Processing Yield and Chemical Composition of Two Nile Fish Species (*Labeo Niloticus* and *Synodontis schall*)

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Abstract

This research conducted in Sudan University of Science and Technology during January-February 2017 to compare the body weight composition and chemical composition of two different Nile fish species (*Labeo niloticus* and *Synodontis schall*). 30 fish from each species were collected from Almawrada fish market and processed for body weight composition and chemical composition (moisture, protein, fat, and Ash). The results show significant difference between the two fish species in the body weight composition and processing yield, *Labeo niloticus* give 49% fillets higher than *Synodontis schall* which is give 40% fillets. Results of chemical composition showed significant difference in the studied fish species in moisture, fat, and Ash which is 71.2±0.2, 4.5±0.6 and 2.1±0.6 respectively for *Labeo niloticus* and 73.5±0.6, 2.0±0.3 and 2.3±0.5 respectively for *Synodontis schall*, there is no significant difference in protein content. The results suggest that the proximate composition and body weight composition of fish species greatly varies within the studied Spp.

Keywords: Fish, Body weight, Fillets, Chemical composition.

Introduction

Fish is the most numerous of vertebrate with at least 20,000 known species and more than 58% are found in marine environment [1]. Fish is one of the most important sources of animal protein available in the tropics and has been widely accepted as a good source of protein and other vital nutrients for the maintenance of a healthy body [2]. Fish meat contains significantly low lipids and higher water than beef or chicken and is favored over other white or red meats [3-4].

The nutritional value of fish meat comprises the contents of moisture, dry matter, protein, lipids, vitamins and minerals plus the caloric value of the fish [5]. The less developed countries capture 50% of the world harvest and a large proportion of the catch are consumed internally[6] in many Asian countries over 50% of the animal protein intake comes from fish while in Africa proportion is 17.50% [7]. Information on the processing yield may be of great help for fish quality control and for the tracing system, with an increase in profits in the processing chain [8], Studies on the effect of weight on yield, especially with regard to the presentation forms of the product to consumers (whole eviscerated fish, carcass, fillet) may greatly improve meat yields and profits. Fillet and carcass yields depend on several factors, such as size, age, sex, anatomic shape of the body, head size and weight of viscera, skin and fins. The efficiency of the fillet machine and the expertise in handling are aspects that should be taken into account. This study aimed to determine the body weight composition of the fish (*labeo niloticus* and *synodontis slugul*) and to determine the chemical composition of the studied fish species.

Materials and Method

Fresh samples were collected from EL Mawrada fish market. (*labeo niloticus* and *synodontis slugul*). A total of (30) samples of each species stored in ice container and transferred to the Fisheries Laboratory in Sudan University Department of Fisheries and Wildlife Science for preparation and
processing. The fish samples were washed thoroughly with tap water and weighed individually and degutted using sharpened and clean knives. The Total Length, standard Length, Total Weight and Filleting yield indices were determined using different materials (sharpened, knives, balance and measuring board), Random samples were taken to conduct the chemical analysis of fresh fish.

**Proximate Composition Analysis**

Moisture content, crude protein, fat and ash were determined for wet sample according to standard methods of Association of Official Analytical Chemists [9] as follows

**Moisture Content Determination**
The samples were first weight (Initial weight) then dried in an electric oven at 105°C for 24-30 h to obtain a constant weight. The moisture content was calculated as follows:

\[
\text{Moisture content (\%) } = \frac{\text{Initial weight} - \text{Dry weight} \times 100}{\text{Initial weight}}
\]

**Protein Determination**
The Kjeldal method for estimation of nitrogen was applied. Nitrogen content was converted to protein percentage by multiplying by 6.25 as follows:

\[
\text{Protein } \% = \frac{(V_a - V_b) \times N \times 14 \times 6.25 \times 100}{1000 \times W_t}
\]

Where \( V_a \) = volume of HCL used in titration
\( V_b \) = volume of sodium hydroxide of known normality used in back titration
14 = conversion factor of ammonium sulfate to nitrogen
6.25 = conversion factor of nitrogen to protein
\( W_t \) = weight of sample
\( N \) = normality of NaOH

**Crude Fat Determination**
Fat content of each sample was determined according to Soxlet method by ether extract using 2 gm of fish samples. Extraction continued for 5 hours at 100°C before finding the weight of the extract fat. Fat percentage was then calculated as follows:

\[
\text{Fat } \% = \frac{\text{Extracted fat weight} \times 100}{\text{Sample weight}}
\]

**Ash Content Determination**
Ash was determined by heating 1 gm at 550°C in muffle furnace until a constant weight was obtained. Ash content percentage was given by the following formula:

\[
\text{Ash } \% = \frac{\text{Ash weight} \times 100}{\text{Sample weight}}
\]

**Statistical Analysis**
Results were analyzed using the SPSS computer program, (ANOVA).

### Table 1: Shows the body weight composition (cm, gm) of the studied fish species (M±SD)

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</thead>
<tbody>
<tr>
<td>Labeo niloticus</td>
<td>32.7±2.8</td>
<td>26.1±1.6</td>
<td>307.8±3.9</td>
<td>44.7±1.8</td>
<td>31.9±1.6</td>
<td>28.2±2.5</td>
<td>44.2±2.2</td>
<td>151.7±1.8</td>
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<tr>
<td>Synodontis schall</td>
<td>26.8±1.8</td>
<td>20.1±1.5</td>
<td>258.8±2.8</td>
<td>102.5±3.8</td>
<td>25.7±3.7</td>
<td>16.5±1.2</td>
<td>31.3±1.9</td>
<td>99.8±3.7</td>
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</tbody>
</table>

M=mean, SD=standard deviation, **= highly significant difference
Table 2: shows the chemical composition (%) of the studied fish species (M±SD)

<table>
<thead>
<tr>
<th>Fish Spp</th>
<th>Moisture</th>
<th>Protein</th>
<th>Fat</th>
<th>Ash</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labeo niloticus</td>
<td>71.2±0.2</td>
<td>22.2±0.5</td>
<td>4.5±0.6</td>
<td>2.1±0.6</td>
</tr>
<tr>
<td>Synodontis schall</td>
<td>73.5±0.6</td>
<td>22.2±0.8</td>
<td>2.0±0.3</td>
<td>2.3±0.5</td>
</tr>
</tbody>
</table>

M=mean, SD=stander deviation, **= highly significant difference

Discussion

The species investigated in the present study labeo Niloticus and Synodontis schall are popular market fishes in rural and urban areas, and belong economically to the different traditional grades, according to consumer and fishermen preference in Sudan. Body weight composition of the fish is important aspect in fish processing witch is giving an idea in amount of the pure fillets and the fish by product. Average of total weight of Synodontis schall fish was 258.8g; significantly lower (p < 0.01) than that of labeo Niloticus (307.8) g.

All studied parameters have the same order except in head weight witch is high significantly in Synodontis schall that may be due to differences in age and body nature and sex, seasons, size and geographical locality of catch [10] .Chemical composition, moisture, Proteins and lipids contents as well as the Ash content were the major constituents, which had been considered in evaluating the nutritional value of the studied species. The nutritional elements showed variable values in the species analyzed; with moisture recording the highest values and Ash recording the lowest and good percentage in protein. This makes the Nile fishes important living resources of dietary protein as other sea and freshwater fish [11-12].Variations in proximate chemical composition of labeo Niloticus and Synodontis schall are summarized in Table( 2).

The results obtained are in partial agreement with that previously reported by Guner et al .[13], reported that fat content of shad is 15.91% which is higher than what was found in our study. The protein content of shad is reported to be 22.42% by Guner et al. [13], which is in the same range obtained in this study. Therefore, it is essential to determine the chemical composition and evaluated for different species of the Nile fish in relation to body weight composition. The chemical composition could influence the post-harvest processing and storage and could assist in determining the suitability of the different species to specific processing and storage techniques.

References


