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Soybean Meal Types and Specifications on Performance of Broilers

SOON SOON OILMILLS SDN BHD (37441-T)
(A member of Soon Soon Group)
2448 Lorong Perusahaan 2, Prai Industrial Estate, 13600 Prai, Penang, Malaysia.
P.O. Box 300, 12720 Butterworth, Penang, Malaysia.
Tel: 604-3828288 Fax: 604-3988 277
Email: oilmill@soonsoongroup.com Website: www.soonsoonoil.com.my

Soybean Meal Types and Specifications on Performance of Broilers

Creswell and Swick (2008), in their trial in BARC, Thailand established that not all soybean meals are the same when used in broiler feeds. Energy (ME), digestible amino acids and proximate assay values derived from NIR by Adisseo showed differences among soybean meals from different sources of origin (Table 1). The difference in energy (ME) between the highest and the lowest in the samples scanned were as much as 18% with the highest found in soybean meal from Soon Soon Malaysia and the lowest from India. Similarly, the difference in digestible lysine value was as much as 14% with soybean meal from Soon Soon Malaysia topping that from India.

What would the effect on growth performance be if these differences in nutrient matrix were taken into consideration and the new feed formulated to contribute the same levels of nutrient as when it was formulated using the original soybean meal type?

To answer this question, Creswell and Swick (2008) conducted a further trial in BARC, Thailand to see whether or not the growth performance of broiler birds is the same when given feeds with similar nutrient specification but use four types of soybean meals as the main source of plant protein. The meals were from India, Argentina, US and Soon Soon (Malaysia).

Energy(ME), digestible amino acids and proximate assay values derived from NIRS (by Adisseo) from samples of these soybean meals were used to formulate the treatment diets The nutrient matrix of the four soybean meals are summarized in Table 1.

Tables 2 showed the iso-nitrogenous and iso-caloric broiler starter (1 – 18 days) diets formulated by Creswell, using the 4 soybean meals from different origin while Table 3 summarized diets for grower (19 – 40days).

These diets were fed to male Ross 308 broilers. Parameters including initial weight, final weight, average dairy gain, feed intake, and mortality were collected. Feed conversion ratios (FCR), both corrected and uncorrected for mortality and culls were computed.

Table 1 Nutrient levels used for the soybean meals when formulating the diets in tables 2 and 3.

	Indian SBM	Argentine SBM	US SBM	SS SBM
ME, Kcal/kg	2162	2340	2376	2550
Protein, %	46.00	46.50	47.50	47.50
Calcium, %	0.30	0.30	0.30	0.30
Available P, %	0.20	0.20	0.20	0.20
Sodium, %	0.02	0.02	0.02	0.02
Choline, ppm	2860	2860	2860	2860
Digest. Lysine, %	2.36	2.43	2.46	2.69
Digest. Methionine, %	0.55	0.57	0.56	0.59
Digest. M+C, %	1.03	1.12	1.13	1.18
Digest. Tryptophan, %	0.56	0.59	0.60	0.64
Digest. Threonine, %	1.56	1.64	1.61	1.75
Digest. Arginine, %	3.06	3.16	3.10	3.39
Digest. Isoleucine, %	1.90	1.92	1.92	2.09
Digest. Valine, %	2.00	2.03	2.02	2.20
Moisture, %	10.44	10.61	10.66	11.13
Protein, %	45.55	46.21	45.99	48.58
Fat, %	1.36	2.12	2.63	2.55
Crude fibre, %	6.05	3.75	3.94	2.28
Ash, %	8.04	6.81	6.22	5.54

Note that the ME, digestible amino acids and proximate assay values in the above table were derived by NIRS from samples of these 4 soybean meals.

Table 2 Composition of starter diets (1-18 days)

	India SBM	Argentina SBM	US SBM	SS SBM
Corn, %	38.36	40.60	40.60	45.65
Cassava, %	15.00	15.00	15.00	15.00
India SBM, %	35.20	0.00	0.00	0.00
Argentina SBM, %	0.00	34.30	0.00	0.00
US SBM, %	0.00	0.00	34.50	0.00
SS SBM, %	0.00	0.00	0.00	30.90
Full fat SBM, %	3.00	3.00	3.00	3.00
Soybean oil, %	3.70	2.40	2.20	0.70
Limestone, %	1.21	1.22	1.22	1.23
MDCP 21, %	1.56	1.56	1.56	1.58
Salt, %	0.36	0.36	0.36	0.36
Sodium bicarbonate, %	0.20	0.20	0.20	0.20
Choline chloride 60, %	0.11	0.12	0.12	0.13
L Lysine HCL, %	0.22	0.21	0.20	0.20
DL Methionine, %	0.33	0.30	0.30	0.31
L Threonine, %	0.05	0.03	0.04	0.04
Maduramycin (1%), %	0.05	0.05	0.05	0.05
Mycotoxin binder, %	0.05	0.05	0.05	0.05
Pelleting agent, %	0.50	0.50	0.50	0.50
Vitamins/mins , %	0.10	0.10	0.10	0.10
Total, kg	**100.00**	**100.00**	**100.00**	**100.00**
Nutrient minimums				
ME, Kcal/kg	2950	2950	2950	2950
Protein, % actual	21.10	21.10	21.10	21.10
Lysine, % actual	1.330	1.330	1.330	1.330
Calcium, %	0.860	0.860	0.860	0.860
Available P, %	0.430	0.430	0.430	0.430
Sodium, %	0.220	0.220	0.220	0.220
Choline, ppm	1850	1850	1850	1850
Digest. Lysine, %	1.150	1.150	1.150	1.150
Digest. Methionine, %	0.426	0.426	0.426	0.426
Digest. M+C, %	0.828	0.828	0.828	0.828
Digest. Tryptophan, %	0.184	0.184	0.184	0.184
Digest. Threonine, %	0.713	0.713	0.713	0.713
Digest. Arginine, %	1.208	1.208	1.208	1.208
Digest. Isoleucine, %	0.748	0.748	0.748	0.748
Digest. Valine, %	0.886	0.886	0.886	0.886

Table 3 Composition of grower diets (19-40 days)

	India SBM	Argentina SBM	US SBM	SS SBM
Corn, %	45.60	47.44	47.36	51.80
Cassava, %	15.00	15.00	15.00	15.00
India SBM	30.10	0.00	0.00	0.00
Argentina SBM, %	0.00	29.40	0.00	0.00
US SBM, %	0.00	0.00	29.60	0.00
SS SBM, %	0.00	0.00	0.00	26.50
Full fat SBM, %	2.00	2.00	2.00	2.00
Soybean oil, %	3.20	2.10	2.00	0.60
Limestone, %	1.08	1.08	1.08	1.09
MDCP 21, %	1.35	1.36	1.35	1.37
Salt, %	0.20	0.20	0.20	0.20
Sodium bicarbonate, %	0.20	0.20	0.20	0.20
Choline chloride 60, %	0.03	0.03	0.03	0.04
L Lysine HCL, %	0.19	0.18	0.17	0.18
DL Methionine, %	0.29	0.27	0.26	0.27
L Threonine, %	0.06	0.04	0.05	0.05
Maduramycin (1%), %	0.05	0.05	0.05	0.05
Mycotoxin binder	0.05	0.05	0.05	0.05
Pelleting agent, %	0.50	0.50	0.50	0.50
Vitamins/mins, %	0.10	0.10	0.10	0.10
Total, kg	**100.00**	**100.00**	**100.00**	**100.00**
Nutrient minimums				
ME, Kcal/kg	3000	3000	3000	3000
Protein, % actual Lysine,	18.9	18.9	18.9	18.9
% actual	1.16	1.16	1.16	1.16
Calcium, %	0.76	0.76	0.76	0.76
Available P, %	0.38	0.38	0.38	0.38
Sodium, %	0.16	0.16	0.16	0.16
Choline, ppm	1350	1350	1350	1350
Digest. Lysine, %	1.00	1.00	1.00	1.00
Digest. Methionine, %	0.38	0.38	0.38	0.38
Digest. M+C, %	0.75	0.75	0.75	0.75
Digest. Tryptophan, %	0.17	0.17	0.17	0.17
Digest. Threonine, %	0.64	0.64	0.64	0.64
Digest. Arginine, %	1.08	1.08	1.08	1.08
Digest. Isoleucine, %	0.67	0.67	0.67	0.67
Digest. Valine, %	0.79	0.79	0.79	0.79

Table 4 Effects of soybean meal different origin and nutrient content on performance of male broilers (0-40 days)

Type of SBM	Initial weight, (g)	Final weight, (g)	Weight gain, (g)	Feed intake, (g)	FCR[1]	FCR[2]	Livability, (%)
India	41	2814	2775	4771	1.720[c]	1.739[bc]	96.88
Argentina	41	2815	2776	4710	1.697[bc]	1.711[ab]	96.88
US	41	2865	2825	4736	1.676[ab]	1.676[a]	100.00
SS	41	2831	2792	4686	1.678[ab]	1.690[a]	98.96

[abc] *Means within a column with different superscript differ significantly (P<0.05)*
[1] *Feed conversion ratio corrected for mortality and culls*
[2] *Feed conversion ratio uncorrected for mortality and culls*

Growth performance results summarized in Table 4 showed that broilers fed diets compounded from different types of soybean meal differed.

At the end of the trial (0 – 40days), Creswell and Swick found that feed conversion ratio (FCR) of broilers fed diet using soybean meal from India was significantly (P<0.05) less efficient than those on meals from US and Soon Soon. Although statistically not significant, FCR of broilers on soybean meal from India also compared unfavorably to those on soybean meal from Argentina. Numerically, soybean meal from US produced the highest weight gain with no mortality, followed by Soon Soon with 1% mortality, then Argentina and India, both with 3% mortality. Feed intake of broilers fed diets using Soon Soon soybean meal was the lowest compared to the other groups.

Creswell and Swick's trial clearly demonstrated that soybean meal from different sources of origin is different. Even their contribution to availability of nutrient is probably different. The growth performance response to the four different types of soybean meal was different even though the broilers were offered feeds with similar nutrient specification.

Nutrient content of these soybean meals alone cannot explain why the different respond to feeds with similar nutrient specification. The performance of broiler chicken is closely associated to the nutrients that are available to meet the growth requirement. From this trial, it clearly indicated that there were significant differences in the availability of nutrients from soybean meal since the levels of other feed ingredients usage was formulated to be more or less constant.

It can be concluded that not only were the nutrient content of soybean meal types differed, the availability of these nutrients for growth also differed. As such, when making a purchasing decision for soybean meal, besides price and nutrient (chemical measurement) content consideration, the source that consistently delivered good growth response as a result of high availability of nutrients to the target species is even more critical.

References:

1. Creswell, D and Swick, R.A., 2008. Soybean meals are not all the same! 1: Effect of soybean meal type and specification on the performance of males broilers. Presented at Soybean Meal Quality Conference, 4 – 5 August, 2008 in Bangkok.