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**RESEARCH ARTICLE**

# EVALUATION OF POULTRY VISCERA AS POTENTIAL FISH FEED INGREDIENT, COMPARED TO FISHMEAL

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**ABSTRACT**

A study was conducted to observe the nutritive value of commonly used fish feed ingredients. High nutrient contents, easy availability and low cost were the major considerations in selecting the fish feed ingredients. During the present study the crude protein percentage of the poultry viscera, fishmeal, mustard oil cake, wheat bran, wheat flour and rice bran was estimated 60.67 %; 55.19 %; 34.86 %; 15.29 %; 15.19 %; 11.37 % respectively. The crude lipid percentage was recorded as 12.05 % in poultry viscera, 7.77 % in fishmeal, 11.77 % in mustard oil cake, 6.85 % in wheat bran, 3.35 % in wheat flour and 10.05 % in rice bran. The proximate composition of the experimented ingredients signified crude protein as the main factor, as the feed cost confirmed restrictions against the superior improvement of fish farming. Fishmeal is traditionally the major animal protein supplement in fish diets, but it is inadequate and expensive. Therefore different types of poultry wastes have been tested, and poultry viscera appeared as an alternate potential protein source, stimulating the poultry waste recycling.



## INTRODUCTION

In India, population explosion, higher economic growth, alterations in food types, and the recent production strategies and technologies are the thrust for fast increase in the demand for animal origin protein source. Traditionally in West Bengal of India, this demand is specially for food fish. The domestic production base for feed premixes, binders, additives , as well as for concentrates, is quite pathetic, and it is far behind requirements. Due to the lack of scientific and professional management, the quality of the produced feeds is often poor. Except some large-scale feed mills, most of the feed mills do not have skilled employees. Nowadays, fish farming is leading towards the semi intensive or intensive culture, equally, formulated feed inputs are shifted from farm-made feeds, to factory made feeds. The farmers depend only on the information given by the feed industry, about the feed composition and its effect on growth performance of fish. So there is a huge threat, that the farmers will be swindled by the feed manufacturer. It is very important to identify the nutritional requirements, for optimum growth of a fish species as well as in formulating a balanced diet. Accurate dietary protein and energy levels are known to influence the growth and body composition of fish. A lot of animal origin fish feed ingredients are considered as protein supplements. Such feed ingredients are fishmeal, fish silage, bone meal, fish viscera, poultry viscera, oyster shell meal, silkworm pupae, crab meal, snail muscle etc. Fishmeal is a nutrient rich, high protein supplement feed ingredient. It is made from flesh, bones and offal from fresh or processed fish. It is used chiefly in diets for domestic animals and also as a high quality organic fertilizer. However, the supply of fishmeal is insufficient and the cost is often high, so the profitable replacement of fishmeal with cheaper and available protein sources is required. So, it is urgent to evaluate the actual information and nutritive value of locally available low cost feed ingredients, which is crucial for the food safety as well as for most favorable growth. Poultry viscera is among such animal origin protein sources that can replace fishmeal. Viscera are the large organs inside the body, such as the heart, lungs and stomach, etc. Research findings has revealed that recycling of wastes from poultry slaughter-houses is of economical, biological and environmental importance (Steffens, W. 1994). Poultry by-product meal (PBPM) is one of the by-products resulting from poultry slaughter houses and produced by processing of the inedible parts of poultry carcasses including heads, feet, and viscera, with the exception of feathers (Bohnert *et al*., 1999) Therefore, the present study was conducted to observe the nutritive value of the locally available potential fish feed ingredients, specially the poultry wastes to replace fishmeal.

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## MATERIALS AND METHODS

### Experimental Sites and Study Period

During the study period, from April 2012 to October 2012, a number of fish feed ingredients were collected from the market for analysis, then transported to the Zoology Laboratory, Visva-Bharati, Birbhum, W.B, India (23°41'30"N Latitude and 87°41'20'' E Longitude).

### Collection and Storage of Samples

Samples of available feed ingredients such as poultry viscera, fishmeal, rice bran, wheat bran, mustard oil cakes, wheat flour etc were collected, sun dried properly, packed in polyethylene bags, to prevent initial spoilage. Then brought to the laboratory and stored in refrigerator.

### Proximate Composition Analysis

Proximate analysis is usually the first step in the chemical evaluation of a feed ingredient, where the material is subjected to a series of relatively simple chemical tests so as to determine the content of moisture, crude protein, lipid, crude fiber, ash etc.

### Estimation of Moisture

Moisture was determined by drying samples at some elevated temperature (100°C ±5°C) for 30 minutes and further at 60°C, until a constant weight was obtained.

### Determination of Ash

Ash was determined by ignition from dried sample at about 500±50°C for 6 hours in Muffle Furnace. The residue was weighed and reported as ash.

### Determination of Crude Protein

The crude protein was determined by Micro- Kjeldhal method using a Kjeltec system (Tecator, Sweden) through digestion and distillation steps. Kjeltab (containing potassium sulphate and catalysts), sulphuric acid, NaOH, phenolphthalein etc were used in this method.

### Determination of Crude Lipid

The lipid content was determined by Soxhlet apparatus. 2gm of sample wrapped in Whatman filter paper (No -1) and placed in a thimble connected with Soxhlet apparatus. Initial weight of Soxhlet flask was recorded and filled with 200ml petroleum ether, which boiled for 8 hrs at 60°C - 80°C through the thimble, by siphoning process. Flask was taken out and allowed to evaporate. The difference in the two weights of the round joint flask gave the weight of the lipid.

## RESULTS

In this study, Table - 1 explained highest 60.67% of crude-protein content in poultry viscera, while lowest 19.01 % in poultry litter. Poultry skin contained highest 12.89 % of crude-lipid, while poultry viscera had 12.05% of crude-lipid. Therefore, poultry viscera selected as potential fish feed ingredient. Fig-2 represented fishmeal which had highest 23.95% of ash content, but low crude protein content than poultry viscera. Here the whole fish body including bones were taken to make fishmeal.

**Table 1. Proximate composition of different poultry wastes**

| Ingredients | Dry matter % | Ash % | Crude-protein% | Crude-lipid % |
|---|---|---|---|---|
| Poultry viscera | 89.70 | 08.93 | 60.67 | 12.05 |
| Poultry intestine | 88.43 | 06.25 | 53.77 | 10.41 |
| Poultry skin | 89.59 | 7.97 | 31.09 | 12.89 |
| Poultry litter | 87.03 | 15.98 | 19.01 | 02.13 |

**Table 2. Proximate composition of commonly used fish feed ingredients**

| Ingredients | Dry matter % | Ash % | Crude-protein% | Crude-lipid % |
|---|---|---|---|---|
| Fish meal | 89.10 | 23.95 | 55.19 | 07.77 |
| Mustard oil cake | 90.90 | 08.08 | 34.86 | 11.77 |
| Wheat bran | 90.07 | 05.64 | 15.29 | 06.85 |
| Wheat flour | 89.93 | 02.87 | 15.19 | 03.35 |
| Rice bran | 90.25 | 15.82 | 11.37 | 10.05 |

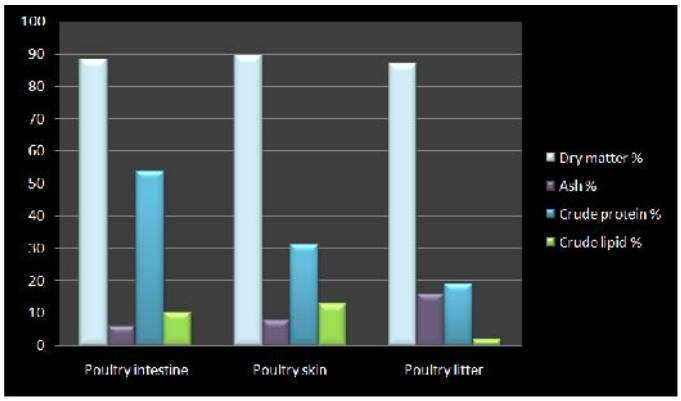


**Figure 1. Nutritional comparison between different poultry wastes (Other than poultry viscera)**

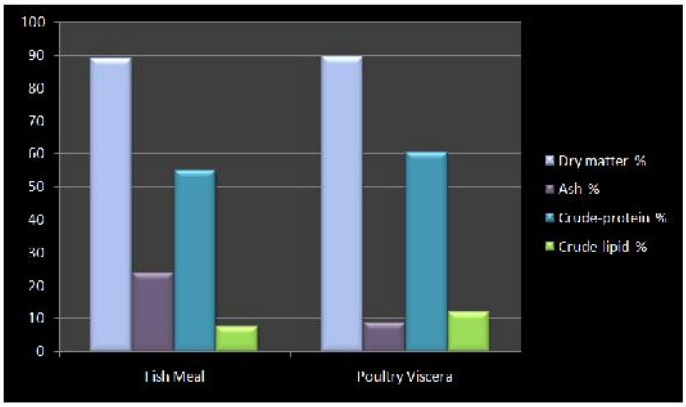


**Figure 2. Nutritional comparison between Fish meal and Poultry Viscera**

## DISCUSSION

In West Bengal, India, a large variety of agricultural crops, wastages and byproducts are used as fish feed. Most of these are available throughout the year and all over the country. In this study the locally used fish feed ingredients were found to

be fish meal, broken rice, maize, mustard oil cake, pulse, rice bran, soybean oil cake, wheat bran, wheat flour etc. Among them only commonly used ingredients like fish meal, mustard oil cake, rice bran, wheat bran and wheat flour were used for proximate composition analysis. Protein is the major growth promoting factor in feed. The protein requirement of fish are influenced by various factors such as fish size, water temperature, feeding rate etc. Fishmeal remains the major dietary protein source in fish feed but increasing cost, uncertainty unavailability and lesser quantity has necessitated the use of other protein sources to reduce feed cost without compromising growth. One of the greatest challenges in contemporary aquaculture especially in relation to fish nutrition is finding a desirable replacement for fish meal. A cheap and readily available source of high quality animal protein is poultry viscera which are considered as a waste in the poultry industry. In poultry processing industry, viscera accounts for nearly 24-29% of the byproducts. Researches on poultry viscera have revealed fascinating results and more work is being done by scientists from all over the world. My current research focuses on proximate analysis of poultry viscera as a potential replacement for fish meal. It is expected that the results will reveal more clues that will justify poultry viscera as a potential replacement for fish meal. The analyzed crude protein contents of the poultry viscera, fishmeal, mustard oil cake, wheat bran, wheat flour and rice bran was estimated 57.90-63.44 %; 52.01-58.38 %; 33.79-35.93 %; 14.90-15.69 %; 14.45-15.93 %; 09.54-13.21 % respectively those are more or less similar with the findings of Fisheries Research Institute. In the present study the protein percentage of the fish meal was estimate as 52.01-58.38 % more or less similar with the findings of *Kim and Easter(2001).* During the present study The crude lipid contents was recorded as 09.22 to 16.49% in poultry viscera, 03.74 to 11.80% in fishmeal, 09.73 to 13.82% in mustard oil cake, 04.12 to 09.59% in wheat bran, 02.74 to 03.97% in wheat flour and 06.78 to 13.32 in rice bran. *Hasan et al.(1991)* reported that mustard oil cake with 2-15% and fish meal with 5-20% lipid contents respectively. Besides management, supplementary feed is essential for enhanced fish farming. Farmers demand good quality and low cost fish feed which is the most important to reduce production cost. Lack of knowledge and information make them uncertain about the application of other feeds. For formulation of such fish feed information about price, availability, nutritive value and seasonal variation on quality are essential. The present study attempted to collect this information.

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