

Some meat quality parameters of some fish species collected found in Raparin local markets

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Abstract:

This study was conducted to evaluate different fish species that obviously found in Raparin local markets which are mostly consumed; these species were common carp *Cyprinus carpio*, silver carp *Hypophthalmichthys molitrix*, grass carp *Ctenopharyngodonidella*, shabbout *Barbus grypus*, and bizz *Lecoibarbus esocinus*. The results of the study revealed that no significant differences were found in quality index scores for five types of local fresh fish meaning that all these species found in fresh in the markets. In the organoleptic evaluation of different fish species found in local markets of Raparin no significant differences in each of tenderness, juiciness, and favor while in color bizz, grass carp and common carp were higher significantly than other species and bizz, common carp, grass carp and silver carp were overall accepted than other species. According to the proximate composition of different fish species found in local markets of Raparin grass carp, common carp and bizz were higher significantly in protein content, grass carp was higher in lipid content and silver carp was higher in ash content.

Keywords: Meat quality parameters, Fish, Local markets

Introduction:

Fish meat quality refers to the sensory, chemical, physical and microbiological characteristics (such as appearance, flavor, odor and texture), as well as the nutritional value, safety and other characteristics of a food product. With respect to fish, quality involves nutritional, microbiological, biochemical and physicochemical properties (Bonilla, 2004).

The quality of fish could be degraded through a many process, including physical, chemical and microbiological forms of deterioration which involved the enzymatic and chemical reactions are usually responsible for the initial loss of freshness whereas microbial activity is responsible for the obvious spoilage and reduce the product shelf life (Gram & Huss, 1996).

Quality index method is based on the significant sensory parameters for raw fish when using many parameters and a score system from 0 to 4 demerit points, QIM is using a practical rating system, in which the fish is inspected and the fitting demerit point is recorded. The scores for all the characteristics are then summed to give an overall sensory score, the so-called quality index (Jonsdottir, 1992).

After catch and harvest, not only is spoilage and freshness parameters are changing due to autolytic and microbiological processes but also the microbial flora is changing. The analytical methods used for seafood analysis can be divided into objective methods and sensory methods. The sensory methods can also be divided into two principal methodologies:

methods based on outer inspection of the sample (without cooking) and methods based on assessing the cooked sample (Bonilla, 2004). For these reasons, this study was aimed to assess the quality of local fresh fish by using the quality index method (QIM), organoleptic evaluation and the chemical composition for the different samples sample captured in Raparin markets.

Material & Methods:

Five types of fish most available in Raparin markets, which were common carp, silver carp, grass carp, shabbout *Barbus grypus*, and bizz *Lecoibarbus esocinus*, were chosen randomly from different fish shops.

Organoleptic evaluation (Sensory analyses) will performed by a panel of five experienced assessors. Raw fish were evaluated using the quality index method (QIM) shown in table(1). This scale is based on the freshness quality grading system. The QIM involves specifying the characteristics of appropriate sensory attributes of the raw fish. Once the characteristic of a sensory attribute is determined, it is assigned a demerit score ranging from 0 to 3. The scores for all characteristics are then summed to give an overall sensory score. The scale gives zero score for absolutely fresh fish, while increasingly larger totals result as the fish deteriorates as described in the table (1).

Table 1: Quality assessment scheme used to identify the quality index demerit score (Larsen *et al.* 1992).

Quality parameter	Character	Score
General appearance	Skin	0 Bright, shining 1 Bright 2 Dull
	Bloodspot on gill cover	0 None 1 Small 2 Big
	Stiffness	0 Stiff, in <i>rigor mortis</i> 1 Elastic 2 Firm
	Belly	0 Firm 1 Soft 2 Belly burst
	Smell	0 Fresh, seaweed/metallic 1 Neutral 2 Musty/sour
Eyes	Clarity	0 Clear 1 Cloudy
Gills	Colour	0 Characteristic, red 1 Faded, discolored
Sum of scores		(min. 0 and max. 20)

Proximate composition: All fish samples were tested for the chemical analysis of the muscle (Moisture %, crude protein%, fat% and ash %) according to AOAC (2000) analytical methods.

Organoleptic evaluation: The fish meatspecimens were placed in open aluminum boxes and cooked for 25 min in an oven pre-heated at 160°C, after cooking sevenpersons were randomly determined as a sensory evaluation panel. Each member of the panel has filled a sensory evaluation table, as shown in table (2).

Table 2: The Sensory evaluation form used in the study.

Type of fish	Tenderness	Juiciness	Color	Flavor	Overall acceptability
Common carp					
Silver carp					
Grass carp					
Shabbout <i>Barbus grypus</i>					
Bizz <i>Lecoibarbus esocinus</i>					
5 =extremely like; 4 = like; 3 = neither like nor dislike; 2 = dislike; 1 = extremely dislike					

Results and Discussion:

Quality Index for raw fish was evaluated as score grades by Quality Index Method (QIM) (Martinsdóttiret al., 2001).The results showed in table (3) explain that the different fish species found in Raparinlocal markets were not nor significant but numerically the shabbout *Barbus grypus* have the lowest value 2.33 as shown in table (3). Sveinsdo'ttir et al. (2002) have mentioned that the results of score near zero represent fish freshness while high scores, near 20, indicate fish deterioration and storage for long times, It was suggested that, when the sum of scores for the batch of fish reach demerit points of 10, the remaining storage time in ice maybe estimated to about five days (Huss, 1995; Kyrana, 2001).

The application of QIM is excellent in the first part of the storage period for fish stored in ice, as during first stage storage other instrumental method results are inaccurate or unreliable (Nealsonand Wimpee, 1991; Mhongole, 2009) . This could be identical to the condition at which fish were stored and the stage of storage when they have been sampled.

Table 3: Quality Index scores for five types of local fresh fish.

Fish Species	Score								Sum Score
	Skin	Blood spot	Stiffness	Belly	Odor	Eye Clarity	Gill color	Gill odor	
Common carp	0.66 ^{ab}	0.66 ^{bc}	0.33 ^a	0.33 ^{ab}	1 ^a	0.33 ^a	0.33 ^{ab}	0.66 ^b	4.33 ^a
Grass Carp	1.33 ^a	1.66 ^a	1 ^a	0 ^b	0.33 ^a	1 ^a	0.66 ^{ab}	0.33 ^b	6.33 ^a
Sliver Carp	0 ^b	1.33 ^{ab}	1 ^a	0.33 ^{ab}	1.33 ^a	0 ^a	0.66 ^{ab}	0.33 ^b	5 ^a
Shabbout <i>Barbus grypus</i>	0.66 ^{ab}	0 ^c	0.33 ^a	0.33 ^{ab}	0.66 ^a	0.33 ^a	0 ^b	0 ^b	2.33 ^a
Bizz <i>Lecoibarbus esocinus</i>	0.66 ^{ab}	0 ^c	0.33 ^a	1.33 ^a	1 ^a	0.66 ^a	1 ^a	1.66 ^a	6.66 ^a

Mean having different letters in the same column are significantly different at $p < 0.05$.

According to the results of organoleptic evaluation forms no significant differences observed among all species found in Raparin local markets in tenderness, juiciness and flavor, for the color the common carp, grass carp and bizz *Lecoibarbus esocinus* were differ significantly than silver carp and shabbout *Barbus grypus*, common carp, grass carp and bizz *Lecoibarbus esocinus* were overall accepted as explained in table (4).

Table 4: Organoleptic evaluation of different fish species found in local markets of Raparin

Type of fish	Tenderness	Juiciness	Color	Flavor	Overall acceptability
Common carp	3.62 ^a	3.75 ^a	4.12 ^{ab}	3.87 ^a	4 ^{ab}
Silver carp	3.66 ^a	3.55 ^a	3.77 ^b	3.33 ^a	3.55 ^b
Grass carp	3.75 ^a	3.37 ^a	4.37 ^{ab}	3.75 ^a	3.75 ^{ab}
Shabbout <i>Barbus grypus</i>	3.71 ^a	3 ^a	3.71 ^b	3.57 ^a	3.42 ^b
Bizz <i>Lecoibarbus esocinus</i>	4.2 ^a	3.8 ^a	4.8 ^a	4.4 ^a	4.6 ^a

Mean having different letters in the same column are significantly different at $p < 0.05$.

The present investigation deals with the determination of fat %, protein%, ash%, and moisture % muscle tissues of five collected fish, the knowledge of proximate composition of fishery species is fundamentally important for the application of different technological processes (Yeannes and María, 2003).

According to the results shown in table 5, the grass carp, common carp and bizz *Lecoibarbus esocinus* were higher significantly in protein ratio as compared to silver carp and shabbout *Barbus grypus*. In lipid and ash content the grass carp was higher significantly when compared with other fish species. Ali *et al.* (1986) found that protein content in shabbout *Barbus grypus* was 17.29% and this percent was differing with the results obtained in the present study. Buyukcapar&Kamalak (2007) recorded the range of protein was between 12.1-13% in common carp. Khidhir (2011) found significant differences ($P<0.05$) in the chemical composition (protein, lipid and ash) amongst the five types of fish (grass carp, silver carp, common carp, bizz and shabbout) were shown and this agree with our results.

Table 5: Proximate composition of different fish species collected in Raparin local markets.

Type of fish	Protein	Lipid	Ash
Common carp	23.170 ^{ab}	17.850 ^b	1.300 ^{cd}
Silver carp	22.375 ^b	6.705 ^{cd}	1.890 ^a
Grass carp	23.735 ^a	19.710 ^a	1.100 ^d
Shabbout <i>Barbus grypus</i>	19.845 ^c	7.450 ^c	1.440 ^{bc}
Bizz <i>Lecoibarbus esocinus</i>	23.150 ^{ab}	5.650 ^d	1.650 ^b

Mean having different letters in the same column are significantly different at $p<0.05$.

The variation in the chemical composition of fish is closely related to feed intake, migratory swimming and sexual changes in connection with spawning, fish will have starvation periods for natural or physiological reasons (such as migration and spawning) or because of external factors such as shortage of food. Most of the species, in addition, do usually not ingest much food during spawning migration and are therefore not able to supply energy through feeding (Rasheed, 2011).

During periods of heavy feeding, at first the protein content of the muscle tissue will increase to an extent depending upon how much it has been depleted, e.g., in relation to spawning. Then the lipid content will show a marked and rapid increase. After spawning the fish resumes feeding behaviour and often migrates to find suitable sources of food. Plankton-eating species such as herring will then naturally experience another seasonal variation than that caused by spawning, since plankton production depends on the season and various physical parameters in the oceans (Oduor-Odote and Kazungu, 2008).

The lipid fraction is the component showing the greatest variation. Often, the variation within a certain species will display a characteristic seasonal curve with a minimum around the time of spawning; the lipid content of fillets from lean fish is low and stable whereas the lipid content in fillets from fatty species varies considerably. However, the variation in the percentage of fat is reflected in the percentage of water, since fat and water normally constitute around 80 % of the fillet (Kent *et al.*, 1992).

The carbohydrate content in fish muscle is very low, usually below 0.5 %. This is typical for striated muscle, where carbohydrate occurs in glycogen and as part of the chemical constituents of nucleotides. The latter is the Source of ribose liberated as a consequence of the autolytic changes *post mortem*. As demonstrated above, the chemical composition of the different fish species show variation depending on seasonal variation, migratory behaviour, sexual maturation, feeding cycles, etc. These factors are observed in wild, free-living fishes in the open sea and inland waters (Oduor-Odote and Kazungu, 2008). The single factors having the most pronounced Impact on the chemical composition is considered to be the feed composition. The fish farmer is interested in making the fish grow as fast as possible on a minimum amount of feed, as the feed is the major cost component in aquaculture. The growth potential is highest when the fish is fed a diet with high lipid content for energy purposes and a high amount of protein containing a well-balanced composition of amino acids (Watanabe *et al.*, 1987). A normal way of reducing the fat content of aquacultured fish before harvesting is to starve the fish for a period. It has been demonstrated for both fatty and lean fish species that this affects the lipid content (Lie and Huse, 1992).

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پوخته

ئەم توێژینەوه ئەنجام درا بۆ هەلسەنگاندنی ئەو جوړه ماسیانەى ئەفروشییت و ئەخوریت له بازارهكانى ناوچهى راپهرین، جوړهكان بریتی بوون له ماسی کارب ئاسایی، کاربی سلفەر، کاربی گیایی، سووره ماسی و بزە. ئەنجامی توێژینەوه که ئەوه پیشان ئەدا هیچ جیاوازییهك نی یه له نیشاندەری کوالیتی بۆ هەر پینچ جوړهکهی ماسی ئەمه مانای وایه که ماسیهكان بهشیوهی تازه یاخود فریش ئەفروشییت له بازارهكان، بهلام بۆ تامکردنی هەستی بۆ هەموو جوړه جیاوازهکانی ماسی که له ناوچهی راپهرین ئەفروشییت هیچ جیاوازییهك نه بینرا له رووی نهرمی و ئاویی و تامی بهلام له رووی رهنگ بزە و کاربی گیایی و کاربی ئاسایی جیاوازییان بهرزتره له جوړهکانی تر وه بزە و کاربی ئاسایی و کاربی گیایی و کاربی سلفەر زۆر تر به کاردییت وهك له جوړهکانی تر. به گوێرهی ئەو پیکهاته کیمیاوییه نزیکهی له گوشتی جوړه جیاوازهکانی ماسی که له بازارهکانی ناوچهی راپه پین ههیه، کاربی گیایی ، کاربی ئاسایی، بزە زۆرترین پێژهی پرۆتینیان ههیه له گوشتدا وه کاربی گیایی بهرزترین پێژهی چهوری ههیه له گوشتدا وه کاربی سلفەر بهرزترین رێژهی خوله میش له پیکهاتهی هه بوو.

الخلاصة

أجريت هذه الدراسة لمقارنة أنواع مختلفة من الأسماك المتوفرة في الاسواق المحلية لمنطقة رابرين. إن أنواع الاسماك المستخدمة في الدراسة هي الكارب العادي و الكارب الفضي و الكارب العشبي و الشبوط و البز. تمثلت نتائج الدراسة بعدم وجود فروقات معنوية في دليل الجودة بين الاسماك الخمسة المستخدمة في الاسواق المحلية وهذل يدل على كون الاسماك المتوفرة هي اسماك طازجة. بينت نتائج التقييم الحسي للاسماك عدم وجود فروقات معنوية بين الاسماك في كل من الليونة و العصرية و النكهة ولكن اعطى اللون في سمكة البز و الكارب العشبي و الكارب العادي فروقات اعلى من الانواع الاخرى من الاسماك المستخدمة. كانت لنتائج التحليل الكيمياءى للحم أسماك الكارب العشبي و الكارب العادي و سمكة البز بفروقات معنوية عالية في نسبة البروتين و احتوى الكارب العشبي نسبة اعلى من الدهن مقارنة ببقية الانواع و كانت نسبة الرماد في الكارب الفضي أعلى من الاسماك المدروسة.