

Nutritive Value of Extracted Coconut (*Cocos Nucifera*) Meal

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Abstract: The crude protein content of extracted coconut meal (ECM) was 22.75 per cent. The lysine and methionine content of ECM were 0.59 and 0.34 per cent, respectively. The critical amino acids, lysine (0.59 per cent) and methionine (0.34 per cent) were lower in ECM compared to values given in NRC (1994) for other vegetable protein sources, which are commonly used in livestock feed like soybean meal (2.69 and 0.62 per cent) sunflower meal (1.00 and 0.50 per cent) and groundnut meal (1.54 and 0.54 per cent).

Key words: Coconut meal, proximate composition, amino acids

INTRODUCTION

The coconut plant is grown in more than 80 countries in the world. Indonesia and Philippines are the first and second largest coconut producing countries in the world. India is the third largest coconut producing country and it is cultivated in an area of about 1.78 million hectares. The world annual coconut production was 53.00 million tonnes which yielded about 1.80 million tonnes of coconut meal. India's coconut meal production was 0.28 million tonnes which was about 15.4 per cent of world production (FAO, 2004). In India, Kerala is the largest producer of coconut followed by Tamil Nadu, Karnataka and Andhra Pradesh.

Botanical name:

Family : Palmeve
Genus : *Cocos*
Species : *Cocos nucifera*

Coconut meal / Copra meal: Matured coconut kernel is called copra. The dried kernel is the chief commercial product from coconut, which is mainly used for oil extraction. Copra normally has an oil content varying from 65 to 72 per cent. Coconut meal is the residue left after the extraction of oil from the coconut kernel.

MATERIALS AND METHODS

Proximate and Amino Acid Analysis: The collected coconut meal samples were subjected to proximate

analysis as per^[1]. The amino acids content of extracted coconut meal were analyzed after sealed tube hydrolysis with 6N HCl^[9,3] in Shimadzu HPLC systems using fluorescent detector with O-phthalaldehyde dye.

Different Types of Coconut Meal: The expeller coconut meal contains more oil (8 to 12 per cent) compared to extracted coconut meal (2 to 3 per cent). Because of this reason expeller coconut meal is prone to rancidity compared to extracted coconut meal.

Expeller coconut meal



Extracted Coconut meal



RESULTS AND DISCUSSION

Proximate Composition of Coconut Meal: The coconut meal is commonly used in cow ration from 5 to 10 per cent. The addition of expeller coconut meal in cow ration reduces feed storage time and requires addition of antioxidants due to rancidity problems. Since this problem was not faced in cattle feed when extracted coconut meal was included in the feed formulation due to its reduced oil content.

The proximate composition of extracted coconut meal is given in Table 1. It contains 22.75 per cent crude protein which was very low compared to other vegetable protein sources but high in nitrogen free extract (54.84 per cent). Because of this reason production of ammonia and other nitrogen components by the rumen microbes is reduced during digestion. Coconut meal is rich in mannan oligosaccharides (MOS) which act as prebiotic for the rumen microbes and thereby helps in digestion resulting in improved milk production.

Table 1: Mean (\pm S.E) nutrient composition (% DM) of extracted coconut meal

Nutrients	Per cent
Moisture	9.54 \pm 0.10
Dry matter	90.46 \pm 0.10
Crude protein	22.75 \pm 0.22
Ether extract	2.89 \pm 0.03
Crude fibre	12.11 \pm 0.24
Total ash	7.41 \pm 0.11
Nitrogen free extract	54.84 \pm 0.32
Calcium	0.40 \pm 0.02
Total Phosphorus	0.63 \pm 0.01

Each value is a mean of 32 observations

Table 2: Mean (\pm S.E) amino acid composition (% DM) of extracted coconut meal

Amino acids	Per cent
Alanine	1.13 \pm 0.10
Arginine	1.99 \pm 0.09
Aspartic acid	1.01 \pm 0.01
Glutamic acid	2.70 \pm 0.03
Glycine	0.52 \pm 0.05
Histidine	0.44 \pm 0.27
Isoleucine	1.76 \pm 0.14
Leucine	2.36 \pm 0.05
Lysine	0.59 \pm 0.15
Methionine	0.34 \pm 0.11
Phenylalanine	0.81 \pm 0.25
Serine	0.71 \pm 0.02
Threonine	0.62 \pm 0.04
Tyrosine	0.27 \pm 0.14
Valine	0.44 \pm 0.12

Each value is a mean of 32 observations

Amino acids	Creswell and Brooks ^[2]	NRC ^[5]
Alanine	0.81	-
Arginine	1.96	1.97
Aspartic acid	1.62	-
Cystine	0.24	0.28
Glycine	0.89	0.82
Glutamic acid	3.64	-
Histidine	0.41	0.36
Hydroxyproline	0.05	-
Isoleucine	0.60	0.63
Leucine	1.21	1.18
Lysine	0.48	0.50
Methionine	0.37	0.28
Phenylalanine	0.81	0.88
Proline	0.71	-
Serine	0.96	0.79
Threonine	0.66	0.58
Tryptophan	-	0.12
Tyrosine	0.46	0.44
Valine	0.89	0.91

* Per cent dry matter basis

** Per cent as such basis

The nutrient composition (per cent) of coconut meal collected from literatures are given below:

Nutrients	Creswell and Brooks ^[2]	Panigrahi <i>et al.</i> ^[7]	Sarkar and Banerjee ^[8]	Panigrahi ^[6]	NRC ^[5]
Crude protein	20.90	22.93	26.23	17.26	19.20
Crude fibre	10.50	7.65	10.61	10.39	14.40
Crude fat	5.80	2.20	1.85	2.05	2.10
Calcium	0.16	0.07	-	0.05	0.17
Total phosphorus	0.55	0.57	-	0.44	0.65
Nitrogen free extract	46.20	51.57	53.99	55.96	-
Total ash	6.50	7.65	7.32	4.67	-

* Values on dry matter basis

Nutraceutical Benefits of Coconut Meal: Ether extract (2.89 per cent) in coconut meal is rich in short and medium chain fatty acids. Shorter chain length allows fatty acids to be metabolized without use of carnitine transport system. These short and medium chain fatty acids were found to have remarkable physiological nutraceutical benefits such as antihistamines, antiseptics

and promoters of immunity. The cow fed with coconut meal have more chances to excrete these fatty acids in milk (Nutraceutical milk).

Amino acid Composition of Coconut Meal: The analyzed values of amino acids (Mean \pm S.E) in 32 samples of extracted coconut meal are given in table 2

Most of the amino acids in coconut meal were comparable to other vegetable oil meals but methionine was low compared to groundnut oil cake and lysine was low compared to soybean meal. The amino acid composition (per cent) of coconut meal given by Creswell and Brooks^[2] and NRC^[5] are mentioned below for comparison with analyzed samples. The variation in amino acid composition between observed values and literature values might be due to difference in breed and variety of coconut from which oil cake was prepared.

The glutamic acid and arginine content were high in coconut meal in which arginine react with lysine and reduces its availability^[4]. Supplementation of lysine and methionine is needed when extracted coconut meal was included in the compounded cattle feed to get more milk yield.

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