UTILIZATION OF GRADED LEVELS OF DRIED CABBAGE LEAVES BY WEANER RABBITS

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ABSTRACT

The study was conducted to determine the utilization of sun dried cabbage leaf meal by weaner rabbits. A total of sixty (60) mongrel rabbits (12 rabbits per treatment, 4 per replicate) were fed five (5) experimental diets containing graded levels of cabbage leaf meal at 0, 5, 10, 15 and 20% designated as diets T1, T2, T3, T4 and T5 respectively. The experiment lasted for eight (8) weeks. The performance variables recorded in this study were significantly affected by the graded levels of inclusion of cabbage leaf meal. In all the parameters, diet 4 (15% inclusion of dried cabbage leaves) gave the best performance, while diet 1 (0% cabbage leaves) gave the least performance. The haematological parameters also showed significant differences (P<0.05) across dietary treatments except for mean corpuscular haemoglobin. Diet 4 recorded higher values in all the parameters analysed while diet 1 and 3 recorded least values. All the parameters analysed for biochemical indices showed significant (P<0.05) differences across the dietary treatments. Diet 4 recorded higher values in all the parameters considered except for cholesterol, where diet 3 recorded higher values, while diet 1 recorded least values. The highest feed cost savings was recorded in diet 5 (20% inclusion of cabbage leaf meal) while the highest cost was recorded in diet 1. It was therefore concluded that cabbage leaf meal can be used in the diet of weaner rabbits for up to 20% level of inclusion for optimum performance. Cabbage leaf meal was therefore recommended to farmers as a feed material so as to reduce cost and increase productivity.

Keywords: Cabbage leaves, Utilization, Rabbits,

INTRODUCTION

The increasing demand for dietary protein in Nigeria due to population increase has aroused the interests of Nigerians in the production of animals with short production cycles, which are prolific, good converters of feed to flesh, relatively easy to care for and require low capital investment in raising such as rabbits, poultry and swine. Poultry and pigs on the other hand require more of commercial feeds which often incorporate ingredients in direct competition with humans and are usually too expensive for most small scale farmers. Therefore, in order to maximize food production in developing countries like Nigeria all viable options including the use of non-conventional livestock must be explored and evaluated (Owen *et al* 2008). Rabbits *(Oryctolagus cuniculus*),which can be considered as non conventional livestock specie appear to be a cheap and sustainable means of producing high quality animal protein for the expanding populations of the developing countries. This is due to the rabbit's established prolificacy, early maturity, fast growth rate, high genetic selection potential, high feed conversion efficiency and economic utilization of space (Hassan *et al* 2012). Also Rabbit meat is low in fat, caloric value, sodium and cholesterol, but high in protein, thereby making it the meat of choice for coronary heart patients and people on low cholesterol and sodium diets. Generally, it is agreed that feed cost accounts for between 60-85% of the total cost of livestock production. Livestock feeds particularly for non- ruminants are becoming prohibitively costly in the developing countries because of the increasing competition between man and livestock for food. One way of reducing cost and increasing animal protein production in the developing countries such as Nigeria is through use of the cheap and readily available feed ingredient in the diets of livestock. Cabbage leaves, one of such cheap ingredients having potential values as a feeding resource is a by-product of the local processing of cabbage and is a rich source of crude protein and energy (Choi and Park, 2003). As cabbage production increases, there is a concomitant increase in the quantity of residues produced. These residues are often discarded into the environment where they pose major environmental concerns (e.g., landfill and nitrate leaching to water sources). Consequently,

there is growing interest in alternative and non-polluting methods of management such as composting and recycling through livestock feeds. Cabbage leaves are characterized by high crude protein (CP) and mineral concentrations (Choi and Park, 2003).

MATERIALS AND METHODS

The experiment was conducted at the Abubakar Tafawa Balewa University Research Unit Bauchi, Bauchi State. The feeding trial was conducted with sixty (60) mongrel weaner rabbits obtain from different rabbit farmers and open markets. The rabbits were randomly allotted to the experimental diets. The weaner rabbits were managed intensively. Water and feeds were given *ad libutum*. Drugs were also administered and deworming done appropriately. The experiment lasted for a period of eight weeks. The cabbage leaves were collected from different markets across Bauchi metropolis. They were then sundried for duration of 6-7 days until completely dried. The cabbage leaves were then milled and mixed with other ingredients to formulate a balanced diet for the weaner rabbits. There were five treatments and each treatment was replicated three times with four rabbits per replicate in a completely randomized design. Cabbage leaf meal was included at 0, 5, 10, 15 and 20% designated as diets T1, T2, T3, T4 and T5 respectively.

Table 1: Ingredients and Composition (%) of the Experimental Diet

Ingredients	**Treatments**				
	T1	**T2**	**T3**	**T4**	**T5**
	0%	**5%**	**10%**	**15%**	**20%**
Maize	55.20	54.75	51.35	50.30	49.05
Soyabean meal	24.65	23.15	21.55	20.20	18.75
Cabbage leaves	0.00	5.00	10.00	15.00	20.00
Wheat offal	16.70	13.65	13.65	11.05	8.75
Bone meal	2.80	2.80	2.80	2.80	2.80
Methionine	0.10	0.10	0.10	0.10	0.10
Lysine	0.10	0.10	0.10	0.10	0.10
Salt	0.25	0.25	0.25	0.25	0.25
Premix	0.20	0.20	0.20	0.20	0.20
Total	**100**	**100**	**100**	**100**	**100**
Calculated Analysis					
Crude protein	18.07	18.02	18.12	18.18	18.21
Me/kcal/kg energy	2700.74	2700.02	2634.67	2623.01	2605.09
Crude fibre	4.24	4.71	5.38	5.89	6.38
Calcium	1.12	1.12	1.11	1.11	1.10
Phosphorus	0.93	0.88	0.86	0.82	0.78
Lysine	0.93	0.89	0.84	0.77	0.69
Methionine	0.32	0.29	0.29	0.28	0.24

RESULTS AND DISCUSSION

Table 2: Performance of Weaner Rabbits Fed Graded Levels of Cabbage Leaf Meal

Parameters	Dietary Treatments						
	T1 0%	T2 5%	T3 10%	T4 15%	T5 20%	SEM	LOS
Average initial weight (g)	277.89	278.67	278.83	278.83	277.89	14.99	NS
Average final live weight (g)	1249.17^{b}	1390.00^{a}	1395.00^{a}	1398.00^{a}	1326.00^{ab}	22.27	*
Average daily feed intake(g)	38.53^{b}	46.41^{a}	46.68^{a}	46.74^{a}	46.47^{a}	0.82	*
Average daily weight gain (g)	17.41^{b}	20.11^{a}	20.15^{a}	21.54^{a}	19.28^{ab}	0.32	*
Feed conversion ratio	2.84^{a}	2.79^{a}	2.50^{ab}	2.11^{c}	2.41^{c}	0.06	*
Feed cost/kg of feed (₦)	76.85	67.70	67.02	66.25	60.51	1.95	NS
Feed cost/kg gain (₦)	218.25	188.88	167.55	127.68	159.66	2.81	NS
Mortality (No.)	5.00	3.00	5.00	2.00	2.00	-	-

^{abc}: Means within the same row bearing different superscripts are significantly different (P<0.05); LOS: Level of significance; NS: Non significant difference

Table 3: Heamatological Indices of Rabbits Fed Graded Levels of Cabbage Leaf Meal

Parameters	T1	T2	T3	T4	T5	SEM	LOS
Packed cell volume (%)	38.20^{c}	43.80^{b}	41.70^{b}	47.40^{a}	37.90^{c}	2.68	*
Haemoglobin (g/100ml)	11.70^{b}	10.00^{b}	10.40^{b}	15.50^{a}	10.20^{b}	2.11	*
Red blood cell ($\times10^{6}$/mm^{3})	5.55^{b}	4.84^{b}	4.68^{b}	7.04^{a}	4.55^{b}	2.02	*
White blood cell ($\times10^{3}$/mm^{3})	12.90^{a}	6.40^{b}	6.41^{b}	12.90^{a}	6.50^{b}	1.39	*
Mean corpuscular volume (μm^{3})	68.80^{b}	82.20^{a}	89.00^{a}	90.00^{a}	67.90^{b}	3.12	*
Mean corpuscular haemoglobin concentration (%)	30.6^{b}	22.9^{c}	24.9^{c}	32.5^{a}	27.4^{bc}	1.14	*
Mean corpuscular haemoglobin (pg)	21.0	20.7	22.1	22.5	22.0	2.32	NS

^{abc}: Means within the same row bearing different superscripts are significantly different (P<0.05); LOS: Level of significance; NS: Non significant difference

Table 4: Biochemical Indices of Rabbits Fed Graded Levels of Cabbage Leaf Meal

Parameters	T1	T2	T3	T4	T5	SEM	LOS
Blood urea (mol/l)	4.0[b]	3.1[c]	3.3[c]	4.2[a]	2.5[c]	0.46	*
Total protein (g/dl)	6.3[b]	5.3[c]	4.9[c]	7.2[a]	4.0[c]	0.27	*
Cholesterol (mol/l)	162[b]	155[c]	199[a]	100[c]	87[c]	2.06	*
Albumin (g/dl)	3.4[c]	3.1[c]	4.4[b]	5.1[a]	3.2[c]	0.33	*
Calcium (mol/l)	7.3[bc]	9.1[a]	8.8[b]	10.0[a]	5.3[c]	0.76	*
Phosphorus (mol/l)	4.0[a]	3.1[b]	2.9[c]	4.3[a]	3.8[a]	0.89	*
Magnessium (mol/l)	5.0[a]	4.7[b]	3.8[c]	5.3[a]	4.8[b]	0.34	*
Potassium (mol/l)	4.8[a]	4.0[a]	3.3[b]	5.5[a]	3.6[b]	0.94	*

[abc]: Means within the same row bearing different superscripts are significantly different ($P<0.05$); LOS: Level of significance

The average daily weight gain was significantly affected by the dietary treatments. The average daily weight gain ranged from 17.41g in treatment 1 to 21.54 in treatment 4 which follow the same trend as daily feed intake and final live weight. The result for average daily weight gain recorded in this study were similar to the values reported by Agunbiade *et al*. (2003) on weaner rabbits fed cabbage waste base diets. There was significant difference in the feed cost across the treatments. The least feed cost was recorded in diet 4 while the highest cost was observed in diet 1. The result of this study showed that, using cabbage leaf meal in the diet of weaner rabbits is cheaper than using conventional feed ingredients.

The packed cell volume values (37.40 to 47.90%) were within the range of 33 to 50% reported by Hillyer (1994) for growing rabbits. The values obtained for all the treatment groups indicate nutritional adequacy of all diets since values did not indicate mal-or-under nutrition (Church *et al*. 1984). The values for white blood cells which ranges from 6.40 to 12.90 $x10^3mm^3$ reported were within the range reported by Hillyer, (1994) for healthy young rabbits. This shows that the animals were healthy because decrease in number of white blood cells below the normal range is an indication of allergic conditions, anaphylactic shock and certain parasitism, while elevated values (leucocytosis) indicate the existence of a recent infection, usually with bacteria (Ahamefule *et al*.,2008).

CONCLUSION AND RECOMMENDATIONS

Cabbage leaf meal can be included in the diet of weaner rabbits at up to 20% without compromising growth performance and haematological indices of the rabbits. There was reduction in cost in the use of cabbage leaves based diets. There was also increased productivity in the use of cabbage leaf meal.

Diet 5 (20% inclusion of cabbage leaf meal) gave the least feed cost and is therefore recommended for use in weaner rabbits diets. Farmers are therefore encouraged to make use of this cheap and easily available feed material especially during the dry season when it is readily available and concides with period of rabbit feed scarcity.

REFERENCES

Ahamefule FO, BE Obua, I A, Ukweni, MA Oguike and RA Amaka, (2008). Haematological and biochemical profile of weaner rabbits fed raw or processed pigeon pea seed meal based diets. *African Journal of Agricultural Research*, **3**: 315-319.

Choi, H. J and Park, T.Y. (2003). Taxonomy of the Allium sect. Sacculiferum in Korea: with special reference to the morphology. *Korean. Journal of plant taxonomy*. **33**: 71-78.

Church, J. P., Judd, J. T., Yong, C. W., Kebay, T. L. and Kim, W. W. (1984). Relationship among dietary constituents and specific serum clinical components of subjects eating self- selected diets. *American Journal of Clinical Nutrition*. **40**: 1338 – 1344.

Hassan, H.E., Elamin,K.M.,Yousif,I.A., Musa,A.M.and Elkhairey,M.A. (2012). Evaluation of body weight and some morphometric traits at various ages in local rabbits of Sudan. *Journal of Animal Science Advances*, **2(4)**: 407-415.

Hillyer EV, (1994). Pet Rabbits. The Veterinary Clinics of North America, Small Animal Practice, **24**(1):25-65.

Owens, P. Daniel K., Anne B. Alerding, Kevin C. Crosby, Aloka B. Bandara, James H. Westwood, Brenda S.J. Winkel (2008). Functional Analysis of a Predicted Flavonol Synthase Gene Family in *Arabidopsis*. *Journal of applied science.* Pp. 108-117.