



Nutrient Digestibility, Internal Organs and Cost Benefit of Weaner Rabbits Fed Saw Dust as Replacement for Wheat Offal

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Abstract

This study evaluated the dietary effects of varying levels of sawdust as replacement for wheat offal on nutrient digestibility, internal organs and cost benefit of weaner rabbits. A total of twenty-four (24) cross-bred weaner rabbits of weight range of 679-723 g were allotted to four dietary treatment groups with six animals per treatment on weight equalization basis. The four dietary treatment groups were four inclusion levels of sawdust (0, 10, 20 and 30%). Data were collected on weekly basis for 10 weeks and the study was conducted for a period of 70 days. Data were subjected to one-way Analysis of Variance and the mean values were separated at 5% probability. Results showed that nutrient digestibility and internal organs parameters obtained for weaner rabbits were not significantly ($p>0.05$) different. Highest CPD and CFD (74.07 and 64.91%) were obtained in rabbits fed 10 % level of saw dust replacement while lowest values (68.00 and 67.22%) of ether extract and dry matter were obtained for rabbit fed 20 % level of saw dust replacement. The values obtained for liver ranged from 2.17 – 2.86% while kidney ranged from 0.45 – 0.80 %. Rabbits fed control diets had higher cost of feed consumed/rabbit (N419.23) while those fed diets containing 30% sawdust had lowest cost of feed consumed/rabbit (N322.60). Rabbits fed control diets had higher cost per weight gain (N 244.64) while those fed diets containing 30% sawdust had lowest cost per weight gain (N 166.44). This study concluded that saw dust can replace wheat offal up to 30% without deleterious effect on nutrient digestibility of weaner rabbits and better economic benefit.

Keyword: Weaner rabbits, Nutrient digestibility, Internal organs, Cost benefit, Saw dust.

Introduction

Rabbit is important livestock specie kept as pet and laboratory model worldwide. Under intensive system of management, movement is largely restricted and rabbits are usually fed concentrates diets that are usually too low in fibre and too high in protein, fat and carbohydrate. Lack of sufficient fibre in diet, combined with the stress of restricted movement, has been identified as a significant cause of morbidity and mortality in young rabbits (Gidenne *et al.*, 2002). Many of the diseases commonly seen in rabbits can be directly attributed to or associated with the feeding of an inappropriate diet and this could be largely prevented (Berthelsen and Hansen, 1999). Thus, feeding an appropriate diet to rabbits under intensive system of management is critical to the growth and health status of the animal. Rabbits are efficient converters of feed to meat and can utilize 30% fibre as against 10% fibre by most poultry species (Egbo *et al.*, 2001). The Rabbit has the ability to convert

feedstuffs such as forages and most agricultural by-products, kitchen waste that human being cannot consume directly into highly nutritious meat. Rabbits are highly prolific, cheap to feed because they can utilize roughage feeds, they have rapid growth rate, high dressing percentage, short gestation period and low purchasing price. Rabbits have a high feed conversion ratio and are efficient converter of plant product and seeds. Efficient rabbit production is largely dependent upon adequate and correct nutrition (Ibitoye *et al.*, (2010). In animal nutrition, sawdust as cellulose is mainly used to furnish bulk, stimulate appetite and to decrease the incidence of abscesses among the farm stocks. Also, Anigbogu *et al.* (2009b) revealed that sawdust, ammoniated sawdust and biodegraded sawdust have been used in animal feeding. Addition of sawdust up to 15% to the rabbit diets had no detrimental effect on growth (Radwan, 1994). Similarly, incorporation of sawdust up to 15% did not affect feed intake. Saw dust is a good source of



dietary fibre for rabbit (Omole and Onwudike, 1981; Radwan, 1994). Radwan (1994) conducted an experiment on different types of sawdust and reported 2.53% crude protein, 0.76% ether extract, 60.26% crude fibre, 24.53% nitrogen-free extracts and 0.80% crude ash. However, there is the need to urgently incorporate non-conventional feed stuff such as saw dust in rabbit diet for optimum performance and reduction in cost of production to make rabbit consumption viable and solve the problem of scarce and expensive conventional feed stuff such as wheat offal.

Materials and methods

The experiment was conducted at the Teaching and Research Farm of Oyo State College of Agriculture and Technology, Igboora Oyo State Nigeria. The site is located within latitude 7°15'North and longitude 3°30' East of the equator with an average annual rainfall of 1278mm and an average temperature of 27°C (Sanusi, 2011). A total of 24 weaner rabbits were allotted on weight equalization to four dietary groups of six (6) animals each in a completely randomized design (CRD), each group was divided into three replicates of two animals each. The diets were formulated such that sawdust was included at 0%, 10%, 20%, and 30% to replace wheat offal.

Table 1: Proximate Composition (%) of analyzed saw dust and wheat offal

Component	Saw dust	Wheat offal
Dry matter	86.60	88.65
Crude protein	11.50	11.32
Crude fibre	30.00	17.76
Ether extracts	5.43	2.12
Ash	3.45	3.90
Moisture content	13.40	11.35
Nitrogen free extract	36.22	53.55
Metabolizable energy	2155.48 kcal/kg	2400kcal/kg

Table 2: Gross composition (%) of experimental diets

Ingredients	T1 (0%)	T2 (10%)	T3 (20%)	T4 (30%)
Maize	38.00	38.00	38.00	38.00
Soy bean meal	17.00	17.00	17.00	17.00
Wheat offal	40.00	30.00	20.00	10.00
Saw dust	-	10.00	20.00	30.00
Fish Meal (72%)	0.50	0.50	0.50	0.50
Bone meal	2.50	2.50	2.50	2.50
Limestone	1.48	1.48	1.48	1.48
Premix Starter	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25
Toxin binder	0.02	0.02	0.02	0.02
Total	100	100	100	100
Calculated Analysis				
ME(MJ/kg)	10.56	10.68	10.80	10.92
CP (%)	18.61	18.41	18.31	18.10
CF (%)	10.00	10.35	10.87	11.50

Digestibility trial

At the end of ten weeks, three rabbits per treatment were selected and transferred into metabolic cages already cleaned and disinfected that were equipped with facilities for collection of faeces for the digestibility trials. These rabbits were allowed to acclimatize for three days, before the commencement of the digestibility trial while faecal collection was taken on daily basis for 3 days, weighed and oven dried at 60°C for 24 hours and bulked until

they were required for analysis. The following parameters were determined: nutrient digestibility, internal organ evaluation and cost benefit analysis

Nutrient digestibility (%) = $\frac{\% \text{ Nutrient feed intake} - \text{Nutrient output}}{\% \text{ Nutrient feed intake}} \times 100$

Nutrient feed intake



Internal organs evaluation

At the 70th day of feeding trial, three rabbits per treatment were randomly selected for internal organs evaluation. The animals were slaughtered via the neck region; it was defured, detached, dressed and cut into parts, each of the weight part were recorded. Internal organs measured were liver, heart, kidney, lungs and GIT (gastro intestinal tract).

Cost benefit analysis

Feed cost analysis was carried out to assess the effect of the diets in relation to performance of the rabbits. Cost of the feed was calculated based on prevailing cost of ingredients per kg as at the time of the experiment.

This was done to determine the following: feed cost (₦/kg), cost of the total feed consumed (₦/kg), feed cost/ weight gain (₦/kg).

Feed cost (₦/kg) = Summation of proportion of each ingredient in the diet × Cost per kg of ingredient/100

Cost of the total feed consumed (₦/kg) = Feed cost (₦/kg) × Feed consumed (₦/kg)

Feed cost/weight gain (₦/kg) = FCR × Feed cost (₦/kg)

Statistical Analysis

Data obtained were subjected to one-way Analysis of Variance and mean values of variables showing significant ($P < 0.05$) difference were separated using Duncan's multiple range test using SAS (2010).

Results and discussion

Nutrient digestibility of weaner rabbits fed sawdust as replacement for wheat offal

The values obtained for nutrient digestibility showed no significant ($p > 0.05$) difference in all the parameters measured across the dietary treatments. The nutrient digestibility of rabbits fed sawdust is comparable to those in control group. CPD varied from 68.02- 74.07%. Highest CFD (64.91%) was obtained in 10% replacement level while lowest value was obtained in 0% level. ASH varied from 71.82 – 77.14% while dry matter varied from 67.22 – 74.17%. This implies that rabbit can digest and absorbed sawdust at higher level of inclusion. It could also imply that the microbial community of digestive system of rabbit is not negatively affected and allowed maximum digestion process across the diets. Thus, suggested the safety of sawdust at higher level of inclusion up to 30%. The crude protein values obtained in this study disagreed with the work of Mohammed *et al.* (2020) who reported significant difference ($p < 0.05$) in rabbits fed Africa locust bean fruit pulp. The ether extract digestibility of the diets obtained during the study were similarly high among the treatments, this is line with the work of Rahajo, (2011) who obtained 56.00 to 82.32% and attested that the values gotten showed good ability of weaner rabbits to utilize dietary fat.

Table 3: Nutrient digestibility of weaner rabbits fed saw dust as replacement for wheat offal

Parameters	Replacement level of saw dust (%)				SEM	P-Value
	0	10	20	30		
CPD (%)	72.95	74.07	68.02	72.42	2.86	0.92
CFD (%)	62.01	64.91	62.00	63.42	3.26	0.99
ASH (%)	71.82	77.14	73.35	72.95	2.21	0.88
Ether extract (%)	70.15	71.11	68.00	70.13	2.23	0.98
Dry matter (%)	70.26	74.17	67.22	71.23	4.75	0.74

CPD: Crude protein digestibility; CFD: crude fibre digestibility;

Internal organs evaluation of weaner rabbits fed saw dust as replacement for wheat offal

The internal organs of the rabbits fed the experimental diets are shown in Table 4. There were no significant ($P > 0.05$) difference in all the parameters measured across the dietary treatments. The non-significant effect of the diets on the prime cut is an indication of better utilization of the fibre ingredients by the

animals. The weight of the kidney, liver, lung, heart did not follow any regular pattern, hence did not revealed any particular influence of the fibrous ingredients on organs of the animals. The findings agreed with the report of Adewumi *et al.* (2000) who reported that the relative weight of the liver, kidney, heart and spleen of the rabbits were not affected by the sources of fibre.



Table 4: Internal organs of weaner rabbits fed saw dust as replacement for wheat offal

Parameters	Replacement level of saw dust (%)				SEM	P-VALUE
	0	10	20	30		
Liver (%)	2.86	2.43	2.17	2.34	3.12	0.68
Heart (%)	0.29	0.12	0.28	0.29	0.54	0.09
Kidney (%)	0.80	0.64	0.45	0.68	0.13	0.35
Lung (%)	0.40	0.52	0.39	0.46	0.03	0.74
GIT (%)	14.06	13.43	11.96	12.44	0.41	0.98

Cost benefit analysis of weaner rabbits fed sawdust as replacement for wheat offal

The cost benefits analysis of the experimental diets fed to the rabbits is presented in Table 5. There were significant ($P < 0.05$) differences in all the parameters measured across the treatments except the feed cost (₦/kg) which showed no significant ($P > 0.05$) difference. The highest value (8.86kg) of feed intake (kg) was recorded in rabbits fed 20% saw dust while the lowest value (6.48kg) was obtained in rabbits fed 30% saw dust. The values for the cost of 100kg of feed ranged from ₦22325.3 kg to ₦25625.3 kg with control diets having the highest value and rabbits fed 30 % saw dust

had the lowest value. Also, the highest cost per weight gain (₦ 244.64 kg) was recorded in control diets while rabbits fed 30% saw dust had the lowest value (₦166.44 kg). Feed cost (₦/kg) decreased with increased level of saw dust. This suggested that inclusion of saw dust in rabbit diets reduced cost of feed formulated. This was due to high cost of wheat offal (₦120.00 kg) at the time of this study compared with low cost (₦50.00 kg) of saw dust. Rabbits fed 30% saw dust had the best result for the feed cost (₦/kg). Decrease in feed cost (₦/kg) with dietary replacement of costly ingredients with cheaper ones has been reported by Igwebuike *et al.* (2000).

Table 5: Cost benefit analysis of weaner rabbits fed sawdust as replacement for wheat offal

Parameters	Replacement level of saw dust (%)				SEM	PVALUE
	0	10	20	30		
Feed intake (kg)	7.83 ^b	7.15 ^c	8.86 ^a	6.48 ^d	269.23	0.00
Cost of feed (N/kg)	256.25	245.25	234.25	23.25	5.05	0.89
Cost of 100kg	25625.30 ^a	24525.30 ^{ab}	23425.30 ^{bc}	22325.30 ^c	399.73	0.00
Cost per	244.64 ^a	209.86 ^b	201.57 ^b	166.44 ^c	8.48	0.00
Weight gain (N/kg)						
Cost of feed Consumed /rabbits (N)	419.23 ^a	387.00 ^{ab}	360.75 ^{bc}	322.60 ^c	1.82	0.00

Conclusion and recommendation

Based on the findings of this study, sawdust at 30% inclusion can successfully replace wheat offal in the diets of weaner rabbits. It is therefore recommended that saw dust may offer a lower-cost alternative to wheat offal in rabbit feed.

References

Adewunmi, M.K., Sokunbi, O.A., Adejumo, D.O., Omojola, A.B., and Anurudu, N.F. (2000). Effects of different fibre source on performance and physiological response of pre-pubertal male rabbits. Dept. of Animal Science. University of Ibadan.

Anigbogun, N.M., Ibe, S.N., Anosike, J.C. and Assam, E.M. (2009b). The effect of life-enzyme (saw dust treated with *Zymomonas mobilis*) on the performance Characteristics of Red Sokoto goats. *Journal of Sustainable Agriculture and Environment*, 11(1): 12-18.

Igwebuike, M. A and Tribeckel, M. C. 2000. The effect of replacing maize with cassava peel on the performance of weaned rabbits. *Nigerian Journal of Animal Production*. 20:92 – 99.



- Berthelsen, H. and Hansen, L.T. (1999). The effect of hay on the behavior of caged rabbits (*Oryctolagus cuniculi*): animal welfare. In de Blas E and Wiseman J (eds), *The Nutrition of the Rabbit*, CABI Publishing, Wallingford: 149-157
- of Oyo State Nigeria. *International Journal of Agriculture and Apiculture Research* (1/2). 86.95.
- SAS (2010) Base SAS 9.2 procedures guide: Statistical Procedures. 3rd Edition, SAS Institute Inc., Cary, 17-34.
- Egbo, M.L., Doma, U.D. and Lackaks, A.B. (2001), "Characteristics of small rabbit production and management in Bauchi metropolis", Proceedings of the 26th Annual Conference of Nigerian Society for Animal Production (NSAP), 18th – 21st March.
- Gidenne, T., Jehl, N., Segura, B. and Michalet-Doreau, B. (2002). Microbial activity in the caecum of the rabbit around weaning: impact of a dietary fibre deficiency and of intake level. *Animal Feed Science and Technology*, 99:107-118.
- Ibitoye, E.B, B.R., Olorede, A.A Jimoh., and N. Suleiman. (2010). The rabbit industry and alternative feedstuffs: A review. Proc. 35th Conf., Nig. Soc. for Anim. Prod. 14-17 March, 2010, University of Ibadan, Nigeria.
- Mohammed, S., Ijaya, A.T., Ayanwale, B.A, and Kudu, Y.S (2020). Growth performance and nutrient digestibility of weaner rabbits fed African locust bean (*Parkia biglobosa*) fruit pulp. *Nig. J. Anim. Prod.* 2020, 47(4): 120-131.
- Omole, T.A and Onwudike, O.C. (1981). Investigations of the treatment of sawdust for rabbit feeding. 1. Effect of sodium hydroxide treatment. *Animal Feed Science and Technology*, 6: 43-50.
- Radwan SM (1994). Use of sawdust as a source of fiber in rabbit. *Egyptian Journal of Rabbit Science*. 4(2):23- 24. Retrieved from <http://agris.fao.org/agris-search/search/display.do?f=1998/EG/EG98009.xml>; EG1998001772
- Rahajo, W.D. (2011). Milk Production & lifer growth Traits in Straight Breed and Cross Breed Rabbit. *Journal of Applied Rabbit Research* 4:21-27.
- Sanusi W.A (2011). Effect of poverty on participation in non-farm activity in Ibarapa local government Area