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Probiotics for Broilers and Turkeys

E. Guenther and C. W. Carlson¹

Probiotic Broiler Study

The objective of this test was to measure the growth response and feed conversion of broiler chicks when fed graduated levels of Probiotic No. 1 with two levels of dietary protein. This material is reported to be a killed culture of lactobacillis and other organisms suspended in the culture media. The duration of the test was 8 weeks starting with day-old Golden Giant broiler male chicks.

The treatments consisted of 10 levels of the probiotic, 3 levels of a placebo (Culture Medium) and 1 level of Culture Supernate fed with each of two levels of protein. A separate control was used for each protein level.

The higher level of protein was formulated to supply 100% of the National Research Council's recommended amino acid (AA) requirements and the lower level of protein supplied 70% of the AA requirements. The starting diets contained 23% and 16% protein, respectively. After 6 weeks and for the remaining 2 weeks of the test, the protein levels were reduced to 20% and 14%, respectively. Throughout the test the energy value of all diets was maintained at 3200 Cal of M.E. per kg of feed.

The broilers were started and grown in a windowless, gas heated, exhaust ventilated facility in brooder-grower wire cages. Three replicate lots of 20 chicks were placed in the upper decks of the 45 x 61 cm starting cages for each of the 30 treatments, making a total of 1800 male chicks used in the study. After 6 weeks, the number of chicks in each lot was reduced to 16, and 8 of these were transferred to the lower deck, resulting in six observational units per treatment.

Feed consumption and body weights by group were recorded at 2-week intervals. Samples of dead chicks were submitted to the SDSU Diagnostic Laboratory for necropsy. Chicks from selected treatments were submitted to the SDSU Microbiology Department for microbial population studies, the results to be reported elsewhere. Continuous, 24-hour lighting was used throughout the study.

The results of this study are summarized in table 1. Added increments of the probiotic did not produce a graded growth response pattern. The weights of the control group in both the 100% AA and 70% AA treatments ranked among the heavier birds. Among the 100% AA treatments, birds fed the medium and

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high levels of placebo and the Culture Supernate also ranked among the heavier birds of the test. Broilers fed the 100% AA diets were significantly heavier than those fed the 70% AA diets (1.925 kg vs 1.759 kg).

Feed conversion ratios of the groups fed the 100% AA diets averaged 1.831, while the conversion ratios for the 70% AA groups averaged 2.068 units of feed per unit of gain. Otherwise, there was no pattern relating feed conversion to dietary levels of the probiotic. The broilers readily ate all of the diets and no unusual dropping or bowel conditions were observed.

No unusual health problems were encountered. Diagnostic reports commonly indicated staphylococcal infections of the hock joints and synovial fluid. Hot weather was experienced during the last 2 weeks of the test causing reduced feed intake and excessive water consumption.

Table 1. Body Weights and Feed Conversion of Broilers Fed Graduated Levels of Probiotic at 8 Weeks of Age

Treatment	Probiotic level gm/T	100% AA		70% AA	
		8 week weights kg	Feed conversion	8 week weights kg	Feed conversion
A	18	1.860de ¹	1.900	1.719h	2.033
B	36	1.904bc	1.879	1.763fgh	2.061
C	70	1.893cd	1.753	1.788efg	2.045
D	155	1.977a	1.778	1.703h	2.085
E	284	1.886cd	1.866	1.804ef	2.039
F	567	1.891cd	1.787	1.763fgh	2.053
G	1135	1.982a	1.834	1.798efg	2.035
H	2265	1.929abc	1.826	1.775fgh	2.093
I	4538	1.954abc	1.819	1.732fgh	2.107
J	9077	1.852de	1.905	1.744fgh	2.056
K	Low placebo ²	1.899bcd	1.832	1.749fgh	2.086
L	Medium placebo	1.982a	1.827	1.725gh	2.110
M	High placebo	1.953abc	1.831	1.763fgh	2.066
N	Supernate ³	1.971ab	1.833	1.774fgh	2.066
O	Control	1.938abc	1.794	1.789efg	2.086
	Average	1.925	1.831	1.759	2.068

¹Duncan's Multiple Range (P<.01) Test. Values with the same superscripts are not significantly different.

²Culture media only without the culture.

³Fluid without the dead organisms.

Probiotic and Pellets Turkey Study

The objectives of this test were to measure the effects of probiotics in the feed during the early growth period and pelleting condition of the feed during the finishing period on growth and feed efficiency of two strains of Large White toms.

A total of 660 poults, 330 of each of two strains, were grown in electric starting batteries to 3 weeks of age and then moved to 1.8 x 3 m floor pens using the following dietary regime:

1. Basal (commercial starter, grower, finisher)
2. Basal + Probiotic No. 1 at 156 gm per ton
3. Basal + Probiotic No. 2 at 1135 gm per ton

The pen arrangement permitted four replicates of the three dietary treatments for each of the two strains. At 14 weeks of age the following dietary regime was superimposed on each of the previous dietary groups, all diets being pelleted.

1. Basal + 2% fat + no binder
2. Basal + 0.5% fat + no binder
3. Basal + 0.5% fat + 0.5% bentonite
4. Basal + 0.5% fat + 1% commercial pellet aid

The study was concluded when the birds reached 22 weeks of age. Individual body weights and feed consumption by pens were recorded at 2-week intervals.

Results of the probiotic and pelleting effects are shown in table 2. The mortality shown during the first 14 weeks resulted from an unusual condition preceding the test. The accuracy of sexing had not been satisfactory on previous lots of poults, and it was decided to double check the sex at the hatchery. Although the poults appeared normal on delivery, the effects of double sexing quickly became apparent. High death losses took place during the first 10 days. Reports from the SDSU Diagnostic Laboratory indicate that the poults were not complete starveouts, but that their feed intake was less than normal. All poults contained large yolks, and several had evidence of umbilicus inflammation. The yolk material was coagulated in nearly all of the poults. Cultures of the livers and yolk sacs yielded E. coli. The significant degree of yolk sac infection probably explained the mortality. Since the mortality subsided abruptly after 10 days, the surviving poults were used in the test. The final body weights, both at 14 and 22 weeks, would indicate that there had not been any detrimental carryover.

Since there were no significant strain-probiotic or strain-pelleting interactions, only the main treatment effects are shown in the table. The only significant and consistent difference was associated with the body weight of the strains. There were no significant effects associated with the use of probiotics or the pelleting conditions in this study.

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Table 2. Effects of Probiotics and Pelleting Conditions on Growth and Feed Conversion of Two Strains of Large White Turkey Males

<u>Treatment</u>	<u>Mortality</u> %	<u>Weight</u> kg	<u>Feed conversion</u>
<u>Probiotics (0-14 weeks)</u>			
Strain 1	29.3	7.567a*	2.232
Strain 2	25.9	8.501b	2.180
Basal	30.4	7.960a	2.201
Probiotic No. 1	33.7	8.095a	2.195
Probiotic No. 2	15.6	8.113a	2.202
<u>Pelleting (15-22 weeks)</u>			
Strain 1	3.9	13.214a	2.890
Strain 2	0.6	14.485b	2.874
2% fat	1.1	13.998a	2.882
0.5% fat	3.3	13.885a	2.823
0.5% fat + 0.5% bentonite	4.4	13.784a	2.886
0.5% fat + 1% commercial pellet aid	0.0	13.772a	2.898

*Duncan's Multiple Range (P<.01) Test. Data with unlike superscripts differ significantly.