

---

## BIOLOGICAL, PROXIMATE AND AMINO ACID COMPOSITION OF ALBIZZIALEBBECK (LINN) FOR RABBITS DIETS

<sup>1</sup>Kaga, B.I., <sup>2</sup>Ayo, J.O., <sup>3</sup>Dyek, N., & <sup>4</sup>Yabaya, S.A.

<sup>1</sup> *Department of Animal Science*

*Kaduna State University, Kafanchan Campus*

<sup>2</sup> *Department of Physiology and Pharmacology, Veterinary Medicine,  
Ahmadu Bello University Zaria, Kaduna State.*

<sup>3</sup> *Department of Biology,*

*Federal College of Education Panshin, Plateau State*

<sup>4</sup> *Department of Agricultural Economics and Extension,  
Kaduna State University, Kafanchan Campus*

### Abstract

This research was carried out to determine the biological, proximate and amino acid profile of Albizzialebbeck(linn) seeds as potential feedstuff for rabbits. The moisture content, ash, total organic matter, crude protein, ether extract, crude fibre and nitrogen free extract were determined using standard methods of the Association of Official Analytical Chemists. The amino acids were determined using Technical Sequential MultiSample Amino Acid Analyzer (TSM). The research shows that Albizzialebbeck (linn) is a good source of crude protein, ether extract and crude fibre. It has superior quality protein because of the higher contents of indispensable amino acids such as lysine, histidine, glycine, methionine, cysteine and threonine. These essential amino acids compare favorably with FAO/WHO reference values. It can therefore be recommended for rabbit's feeding. It has low moisture content which can enhance its storage.

**Keywords:** *Biological, proximate, Amino Acids, Albizzialebbeck*

### Background to the Study

Protein malnutrition is very acute and worrisome in developing countries and has generated interest for a lot of work to be done on leaves and seeds of various plants as a source of protein in different human dishes and animal feeds. Although wild plant legumes have not been completely exploited, it is a well-known fact that they are potential sources of protein for human and animal feeding. The utilization of seeds flour and plant protein as functional ingredients in food systems continue to be of research interest on soya beans, peanut, cotton seeds and sun flower (Fagbemi *et al.*, 2005). Plants are known to produce valuable substances that have nutritional properties and are therefore, used to furnish animal requirements for energy, body building and protection against diseases.

Therefore, intense efforts to find alternative sources of protein from plant are conducted round the world (Bravo *et al.*, 1994, Sidhuraju *et al.*, 1995). The increasing world population especially in developing countries has resulted in the inadequacy of food supply and deficiency of dietary nutrients of which animal protein is most prominent. The search for alternative source of feed to improve the scope of rabbit production as well as raise the protein intake by Nigerians therefore, continue to be of interest to scientists. The beacon is therefore now on alternative source of feeds otherwise known as non conventional feed stuffs. These non conventional feed stuffs are mostly not competed for by man and animals and hence represent a great potential as a cheaper and readily available feed resources.

#### Objectives of the Study

1. To determine the proximate composition of *Albizia lebeck* (Linn) seed, for rabbits diets
2. To examine the biological characteristics of this plant.
3. To determine the amino acids profile.

#### Materials and Methods:-

**Seeds Collection:** Dry pods of *Albizia lebeck* were collected from the trees in the main campus of Ahmadu Bello University, Zaria, Nigeria. They were thrashed in bags of which they were collected and winnowed on a tray to get clean seeds by blowing air through in order to remove the chaffs. The seeds were milled in a hammer mill to obtain the powder and stored in air tight glass ware before analysis.

**Chemical Analysis:** The proximate composition (moisture content, dry matter, ash, total organic matter, crude protein, ether extract, crude fibre and nitrogen free extract) were determined using the standard methods of procedure (A.O.A.C., 2005). The caloric value was estimated multiplying the percentages of carbohydrate by 4.1 kcal/100g, fat by 9.4 kcal/100g and protein by 5.5 kcal/100g. The sum total was taken as the caloric value (kcal/100g) of the sample (Weinberg, 1971).

**Amino Acids Content:** Prior to the amino acids analysis, the sample powder was hydrolysed into its constituent amino acids which occur in the peptide chain. Defatted sample (100mg) was weighed into 250cm<sup>3</sup> round bottom flask and mixed with 25cm<sup>3</sup> 6M HCl. After adding and pumping granules, the solution was boiled at 110°C for 24 hours. The cartridge of amino acid analyzer was loaded with 10l of amino acid and 20 hydrolysate in buffer H 2.0.

The Technical Sequential Multi Sample Amino Acid analyzer (TSM) was designed to separate, detect and quantify amino acids used. The effluent which flowed into the analytical system was mixed with segmented streams of reagents. The mixture was passed through a heating bath where colours develop and absorbance was monitored continuously in a calorimeter and the signals were then magnified and traced on a two-pen recorder using a linear chart to develop a chromatogram. The area peak was calculated as the concentration of each amino acid. This was expressed as g/16gN to the equivalent of g/100g protein (Pearson, 1976).

These values of amino acids were compared with FAO/WHO (1990) reference values.

#### Result and Discussions

##### The Biological Characteristics of *Albizia lebeck* (Linn)

*Albizia lebeck* belongs to the family Leguminosae and sub-family mimosoideae. This is an introduced species in Nigeria (Keay, 1989). It can reproduce itself readily and may be found growing wild. The tree is easily grown from seeds. It has very persistent fruits hanging down in conspicuous clusters. The tree could grow up to 15m to 50m high, usually branching low down. The bark is grayish. This genus is represented throughout the tropics. All the Nigerian species are deciduous with widely ascending spreading branches. The fruits are pendulous, elongated and flat, often clearly visible inside the

Pods are spaced uniformly along its whole length. Each seed is placed centrally in the pod. It flowers from November to February, heavily scented with the stamen, free above the corolla. Fruiting is from September to May remaining on the tree until after the new flowers appear. The foliage is commonly used as fodder in Sudan and Nigeria for feeding cattle, goats and sheep.

#### Proximate and Amino Acids Profile

The proximate and amino acids profile are presented in Tables 1 and 2 respectively.

Total organic matter, dry matter and crude protein recorded the highest values respectively in the proximate composition. *Albizzialebbeck* (Linn) has high dry matter which is desirable because it implies that the shelf life of the seed is likely to be long (Auta and Anwa, 2007). The crude protein content of *Albizzia* seeds qualifies it as a protein feed stuff because it is well above 20% as reported by Auta and Anwa (2007). This confirms the report of Nories (2005). It was observed that the seeds also have high lipid content of  $11.13 \pm 0.50$ . This contradicts the report of Auta and Anwa (2007) who reported  $5.63 \pm 0.12$  lipid. The crude fibre content was  $11.13 \pm 0.33$  and this is similar to the report of Auta and Anwa (2007). The high crude fibre reported in this research is very important for rabbit's diet as a requirement for monogastric diet. Crude fibre enhance digestibility in rabbits (Kaga, 2011).

Table 2 shows to the amino acids profile of *Albizzialebbeck* (Linn). Lysine, histidine, glutamate, glycine and cysteine compare favourably with the FAO/WHO (1990) reference values. The amino acids in *Albizzialebbeck* (Linn) could be used to supplement cereal staples since various investigations had shown that cereals and legumes protein are nutritionally complementary to each other (Ega and Samba 1994, 1995). *Albizzialebbeck* (Linn) has superior quality protein because of the higher content of indispensable amino acids such as lysine, histidine, glycine, methionine, cysteine and threonine. These are all essential amino acids required by rabbits.

#### Conclusion and Recommendation

The result of this study shows that *Albizzialebbeck* (Linn) is a good source of crude protein, ether extract and crude fibre. It is a good source of glutamate (non-essential amino acids), lysine, histidine, glycine and methionine which are essential amino acids. It can therefore be recommended for rabbits feeding. It has low moisture content and can be stored for a long time. Anti-nutritional properties however, need to be further investigated as a potential feedstuff for monogastric animals.

Table 1: Proximate composition of *Albizzialebbeck* (Linn)

Moisture content	13.85±0.35
Dry Matter	84.51±1.00
Ash content	5.28±0.56
Total organic matter	93.69±0.49
Crude protein	36.00±1.05
Ether extract	11.13±0.50
Crude fibre	11.31±0.33
Carbohydrate by difference	33.72±0.05
Nitrogen free extract	24.43±1.21
Energy value Kcal/100g	381.26
Energy value kJoules/100g	1597.48

Table 2: Amino acid profile of AlbizziaLebbeck (g/16gN)

Lysine	4.66	5.8
Histidine	1.83	2.5
Arginine	1.73	5.2
Aspartate	2.64	8.0
Threonine	1.75	3.4
Serine	1.75	8.0
Glutamate	15.02	15.0
Proline	1.49	11.0
Glycine	3.24	2.0
Alanine	1.16	6.1
Cysteine	0.49	1.10
Valine	0.31	4.0
Methionine	1.57	3.0
Isoleucine	0.11	3.0
Leucine	1.34	7.0
Tyrosin	1.64	3.1
Phenylalanine	2.28	6.3

Values represent grand means of duplicate determinations

#### Reference

- AOAC (2005), "Official Methods of Analysis of the Association of Official Analytical Chemists". (17<sup>th</sup> Edition) Washington D.C
- Bravo, L. Grade, N. Saura. Calixto, F. (1994), "Composition & potential uses of mesquite pods (*Prosopis pallid*) Comparism with carab pods (*Ceratonia siliqual*) journal of food Science Agriculture 65:Pp. 302-206
- FAO/WHO (1990), "Protein quality evaluation in report of joint FAO/WHO expert consultations". Food & Agricultural organization of the United Nation Rome 1990. Pp.43
- Fagbemi, T .N. A. A. Oshodi & K.O. Ipinmoroti (2005), "processing effects on some anti-nutritional factors & in vitro multi-enzyme protein digestibility". (ivpd) of three tropical seeds: Breadnut (*Artocarpusaltilis*). Cashewnut (*Anacardium Accidentale*) & fluted Pumpkin (*Telfairiaaccidentalis*).Pakistan Journal of Nutrition, 4:Pp.250-256.
- Kaga B.I.(2011), "Performance of rabbits fed DelonixRegia seed diets". PhD Thesis Department of Biological Science Ahmadu Bello University Zaria
- Keay R.W.J.C.F.A Onochie & D.P Standfield, (1964).Nigerian TreesVol II. Nigerian National Press Limited Apapa. Pp:495
- Auta,J. & Anwa, E.P. (2007). "Preliminary Studies on Albizzialebbeck Seeds: Proximate Analysis & Phytochemical Screening". Research journal of biological sciences 2(1) Pp.33-35
- Norris, J.R.D.(2005), Where do you get your protein? Vegan Outreach, Pp: 1-6
- Pearson D. (1976), "The chemical analysis of food, 2<sup>nd</sup> edition, Longman Group Limited". Edinburg London & New York Pp.6-8, 60-70

- Siddhuraju, P., Ijayakumar, K. & Jonardhana, K. (1995), "Chemical Composition protein quality of the little known legume, velvet bean *Mucuna Pruriens* (L.) Journal of Agricultural Technology Vol. 12 Pp. 12-16
- Samba, R.M.D. & Ega R.A.I. (1994), "Effect of *Parkia Sesamun* mixed protein Diets on Rat growth". Journal of the science Teachers' Association of Nigeria 29, 1 & 2 (August, 1994). Pp.83-96
- Samba, R.M.D. & Ega R.A.I. (1995), "Reproductive Performance of Rats on *Parkia Sesamun* mixed protein Diets". Journal of science Teachers' Association of Nigeria, 30, 1 and 2 (August, 1995) Pp. 73-79
- Winberg, G.G.(1971), "Symbols, Units & Conversion factors in studies of fresh water productivity" T.B.P. Section PFTBP Central office London. Pp. 25-35