

THE EFFECT OF LEVEL OF FEEDING AND SUPPLEMENTATION WITH SWEET POTATO FOLIAGE ON THE GROWTH PERFORMANCE OF PIGS

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ABSTRACT

Three groups of six pigs were fed one of three rations. The first group received *ad libitum* an 18 per cent crude protein grower ration. The second received the same ration up to a maximum of 1.82 kilogram (4 lb) daily, while the third group was also restricted to 1.82 kilograms daily but received *ad libitum* sweet potato foliage. Growth rate and food consumption were significantly increased by the high plane of nutrition, while food conversion ratio was significantly and adversely affected. Feeding sweet potato adversely affected both weight gain and food conversion ratio when compared to the restricted unsupplemented group. Neither of the differences reached significance.

INTRODUCTION

The Agricultural Research Council (1967) in its comprehensive review of the nutritional requirements of swine has considered the effects of plane of nutrition on growth and carcass development. It was concluded that high planes of feeding increase growth rate but that the effects on food conversion efficiency have not been sufficiently clarified, with some experiments showing improvements while others showed the reverse. In general high planes of feeding have usually been found to increase the fat content of carcasses.

The use of green feed either as pasture or as dried legume hay is very common in the United States, where its use is considered to protect against possible vitamin deficiencies and to provide unidentified growth factors (Morrison 1961). In tropical developing countries, the use of high levels of green feed is almost universal, as it helps to overcome protein and vitamin deficiency. Some of the plants which have been tested experimentally include Para grass (Catanaoan 1971), water hyacinth (Mahendranathan 1971), *Ipomoea aquatica* (Payne 1956), grass-legume mixture (Modebe 1969) and sweet potato foliage (Zarate 1956, Catanaoan 1971).

Zarate (1956) studied the digestibility of sweet potato foliage (*Ipomoea batatas*) and found it to be considerably lower than that of the tubers, due to the much higher levels of crude fibre in the leaves and stems.

A system of limited feeding has been developed in the Philippines whereby only half of the normal allowance of grain based concentrate ration is fed and the pig is allowed green feed *ad libitum*. It has been claimed that performance is not significantly reduced by this feeding regime (Catanaoan 1971).

MATERIALS AND METHODS

Three litters containing six weaner pigs 8 weeks of age were allocated randomly to the three feeding regimes. All pigs received the same 18 per cent crude protein ration¹ based on sorghum and a commercial protein, vitamin-mineral supplement.² All the pigs were housed individually in concrete floored pens having an area of 1.35m². Water was available *ad libitum*. The three feeding regimes were as follows:

1. Unrestricted grower ration.
2. Ration restricted to 1.82 kilograms daily.

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1. Kaiani Feed Mills, Lae.

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3. Ration restricted to a maximum of 1.82 kilograms daily (4 lbs).

When pigs had completed their daily quota they were allowed free access to sweet potato foliage.

During the early stages of the experiment, pigs on the restricted plane failed to consume all of their daily allocation which reduced mean daily consumption over the whole experiment.

Pigs were fed daily, and uneaten residues weighed and consumption recorded. Pigs were weighed weekly until the end of the experiment 85 days later.

RESULTS AND DISCUSSION

The results of the experiment are shown in Table 1. Compared to the restricted unsupplemented ration, *ad libitum* feeding increased rate of gain by about 13 per cent. However consumption over the experimental period was increased by 47 per cent, a fact which is borne out in the much inferior food conversion ratio. It would appear from these results that restricted feeding resulted in a saving in feed required per pound of gain of about 30 per cent. This represents a considerably higher saving in feed due to restriction than has been reported by any of the recent reviewers (Lucas and Calder 1956, A.R.C., 1967, Vanschoubroek *et al.* 1967). The latter author has developed prediction equations based on the published literature which show that on average a decrease of one per cent in food consumption leads to a saving

in feed of 0.31 per cent. On this basis, the saving in feed for the restricted group should have been of the order of 15 per cent not 30 per cent as recorded.

That it was not may be a reflection of two factors:

1. The data of Vanschoubroek *et al.* (1967) refer to bacon pigs from 30 to 90 kg. The present study was conducted at much lighter weights.
2. The possibility that nutritional requirements and growth rates are different in tropical environments.

Several authors have recorded that high temperatures decrease weight gain, intake and adversely affect food conversion ratio (Heitman *et al.* 1958, Sugahara *et al.* 1970, Holmes 1971). In addition there is the suggestion that to compensate for the lower energy intakes of swine at high temperatures, rations containing higher protein levels than are recommended for temperate climates may be required. (Devendra and Clyde-Parris 1970).

Day and night temperatures at Goroka average 28.3° C and 15.3° C respectively. Day temperatures are considerably higher than the temperature range for optimal growth of 15 to 20° C as found by Mount (1968).

The feeding of sweet potato vines did not significantly affect the performance of pigs compared to the restricted control. In fact performance was adversely affected. It is however possible that a genetic factor is at work. Zarate (1956) has shown that the

Table 1.—Performance of growing pigs fed at various levels of nutrition

Parameter	Treatment		
	Ad-libitum ration	Restricted ration	Restricted ration plus sweet potato foliage
Number of pigs	6	6	6
Mean initial weight (kg)	16.1 ± 3.4	15.1 ± 2.5	15.8 ± 4.6
Mean Final weight (kg)	59.2 ± 4.1	53.0 ± 3.8	50.8 ± 8.2
Mean daily gain (g)	1 507 ± 30 ^{ab}	447 ± 30 ^a	410 ± 54 ^b
Mean daily grower ration consumption (kg)	2.46 ± 0.33 ^{ab}	1.67 ± 0.06 ^a	1.65 ± 0.09 ^b
Mean food conversion ratio. (grower ration)	4.88 ± 0.76 ^{ab}	3.76 ± 0.22 ^a	4.07 ± 0.52 ^b

¹ Means in the same row with the same superscript are significantly different. P < 0.05.

digestibility of fibre in sweet potato vines was much higher in native Philippine pigs than either the Berkshire or the Berkjala (a hybrid pig developed from the indigenous Jajala breed and the Berkshire) and it is possible that exotic commercial breeds such as were used in the present experiment are unable to successfully digest high fibre rations. There is further evidence of genetic differences in fibre digestibility from the work of Farries and Angelowa (1968) who found that European wild hogs were able to digest fibre more efficiently than German Landrace.

CONCLUSIONS

The use of *ad libitum* grain feeding is not recommended as it reduces feed efficiency. The supplementation of standard rations with sweet potato foliage was not found to improve performance.

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