Education • Research • Extension
TEXAS A&M UNIVERSITY
College of Agriculture and Life Sciences
Department of
Poultry Science

June 6, 1995

Mr. Johnny Brannen, President and CEO
and
Mr. Douglas Skolaut, Agronomist
Organic Solutions, Inc.
8023 Vantage Drive, Suite 600
San Antonio, Texas 78230

Gentlemen:

Enclosed are copies of the Final Report finalizing the Memorandum of Agreement involving the evaluation of Nutra-Flour as an ingredient in a commercial layer diet. The experiment was a successful one in that we had no significant problems that would have affected the outcome of study. Rate of egg production, livability and bird care were excellent. We had no problems pulling the data together (except that we have volumes of it), and it took time. Add to that the demands for my time as a teacher, researcher and industry trouble shooter, and things sometime go slow.

If you choose to conduct a second study somewhere, I would suggest that you increase the number of birds in the experiment. Normally 40 hens per treatment group is adequate. In this study we encountered small, consistent differences that turned out not to be statistically significant. As a scientist one does not know how to interpret these differences because one is so dependent on statistical interpretation. More birds per group may have helped us. I have the gut feeling that some of these differences may be real because of their consistency, but the statistics say not.

We enjoyed doing this project for you.

Sincerely,

W. F. Krueger

W. F. Krueger
Professor

Tests using Perma-Guard Fossil Shell Flour

Room 101 Kleberg Animal and Food Science Center
Texas A&M University

TABLE 2

THE EFFECT OF NUTRA-FLOUR AND DIETARY PROTEIN LEVEL ON FEED EFFICIENCY, LIVABILITY, EGG WEIGHT AND BODY WEIGHT FOR TEN PERIODS OF PRODUCTION USING EGG-TYPE COMMERCIAL LAYERS.

Treatment	No. Hens	Feed Efficiency	Livability (%)	Egg Weight	Body Weight
15% Protein Control	42	2.2459a	85.71a	60.19 b	1674a
15% Protein + NF	44	2.1543 b	86.36a	62.30a	1618a
16% Protein Control	42	2.1179a	90.48a	62.53a	1569a
16% Protein + NF	42	2.1229a	92.86a	60.65 b	1672a
17% Protein Control	42	2.0659a	95.24a	61.33a	1675a
17% Protein + NF	42	2.1158a	100.00a	61.65a	1593a
Control Diets	126	2.1404a	90.48a	61.35a	1639a
Control Diets + NF	128	2.1311a	92.97a	61.53a	1627a
15% Protein Diets	86	2.1991a	86.05 b	61.25a	1646a
16% Protein Diets	84	2.1199 b	91.67 b	61.59a	1620a
17% Protein Diets	84	2.0910 b	97.62a	61.49a	1634a

ab Means within treatment classes followed by different letters are significantly different statistically at P = .05.

NOTES:

Feed efficiency (FE) is defined as the grams of feed required to produce a gram of egg mass. A difference (LSD) of 0.050 units FE is required for statistical significance.

Differences in livability were tested statistically using Chi Square analysis.

A difference of 0.82 grams (LSD) in egg weight is required for statistical significance.

A difference of 130 grams (LSD) in body weight is required for statistical significance.

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16% Protein + NF	42	2.1229a	92.86a	60.65 b	1672a
17% Protein Control	42	2.0659a	95.24a	61.33a	1675a
17% Protein + NF	42	2.1158a	100.00a	61.65a	1593a
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Control Diets + NF	128	2.1311a	92.97a	61.53a	1627a
15% Protein Diets	86	2.1991a	86.05 b	61.25a	1646a
16% Protein Diets	84	2.1199 b	91.67 b	61.59a	1620a
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A difference of 0.82 grams (LSD) in egg weight is required for statistical significance.

A difference of 130 grams (LSD) in body weight is required for statistical significance.

TABLE 3

THE EFFECT OF NUTRA-FLOUR AS A SUPPLEMENT TO 15, 16 AND 17 PERCENT CRUDE PROTEIN LAYER DIETS ON PERCENT HEN-DAY* EGG PRODUCTION IN COMMERCIAL LAYERS WHEN FED FOR 10 PERIODS OF PRODUCTION.

Treatment**	No. Hens	Periods 1 - 3	Periods 4 - 6	Periods 7 - 10	Periods 1 - 10
15% Protein Control	42	86.33	82.47	80.25	83.19a
15% Protein + NF	44	85.45	82.71	77.81	82.19a
16% Protein Control	42	88.14	84.65	76.66	83.39a
16% Protein + NF	42	90.13	85.25	80.99	85.63a
17% Protein Control	42	88.51	87.30	82.65	86.29a
17% Protein + NF	42	88.48	86.39	78.89	84.73a
Control (No NF)	126	87.67a	84.85a	79.87a	84.30a
Plus Nutra-Flour	128	87.97a	84.78a	79.20a	84.16a
15% Protein Diet	86	85.87a	82.60a	78.99a	82.64a
16% Protein Diet	84	89.14b	84.95ab	78.82a	84.51ab
17% Protein Diet	84	88.49b	86.84 b	80.73a	85.50 b

* Percent hen-day egg production is a function of rate of egg production only. Hens contribute to hen-day egg production only as long as they are alive.

** Means within columns and treatment groups followed by the same letter do not differ significantly at P = .05.

TABLE 4

THE EFFECTS OF NUTRA-FLOUR AS A SUPPLEMENT TO 15, 16, AND 17 PERCENT CRUDE PROTEIN LAYER DIETS ON PERCENT HEN-HOUSED* EGG PRODUCTION IN COMMERCIAL LAYERS WHEN FED FOR 10 PERIODS OF PRODUCTION.

Treatment	No. Hens	Periods 1 - 3	Periods 4 - 6	Periods 7 - 10	Periods 1 - 10
15% Protein Control	42	83.47	76.58	72.10	77.47
15% Protein + NF	44	85.45	78.73	71.54	78.71
16% Protein Control	42	86.04	80.62	71.34	79.51
16% Protein + NF	42	88.94	81.96	75.20	82.17
17% Protein Control	42	88.51	85.58	78.72	84.40
17% Protein + NF	42	88.45	86.39	78.89	84.73
Control (No. NF)	126	86.01	80.93	74.05	80.46
Plus Nutra-Flour	128	87.62	82.36	75.21	81.87
15% Protein Diet	86	84.46	77.62	71.82	78.09
16% Protein Diet	84	87.49	81.29	73.27	80.84
17% Protein Diet	84	88.50	85.99	78.80	84.57

* Percent hen-housed egg production is a function of rate of egg production and mortality. It is production based on the number of pullets originally housed.

TABLE 5

THE EFFECT OF NUTRA-FLOUR AS A SUPPLEMENT TO 15, 16, AND 17 PERCENT CRUDE PROTEIN DIETS ON EGG WEIGHT IN EGG-TYPE COMMERCIAL LAYERS.

Treatment	No. Hens	Periods 1 - 3	Periods 4 - 6	Periods 1 - 10	Periods 1 - 10
15% Protein Control	42	57.07	60.98	63.70	60.19b
15% Protein + NF	44	59.69	62.76	65.53	62.30 a
16% Protein Control	42	60.08	62.09	66.87	62.53a
16% Protein + NF	42	58.33	60.71	64.03	60.65 b
17% Protein Control	42	59.24	61.29	64.52	61.33a
17% Protein + NF	42	59.34	61.83	64.84	61.65a
Control (No. NF)	126	58.80	61.45	65.03	61.35a
Plus Nutra-Flour	128	59.12	61.77	64.80	61.53a
15% Protein Diet	86	58.38	61.87	64.62	61.25a
16% Protein Diet	84	59.21	61.40	65.45	61.59a
17% Protein Diet	84	59.29	61.56	64.68	61.49a

ab Means within treatment classes followed by different letters are significantly different statistically at P = .05.

The difference (LSD) required for significance at P = .05 level of probability is 0.82 grams.

TABLE 6

THE EFFECT OF NUTRA-FLOUR AS A SUPPLEMENT TO 15, 16, AND 17 PERCENT CRUDE PROTEIN LAYER DIETS ON BODY WEIGHT IN EGG-TYPE COMMERCIAL LAYERS.

Treatment	No. Hens	Periods 1 - 3	Periods 4 - 6	Periods 7 - 10	Periods 1 - 10
15% Protein Control	42	1697	1664	1652	1674a
15% Protein + NF	44	1651	1616	1570	1618a
16% Protein Control	42	1572	1561	1574	1569a
16% Protein + NF	42	1611	1792	1583	1672a
17% Protein Control	42	1629	1776	1591	1675a
17% Protein + NF	42	1655	1530	1596	1593a
Control (No. NF)	126	1633	1667	1606	1639a
Plus Nutra-Flour	128	1639	1646	1583	1627a
15% Protein Diet	86	1674	1640	1611	1646a
16% Protein Diet	84	1592	1677	1578	1620a
17% Protein Diet	84	1642	1653	1593	1634a

a Means within treatment classes followed by the same letter do not differ significantly at P = .05.

The difference (LSD) required for significance is 130 grams at P = .05 level of probability.