GROWTH PERFORMANCE OF WEANER RABBITS FED GRADED LEVELS OF MILLET OFFAL DIETS AS REPLACEMENT FOR WHEAT OFFAL

[3]Ajimohun, F.F.[1@], Doma, U.D.,[2] Mancha, Y.P.[2], Kalla, D.J.U.[2], Oshibanjo, D.O,[3] Akwashiki M.A, [3] Adelowo, V. O.[4], Bot, M.H[4] and Olaiya O.D[4].

[1]National Veterinary Research Institute Vom, Plateau state
[2]Department of Animal production Abubakar Tafawa Balewa University, Bauchi state
[3]Department of Animal production University of Jos
[4]Federal College of Animal Health and Production Technology, Vom, Plateau State, Nigeria.
Corresponding author's email: ajumohunfelicia@gmail.com +2348036708169

ABSTRACT
The aim of this study was to determine the growth performance of weaner rabbits fed graded levels of millet offal diets with groundnut haulms as replacement for wheat offal. A total of 60 weaner rabbits aged 5- 6 comprising New Zealand white, Californian white, Dutch Belted, American checkered, Chinchilla and English Spotted of both sexes were purchased from reputable rabbit farmers in Vom Jos South where used in 8 weeks feeding trial. In this experiment, five iso-nitrogenous diets were formulated to meet 16% crude protein nutritional requirements of the weaner rabbits and similar levels of crude fibre by replacing wheat offal with graded levels of millet offal respectively in which groundnut haulms constituted 20% of each diet. The diets were designated 1, 2, 3, 4 and 5. Diet 1 contained wheat offal which served as the control (0%) while treatments (2-5) contained millet offal at graded levels of 25, 50, 75, and 100%, respectively. Data on daily Feed intake was determined, weight gains, Feed conversion ratio (FCR) were calculated. Mortality records were kept when they occurred throughout the experimental period. There were no significant differences in all parameters measured. Conclusion, the inclusion of millet offal was best at 75 -100% with improved the growth performance of rabbits without any deleterious effect.
Keywords: Growth Performance, Weaner Rabbits, Millet Offal Groundnut Haulms and Wheat Offal

INTRODUCTION

The problem of feed supply and availability on a sustainable basis has been the major concern of the livestock industry in Nigeria (Ajimohun *et al.,* 2022). Faced with the competition between humans and livestock for grains and the need to bridge the gap of animal protein consumption, Nigeria was look in wards for her feed resources. The livestock sector is required to shift emphasis from the usual conventional to non-conventional feed materials that are locally available and cheap (Ajimohun *et al.,* 2022). Among monogastric animals, rabbit has been reported to utilize fibrous materials for production of meat (Wafar *et al.,* 2019). Studies showed that chemical composition of forages could serve as a potential source of nutrients for animals (Wafar *et al.,* 2019).

Forages can be fed in the dry form as hay or fresh. This is of importance to rabbit farmer in the northern part of Nigeria, characterized by long period of dry season. Forage haulms are abundant in northern Nigeria especially during the peak of harvest (Wafar *et al.,* 2019). Such as millet offal.

Millet offal contained higher crude protein, crude fibre and ash concentrations than maize or sorghum offals. Millet offal is one of the industrial by-products which could substitute for maize as energy as well as wheat offal in rabbit diet. Ezieshi and Olomu (2008) reported the chemical composition of millet offal obtained from two sources, one from pap manufacture and the other from brewery. The millet offal from pap contains 20.65% CP, 3.12%CF, 3.01% EE, 3.36% ash and 2506 kcal/kg ME while the one from brewery contained 14.60% CP, 4.5% CF, 2.25% EE, 2.90%AS and 2148.0 kcal/kg ME respectively. Ogundipe and Agbede (2012) reported 12.08% CP, 15.9% CF and 6.36% ASH for millet offal. They reported that millet offal can be included in rabbit diets at up to 100% level without adverse effect on performance, carcass characteristics, organ weight and haematological responses of and at a lower cost.

Therefore, this study seeks to evaluate the growth performance of weaner rabbits fed graded levels of millet offal diets with groundnut haulms as replacement for wheat offal.

MATERIALS AND METHODS

Experimental Site

The research was conducted in the Rabbitry section Dagwom Farm, National Veterinary Research Institute, Vom, Plateau State in the Sudan savanna zone of North Central Nigeria.

Experimental animals and management

The rabbits were managed according to the provisions of International Guideline principles of Biomedical Research involving animals (CIOMS, 1985). A total of 60 cross bred weaner rabbits aged 5- 6 comprising of New Zealand white, Californian white, Dutch Belted, American checkered, Chinchilla and English Spotted of both sexes were purchased from reputable rabbit farmers in Vom Jos South. In this experiment, sixty (60) aged 5- 6 weeks with an average mean weight value of 529 - 574g where used in 8 weeks feeding trial. The hutches were provided with suitable facilities for drinking, feeding and faecal collection. Management practices, health and sanitation programme were strictly followed. At the end of the acclimatisation week the weaners were randomly allocated to five dietary treatments in a Completely Randomised Design (CRD). Feed was given at 7.00am- 9.00am in the morning and the left over from previous day were collected and weighed in order to determine feed intake. Each experiment lasted for eight weeks (56 days).

Experimental diets

In this experiment, five iso-nitrogenous diets were formulated to meet 16% crude protein nutritional requirements of the weaner rabbits and similar levels of crude fibre by replacing l wheat offal with graded levels of millet offal respectively in which groundnut haulms constituted 20% of each diet. The diets were designated 1, 2, 3, 4 and 5. Diet 1 contained wheat offal which served as the control (0%) while treatments (2-5) contained millet offal at graded levels of 25, 50, 75, and 100% respectively. The test ingredients and five diets were analysed for their proximate composition. The composition and proximate composition of the diet is shown in table 1.

Table 1: Ingredients and Percentage Composition of Graded Levels of Millet Offal in Weaner Rabbits Diets with Groundnut Haulms as Replacement for Wheat offal

Ingredients	Diets				
	I	**2**	**3**	**4**	**5**
	0%	**25%**	**50%**	**75%**	**100%**
Maize	31.87	31.13	30.39	29.65	28.92
Soya beans cake	14.88	15.62	16.36	17.11	17.83
Wheat Offal	30	22.5	15	7.5	0
Millet offal	0	7.5	15	22.5	30
Groundnut haulms	20	20	20	20	20
Bone meal	1.5	1.5	1.5	1.5	1.5
Limestone	1.0	1.0	1.0	1.0	1.0
Common Salt	0.25	0.25	0.25	0.25	0.25
Premix	0.25	0.25	0.25	0.25	0.25
Lysine	0.13	0.130	0.13	0.13	0.13
Methionine	0.12	0.12	0.12	0.12	0.12
Total (%)	100	100	100	100	100
Calculated Analysis (%)					
Crude Protein (CP)	16.00	16.00	16.00	16.00	16.00
Metabolisable Energy(ME Kcal/Kg)	2619.71	2661.97	2704.24	2746.78	2788.85
Crude fibre (CF)	9.00	9.04	9.00	9.35	9.19
Either Extract (EE)	4.63	4.74	5.44	4.97	5.12
Calcium	1.12	1.20	1.20	1.36	1.27
Phosphorus	0.42	0.45	0.39	0.51	0.36
Lysine	1.39	1.30	1.31	1.33	1.39
Methionine	0.54	0.67	0.79	0.87	1.05
Ash	4.76	4.7	4.70	4.67	4.65

Bio-premix supplied per kg of diet: Vitamin A, 12500I.U; Vit. D_3, 2500 I.U; Vit E, 50mg; Vit. K_3, 2.5mg; Vit. B_3.0mg; VitB_6 6.0mg; Niacin, 40.0mg; Calcium pantothenate 10.0mg; Biotin 0.8mg; Vit B_{12} 0.25mg; Folic acid 1.0mg; Choline chloride 300mg; Manganese 100mg; Iron 100mg; Zinc,50mg;Iodine 1.55I.U; Selenium 0.1mg

Experimental design
After the 7 days acclimation period, the rabbits were randomly distributed into 5 groups of 12 rabbits, divided into three replicates of 4 rabbits per replicate in a Complete Randomise Design (CRD).

Data collection
Data on daily Feed intake was determined by subtracting the leftovers (orts) from the feed offered to each rabbit. The weight gains were calculated as the difference in the weight from the previous week. Feed conversion ratio (FCR). This will be calculated as the ratio of feed intake to weight gain. Mortality records were kept when they occurred throughout the experimental period.

$$FCR = \frac{\text{Feed Intake (g)}}{\text{Weight gain (g)}}$$

Results
The results of growth performance of weaner rabbits fed graded levels of millet offal diets as replacement for wheat offal are presented in Table 2. There were no significant differences in all parameters measured. The initial weights of the weaner rabbits varied from (498.47 – 531g) diet 3 (50%) and diet 2 (25%) were similar. The final weight values varied between (1488.4 – 1670.33g) on diets 1 and 2 were similar. The weight gain values ranged from (989.93 – 1150.93g) in weaner rabbits fed diets 3 and 1. The highest weight gain value (1150.93g) obtained on diet 1 (control) and lowest value (989.93g) on diet 3 (50%) were similar. Feed conversion ratio values varied between (3.62 – 4.14) best value (3.62) observed on diet 4 followed by (4.14) on diet 5 were comparable to 3.71, 3.70 and 4.13 on diets 1, 2, and 3 respectively, similarly values obtained on FCR across dietary groups were all within the range recommended for rabbits.

Table 2: Growth Performance of Weaner Rabbits fed Graded Levels of Millet Offal Diets with Groundnut Haulms as Replacement for Wheat Offal

Parameters	Diets					
	1 (0%)	**2 (25%)**	**3 (50%)**	**4 (75%)**	**5 (100%)**	SEM
Initial weight (g)	499.80	531.50	498.47	509.47	519.40	10.14 ^{NS}
Final weight (g)	1650.73	1670.33	1488.4	1641.4	1517.53	41.94 ^{NS}
Weight gain (g)	1150.93	1138.83	989.93	1131.93	998.13	34.77 ^{NS}
Total feed intake (g)	4219.60	4211.20	4085.20	4042.64	4117.12	55.44 ^{NS}
Daily Feed intake (g)	75.35	75.2	72.95	72.19	73.52	0.99 ^{NS}
Daily weight gain (g)	20.55	20.34	17.68	20.21	17.82	0.62 ^{NS}
FCR	3.71	3.70	4.13	3.62	4.14	0.09 ^{NS}
Mortality (No)	0.00	0.00	0.00	0.00	0.00	0.00 ^{NS}

$^{a, b, c}$ means with different superscripts on the same row differ significantly, SEM = Standard Error of Means, NS = Not significant, FCR = Feed conversion ratio

DISCUSSION
The results revealed no significant differences in the growth performance parameters measured. However rabbits on millet offal diets, had higher numerical values compared to those on control diet. The final weight obtained ranged from 1488.4 - 1670.33g this study was higher than 82.23 – 1332.25g and 813.75 – 1283.50g reported by Ojebiyi *et al*. (2006) and Egbo *et al*. (2005), lower than 2098.9g and 1723.10 – 1814.50g reported by Uko *et al*. (1999) and reports by Ogunsipe and Agbede (2012) but was comparable to 1350.00 – 1666.67g and 1420.00 – 1620g reported by Adejinmi *et al*. (2013) and Deli and Preston (1991). The values for feed intake ranged from 72.95 – 75.35g observed in this study were higher than 59.05 – 62.18g, 30 - 32g and 34.59 – 71.71g reported by Makinde *et al*. (2017), Denli *et al*. (1991) for rabbits of the same age, also by Bassey Okon and Oluwatosin Olawoyin (2008). The values within 59.09 to 71.70 g/day reported by Ogunsipe and Agbede (2012), 40.3 to 71.19g/day reported by Taiwo et al. (2005), Amaefule *et al.* (2005) were comparable. The daily weight gain values ranged from 17.68 – 20.55g observed in this study were higher than 16.90g, 12.93g and 9 - 15.2g reported by Uko et al. (1999), Egbo *et al*. 2005, Muir and Massaete (1996) comparable to 17.69 – 18.53g and 18.3 – 22g reported by Ogunsipe and Agbede (2012) and Deli and Preston (1991).This thus, confirms the nutritive adequacy of the millet offal vis-à-vis the test diets and

by implication, any of the diets could be used for rabbit production in areas where shortage of one abounds. The non significant influence of the dietary treatments on weight gain confirms the earlier reports by Bassey *et al.* (2008) that millet bran could replace wheat bran in rabbit diets. The variations in results could be associated with the age of the rabbits, type of ration, breed and the climatic conditions where the experiment was conducted. The results of the feed conversion ratio (FCR) values ranged from 3.70 – 4.14 rabbits on the control diet were not significantly different from those fed the various test diets were comparable to 3.26 – 3.99 reported by Ogunsipe and Agbede (2012). Feed conversion ratio obtained is still within the normal range for rabbits. This shows that though the effect of dietary treatments were not statistically different rabbits fed on the test diets better utilized their diets than those fed the control diets.

CONCLUSION

Conclusion, the inclusion of millet offal was best at 75 -100% with improved the growth performance of rabbits without any deleterious effect.

REFERENCES

Adejinmi Olufunmilayo, Michael, Odetola, Omole, J. 2013. Performance and Carcass Characteristics of Growing Rabbits Fed Diets Containing Different Fibrous Ingredients. *Journal of Agricultural Science* DOI:10.5539/jas.v5n9p198

Ajimohun Felicia, Doma Umar Dass, Mancha Yusufu Pam, Kalla Demo Joab, Oshibanjo Debola Olusegun (2022). Effect of Maize Offal (*Zea Mays*) with Groundnut Haulms as Replacement For Wheat Offal in Diet of Weaner Rabbits (*Oryctolagus Cuniculus*) on Growth Performance, Nutrient Digestibility and Economics of Production. *Agricultural Studies* Volume 6, Issue 2, page 15-26. DOI: https://doi.org/10.31058/j.as.2022.62002

Amaefule K. U,, Iheukwumere F. C., Nwaokoro C.C. (2005). A note on the growth performance and carcass characteristics of rabbits fed graded dietary levels of boiled pigeon pea seed meal (*Cajanus cajan*). *Livestock Research Rural Development.*, 17(5) article 48.

Bassey, I.O., Oluwatosin, O.O., Olawoyin, O. (2008). Performance characteristics of rabbits fed millet bran as a replacement for wheat bran. *African Journal Animal Biomedical Science*. 3(2): 1-4.

Denli V.B., Chinh B.V., and Preston T.R. 1991. Molasses- urea blocks as supplements for rabbits. *Livestock Research for Rural Development.* (3)2. http://www/cipav.org.co/lrrd/lrrd3/2/viet1.htm.

Egbo, M.I., Adegbola T.A., Oyawale E.O., Abubakar M.M., and Bamgbose A.M. (2005). Effect of dietary protein sources on growth performance and nutritional digestibility in rabbit. *Tropical Journal Animal Science* **8**(1): 103-108.

Ezeishi and Olomu, 2008, Cheeke P.R. 1984. Rabbit nutrition and feeding Recent advancement and future perspectives. *Journal Applied Rabbit Research,* 7 (1): 31-37

Makinde, O. John, Sikiru Akeem B, Ajibade, A. Johnson, Opoola, Emmanuel, Ibe, E. Agwor and Ibikunle K. Yemiola. (2017). *International Journal of Research in Agriculture and Forestry.* 4(7) pp 1-8.

Muir J.P., and Massaete E. 1996. Seasonal growth in rabbits fed wheat and maize brans with tropical forages. Livestock research for Rural Development. (8)1: 140-143. http://www/cipav.org.co/lrrd/

Ogunsipe, M.H. and Johnson, A.O. 2012. Effect of millet offal-based diets on performance, carcass cuts and haematological profile of growing rabbits. *African Journal of Food Science* 6(10): 280-286.

Ojebiyi, O.O., Fainu. G. O., Togun, V.A., Akinlade, J.A., Ademola, O.A and Rafiu, T.A. (2006). Effect quantitative concentrate reduction on the growth of weaned rabbits. *Proceedings of the 11th Annual Conference of the Animal Science Association of Nigeia* (ASAN), September 18th – 21st , I.A.R and T., Ibadan. Pp

Taiwo A.A. Olupona J.A. Fapohunda J.B. Titilola G.A. Ogundipe A.I. and Adebowale E.A. 2005. Comparative study of the effect of *Tridax procumbens* and *Tithonia diversfolia* on the performance of weaned crossbred rabbits. *Tropical Journal Animal Science* 8(1): 43 -48.

Uko OJ, Ataja AM, Tanko HB (1999). Response of rabbits to cereals by-products as energy sources in diets. *Arch. Zoo technology.*, 48(183): 285-293.

Wafar, R.J., Ndubuisi, D.I., Tarimbuka, L. I., Sini, T., and Odah E. (2019). Growth performance and blood profile of weaner rabbits fed different legume haulms supplemented with concentrate *Nigerian J. Anim. Sci*., 21 (3): 377-384.