# PROXIMATE ANALYSIS, MINERAL AND AMINO ACID PROFILES OF DEOILED RAPESEED MEAL

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## ABSTRACT

Commercially available rapeseed meal (RSM) samples were collected from in and around Namakkal, TamilNadu and analysed for their chemical composition, mineral content and amino acid profile before inclusion in poultry feed to know their nutritive value. Mean crude protein, ether extract and crude fibre contents of commercially available rapeseed meal (RSM) on dry matter basis were found to be  $34.92 \pm 3.33$ ,  $1.10 \pm 0.06$  and  $9.14 \pm 0.25$  %, respectively. Total ash, acid insoluble ash and nitrogen free extract contents of RSM were estimated to be  $7.12 \pm 0.12$ ,  $0.77 \pm 0.02$  and  $38.47 \pm 0.25$  %, respectively. Calcium, total phosphorous and magnesium contents of RSM were estimated to be  $1.08 \pm 0.73$ ,  $0.68 \pm 0.12$  and  $0.55 \pm 0.45$  % and RSM was also found to be a good source of trace minerals like manganese, zinc, copper and iron based on their estimation. RSM was found to be a fairly good source of amino acids with 2.12% lysine and 0.70 % methionine content. Arginine, leucine, threonine, histidine and phenylalanine contents of RSM were estimated and found to be 2.11, 2.55, 1.61, 1.00 and 1.43 % respectively.

Key Words: Rape Seed Meal – Proximate Analysis – Mineral and Amino Acid Profile

#### **INTRODUCTION**

Deoiled Groundnut Cake (GNC) is the one of the most commonly used poultry feed ingredient in India. Though high in protein, GNC is a poor source of essential amino acids like lysine and methionine; but invariably infested with *Aspergillus* sp., which will produce aflatoxins under favourable conditions. A suitable alternate to GNC in poultry feeding, therefore needs to be identified. In this circumstance, Deoiled Rape Seed Meal (RSM) appears to be a potential source of replacing GNC in poultry rations.

Deoiled rapeseed meal (RSM) is the material left after the extraction of oil from rapeseed. In common industrial processing, the oil is extracted using organic solvent like hexane to effect the maximum extraction. The amino acid content of rapeseed meal is comparable well with that of soya bean meal and richer in methionine (Clandinin, 1967). RSM is also fairly rich in mineral content particularly calcium and phosphorus.Before incorporating deoiled rapeseed meal (RSM) in poultry ration, they should be analysed for their proximate composition viz. total dry matter, crude protein, crude fibre, total ash etc, various mineral and amino acid profiles to know their nutritive value.

Hence, this study with commercially available RSM samples collected from different sources will be useful to asses their nutritional value for inclusion in poultry feed.

#### MATERIALS AND METHODS

Deoiled rapeseed meal samples collected from various commercial feed manufactures of livestock and poultry at Namakkal, TamilNadu, India were analysed for their proximate composition and mineral profile at Animal Feed Analytical and Quality Control Laboratory, Namakkal and Institute of Animal Nutrition, Kattupakkam, various units of Tamil Nadu Veterinary and Animal Sciences University, India. At Central Institute of Brackish water Aquaculture (CIBA), Chennai, the amino acid assay of RSM was carried out.

## **Research Article**

The RSM samples were analysed for their total dry matter, crude protein, crude fibre, ether extract and total ash content and mineral profile viz. calcium, phosphorous, iron, copper, manganese, magnesium and zinc contents according to AOAC methods (1990). Amino acid analysis was carried out in Shimadzu HPLC using fluorescent detector with O- pthalaldehyde dye (Finalyson, 1964).

## RESULTS

#### **Proximate Chemical Analysis**

Proximate chemical composition of RSM estimated is presented in Table 1.

RSM contained mean crude protein of 34.92 % and hence appeared to be a moderately good source of protein. Mean ether extract content was low at 1.10 % whereas, crude fibre content was not so high. Total ash content of RSM was found to be 7.12 % among which contribution of acid insoluble ash was only 0.77 % indicating that it is a good source of minerals.

Tuble IT Estimated Chemical Composition of Roll				
Chemical Composition	Level – DM basis (%)			
Chemical Composition	$(Mean^* \pm SE)$			
Total Dry Matter	$90.75 \pm 0.72$			
Crude Protein	$34.92 \pm 3.33$			
Ether Extract	$1.10 \pm 0.06$			
Crude Fibre	$9.14 \pm 0.25$			
Total Ash	$7.12 \pm 0.12$			
Nitrogen Free Extract	$38.47 \pm 0.25$			
Acid Insoluble Ash	$0.77 \pm 0.02$			
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#### **Table 1: Estimated Chemical Composition of RSM**

\*Mean of 10 observations

#### Mineral composition

Major minerals like calcium, phosphorous and magnesium and minor minerals like manganese, zinc, copper and iron contents of RSM were estimated in the samples collected and the results are presented in table 2.

Minoval	Level – Dry matter basis	
Mineral	$(Mean \pm SE)$	
Major minerals (g/100g)		
Calcium	$1.08 \pm 0.73$	
Phosphorus	$0.68 \pm 0.12$	
Magnesium	$0.55 \pm 0.45$	
Trace minerals (mg/kg)		
Manganese	$67.15 \pm 4.25$	
Zinc	$48.00 \pm 4.52$	
Copper	$18.42 \pm 5.22$	
Iron	$345.00 \pm 12.02$	

#### Table 2: Estimated mineral composition of RSM

RSM was found to contain 1.08% calcium, 0.68% phosphorous and 0.55% magnesium and also moderately high quantities of micro-minerals.

## Amino acid profile

Amino acid composition of RSM was analysed and the results are given in table 3. RSM was found to be a good source of lysine (2.12%) and methionine (0.7%), the critical amino acids for poultry.

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Table 5: Allino aciu profile of KSW					
Amino acid	Level– DM basis (%)	Level – Protein basis (%)	Level in GNC-DM (%)*		
Aspartic acid	2.10	7.68			
Threonine	1.61	5.88	1.24		
Serine	1.98	7.24	2.25		
Glutamic acid	2.14	7.82			
Proline	1.31	4.79			
Glycine	2.58	9.33	2.67		
Alanine	1.69	6.10			
Valine	1.83	6.79	1.87		
Methionine	0.70	2.55	0.54		
Isoleucine	1.41	5.18	1.55		
Leucine	2.55	9.32	2.97		
Tyrosine	0.80	2.92	1.80		
Phenylalanine	1.43	5.23	2.41		
Histidine	1.00	3.66	1.07		
Lysine	2.12	7.75	1.54		
Arginine	2.11	7.76	5.33		

## Table 3: Amino acid profile of RSM

\* NRC (1994)

#### DISCUSSION

#### **Proximate Chemical Analysis**

Mean crude protein (%) content of RSM samples obtained was  $34.92 \pm 3.33$  which was lower than those reported by many other authors (Blair *et al.*, 1986 and Verma and Banday, 1997). However, Vogt *et al.*, (1967) and Garcha *et al.*, (1976) reported comparatively lesser crude protein in RSM. The variation observed could be because of the variety of RSM raised and the differences in sampling adopted, influence of season of harvest etc.

Mean ether extract content of RSM samples was also low compared to many other authors (Garcha *et al.*, 1976 and Prasad, 1977). However, Sadagopan *et al.*, (1982) and Verma and Banday (1997) observed comparable values.

Mean crude fibre content of RSM samples was  $9.14 \pm 0.25$  % which was also found to vary among reports of different authors (Blair *et al.*, 1986 and NRC, 1994). Variations due to hulling procedure and time, variety etc., would have contributed to these differences. Compared to NRC (1994) values for solvent extracted ground nut cake, crude protein content of RSM samples was found to be much lower (50.70 Vs 34.92%) while ether extract and crude fibre contents were almost equal (1.2 vs 1.1 and 10.00 and 9.14% respectively).

#### Mineral Composition

RSM was found to be a very good source of some macro-minerals and trace minerals even though it is not employed as a mineral source in poultry diets. Based on figures of NRC (1994), RSM samples in this experiment were found to contain higher levels of all minerals estimated compared to GNC and Soya bean oil meal (SBOM).

Calcium content of RSM compared to that of GNC and SBOM was 1.08, 0.20 and 0.29 % respectively and the total phosphorous content 0.68, 0.13 and 0.27 % and Magnesium 0.55, 0.04 and 0.27 %. Respective figures for trace minerals like Manganese were 67, 29 and 29 mg/kg, Copper 18.42, 15 and 22 mg/kg, Zinc 48, 20 and 40 mg/kg and Iron 345, 142 and 120 mg/kg.

Even though variations in content of minerals in RSM were reported (Bell and Jaffers, 1976 and Nwokolo and Bragg, 1976), several authors have authenticated that RSM is a good source of minerals, especially the major minerals (Prasad, 1977 and Sadagopan *et al.*, 1982).

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#### Amino acid profile

Amino acid composition of RSM indicated that it is a better source of lysine and methionine compared to groundnut oil cake (NRC, 1994). However, arginine, serine, leucine, phenylalanine and tyrosine contents were found to be lower in RSM than in GNC.

Clandinin (1967) and Jackson (1969) also indicated that RSM is a good source of methionine. However, Jackson (1969) indicated lower availability of essential amino acids in RSM as compared to Soya bean meal. While Jackson (1969) reported only 71% availability for lysine in RSM, Nerilo *et al.* (1996) observed the availability of methionine in rapeseed to be only 21.88%.

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