COCONUT MEAL FOR GROWING PIGS

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ABSTRACT

A total of 79 pigs were used in three experiments to evaluate coconut meal in rations for growing pigs at levels up to 30 per cent of the ration. There were no significant treatment effects up to this level of inclusion, although there was a trend to reduced performance with increasing coconut oil meal inclusion.

INTRODUCTION

Coconut oil meal is produced from the dried endosperm of the coconut, *Cocos nucifera.* The meal produced in Papua New Guinea is usually exported to Europe where it is widely used as feed for dairy cattle. Because of its wide availability in the tropics it has been investigated by a number of authors as a possible ingredient of pig rations (Grieve, Osbourn and Gonzales 1966, Adzic, Gradinae, Bozickovic and Zivkovic 1966, Springhall 1969, Cresswell and Brooks 1971b). Cresswell and Brooks (1971a) have also studied the digestibility and chemical composition of coconut meal in detail. Arek (unpublished 1971) has studied the effect of local coconut meal on the growth and carcass development of the pig.

There appears to be disagreement in the published literature on the value of coconut meal for pigs with some experiments showing deleterious effects at levels higher than 20 per cent and others with no significant effects on performance at levels up to 30 per cent of the ration.

The experiments described was designed to further evaluate coconut meal as a potential ingredient of pig rations in Papua New Guinea.

MATERIALS AND METHODS

Three separate experiments were conducted, one at Rabaul at sea level, and two at Goroka at an altitude of 1,600 metres.

In the first experiment each of three litters of nine weaner pigs were allocated at random into three treatment groups. Each litter-treatment group containing three pigs was housed in a concrete floored pen having an area of 4.5 m². Feed and water were available *ad libitum.* The pigs remained on the treatments until they reached a weight of 55 kg liveweight.

The second experiment contained four treatment groups of seven crossbred weaner pigs. Each treatment group was housed in half covered concrete pens having an area of 27 m². Feed and water were available *ad libitum* during the course of the experiment which lasted for 70 days.

In the third experiment each of three litters of eight weaner pigs were allocated at random to one of four treatment groups. Pigs were housed individually in pens having an area of 1.4 m². Feed and water were available without restriction. The experiment lasted for 77 days.

The rations used in the three experiments are shown in *Table* 1. The first experiment which was of a preliminary nature was designed simply to study the effect of substituting coconut oil meal for a commercial 18 per cent crude protein grower ration without attempting to balance the ration. In experiments two and three the rations were calculated to contain approximately equivalent levels of protein and micronutrients. The data in the first experiment were analysed for variance. The second and third experiments were analysed by covariance to eliminate the effects of varying initial weight (Steel and Torrie 1960).

RESULTS AND DISCUSSION

There were no significant differences in growth performance due to treatment in any of the three experiments. There was a trend

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Table 1.—Composition of experimental rations

Ration number	Experiment 1			Experiments 2 & 3			
	1	2	3	4	5	6	7
Coconut oil meal (kg)	—	16.5	29	—	10	20	30
Ground sorghum (kg)	80	67	57	80.5	73	64.5	58
Protein-vitamin-mineral supplement (kg)[1]	20	16.5	14	19.5	17	14.5	12
Bone ash (g)				—	264	528	792
Salt (g)				—	88	172	264
Vitamin-mineral supplement (g)[2]				—	22	44	66
Calculated crude protein (%)	18.2	18.4	18.6	17.9	18.0	17.8	17.8

[1] In experiment 1, the supplement was Hutmills, Melbourne, and contained 55 per cent crude protein, 2 per cent salt, Vit.A 74,800 I.U/kg., Vit.D3 12,800 I.U./kg., Vit.E 61.6 I.U/kg., Vit.B2 26.4 mg.
In experiment 2, Provincial Traders supplement was used. This contained 55 per cent crude protein, 4 per cent salt, Vit.A 60,100 I.U./kg., Vit.D 3,960 I.U./kg., Vit.E 88 I.U/kg., Vit.B2 16.5 mg/kg.

[2] Contains Vit.A 3,300,000 I.U/kg., Vit.D3 660,000 I.U./kg., Vit.B2 1375 mg/kg., Vit.E 3,300 I.U./kg., Cu 22 g/kg., I 0.22 g/kg., Fe 88 g/kg., Ma 44 g/kg., Zn 110 g/kg.

in all three experiments for performance to deteriorate with the higher levels of coconut oil meal.

Adzic *et al.* (1966) and Cresswell and Brooks (1971b) recorded reduced growth performance with levels of coconut oil meal higher than 10 per cent of the ration. This has been attributed to the low digestibility of protein in the meal (Cresswell and Brooks 1971a).

Performance in experiment three was uniformly inferior to that in experiment two. The difference is considered to be due to the individual feeding practised in experiment three, which imposes stress on the animals.

Table 2.—The growth performance of pigs fed rations in which coconuts oil meal was substituted (Experiment 1)

Level of coconut oil meal (%)	0	16	29
Number of pigs	9	9	9
Initial weight (kg)	17.4	17.0	17.0
Final weight (kg)	54.9	55.8	55.6
Days on test	60	74	84
Average daily gain (g)	560	520	460
" food consumption (kg)	1.70	1.72	1.37
Feed conversion ratio	3.03	3.30	2.98

A contributing factor in the performance of pigs fed coconut meal was the reduction in voluntary feed intake that occurred as levels rose. This was found in all three of the present experiments and was also found by Cresswell and Brooks (1971b). This is rather unexpected as due to the high fibre content of coconut oil meal an increase in consumption would be more usual (Agricultural Research Council 1967). It is possible that there is some factor in the meal which reduces voluntary consumption.

Table 3.—The effect of coconut oil meal in rations for growing pigs (Experiment 2)

Level of coconut oil meal (%)	0	10	20	30
Number of pigs	7	7	7	7
Average initial wt. (kg)	18.6	19.5	20.0	18.2
Average final wt. (kg)	61.8	61.7	59.1	59.2
Average daily gain (g)	617	600	557	584
Av. food consumption (kg)	1.81	1.81	1.78	1.78
Av. food conversion ratio	2.93	3.01	3.19	3.05

Table 4.—The effect of coconut oil meal in ration for growing pigs (Experiment 3)

Level of coconut oil meal	0	10	20	30
Number of pigs	6	6	6	6
Average initial wt. (kg)	17.3	18.3	17.0	15.6
Average final wt. (kg)	45.4	41.8	38.0	36.7
Average daily gain (g)	589	543	493	476
Average daily food consumption (kg)	2.20	2.08	1.86	1.87
Average food conversion ratio	3.67	3.83	3.81	3.89

Feed conversion ratio was adversely affected in two of the three experiments. In experiment one this was not observed. Such a finding is not unexpected in view of the reduced consumption and poor digestibility of coconut oil meal.

The results of the three experiments described above show that at levels of up to 30 per cent inclusion of coconut oil meal no statistically significant effects were observed on growth performance of pigs. There was a trend however for performance to decline with high levels of inclusion. Further work is required to study the effects of coconut meal on carcass quality.

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REFERENCES

ADZIC, A., GRADINAE, D., BOZICKOVIC. S. AND ZIVKOVIC, S. (1966). Comparative trials with fishmeal dried skim milk soyabean meal and coconut meal as the protein source in the feeding of growing pigs. *Stocarstvo.*, 20:43.

AGRICULTURAL RESEARCH COUNCIL (1967). Nutrient Requirements of Farm Livestock No. 3 Pigs. Technical Reviews and Summaries. A.R.C. London.

AREK, T.C.P. (1971). The effect of coconut oil meal in growing pig rations on performance, carcass measurements and the economics of feeding. Unpublished report. Vudal Agric. College, East New Britain.

CRESSWELL, D. C. AND BROOKS, C. C. (1971). Composition, apparent digestibility and energy evaluation of coconut oil and coconut meal. *J. Anim. Sci.*, 33:366-369.

CRESSWELL, D. C. AND BROOKS C. C. (1971). The effect of coconut meal on Coturnix quail and of coconut meal and coconut oil on performance carcass measurements and fat composition in swine. *J. Anim. Sci.*, 33:370-375.

GRIEVE, C. M., OSBOURN, D. F. AND GONZALES, F. O. (1966). Coconut oil meal in growing and finishing rations for swine. *Trop. Agric.*, 43:257-261.

SPRINGHALL, J. A. (1969). The use of selected local ingredients for pig rations in the Territory of Papua New Guinea. *Papua New Guinea agric. J.*, 21:76-87.

STEEL, R. G. D. AND TORRIE, J. H. (1960). *Principles and procedures of statistics.* McGraw Hill, New York.

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