutritional factors such as trypsin inhibitors, lectins etc. While the process is efficient, it is not optimized for producing the best possible quality soybean meal, since the desolventising and toasting processes also reduce the quality of the soybean meal through heat and moisture catalyzed reactions e.g. maillard reactions. Evidences in the literatures (Dudley-Cash,2001, Zhiang, 2003) generally shows that different soybean meals have very different performances in animal trials.

A new processing technology has been developed that is more focused on optimizing the quality of soybean meal and full fat soybean meal. The resulting products described as high efficiency soybean meal and full fat soybean meal, were subjected to evaluation using the Chick Protein Efficiency Ratio (PER) test and the Chick Apparent Metabolizable Energy (AME) test. Feeding trials were also carried out for broilers, layers and breeders.

Methods and Results

Chick PER testing was carried out comparing this soybean meal with soybean meals from 3 other origins (Swick, 2003). The results are summarized in Table 1. The Chick AME of this high efficiency soybean meal and full fat soybean meal were measured and

showed to be significantly higher than the soybean meal from another origin. (Selle, 2004) (Table 2)

Numerous feeding trials were carried out comparing this new high efficiency soybean meal with soybean meals from other origins. Summaries of broiler feeding trials, layers and breeder trials are presented in Table 3 and Table 4.

Using the new high efficiency full fat soybean meal to substitute the high efficiency soybean meal and vegetable oils in isocaloric and isonitrogenous diets can further improve the performance of broilers, layers and breeders. The results of feeding trials are summarized in Table 5.

Table 1: Comparing Chick PER results of High Efficiency soybean meal with 3 other soybean meals from different origins

Types of soybean meal (SBM)	PER
SBM A	1.779 [a]
SBM B	1.842 [a]
SBM C	1.591 [a]
High Efficiency SBM	2.491 [b]

a,b Means in a column with different subscripts are significantly different at (P<0.001)

Table 2: Comparison of broiler feed AME with and without high efficiency full fat soybean meal

Treatments	AME of feeds (Kcal/kg DM)	Extra AME of soybean meal @ 25% inclusion (Kcal/kg DM)
SBM 1	3540 [a]	-
High Efficiency SBM	3587 [b]	+ 188 (vs SBM1)
SBM1 + High Efficiency Full fat (10%)	3559 [c]	+ 76 (vs SBM1)
High Efficiency SBM + Full Fat (10%)	3776 [d]	+ 944 (vs SBM1)

a,b,c,d Means in a column with different subscripts are significantly different at (P<0.05)

Table 3: summary of broiler trials

Type of trial	Duration of trials	Control : normal SBM		HE SBM		% Improvement		References
		FCR	Wt gain (kg)	FCR	Wt gain (kg)	FCR	Wt gain (kg)	
10 farms. 2000 to 32500 birds	1 to 40 days	2.01	2.11	1.84	2.32	9.3	9.6	Neoh & Raghavan, 2003
8 farms. 2300 birds	1 to 35 days	1.53	1.78	1.49	1.85	3.35	4.0	Soon Soon Unpublished data

Table 4 : summary of layer and breeder trials

Type of trial	Durati-on of trials	Control: normal SBM			HE SBM			% improvement			Ref
		Prod. Rate %	Egg mass g/d	Hat %	Prod. Rate %	Egg mass g/d	Hat. %	Prod. Rate %	Egg mass g/d	Hat. %	
Breeder farms 2x 12500 Avian	6 weeks each	81.5	48.7	87.1	87	52.3	89.8	6.7	7.4	3.1	Neoh & Ragha-van, 2003
Layer farms 25000 lohman	8 weeks each	72	-	-	79	-	-	9.7	-	-	Ragha-van unpulish-ed data

Using high efficiency full fat soybean meal to substitute the high efficiency soybean meal and vegetable oils in isocaloric and isonitrogenous diets can further improve the performance of broilers, layers and breeders. The results of feeding trials are summarized in Table 5.

Table 5: Effect of using high efficiency full fat soybean meal to substitute soybean meal and vegetable oil in broilers, layers and breeders.

Type of trials	Full fat inclusion rate	Effect 1	Effect 2	Reference
Broiler trial 500 x 6 birds	10%	FCR improved by 10 -15 % ($p< 0.001$)	Body weight improved by 5-10% ($p< 0.001$)	Neoh and Raghavan, 2004
Layer trials 3 farms with 90,000 to 150000 egg /day	6%	Egg mass increased by 1.7%	Large eggs increased by about 6%	Neoh and Raghavan, 2004
Breeder trial 1 farm was equally divided into 2 groups	8%	Egg weight increased by 1%	Weight of D.O.C. increased by 1%	Raghavan unpublished data, 2003

In an attempt to find an explanation for the large significant improvements in FCR and weight gain in broilers, as well as significant increases in egg production/mass and hatchability in layers and breeders, broiler feeding trials were carried out comparing viscera weights of the chicken using isocaloric and isonitrogenous feeds formulated with the high efficiency soybean meal and normal soybean meal (Neoh & Ng, 2004). The results are summarized in Figure 1. A parallel feeding trial was also carried out comparing viscera weights of broilers fed with feeds of different nutrient densities. The results are summarized in figure 2.

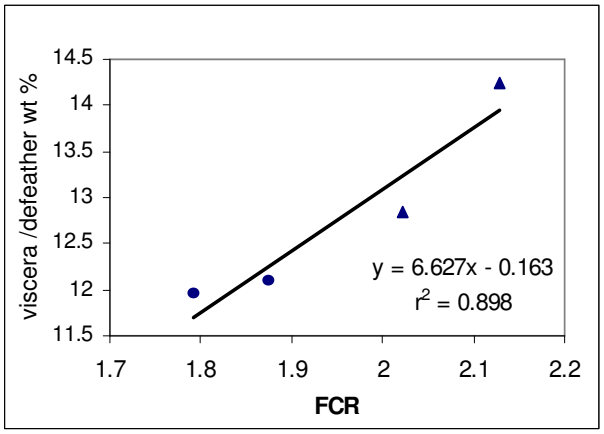

Figure 1. Relationship between relative viscera weight and FCR in diets with different soybean meals. • Soon Soon SBM , ▲Argentinian SBM.

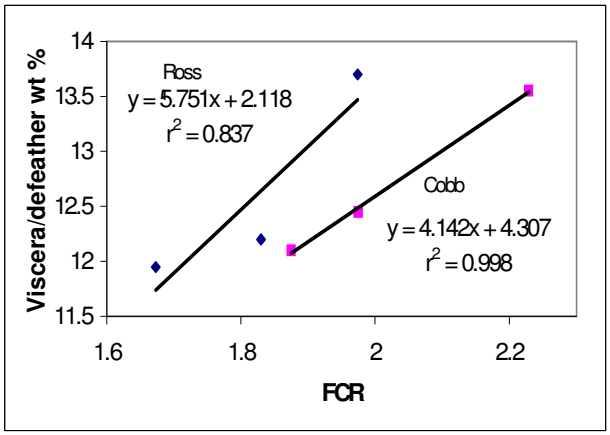

Figure 2. Relationship between relative viscera weight and FCR in diets with three tiers of nutrient specifications

Discussion

The PER test suggest that the efficiency of the protein in the high efficiency soybean meal is significantly higher than other soybean meals by more than 30%. Similarly the AME of both the high efficiency soybean meal and full fat soybean meal were significantly higher than another soybean meal equivalent to 188kcal/kg and 944kcal/kg respectively.

Feeding trials comparing the high efficiency soybean meal with another soybean meal done at 10 commercial farms show an average FCR increase of 9.3% and average body weight gain of 9.6%. A broiler trial carried out using high nutrient density feed also showed a significant improvement in FCR of 3.35% and body weight gain of 4% when using the new high efficiency soybean meal. Breeder trials (Neoh & Raghavan, 2003) comparing the new high efficiency soybean meal with another soybean meal showed an increased of egg production of 6.7%, egg mass by 7.4% and hatchability increased by 3.1%. In layer trials (Raghavan, 2002 unpublished data) using the high efficiency soybean meal resulted in a 10% increase in egg production and a 5% reduction in feed consumption.

The huge increase in the AME of the high efficiency full fat is borne out by improvements seen in broilers, layers and breeders trials (Neoh & Raghavan, 2004). From Table 5, using 10% of high efficiency full fat soybean meal to substitute the high efficiency soybean meal and vegetable oil in isocaloric and isonitrogenous diets resulted in FCR improvements of 10-15% and body weight gain of 5-10%. Similarly using 8% of full fat soybean meal in breeder feeding increased day old chick weights by 1%. In layers when using 6% of the high efficiency full fat soybean meal to replace high efficiency soybean meal and vegetable oil, there was a significant increased in egg size with egg mass increasing by 1.7%.

In an effort to find an explanation for the improved performance of these new high efficiency soybean meals and full fat soybean meals, the viscera system of the chickens were investigated for a possible explanation. In feeding trials (Neoh & Ng, 2004) using the new high efficiency soybean meal versus normal soybean meal, the

percentage weight of the viscera was shown to correlate with FCRs (Fig 1 & 2). Diets using the high efficiency soybean meal gave lower FCRs and lighter viscera weights as compared to diets using Argentine soybean meal (Fig 1). Similarly in Fig.2, higher nutrient density feeds gave lower FCRs and viscera weights. This would suggest that feeding poultry with higher quantities of digestible/available nutrients by either using better feed ingredients or by increasing nutrient densities would result in chickens with a lighter viscera weight which is more efficient and consumes less nutrients for maintenance thus releasing more nutrients for growth and reproduction. This phenomenon can partially explain why the new high efficiency soybean meal and full fat soybean meal can dramatically improve the performance of broilers, layers and breeders despite having a similar proximate analysis when compared with other soybean meals.

Conclusion

The new high efficiency soybean meal and full fat soybean meal have been proven to perform significantly better than normal soybean meal in various scientific testing and feeding trials. These tests and trials seem to suggest that there is a significant increase in available nutrients. Furthermore this increase in available nutrients seems to result in lower viscera weights in poultry, lower viscera weights will consume less nutrients for maintenance thus releasing more nutrients for growth and reproduction. These new products have allowed animal nutritionists to lower the protein and metabolizable energy of their poultry feed and still be able to obtain good performance.

References

Dudley-Cash, W. A. (2001). *Feedstuffs*. **73**(41).

Neoh, SB and Raghavan V. (2002). Conference Proceedings, 12th Australian Poultry and Feed Convention p.239.

Neoh, SB and Raghavan V. (2004). Proceeding of the Australian Poultry Science Symposium. **16** (67)

Neoh, SB and L.E. Ng (2004). Proceeding of the Australian Poultry Science Symposium. **16** (75)

Selle, P. (2004). University of Sydney, unpublished data.

Swick R.A. (2003). American Soybean Association, personal communication.

Zhiang Z.R. (2003). Ajinomoto,unpublished data.