

## Utilisation of Different Protein Sources for Growing Rabbits

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### ABSTRAK

Kesan hampas kacang tanah dan serbuk ikan tempatan ke atas pertumbuhan dan penggunaan protein oleh arnab dikaji. Percubaan pemberian makanan selama lapan minggu melibatkan dua puluh empat arnab putih eksotik jantan dan betina berusia enam minggu seberat 550-610 g dalam satu pola rawak sepenuhnya telah diberi makan tiga diet: satu diet kawalan yang mengandungi kombinasi hampas kacang tanah dan serbuk ikan tempatan, dan diet eksperimen yang mengandungi sama ada hampas kacang tanah (GNC) dan serbuk ikan tempatan (LFM) adalah tinggi kandungan protein (masing-masing 48.13% dan 52.15%), serbuk ikan tempatan mengandungi tahap serat yang rendah (0.83%) manakala hampas kacang tanah rendah tahap abunya (5.22%). Kedua-duanya sumber protein membekalkan jumlah protein dan mineral yang ketara. Diet kawalan memberikan signifikan ( $P < 0.01$ ) tambahan berat yang lebih baik daripada hampas kacang tanah dan serbuk ikan tempatan. Nisbah keberkesanan protein juga secara signifikannya lebih baik ( $P < 0.01$ ) dengan diet kawalan, apabila dibandingkan dengan diet GNC dan LFM. Tiada perbezaan signifikan diperolehi pada tahap pemberian makanan: Tambahan berat daripada arnab yang diberi makan diet percubaan. Tiada insiden kematian yang berlaku di kalangan kumpulan rawatan.

### ABSTRACT

The effects of groundnut cake and local fish meal on the growth and protein utilisation of rabbits were studied. The eight weeks feeding trial involving twenty-four, six-week-old male and female exotic white rabbits weighing 550-610 g in a completely randomised design were fed three diets: a control diet which had the combination of groundnut cake and local fish meal, and experimental diets that had either groundnut cake or local fish meal as the protein source. The groundnut cake (GNC) and the local fish meal (LFM) were high in protein (48.13% and 52.15% respectively), the local fish meal had a low fibre level (0.83%) while the groundnut cake was low in ash (5.22%) but high in fiber (5.52%). Both protein sources supplied appreciable amounts of protein and minerals. The control diets gave significantly ( $P < 0.01$ ) better weight gains than the groundnut cake and local fish meal diets respectively. Protein efficiency ratio was also significantly ( $P < 0.01$ ) better with control diets, when compared with the GNC and LFM diets. No significant differences were obtained in the level of feed: Gain from rabbits fed the trial diets. There was no incidence of enterities or mortality among the treatment groups.

### INTRODUCTION

The world is faced with inflation and there is the problem of lack of food to sustain its ever-growing population. The demand for protein has risen greatly and the human dependence on animals for protein is increasing, especially since

plant proteins are generally deficient in four essential amino i.e. acids lysine, methionine tryptopham and lencine. If meat consumption demands are to be met in Nigeria, encouragement for the production of short-cycle animals like poultry and especially rabbits should be given

great consideration by government and appropriate research institutes.

Rabbits possess attributes that make them advantageous over other livestock species. Rabbits can be produced on forage alone, although production can be improved by addition of other feed supplements. Rabbits are highly prolific and have a short gestation period (28-32 days). They are also good converters, easy to care for and they require low capital investment in rearing.

In biological value, it is comparable to chicken (Biobaku and Oguntona 1997). The meat is white, highly favoured nutrition and appetizing (Biobaku 1998). There is no religious prohibition against the consumption of rabbit meat in most countries (Biobaku 1998).

The objective of this study is to examine the effect of protein concentrates sourced from plant and animal products on the growth performance of weaner rabbits.

#### MATERIALS AND METHODS

Three diets termed A,B, and C were prepared. Diet A contained the groundnut cake and local fish meal. Diet B had only the groundnut cake while Diet C had only the fish meal as shown in Table 1. The diets were all pelleted and were calculated to contain 20.42-20.89% crude protein and 9.48-10.42KJ/gM.E.

Twenty four six week old New Zealand white male and female rabbits weighing 550-610 g were obtained from University Teaching and Research Farm. The animals were divided into three groups of eight rabbits per group with an average weight of 579 g in each groups. Each group was further sub-divided into two, such that duplicate groups of four rabbits were obtained for each sub-group with two rabbits per cage. The rabbits were fed the pelleted diet daily at 8:30 am. Water was provided *ad libitum*.

Feed refusals were weighed during the last fourteen days of each collection period in order to calculate the feed intake in g/d over the fourteen-day period.

Digestibility of the diet was carried out in the sixth week of the experiment and lasted for seven days. The first four days were for adaptation of the animals to the new environment and the last three days were used for collection. Two rabbits were used per replicate. Records of the daily feed intake and the daily faeces voided were kept. Faeces collected were dried in an oven at about 125°C for 24-48 h.

Records of weekly body weight gain, feed intake faeces voided, feed efficiency ratio, protein efficiency ratio and digestibility of protein were calculated for eight weeks. These calculations were done on dry matter basis.

TABLE 1  
Percentage composition of experiment diets

Components	Control Diet	Groundnut cake Diet (GNC Diet)	Local fish meal (LFM Diet)
Yellow	52.97	47.85	54.11
Groundnut cake	6.36	18.61	-
Local fish meal	7.17	-	12.39
Brewer's Grains	30.00	30.00	30.00
Oyster shell	2.00	2.00	2.00
Bone meal	1.00	1.00	1.00
Vit./Mineral Premix	0.25	0.25	0.25
Salt	0.25	0.25	0.25
<b>Total</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>
<b>Calculated Analyses</b>			
Protein (%)	20.42	20.89	20.55
Energy (KJ/gm)	10.42	9.48	10.20
Calcium (%)	2.64	2.44	2.48
Methionine (%)	0.74	0.70	0.72
Lysine (%)	0.64	0.58	0.62

Feed efficiency ratio determination

Feed efficiency (per week)=

Total body weight gain/week (kg)

Total feed intake/week (kg)

Protein efficiency ratio determination

Protein efficiency ratio (per week)=

Total body weight gain/week (kg)

Total protein consumed/week (kg)

*Analytical Techniques*

Samples of the groundnut cake, local fish meal and the three ratios were analysed for proximate composition according to AOAC (1990).

*Statistical Analysis*

Performance records of the animals were subjected to one way analysis of variance by method of Snedecor and Cochran (1967).

Duncan's (1955) multiple range test method was used to determine significant differences between means.

**RESULTS AND DISCUSSION**

The groundnut cake used in this trial contained 48.13% protein which was significantly ( $P < 0.01$ ) lower than the protein in the local fish meal, which contained 52.15%.

The dry matter, fat and ash contents of local fish meal were significantly higher than those found in the groundnut cake (Table 2).

The levels of the crude fibre were (18.25%) for the control diet, groundnut cake (20.25%) and local fish meal (20.25%). Cheeke (1983) had reported that although rabbits digest fibre poorly, dietary fibre is useful in preventing enteritis and for chewing. A level of 15-18% dietary fibre is therefore suggested for optimum growth.

Beyond 18%, it may caecal impaction, but fibre again is indispensable for adequate filling of the digestion tract and maintenance of normal peristaltic movements (Arveux 1980).

Although the crude fibre in their diets varied from 18.25-20.45%, there was no observation of caecal impaction, and this agrees with the findings of Ekpenyong and Biobaku (1986), that

TABLE 2  
Chemical composition of groundnut cake, local fish meal and experimental diets (% dry matter basis)

Chemical Composition (% Dry matter)	Groundnut cake (GNC)	Local fish meal (LFM)	Control diet	Groundnut cake diet (GNC)	Local fish meal diet LFM diets
Moisture	7.48	4.81	11.50	12.00	17.00
Crude protein	48.13	52.15	20.15	18.85	19.25
Ether extract	6.05	7.76	2.20	2.25	1.50
Crude fibre	5.52	0.83	18.25	20.45	20.25
Nitrogen free extract	26.53	6.11	24.90	23.20	18.00
Ash	5.22	26.84	22.00	22.00	23.00
Minerals					
Potassium (%)	0.332	0.442	0.342	0.348	0.356
Phosphorus %	0.048	0.640	0.042	0.062	0.068
Calcium %	0.440	0.560	0.364	0.342	0.354
Magnesium Ppm	0.714	0.124	0.164	0.184	0.174
Managanese Ppm	226	268	224	218	216
Iron (ppm)	142	142	138	136	136

TABLE 3  
Effects of diets on growth performance of rabbits

Performance Parameters	Control diet 1	Groundnut cake diet (GNC Diet)	Local fish meal diet (LFM Diet)	<sup>1</sup> SEM
Numbers of rabbits	579 <sup>a2</sup>	579 <sup>a</sup>	579 <sup>a</sup>	6.49
Initial body weight (g)				
Final body weight (g)	1145 <sup>a</sup>	1084 <sup>a</sup>	1132 <sup>a</sup>	16.42
Daily Wt gain (g/day)	10.11 <sup>a</sup>	9.02 <sup>b</sup>	9.88 <sup>a</sup>	0.44
Daily feed intake (g/day)	90.37 <sup>a</sup>	84.37 <sup>b</sup>	86.41 <sup>ab</sup>	3.42
Feed gain	8.94 <sup>a</sup>	9.40 <sup>a</sup>	8.75 <sup>a</sup>	2.46
Feed efficiency	0.30 <sup>a</sup>	0.21 <sup>b</sup>	0.29 <sup>a</sup>	0.80
Protein efficiency Ratio	7.2 <sup>a</sup>	6.29 <sup>b</sup>	7.01 <sup>a</sup>	0.04
Protein digestibility	88.40 <sup>a</sup>	85.98 <sup>c</sup>	86.55 <sup>b</sup>	6.42
Mortality	0	0	0	

1: Standard error of mean; values are the mean of eight analyses

2: Means along the same row with different superscripts are significantly different ( $P < 0.05$ )

crude fibre in the diet of rabbits can be varied from 28-32% with no caecal impaction.

The effect of the trial diets on growth, feed efficiency, protein efficiency and protein digestibility is shown in Table 3. Rabbits fed control diets had the highest body weight gain, which is statistically significant ( $P < 0.01$ ) when compared with rabbits fed the groundnut cake. There is no significant difference between rabbits fed the control diet and those rabbits fed the local fish meal diet.

The rabbits on the control diet consumed the highest amount of the diet to produce unit weight gain though they had the best feed efficiency which is statistically not significant when compared with other two diets. However, this may be due to the fact that the control diet contained a balanced protein profile.

Table 3 also shows that the rabbits fed the fish meal diet consumed more feed with higher body weight gain when compared with rabbit-fed groundnut cake diet. This may be due to the fact that animal protein source is better in quality when compared with plant protein source, which is deficient in some essential amino acids and this view was supported by Tewe (1995).

The poor performance of rabbits fed the diet containing groundnut cake as protein source was supported by Omole (1982) who reported that the groundnut cake protein contained large amounts of nutritionally essential amino acids,

particularly arginine but its nutritive value tends to be limited, particularly by its low content of lysine and methionine which are very essential for proper growth of animals.

Table 3 also shows the value for the protein efficiency ratio. The protein efficiency of rabbits fed the control diet is significantly ( $P < 0.01$ ) higher than those of rabbits fed the groundnut cake diet. However, there are no differences between rabbits fed the control diet and those rabbits fed the local fish meal diet.

The protein digestibility in rabbits fed the control diet was significantly ( $P < 0.01$ ) higher than those rabbits fed diets containing groundnut cake and fish meal as protein sources; this may be due to the levels of protein and crude fibre. The level of crude protein in the control diet was higher and level of crude fibre lower than in the other two diets and it had been demonstrated that feeding elevated levels of fibrous materials and lower protein levels, reduces the apparent digestion coefficient of the crude protein in rabbits (Besedina and Pereidik 1970).

Table 4 shows that the diet containing groundnut cake as the protein source reduced the cost of feed of the minimum level, but this has not led to improvement in body weight gain, feed consumed, feed efficiency, which shows that although it is possible to have the cheapest sources of feed, they do not have to produce the best results on rabbit production.

TABLE 4  
The influence of experimental diets on the economy of rabbit production

Components	Control diet	Groundnut cake diet (GNC Diet)	Local fish meal diet (LFM Diet)
Total no of rabbits	8	8	8
Initial average wt (g)	579	579	579
Final average wt (g)	1145	1084	1132
Total body wt gain (kg)	0.566	0.505	0.553
Total feed consumed (kg)	5.06	4.75	4.86
Protein efficiency ratio	7.2	6.29	7.01
Total cost of feed	61.080	44.89	52.776
Consumer (N)			
Cost/kg feed (N)	12.071	9.450	10.859
Cost of feed/kg wt	21.327	16.697	19.637
Gain (N/kg)			

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