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Chemical composition of decorticated tamarind seed meal

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ABSTRACT

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Decorticated tamarind seed meal (DTSM) a by-product of tamarind pulp industry had the following nutrient content (%), crude protein -16.58, crude fibre -2.27, ether extract -7.84, total ash -3.59, calcium 0.34, phosphorous-0.29, methionin-0.17, nicotinic acid -0.17mg/g, nicotinamide -0.84 mg/g, pantothenate-11.14 mg/g and tannin 0.40%. The digestibility % of nutrient in the TSM was 75.01, 43.13,15.16, 47.60 and 18.55 for ether extract, NDF, ADF, hemicelluloses and cellulose respectively. The metabolizability of protein and energy are 59.36 % and 2712 Kcal/kg.

Key words: Decorticated tamarind seed meal- chemical composition

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INTRODUCTION

The need to explore alternative feed ingredients has gained much attention because of rising cost of conventional feedstuffs and deficit supply. Large amount of agro industrial by-products are produced annually and generally they wasted because of lack of knowledge concerning the nutritive value and needed machinery to process them. Reducing the feed cost can be achieved by the inclusion of cheaper unconventional feedstuffs, which are fairly rich in energy and protein.

One such unconventional feedstuff is decorticated tamarind seed meal (DTSM). DTSM is a by-product of tamarind pulp industry. The annual production of tamarind seed in India is estimated to be 0.132 million tonnes (Narahari, 1997).

The tamarind seeds contain 30-35 % of red hulls and 65-70 % of white kernels: the undecorticated seed contains 22.5% crude fibre and 2450 Kcal of ME/kg (Narahari, 1997b). Information on the chemical composition of decorticated tamarind seeds is limited except for its proximate composition (Ramesh, 1994; Kumararaj *et al.,* 1981; Ravi, 2000).

MATERIALS AND METHODS

Chemical composition

Ten samples of DTSM collected from different sources were subjected for proximate analysis as per the method of AOAC, (1990), fibre fractionation, (Goering and Vansoest 1970) phytate phosphorous (Haug and Lantzsh 1993), Methionine (Horn *et al.,* 1946). B complex vitamins using HPLC as described in Shimadzu manual 1995 and tannin (Porter *et al.*, 1986).

Digestibility and metabolizability of TSM

The metabolizability trials on DTSM were conducted with eight cockerels. The birds were fasted for 48 hrs, then they were force-fed with the test materials (50 g DTSM per bird) and the excreta was collected on 24 hours after feeding.. The collected excreta and the DTSM samples were analyzed for gross energy, dry matter, crude protein, ether extract, and fiber fractions adopting standard procedures. The apparent metabolizable energy, the digestibilities of dry matter, ether extract and metabolizability of protein were estimated.

RESULTS AND DISCUSSION

Proximate and chemical composition of DTSM

The proximate composition, fibre fractions, tannin and vitamin B Complex contents of the DTSM are presented in Table 1.The mean crude protein in the DTSM was 16.58% and it varied from 15.28 to 18.30%. The crude protein content of samples analyzed in the study is in consistent with the earlier reports of Reddy and Reddy (1978), Kumararaj *et al.* (1981), Ramesh (1994), Lockett *et al*. (2000) and Ajayi *et al*.

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Table 1. Nutrient composition and tannin levels* (%) in DTSM

Particular	Mean ± SE	Minimum	Maximum
Moisture	6.42±0.34	5.9	7.0
Crude protein	16.58±0.86	15.28	18.30
Crude fibre	2.27±0.64	1.38	3.71
Ether extract	7.84±1.28	4.68	9.17
Total ash	3.59±0.32	3.1	4.2
Acid insoluble ash	0.57±0.23	0.24	1.0
NFE	63.30±1.38	61.71	65.84
Calcium	0.34±0.07	0.25	0.49
Phosphorous	0.29±0.02	0.25	0.33
Phytate Phosphorous	0.07±0.02	0.05	0.10
Methionine	0.17±0.01	0.15	0.20
Vitamin B complex (mg/g)			
Nicotinic Acid	0.17		
Nicotinamide	0.84		
Pantothenate	11.14		
Fibre fractionation			
1. NDF	44.38±5.91	33.33	54.04
2. ADF	11.09±0.92	10.05	13.07
3. Hemicellulose	33.37±5.52	22.50	40.96
4. Cellulose	7.64±1.30	4.48	8.90
5. Lignin	4.04±1.18	2.98	6.42
Tannin			
DTSM	0.40±0.04	0.34	0.47
Tamarind hulls	11.05±0.31	-	-

*Mean of ten samples

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(2006). The crude fibre content of DTSM ranged between 1.38 and 3.71% with a mean of 2.27. The results were in agreement with most of the earlier reports (Reddy and Reddy, 1978; Bhattacharya *et al.,* 1994; Ramesh, 1994; Ravi *et al.,* 2000). While, Kumararaj *et al.* (1981) , Narahari (1997), Lockett *et al*. (2000) and Ajayi *et al*. (2006) observed higher values (9.38, 9.1, 16.73 and 18.00%, respectively).

The ether extract content varied from 4.68 to 9.17 %, with an average value of 7.84% and were comparable with the values reported by Kumararaj *et al.* (1981), Panigrahi *et al.* (1989), Bhattacharya *et al.* (1994), Narahari (1997), Shankaracharya (1998). Whereas, lower values were reported by Reddy and Reddy (1978), Sahu *et al.* (1982), Ravi *et al.* (2000) and Lockett *et al*. (2000) which ranged from 1.52 to 3.89%.

The NFE content of TSM ranged from 61.71 to 65.84% with a mean of 63.30%. The range observed in this study was comparable to the values reported by various researchers (Ramesh, 1994; Bhattacharya *et al.,* 1994; Siddhuraju *et al.,* 1995; Narahari, 1997; Shankaracharya, 1998 , Ravi *et al.,* 2000 and Lockett *et al*. 2000). While lower value (38.27%) was reported by Ajayi *et al*. (2006). The total ash content varied from 3.10 to 4.20 % with a mean value of 3.59 %. The value in this study are in agreement with the authors (De, Marangoni *et al.,* 1988; Ramesh, 1994; Ravi *et al.,* 2000; Lockett *et al*., (2000) . Whereas, Panigrahi *et al.* (1989) and Ajayi *et al*., (2006) reported 1.97% and 1.5 % of total ash, respectively. The acid insoluble ash value varied very little (0.24 to 1.00%) which indicates that contamination with sand is minimal.

The estimated values of calcium and total phosphorous and available phosphorous, phytate phosphorous are presented in Table 1. The calcium and phosphorous contents in TSM were comparable to the values observed by Shankaracharya (1998). But, Reddy and Reddy (1978) and Sahu *et al.* (1982) reported higher levels of calcium (0.53 and 0.7%, respectively) and phosphorous (0.70 and 0.5%, respectively). However, Panigrahi *et al.* (1989) observed lower values of 0.17 and 0.18% for calcium and phosphorous respectively in roasted undecorticated tamarind seed meal. The percentage of phytate phosphorous in TSM was 24 %.

The methionine, B vitamins and tannin content in the TSM are presented in Table 1. The mean methionine level 91.06 g / 100g of protein agrees with that of Panigrahi *et al.*. (1989), while De Lumen *et al.* (1986) have reported a higher value (1.8 g/100 g of protein). Of the B complex vitamins, only nicotinic acid, nicotinamide and pantothenate were within detectable limits and the values were 0.17 , 0.84 and 11.14 mg/g, respectively The tannin content of DTSM varied between 0.34 and 0.47%, with a mean value of 0.40%. The results are lower than the report of Panigrahi *et al.* (1989) who observed the tannin content of boiled decorticated tamarind seed as 0.76% , Ramesh (1994) observed a very low level (0.13%) in roasted decorticated tamarind seed. But, Kumararaj *et al.* (1981) and Narahari (1997) have reported higher values (2.28 and 2.8%, respectively).

The results of fibre fractions of TSM are given in Table 1.The mean NDF and ADF values of TSM was 44.38 and 11.09%.The estimated values of hemicelluloses, cellulose and lignin contents were 33.37 (22.5-40.96), 7.64 (4.48-8.90) and 4.04% (2.98-6.42), respectively. Comparing the non starch polysaccharides in DTSM with that of maize, it was found that DTSM contained nearly four times more of NDF, ADF, hemicelluloses, cellulose and lignin than that of maize. The

NDF, ADF and hemicelluloses, (%) in maize, sorghum and pearl millet are 2.4, 11.7 and 2.8 ; 10.9, 5.9 and 5.0 and 18, 6 and 12, respectively NRC. (1994).

Biological Trials

Nutrient digestibility and metabolizability of DTSM

The mean values of digestibilities of dry matter, ether extract, NDF, ADF, hemicelluloses, cellulose and metabolizability of crude protein of TSM in cockerels are given in Table 2.

Table 2. Nutrient digestibility/metabolizability of decorticated tamarind seed meal in cockerels

Nutrient	Digestibility/metabolizability (%)
Dry matter	61.54±2.53
Ether extract	75.01±1.60
Protein (Metabolizability %)	59.36±2.35
NDF	43.13±5.07
ADF	15.16±2.56
Hemicellulose	47.60±3.96
Cellulose	18.55±3.73
Metabolizable energy Kcal/kg	2712±49.20

The digestibility of ether extract (75.01%) was comparatively higher than the digestibility of other nutrients. The higher digestibility of hemicelluloses (47.60%) indicates that the hemicelluloses portion of DTSM was more available for break down compared to cellulose (18.55%). The protein metabolizability was low. The metabolizable energy value of DTSM was 2712 Kcal/kg. The value was quite similar to the value reported by Kumararaj *et al.* (1981).

The higher level of NSPs could have contributed to the lower digestibility of dry matter and low metabolizability of protein. This confirms the observation of Panigrahi *et al.*, (1989) who reported that low nutritive value of tamarind seeds, which may be attributed to the presence of NSPs rather than its tannin content.

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