



Dried Grassmeal in the Diets of Weaner Rabbits: Effect On Growth And Carcass Characteristics

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Abstract

Growth and carcass characteristics of weaner rabbits fed diets containing different levels of dried grass meal were evaluated in a 62-day trial. Twelve weaner rabbits of 4-6 weeks of age, averaging 908 g in weight were randomly divided into three groups of 4 animals each and replicated four times with a rabbit per replicate. These rabbits were assigned three different diets (1, 2 and 3) containing dried grass meal replacing rice offal at 0, 5.5 and 11% in a completely randomized design. Results showed that body weight (g) and ADFI did not differ ($P>0.05$) among the treatment groups. FCR followed a similar pattern. ADG was significant ($P<0.05$); diet 3 promoted the best gain (18.17 g), though similar to results obtained for rabbits fed diet 2 (15.08 g) which differed significantly ($P<0.05$) with daily body gain of animals on control diet (13.30 g). The slaughter weights, unsinged weight and dressed weight of rabbits fed diets 2 and 3 were highest and similar ($P<0.05$) while rabbit on control had the least values for these parameters. Headless singed weights were superior ($P<0.05$) for rabbits fed diet 3 (1.13 g) while rabbits on other treatment groups had the least and similar headless singed weights values. Dressing percentage was marginally enhanced for rabbits fed diet 3 but this was not significant ($P>0.05$). Therefore, dried grass meal can replace rice offal up to 11% in rabbit diet without adverse effect on growth and carcass characteristics of rabbits.

Key words: Grass-meal, Weaner rabbit, Growth, Performance and Carcass

Introduction

Reports of low animal protein intake in most developing countries of the world are well documented (FAO, 1989; Fadipe, 1996; Obioha, 1997). In Nigeria, this situation has become somewhat persistent because the animal production techniques, as practiced (subsistence, extensive and few intensive enterprise), often than not, are localized and the end products are unable to meet the animal protein demands of the teeming populace. Livestock production, hence, has not kept pace with the human population increase in Nigeria. Among other factors, previous investigations have implicated poor genetic merit, management and nutrition (Ibeawuchi *et al.*, 2000; FAO, 2000) for this shortcoming.

Government has been making concerted efforts to stem the tide by encouraging investment in animal agriculture. Be it as it may, any government intervention programme geared towards addressing animal production and indeed animal protein consumption of Nigerians should encourage rapid domestication and multiplication of livestock species, especially those with short generation interval and high fecundity. (Ahamefule *et al.*, 2007).

Among the livestock of interest, rabbit, a monogastric herbivore could be exploited to meet the observed animal protein deficit in the diet of Nigerians. Documented evidence portrays some of the advantages of raising rabbits to include high protein content, low meat cholesterol, great genetic

diversity, fast growth rate and low investment cost (Aduku and Olukosi, 1990; Ahamefule *et al.*, 2007).

Cost effective raising of rabbit demands that production cost be drastically reduced to make the final product affordable. Given this circumstance, feed cost, which constitutes bulk of the expenses incurred in rabbit production, could be reduced by the incorporation of dried grass meal in rabbit nutrition. Rabbits are good feed converters and could perform well on a combination of grass meal in a concentrate mixture.

There is dearth of information on rabbit studies conducted with dried grass meal as earlier studies reported use of green grass or forages. Dried grass meal was incorporated in a concentrate mixture and fed at different dietary levels to weaner rabbits. The objective was to evaluate the performance and carcass characteristics of weaner rabbits fed graded levels of dried grass meal in a concentrate formulation.

Materials and Methods

Experimental Site

The study was conducted at the Rabbitary Unit of the Teaching and Research Farm of University of Agriculture, Makurdi, Benue State, Nigeria. Makurdi is located on latitude 07° 43" North and longitude 08° 3" East. Rainfall lasts from April to October and average 1200mm annually. Temperature fluctuates between 23 and 35°C while relative humidity ranges from 47 -85%.

Experimental Animals and Management

Twelve mongrel weaner female rabbits, averaging 908 g in weight and aged between 4-6 weeks were randomly divided into three groups of 4 rabbits per group. The rabbits were housed separately in a standard hutch of 60 cm × 60 cm and raised 60 cm above the ground. They were

provided with drinkers and feeders. The animals were dewormed using Ivomectin^(R) (0.2ml/animal administered sub-cutaneously) while neomycin^(R) was administered through drinking water to combat bacterial infections.

Processing of Dried Grass Meal

Fresh grasses comprising *Cynodon dactylon*, *Gomphrena celesoides* and *Chloris gayana* were collected, after mowing of field around the University environment. The grass sword was sundried to about 10% moisture content and subsequently milled for incorporation into the diets.

Experimental Diets and Design

Experimental diets were formulated using Maize, Maize offal, Brewer's Dried Grains, Full-fat Soya beans, Rice offal, Dried grass meal, Bone ash, Common salt and Vitamins premix*. These experimental diets were designated as Diet 1, Diet 2 and Diet 3 containing dried grass meal replacing rice offal at 0, 5.5 and 11%, respectively. Twelve weaner rabbits of 4-6 weeks of age, averaging 908 g in weight were randomly divided into three groups of 4 animals each and replicated four times with a rabbit per replicate in a completely randomized design

Data Collection

Daily feed intake and weekly body weight of animals were recorded. Average daily feed intake (ADFI g/d), average daily weight (ADG g/d), and feed efficiency were computed for each animal per treatment group.

Carcass Evaluation

At the end of the 62-day feeding trial, three rabbits whose weights were closest to the average weight of rabbits in that treatment group were selected, starved overnight to clear their guts of digesta and subjected to carcass evaluation as described by

Agunbiade *et al.* (2000). Each animal was weighed before slaughter, after slaughter and after dressing. Dressing percentage was calculated as the weight of dressed carcass in relation to live weight at slaughter multiplied by 100. Dressed carcass is the weight of the rabbit after removal of the head, fur, contents of the thoracic and abdominal cavities (including the diaphragm and kidney).

Feed and Data Analysis

The experimental diets were analysed for proximate composition using methods of AOAC (2000). All data were subjected to analysis of variance (ANOVA) procedure for a completely randomized experiment

(Steel and Torrie, 1980). Differences between treatment means were separated using Duncan's Multiple Range Test (Duncan, 1955).

Results and Discussion

The composition and proximate constituents of the experimental diets are given in Table 1. The crude protein and crude fibre contents of the diets ranged from 13.67 - 15.92% and 14.14 – 20.10%, respectively. These fell within the recommended dietary crude protein (12 – 17%) and crude fibre (10 – 20%) levels for the optimum growth and performance of weaner rabbits (Aduku and Olukosi, 1990) in the Tropics.

Table 1: Ingredients Composition and the proximate composition of the Experimental Diets

Ingredients(kg/100kg)	Diet 1	Diet 2	Diet 3
Maize	25.00	25.00	25.00
Maize Offal	15.00	15.00	15.00
Brewer`s dried grain	15.00	15.00	15.00
Full-fat soya beans	20.00	20.00	20.00
Rice offal	22.00	16.50	11.00
Dried grass meal	0.00	5.50	11.00
Bone ash	2.25	2.25	2.25
Common salt	0.50	0.50	0.50
Vitamin premix*	0.25	0.25	0.25
Total	100.00	100.00	100.00
Analysed content (% DM basis)			
Dry matter	94.58	94.74	95.20
Crude protein	15.92	14.20	13.67
Ether extract	7.30	8.04	9.36
Crude fibre	14.18	19.21	20.10
Nitrogen free extract	46.43	40.07	40.30
Total ash	10.75	10.22	11.77
Metabolisable Energy (Kcal/Kg)	2834.45	2605.56	2702.09

Three experimental diets were formulated and the grass meal was used to replace rice offal at 0, 5.5 and 11% dietary levels in D1, D2 and D3 respectively as shown in the Table above.

Kcal= Kilocalories and Kg= Kilogramme.

*Premix contents provides the following per Kg: Vitamin A, 1500 UI; Vitamin E, 11.00mg; Biotin, 0.25mg; Pantothenic acids, 11.00mg; Vitamin K₃, 3.00mg; B₂, 2.5mg; B₆, 8.00mg; Nicotinic Acid, 8.00mg; Fe, 5.00mg; Mn, 10.00mg; Zn, 4.5mg; Co, 0.2mg; Se, 0.01mg.

The growth performance of weaner rabbits fed diets containing graded levels of dried grass meal (DGM) is summarized in Table 2. Average daily feed intake (g/d) did not differ ($p>0.05$) among treatment groups, but there were indications that rabbits fed diets 1, 2 and 3 consumed 3.82, 4.12 and 3.61% of their average live weights, respectively. Iribeckel (2001) cited by Leng (2006) reported that an easier way of adjudging if a concentrate diets provided adequate nourishment in any given trial is when rabbits on subsisting rations consumed 5% or more of their body weights. This observation did suffice in the study.

Even when consumption was less than 5% of body weights, rabbits in all dietary groups were well nourished judging by their dressed percentages (Table 3). This probably suggests that rabbits would tend to efficiently utilize concentrate diets that are fortified with dry forage or dry grass meal relative to sole concentrate diets. This preference and indeed efficiency of feed utilization tended to be higher as dietary levels of DGM increased in the diets. Diet 3 with the highest inclusion of dried grass meal (11%) had the best dressed out percentage (69.81%).

The daily feed intake values (65.58 – 74.61 g) compared favourably with the result of trials conducted on weaner rabbits by Ahemen *et al.* (2012) (67.02 – 79.71 g) in Makurdi and also with results obtained by Ahamefule *et al.* (2005) (64-74.61 g) and Ahamefule *et al.* (2007) (64.4-85.0 g) with weaner rabbits elsewhere.

The average daily gains (ADG) (g/d) was influenced ($p<0.05$) by dietary treatments. The values of 15.08 and 18.17 g obtained for DGM fortified diets 2 and 3, did not differ ($p<0.05$) from each other. Similarly,

rabbits fed the control diet (13.30) and diet 2 had the same daily weight gain. However, rabbits fed diet 3 had significantly higher ($p<0.05$) ADG values relative to rabbits in the control group. Average daily gain (ADG) generally increased in this study as the level of DGM increased in the diets. Rabbits are known to relish and prefer green forages over concentrate diets, perhaps because of its succulence, acceptability, efficiency of utilization, ease of handling and relative low gut retention time. This probably implies that in the absence of green forages and because of their affinity for plants, rabbits would positively be inclined, in terms of consumption, towards concentrate diets that have traces of dried forages or indeed grass meal incorporation. This view is corroborated by the findings of Ahemen *et al.* (2012). The range of ADG values obtained in this study (13.30 – 18.17 g/d) compared favourably with results obtained with same animal species fed green forages, *ad libitum* (12.50 – 20.80 g/d; Asuquo, 2007). The value (25.20 g/d) reported by Aduku and Olukosi (1990) was slightly highest. The slight variation in ADG values as reflected in the investigations probably demonstrate sensitivity of the herbivorous monogastric animal to differences in management and the influence of diets, diet form, breed and weather condition on production. The carcass characteristics of rabbits fed graded levels of dried grass meal are shown in Table 3. The slaughter weights differed ($P<0.05$) among treatment groups and was highest (1.77 Kg) for rabbits fed diet containing 11% DGM (diet 3); this value however, did not differ ($P>0.05$) from weight of rabbits fed diet 2 (1.72 Kg). The control group had the least slaughter weight (1.50 Kg) which was inferior ($P<0.05$) to slaughter weight of rabbits fed

diets 2 and 3. Ahamefule *et al.* (2007) reported rabbit slaughter weights of 1.80 – 2.00 kg and 1.15 – 1.40 kg in his studies using rabbit which were respectively higher and lower than values obtained in

the present study. Salroo *et al.* (1989) also reported average slaughter weight of 1.72 kg in soviet fryer at 12 weeks of age which compared favourably with the present result.

Table 2: Growth characteristics of rabbits fed dietary levels of dried grass meal

Parameters	Diet 1 (0%DGM)	Diet 2 (5.5%DGM)	Diet 3 (11%DGM)	SEM
Initial body weight (g)	906.25	906.25	912.50	43.01
Final body weight (g)	1712.50	1793.75	2062.50	70.99
Average daily feed intake (g/d)	65.58	74.06	74.61	1.93
Average daily body weight gain (g)	13.30 ^b	15.08 ^{ab}	18.17 ^a	0.87*
Feed conversion ratio	5.08	4.95	4.18	0.23

^{a,b} = Means on the same row with different superscripts differ significantly (P<0.05)
SEM = Standard error of mean. DGM= Dried Grass Meal

Table 3: Carcass characteristics of rabbits fed diet containing graded levels of dried grass meal

Parameters	Diet (0%DGM)	Diet 2 (5.5%DGM)	Diet 3 (11%DGM)	SEM
Slaughter weight (Kg)	1.50 ^b	1.72 ^a	1.77 ^a	0.45
Unsinged weight (Kg)	1.17 ^b	1.38 ^a	1.43 ^a	0.45
Headless weight (Kg)	0.92 ^b	1.00 ^b	1.13 ^a	0.43
Dressed weight (Kg)	1.03 ^b	1.15 ^a	1.23 ^a	0.04
Dressing percentage	68.75	67.13	69.81	1.65

^{a,b} = Means on the same row with different superscripts differ significantly (P<0.05)
SEM = Standard error of mean. DGM= Dried Grass Meal

The unsinged and headless singed weights were influenced (P<0.05) by dietary treatments. Rabbits fed control diet had least unsinged weight (1.17 Kg) while rabbits fed diets 1 and 2 had the highest and similar unsinged (1.38 Kg). Headless singed weight for diet 3 (1.13 Kg) was however, superior (P<0.05) to those of either diet 1; the control (0.92 Kg) and Diet 2 (1.00 Kg) groups.

The dressed weight followed same trend as slaughter weight in this study, increasing as the level of DGM increased in the diets. Diet 3 promoted the best dressed weight (1.23 Kg) followed by diet 2 (1.15 Kg) and control diet had the least value (1.03 Kg). These weights obtained for diets 2 and 3 were similar (P>0.05) but differed

significantly (P<0.05) from that of the control.

The dressed weights in this study are in consonance with result (1.00 – 1.01 kg) reported by Ahamefule *et al.* (2005) for weaner rabbits fed cassava peel-based diets; but higher than the values (0.53 – 0.73 kg) recorded for rabbits fed pigeon pea-based diets (Ahamefule *et al.*, 2007). Slaughter and dressed weights are interrelated as the latter is derived from the former. It is therefore not surprising that they followed similar pattern in this study.

Dressing percentage did not differ (P<0.05) among treatment groups. The values in this study were nevertheless high and showed high efficiency of feed utilization

especially for the dried grass meal (DGM) - based diets. The highest value of 69.81 % obtained for rabbits fed diet 3 suggests that the optimum DGM inclusion in the rabbit diets may not have been attained. Perhaps, weaner rabbits could tolerate higher levels (>11%) of DGM in their diets as it improves their weight gain, dressing weight as well as dressing percentage.

This performance increased as levels of DGM in the diets increased. In fact, diet 3 (11% DGM) presumptuously stands out as the diet of choice for rabbits owing to the relatively better performance it promoted. It would be pertinent to note that the optimum DGM in rabbit nutrition was achieved in this study and may still require further investigation. This may however form the focus of a subsequent study. It is worth to know that incorporation of DGM in rabbit diets at 11% promote growth and carcass traits of weaner rabbits in the present study.

Conclusion

It is concluded that dried grass meal comprising *Cynodon dactylon*, *Gomphrena celesoides* and *Chloris gayana* can replace up to 11% rice offal in diets of growing rabbit without deleterious effect on their growth and carcass characteristics.

References

Aduku, A. O. and Olukosi J. O. (1990). Rabbit Management in the Tropics:

Production, Processing, Utilization, Marketing, Economics, Practical, Training, Research, and Future Prospects. Living Books series. G.U. Publication, Abuja, Nigeria.

Agunbiade, J.A., Adeyemi, O.A., Fasina, O.E., Ashorobi, B.O., Adebajo, M.O. and Wade, A. O. (2000). Cassava peels and

leaves in the diet of rabbits: Effect on performance and carcass characteristics. *Nigerian Journal of Animal Production*, 26:29-34.

Ahamefule, F.O., Ibeawuchi, I. A. and Umunnakwe, D.U. (2007). Performance of weaner rabbits fed diets containing raw and processed pigeon pea (*Cajanus cajan*) seed meal. *Journal of Animal and Veterinary Advances*, 6(6): 797-801

Ahamefule, F.O., Ibeawuchi, J.A. and Nwankwo, D.N. (2005). Utilization of sundried, fermented and ensiled cassava peel-based diets by weaner rabbits. *Nigeria Agricultural Journal*, 36:52-58

Ahemen, T., Wuanor, A. A. and Madu, H.N. (2012). Performance of male rabbits fed graded levels of *Moringa oleifera* leaf meal in a Guinea savannah environment of Southern Nigeria. Proceeding of Annual Conference of Animal Science Association of Nigeria, 9 – 13, Sept. 2012, Abuja, Nigeria. Pp 263-267.

A.O.A.C. (2000). Association of Official Analytical Chemists. Official Methods of Analysis 15th edition, Arlington, Virginia, Washington D.C.

Asuquo, B.O. (1997). Nutritional potentials of *Ipomea*, *Centrosema*, *Pueraria*, *Emila* and *Tridax* forages in mixed feeds for weaner rabbits. *Nigerian Journal of Animal Production*, 24: 46 - 50

Duncan, D.B. (1955). Multiple Range and Multiple F test. *Biometrics* 11: 1 – 42.

FAO (1989): [Food and Agriculture Organisation]. Production Year Book. Volumes 43 United Nation, Rome, Italy. Pp 104.

FAO (2000). [Food and Agriculture Organisation / World Health Organisation]. Energy and protein requirements. Report of joint FAO/WHO, expert consultation,

- FAO. Food and Nutrition Paper 51, FAO/WHO, Rome, Italy.
- Fadipe, A. A. (1996). The Nigerian Livestock subsectors: A keynote address at the 21st Annual Conference of Nigerian Society for Animal Production. University of Uyo, March 24 – 28, 1996.
- Ibeawuchi, J. A., Chindo, L. and Ahamafule, F.O. (2000). Milk production characteristics of imported Holstein-Friesian cattle maintained in a tropical high altitude environment. *Journal of Sustainable Agriculture and Environment*, 2(1): 14 – 19
- Leng, R. A. (2006). Digestion in rabbits: A new look at the effect of their feeding and digestive strategies. Workshop-seminar ‘Forages for Pigs and Rabbits’. MEKAR CelAgrid. Phnom, Cambodia, 22-24 August, 2006. Article 18. Retrieved December 23, 112 from <http://www.mekarn.org/proprf/prestonhtm>
- Obioha, F. C. (1997). A Guide to Poultry Production in the Tropics. ACENA Publishers Ltd. Enugu, Nigeria. pp. 1 – 25.
- Salroo, G. M., Prasad, V. S. S. and Gupta, S. C. (1989). Effect of age on carcass traits of Soviet Chinchilla rabbits. *Indian Journal of Animal Science*, 59(7):890 – 892.
- Steel, R. G. D. and Torrie, J. H. (1980). Principles and Procedures of Statistics. 2nd edition. McGraw-Hill Book Company Incorporated, New York.