

CHEMICAL COMPOSITION OF OILSEED CAKES AND DEOILED CAKES IN NEPAL

N. K. SHARMA

Tribhuvan University, Institute of Agriculture and Animal Science, Nepal

*E-mail: nishchalks@gmail.com; nischal.sharma@nimbusnepal.com

Corresponding Address: Dr. Nishchal Kumar Sharma; Probiotech Industries Pvt. Ltd, Kathmandu, Nepal

ABSTRACT: A study was conducted at Probiotech Industries laboratory from March 2011 to September 2012 A.D to access the qualities of MCs (Mustard cakes), MDOCs (Mustard deoiled cakes) and SDOCs (Soy deoiled cakes) available in different parts of Nepal. Oilseed cakes and deoiled cakes commonly used in livestock and poultry feed in Nepal are MC, MDOC and SDOC. Laboratory findings showed wide variation in chemical composition of these feed ingredients. Mustard Cake contained 91.42% dry matter (DM), 30.12% crude protein (CP), 5.98% crude fibre (CF), 9.29% ether extract (EE), 6.73% total ash (TA) and 1.58% acid insoluble ash (AIA). Mustard deoiled cake varied greatly in DM content ranging from 84.42% to 94.76% with a mean value of 89.84% DM. The mean CP, CF, EE, TA and AIA content in MDOC was 35.65%, 10.28%, 0.69%, 7.61% and 1% respectively. The mean DM content in SDOC was 87.24% but it ranged from 6.23% to 19.26%. Soy deoiled cake contained 44.85% CP, 7.16% CF, 1.03% EE, 7.74% TA and 1.49% AIA on an average though there was marked variation in these parameters. About 32.6% of SDOC samples contained CP above 46%. Since there is quite variation in composition of these oilseed cakes and DOCs, it is suggested that the feed millers and nutritionists of Nepal test each samples before using it for feed formulations.

ORIGINAL ARTICLE

Key words: Mustard Cake, Mustard Deoiled Cake, Soy Deoiled Cake, Nutrient Composition, Quality

INTRODUCTION

Nepal is self-sufficient in poultry products and poultry feeds, but it still relies heavily on raw materials such as grains and protein meals from India (Sharma, 2012). Protein meals such as oilseed cakes and deoiled cakes commonly used in livestock and poultry feed in Nepal are mustard cake (MC), mustard deoiled cake (MDOC) and soy deoiled cake (SDOC). Nepal imports hundred percent soybean seeds from India and there are three solvent extraction plants in Nepal that crush soybean and mustard seeds to produce de-oiled cakes (DOCs) and crude oil for the local market (Sharma, 2012). About 30 to 40 percent of mustard cakes are locally produced from these crushing industries. All the crushing plants in Nepal use solvent extraction method for producing deoiled products. These locally produced oilseed cakes and DOCs are not enough to meet the total daily requirements to make compound feeds for livestock and poultry. So, a large volume of oilseed cakes and DOCs are imported from India (Sharma, 2012)

The oilseed cakes and DOCs available in Nepali market may vary in chemical composition due to varietal differences, varying sources, different processing conditions, adulteration with similar ingredients with little nutritive value, adulteration with sand silica, hulls, etc. Very few crushing industries, suppliers or traders provide reliable information to the farmers and feed industries regarding nutrient composition of these products. Only limited information on composition of oilseed cakes has been documented (Tiwari et al., 2006 and Upreti, 2006). There is therefore an urgent need to access the actual nutritive values of these oilseed cakes and DOCs available in the market.

The aim of the study was to assess the nutritional composition of MCs, MDOCs and SDOCs available in different parts of Nepal.

MATERIALS AND METHODS

Sampling Method

Samples of mustard cakes (31), mustard DOCs (43) and soy DOCs (136) were collected in a polythene bag from crushing plants, traders and suppliers from various parts of Nepal between March 2011 to September 2012



A.D and sent to Probiotech Industries Pvt. Ltd. Birjung laboratory for analysis. The samples were ground and measured in a small cuvette using MPA-FT-Near Infrared Reflectance Spectrometer (NIRS) in the 12,500-4,500 nm wavelength range to determine moisture contents, dry matter (DM), crude protein (CP), ether extract (EE), crude fibre (CF), total ash (TA), nitrogen free extract (NFE) and sand silica (SS) contents. Calibration databases used in NIRS included enough samples from all over Nepal to cover most of the possible spectral variability encountered during routine analysis.

Statistical Analysis

The data generated through NIRS were compiled using Microsoft Excel 2007 and analysis of these data was carried out by using descriptive statistics tool available in MS Excel 2007.

RESULTS AND DISCUSSION

The chemical composition of MC, MDOC and SDOC are presented in Table 1. There were wide variation in nutrient contents of MC, MDOC and SDOC. Crude protein content in mustard cake was more and CF content was almost half than that reported by Tiwari et al. (2006). He again reported 27.48 CP%, 91.88 DM%, 8.72 TA% and 11.60 CF% in mustard cake. Oil content in mustard cake was below 10% whereas acid insoluble ash as high as 3.23% was recorded with a mean value above 1.5%.

Table 1 - Chemical composition of mustard cake and deoiled cakes (% as fed basis)

Composition		Mustard Cake	Mustard DOC	Soy DOC
Number of Samples		31	43	136
DM	Minimum	90.03	84.42	80.74
	Maximum	93.46	94.76	93.77
	Mean	91.42	89.84	87.24
	SE	0.16	0.30	0.18
CP	Minimum	27.32	33.54	39.07
	Maximum	34.31	36.97	48.37
	Mean	30.12	35.65	44.85
	SE	0.28	0.14	0.18
CF	Minimum	4.40	9.68	4.29
	Maximum	7.85	11.55	11.41
	Mean	5.98	10.28	7.16
	SE	0.16	0.15	0.10
EE	Minimum	8.12	0.30	0.07
	Maximum	11.20	0.99	3.58
	Mean	9.29	0.69	1.03
	SE	0.18	0.02	0.03
TA	Minimum	5.79	6.48	4.69
	Maximum	8.37	9.63	11.56
	Mean	6.73	7.61	7.74
	SE	0.10	0.12	0.09
NFE	Minimum	34.03	30.21	21.08
	Maximum	40.52	38.35	31.80
	Mean	37.39	33.68	26.34
	SE	0.30	0.57	0.19
AIA (Sand/Silica)	Minimum	0.16	0.40	0.24
	Maximum	3.23	1.93	4.34
	Mean	1.58	1.00	1.49
	SE	0.15	0.06	0.07

Note: DM- dry matter, CP- crude protein, CF- crude fibre, EE- ether extract, TA- total ash, NFE- nitrogen free extract, AIA- acid insoluble ash, DOC- deoiled cake

Mustard deoiled cake varied greatly in moisture content ranging from 5.24% to 15.58%. The mean CP content in MDOC was 35.65% and oil content was recorded less than 1% in all the samples. Mean AIA in MDOC was 1% and the maximum value recorded was below 2%.

There was wide variation in nutrient content of SDOC. Moisture content ranged from 6.23% to 19.26%. However, only 4.35% of the samples contained moisture above 16% and 26% of the samples contained moisture above 14%. Below 12% moisture content was recorded in 24.63% of the samples. Recommended moisture level in raw materials is usually below 10% or 12%. Similarly, 32.6% of the samples contained CP above 46% and CP was found in the range of 44 to 46% in 34% of the samples. However, only 34% of the samples contained CP equal to or more than the value given by NRC, (1994) of 44% for solvent extracted SDOCs with hulls. Less than 44% CP was found in 33.4% of the samples.

The mean crude fibre content in SDOC was found to be 7.16% which is higher than that reported by NRC (1994) of 7% in solvent extracted SDOC with hulls. In current findings, 50.37% of the samples contained CF above



7% and 49.63% of samples contained CF below 7%. Crude fibre below 6% and above 8% was found in 13.33% and 17.03% of the samples respectively. Acid insoluble ash as high as 4.34% was recorded in SDOC. Acid insoluble ash above 1.5% was recorded in 44.45% of the samples and above 2% was found in 19.26% of the samples. Only 28.14% of the samples contained AIA below 1%.

CONCLUSION

There was a wide variation in chemical composition and quality of oilseed cakes and DOCs found in Nepal. Low protein and high crude fibre content in most of the SDOC samples is due the presence of hulls. Since there is quite variation in composition of these oilseed cakes and DOCs, it is suggested that the feed millers and nutritionists of Nepal test each samples before using it for feed formulations.

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