# Effects of Varying Levels of Sun Dried Yam Peel Meal on the Growth Performance, Carcass Characteristics and Economic Efficiency of Weaner Rabbits

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**Abstract:**
*Twenty weaner rabbits of mixed sexes with an average initial weight of 0.62kg were used to determine the effect of varying level of sun-dried yam peel meal (YPM) as a source of fibre on their growth performance, carcass characteristics and economics of production. The rabbits were randomly allotted to five diets formulated with sun dried yam peel meal (YPM) replacing wheat offal (WO) at 0, 25, 50, 75 and 100% level of inclusion. The final live weight of rabbits were significantly higher ($p<0.01$) in diet 2 (25% YPM), the feed conversion ratio and feed efficiency compare favourably among the dietary treatments. There was significant difference ($p<0.05$) with higher daily feed intake on diets 1 and 2 value compared to others. Weight of organ expressed as a percentage of live weight did not show any significant difference between the treatment means accepts in the carcass weight which shows a highly significant difference ($p<0.01$). The cost in Naira per kilogram gain was highest on diet 1 (0% YPM) and lowest on diet 5 (100% YPM). The result indicates that yam peel meal can be used to replace wheat offal at up to 75% in the diet of weaner rabbits with good performance and tremendous reduction in feed cost.*

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**Key Words;** Varying, Wheat offal, Yam Peel Meal, Rabbits Diet, Economic Analysis.

## INTRODUCTION

Animal protein consumption in Nigeria and other developing countries has been reported to be comparatively low (Ayorinde and Aromolaran 1998). (Food and Agricultural organization FAO (1996) recommended a protein consumption level of 65g per day of which 35g should be from animal source. However, the consumption of protein especially animal protein is about 6.8g (OYenuga, 1995).This problem has generally been attributed to shortage of animal protein products. This has led to current high cost of animal products making them out of reach of an average Nigerian. This problems can bridged by directing efforts at the production of animals that are highly prolific, with short generation interval (Akinmutimi and Onwukwe, 2002). One of such is the rabbit. It has high fecundity with short gestation period (Fielding and Metheron 1991). They are fast growing and can obviously convert forage and kitchen wastes into meat with high efficiency (Nworgu and Ogbosuka, 2003). Rabbit supply animal protein to Nigeria especially in rural and peri-urban areas (Egbo *et al*., 2001). Rabbit production has the potential to improve on the diet and income of many poor households due to its growth and fecundity rate, low investment and labour cost (Spore. 2007: Soyebo. 2006).

According to Oseni *et al*. (2008) a major limitation to the development of small holder rabbit production in Nigeria is the absence of reliable sources of quality genetic stocks of rabbits suitable for such units. Rabbit meat is delicious, tasty, well accepted and contains low fat and cholesterol levels. The nature of rabbit in terms of size, short generation interval, rapid growth rate (Ensminger, 1991), easy conversion of available proteins in cellulose-rich plants to meat (Nowak, 1991) and good source of high quality animals protein (Fielding and Metheron 1991) make rabbit production attractive. According to (Omole *et al*, 2005), the white meat of rabbit is very nutritious, easily digestible and extremely low in cholesterol and sodium levels. However, the major constrains in animals production has being compounded with the present economic depression and the fact that most of the feed ingredients such as maize, sorghum and soya beans used in preparing rabbit diets face serious competition from man as food (Ijaiya and Awonusi, 2002). Consequently, there was a need to search for alternative sources of feed ingredients that will be cheap, locally available and nutritionally adequate. One of such feed ingredient is the yam peels which are usually regarded as waste products.

This work therefore attempts to study the performance and cost effectiveness of varying levels of yam peel and meal and wheat offal as a fibre source in the diets of weaner rabbits. This forms the basis of this study.

## MATERIALS AND METHODS

**Experimental site and housing:** The experiment was conducted at Abubakar Tafawa Balewa university teaching and research farm. Located in southern part of Bauchi town about six kilometers along Dass road in Bauchi state. Bauchi state occupied a land area of about 60,000sq km approximately 7% of Nigeria total land area. The state lies between latitude $90^0$30'n and $120^0$30'N and longitude $80^0$42'E and $11^0$8'.The average rainfall ranges from 130mm to 600mm. The vegetation is guinea savanna (B.S.A.D.P. 1999).
The experimental weaner rabbits were housed in hutches located inside the rabbitry building. Each hutch had a feeder and waterer attached.

**Experimental Diets:** The test feedstuff (fresh yam peel) were collected as kitchen waste from Muda Lawan market in Bauchi metropolis and sun-dried on clean floor until it is crispy to touch it was then milled using the hammer mill at the feed milling unit of the Abubakar Tafawa Balewa University to produce yam peel meal.

Five experimental diets were formulated. In the diets sundried yam peel were used to replace varying levels of wheat offal in the weaners diets. Sundried yam peel meals replaced 0, 25, 50, 75, and 100% dietary inclusion levels of wheat offal. The table were designed as T1, T2, T3, T4, and T5 respectively.

**Experimental animals and their management**: Twenty weaner rabbits of mixed breeds (mongrels) and sexes with an initial weight of 435-600g were used for the investigation. They were randomly assigned to five dietary treatments in four (4) rabbits per treatment in a complete randomized design (CRD) arrangement. The experiment lasted for six weeks (42 days). Experimental diets and water were made available *ad-libitum* throughout the study period.

Prior to arrival of the weaner rabbits, the house and the cage were cleaned and disinfected, the feeder and waterer were equally cleaned before the beginning of the experiment, also the feeders and drinkers were cleaned before the next feeding and watering. The surrounding was kept clean by sweeping and cleaning on daily basis.

**Data collection**: Initial average weight of the rabbits was taken on the first of the experiment. They were subsequently weighed on weekly basis. Feed conversion ratio (FCR) was calculated by dividing the average feed intake by the average weight gain. Percentage mortality was calculated using number of dead rabbits divide by number of rabbits X100.
Gross margin/profitability test of the diets were calculated according to Saniya(2007). Evaluations of carcass quality and organ weight were carried out as described by Ojewola and Longe (1999).
**Statistical analysis:** data collected were analyzed using SPSS (1996) statistical package 7.5.

## RESULT AND DISCUSSION

The growth performance and cost analysis of weaner rabbits fed experimental diets as is shown in table 2. There was no significant difference ($p>0.05$) in the parameters measured except in the daily feed intake and daily weight gain ($p<0.05$.) T4 and T4 has the lowest and highest daily feed intake respectively i.e. 59.08g and 79.50g and the values are lower than 80.08g and 89.13g as reported by Akinmutimi (2008) who fed weaner rabbits with similar diet. The difference may be due to ambient temperature and fibre content (Preston, 1987). Diets 5 and 3 has the lowest and highest daily weight gain (13.22g and 19.49g) respectively. These values were higher than 9.23g and 11.3g reported by Akinmutimi (2008).

The mean total weight gain obtain in this result shows that Diet 3 has the highest (818.75g) value and Diet 5 has the lowest value (635.25g) this shows that the higher the inclusion level of yam peel the lower the total weight gain. The value obtained are to those reported by Akinmutimi *et al*, (2006) who fed weaner rabbits with ripe plantain and yam peels base diet. The result for final body weight shows that animal fed Diet 3 and diet 2 have the highest final body weight of 1505.5g and 1458.80g respectively. The values obtained are higher than 1375.00g and 1308.33g reported by Akinmutimi(2006).The fed conversion ratio ranged from 3.92-4.28g were lower than 6.56-7.99g reported by Akinmutimi and Anakebe (2008) who fed rabbits with yam peels, sweet potato peels meal in place of maize and also lower than (4.39-6.64g) as reported by Osakwe and Nwose (2008) for rabbits fed graded levels of cassava meal. The fed efficiency was similar for all the treatment (0.24-0.26g).

The economic analyses of the experimental diets were presented in table 2. The cost (per kg) of feed ingredient favoured diets 4 and 5, this may be due to the cheaper price of the test ingredients. This may be due to effect of the cost of kg of feed reported by Akinmutimi (2004). Thus increase in the levels of yam peel meal may result in considerable reduction in the cost of rabbits production which in extension makes the product affordable to consumers thereby achieving the major objective of this trial.

Table 3: shows carcass characteristic of weaner rabbits fed experimental diets. There was no significant ($P>0.05$) treatment effect on the carcass parameters measured except live and carcass weight ($P<0.01$) this result is higher than the reported by Ijaya and Awonusi (2002) when they replace maize with yam peel meal. Dressing percentage of 47.8-55.7% recorded were not significantly different this result agrees with value of 47.42 –

54.08% for rabbits (Akinmatimi (2004) the differences could be attributed to breed, age and feed to the animals. The percentage weight of liver, kidney, heart and spleen were similar to those reported by (Akinmuti, 2004) for rabbits fed yam peel meal in place of maize based diets. The percentage small intestine (5.89-8.84%) and large intestine (0.64-081) were statistically similar. The values are higher when compared to those reported by Ironke (2004) for rabbits fed agricultural by-products based diets.

**Table 1:** Percentage composition of experimental diet

| **Ingredient** | **$T_1$ 0%** | **$T_2$ 25%** | **$T_3$ 50%** | **$T_4$ 75%** | **$T_5$ 100%** |
|---|---|---|---|---|---|
| Wheat offal | 40 | 30 | 20 | 10 | 0 |
| Yam peel | 0 | 10 | 20 | 30 | 40 |
| Maize | 25.25 | 25.25 | 25.25 | 25.25 | 25.25 |
| Soya beans meal | 19.05 | 19.05 | 19.05 | 19.05 | 19.05 |
| Groundnut hay | 10 | 10 | 10 | 10 | 10 |
| Fish meal | 2 | 2 | 2 | 2 | 2 |
| Bone meal | 3 | 3 | 3 | 3 | 3 |
| Salt | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 |
| Premix | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 |
| Lysine | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| Methionine | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| Total | 100 | 100 | 100 | 100 | 100 |
| **Calculated Analysis** | | | | | |
| Crude protein (%) | 18.00 | 17.84 | 17.68 | 17.49 | 17.28 |
| ME (kcal/kg) | 2253.05 | 2345.05 | 2447.05 | 2538.05 | 2633.05 |

**Table 2**: Growth performance and cost analysis for weaner rabbits fed experimental diets.

| | Replacement levels of yam peel meal | | | | | | |
|---|---|---|---|---|---|---|---|
| **Parameter** | **0%** | **25%** | **50%** | **75%** | **100%** | **SEM** | **LS** |
| Initial weight (g) | 578.25 | 665.75 | 686.75 | 601.25 | 564.75 | 54.55 | NS |
| Final weight (g) | 1360.50 | 1458.80 | 1505.50 | 1239.60 | 1200.00 | 121.75 | NS |
| Total weight gain (g) | 782.25 | 802.50 | 818.75 | 638.35 | 635.25 | 123.57 | NS |
| Daily feed intake (g) | $78.77^{a}$ | $79.50^{a}$ | $73.90^{b}$ | $59.08^{c}$ | $60.44^{c}$ | 5.69 | 13.13* |
| Daily weight gain (g) | $18.63^{a}$ | $19.11^{a}$ | $19.49^{a}$ | $15.19^{b}$ | $13.22^{c}$ | 1.35 | 2.88* |
| Feed conversion ratio | 4.28 | 3.80 | 3.92 | 3.91 | 4.02 | 0.36 | NS |
| Feed efficiency | 0.24 | 0.26 | 0.26 | 0.26 | 0.25 | 0.02 | NS |
| Total feed intake (kg) | 3.31 | 3.05 | 3.10 | 2.48 | 2.54 | | |
| Feed cost (₦/kg) | 44.89 | 42.69 | 40.24 | 38.48 | 30.07 | | |
| Total feed cost (N) | 148.59 | 130.20 | 125.49 | 90.93 | 91.62 | | |
| Feed cost (₦/kg gain) | 190.50 | 162.75 | 176.75 | 148.33 | 143.16 | | |
| Mortality | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - |

Superscripts a,b,c =means in the same raw with different superscripts differed significantly *($p<0.05$)
SEM= Standard Error of Mean, LSD= Least Significant Different,

**Table 3:** Carcass characteristic as percentage live weight of weaner rabbits fed experimental diets

| | Replacement levels of yam peel meal | | | | | | |
|---|---|---|---|---|---|---|---|
| **Organs** | **0%** | **25%** | **50%** | **75%** | **100%** | **SEM** | **LSD** |
| Live weight (g) | $1401.7^{a}$ | $1494.1^{a}$ | $1341.0^{b}$ | $1191.4^{d}$ | $1204.3^{c}$ | 53.22 | 168.65** |
| Carcass weight (g) | $785.00^{a}$ | $689.67^{b}$ | $723.67^{a}$ | $630.67^{b}$ | $602.33^{bc}$ | 29.66 | 93.99** |
| Dressing | 55.70 | 47.36 | 54.22 | 52.92 | 50.12 | 2.83 | NS |
| Spleen | 0.07 | 0.07 | 0.07 | 0.08 | 0.10 | 0.01 | NS |
| Hard | 0.26 | 0.28 | 0.27 | 0.22 | 0.28 | 0.05 | Ns |
| Kidney | 0.46 | 0.64 | 0.74 | 0.64 | 0.67 | 0.10 | NS |
| Liver | 4.17 | 2.77 | 3.49 | 2.99 | 2.95 | 0.40 | NS |
| Lungs | 0.67 | 0.59 | 0.50 | 0.65 | 0.55 | 0.07 | Ns |
| Large intestine | 0.69 | 0.64 | 0.67 | 0.81 | 0.78 | 0.07 | NS |
| Small intestine | 8.84 | 5.89 | 6.43 | 7.33 | 7.53 | 1.09 | NS |
| Large intestine length (CM) | 48.67 | 55.67 | 59.33 | 59.00 | 80.33 | 28.17 | NS |
| Small intestine length (CM) | 252.67 | 334.67 | 338.93 | 332.32 | 275.67 | 27.54 | NS |

Superscripts a,b,c,d= means with different superscript in the same raw differ highly significantly**($p<0.01$)

## CONCLUSION

Judging from the performance, carcass characteristics and economic analysis yam peel meal, which is economically cheaper than wheat offal can replace up to 75% of wheat offal in weaner rabbits diets without adverse effects on performance. This would go a long way especially during periods of feed scarcity to increase animal protein availability and reduce accumulation of waste (SDYPM) in the environment.

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*SPSS (statistical package for social science, 1996). Release 7.5*