

## **The utilization of African mesquite (*Prosopis africana*) as potential feedstuff for monogastric animals: A review**

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**Target Audience:** *Livestock farmers, nutritionists and animal scientists*

### **Abstract**

*The keen competition between the human populace and livestock industry for grains as well as the problem of grain scarcity because of the decline in production has led to the search for unconventional feedstuffs. In light of this challenge, this paper presents a review of research work on the utilization of African mesquite, a potential non-conventional feed resource (NCFR) for animal feeding. Utilization of non-conventional feedstuff is one way of achieving sustainable livestock production, to cushion the effect of shortages in animal feedstuff and thereby ensuring a level of nutritional security. The proximate composition, as well as the successful inclusion of the pulp and the processed seed meal of African mesquite in animal diets, have been reported by some researchers. The proximate composition of the seed; crude protein for raw seeds is in the range of 20.50 to 27.67% while that of the processed seeds is from 20.54 to 23.60 %. Crude fibre is within the range of 6.90 to 12.10% and 3.03 to 6.51% for raw and processed seeds, respectively. Ether extract value for raw seeds is between 4.56 and 6.46% whereas the processed seeds range from 3.60 to 12.93%. Ash value is from 4.04 to 6.05% and 4.40 to 5.67% for raw and processed seeds, respectively. The crude protein for the pulp is between 10.00 to 13.83% and for crude fibre ranged from 17.36 to 23.00%. The ether extract value ranged from 1.35 to 3.30% and the ash content of the pulp is from 3.00 to 6.28%.*

**Keywords:** *African mesquite, non-conventional feed resource, proximate composition*

### **Description of Problem**

There have been growing concerns about the ever-expanding gap existing between feed available and feed required by livestock. This glaring shortage to meet up with the growing livestock population is an alarming challenge, an imminent problem that requires urgent attention. Animal scientists and nutritionists are still searching and conducting research on the nutritional potentials of non-conventional feed resources for future inclusion in livestock feed in commercial-scale [1], [2]. Additionally, the optimum level of inclusion of these non-conventional ingredients will also have to be determined.

The utilization of non-conventional feed resources is one way of achieving sustainable

livestock production, to cushion the effect of shortages in animal feedstuff and thereby ensuring a level of feed security. Nigeria possesses a vast array of NCFR (trees, shrubs, legumes) that can be used for livestock feeding. These feed resources have the potential in the alleviation of feed scarcity experienced during dry seasons, thus contributing to nutritional security. It noteworthy, that any substitute or alternative feedstuff resource should not be toxic, but should be palatable, nutritious, available, affordable and economical, with little or no competition between man and animal.

Due to this arising need, African mesquite seed is been put into consideration as a potential non-conventional feed resource, an alternative

for inclusion in animal feed. African mesquite also called iron tree, is spread across the Sub-Saharan Africa region, a perennial legume tree that belongs to the *Fabaceae* family. It is one of the locally utilizable and under-exploited tropical plants. This tree plant is commonly found in northern and north-central Nigeria and the seeds are produced in abundant quantities between February and August [3].

This legume tree can play a vital role in combating the problem of feed crisis in the livestock sector. [4] suggested using this tree plant as forage for feeding animals in arid zones and that the pod can serve as a source carbohydrate, the seeds as a source of protein and the leaves as a rich source of fibre for both ruminant and non-ruminant animals. It is also used for making special traditional soup condiments [5], [6] and can be utilized in mixed animal feed [3]. African mesquite contains amino acids at levels comparable with most common legumes [7]. This paper presents a review of research work on the utilization of African mesquite in animal nutrition as a potential non-conventional feed resource.

## Discussion

### African mesquite a potential non-conventional feedstuff

African mesquite is a valuable multipurpose tree and it is considered a non-conventional feedstuff. Raw seeds of African mesquite contain antinutritional factors, nevertheless, proper processing reduces the levels of the toxic factors [8, 9, 10]. African mesquite seeds are good sources of carbohydrates, fibre and protein [11]. It is also a good source of potassium and magnesium. The seeds do not contain heavy metals like lead (Pb) and cadmium (Cd) at a detectable range [12]. Additionally, African mesquite contains substantial quantities of most of the indispensable amino acids [13, 14]. It was found that processing (fermentation) enhances the total amino acid in African mesquite seeds

[7, 14]. However, the seeds were found to be limiting in the sulphur-containing amino acids, thus, their supplementation during feed formulation is required [8].

### Utilization of African mesquite in animal diets

African mesquite can be used as fodder for animals, it is described as a tree with multiple uses. It starts fruit production from November to March [15].

The successful inclusion of processed seed meal of African mesquite in chicken diets has been reported by some researchers [8, 16, 17]. It was reported [17] that total replacement of soya bean meal with decorticated fermented African mesquite seed meal in broiler diet had no negative effect on carcass yield. According to [16], replacement of 25% of sesame seed meal with soaked African mesquite seed meal significantly increased final live weight and weight gain of broiler chickens as well as improved feed efficiency compared with other treatments. [8] reported that processing increased the crude protein of African mesquite while it decreased the crude fibre, ether extract and ash content. The authors found out that raw African mesquite contains high levels of tannins in the seeds, which can be significantly reduced with proper processing. On one hand, pullets fed raw African mesquite seeds recorded decreasing feed intake and weight gain with increasing levels of the seeds in the diet as well as a high mortality rate. While on the other hand, birds that were fed the processed seeds had significantly higher weight gain and feed efficiency which was similar to the control [8].

According to [18], the incorporation of 12.5% heat-treated African mesquite seed coat meal (that is replacing 33.33% of maize) did not have an adverse significant effect on the carcass characteristics of meat-type Japanese quails (*Coturnix coturnix japonica*).

[19] reported that African mesquite pulp was

included at 20% in rabbit diets (which was equivalent to a replacement of 50% of maize) without negatively affecting growth performance.

Rabbits fed African mesquite pulp were significantly better in weight gain and feed conversion ratio than the control. Besides, [20] fed African mesquite pulp to rabbits and reported that the haematological and serum indices of the rabbits were not negatively affected by inclusion of African mesquite pulp, therefore, suggested that African mesquite pulp can be included up to 30% in rabbit diet without deleterious effects.

#### **Proximate composition of African mesquite seeds and pulp**

The proximate composition of African mesquite seeds and pulp as reported by some researchers is depicted in Table 1. The crude protein for raw seeds is in the range of 20.50 - 27.67% while that of the processed seeds is from 20.54 to 23.60%. Crude fibre is within the range of 6.90 to 12.10% and 3.03 to 6.51% for raw and processed seeds, respectively. Ether extract value for raw seeds is between 4.56 and 6.46% whereas the processed seeds range from 3.60 to 12.93%. The ash value is from 4.04 to 6.05% and 4.40 to 5.67% for raw and processed seeds respectively. Nutritional information on the proximate composition of African mesquite pulp is scanty. The crude protein for African mesquite pulp is between 10.00 to 13.83% and for crude fibre it is within

the range of 17.36 to 23.00%. The ether extract value ranged from 1.35 to 3.30% and the ash content of the pulp is from 3.00 to 6.28%.

#### **Conclusion and Applications**

1. Tree plants that serve as NCFR sometimes produce seeds that can be processed for feeding livestock as a plant protein feed resource. There is the possibility that these plants in the future may be used on a large scale in the Nigerian livestock industry.
2. There is a need for supplementation of the limiting amino acids. An overview of proximate composition shows that African mesquite is a good source of feedstuff with a great possibility of dietary inclusion for livestock, notwithstanding proper processing is required before its inclusion in the diets.
3. In essence, African mesquite can serve as a partial replacement for expensive feedstuff such as maize, soybean and groundnut cake. The use of African mesquite, a potential unconventional feedstuff will contribute to feed security because of the gradually declining supply of conventional feedstuff, and even when the conventional feed resources are available they are sometimes not affordable due their exorbitant prices, particularly in developing countries.

**Table 1: Proximate composition of African mesquite seeds and pulp**

	Dry Matter	Crude Protein	Crude Fibre	Ether Extract	Ash	References
<b>Raw Seeds (%)</b>	96.08	22.62	6.90	6.46	4.04	[17]
	85.00	27.67	10.00	6.00	5.00	[19]
	92.40	20.50	12.10	4.56	6.05	[8]
<b>Processed Seeds (%)</b>	98.10	23.60	3.30	12.80	4.40	[13]
	95.49	20.54	6.51	12.93	5.67	[3]
	94.50	22.86	11.50	3.60	4.95	[8]
<b>Pulp (%)</b>	86.00	10.00	23.00	3.30	3.00	[19]
	86.30	13.83	17.36	1.35	6.28	[20]

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