

Fat Choice in Broiler Diets

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Fat utilization in broiler rations in the United States has been established for many years. In many other countries, however, use of fats has been sporadic, at much lower levels, and with an emphasis on vegetable fats. In international markets, soybean oil is the preferred fat source as it is perceived as the highest quality fat available. It often sells at a multiple of greater than two times that of imported U.S. yellow grease and thus makes no economic sense unless it has a substantially greater benefit in terms of the performance of the bird.

Relatively speaking, little work on the use of all fats in broiler rations has been performed in the past 20 years. While there has been a good bit of work relative to the energy content of a variety of fat sources (National Research Council, 1994), there has been less work on how these numbers relate to real world performance. The objectives of the current work were to: a) compare various fat sources fed at similar levels to demonstrate that the differences in energy content seen in a digestibility assay have little practical significance at typically fed fat levels; and b) show the benefits of fat additions through a titration of energy in broiler rations using the fats tested in the first trial.

Two broiler floor pen trials were conducted using a curtain-sided facility. In the first trial, seven different fat sources were utilized at three percent of the diet from hatch to seven weeks of age. Birds were weighed and feed intake quantitated at three, five, and seven weeks of age with cut-up and yield at 50 days of age. Diets consisted primarily of corn, soybean meal, and animal by-product meal.

The second trial utilized two fat types (soybean oil versus an animal-vegetable blend) at four different levels of energy. Diets were formulated to industry standard levels used in the initial trial as well as three additional diets with energy increasing at 100 kilocalories (kcal) per kilogram (kg) increments. Thus, if the starter diet was 3,075 kcal, the additional diets contained 3,175, 3,275, and 3,375 kcal based on energy content of the rendered product. Soybean oil replaced the rendered fat on a one-to-one basis rather than being adjusted for differential energy content. Similar procedures were utilized as in the first trial with weights obtained at diet changes of three, five, and seven weeks of age.

Results and Discussion

Results for the first study are found in Tables 1 and 2. Birds on all treatments performed very well with final body weights approaching three kilograms. Few differences in any of the parameters measured were noted, suggesting that the

Table 1. Means for the Adjusted Feed:Gain Ratios per Bird for the Growth Period

Fat Source	0-3 Week (kg:kg)	0-5 Week (kg:kg)	0-7 Week (kg:kg)
Soybean Oil	1.38	1.60	1.87
Yellow Grease	1.38	1.56	1.85
Poultry Fat	1.38	1.58	1.85
Tallow	1.40	1.61	1.83
Vegetable-animal Blend (VA)	1.42	1.63	1.86
Lard	1.40	1.52	1.77
Palm Oil	1.42	1.56	1.88

Level of significance (probability of difference [p]<0.05).

Table 2. Means for the Average Broiler Gain for the Growth Period

Fat Source	0-3 Week (kg/bird/phase)	0-5 Week (kg/bird/phase)	0-7 Week (kg/bird/phase)
Soybean Oil	0.77	1.92	2.85
Yellow Grease	0.76	1.96	2.95
Poultry Fat	0.76	1.93	2.92
Tallow	0.75	1.92	2.99
VA	0.74	1.89	2.96
Lard	0.75	1.88	2.97
Palm Oil	0.75	1.95	2.94

Level of significance (p<0.05).

Should be Based on Economics

choice of fat source should be based on economics rather than perceived differences. While numerous analyses suggest that there are differences in metabolizable energy of different fat sources (Table 3), there is no indication that these differences are of consequence in a practical formulation. Although not of statistical significance, the highest numerical growth rates were found in the more saturated animal fats (lard and tallow).

Results for the second study are found in Tables 4 and 5. Again, performance of broilers was quite good with body weight gain over three kilograms at seven weeks. No differences were observed in body weight at the conclusion of the trial, but increased energy content resulted in improved feed efficiency at the conclusion of the trial as expected, although the differences seen were perhaps less dramatic than some research in the past. Recent data has shown a reduced caloric intake per pound of body weight gain in modern broilers, which may

mean that birds will have less response to added energy than in the past.

Conclusions

Utilization of any of the commonly available fats will result in similar performance, and fat additions should probably be made based on economic considerations rather than criteria such as fatty acid profiles. Increasing energy in the diet through fat addition improves feed efficiency at later ages. **R**

Table 3. Metabolizable Energy (ME) of Fat Sources

Fat Source	ME (kcal/kg)
Yellow Grease	7,268
VA	8,124
Soybean Oil	8,197
Poultry Fat	8,220
Lard	8,386
Palm Oil	8,561
Tallow	9,144

Table 4. Means for the Adjusted Feed:Gain Ratios per Bird for the Growth Period

Energy Source	Treatment	0-3 Week (kg:kg)	0-5 Week (kg:kg)	0-7 Week (kg:kg)
Soybean Oil	1	1.51	1.64	1.87 ^{AB}
	2	1.44	1.62	1.84 ^{BC}
	3	1.42	1.63	1.83 ^{BC}
	4	1.51	1.63	1.82 ^{BC}
VA	5	1.50	1.67	1.91 ^A
	6	1.48	1.65	1.86 ^{ABC}
	7	1.51	1.65	1.84 ^{BC}
	8	1.60	1.67	1.81 ^C

A, B, C – Means in the same column bearing different subscripts are significantly different ($p < 0.05$).

Table 5. Means for the Average Broiler Gain for the Growth Period

Energy Source	Treatment	0-3 Week (kg/bird/phase)	0-5 Week (kg/bird/phase)	0-7 Week (kg/bird/phase)
Soybean Oil	1	0.72	1.91 ^A	3.28
	2	0.74	1.88 ^{AB}	3.28
	3	0.73	1.78 ^{BC}	3.08
	4	0.70	1.74 ^C	3.07
VA	5	0.73	1.90 ^A	3.24
	6	0.74	1.90 ^{AB}	3.24
	7	0.71	1.88 ^{AB}	3.31
	8	0.72	1.89 ^{AB}	3.28

A, B, C – Means in the same column bearing different subscripts are significantly different ($p < 0.05$).