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TRUE METABOLIZABLE ENERGY AND APPARENT METABOLIZABLE ENERGY CONTENTS OF SESAME OIL CAKE (*Sesamum indicum*) IN ROOSTERS

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Abstract: A study was carried out to analyze the sesame oil cake test sample for their chemical composition and to estimate the true and apparent metabolizable energy contents of sesame oil cake using roosters. The per cent dry matter, crude protein, ether extract, crude fibre, nitrogen free extract, total ash, acid insoluble ash, calcium and phosphorus content of sesame oil cake test sample were 94.26, 33.20, 9.92, 7.80, 37.04, 12.04, 0.51, 2.29 and 1.05, respectively. The lysine and methionine content (g/16 g N) of sesame oil cake test sample were 2.27 and 2.55, respectively. The per cent free fatty acid, sodium chloride and oxalate content of sesame oil cake test sample were 1.84, 0.65 and 4.21, respectively. The sesame oil cake test sample contained traces of aflatoxin. The true metabolizable energy (TME) and apparent metabolizable energy (AME) content of sesame oil cake test sample were 2955.2 kcal/kg and 2688.9 kcal/kg, respectively. Based on the present results, it is concluded that sesame oil cake is a potential vegetable protein and energy supplement for poultry.
Keywords: Sesame oil cake, True metabolizable energy, Apparent metabolizable energy, Roosters.

INTRODUCTION

The nutrient composition of sesame meal varies widely depending on the variety used, the degree of decortication and the processing method employed (Lease and Williams, 1967; Johnson *et al*., 1979). Various methods of processing of sesame oil cake has been found to affect the nutrient quality. The decorticated or undecorticated sesame seeds are processed for extraction of oil by ghani, rotary, expeller or solvent extraction methods. Ravindran (1990) observed that the solvent-processed meals contained slightly higher protein (45%) and lower fat (1%) levels than those produced by expeller extraction which correlated with the findings of Mamputu and Buhr (1995), who reported that sesame meal processed by screw-press methods contained higher levels of oil and lower levels of protein than sesame meal processed by solvent-extraction.

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Hasan and Khandaker (2000) estimated the metabolizable energy value of ghani cake to be 1650 kcal/kg. The ISI (1980) specification revealed that the metabolizable energy value of 1882 kcal/kg for expeller cake, which was far below the values reported in NRC (1994) (2376 kcal/kg) and Mamputu and Buhr (1995) (2500 kcal/kg). The metabolizable energy in deoiled sesame oil cake was found to be 2660 kcal/kg by Pathak and Kamra (1989). On the contrary, Robert Swick (2001) and Mehta (2000) reported a lower value of 1930 and 2250 kcal/kg, respectively in sesame oil cake. In view of the above, the present work was undertaken to analyze the chemical composition and to estimate the true metabolizable energy (TME) and apparent metabolizable energy (AME) content of sesame oil cake (*Sesamum indicum*) in roosters.

MATERIALS AND METHODS

The sesame oil cake test sample for conducting biological trial was procured in bulk locally. The samples were ground and used for analysis. The chemical analysis and biological experiment in roosters were carried out in the Department of Animal Nutrition, Veterinary College and Research Institute, Namakkal, following the standard procedures to assess the nutritive value of sesame oil cake.

Chemical composition

The sesame oil cake test sample was analyzed for the chemical composition *viz*., crude protein, crude fibre, ether extract and total ash as per the methods of AOAC (1990). The nitrogen free extract was calculated by difference. All the values were expressed as per cent dry matter basis. The calcium, phosphorus and sodium chloride contents were estimated as per the methods of AOAC (1990). The amino acids namely lysine and methionine were estimated as per the methods of Sadasivam and Manickam (1992). Aflatoxin B_1 was estimated quantitatively by Romer (1975) method. The oxalate and free fatty acid contents were analyzed as per the method of Abaza *et al*. (1968) and AOAC (1990), respectively.

True metabolizable energy

The true metabolizable energy content of sesame oil cake test sample was estimated in roosters (21 week-old) as per the method of Sibbald (1976). A total of sixteen roosters were randomly divided into two groups of eight birds each and housed in an individual metabolic cages. Both the groups were fed with test material *ad libitum* for three days for adaptation. Then the birds were starved for 24 h.

Each bird in the first group was fed with 50 g of test material. The other group was kept as control to calculate the endogenous loss. The excreta for 24 h period in both the

groups were collected, thoroughly homogenized, weighed and dried in a hot air oven at 80^0C for 24 h and the dry matter was estimated. The calorific values of sesame oil cake as well as the excreta were assayed in an adiabatic bomb calorimeter adopting the standard procedure.

The analyzed values were used to arrive at the true metabolizable energy content of the sample using the following formula:

TME (kcal/g air dry) = ((Gef × X) – (Yef – Yec)) / X

Where, Gef is the gross energy of the feeding stuff (kcal/g); Yef is the total gross energy voided in the excreta by the fed bird (kcal); Yec is the total gross energy voided in the excreta by the unfed bird (kcal); X is the weight of the feed (g).

Apparent metabolizable energy

The apparent metabolizable energy content of sesame oil cake test sample was calculated using the following formula:

AME (kcal/g air dry) = ((Gef × X) – Yef) / X

Where, Gef is the gross energy of the feeding stuff (kcal/g); Yef is the total gross energy voided in the excreta by the fed bird (kcal); X is the weight of the feed (g).

Statistical analysis

Data collected during the investigation were subjected to statistical analysis as per Snedecor and Cochran (1989).

RESULTS AND DISCUSSION

Chemical composition

The chemical composition of sesame oil cake taken for this study was presented in Table 1. Sesame oil cake test sample contained 94.26, 33.20, 9.92, 7.80, 37.04 and 12.04% of dry matter, crude protein, ether extract, crude fibre, nitrogen free extract and total ash, respectively. The acid insoluble ash content of sesame oil cake was 0.51%. It was observed that the dry matter, crude fibre and total ash content of the test sample taken for this study was within the range reported by early workers (Pathak and Kamra, 1989; Chand *et al*., 1991; Mamputu and Buhr, 1995; Hasan and Khandaker, 2000; Mehta, 2000; Robert Swick, 2001). However, the crude protein content of sesame oil cake was lower and ether extract and nitrogen free extract were higher as compared to the values reported by earlier workers.

The sesame oil cake contained 2.29% calcium and 1.05% phosphorus. The calcium and phosphorus content estimated in the present study was similar to that of sesame oil cake reported in literatures (Pathak and Kamra, 1989; Mamputu and Buhr, 1995). The sesame oil cake contained 2.27 (g/16 g N) lysine and 2.55 (g/16 g N) methionine. The lysine and

methionine content of sesame oil cake observed in this study were within the range reported by Pathak and Kamra (1989) and Robert Swick (2001). The free fatty acid, sodium chloride, aflatoxin and oxalate content of sesame oil cake was 1.84%, 0.65%, traces and 4.21%, respectively.

Metabolizable energy

The true metabolizable energy content of sesame oil cake ranged from 2632.7 to 3346.9 kcal/kg with a mean of 2955.2 kcal/kg (Table 2). Similarly, apparent metabolizable energy content of sesame oil cake ranged from 2448.7 to 3100.6 kcal/kg with a mean value of 2688.9 kcal/kg. The mean true metabolizable energy and apparent metabolizable energy of sesame oil cake observed in this study was higher than the values reported by earlier workers (Pathak and Kamra, 1989; Hasan and Khandaker, 2000; Mehta, 2000; Robert Swick, 2001). The higher true metabolizable energy and apparent metabolizable energy value observed in this study might be due to presence of the higher level of nitrogen free extract and ether extract content of sesame oil cake.

CONCLUSION

Sesame oil cake with 33.20% crude protein, 9.92% ether extract, 2.27 (g/16 g N) lysine, 2.55 (g/16 g N) methionine and 2955.2 kcal/kg of true metabolizable energy is a potential vegetable protein and energy supplement for poultry.

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