THE OPTIMAL USAGE OF DEHULLED FULL FAT SOYBEAN MEAL IN BROILER STARTER DIETS

S.B. NEOH and L.E. NG

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

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Soon Bin Neoh and Liew Ee Ng
Soon Soon Oilmills Sdn. Bhd.
2448, Lorong Perusahaan Dua, Prai Industrial Estate, 13600 Prai, Penang, Malaysia.

ABSTRACT

A dehulled full fat soybean meal (DFF SBM) with higher apparent metabolizable energy (AME) has been tested in broiler starter diets at 0%, 5% and 10% incorporation rate using iso-caloric and iso-nitrogenous diets. A dehulled soybean meal produced by Soon Soon Oilmills, Malaysia was used in conjunction with the DFF SBM in this trial. Dehulled Argentinean soybean meal (ARG SBM) was used as a control. The results showed that as the percentage of DFF SBM increases, the weight gain of the broiler chicks increased in a linear manner from 749.6g without DFF SBM to 766.6g with 10% DFF SBM ($p< 0.05$). The control Argentinean soybean meal diet gave 740.8g of weight gain. In the case of FCR, the best result (1.366) was obtained at 5% DFF SBM incorporation rate compared with 1.381 without DFF SBM. Increasing DFF SBM in the diet to 10% resulted in a higher FCR of 1.387. The control diet using ARG SBM gave an FCR of 1.412 which was statistically different ($p<0.05$) when compared to the other test diets. These results seem to indicate that the optimum level of DFF SBM in broiler starter diets is probably between 5 to 10%. All the test diets performed better than the control diet using ARG SBM.

Keywords: Dehulled full fat soybean meal, Body weight gain, FCR, Broiler starter, Argentinean dehulled soybean meal

INTRODUCTION

Full fat soybean meal is widely used in the poultry industry. However its use in broiler starter feed is less well documented. Moreover most of these trials used non dehulled full fat soybean meal which may not be optimized for broiler starter diets as soybean hull is not digestible by young broilers. The purpose of this trial is to determine the effect of using dehulled full fat soybean meal (DFF SBM) at 0%, 5% and 10% in diets which are isocaloric and isonitrogenous. The other main protein source is a dehulled soybean meal that has been tested to have a higher nutrient content (Neoh and Raghavan, 2002; Neoh and Ng 2004; Neoh and Ng 2006). The control diet was using dehulled Argentinean soybean meal (ARG SBM). The apparent metabolizable energy (AME) of DFF SBM can be calculated by assuming that it constitutes of 20% soybean oil and 80% dehulled soybean meal. The calculated value at 12% moisture basis is 3488 kcal/kg (NRC, 1994). However the AME of this particular DFF SBM was measured to be 3760 kcal/kg (Swick, personal communication).

MATERIALS AND METHODS

The DFF SBM and dehulled soybean meals (SS DSBM) were produced by Soon Soon Oilmills, Malaysia. The ARG SBM was obtained from an importer in Penang, Malaysia. The broiler trial was conducted at Bangkok Animal Research Centre (BARC), Thailand. 384 male and 384 female Arbor Acre High Yield Breed day old chicks were equally divided into 48 floor pens with 16 birds in each pen. These pens were randomly assigned to 4 diet groups and set up as a 4 x 12 replication trial. The control diet was formulated with ARG SBM without DFF SBM. The other three diets were formulated with SS SBM with 0%, 5% and 10% inclusion rate of DFF SBM. The metabolizable energy of DFF SBM used in the formulation is 3760 kcal/kg which is 272 kcal/kg more than the calculated value (NRC, 1994). These four diets were iso-caloric and iso-nitrogenous. Diet formulations and calculated nutrients are listed in the Table 1. The broiler chicks were offered the four diets from day 1 until 21 days. At the end of 21 days, total feed consumption and body weight were measured. Body weight gain (BWG) and feed conversion ratio (FCR) were then calculated.

Table 1: Formulae and calculated nutrients of control diet, 0%, 5% and 10% DFF SBM incorporation rate diets using SS SBM

Ingredients	ARG Control	SS SBM 0% DFF	SS SBM 5% DFF	SS SBM 10 %DFF
Corn, %	53.43	53.43	53.89	54.33
ARG SBM, %	33.71	0	0	0
SS DSBM, %	0	33.71	29.78	25.85
DFFSBM, %	0	0	5	10
Wheat Pollard, %	6	6	6	6
Palm Oil, %	3.03	3.03	1.51	0
MDCP, %	1.47	1.47	1.46	1.45
Limestone, %	1.31	1.31	1.31	1.33
DL methionine, %	0.22	0.22	0.22	0.22
L Threonine, %	0.04	0.04	0.04	0.03
Salt, %	0.28	0.28	0.28	0.29
L Lysine, %	0.15	0.15	0.15	0.14
Sodium bicarbonate, %	0.16	0.16	0.16	0.16
Vit/ Min mix, %	0.2	0.2	0.2	0.2
Calculated Nutrients				
ME	2925	2925	2925	2925
Crude Protein	21	21	21	21
Crude Fat	5.9	5.9	5.4	4.9
Dig Lysine	1.077	1.077	1.077	1.077
Dig Met	0.501	0.501	0.500	0.498
Dig M+C	0.787	0.787	0.787	0.787
Dig Threonine	0.665	0.665	0.665	0.665
Dig Tryptophan	0.224	0.224	0.225	0.225
Dig Arg	1.206	1.206	1.209	1.212

RESULT AND DISCUSSION

The BWG and FCR results are presented in Table 2. The results demonstrated that increasing the level of full fat from 0 to 10% in the diet increased the BWG of broiler chicks in a linear manner. The BWG of broilers offered diets with 0%, 5% and 10% DFF incorporation rate were 749.6g, 760.3g and 766.6g respectively ($p < 0.05$). The BWG of the control diet using ARG SBM was the lowest at 740.8g. The response of FCR to the level of DFF SBM used in the diet was different from the BWG. The lowest FCR (1.366) was obtained from broilers offered the diet using 5% DFFSBM. This result was significantly lower than the FCR (1.387) obtained for broilers offered 10% DFF SBM as well as broilers offered 0% DFFSBM in which the FCR was 1.381. In comparison the control diet using ARG SBM had a FCR of 1.412 which is statistically different from the other three diets ($p<0.05$).

Table 2: The body weight gain and feed conversion ratio of broilers offered different diets

Parameters	ARG Control	SS SBM 0% DFF	SSSBM 5% DFF	SSSBM 10 %DFF	*SE (pooled)*	*CV (%)*
Initial body weight, g	42.46	42.46	42.46	42.44	-	-
Final body weight, g	783.28^{a}	792.05^{ab}	802.74^{bc}	809.03^{c}	*5.549*	*2.41*
Body weight gain, g	740.8^{a}	749.6^{ab}	760.3^{bc}	766.6^{c}	*5.549*	*2.55*
Feed conversion ratio	1.412^{c}	1.381^{ab}	1.366^{a}	1.387^{b}	*0.005*	*1.37*

The results seem to indicate that the use of a DFF SBM can improve the performance of broiler starter diets. Although increasing the DFF SBM in the diet to 10% gave higher BWG, the FCR was not significantly different from the 0% DFF SBM diet and was significantly worse than the 5% DFF SBM diet. This may suggest that the optimum level of DFF SBM in broiler starter diet should be between 5 to 10%. The reason for the diet containing 10% DFF SBM having poorer FCR than the diet containing 5% DFF SBM could not be identified. It could be that the total oil content in the diet containing 10% DFF SBM was at 4.9% compared with 5.9% and 5.4% for the diets containing 0% and 5% DFF SBM respectively. Interestingly the diet using dehulled soybean meal produced by Soon Soon Oilmils Malaysia had significantly lower FCR and numerically higher BWG when compared to the diet using ARG SBM.

CONCLUSION

Dehulled full fat soybean meal can be an important ingredient to improve the performance of broiler starter feed. The optimum level of usage appears to be between 5 to 10% of total feed. There appears to be a significant difference in performance between the feed using ARG SBM and those using soybean meal produced by Soon Soon with or

without the addition of DFF SBM. It is worthwhile to note that the AME of the DFF SBM used in this trial was set at 3760 kcal/kg which is 272 kcal/kg higher than the theoretical value calculated on the basis of its constituents which is 80% dehulled soybean meal and 20% soybean oil.

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