EVALUATION OF THE NUTRITIVE VALUE OF COWPEA (*Vigna unguiculata*) TESTA AS AN ALTERNATIVE FEED INGREDIENT FOR LIVESTOCK PRODUCTION

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ABSTRACT
This study was conducted to evaluate the nutritive value of dried cowpea (Vigna unguiculata) testa as an alternative feed ingredient for livestock production. With feed costs representing over 70% of total animal production expenses, identifying cost-effective unconventional feed ingredients has become crucial. The research examined the proximate composition, amino acid profile and mineral constituents of cowpea testa obtained from local processors in Gwagwalada-FCT-Abuja. Results on the proximate composition of dried cowpea testa showed that it contained 88.50 % dry matter, 8.20 % crude protein, 3.40 % crude fibre, 9.00 % ash, 1.32 % ether extract and 2472.55 kcal/kg metabolizable energy. Amino acid profile of cowpea testa showed alanine 5.2 %, histidine 2.6 %, arginine 5.7%, isoleucine 4.8%, Aspartic acid 6.0%, leucine 7.2%, cysteine 1.8%, methionine 1.7%, phenylalanine 6.2%, threonine 5.1%, glycine 5.2 %, proline 6.1 %, valine 5.8 %, tyrosine 4.2 %, serine 5.6 % and tryptophan 2.2 %. The sample contained sodium (100.50 mg/100g), potassium (65.45 mg/100g), calcium (50.01 mg/100g), iron (17.02 mg/100g), phosphorus (79.34 mg/100g) and zinc (43.10 mg/100g). The study concludes that cowpea testa represents a viable alternative feed ingredient, particularly as a partial replacement for conventional energy and fibre sources in livestock diets. This utilization would not only reduce feed costs but also minimize environmental pollution.
Keywords: Amino acid, Cowpea, Feedstuff, Mineral, Proximate

INTRODUCTION

The price of conventional ingredients such as maize has soared so high in recent times and is no longer economical to be used in poultry feed formulation (Badou *et al.,* 2013). The continual rise in the price of conventional feed stuffs and some industrial by-products has necessitated the search for alternative unconventional feed stuffs. One of such alternative unconventional feedstuffs is cowpea testa. Cowpea (*Vigna unguiculata*) testa is a residue obtained from cowpea processed for making moi-moi and bean cake (akara, kosai). Cowpea testa contains moderate levels of protein, fat, carbohydrates and minerals, making it a valuable source of nutrients for livestock (Diouf, 2011). Cowpea (*Vigna unguiculata*) is one of the most important leguminous plant grown in tropical savannah zones in Africa (Hall *et al*., 2003). Its cultivation makes a major contribution to food security for people living in the most marginal areas. Its seeds are rich in lysine and tryptophan, which are a valuable source of plant protein (Pungulani *et al.,* 2013). In addition, cowpea is an essential source of vitamins and minerals, which help to prevent birth defects (Diouf, 2011).

Reports have shown that the nutritive value of Cowpea testa can be influenced by geographical location, climatic condition, age of plant, specie amongst others (Ojediran *et al*., 2024). This study was designed to examine the nutritive value of Cowpea testa as an alternative feed ingredient in livestock production.

MATERIALS AND METHODS

Experimental location

The study was carried out at the Department of Animal Science, University of Abuja, Gwagwalada, located between latitude 08º51 and 09º37 N and longitude 007º20 and 007º51 E, with a land mass of about 65 km square meter (Balogun, 2001).

Source and processing of Cowpea testa

Cowpea testa was collected from road side food vendors in Gwagwalada and its environs who processes beans into bean cake and Moi-moi for human consumption. The cowpea testa was sent to the department of Crop Science, University of Abuja, Gwagwalada for proper identification with reference number (CPP/008/2024) before it was air dried (to a constant weight), milled and was subjected to proximate, amino acid and mineral constituent analyses.

Data collection

Proximate analysis was carried out using Near-infra red automatic feed analyzer (Model ADF-006, Netherlands). Amino acid was analysed using commercial kit Priff™ amino analyzer (Model: TG-006H, China). Mineral composition was determined using Atomic Absorption Spectrometer (AAS-118-07, China).

RESULTS AND DISCUSSION

Proximate composition of air dried Cowpea ((*Vigna unguiculata*) testa (Table 1) showed that sample contained 88.50 % dry matter, 8.20 % crude protein, 3.40 % crude fibre, 9.00 % ash, 1.32 % ether extract and 2472.55 Kcal/kg metabolizable energy. The result obtained aligns with the findings of Drăghici *et al.* (2016). Crude protein value obtained in this study was higher than 6.77 % reported by Jia *et al*. (2013) and 7.89 % reported by Agubosi *et al.* (2021) for air-dried sweet potato peels. The little variation in the values could be as a result of different locations in which the samples were collected. The results suggested that cowpea testa could be good sources of mineral elements and energy for animals. Fibres in the diet are necessary for gut health, effective elimination of wastes, and can lower the serum cholesterol, the risk of coronary heart disease and constipation (Ishida *et al*., 2000). Thus, cowpea testa can be considered as a valuable source of dietary fibre and carbohydrate in animal nutrition.

Table 1: Proximate composition of dried Cowpea ((*Vigna unguiculata*) testa

Parameters	Composition (%)
Dry matter	88.50
Crude protein	8.20
Crude fibre	3.40
Ash	9.00
Ether extract	1.32
Metabolizable energy (Kcal/kg)	2472.55

Amino acid composition of dried Cowpea (*Vigna unguiculata*) testa is presented in Table 2. Leucine had the highest concentration (7.20 %) followed by phenylalanine (6.20 %), proline (6.10 %), aspartate (6.00 %), valine (5.80 %), arginine (5.70 %), serine (5.60 %), glycine (5.20 %), alanine (5.20 %), threonine (5.10 %), isoleucine (4.80 %), tyrosine (4.20 %), histidine (2.60 %), cysteine (1.80 %) and methionine (1.70 %) respectively. Result obtained is in agreement with the reports of Asiwe *et al*. (2009). Essential amino acids are potent immunological modulators for birds, they are also required for maximum growth and feed efficiency (Badou *et al*., 2013).

Table 2: Amino acid composition of dried Cowpea (*Vigna unguiculata*) testa

Components	Composition (%)
Alanine	5.20
Histidine*	2.60
Arginine*	5.70
Isoleucine*	4.80
Aspartate	6.00
Leucine*	7.20
Cysteine	1.80
Methionine*	1.70
Phenylalanine*	6.20
Threonine*	5.10
Glycine	5.20
Proline	6.10
Valine *	5.80
Tyrosine	4.20
Serine	5.60

*Essential amino acids

Mineral composition of dried Cowpea (*Vigna unguiculata*) testa is presented in Table 3. The sample contained sodium (100.50 mg/100g), potassium (65.45 mg/100g), calcium (50.01 mg/100g), iron (17.02 mg/100g), phosphorus (79.34 mg/100g) and zinc (43.10 mg/100g). Result obtained in this study is in agreement with the report of Jia *et al*. (2013). Minerals are required for normal growth, activities of muscles and skeletal development, cellular activity and oxygen transport (copper and iron), chemical reaction in the body and intestinal absorption (magnesium), fluid balance and nerve transmission (sodium and potassium) (Madziga *et al*., 2010). Deficiency of these minerals are known to affect the performance and health in both humans and livestock's (Aritra and Sumana, 2012).

CONCLUSION

The result of this study indicates that Cowpea testa has moderate nutritional value and can be used as a feedstuff. Cowpea testa contains appreciable quantities of crude protein, minerals and amino acids. The use of cowpea testa will further assist in reducing cost of production and preventing competition for available conventional feedstuffs.

Table 3: Mineral composition of dried Cowpea (*Vigna unguiculata*) testa

Parameter	Concentration (mg/100g)
Sodium	100.50
Potassium	65.45
Iron	17.02
Calcium	50.01
Phosphorus	79.34
Zinc	43.10

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