PLANTATION CROP BY-PRODUCTS FOR GROWING PIGS

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ABSTRACT

Three experiments were conducted to evaluate pyrethrum marc, cocoa pod meal and dried coffee pulp as potential feedstuffs for growing pigs. All three proved to be detrimental to growth and efficiency of feed utilisation. In each case, toxicity rather than high fibre content, was considered to be the main factor responsible for the poor performance.

INTRODUCTION

THE main plantation crops in Papua New Guinea are copra, coffee, cocoa, rubber, oil palm, tea and pyrethrum.

In many cases the initial processing of the new material leaves a waste product which is at present not utilised. Of the many residues from plantation crop processing, only coconut oil meal is a recognized stockfeed (Morrison 1961).

The present report describes preliminary experiments designed to investigate the value of three waste-products of plantation crops, namely pyrethrum marc, cocoa pod meal and dried coffee pulp.

MATERIALS AND METHODS

Three trials were conducted, one for each product. The published chemical composition of the three products are shown in *Table* 1.

Table 1.—Chemical composition of some plantation by-products (%)

Product	Dry matter	Crude Protein	Crude Fibre	Fat	Ash	Reference
Pyrethrum marc	78.3	10.2	18.5	0.4	5.6	Ayre-Smith (1965)
" "	85.5	14.7	20.6	0.6	6.6	Naik, 1967
" "	71.3	14.9	24.9	2.1	7.6	Springhall (1969)
Cocoa pod meal	95.7	8.2	29.7	1.8	—	De Alba *et al.* (1954)
" " "	93.3	6.8	35.4	1.5	9.7	Bateman *et al.* (1967)
" " "	90.6	8.4	23.5	2.5	6.7	Springhall (1968)
Dried coffee pulp	87.6	10.0	19.3	—	—	This study
" " "	100.0	11.2	13.1	1.7	6.9	Branckaert (1968)

Exp. 1: *Pyrethrum Marc*

Pigs from a litter of eight pure-bred Berkshires were allocated at random to one of three treatments:

a) unsupplemented control,

b) control ration in which 10 per cent of the ration was substituted with pyrethrum marc,

c) 25 per cent substitution with marc. A standard 15 per cent crude protein control ration was used based on sorghum and an imported protein-vitamin-mineral supplement (*Table* 2). Food and water were available *ad libitum*.

Pigs were housed in groups throughout the experiment which lasted for 140 days. Food consumption and weight gains were recorded.

Exp. 2: *Cocoa Pod Meal*

Four litters of crossbred Berkshire pigs were allocated to the four replicates of a randomised block design.

Each litter contained two male and two female pigs. Pigs were housed individually throughout the experiment which lasted for 50 days from weaning at eight weeks. Rations used are shown in *Table* 2. Feed and water

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Table 2.—Formulations of experimental rations

Experiment Number	1			2		3			
Ration	A	B	C	D	E	F	G	H	I
	Percentage Composition of Ration Ingredients								
Ingredient									
Protein supplement[1]	12.5	11.3	9.4	20	20	18	18.5	19	20
Ground sorghum	87.5	78.7	65.6	80	40	82	71.5	61	50
Pyrethrum marc[2]	—	10.0	25.0	—	—	—	—	—	—
Cocoa pod meal	—	—	—	—	40	—	—	—	—
Dried coffee pulp	—	—	—	—	—	—	10	20	30

[1]Huttmills, Melbourne, contained 55% crude protein salt 2%, per kg, 750,000 I.U. Vit. A., 12,800 I.U. Vit. D3, 62 I.U. Vit. E., 26 I.U. Vit. B2.

[2]Stafford Allen (NG) Pty Ltd, Mount Hagen.

were available *ad libitum*. Feed consumption and weight gain were recorded.

Exp. 3: *Dried Coffee Pulp*

Three litters of four weaner pigs were used in the experiment. Pigs were allocated on a litter basis to one of the four treatments in a randomised block design.

Pigs were housed individually during the experiment which lasted for 50 days. Rations calculated to be isonitrogenous were fed *ad libitum* during the experiment. Details of rations are shown in *Table* 2. Food consumption and weight gain were recorded.

The data were analysed for variance, and treatment means were tested by Duncan's Multiple Range Test (Steele and Torrie 1960). Insufficient numbers precluded a statistical analysis in *Experiment* 1.

RESULTS AND DISCUSSION

The growth performance of pigs in the three experiments is shown in *Table* 3.

Pyrethrum marc inclusion reduced performance of growing pigs. The major effect was on growth rate, although food consumption was also adversely affected. The effects may have been due to reduced digestibility associated with the high crude fibre content of the marc (Agricultural Research Council 1967). This is unlikely, however, as the commonest response to increased fibre intake is increased food consumption (Agricultural Research Council 1967). The most likely explanation is that a toxic residue of the pyrethrum plant or its manufacturing process remained in the meal. No clinical symptoms were observed.

The cocoa pod meal dramatically reduced performance of growing pigs. Growth rate was particularly affected. There was no difference in the food consumption, although in the absence of toxicity, food intake might have been expected to increase in the cocoa-pod group.

The effects found in this experiment are in marked contrast to those of De Alba and

Table 3.—Growth performance of pigs fed plantation crop by-products[1]

Experiment Number	1			2		3			
Ration	A	B	C	D	E	F	G	H	I
n	3	3	2	8	8	3	3	3	3
Daily wt. gain (g)	429	368	278	459^{a}	223^{b}	495^{b}	213^{a}	159^{ac}	113^{c}
Daily food cons. (kg)	1.86	1.60	1.53	1.39^{a}	1.30^{a}	165^{b}	0.95^{a}	0.96^{a}	0.76^{a}
Food conversion ratio	4.3	4.4	5.6	3.1^{a}	6.1^{b}	3.3^{a}	4.5^{ab}	6.7^{b}	7.3^{b}

[1]Treatment means in the same experiment in the same row with the same superscripts are not significantly different ($P < 0.05$).

Basadre (1952) who using a ration containing 50 per cent cocoa pod meal but based on maize found no significant differences in performance when compared to a control.

A number of the pigs fed cocoa pod meal did not appear to be entirely healthy. One animal died two days after the completion of the experiment with joint, peritoneal and pericardial effusions, muco-gelatinous fat depots, cardiac haemorrhages, congested liver, renal haemorrhages and urinary precipitates. Histopathological examinations of tissues were conducted at the Central Veterinary Laboratory, Port Moresby and revealed massive haemorrhages of the renal tubules and glomeruli, with blocking of the tubules by casts.

The symptoms were considered to support a diagnosis of theobromine poisoning from the cocoa pod. Theobromine is a potent diuretic which in excess can cause circulatory failure. (British Veterinary Codex 1965).

The inclusion of even 10 per cent coffee pulp drastically reduced growth and food consumption. Again the food consumption response suggests a toxic factor, although pigs remained healthy during the entire experiment.

Vast amounts of waste-products result from plantation crop processing. It has been suggested that these products be used as feeds for livestock (Anon 1970). The findings described above, although preliminary in nature, suggest that for pigs at least, the three waste products tested should not have any place in the diet.

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