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Proximate analysis of some of the commonly available fish feed ingredients of Kashmir

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Abstract

The present study was carried out to determine the proximate composition of few selected fish feed ingredients collected from local market of Kashmir Valley during 10 June, 2017 to 15 September, 2017. Feed ingredients were analysed for protein, lipid, carbohydrate and also assessed for ash and moisture. Proximate compositions of feed ingredients were determined on the homogenous basis. The percentage of protein in selected feed ingredients ranged from (8.0%-42.4%). The percentage of lipid in selected feed ingredients varied from (1.5%-12.1%). The percentage of moisture and ash were recorded at (7.1 %-12.9%) and (1.1%-24.9%) respectively. Carbohydrate and nitrogen free extract were found to be in the range of (3.9%-25.1%) and (28.9%-54.1%) respectively. In order to provide cost effect feed to fish farmers, it is necessary that we should target locally available feed ingredients. This will not only bring down the cost of feed but at the same time decrease cost of production.

Keywords: Proximate analysis, feed ingredients, locally, cost effective, silkworm pupae

1. Introduction

Nearly 65% of the State falls in the Cold Zone and is therefore suitable for cold water fisheries development especially in the higher reaches which can be utilized for trout production in private sector and can grow as economic activity along with the employment generation in such backward areas. About 20 Streams existing in various Districts of the State are suitable for Cold Water Fisheries Development.

The Department of Fisheries has increased the production in the subsequent years by construction more rearing units in the State and increasing the rearing facilities by remodelling of existing units. Presently the Department is producing more than 100-120 metric tons of fish per annum through various rearing units which are located in all most all the districts of the State (Source Department of Fisheries, Jammu & Kashmir Government).

So far the production level is optimum or below it. The intensive rearing could be achieved by providing additional facilities. The main constraint presently is the availability sufficient/required quantity of feed. The Department of Fisheries, J & K Govt., has two feed mills one at Kokernag and another at Manasbal. Feed is being supplied to all the rearing units of the State from these production plants. In the State of Jammu and Kashmir fish farming in the private sector has come up in a big way. It is urgently required to establish one more feed mill unit in almost all districts of the state for the sustainable development of fisheries sector in the State. The same may collapse if alternate arrangements are not made.

The farmers tend to use farm made low cost but high nutrients contain feeds rather than traditional feeds. This tendency of using farm/factory made feeds in aquaculture proves the probability of swelling production and ultimately reveals the prospective importance of aqua feeds^[1]. In order to ensure regular and dependable feed supply to the units that shall exist or proposed to be constructed in future in the State of J& K, the supply of cost effect, good quality feed is of prime importance. The establishment of feed mills can also be taken up in private sector. The requirement of low cost nutrient rich feed in place of expensive feed, locally available feed ingredients are being used to cut off the expensive feed cost^[2]. The present study aimed at analysing some of the locally available fish feed ingredients for their proximate composition to bring down the cost of production.

2. Materials and methods

2.1. Sampling

Field survey was made in the local markets to collect and identify feed ingredients mostly used in aqua farms in district Srinagar and Ganderbal. Both plant and animal based ingredients were selected like mustard cake, azolla powder, rice bran, rice polish, wheat bran, wheat flour and maize. Animal based ingredients used were silkworm pupae and poultry viscera. Some of these ingredients are presently utilized in formulating trout and carp feeds. Other non conventional ingredients like silkworm pupae, poultry viscera and azolla powder are rarely used even though they have good nutritional profile. Apart from non conventional ingredients all other ingredients are profusely available in the local markets.

2.2 Sample preparation

Different feed ingredients were collected from the different area of Srinagar and Ganderbal. After collection the samples were taken to Fish Nutrition and Biochemistry laboratory of Faculty of Fisheries, Rangil, Ganderbal, SKUAST-K for proximate analysis of protein, lipid, carbohydrate, moisture, ash and nitrogen free extract.

2.3 Method of proximate analysis

Proximate analysis was done to ascertain the moisture, crude protein, crude lipids, ash and carbohydrate content of the sample.

2.4. Determination of Moisture

Moisture contents in the feed were determined by [3]. The percentage of the moisture content in the sample was calculated by the following formulae:

$$\% \text{ of moisture} = \{ \text{weight of original sample} - \text{weight of dried sample} \} / \text{weight of original sample} \times 100.$$

2.5. Determination of Ash

Ash content of each feed was estimated by following incineration method [4].

$$\text{Calculation: } \% \text{ of ash} = (\text{weight of ash} \div \text{weight of sample}) \times 100$$

2.6. Determination of Crude Protein

Micro kjeldhal method [5, 6] are used to determine the crude protein.

$$\text{Calculation: } \% \text{ Nitrogen} = \frac{\text{Value of HCL} \times 0.1 \times 0.014}{\text{Weight of sample}} \times 100$$

$\% \text{ of Crude Protein} = \% \text{ Nitrogen} \times \text{Conversion factor}$
(Conversion factor for animal and plant origin is 6.25 & 5.90 respectively).

2.7. Determination of Crude lipid

Fat is examined with low boiling organic solvent (petroleum ether/ diethyl ether, xylem) by soxhlet extraction and the extract thus obtained weighed after recovery of the solvent. Crude fat was determined through Soxhlet extraction technique [7] using diethyl ether (60°C-65°C) as the solvent.

Calculations:

$$\% \text{ of crude fat} = (\text{corrected weight of fat} \div \text{weight of sample}) \times 100$$

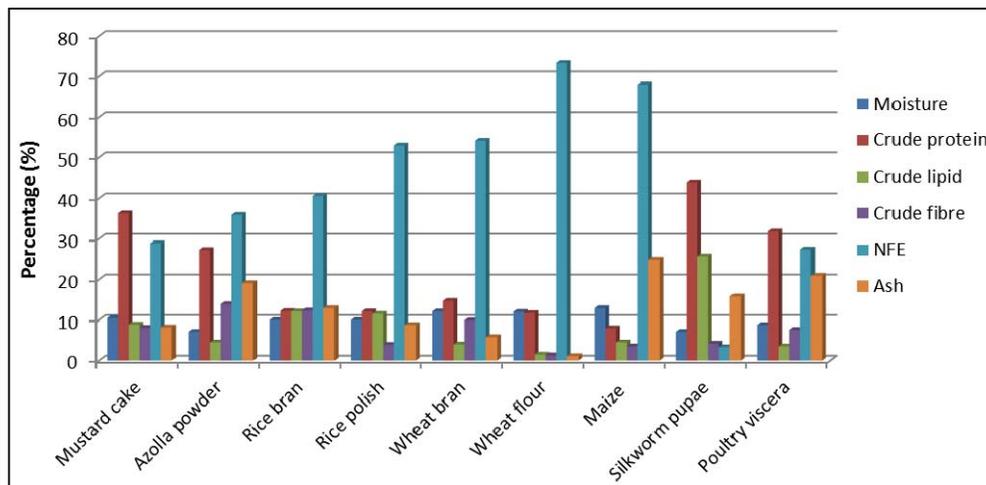
$$\% \text{ of carbohydrate} = 100 - (\text{moisture} + \text{ash} + \text{protein} + \text{fat})$$

3. Results and Discussion

Different fish feed ingredients both plant based and animal based and agricultural crops wastages and by-products are available in Kashmir Valley which can be used in formulating feed. In the present study locally used fish feed ingredients were found to be rice bran, maize, mustard cake, azolla powder, silkworm pupae, poultry viscera, wheat bran, wheat flour. Proximate analyses of different feed ingredients are shown in table 1. All the studied ingredients were comparable to other published data with small variations [8] [9].

Table 1: Some of the commonly available fish feed ingredients of Kashmir Valley and their Proximate composition

| Nutrient composition (%) | | | | | | |
|--------------------------|----------|---------------|-------------|-------------|------|------|
| Feeds of plant origin | | | | | | |
| Feed ingredients | Moisture | Crude protein | Crude lipid | Crude fibre | NFE | Ash |
| Mustard cake | 10.5 | 36.3 | 8.9 | 8.1 | 28.9 | 8.2 |
| Azolla powder | 7.1 | 27.3 | 4.5 | 13.9 | 35.9 | 19.1 |
| Rice bran | 10 | 12.2 | 12.1 | 12.3 | 40.6 | 12.9 |
| Rice polish | 10 | 12.1 | 11.5 | 3.9 | 52.9 | 8.8 |
| Wheat bran | 12.1 | 14.7 | 4 | 9.9 | 54.1 | 5.8 |
| Wheat flour | 12 | 11.7 | 1.5 | 1.3 | 73.3 | 1.1 |
| Maize | 12.9 | 8.0 | 4.5 | 3.5 | 68 | 24.9 |
| Feeds of animal origin | | | | | | |
| Silkworm pupae | 7.1 | 43.9 | 25.7 | 4.2 | 3.3 | 15.8 |
| Poultry viscera | 8.8 | 31.8 | 3.5 | 7.6 | 27.4 | 20.9 |



Graph 1: Showing percentage of different nutrients in ingredients.

The analyzed ash contents of the samples of the fish feed ingredients collected were lowest in wheat flour (1.1%) and highest was found in maize (24.9%), (Table 1, Graph 1). Percentage of protein in feed plays an important role in promoting growth. It has been observed that the protein requirement of fish is influenced by fish size, water temperature, feeding rate and overall digestible energy content of the diet^[9]. In the present study the analyzed crude protein content was found to be lowest in maize (8.0%) and highest was observed in silkworm pupae (43.9%), (Table 1, Graph 1). Keeping in view the highest percentage of protein in silkworm pupae, it can be used as an alternate source of protein in fish feed.

The proximate analysis of crude lipid contents of different fish feeds ingredients varied considerably. The lowest value of crude lipid was observed in wheat flour (1.5%) and the highest was observed silkworm pupae (25.5%), (Table 1, Graph 1).

In the present study the protein percentage of mustard oil cake was estimated at 36.3% which coincides more or less with the findings of Fisheries Research Institute^[10]. A nationwide survey was conducted by the Fisheries Research Institute, Bangladesh and they reported that the mustard oil cake contained about 33.30% protein. The protein percentage of silkworm pupae was estimated at 43.9% which is very much less than the findings of^[11]. The findings were almost similar to the investigation of^[12].

In the present study the lowest value of lipid percentage was recorded in wheat flour (1.5%) and the highest value were recorded in silkworm pupae (25.7%). Tomotake *et al.* (2010)^[11] found that, the silkworm pupae possessed n-3 fatty acids, especially α -linolenic acid (36.3%), as a major component. Since silkworm pupae are having good lipid content, it is having a potential to be incorporated into aquafeed. The results of ash and lipid percentage were also almost similar to the findings of^[13].

In the present study unconventional protein rich feed ingredients showed almost similar results reported by others^[14]. The dry matter, crude fibre and ether extract content of rice bran, wheat bran and rice polish analysed in the present study showed lower values than those reported by^[15] while as crude protein showed higher values. The reasons for high crude protein level may be due to the fact that bran was collected fresh from local markets and analysed immediately. While comparing the crude protein content of azolla powder and mustard cake it was observed that it contains higher levels when compared to other workers^{[10][16]}. The reasons for small variation may be due to different varieties of ingredients or some variations may be also attributed to the laboratory procedure and human error^[17].

4. Conclusion

In the present study attempt has been made to analyse some of the selected feed ingredients to be used in fish feed in order to bring down the cost of production. Once the data base of proximate composition of ingredients becomes available, appropriate diets can be formulated for testing at various locations of Kashmir Valley. The main objective of the present study is making available efficient and economical diets to farmers-engaged in coldwater fish culture in various parts of the Kashmir.

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