GLOBAL JOURNAL OF AGRICULTURAL SCIENCES VOL. 7, NO. 1, 2008: 31 - 34
 1SSN 1596 - 2903

PERFORMANCE OF GROWING MALE PIGS EXPOSED TO QUANTITATIVE FEED RESTRICTION

E. N. UCHEWA and M.O. OTUMA

(Received 8 May 2007; Revision Accepted 27 July 2007)

ABSTRACT

Eighteen growing pigs weighing 32.4 ± 1.4 were assigned in a completely randomized design to three levels of dietary rearmaments to know the effect of quantitative fed restriction on them. Each treatment had three replicates of two growing pigs per replicate. Each of the treatment was fed one of the 3 dietary levels as follows: 10% of the body weight as feed given to the control group (T_1), 7.5% for T_2 and 5.5% for T_3. Analysis of variance at the end revealed that though the total feed intake value for T_1 differed slightly numerically than those of T_2 and T_3; there were no significant differences (P> 0.05) in feed gain and body weight gain in all the treatments. Economic analysis was also determined. Result shows that subjecting growing pigs to feed restriction made higher profit than the control.

KEY WORDS: Quantitative, feed restriction, Pig.

INTRODUCTION

The ideal practice of feeding pigs at 10% body weight has sometimes not been attained due to high cost of feed, lack of skilled manpower, and government policies on the importation of raw materials/ingredients. Anthony (1991) reported that feed cost account for about 70% of total cost of production in the tropics. This has apparently resulted in high cost of pig products. Feed restriction in animal production can reduce the cost of production by 30%. Quantitative and qualitative feed Restriction for Monogastrics have been studied by Bows *et al*, (1988) who reported on the nature and levels of feed restriction that will not result in considerable weight loss and poor production. Food restriction and compensatory growth are an important phenomenon in temperate condition with food shortage in inter and re-alimentation in wt and dry seasons (Lee *et al,* 1971; Hogg, 1991). Conversely, in and semi-and areas food shortage occurs in dry season associated with thermal stress.

Fed restriction had been used on pigs as a means of reducing their excessive fat deposit and feed cost (Arafer *et al*. of 1983). There is a close relationship between level; of feeding an the weight of some non-carcass components particularly the metabolic organs (Atti, *et al,* 2002; Times *et al,* 1981). So, when intake changes, weights of visceral organs occur, which produce changes in the maintenance requirement (Ferrel *et al,* 1986). It has been shown that animals on restricted planes off nutrition have proportionally smaller livers (Ferrel *et al,* 1986; Marray *et al,* 1977) and also have lower maintenance energy requirement (MER). It has been suggested that the phenomenon of compensatory gain is directly related to liver mass and protein turn-over (Frisch and Vercoe, 1977). However, the requirements of splanchnic tissues, particularly the gut, represent a major part of MER (Hogg, 1991) and this adaptation to under feeding, by a reduction of the MER, has been explained by a decrease in the weight of the gut and some other metabolic organs in underfed animals (Mdllisson *et al*, 1991).

This experiment is therefore justified by the fact that exposing the pigs to quantitative feed restriction, will reduce the cost of production without a significant difference in the productivity of the animal.

MATERIALS AND METHODS

Experimental site

This experiment was carried out at the piggery research unit of the department of animal production and fisheries management, Ebonyi State University, Abakaliki

Experimental animal/designed

Nine growing male pigs, cross breeds of Large white and land Race (LW x LR) between 4-5 months of age, obtained from a local farm were used in the experiment. This experiment was conducted using a completely randomized designed (C.R.D) (Steel and Torrie 1980). There were three treatments with six animal per treatment and three animals per replicate. Each group treatment was fed with one of the three (3) levels of dietary treatment designed for the animal according to the body weight of the animal. The dietary levels were 10% of the body weight for treatment one (T_1), 7.5% of the body weight for treatment two (T_2) and 5.5% of the body weight for treatment three (T_3). The animals were numbered and weighed at the start of this study and were randomly assigned to the experimental treatments. They were then reared for 12 week. They received no supplemental feeding or growth enhancer during the experimental period.

Experimental diet

The experimental diet were formulated using locally sourced materials/ingredients that are, chap, affordable and which provided not less than 14mj/kg digestible energy (Table 1).

DATA COLLECTION

Fed intake:

The daily feed requirement were measured and served to each treatment between 7:00am and 8:00am daily. Left over were weighed and recorded the next morning. The difference between the fed served and the over was assumed to have been consumed. The daily body weight gain was determined mathematically by dividing the body weight gained by the number of days/weeks the study lasted.

The feed conversion ratio was determined by dividing the average daily intake by the average daily weight gain. That is:

Body weight gain = initial body weight – final body weight

$$\text{Daily weight gain} = \frac{\text{body weight gain}}{\text{Number of experimental days.}}$$

Statistical analysis

Data on feed intake, body weight gain, final body weight and feed efficiency were analyzed using a one-way ANOVA (Analysis of Variance) in a Completely Randomized Design (CRD) and significant means were separate using Duncan's multiple Range Test.

Economic analysis

The following parameters were measured.

E. N. Uchewa, Dept. of Animal Production and Fisheries Mgt, Ebonyi State Univ., P. M. B. 053. Abakaliki, Ebonyi State, Nigeria.
M. O. Otuma, Dept of Animal Production and Fisheries Mgt, Ebonyi State Univ., P. M. B. 053. Abakaliki, Ebonyi State, Nigeria.

(i) Cost of feed consumed (N)/kg = cost of feed/kg X quantity of fed consumed.
(ii) Total revenue (N) = the selling price of the animals.
(iii) Net Return (N) = Total Revenue generated – Total cost of production.

RESULT AND DISCUSSION

The summary of the effects of the treatment on the performance of the pigs is shown on Table 2 means of final body weight showed that there was no significant difference ($P> 0.05$) in body wt between pigs in the control (T_1) group and those in T_2 and T_3. Result agrees with the earlier finding of Beane e*t al,*. (1979) in chicken, which showed that restricting the feed intakes of broilers to 85% of full fed control again, is in line with that reported by (Bohman 1955. Plavnile and Hurtwiz 1985; and Tion *et al*, 2001) also in chicken, that was non significance difference ($P< 0.05$) in the growth of earlier restricted group of chicken following realimentation.

Table 1: The Composition of the experimental Diet

INGREDIENTS	PERCENTAGE INCLUSION (5)
Maize by-product	50
Barbara nut by-product (Okpa)	20
Palm Kennel Cake (P.K.C)	29
Bone Meal	0.4
Salt	0.25
Premix*	0.25
Lysine	0.10
TOTAL	**100**

*** Vitamin A 10,000 I.U, Vitamin D3 2,000,000 I.U, Vitamin E 12,000 I.U, Vitamin K 2 I.U, Thiamine B1 1.5 GR., Riboflavin B2 5 GR, Pyiboflavin-B6 5 GR, Vitamin B12 10 MGR, Biotin 20 Niacin 15 GR, Pantothenic acid 5 GK, Folic acid 0.6 GR, manganese 75 GR, Zinc 50 GR, Iron 25 GR, Copper 5 GR, Iodine 1 GR, Selenium 100 MGR, Cobalt 300 MGR, B.T. 125 Gr, Choline Chloride 150 GR.**

The slightly numerical difference in final body wt of T_1 (45.42kg), T_2 (44.15kg) and T_3 (43. 18kg) where (T_1 = 1.27kg > T_2 = 0.97kg > (T_3) affirms the suggestion of Cock (1963) and Mollison *et al* (1984) that although the compensatory growth of the restricted animal at certain periods may equal that of the unrestricted group, the final body wt of the restricted groups never up with that of the unrestricted (control group). some of the reasons for the discrepancy have been discussed by Murray et al. and (1977) and this includes the severity, the duration and the timing of the feed restricted. In this study, the pigs were fed at three dietary levels of their body weights at growing age. Hogg (1991) gave same indication that cattle restricted before 6 months of age showed limited compensatory growth subsequently almost independent of the severity of the restriction, while cattle restricted at ages beyond 6 months exhibit compensatory growth proportional to the degree of restriction. Thus, there might have possible been a residual effect of the initial 10% body weight feeding regime (from waning to growing age) during the restriction period which did not allow the effect of the restriction to be made manifest. That is, since restriction did not start from weaning, tissue development at this phase could not have been impeded.

Feed intake and feed conversion ratio

Table 2 also reveals that the total fed intake value for T_1 differed slightly numerically, than those of T_2 and T_3, FCR (Feed gain ratio) did not differ ($P> 0.05$) in all the treatments. Increased appetite resulting in an increased feed intake is generally thought to be the most important factor considered to have a possible influence on compensatory live weight gains and feed efficiency. (McCartney and Brown, 1976). Though there were numerically significances ($P> 0.05$) in the total feed intake among the treatments. The feed efficiency did not differ ($P< 0.05$) among the treatments. This is supported by the report of Orr and Kirk (2001) that the level of intake may influence the rate of passage and/or digestibility and thus the efficiency of fed conversion. It is possible that the feed consumed by the full-fed animals as too much in the stomach within a given time to have limited rate of passage and/or digestion, whereas the reverse is the case in the restricted animal

Table 2: Performance of Pigs Place on Quantitative Feed restriction

Parameters	Treatments 1	2	3	Level of significant
Initial body wt (kg)	34.10	33.50	33.16	N.S
Final body weight (kg/pig0	45.42	44.15	43.18	N.S
Total weight gain (kg)	12.91	12.86	12.17	N.S
Average daily weight gain kg/day	0.61	0.59	0.58	N.S
Total feed intake kg	85.17	66.61	66.45	N.S
Average daily feed intake kg	2.66	2.57	2.49	N.S
F.C.R.	4.36	4.35	4.29	N.S

- **NS = not significant (P> 0.05)**

Further confirmatory support for the findings of this study is that feed restriction often results in apparent decrease in maintenance requirement due to depressed metabolic rate, suggesting that an animal becomes more and more efficient in utilizing a reduced food intake (Frisch and Vercoe 1977). This is based on the concept of a reduced maintenance requirement.

Table 3 gives effect of fed restriction on the economy of production. The data reveled that feed cost (N)/kg weight gain increased in this order: T_3, T_2 and T_1

Table 3: Economic Analysis

PARAMETER	TREATMENT 1	2	3
Cost of feed/kg (N)	20	20	20
Total feed consumed (kg)	85.17	66.45	56.61
Labour + exigencies	400	400	400
Total cost of feed consumed (N)	1,703.40	1,329.00	1,132.20
Cost of production of pigs (N) (cost of feed consumed + labour and exigencies)	2,103.40	1,729.00	1,532.20
Total weight	45.42	44.15	43.18
Selling Price/kg weight (N)	350	350	350
Total selling price = Revenue (N)	15,897.00	15,452.50	15,113.00
Net returns	13,793.60	13,723.50	13,580.80
Cost/Benefit ratio	1.52	1.26	1.13

(N42.69, N49.58 and N49.72 respectively). Total feed consumption and feed cost as higher in the control (T_1) and declined in the restricted group (T_2 and T_3). Thus, total feed cost was lower for the restricted group than the full fed. The cost of production of the pigs also, followed similar trend.

The net returns (gain N/pig) were found to be as follows:

T_1 = N1379360, T_2 = N13723.50, T_{13} = N13580.80

Higher fed cost/kg feed consumed was observed in T_1 and the weight Naira/pig was higher in $_{T3}$ by N7.02. Thus the increase in cost/kg gain in T_1 was a reflection of higher quantity of feed consumed and the increased weight in Naira/pig in T_3 was also as a result of efficient feed conversion.

This result agrees with the findings of Bohman (1955) and Ferrel et al (1986) that feed restriction had a significant effect on monetary returns for birds over fed. Lee *et a*l. (1971) also indicated that birds subjected to feed restriction made higher profit than the control. From the present study pigs fed 7.5%, and 5.5% of their body weight compared favourably tot hat fed the recommended 10% body weight.

CONCLUSION

In conclusion, feeding growing pigs at almost half (5.5%) of the body weight than the recommended feeding standard (10%) body weight will have no significant effect on the growth and performance of the pigs and will reduce the cost of production by almost 30%. Thus, feeding at 10% body weight may amount to more wastage considering the cost of feed and poverty level in this part of the world.

REFERENCES

Anthony J. Smith., 1991. The Tropical Agriculturalist Series #Edition Livestock Volumes. Centre for Tropical Veterinary Medicine University of Edinburgh (c) copyright text David H. Holiness.

Arafer, A. S., Boone, K. A., Sanky, D. M., Wilson, H. H., 1983. Energy restriction as a means of reducing fat deposite in Swine. Animal science, 62:314-320.

Atti, N., Noziere P., Doreau. M., Kayoouli, C. and Bocquier, F. 2002, effects of under feeding and refeeding dry feed. Livestock research 38:37-43.

Beane, W. L., Cherry, J. A. and Weaner Jr. W. D., 1979. intermittent light and restricted feeding of broiler Chickens, Poultry Science. 58:567-571.

Bowes, V. A. Julian, R. J, Lesson, S., Stritizinger, T., 1988. Effects of feed restriction on fed efficiency and incidence of sudden death in Food and Agricultural Organization of the United Nations (FAO), Quarterly Bulletins of Statistics, 1988-1989. FAO. Rome.

Boham, V. R., 1955 Compensatory growth of beef cattle. The effect of hay Maturity J. Animal Science. 14:249-255

Cock, A. G., 1963. Genetical Studies on Growth and Form in the Monogastrics, and phenotypic variation in the relative growth pattern of body-weight Genetics Research. 4:167-192.

Ferrel, C. L., Kppng, l. J. and Nienaber, J. A., 1986. Effects of previous nutrition on body composition and Maintenance energy costs of growing animals. British Journal of nutrition 56:59-605.

Frisch, J. E. and Vercoe, J. E., 1977. Food intake, eating rate weight gains, metabolic rate and efficiency of food feed utilization in Bos, Bos indicus crossbreed cattle. Animal Production 25:343-351.

Hogg, B.W, 1991 compensatory Growth in ruminants. In Pearson, A. M. and Dotson, T.R. (eds) Growth Regulation in Farm Animals Series. Advances in meat Research, vol. 7. Elsevier Applied Science. Publishers pp. 103- 134.

Idodo, G. U., 1996. College biology. Umeh Pub. Limited. Benin City, Edo State, Nigeria pp. 374-388.

Ibe, S. N., 1990. Effect of Feed Restriction on Principal Component Measures of body size and conformation in Livestock. Nig. J. of Animal Prod. 17:1-5.

Lippericott,, F. B. and Guard, L.E., 1949. Animal production. Lea and Febiger Philache Iphia pp 264.

Lee, P. J., Gulliver, A. L. and Morris, T. R., 1971. A quantitative Analysis of the literature concerning the restricted feeding of growing pig. Science. 12: 413-436

Murray. D.M., Tulloh, N. M. and Winter, W. H., 1977. The effect of 3 different growth rate on some offal components of cattle, Journal of agricultural Science, Cambridge 89:119-128.

McCartney, M. G. and Brown, H. B., 1976. The effect of feed restriction time on the growth and feed conversion of broiler males. Poultry Science. 56:713-715.

Mollison, B. W. Guenter, and Boycott, B. R., 1984. Abdominal fat deposition and Sudden death syndrome in broiler, pigs: the effect of restricted intake early life calore (Fat) restricted and caloric: protein ratio. Science 56:1190-1200.

Orr, R. M. and J. Kirk. 2001. The Agricultural Note Book. 4th edition. England. Pp 133-145.

Steel and Terrie. 1980. Duncan's New Multiple Range

Robbinson, F. E., Classing, H. L., Henson, J. A., and Onderka, D. K., 1992 Growth Performance, feed efficiency and the meidence of skeletal and metabolic disease in fed and full-fed and feed restricted broiler and roaster chickens poultry research 1 : 33-41.

Times J. Clutton-Brock, 1981. Domesticated Animals from early British Museum, London and University of the Press Austin, Tx.

Webster, C. E. and Welson, P. N., 1980. Agriculture in the Tropics, Longman group, Limited London.