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Nutrient Analysis of Some Poultry Feedstuffs Locally Available in Manipur, India

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Abstract: The present study was conducted to investigate the chemical composition of six different feed ingredients of poultry viz. maize flour, rice bran, rice polishing, oil cake, fish waste and snail meat which are locally available ingredients in the market of Manipur and analysed for protein, lipid, carbohydrate, crude fibre, moisture and ash content. From the analysis of the feedstuffs, it revealed that the highest crude protein was found in fish waste (49.06±0.41%) and lowest in maize flour (10.93±0.03%). Lipid content varied from 21.80±0.21% in fish waste to 5.06±0.21% in maize flour. Values of carbohydrate ranged from a maximum of 82.46±0.42% in rice polishing to a minimum of 10.23±0.20% in fish waste. Maize flour exhibited the highest percentage crude fibre content (9.03±0.27) while the local fish waste gave the least value (1.00±0.11). Moisture content varied from 15.06±0.44% in rice bran to 5.56±0.12% in fish waste. In case of Ash content it varied from 24.00±0.11% in snail meat to 2.00±0.05% in maize flour. Statistical analysis revealed the presence of significant composition of protein, lipid, carbohydrate, crude fibre, moisture and ash in the ingredients. The results of the study showed that proximate composition of raw ingredients have higher or comparable content of crude protein, lipid, carbohydrate, crude fibre, moisture and ash with the same poultry feedstuffs reported by other workers. So, the above ingredients will fulfill the requirement of nutrients need by poultry feed. These ingredients may be use for making low cost poultry diet.

Key words: Nutrient composition · Protein · Poultry feeds · Low cost · Manipur

INTRODUCTION

Poultry production is one of the lucrative farming business in Manipur (Latitude 23.80° N to 25.68° N and Longitude 93.03° E to 94.78° E) a state in the north-east corner of India. The meat and egg which are the main products are well accepted and rich in protein [1]. The major limitation to the growth of the industry is high cost of feed ingredients which constitute about 70% of the total cost [2]. Determination and knowledge of quality and nutrient content in poultry feed resources are necessary for proper use of them in scientific poultry diet. A major problem facing poultry industry is the provision of feeds that will contain all the necessary diet components needed by the birds to grow rapidly within a short period of time. It is necessary to analyze chemical composition before feeding [3, 4]. In order to prepare chemical composition tables of feedstuffs, the present study was carried out on the most consuming poultry feed resources such as- maize flour, rice bran, rice polishing, mustard oil cake, fish waste and snail meat which are commercially available in the market of Manipur.

MATERIALS AND METHODS

Samples of maize flour, rice bran, rice polishing were collected randomly from various rice mills, mustard oil cake from the oil mill, fish waste from the Imphal market and snail meat from the field by handpicked as it is easily available in Manipur. Proximate composition of feed ingredients were analysed according to methods of A.O.A.C [5] as follows: lipid was determined by extracting the residue with 40-60°C petroleum ether for 7-8 hour in a Soxhlet apparatus. Crude fibre was determined as loss on ignition of dried lipid-free residue after digestion with 1.25% H_2SO_4 and 1.25% NaOH and ash was determined by ignition at 550°C in a muffle furnance to a constant weight. Moisture was determined by oven drying at

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105°C for 24 hour. Significant mean differences were separated by Duncan's multiple range test ($p<0.05$) using SPSS software version 12.0 for windows and values were expressed as mean±S.E.

RESULTS AND DISCUSSION

The proximate composition of different feed ingredients used in the present study is presented in Table 1 and discussed below under each sub-head:

Maize Flour: Maize is a main source of energy for broiler chicken because it contains considerable amounts of digestible nutrients [3]. Nutrient utilization of maize grain by broilers is high and it influences final body weight as well as feed conversion ratio [6].

In the present study the content of protein, lipid, carbohydrate, crude fibre, moisture and ash were recorded as; 10.93±0.03, 5.06±0.21, 73.13±0.93, 9.03±0.27, 7.13±0.18 and 2.00±0.05%, respectively. The crude fibre value observed in the present study was comparatively lower than the average value of 9.50% reported by Watson [7].

Rice Bran: Rice bran is a powdery fine, fluffy material that consist seeds or kennels, in addition to particles of pericarp, seed coat, aleurone, germ and fine starchy endosperm. Rice bran is rich in vitamins-B and tocopherols and its nutrient density and profiles of amino acids and fatty acids including 74% of unsaturated fatty acids, are superior to cereal grains. Both rice bran protein and fat are of relatively high biological value [8].

The proximate composition of rice bran for ether extract (lipid), crude protein, crude fibre and ash were; 16.98, 14.93, 11.42 and 8.64%, respectively [15]. Rice bran in the present study exhibits 11.80±0.20% of protein, 13.13±0.18% of lipid, 64.46±0.81% of carbohydrate, 4.00±0.15% of crude fibre, 15.06±0.44% of moisture and 6.76±0.25% of ash. Values of moisture, crude protein, lipid, ash and crude fibre were recorded as: 10.90, 10.80, 20.60, 5.35 and 15.00% respectively [9]. Moisture content of rice bran in our study was comparatively higher than reported by Pitchaporn [10] i.e 13.17±0.12%. Higher values than our study in crude protein (13.00±0.46), ash (21.41±0.76) and crude fibre (25.50±0.91) while lower value of moisture (4.45±0.16) and crude lipid (5.14±0.18) was reported [11].

Rice Polishing: Rice polishing has great potential as an ingredient in poultry, feed with inclusion level varying from 25 to 40% [12]. It is a good source of proteins, energy, vitamins and minerals [13]. It also contains better assortment of amino acids, particularly lysine and methionine, compared to other cereal grains, including corn and wheat [14]. Rice polishing supplies as much total digestion nutrients as maize [12].

The proximate composition of rice polishing for protein, lipid, carbohydrate, moisture and ash in this study were recorded as: 14.63±0.23, 1.00±0.10, 82.46±0.42, 10.00±0.35 and 2.06±0.14%, respectively. Absent of crude fibre content was observed in rice polishing. Moisture content of rice polishing in our study was higher than reported [21] i.e 11.77±0.06%. Ash content found in rice bran was higher than that of rice polishing. The findings of the present study are in accordance to the studies reported [16-18]. The ash content may be different in different milling fractions due to degree of severity during milling for the separation of bran.

Mustard Oil Cake: Mustard oil cake contribute 38.86±0.24% of protein, 21.80±0.21% of lipid, 22.40±0.28% of carbohydrate, 9.00±0.06% of crude fibre, 6.06 ±0.14% of moisture and 8.06±0.22% of ash,. Lower values of moisture (14.00±0.49%), crude protein (35.93±1.27%), crude fibre (5.53±0.20%) and comparatively similar value of ash (8.37±0.29%) were reported by Ramachandran and Ray [12].

Table 1: Proximate composition (mean±SE; n=3) of various feed ingredients (% dry matter basis)

Nutrients	Maize	Rice bran	Rice polishing	Mustard oil cake	Fish waste	Snail meat
Protein %	10.93±0.03^{a}	11.80±0.20^{b}	14.63±0.23^{ab}	38.86±0.24^{c}	49.06±0.41^{d}	47.33±0.13^{bc}
Lipid %	5.06±0.21^{b}	13.13±0.18^{ab}	1.00±0.10^{a}	21.80±0.21^{c}	19.40±0.10^{bc}	5.23±0.16^{ab}
Carbohydrate %	73.13±0.93^{c}	64.46±0.81^{ab}	82.46±0.42^{bc}	22.40±0.28^{b}	10.23±0.20^{a}	21.70±0.11^{b}
Crude fibre %	9.03±0.27^{bc}	4.00±0.15^{c}	-	9.00±0.06^{bc}	1.00±0.11^{b}	2.06±0.27^{ab}
Moisture %	7.13±0.18^{b}	15.06±0.44^{c}	10.00±0.35^{ab}	6.06±0.14^{a}	5.56±0.12^{a}	7.56±0.17^{b}
Ash %	2.00±0.05^{a}	6.76±0.14^{b}	2.06±0.14^{a}	8.06±0.22^{ab}	20.46±0.78^{c}	24.00±0.11^{bc}

Values in the same row with different superscript (a-d) are significantly different at $p<0.05$ (Duncan's Multiple Range Test)

Fish Waste: Fish wastes are a rich source of protein. Many workers over the world have investigated fish silage in animal feed and have used fish silage products [19-23]. However, in Manipur the use of this technique is still limited to research despite the scarcity of animal feed and the large amount of fish waste. Fish by- products are a valuable protein source in animal feeds including fish [24, 25].

Fish waste in the present study reported the proximate composition of protein, lipid, carbohydrate, crude fibre, moisture and ash as: 49.06±0.41, 19.40±0.10, 10.23 ±0.20, 1.00±0.11, 5.56±0.12 and 20.46±0.78%, respectively. According to Sotolu [26] proximate composition of fish wastes and meal diet used in diet formulation (%DM) were: crude protein: 61.62%, Crude fat 9.55% and ash 22.40. In the study by Begum [10] moisture, crude protein, lipid, ash and crude fibre recorded a value of 11.50, 27.00, 29.15, 16.60 and 11.48% respectively. Higher values of crude protein (58.50±2.07%) and crude fibre (3.93±0.14%) whereas lower values of moisture (2.26±0.07%) and ash (11.50±0.40%) were reported by Ramachandran and Ray [12].

Snail Meat: The land snails are non conventional wildlife dietary protein source found abundantly in Manipur. Snail meat is a high quality food that is rich in protein, low in fat and a source of iron [27]. Ajayi [28] indicated that snail meat is particularly rich in protein and iron. In the present study percentage contribution of protein, lipid, carbohydrate, crude fibre, moisture and ash were recorded as: 47.33±0.13, 5.23±0.16, 21.70±0.11, 2.06±0.27, 7.56±0.17 and 24.00±0.11%, respectively. Fresh snail meat showed proximate composition of moisture, crude protein, lipid, range and ash lies in the ranged of 73.67-84. 91, 5.86-19.53, 1.05-2.44, 1.80-7.25 and 1.78-2.56 (g/100 g of fresh meat), respectively. The crude protein value of snail meat observed in the present study was higher than the value which lies within the range of 18.66-20.56% in four species of snail reported by Fagbuars [30]. The lipid content of it obtained in this study was low when compared with 9.6, 21.4 and 23.0% found in egg, mutton and duck products, respectively [31]. The low content of lipid makes snail meat a good antidote for the hypertensive patient and those that have related diseases i.e arteriosclerosis [32]. Significant values of protein and lipid content were found in mustard oil cake ($p<0.05$), carbohydrate in rice polishing, crude fibre in maize, moisture in rice bran and ash in snail meat at 0.05 level of significant as shown in Table 1.

The results of the study therefore showed that of all the samples evaluated, the local fish waste gave the highest percent of crude protein and the lowest in maize. This was closely followed by snail meat and oil cake while comparatively lower values were obtained in rice polishing, rice bran and maize grain. The lipid of mustard oil cake was the highest and lowest in rice. Rice polishing contributed maximum carbohydrate content and fish waste exhibits minimum carbohydrate content. Maximum moisture content was found in rice bran and minimum in fish waste. Ash content was found to be maximum in snail meat and minimum in maize flour. Crude fibre content was not available in the rice polishing. Maize and mustard oil cake got the same highest fibre content and the least in fish waste.

These locally available indigenous raw materials may serve as important ingredients for the formulation and development of cheaper and quality poultry feedstuffs. In order to do this, it is necessary to develop the technology for proper formulation and manufacturing of the feeds, assuming the optimum contents of indispensable protein, lipid and carbohydrate and growth promoting substances.

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