

# Poultry diets compared for gross margin improvement

*Four structured treatments using a proprietary feed blend versus commodity meat and bone meal were assessed to compare differences in broiler performance and yield and determine their associated economic values.*

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**I**n ongoing efforts to optimize broiler performance and promote customer profitability, poultry feed suppliers are constantly looking for ways to help nutritionists raise birds more cost-effectively.

With those goals in mind, several pen trials were recently conducted at the University of Arkansas in Fayetteville, Ark., to measure the value of four selected feed mixes and their relative effects on growth, performance and carcass characteristics in broilers.

The study was designed to assess bird performance and yields in four structured treatments and determine their associated economic values. Specifically, researchers wanted to compare the effects of a proprietary feed blend (ProPlus 57 from H.J. Baker) to differences in performance and yield that result from variations in commodity meat and bone meal (MBM) during production. Diets were formulated to meet nutrient requirements based on the Brazil standards.

"More accurately formulating feeds to digestibility targets can diminish nutrient waste and excess cost," explained H.L. Goodwin, professor of agricultural economics and agribusiness at the University of Arkansas. "That promotes enhanced efficiency of the feeding program, which is what we hoped to identify."

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## Research process

The study included four treatments with 12 replicates each of 25 male birds from a Cobb 500 female line. The broilers were fed a starter diet for days 0-14, a grower diet for days 14-28 and a finisher diet for days 28-49.

Treatment 1 received the protein blend continuously. Treatment 2 was fed MBM50 only. Treatment 3 (MBMV) began with MBM50, but at day 14, the starter diet was weighed out, and then the grower and withdrawal diets rotated among three blends formulated with MBM45, MBM50 or MBM55. Treatment 4 (MBMV50) birds were fed diets formulated with the nutrient profile for MBM50, but MBM45 was used in the actual diets.

## Diet formulations

Diets were formulated to meet the nutrient requirements based on the recommendations of Brazil standards. Throughout the trials, the MBMV ration was balanced for the MBM50 ingredient (treatments 3 and 4).

Feed formulation for each treatment and the resultant costs per kilogram by treatment using May 11, 2015, market prices are presented in Table 1. Note that the amount of feed associated with treatment 1 was the highest vis-à-vis the other treatment diets. The feed cost also was 3-6 cents/kg higher for the treatment 1 diet.

## Biological results

Five birds per pen were randomly selected and individually weighed during day 49 for processing. A hot carcass weight was obtained. Carcasses were chilled in an ice bath for two hours. Post-chilling, the whole carcass was reweighed. The breast major and minor, wings and leg quarters were removed and subsequently weighed. Mean liveweights for each treatment, the whole bird without giblets (WOG) — calculated as a summation of parts yield to

account for shrinkage — and the weight for each of the assessed parts are shown in Table 2.

An analysis of the treatment effects on bird liveweights revealed that at day 49, broilers consuming the treatments 1 and 2 diets had significantly heavier liveweights at slaughter than those consuming the treatments 3 and 4 diets, at 3.805 kg and 3.793 kg versus 3.724 kg and 3.721 kg, respectively.

The effects of treatments on feed showed no statistically significant differences among the four treatments across the entire 49-day period, even though there was a 0.013 difference between treatments 1 and 2 and a slightly larger difference between treatments 1 and 3. Similarly, there was no statistically significant difference among treatments for livability across the 49-day period.

The effects of treatments on feed intake per bird are shown in Table 3. With respect to total feed intake during the 49-day trial, statistically significant differences were shown to exist among treatments 1, 3 and 4 and between treatments 2 and 4. Ranking the feed intakes per bird under the four treatments revealed that the treatment 1 diet resulted in the highest feed consumption, at 6.42 kg per bird, compared with treatment 2 at 6.26 kg per bird, treatment 4 at 6.29 kg per bird and treatment 3 at 6.24 kg per bird.

These results suggest that despite no statistically significant difference in feed:gain ratios, the higher feed consumption per bird would result in larger birds based on total feed consumption over the 49-day period.

## Economic results

Combining the results of Tables 1 and 2 and adding the May 11, 2015, prices for parts resulted in an interesting summation for the pen trials in terms of economics (Table 4). It can be seen that the gross margin — i.e., revenues from harvested meat minus the feed costs — for treatment 1 was greater than that for any other treatment by 11-14 cents per bird. This calculation assumes that feed costs for each of the alternative rations are equal to the treatment 2 ration.

Although feed costs per bird for broilers fed the treatment 1 diet were indeed higher by 3-6 cents per bird, there were associated increases in revenues of 14-21 cents

per bird resulting from parts value. Hence, based on gross margins, broilers fed treatment 1 outperformed other diets in terms of enhanced bird performance.

Now that the gross margin differences and the cost differences have been shown for various diet formulations, a calculation of the return on investment by using the protein blend as a replacement for traditional MBM diet formulations is possible. By weighting the amount of animal-based proteins necessary for starter, grower and finisher feeds, it can be derived that, using industry data for 49-day-old broilers, enough feed to produce 2,845 broilers to slaughter weight can be produced from one ton of animal-based protein.

To calculate the return on investment for one ton of the protein blend, multiply the 2,845 birds by the additional gross margin for the protein blend — 11-14 cents per bird — and divide by the cost premium paid for the protein blend versus MBM. The amount of additional gross margin per ton of protein blend is \$312.95-398.30.

The cost premium at the time of analysis of \$55 per ton, divided into the additional gross margin, yields returns on investment of 5.69 and 7.24, respectively. The additional total gross margin for this number of birds is between \$132,000 and \$168,000 per week, assuming a 1.2 million-bird complex.

## Summary

This study dealt with the use of broiler pen trials designed to assess relations among bird performance and yields of four structured treatments as well as to develop economic values of these relationships. Key findings from the study were:

- Based on broiler pen trials conducted at the University of Arkansas for 49-day-old birds, significantly higher liveweights, feed intakes per bird and weight gains were evident for the protein blend and the MBM50 diets over other diets.

- The amount of feed and cost per kilogram associated with the protein blend treatment diet were the highest vis-à-vis other treatment diets. The cost differences were on the order of 3-6 cents per bird for 49-day-old birds.

- The gross margin — the revenues from harvested meat minus the feed costs to get the broiler to slaughter — for the protein blend treatment was greater than for any other treatment by 11-14 cents per bird for 49-day-old birds.

## 1. Feed formulation for each treatment and resultant costs/kg

Treatment	Days			
	0-14	14-28	28-49	Total
<b>1/Protein blend</b>				
Feed, kg	0.52	1.87	4.07	6.42
Cost, \$/kg	0.1886	0.6632	1.4514	2.3032
<b>2/MBM50</b>				
Feed, kg	0.52	1.85	4.03	6.36
Cost, \$/kg	0.1906	0.6549	1.4264	2.2719
<b>3/MBMV</b>				
Feed, kg	0.51	1.83	3.93	6.27
Cost, \$/kg	0.1884	0.6488	1.3920	2.2293
<b>4/MBMV50</b>				
Feed, kg	0.52	1.84	3.96	6.29
Cost, \$/kg	0.1917	0.6510	1.4009	2.2436

## 2. Mean weights for each of the four treatments

Treatment	Liveweight, kg	Wings, g	Breast, g	Tenders, g	Legs, g	Rack, g	WOG weight, kg	WOG dressing %	WOG value, \$
1	3.98	294.43	821.10	159.52	941.88	788.72	3.01	75.53	7.57
2	3.93	287.18	807.53	155.30	915.00	775.72	2.94	74.75	7.40
3	3.89	287.15	792.02	155.45	914.37	760.02	2.91	74.86	7.32
4	3.89	285.90	803.15	151.80	924.02	767.69	2.93	75.30	7.38
Georgia									
dock, \$/kg*	—	3.685	4.488	4.763	1.078	0.11	2.517	—	—

\*As of May 11, 2015.

## 3. Impacts of treatments on feed intake, kg/bird

Treatment	Days				
	0-14	14-28	0-28	0-49	28-49
1	0.518 + 0.004	1.870 + 0.012	2.384 + 0.014	6.423 <sup>a</sup> + 0.031	4.070 <sup>a</sup> + 0.032
2	0.517 + 0.006	1.850 + 0.015	2.359 + 0.020	6.357 <sup>ab</sup> + 0.045	4.027 <sup>ab</sup> + 0.035
3	0.511 + 0.004	1.833 + 0.008	2.343 + 0.011	6.235 <sup>c</sup> + 0.028	3.930 <sup>c</sup> + 0.028
4	0.520 + 0.005	1.839 + 0.010	2.353 + 0.014	6.289 <sup>bc</sup> + 0.024	3.955 <sup>bc</sup> + 0.018
P-value	0.5862	0.1648	0.3365	0.0020	0.0035

\*Statistically significant at: (a) the 0.01 level of significance, (b) the 0.05 level of significance or (c) the 0.10 level of significance.

## 4. Per bird parts value, feed costs and gross margins (\$), by treatment, for broiler pen trials of 49-day-old broilers

Treatment	Liveweight, kg	Parts value	Feed cost	Gross margin
1	3.98	6.63	2.30	4.33
2	3.93	6.49	2.27	4.22
3	3.89	6.42	2.23	4.19
4	3.89	6.46	2.24	4.22

- In terms of economics, specifically gross margins, bird performance was substantially enhanced for broilers fed the protein blend diet over the other treatment diets. A typical poultry complex processing 1.2 million 49-day-old birds per week could realize an increase in net revenues

(added profits) of between \$132,000 and \$168,000 per week, if all other factors are held constant.

- Returns on investment for the \$55-per-ton additional cost of the protein blend ranged from 5.69 at the 11-cent gross margin and 7.24 at the 14-cent gross margin. ■