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UTILIZATION OF COWPEA SHELL AND MAIZE COBS IN DIETS FOR RABBITS

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Target Audience: Nutritionists, small scale farmers, crop scientists.

ABSTRACT

Thirty-two Dutch rabbits of both sexes with an average initial live weight of 1040g ± 1.5 were fed diets containing cowpea shell (CPS) and maize cobs (MC) at 20% and 40% levels to determine the effect of test ingredients and level of inclusion on performance and nutrient utilization in rabbits. The feeding trial lasted for five weeks. The dry matter intake (DM), Acid Detergent Fibre Digestibility (ADF), daily weight gain (DWG) and feed conversion ratio (FCR) were significantly (P< 0.0.5) affected by type X level in the diet of rabbits while maize cobs gave satisfactory performance at the 20% inclusion level.

Key words: Rabbits, fibre sources, performance

DESCRIPTION OF PROBLEM

Rabbit production is being promoted as solution to meat supply in Nigeria because of their sustainability to both large and small-scale production. Rabbits are clean, fast growing, highly profile and have short generation intervals. The meat is very nutritious, high in protein and low in fat and cholesterol level.

The potential of rabbits as meat and fur producing animals is due mainly to their ability to utilize fibrous feedstuffs that cannot be effectively consumed by humans (1). Fermentation of fibre in the rabbit is post gastric in the caecum which harbours a large population of micro-organisms

Rabbits require a level of crude fibre in excess of 9% for normal growth and to reduce the incidence of enteritis (2). The fibre level of feeds has been found to effect intake and digestibility (3) and dry matter intake was found to increase significantly as the dietary fibre was increased (4).

The need to identify cheap and suitable feedstuff has led to more research in the area of unconventional feed materials such as farm wastes and agro-industrial by-products. This study was therefore conducted to determine the

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effects of two fibre types, cowpea shell and maize cobs, at two levels (20%, 40%) on growth, nutrient intake and digestibility in rabbits.

MATERIALS AND METHODS

Thirty-two Dutch rabbits of both sexes, eight to nine weeks of age with average initial weight of 1040g were allocated to four experimental diets on weight and sex equalisation basis. They were kept in individaul metabolic cages with facilites for water and feed.

Four diets were formulated using two types of fibre at 20% and 40% each. The fibre sources were ground cowpea shell (CPS) and maize cobs (MC) which were incorporated into feeds by mixing together the various ingredients as shown in Table 1.

The rabbits were provided with 100g of the diet at 0700 h and the leftovers (residues) were collected and weighed before the next morning feeding. Clean, cool water was provided ad. libitum. The rabbits were weighed at weekly intervals and feeding lasted for five weeks. At the fifth week, metabolic studies were carried out for seven days using total faecal collection. Feeds and faecal were oven dried at 105°C for 48 hours and ground to pass through a 1mm sieve for determination of proximate composition (5). The neutral detergent fibre (NDF) and acid detergent fibre (ADF) were determined (6). the experimental design was a 2 x 2 factorial in a completely randomized design in which fibre types (cowpea shell and maize cobs) and inclusion levels (20%, 40%) were the factors.

All data were subjected to analysis of variance and the significantly means were separated by least significant difference (LSD) (7).

Table 1: The composition (%) of the experimental diets.

	Cowpea shell		Maize cobs	
Ingredients	20%	40%	20%	40%
Maize	50.70	25.30	50.70	25.30
Soyabean meal	26.30	31.70	26.30	26.30
Cowpea Shell	20.00	40.00	—	—
Maize cobs	—	—	20.00	40.00
Bone meal	2.00	2.00	2.00	2.00
Salt	0.50	0.50	0.50	0.50
Vit-Premix*	0.50	0.50	0.50	0.50
	100.00	100.00	100.00	100.00

* Composition of vitamin premix per kg vitamins: A 1,000,000 I. U; D_3 2,000,000 I.U; E 15, 000mg; K_3 2000mg, B_3 10,000mg, B_6 , 100mg, PP 30,000mg, B_{12} ,10mg, Folic acid, 100mg, C 10 10,000mg, Choline 20,000mg and Ethoxyquine 10,000mg.

RESULTS AND DISCUSSION

The chemical compositions of experimental diets are shown in Table 2. The protein content of the diets was about 16% which is adequate for rabbit growth and production (8).

The nutrient intake and growth performance are presented in Table 3. The dry matter intake (DMI) of rabbits on 40% cowpea shell (CPS) was significantly higher ($P<0.05$) than those on the 20% CPS level. An increase in dry matter intake (DMI) with increasing dietary fibre level has been reported in rabbits (9). However, the DMI on the 20% maize cobs (MC) level was significantly higher ($P<0.05$) than on the 40% maize cobs (MC) diets. This observation is similar to the findings of cheeke *et al.* (10).

Table 2: Chemical Composition (%) of the Experimental Diets.

Parameter	Cowpea shell		Maize cobs	
	20%	40%	20%	40%
Cal. ME (MJ/kg)	11.29	9.78	11.29	9.78
Dry Matter (on dry matter basis)	95.90	96.54	96.62	97.13
Crude protein	16.25	16.45	15.68	15.75
Ether Extract	10.32	11.32	10.52	11.72
ADF	17.82	22.80	19.23	27.59
NDF	36.37	42.3	38.19	54.28
NFE	6.91	10.29	4.92	5.64

The crude protein intake (CPI) values ranged from 8.44g/day on the 40% maize cobs to 10.52g/day on the 40% cowpea shell diet. These values are within the range of 7.58g/day to 11.78g/day reported for rabbits fed varying protein levels in humid tropical environment (8). The acid detergent fibre intake (ADFI) obtained on the 40% level of the two fibre types were significantly higher ($P<0.05$) than the values observed in rabbits fed on the 20% level of the diets. There was an increase in neutral detergent fibre intake (NDFI) with increasing fibre level.

The type x level interaction for dry matter intake (DMI), crude protein intake (CPI) and acid detergent fibre intake (ADFI) were significant ($P<0.05$) indicating that the effect of fibre type on these parameters depended on the level of fibre inclusion in the diet.

Table 3: Nutrient intake and growth performance of rabbits fed experimental diets.

Parameters	Cowpea shell		Maize cobs		SE	LSD(5%)
	20%	40%	20%	40%		
Dry matter intake (g)	56.68[b]	63.96[a]	65.46[a]	53.50[b]	1.43	5.878
Crude protein intake (g)	9.21	10.52	10.26	8.44	0.65	1.15*
Acid detergent fibre intake(g)	10.10[b]	14.54[a]	12.59[ab]	14.76[a]	0.44	1.27*
Neutral detergent fibre intake (g)	21.21	2.10	24.99	29.04	0.69	0.92*
Daily weight gain (g)	16.52	15.62	16.07	10.98	0.92	NS
Feed Conversion Ratio	3.43	4.09	4.07	4.87	0.20	NS
Feed Cost (₦/kg gain)	15.37	15.29	18.23	18.21	0.17	NS
Mortality (%)	0.00	0.00	0.00	0.00	0.00	0.00

* = significant at 5% probability level
*NS = not significant

The daily weight gain (DWG) observed in rabbits fed 20% cowpea, 40% cowpea shell — and 20% maize cobs — based diets were similar and comparable to the values previously reported in a similar experiment with rabbits (8). The low daily weight gain obtained for rabbits on 40% maize cobs diet could be attributed to low dry matter intake of the rabbits. There was no significant ($P<0.05$) type x level interaction for neutral detergent fibre intake, daily weight gain and feed conversion ratio.

The nutrient digestibility is shown in Table 4. The dry matter digestibility (DMD) and crude protein digestibility (CPD) values observed in rabbits fed 20% levels of the two fibre diets were significantly higher ($P<0.05$) than in rabbits on the 40% dietary fibre level. There was a significant ($P<0.05$) difference between type x level interaction on dry matter digestibility and crude protein digestibility.

The faeces of rabbits fed on the 40% maize cobs based diets were hard, this probably reduced caecotrophy and thus decreased the digestibility of available nutrients in the faeces such as the undigested microbial and feed protein and the B-vitamins. The detergent fibre digestibilities (ADFD and NDFD) decreased significantly ($P<0.05$) with increasing dietary fibre level and these confirm earlier reports that rabbits are not as efficient as cattle in digesting fibre (13). The high contents of indigestible plant materials, lignin and silica, in ADF probably account for its low digestibility in the experimental animals.

Table 4: Nutrient digestibility of rabbits fed experimental diets

	Cowpea shell		Maize cobs			
Parameters	20%	40%	20%	40%	SE	LSD(5%)
Dry matter digestibility (%)	72.38	67.74	79.32	67.38	1.54	4.48
Crude protein digestibility	71.62	67.71	81.39	71.44	1.39	4.03
Acid detergent fibre digestibility	44.58	32.11	63.00	55.41	2.12	NS*
Neutral detergent fibre digestibility (%)	58.13	52.99	68.60	61.73	1.28	NS*

*NS = not significant.

There was no significant ($P<0.05$) type x level interaction for the detergent fibre digestibility. The economic analysis (Table 3) shows that feed cost per kg gain was lower in cowpea shell diets than maize cobs diets, indicating that at higher level of inclusion, cowpea shell is a superior and cheaper source of dietary fibre and more economical than maize cobs. The results indicate that cowpea shell could be included at up to 40% level in the diet of growing rabbits, whilst better performance was found in rabbits fed 20% maize cobs based diets.

CONCLUSION

It can be concluded that:

1 Cowpea shell and maize cobs which are agro by-products can be incorporated into rabbit feeding up to 40% and 20% respectively without compromising productive performance of rabbits.

2 Further research is necessary to assess the effects of these fibre sources on carcass quality.

3 Increased rabbit production should be encouraged by using agro-industrial by-products.

REFERENCES

1 Aduku, A.O. and Olukosi, J.O. 1990. Rabbits management in the tropics. 1st Edition. G.U. Publishers, Abuja, Nigeria pp. 85 — 90.

2 Champe, K.A. and Manrice D.V. 1983. Research review on response of early weaned rabbits to source and level of dietary fibre. J. Appl. Rabbits Res. 6(2): 64 — 67.

3 Adegbola, T.A. and Osiyi, H.N. 1985. The effect of dietary fibre levels on dry matter intake and nutrient digestibility in the rabbits. Nig. J. Nutri. Sci. 6(2): 113 — 118.

4 Abou-Shour, A.M. and Baraket, M.A. 1986. Effect of dietary fibre levels on digestibility, Performance and cecal microbial activity in growing rabbits. World Rev. Anim. Prod. 22(4): 52 — 54.

5 A.O.A.C. 1980. Association of Official Analytical Chemist Official

Methods of Analysis. 13th edition. Washington, D.C.

6 **Goering, H.K. and van Soest, P.J.** 1970. Forage fibre analysis. Agric. Handbook No. 378. Agric. Res. Station. Washington D.C.

7 **Steel, R.G.D. and Torrie, J.H.** 1980. Principles and procedures of statistics. 2nd edition. McGraw Hill Book company. New York.

8 **Adegbola, T.A.** 1991. Effects of Protein levels on growth and feed utilization of rabbits in the humid tropical environment. J. Agric. Sci. Tech. 1 (2): 158 — 160.

9 **Doma, U.D., Adegbola, T.A. and Eagami, V.G.** 1997. Effect of crude protein and forage levels on growth and nutrient digestibility in rabbits. Appl. Trop. Agric. 2: 31 — 34.

10 **Cheeke, P.R. Grobner, M.A. and Protton, N.M.** 1986. Fibre digestion and utilization in rabbits. J. Appl. Rabbit Res. 9(1): 25 — 30. 1978. A study of the need for fibre by the growing New Zealand White rabbits. J. Sci. food Agric. 29: 640 — 648.

12. **Pote, L. M., Cheeke, P. R. and Patton, N. M.** 1980. Utilization of diets high in alfalfa meal by weanling rabbits. J. Appl. Rabbits res. 3(4): 5 — 10.

13 **Slade, L.M. and Hintz, H.F.** 1969. Comparison of digestion in horses, ponies, rabbits and guinea pigs. J. Anim. Sci. 28: 842 - 843.