

Nutritional Value Of Protein Content In Exotic Major Carps Of Darbhanga Region

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Abstract

Fishes are well known for a good source of dietary protein, lipid and carbohydrates. The present study highlights the role of exotic major carps in overcoming the malnutrition present in children, in particular due to protein deficiency. Exotic major carps (silver carp, common carp and grass carp) play an important role in Indian aquaculture after the Indian major carps (Rohu, Catla and Mrighal). The present findings on proximate content of exotic carps with special reference to protein that their protein content is relatively high being 16.3 ± 1.33 (silver carp), 13.4 ± 0.55 (common carp) and grass carp (12.1 ± 3.14) % /100g as determined by Kjeldahl apparatus. In general, pulses, that contain 5g/100g protein are taken as the main dietary supplement for protein and taken as the main convalescence. The study clearly indicates the fish flesh (of three exotic carps) contain a definite high level of protein. Thus consumption of exotic carps, that are always cheaper than Indian major carps can prove to be a reasonable alternative to overcome the protein deficiency not only in children but human being in general.

Keywords: Exotic carps, protein, Pulses, Convalescence.

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I. Introduction

In view of the excessive pressure on cereals, pulses and other agricultural products due to population explosion, exploitation of some alternative dietary items was felt during 1980s-1990s. In due course of time, fishes, which are not inferior to any dietary item in its protein was accepted as proper substitute. Globally more than 3.3 billion people received 20% of their per capita intake of animal protein from fish (FAO, 2020). Global population growth promotes fish demand and causes over fishing and potential fisheries resources depletion (FAO, 2020; Pauly and Zeller; Vianna *et al.*, 2020).

In a country like India, where dietary intake is much less than the level of balanced diet, fishes can serve as appropriate source for providing protein. With recent technological advancements in the field of aquaculture, the fish yield has increased tremendously. Addition of the many exotic carps like Silver carp (*Hypophthalmichthys molitrix*), Common carp (*Cyprinus carpio*) and Grass carp (*Ctenopharyngodon idella*) has further added to the total aquaculture landings. India ranks third in world in Inland fish production. Bihar, showing a significance magnitude of fish production excluding coastal states *i.e.* Tamilnadu, Andhra Pradesh and West Bengal (Jhingran, 1982). *Hypophthalmichthys molitrix* is a warm water fish, Frimodt, (1995) points out that this species is famous for being consumed. The weight of this carp may be grow upto 50 kg (Maccracken, 2016). This carp is filter feeder and possess a particular device for feeding and filters very tiny particles of 4 μ m. Its food include Zooplankton and detritus also (Willink, 2009). *Cyprinus carpio* is one of the most common freshwater carp throughout the world. The *C. carpio* is cyprinid fish and live in medium or lower zone of water in rivers and ponds. Their habitations are mostly grassy zones with a dark bottom. Carp in fry stage consume zooplanktons. However during adult stage they become benthic feeders and feed on other animals and plants. Tycon, (1991) points out that 3% of the cyprinids are produce through intensive culture system. *Ctenopharyngodon idella* feeds on aquatic weeds, terrestrial grasses and has short intestine. It manures the pond as 50% of its daily food consumed (twice of its body weight) is defecated in semi digested condition, which serves as an important source of organic manure (Muhammad Yasin Ashraf *et al.*, 2011).

Popularization of health clues hidden in fish flesh consumption was taken up quite earlier by magazines and dailies (the times of India, Sunday review, July 18, Aug 8 and Aug 22, 1999 and Dec. 18, 2001), suggesting people to aim for 100gm of fish at least 2-3 times a week to retard ageing and keep protected against protein deficiency disease like Kwashiorkor and Marasmus in children and cardiac attack, hypertension, cancer, arthritis etc. in adults and older. Protein is the major and most important content of fish meat and lean to differ in a small amount in healthy fish (Weatherly and Gill, 1987).

In present context it appears to be appropriate to have a brief introduction on protein contents of exotic major carps. Proteins that constitute body, comprise of amino acids. Protein from food is separated into amino acids and then utilized for building and fixing muscles, red platelets, different tissues, and for making chemicals. Sufficient protein intake is significant for a sound resistant framework. Since protein is a source of calories (5.45 kcal per gram), it is utilized for energy.

Meat, fish, poultry, dairy items and eggs are amazing wellsprings of protein (Das *et al.*, 2010). Proteins are may be the most significant bio particles and comprised of amino acids, consolidated by peptide bonds and have a flexible job in the living framework. Protein substance of the fish muscle ranges between 16- 20%. The protein content fluctuates with the kind of muscle and dim muscles typically contain low degrees of dampness and protein contrasted with light muscles. Kumar in 1992, recognized that fishes are the excellent food source for human beings for centuries and is preferred as a perfect diet not only due to its excellent taste and high digestibility but also because of having higher lipids proportions of unsaturated fatty acids, essential amino acids and minerals for the formation of functional and structural proteins.

II. Materials and methods

PROCUREMENT OF FISH:

All the three exotic major carps under study were procured from local fish culture ponds in every month. In order to ensure that every month, the fishes were cultured in the same habitat and same feeds were available. The size of fishes, obviously varied every month with their growth. Fishes were transported alive to the Toxicology Laboratory, Department of Zoology, L. N. Mithila University, Darbhanga, Bihar. To determine protein content differences between species, different groups were managed and analyzed separately during the experiment.

Fish samples of Common carp (*Cyprinus carpio*), Grass carp (*Ctenopharyngodon idella*) and Silver carp (*Hypophthalmichthys molitrix*) were collected on a monthly basis from Local fish pond (Sonki barki pokhar) Darbhanga, Bihar from March 2019 to Feb 2020 period.

CRUDE PROTEIN:

The estimation of crude protein (N x 6.25) was done using an auto Kjeldahl system (Kjeltec Foss Tecator, Hoganas, Sweden) after acid digestion with an auto-digester (Foss, Tecator, Hoganas, Sweden). A known quantity of 2g sample was taken in Kjeldahl digestion tubes. To this, 0.8 g of copper sulphate, 7.0 g potassium sulphate and 12 ml. of concentrated sulphuric acid were added. The content was digested in pre-heated digestion block of the instrument. The process of digestion continued for 60 minutes until clear Blue or Green solution was obtained. Now the digested sample was cooled at room temperature and titrated automatically in distillation unit of the instrument. The level of protein displayed on the screen was noted down.

Calculation for protein:

In the equation below, “N” represents normality. “ml blank” refers to the milliliters of base needed to back titrate a reagent blank if standard acid is the receiving solution, or refers to milliliters of standard acid needed to titrate a reagent blank if boric acid is the receiving solution.

$$\% \text{ of nitrogen} = \frac{m \text{ of standard acid (blank)} * N \text{ of acid} * 1.4007}{\text{weight of sample in gram}}$$

% of protein = % of Nitrogen × 6.25 (conversion factor).

Calorific value of protein = % of protein × 5.65

III. RESULTS AND DISCUSSION

The results obtained on the protein content of the present fishes (Silver carp, Common carp and Grass carp) have been presented (Table 1, Histogram 1 and Graph 1). Like moisture content the Silver carp also exhibit high protein content with a maximum of 17.3±2.26 recorded in the month of February at the age of 16 months. The minimum value of protein was recorded during March being 15.74±0.96 in five month old fish. This indicate a rise of less than 0.5%/g per month with increase in age of fish.

In Common carp (Table 1, Histogram 1 and Graph 1), the maximum protein content was recorded as 14.51±0.21 in the month of February and at the age of 16 months, the minimum protein content was recorded at the age of 5 months being 12.32±0.99. Similarly in Grass carp maximum protein content was recorded at the age of 16 months being 13.36±3.12 and minimum 11.32±2.98 at the age of 5 months.

The average record of protein content (Table 1, Histogram 1 and Graph 1), indicate the protein content is highest in Silver carp (16.3±1.33) followed by Common carp (13.4±0.55) and Grass carp (12.1±3.14). The findings also suggest that the protein content in Silver carp is reasonably high in comparison the other two fish

(Common carp and Grass carp) studied presently. The Grass carp exhibit a low protein content comparatively (Table 1, Histogram 1 and Graph 1).

Ali *et al.*, (2001) reported that protein content is a vital constituent of living cells and shows relatively a little variation in healthy fish unless drawn upon during particular demand of reproduction or during food declination. The assimilated protein is mainly incorporated in the muscle of fish (Dabhade *et al.*, 2009). Thus the protein present in fish flesh is characterized by amino acids. The tissue also rich in vitamin A, B and B complex.

During present experiment highest level of protein could be recorded in case of Silver carp, followed by Common carp and Grass carp.

A relatively higher gain in protein content may be correlated with the availability of preferred food in surrounding media. Similar observations have been reported by Ashraf *et al.*, (2011).

Kindong *et al.*, (2017) also reported high protein content in Silver carp. Gulsun and Abdurrahman (2006) experimentally showed that change in protein content in fish flesh is directly depend upon the fish food.

According to Ashraf *et al.*, (2011) Protein content were recorded low in farmed Exotic carp as compare to wild exotic carp where the feed type abundance is low as compared to wild. Asma and Ashraf (2010) found a linear relationship between protein and age/size of three carnivorous fish species (*Wallagoattu*, *Mystus seenghala* and *Channa morulius*). Kindong *et al.*, (2017) considered that the Silver carp contain high amount of protein (29%) and low fat content (4%) and classified Silver carp as a lean fish. Same result was also recorded by the Wen *et al.*, (2016). Sary *et al.*, (2012) concluded that higher protein content of the applied feed may be caused to greater fillet protein content. Kinsella *et al.*, (1977); Testi *et al.*, (2006); Unlusayin *et al.*, (2001) and USDA, (2005) showed correrately the same result. Fanuel *et al.*, (2017) worked on three different ponds and recorded variation in protein content in tilapia fish (13.86-17.12%), their results revealed that the source of protein fish directly influenced the proximate content in fish.

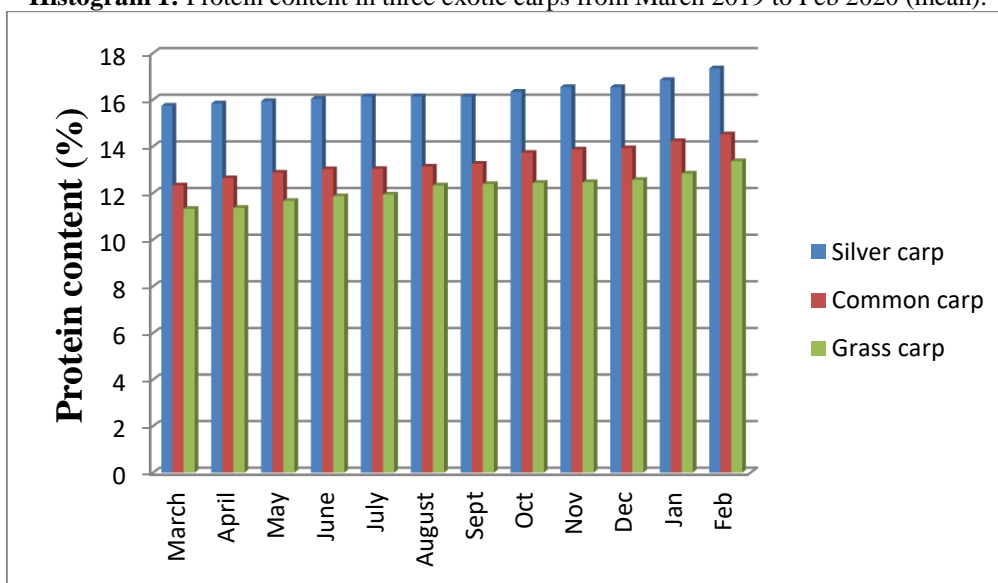
According to FAO, (2016), proteins are the second most important fish constituent. Protein value increase or raised in fish flesh that feed on the cereal based diets also increases in amino acids like lysine, Methionine and Cysteine.

Protein content in Common carp (Omnivorous) is higher than Grass carp but lower than the Silver carp (Table 1, Histogram 1 and Graph 1). Silver carp (Herbivorous) has maximum protein content being 16.3±1.33g followed by the Omnivorous Common carp being 13.4±0.55g and herbivorous Grass carp being 12.1±3.14g throughout the present study. Calorific value due to protein content in three fishes could be recorded as 92.02 Kcal/100g, 75.71Kcal/100g and 68.37 Kcal/100g in Silver carp, Common carp and Grass carp respectively. Protein content increases as the age and weight of fish increases.

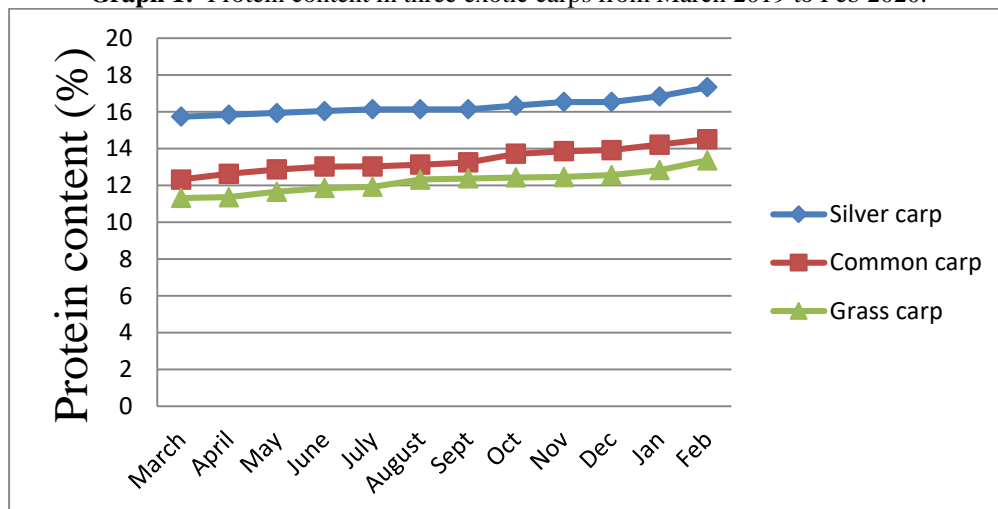
Table . Protein content in exotic carps during March 2019 to Feb 2020 (Mean ± SE).

Months	Silver carp	Common carp	Grass carp
March	15.74±0.96	12.32±0.98	11.32±2.98
April	15.84±0.94	12.63±0.42	11.36±2.01
May	15.94±1.12	12.87±0.42	11.66±3.92
June	16.04±1.36	13.02±0.59	11.86±3.12
July	16.14±1.20	13.03±0.92	11.93±3.21
Aug	16.14±1.22	13.13±0.49	12.32±4.02
Sept	16.14±1.12	13.25±0.48	12.38±4.18
Oct	16.34±1.26	13.72±0.78	12.43±3.02
Nov	16.54±1.58	13.86±0.43	12.46±3.41
Dec	16.54±1.38	13.92±0.24	12.56±1.18
Jan	16.84±1.38	14.22±0.63	12.83±3.48
Feb	17.34±2.26	14.51±0.21	13.36±3.12
Average	16.3±1.33	13.4±0.55	12.1±3.14

Histogram 1: Protein content in three exotic carps from March 2019 to Feb 2020 (mean).



Graph 1: Protein content in three exotic carps from March 2019 to Feb 2020.



IV. Conclusion

Protein content in different fishes showed a significantly a variable trend during the study. All these carps feeds on different kinds of food present in ponds. Protein content in Common carp (Omnivorous) is higher than Grass carp but lower than the Silver carp (Table 1, Histogram 1 and Graph 1). Silver carp (Herbivorous) has maximum protein content being $16.3 \pm 1.33g$ followed by the Omnivorous Common carp being $13.4 \pm 0.55g$ and herbivorous Grass carp being $12.1 \pm 3.14g$ throughout the present study. Calorific value due to protein content in three fishes could be recorded as 92.02 Kcal/100g, 75.71Kcal/100g and 68.37 Kcal/100g in Silver carp, Common carp and Grass carp respectively. Protein content increases as the age and weight of fish increases. The result provide an important protein content in exotic carps.

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