100 - 103

NUTRITIVE VALUE OF SOME LOCALLY AVAILABLE NON-CONVENTIONAL FEEDSTUFFS FOR POULTRY IN WESTERN KENYA

Okitoi, L.O and F.N. Muyekho

ABSTRACT

Cassava leaves and roots, oil palm kernel meal and fish silage were assessed for nutritive content and feeding value in broiler diets. Near Infra Red reflectance technology was used for proximate analyses. The feeding values of cassava roots, cassava leaves, oil palm kernels and fish silage was determined in broiler diets from 36-42 days of age by including ingredients at 210, 125, 102 and 224 g/ kg feed respectively at the expense of maize and soya bean meal. Cassava roots may be classified as an energy source for poultry because of low (<20%) protein. Cassava roots may be used as an energy source due to its high levels (60-70%) of starch, low levels of crude fibre. The low level of the amino acid requires that when used in poultry diets, it be supplemented with methionine. Oil palm nuts can neither be classified as a protein concentrates nor an energy concentrates because of the low levels of protein and starch (<20 and 1.01% respectively). The amino acids lysine, tryptophan and methionine + cystine levels in the oil palm 0.5,0.15 and 0.57% respectively are similar to values for coconut meal. The crude fibre content of 37% may limit its use in poultry diets although the essential amino acids contents are similar to coconut meal. Therefore may be used sparingly in poultry diets depending on abundance and the cost. The crude protein level in fish silage is high and the crude fat (5.68%) obtained in fish silage is high. The amino acid lysine and methionine are present in high levels as they are in fish meal. The reduction in body weights for bird fed oil palm kernel meal was reduced due to high crude fibre content (4.96%). The similar weight gain for birds fed cassava leaves with those of the control diets indicates that 125g/kg fish cassava leaves could replace maize and soya bean meal on an equal crude protein basis in the diets of chickens. The fact that birds fed cassava leaves, cassava roots, oil palm kernel meal and fish silage diets obtained similar weight gains indicates that 210 g/kg cassava, 224 g/kg fish silage and 102 g/kg oil palm kernel can replace maize and soya bean meal on equal crude protein basis in diets for chickens. The high feed/gain for birds fed oil palm kernel was due to reduced intake due to high crude fibre.

Key words: nutritive content; cassava leaves; cassava roots; oil palm kernel meal; fish silage

INTRODUCTION

The principle function of the feedstuffs is to provide cost effective diets which meet the requirements of poultry. Several non-conventional feedstuffs have great potential for poultry in western Kenya but are not yet exploited by nutritionists. Feed ingredients such as cassava roots, cassava leaves, oil palm kernels and fish waste that can be preserved as silage are available in Western Kenya. There is an increased demand for feedstuffs by the ever-growing feed industry. Demand for cereals for bio-energy coupled with competition with humans for consumption have pressured greater use of non-conventional feedstuffs in order to economically optimise poultry production

In order to fulfil the great demand for non-conventional feedstuffs, it is imperative to assess the above ingredients' suitability for poultry feeds. Extensive work on utilization of these alternatives and their by-products has been carried out by scientists outside Kenya: Fish silage (Perez 1995), Oil palm (Ocampo 1995), sugarcane molasses (Figuera and Ly, 1990), Cassava roots and leaves (Buitrago *et al* 1992; Ravindran 1995). The advantage of these ingredients is that they are grown and processed on-farm where the chicken enterprise are situated and farmers are familiar with.

Poultry nutritionists are becoming interested in formulating diets on the basis of cost effectiveness, availability, and with less demand for human consumption and other industrial uses such as bio-energy.

Lack of detailed information on nutritive value of above ingredients makes incorporation into feeds more difficult. The object of the study was to determine the chemical composition of cassava

leaves, cassava roots, oil palm kernel and fish silage and feeding values.

Materials and methods

Ingredient source and processing

Cassava roots, cassava leaves, oil palm kernels and fish silage were collected and ground. Fish silage was made from by-product of the fish fillet processing (Mgongo wazi) was minced and mixed with molasses and ground cassava in the following amounts (% by weight): Mollasses 10, ground fish 40 and ground cassava 50 and packed in a 20 kg plastic jar. The jar was tightly covered first with a polythene sheet and then a lid to ensure anaerobic fermentation for 3 weeks. Cassava leaves, obtained from freshly harvested cassava leaves was sun-dried for 24-48 h and ground. Cassava roots obtained from freshly harvested cassava roots were peeled, chipped and sun dried for 24-48 h and ground. Oil palm kernel were collected, dried and ground.

Sample analyses and calculations

Feed samples for each treatment, in three replicates were analysed. The Near Infra Red reflectance (NIR) was used to determine DM dry matter, CFAT crude fat, CFIB crude fibre, starch starch, ME Metabolizable Energy, CPROT crude protein, Lys Lysine, Try Tryptophan, Metcys Methionine + Cystine

Growth assay

Feeding value of cassava roots, cassava leaves, oil palm kernels and fish silage was determined by including the ingredients in maize soya bean diets at 210, 125, 102 and 224 g/ kg feed respectively. The experimental and control diets were formulated to contain similar amounts of protein (Table 1). All diets were offered as mash.

One hundred and fifty broilers at 4 weeks of uniform body weights were selected from within a group of 200 broilers by discarding the upper and lower 5%. Selected birds were assigned to five dietary treatments and three replicates with 10 birds per replicate. The experimental diets are as shown in Table 1. The broilers were fed with a basal diet (Maize 76.9%+Soya bean 23.1%) with a crude protein of 180g/kg DM and ME of 2824.3 kcal /kg dry matter. Experimental diets contained similar protein and energy values but the proportions of non conventional feedstuffs were fish silage 22.4%, cassava roots meal 21%, cassava leaves 12.5% and oil palm kernel meal 10.2%. Each diet was fed to birds from 28-56 days . Body weights were recorded at days 28, 36,42 and 56 . Group feed consumption was recorded during the experimental period. Data was subjected to Analysis of variance procedure of SAS. Effects were tested for significance using an F-test. Significance will be shown by use of the following symbols: ns not significant, * $p< 0.05$.

RESULTS

Table I presents the chemical composition of cassava roots, cassava leaves, fish silage and oil palm kernel meal. The chemical composition of cassava roots shows high levels of starch (69.14%), low levels of protein (2.34), crude fibre (5.29%), crude fat (0.68%), sugar (0.45%), amino acids

TABLE I - THE COMPOSITION (%) OF DIETS USED TO DETERMINE FEED VALUE OF INGREDIENTS

Ingredient	Control Reference	Cassava	Cassava leaves	Fish silage	Oil palm kernels
Maize	76.9	53	70	59.7	67.8
Soya bean meal	23.1	26	17.5	17.9	22
Cassava		21			
Cassava (L)			12.5		
Fish silage				22.4	
Oil palm kernels					10.2
Nutrient composition					
Dry matter	89.84	89.61	89.88	90.7	89.54
Crude protein	18.04	17.92	17.90	17.91	17.73
Crude fibre	1.84	1.65	2.7	2.48	4.96
ME	2824.3	2782.2	2750.2	2725.7	2726
Methionine +Cystine	0.58	0.62	0.64	1.66	0.76
Lysine	0.91	2.21	1.51	5.38	1.36
Tryptophan	0.21	0.36	0.54	0.32	0.44
Threonine	0.72	0.72	0.76	0.68	0.83
Price	18.46	17.89	16.38	16.12	17.19

TABLE II -2 CHEMICAL COMPOSITION OF CASSAVA ROOTS, CASSAVA LEAVES, FISH SILLAGE AND OIL PALM NUT (% DRY MATTER)

Content	DM	CPROT	MEkcal	CFIB	CFAT	Starch	SUG	Lys	Try	MetCys
Cassava roots	89.02	2.34	2968.19	5.29	0.68	69.14	0.45	0.06	0.08	0.03
Cassava leaves	90.03	28.25	2290.01	10.22	6.59	13.26	1.28	29.53	3.01	10.94
Fish silage	93.67	18.65	3498.68	4.99	5.68	49.85	5.6	22.28	0.75	5.78
Oil palm nuts	86.97	11.45	1905.56	37.1	18.67	1.01	0.49	0.81	0.15	0.57

lysine, tryptophan and methionine + cystine (0.06, 0.08 and 0.03 respectively), compared to cassava leaves, fish silage and oil palm nut.

The composition of oil palm nuts shows high levels of crude fibre (37.1%) and crude fat (18.67%) but lowest levels of starch (1.01%) and energy (1905.56kcal ME /Kg DM) as compared to cassava roots, cassava leaves and fish sillage. The crude protein level is (11.45) and amino acids lysine, tryptophan and methionine + cystine are 0.81, 0.15 and 0.57% respectively.

The composition of fish silage shows a rich source of crude protein (18.65%) and energy (3498.68 kcal/kg DM). The amino acids lysine, methionine are high compared to other ingredients. The crude fibre content is moderate

The composition of cassava leaves shows high levels of crude protein (28.25%), crude fibre (6.59%) and the amino acid tryptophan (3.01)
The performance as assessed by 42 day body weight, weight gain between 36-42 days and feed gain between 36-42 days (Table 3) shows initial body weight were similar in all experimental diets. Body weight at 42 days was significantly ($p<0.05$) reduced for birds fed on oil palm kernel meal diets
The body weights for birds fed cassava leaves, cassava roots and fish silage diets were similar to those of control diets. The weight gains for birds fed cassava leaves were similar to those seen in control diets. While the gain for birds fed cassava leaves, cassava roots, oil palm kernel meal and fish silage diets were similar and significantly reduced compared to those of control diets.

DISCUSSION

The protein, amino acids lysine, tryptophan and methionine + cystine values in cassava roots are similar to those reported by Elkin (2002), Garcia and Dale (1999). The starch content 69.14% is similar to values (60-70%) reported by Garcia and Dale (1999). Cassava roots may be classified as an energy source for poultry because of low (<20%) protein therefore classified as an energy concentrate according to Pond *et al* 1995. The roots may be used as an energy source due to its high levels (60-70%) of starch and low levels of crude fibre. The low level of the amino acid requires that when used in poultry diets, it be supplemented with methionine particularly because methionine is critical in cyanide detoxification since it contains labile sulphur (Elkin 2002).
Oil palm nuts can neither be classified as a protein concentrates nor an energy concentrates because of the low levels of protein and starch (<20 and 1.01% respectively) Pond *et al* (1995) and Garcia and Dale (1999). The amino acids lysine, tryptophan and methionine + cystine levels in the oil palm 0.5,0.15 and 0.57% respectively are similar to values for coconut meal and palm kernel meal (Elkin 2002).

TABLE III - BODY WEIGHT GAIN OF BROILERS FED ON DIETS WITH CASSAVA, CASSAVA LEAVES, FISH SILAGE AND OILPALM KERNEL MEAL

Treatment	Initial body wt (36 days)	Body wt (42 days)	Wt gain (36-42 days)	Feed / gain
Control	1328a	1960.78a	273.85a	2.31b
Cassava leaves	1273.4a	1814.77ab	230.21ab	2.46ab
Cassava roots	1281.25a	1793.91ab	192.2b	2.94ab
Fish silage	1273.4a	1794.9ab	184.3b	2.76ab
Oil palm kernel meal	1256.81a	1756.36b	173.84b	3.32a

The crude fibre content 37% may limit its use in poultry diets although the essential amino acids contents are similar to coconut and oil palm kernel meal. Therefore may be used sparingly in poultry diets depending on abundance and the cost.

The crude protein level in fish silage is lower than reported by Gohl (1981) and Perez (1991) and the crude fat (5.68%) obtained in fish silage is comparable with that reported by Gohl (1981). The amino acid lysine and methionine are present in high levels as they are in fish meal. Consequently fish silage could appear an excellent protein supplement from non-conventional ingredients for poultry.

The reduction in body weights for bird fed oil palm kernel meal was due to high crude fibre content (4.96%). The similar weight gain for birds fed cassava leaves with those of the control diets indicates that 125gkg^{-1} fish and cassava leaves could replace maize and soya bean meal on an equal crude protein basis in the diets of chickens. The fact that birds fed cassava leaves, cassava roots, oil palm kernel meal and fish silage diets obtained similar weight gains indicates that 210 g kg^{-1} cassava, 224 g kg^{-1} fish silage and 102 g kg^{-1} oil palm kernel can replace maize and soya bean meal on equal crude protein basis in diets for chickens. The high feed/gain for birds fed oil palm kernel was due to reduced intake due to high crude fibre.

CONCLUSION

Cassava leaves and roots, oil palm kernel meal and fish silage are valuable non-conventional feed rsources for scavenging chickens. The inclusion levels in diets of oil palm kernels may be limited by the high crude fibre levels.

REFERENCE

[1] Elkin,R. G , E aurthur, B.R. Hamaker, J.D. Axtell, M.W Douglas and C.m parsons (2002). Nutritioal value of highly digetible sorghum cultivars formeat type chickens. J. Agric. Food .Chem 50 : 4146-4150Figuera, V and Ly, J (1990). Alimentatio porcina no convenceonal cottecion GEPLACEA, serie Diversification Mexico 215 pp

[2] Garcia m and Dale N (1999). Cassava root meal for poultry. . J. applied poultry research 1999. 8: 132-137

[3] Gohl, B. (1981). Tropical Animal feeds. FAO Animal production and health series no. 12 FAO Rome 529pp

[4] Ocampo, A. (1994). Raw palm oil as the energy source in pig fattening dietsand Azolla as a sustitute for Soya bean meal. Livestock Research for Rural development 6 (1) : 8-17

[5] Perez, R. (1995). La Cana de azucar como base de un sistema alementicio recuario. Proceedings II encuentro national de agricultura organica 17-19 de mayo de 1995 la Habana Cuba p 77-84

[6] Pond W.G, Church D C and Pond K R (1995). Basic animal nutrition and feeding (4th edition) John wiley and sons new york 615 pp

[7] Ravindran V (1995). Biochemical and nutritional assessment of tubers from 16 cultivars of sweetpotatoes. J. Agric. Food .Chem1999. 43:2646-2651