THE EFFECT OF FEED RESTRICTION ON GROWTH PERFORMANCE ON PIGS

G. L. MALYNICZ*

ABSTRACT

Three litters of six pigs were allocated to one of six treatments. These were ad libitum *grower ration and* 90 *per cent,* 75 *per cent,* 60 *per cent,* 40 *per cent and* 25 *per cent of the consumption of the* ad libitum *group. The experiment was continued until each group reached a mean weight of* 200 *pounds. Growth rate was most rapid in the* 90 *per cent group treatment and declined according to restriction. The* ad libitum *group had the worst food conversion ratio. The time taken to reach* 200 *pounds for the groups were* 170, 161, 187, 213, 272 *and* 411 *days respectively.*

INTRODUCTION

IN developing countries, with smallholder pig enterprises, budgets are often formulated in which labour, the main item of variable costs, is considered to cost nothing. In this form of budgetary analysis, net profit is shown as a return to labour. Under these conditions the rate of throughput of an enterprise is less important than the absolute variable costs, by far the greatest proportion of which is accounted for by feed costs. With these factors in mind an experiment was designed in which pigs were subjected to varying degrees of nutritional restriction in order to study the effects, particularly on food consumption, of a given increment of body weight.

Lucas and Calder (1965) and Vanschoubroek, De Wilde, and Lampo (1967) have reviewed the literature on the effects of feed restriction in growing pigs. These authors found that restriction decreased weight gain and back fat thickness. Food conversion ratio was initially improved, but as the restriction became more severe it deteriorated due to the increasing proportion of the ration required for maintenance. Vanschoubroek *et al.* (1967) developed equations for predicting the effects of feed restriction on weight gain, feed conversion ratio and back fat thickness.

MATERIALS AND METHODS

Each of the pigs from three litters of purebreed pigs, either Tamworth or Berkshire, were allocated to one of six treatments. Each treatment varied only in the degree of nutritional restriction. One group, which was fed to appetite, controlled the intake of the other groups, which were fed to provide 90, 75, 60, 40 and 25 per cent of the feed intake of the unrestricted group. Feed intakes for restricted groups were adjusted to those of the control group on a weekly basis, or more frequently if large variations occurred. Mean daily intakes expressed on a monthly basis are shown in *Table* 1. The ration consisted of a 6:1 mixture of ground sorghum and a commercial protein-vitamin-mineral supplement[1] with a calculated crude protein concentration of 16.5 per cent. Pigs were floor-fed in groups in such a way that individual intakes were more or less equivalent. The experiment lasted until each group reached a mean liveweight of 200 pounds. In

Table 1.—Feed allowance per month

Month	Feeding Level (Percentage of Ad Libitum)					
	100	90	75	60	40	25
1	1.54	1.38	1.12	1.04	0.70	0.55
2	2.60	2.35	2.10	1.55	1.04	0.68
3	3.52	3.02	2.21	1.83	1.31	0.99
4	5.87	5.34	4.43	3.34	2.25	1.44
5	5.47	4.73	3.99	3.28	2.14	1.45
6	6.54	5.68	4.80	3.91	2.72	1.65
7	8.01	7.60	6.22	5.03	3.43	2.08
8	—	—	5.67	4.67	3.33	2.0
9	—	—	5.67	4.67	3.33	2.0
10	—	—	—	—	3.33	2.0
11	—	—	—	—	—	2.0
12	—	—	—	—	—	2.0
13	—	—	—	—	—	2.0

[1]Huttmills, Melbourne. Calculated composition of meal, 25% crude protein.

*Tropical Pig Breeding and Research Centre, D.A.S.F., Goroka.

the case of the *ad libitum* group consumption details were recorded for several more weeks, until consumption had stabilised sufficiently to enable feeding tables to be constructed for the remaining groups.

Daily food consumption and weekly weight gain data were recorded. Weight gain data were analysed for variance and differences between treatment means were tested using Duncan's New Multiple Range Test (Steel and Torrie, 1960).

RESULTS AND DISCUSSION

The results presented in *Table* 2 show that the weight gain was reduced when allowances of less than 90 per cent *ad libitum* were fed. The low sensitivity of the tests of significance between treatment means was due to the small size of the experiment and the group feeding which invariably increased experimental error. Comparison of the results with those predicted by Vanschoubroek *et al.* (1967) reveal that the fall in weight gain with increasing restriction was not nearly as severe as that predicted by these workers. For example, with 40 per cent restriction the predicted fall in liveweight gain is 38.1 per cent while in the present experiment it was 20 per cent. To a degree this effect is the result of the relatively poor weight gains of the *ad libitum* group. However, even if the weight gain data are extrapolated graphically to give a theoretical mean weight gain in the unrestricted group of 1.18 pounds per day, this only raises the fall in weight gain to 28 per cent on the 40 per cent restriction.

Three reasons to account for this difference may be advanced. The data of Vanschoubroek and co-workers was conducted under temperate conditions. Day temperatures at Goroka are well in excess of the 15-20° C suggested by Mount (1968) as optimum for pigs over 20 kg liveweight.

Secondly, the breeds used in the present trial are more primitive than those used in developing the prediction equations, which would suggest a lower potential for protein deposition and therefore a lower sensitivity to undernutrition. Thirdly, the growth of the less restricted pigs was low compared to experimental results in Northern Europe which would tend to diminish the relative decline under severe restriction.

Food conversion ratio, particularly at the more severe levels of restriction was not as severely affected as the results of Vanschoubroek would suggest. In common with these workers it was found that an allowance of 75 per cent *ad libitum* resulted in the most efficient conversion of food to liveweight gain.

It can be seen that, in terms of the amount of food required to produce the increment from 20 to 200 pounds, there was relatively little difference between treatments. Allowances of 90 and 75 per cent of *ad libitum* used least feed. This suggests that under conditions where time and labour are not important determinants, it may pay to restrict levels of feeding quite severely, particularly as this will result in the production of lean carcasses (lean carcasses, under conditions where protein is limiting and genotypes inferior, being particularly difficult to produce).

ACKNOWLEDGEMENTS

The author would like to thank Messrs I. R. Watt and D. H. Nad for supervision of the experimental animals.

REFERENCES

LUCAS, I. A. M. AND CALDER, A. F. (1956). The response of different types of pigs to varying levels of feeding from weaning to bacon weight, with particular reference to carcass quality. *J. Agric. Sci.* Camb. 47:287-323.

[*continued on page* 22]

Table 2.—The effect of feed restriction on growth performance of pigs from weaning to 200 pounds live-weight

Parameter	Feeding Level (Percentage ad libitum)					
	100	90	75	60	40	25
Initial weight (lb)	19	21	19	17	18	19
Time to reach 200 lb (days)	170	161	187	213	272	411
Total food consumption per group (lb)	2064	1787	1754	1939	1932	1926
Mean daily weight gain (lbs)[1]	1.06[ab]	1.11[a]	0.97[abc]	0.85[abc]	0.67[c]	0.44
Food conversion ratio	3.80	3.20	3.04	3.51	3.50	3.44

[1]Means with the same superscript are not significantly different. ($P < 0.05$)