

Effect of Different Levels of Coconut Meal on Egg Production¹

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ABSTRACT

Different levels of coconut meal in laying diets were compared in three studies using intensity of lay and feed conversion as criteria for comparison. In all studies the production and efficiency of feed utilization decreased as the level of coconut meal was increased in the diet.

The best results were obtained when the level of coconut meal did not surpass approximately 20% of the diet. The practical level of coconut meal up to approximately 20% of the diet will be determined by its relative net cost.

INTRODUCTION

Soldevila et al. (3) reported that coconut meal obtained by the expeller-process may be used up to a level of 50% in practical diets for broilers. These results generally substantiated the work of Thomas and Scott (4).

Coconut meal is known to contain no toxic factors (4). The solvent-extracted product has proven superior to the expeller-extracted one, because the lysine present is less severely damaged (1). Coconut meal is known to be deficient in some of the essential amino acids, particularly methionine and phenylalanine (2).

The objective of these studies was to determine the maximum levels of expeller-extracted coconut meal that could be efficiently used in practical laying diets.

MATERIALS AND METHODS

Different levels of coconut meal were evaluated in three nutritional studies carried out with Leghorn hens at the Lajas Substation, in which production and feed conversion were used as criteria for comparison. The first two studies were carried out in 1966-67, and the third one in 1968-69. In the three trials individual wire cages over water pits were used.

In the first study, a partially-balanced-incomplete-block design with eight treatments and six replications was used. Each replicate consisted

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of two hens which were housed in adjacent wire cages. In the second study, a complete block design with five treatments replicated 12 times was used. Each replicate consisted of one hen housed in an individual wire cage. In the third study, a singular block-divisible design with eight treatments replicated six times was used. Each replicate consisted of two hens housed in two adjacent wire cages.

The basal diets used in these studies are described in table 1. Feed and water were offered free choice.

RESULTS AND DISCUSSION

In the three studies, as the level of coconut meal in the diet increased over 20%, the overall performance of the birds was poorer.

TABLE 1.—*Composition of the basal diets used during the laying studies*

Ingredient	Study 1	Study 2	Study 3
	%	%	%
Corn, dent, no. 2, ground	0-76.7	60.9-75.8	3.5-76.0
Coconut meal ¹	0-76.7	0-20.0	0-70.0
Soybean meal	9.0	6.1-9.0	.0-9.1
Tuna fishmeal	6.0	6.1-9.0	.0-9.1
Meat meal with bone	3.0	0	0
Dicalcium phosphate	.5	1.0-1.7	1.0-2.5
Limestone, ground	4.0	4.4	4.0-5.2
Tallow	0	0	0-18.0
NaCl	.5	.5	.5
Premix ²	.3	.3	.3
Crude protein, calculated	15.41-24.62	15.25	15.03
Calcium, calculated	2.33-2.45	2.55	2.68
Phosphorus, calculated	.52-.61	.61	.90

¹The average percentage chemical composition of the coconut meal used was: Moisture 14.03; crude protein 22.07; fat 12.39; fiber 8.32; ash 6.80 (Ca .26 and P .84); nitrogen-free extract 36.39.

²Contains .0009 vitamins A/D₃ (500,000/100,000 IU/g); .0002 riboflavin; .0006 niacin; .0250 manganese sulfate (75%); .2000 terramycin (3 g oxytetracycline and 3 mg vitamin B₁₂/kg).

In study 1 (table 2), the experimental control (commercial diet 8) was matched in overall performance only by the diets containing 0 and 13% coconut meal. A level of 26% and above of coconut meal brought about very poor results from the standpoint of feed conversion, production, and mortality.

In study 2 (table 2), when isonitrogenous diets containing levels of coconut meal as high as 20% were evaluated, the overall performance of all diets was excellent and comparable.

In study 3 (table 2), where the diets were isonitrogenous and isocaloric, the results demonstrate again that levels as high as 20% coconut meal

TABLE 2.—Average egg production and feed utilization for laying studies conducted at the Lajas substation

Diet	Coconut meal in diet	Production	Feed conversion
Number	%	Laying rate ¹	Lb feed/dozen eggs
<i>Study 1—From July to October 1966</i>			
1	0	56.0 a ²	3.88 a
2	13	52.8 ab	4.14 ab
3	26	37.8 bc	5.80 cd
4	39	46.0 ab	5.37 bc
5	52	39.2 bc	6.17 cd
6	65	27.8 c	8.62 d
7	77	11.8	20.79
8 (Commercial diet)	0	50.8 ab	4.70 abc
<i>Study 2—From February to July 1967</i>			
1	0	72.4 a	3.30 a
2	5	71.2 a	3.30 a
3	10	70.8 a	3.55 a
4	15	73.4 a	3.27 a
5	20	70.9 a	3.45 a
<i>Study 3—From May to August 1968³</i>			
1	0	76.5 a ³	3.11 a
2	10	71.0 a	3.36 ab
3	20	71.2 a	3.17 ab
4	30	51.9 b	3.70 bc
5	40	46.4 bc	4.14 cd
6	50	37.2 c	4.72 d
7	60	19.0 d	8.38 e
8	70	13.4 d	9.23 f

¹ Percent laid during the experimental period, based on the standard 2-oz egg.

² Means followed by the same small letter or letters are not significantly different at $P = .05$ level.

³ Means listed below that are followed by the same letter or letters are not significantly different at $P = .01$.

may be successfully incorporated in practical-type laying diets. These results basically corroborate the work of Thomas et al. (4) and their conclusion that the use of coconut meal requires careful formulation in order to insure proper balance of all nutrients. On the other hand, this study shows marked differences from the previous results obtained by the author and coworkers (3) with broiler chicks.

All hens in study 3 were fed a commercial laying diet after the completion of the trial. Thirty days after such change, the average production of all groups was equivalent and comparable to the control group used throughout the experiment, demonstrating that no residual

effect was caused by prior feeding to high levels of coconut meal for prolonged periods.

RESUMEN

En tres estudios de nutrición durante el período de postura se evaluaron diferentes niveles de harina de coco en dietas prácticas, usando la intensidad de la postura y la eficiencia en la utilización del alimento como criterios de evaluación. En términos generales, el crecimiento de las aves menguó y la utilización del alimento fue más pobre a medida que el nivel de harina de coco en la dieta se aumentó.

El uso de harina de coco en niveles hasta aproximadamente el 20% de la dieta por períodos prolongados no dejó efectos residuales perjudiciales en las gallinas que lo consumieron. La harina de coco posee un alto contenido de protefna bruta que, sin embargo, es deficiente en algunos aminoácidos esenciales y su contenido calórico es menor que el del maíz. El nivel práctico a usarse en las dietas hasta aproximadamente el 20%, lo determinará el costo neto de su incorporación.

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