

The Determination of the Proximate Composition and Sensory, Chemical, Microbiological Quality of the Fish which are Sold by Retail in Sinop, Turkey

¹Hunkar Avni Duyar, Suleyman Ozdemir, Aysun Gargaci, and Zafer Hakan Kalayci

Abstract – In this study, the horse mackerel (*Trachurus mediterraneus*), whiting (*Merlangius merlangus euxinus*), red mullet (*Mullus barbatus ponticus*) and picarel (*Spicara smaris*) fish that are widely consumed in Turkey were bought from three fish markets (1, 2, 3). After being taken to the processing laboratories in the fisheries faculty in foam boxes with ice, the fish were analyzed in terms of sensory, chemical, physical (a_w) and microbiological characteristics. For this purpose; skin, gill, color and texture analyses, chemical quality (TVBN, TBA) and proximate composition analysis (Raw protein, raw fat, raw ashes and moisture) were evaluated.

Keywords – : Black Sea, Fish, Quality, Sinop

I. INTRODUCTION

FISHES are an important role in the nutrient of human beings since it is a important source of animal protein. Fish has been preferred foods by consumers due to their unique quality and high nutritional values. However, they can quickly spoil because of their biological composition. Fish received increased attention as a potential source of animal protein and essential nutrients for human diets [1, 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]. However, fish can quickly spoil because of their biological composition. The poor handling practices and storage conditions led to the deterioration of large proportions of fish before they reached to the consumer. Spoilage of the fish is brought about by microbial, enzymatic, chemical and physical reactions take place after harvesting.

II. MATERIAL AND METHOD

A. Samples collection

The fish samples used for this study include horse mackerel, whiting, red mullet and picarel, they were bought from the fish market in Sinop (Fig 1).

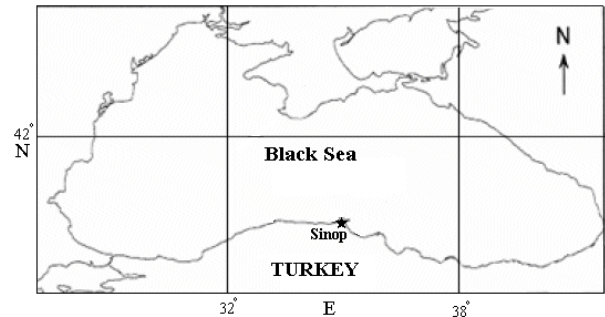


Fig. 1. The study area

About Coding: 1R-2R-3R-1P-2P-3P-1W-2W-3W-1H-2H-3H

1, 2, 3 = Fish markets

R= Red mullet,

P= Picarel,

W= Whiting,

H=Horse mackerel

B. Chemical and proximate composition analysis

For proximate composition; the samples were analysed, lipid content by the [6] method, moisture content by the [7] AOAC method, crude protein by the Kjeldahl method [8] (AOAC, 1984) and ash content by the [7] AOAC method. Total volatile basic nitrogen (TVB-N) was determined according to the method [9]. The thiobarbituric acid (TBA) was determined according to [10]. For pH measurement 10 g fish meat samples were homogenized in 10 ml of distilled water solution [11].

C. Microbiological Analyses

For all microbiological counts, 10 g of sample was taken from fishes and transferred in 90 ml 0.1% peptone water. From the 10^{-1} dilution, other decimal dilutions were prepared. Mesophilic bacteria, psychrophilic bacteria, coliform bacteria were determined.

D. Sensory Analyses

Six experienced assessors judged the overall acceptability of the samples using 1-10 point quality scale according to Torry [21].

¹Hunkar Avni DUYAR, Suleyman OZDEMIR, Aysun GARGACI, and Zafer Hakan KALAYCI are with Sinop University, Fisheries Faculty, Phone +90368 2715728 Fax: +90368 2715729 e-mail: had052@gmail.com

¹Corresponding author

III. RESULTS AND DISCUSSION

Table I shows the results of proximate composition of fresh fish. The proximate composition of fish depends on age, kind, size, sex, environment and season [12, 13]. Table II shows the result of pH, TVB-N and TBA values. PH value was not regular because of the kind of fishes. And pH value is not a criterion of spoilage. It has to be supported by other chemical, sensory and microbiological analyses [14, 15]. Regarding the value of TVB-N, [16] reported the limit values as very good until 25 mg/100, good until 30 mg/100, marketable until 35 mg/100 g and spoilt more than 35 mg/100 g. Our results in every fish are similar and found acceptable. Thiobarbituric acid (TBA) values are used indicator of the quality of the fish, whether it was chilled, frozen or stored on ice [17]. TBA value should be less than 3 mg malonaldehyde/kg in perfect quality material and should not be more than 5 mg malonaldehyde/kg in good quality material, consumption limits were from 7 to 8 mg malonaldehyde/kg [18] and all fishes in markets were close to the acceptability limits for consumption. Table III shows the activity of water (aw) of four commercial fish. A crucial factor, which determines the microbial, chemical and enzymatic stability of foods, is the water activity (Aw) [19] The water activity values of the fishes were found between 0.975-0.995. Sensory values scores were found very good for all samples for every market. All samples were found to be acceptable scores. Table IV shows the microbiological analysis (log cfu/gr) of four commercial fish. The mean numbers of total coliforms were found as every fish kind and fish markets but P2 and W1. Mesophilic bacteria, psychrophilic bacteria and coliform bacteria were found every fish and fish markets. It has been identified that was obtained in every fish and fish market that the limit values consumability was not exceeded in terms of chemical and microbiological bacteria quality criteria. Similar results have been obtained about microbiological bacteria was found whiting which is sold in Sinop market [20]. This study is in line with [22] other research. According to the results of chemical and microbiological analysis all fish kinds at all fish markets are between acceptability limits for consumption.

TABLE I
PROXIMATE COMPOSITION OF FOUR COMMERCIAL FISH

Fish	Markets	Raw Protein %	Raw Fat %	Raw Ash %	Moisture %
R	1	16.36±0.2	3.10±0.3	1.55±0.3	76.18±0.3
	2	17.01±0.1	3.61±0.2	1.50±0.2	75.23±0.2
	3	17.82±0.1	4.07±0.3	1.56±0.2	76.49±0.4
P	1	14.51±0.5	7.72±0.3	1.43±0.3	75.45±0.4
	2	14.63±0.3	7.26±0.2	1.47±0.5	75.68±0.4
	3	14.93±0.3	6.30±0.1	1.05±0.3	76.92±0.5
W	1	14.12±0.2	1.45±0.4	1.43±0.1	81.03±0.2
	2	14.11±0.4	1.23±0.5	1.31±0.1	82.29±0.5
	3	14.45±0.4	2.13±0.4	1.79±0.3	80.12±0.6
H	1	16.50±0.2	4.39±0.6	2.05±0.6	73.05±0.4
	2	16.35±0.3	5.97±0.4	2.22±0.7	70.35±0.4

	3	16.57±0.3	5.56±0.4	1.87±0.3	71.12±0.6
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TABLE II
CHEMICAL QUALITY PARAMETERS OF FOUR COMMERCIAL FISH

Fish	Markets	TBA (µg MDA/g)	TVB-N (mg/100gr)	PH
R	1	0.62±0.03	15.5±0.02	6.73±0.06
	2	0.42±0.08	9.09±0.06	6.65±0.06
	3	0.56±0.07	13.06±0.05	7.13±0.07
P	1	0.45±0.03	16.44±0.08	6.66±0.05
	2	0.05±0.04	15.94±0.03	6.44±0.10
	3	0.35±0.04	10.39±0.07	6.80±0.30
W	1	0.73±0.08	13.84±0.08	7.12±0.06
	2	0.44±0.1	16.54±0.05	6.99±0.09
	3	0.45±0.09	19.45±0.06	7.05±0.04
H	1	0.65±0.08	15.88±0.09	7.05±0.20
	2	2.96±0.9	15.3±0.08	6.68±0.05
	3	0.96±0.03	15.25±0.07	7.01±0.40

TABLE III
PHYSICAL ANALYS (AW) OF FOUR COMMERCIAL FISH

Fish	Markets	AW
R	1	0.981±0.1
	2	0.99±0.1
	3	0.995±0.1
P	1	0.99±0.1
	2	0.985±0.1
	3	0.985±0.1
W	1	0.98±0.05
	2	0.981±0.1
	3	0.975±0.1
H	1	0.978±0.02
	2	0.979±0.02
	3	0.978±0.02

TABLE IV
MICROBIOLOGICAL ANALYSIS
(LOG CFU/GR) OF FOUR COMMERCIAL FISH

Fish	Markets	Coliform Bacteria	Mesophilic Bacteria	Psychrophilic Bacteria
R	1	2.47±0.9	4.39±0.5	3.77±0.5
	2	3.79±0.4	3.73±0.8	4.17±0.3
	3	3.50±0.5	4.72±0.6	4.07±0.7
P	1	1±0.5	4.20±0.4	3.96±0.6
	2	none	3.83±0.2	4.09±0.7
	3	1.84±0.8	4.26±0.1	3.78±0.8
W	1	none	4.25±0.2	4.50±0.5
	2	2.53±0.3	4.20±0.05	4.51±0.6
	3	3.38±0.02	4.62±0.02	4.77±0.1
H	1	2.43±0.5	4.26±0.02	4.74±0.2
	2	2.07±0.05	3.91±0.05	4.28±0.4
	3	1.84±0.01	4.22±0.1	4.91±0.3

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