

NUTRIENT DIGESTIBILITY AND CARCASS CHARACTERISTICS OF WEANER RABBITS FED DRIED CABBAGE LEAF MEAL

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The study was conducted to determine the nutrient digestibility and carcass characteristics of weaner rabbits fed dried cabbage leaf meal. 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 result showed that, most of the carcass traits showed significant differences ($P < 0.05$) among the treatments except for organs such as heart, kidney, head, feet, tail, shoulder and thigh. The digestibility result also showed significant treatment ($P < 0.05$) effect except for nitrogen free extract. Diet 4 also gave the highest digestibility values. Diet 1 gave the least value for dry matter, crude protein and crude fibre, while diet 5 (20% cabbage leaves inclusion) gave the least values for ether extract, ash, nitrogen free extract and total digestible nutrients. It was therefore concluded that cabbage leaf meal can be used in the diet of weaner rabbits at 20% level of inclusion for efficient nutrients digestibility and optimum carcass yields. Cabbage leaf meal was therefore recommended to farmers as a feed material so as to improve digestibility and carcass yield of their weaner rabbits.

Keywords: Cabbage leaves, Nutrients, Digestibility, Carcass, 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 libitum*. 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 0%	T2 5%	T3 10%	T4 15%	T5 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

Table 2: Digestibility of Nutrients by Rabbits Fed Graded Levels of Cabbage Leaf Meal

Parameters	Dietary Treatments					SEM	LOS
	T1	T2	T3	T4	T5		
Dry matter	78.81 ^{ab}	79.84 ^a	78.26 ^b	83.51 ^a	79.85 ^a	1.53	*
Crude protein	74.19 ^b	75.01 ^b	76.17 ^b	80.81 ^a	76.42 ^b	1.83	*
Crude fibre	18.46 ^b	20.04 ^b	24.49 ^b	32.37 ^a	25.62 ^b	2.24	*
Ether extract	90.76 ^{ab}	89.36 ^b	90.18 ^{ab}	92.37 ^a	88.74 ^b	0.76	*
Ash	75.11 ^{bc}	79.74 ^b	73.80 ^c	86.43 ^a	74.85 ^{bc}	1.82	*
Nitrogen free extract	90.62	88.31	89.76	91.21	88.51	0.93	NS
Total digestible nutrients	79.82 ^a	53.15 ^b	78.19 ^a	82.41 ^a	77.88 ^{ab}	1.40	*

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

Table 3: Carcass Traits of Weaner Rabbits Fed Graded Levels of Cabbage Leaf Meal

Parameters	Dietary Treatments					SEM	LOS
	T1	T2	T3	T4	T5		
Pre-slaughter weight	1350.00 ^b	1435.00 ^a	1453.33 ^a	1485.33 ^a	1386.67 ^b	12.95	*
Carcass weight	775.98 ^c	959.10 ^a	963.07 ^a	989.63 ^a	899.54 ^b	10.15	*
Dressing percentage	57.68 ^b	65.85 ^a	65.95 ^a	66.70 ^a	64.77 ^a	0.43	*
Heart	0.28	0.27	0.27	0.31	0.29	0.01	NS
Lung	0.66 ^b	0.77 ^{ab}	0.82 ^{ab}	0.89 ^a	0.67 ^b	0.02	*
Liver	3.26 ^c	3.81 ^{ab}	3.22 ^c	4.37 ^a	3.62 ^b	0.07	*
Kidney	0.96	1.02	1.14	1.18	1.17	0.03	NS
Stomach	1.99 ^a	1.72 ^a	1.40 ^b	1.78 ^a	1.22 ^b	0.03	*
Intestine	15.29 ^c	19.56 ^b	20.00 ^{ab}	21.90 ^a	19.50 ^b	0.40	*
Head	12.13	11.77	11.08	12.33	11.56	0.25	NS
Skin	10.96 ^{ab}	12.59 ^a	10.73 ^{ab}	12.74 ^a	11.55 ^{ab}	0.25	*
Feet	2.62	2.65	2.62	3.13	2.59	0.10	NS
Tail	1.16	1.26	1.08	1.06	1.25	0.03	NS
Shoulder	25.66	23.90	26.99	27.42	25.66	0.31	NS
Loin	21.45 ^a	17.37 ^b	20.41 ^{ab}	27.78 ^a	19.86 ^{ab}	0.34	*
Thigh	26.02	24.91	23.44	29.65	26.01	0.64	NS

^{abc}: means within the same row bearing different superscripts are significantly different (P<0.05); LOS: level of significance; SEM: Standard error of mean, NS: No significant difference (P>0.05)

These results showed marked improvement in the digestibility of nutrients up to 20% cabbage leaf meal inclusion level reflecting efficient utilization of nutrients with increasing level of cabbage leaf meal inclusion. These results corroborate the findings of Obeh and Tewe (1992) who reported that feeding of cassava leaf meal to pigs resulted in better utilization of nutrients from leaves, improved digestibility of nutrients as well as better growth and higher feed intake. However the result observed in this study did not agree with the findings of Iyayi (2001) who reported that digestibility values of dry matter, crude

protein, crude fibre, ether extract, ash and nitrogen free extract were not significantly ($P<0.05$) different when growing rabbits were fed diets containing graded levels of moringa leaves.

The result of carcass yields obtained in this study is similar to the report of Jamroz *et al.* (1996) who observed increased dressing percentage when broiler chickens were fed vegetable based diets. The decline in dressing percentage (20% inclusion of cabbage leaf meal) may have resulted from the rapid impact of the cabbage leaves on caecal fermentation thus resulting in higher microbial activities.

CONCLUSION AND RECOMMENDATIONS

Cabbage leaf meal can be included in the diet of weaner rabbits at up to 20% without compromising carcass yields and nutrients digestibility of the rabbits. It 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 coincides with period of rabbit feed scarcity.

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