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Study of Some Qualitative Traits Of Some Salmon Products Imported Into Iraq

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Abstract: This study was conducted on 12/19/2021 on salmon products imported to Iraq, which are whole fish with the head and tail removed, slices, rings, fingers, and cubes for the purpose of determining the physical characteristics of these products and to determine their suitability for human consumption. The products were obtained from K.F. M Marine Fish, the exclusive agent in Iraq, and all products were one meal and one date, and the product was valid from 10/5/2021 until 7/4/2022, and the results were as follows- :The results of the qualitative characteristics of total volatile nitrogen (TVN), pH, and trimethylamine (TMA) were within permissible limits, and myoglobin pigment concentrations were low in imported salmon fish products.

Keywords: Qualitative Characteristics, Total Volatile Nitrogen, Ph, Trimethylamine, Myoglobin Pigment.

Introduction

Fish are a rich source of fat-soluble vitamins A, K, D, and E (Al-Anbari et al., 2019). Vitamins A and D are found in the liver of fish. They are also rich in mineral elements such as sodium, potassium, sulfur, iron, iodine, and selenium, which are found in saltwater fish. In addition, fish meat contains less connective tissue compared to other meat, which makes it more tender after cooking (Marques et al., (2019). The main components of the fish body are water, protein, and fat, with a small percentage of minerals and vitamins (Al-Hilali and Al-Khshali, 2019). It contains a small percentage of carbohydrates and cholesterol when compared to other meats, in addition to containing important fatty acids that provide the main nutrients for brain development (Jaclyn et al., 2010). Fish protein provides a complete source of essential amino acids for humans, as these amino acids are present in fish meat. The amino acids found in ruminant meat, milk, and eggs are less advantageous compared to this. Fish meat is rich in fats that include essential fatty acids, which are beneficial in preventing heart disease (Kaur et al., 2014). Among fish products, Atlantic salmon is considered the most favourable. Widely

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recognised in Europe and around the globe, this species is officially referred to as Salmo salar and is classified within the Salmonidae family. It is distinguished by its elevated nutritional content and its status as a superb provider of protein, lipids, vitamins, and minerals. Salmon protein is rich in important amino acids, particularly methionine and lysine (Hixon, (2014), making it a very nutritious source of nutrition. Examples of nutrients included in fats include vitamins such as vitamin A, B12, D, EPA, DHA, iodine, and selenium (Hicks et al., 2019). Consuming long-chain unsaturated fatty acids is linked to a decreased likelihood of heart disease in adults and enhanced functional aspects of neurodevelopment in children, particularly when seafood, particularly fish, is consumed (EFSA, 2014)... Considering the significance of salmon fish meat and its many nutritional components, as well as the limited scientific research conducted on this topic. The objective of this study was to examine the qualitative attributes of imported salmon fish products, including whole fish, fillets, fingers, rings, and small cubes. The study aimed to assess their suitability and quality by comparing them to the standard specifications set by the Central Agency for Standardisation and Quality Control.

Materials and Methods

-pH:

The pH of fish meat samples was determined according to the method mentioned by Verma et al. (2008.(

-2Estimation of total volatile nitrogen (TVN): Total Volatile Nitrogen

Total volatile nitrogen was estimated based on the method of Egan et al. 1997

3-The compound Trimethylamine (TMA:(

According to the extraction method and analysis conditions provided by Oh et al. 1997.(

-4Estimation of myoglobin concentration:

The concentration of myoglobin in meat samples was estimated according to the method of Zessin et al. (1961).

statistical analysis

The results were analyzed using the Complete Randomized Design (CRD), within the ready-made statistical program (SAS - Statistical Analysis System 2012), and

the results were compared using the Least Significant Difference (Least Significant Difference) test.

Significant Difference-LSD).

$Yij=\mu+Li+Eij$

Since:

Yij = the value of the jth view of transaction i

μ = the general average of the studied trait i

Li = effect of system i

Eij = value of random error

Results and Discussion

-1 pH

It is clear from Table (1) that the pH values of imported salmon fish products were 6.20, 6.45, 6.72, 6.70 and 6.72 for treatments T1, T2, T3, T4 and T5, respectively, and the results showed that there were non significant differences ($P>0.05$) between the second treatments and the third, fourth, and fifth, while all of them excelled on the first treatment. Fish meat is considered healthy when the pH reaches 6.8, but it is considered spoiled when the pH reaches higher than (Zang et al., 7, 2012). The pH is an indirect measure of the extent of decomposition. In carbohydrate materials, especially glycogen, after the death of the fish and its conversion to lactic acid (Huss, 1988), the increase in pH is attributed to the release of total volatile nitrogenous bases resulting from protein decomposition by enzymes, resulting mainly from microbial activity (Ottestad et al., 2011). The slight decrease in pH values in the current study indicates the growth of microbes and the work of enzymes that liberate and break down components and produce ammonia and free trimethyl amine, which in turn raises the pH (Raveendran et al., (2018). Rotabakk et al. (2022) observed a decrease in the pH with an increase in the freeze-storage period in Frozen Atlantic salmon fillets for four months, and Duun and Rustad (2008) showed an increase in pH upon freezing storage of Atlantic salmon fillets stored at temperatures of 1.4 and 3.6°C.

-2Total volatile nitrogen (TVN)

Table (1) presents the TVN values in imported salmon fish products. The values for treatments T1, T2, T3, T4, and T5 were 3.26, 2.90, 3.60, 2.73, and 3.60 mg

nitrogen/100 g, respectively. The results indicate that there were no significant differences (P>0.05) between the first and second treatments compared to the other treatments. The percentages mentioned above adhere to the recommended limits set by the Central Organisation for Standardisation and Quality Control (amended version for 2021). According to these standards, fish meat is deemed acceptable if the TVN percentage in the final food product does not exceed 20 mg of nitrogen per 100 g. Barraza et al. (2015) found that the TVN values in Atlantic salmon fillets, which were frozen at four distinct temperatures, did not decrease to -30-35 mg nitrogen/100 g.

3- Myoglobin stain

The data presented in Table (1) indicates that the quantities of myoglobin pigment in salmon fish products were measured at 0.076, 0.086, 0.093, 0.096, and 0.096 mg/g for treatments T1, T2, T3, T4, and T5, respectively. Statistical analysis revealed no significant differences (P>0.05) between the treatments. The second, third, fourth, and fifth treatments did not differ substantially from each other, nor did the first and second treatments. However, the first treatment differed significantly (P<0.05) from the third, fourth, and fifth treatments. The alteration in meat colour can be ascribed to the oxidation of myoglobin, a muscle pigment, which renders myoglobin vulnerable to auto-oxidation into the compound methemoglobin Met. Mb, which is responsible for the brown hue of meat (Pacheco-Aguilar et al., 2000). The low concentration of myoglobin pigment in meat can be attributed to various reasons, including protein denaturation, storage duration, thawing and freezing. These variables can result in a reduction of colour in fish muscles. The colour shift may be due to the packaging coating, which is designed to enable a controlled amount of oxygen to pass through and facilitate the restoration of OxyMb's colour. Surface drying also leads to colour alteration, as it triggers physical transformations that impact the characteristics of the meat's surface. To reflect or absorb light, bacteria are another factor that affects the color change in fish meat, as the bacteria present on the meat deplete some or all of the oxygen, thus accelerating the formation of green-colored sulfamicolobin, or it may cause the formation of hydrogen sulfide (H2S). Surface drying also causes color change, as Physical changes occur that affect the nature of the surface

of the meat to reflect or absorb light (Al-Taie, 1987). According to Bott (1995), the color of seafood meat within its species can be affected by the location from which it was caught, the method and season of fishing, and methods of handling and storage. The flesh of raw Atlantic salmon is characterized by a reddish-orange color, which is due to the content of the pigments astaxanthin and canthaxanthin (Erikson and Misimi, 2008). Astaxanthin produces the pink-red pigment that is naturally found in wild Atlantic salmon and can also be found in algae, yeast, crustaceans, and plants. The amount of astaxanthin varies depending on the species of salmon and between wild species versus farmed species. In addition, the myoglobin pigment is affected by storage and handling, which cause chemical and microbial changes leading to a change in color (Pacheco-Aguilar et al., 2000).

-3 Tri- Methyl Amine (TMA)

It is clear from Table (1) that the values of the compound trimethylamine in imported salmon fish products reached 15.47, 10.64, 25.45, 9.13 and 6.63 mg/kg fish in treatments T1, T2, T3, T4 and T5, respectively. The third treatment recorded the highest value and reached Its value was 25.45 mg/kg fish, while the lowest value recorded for the fifth treatment was 6.63 mg/kg fish. The results indicated that there were significant differences ($P<0.05$) between all treatments. The increase in TMA levels may result from the effects of free amino acids, amine oxidation, and nucleotide degradation by autolytic enzymes and microbial activity (Chudasama et al., 2018). Determining the levels of the compound TMA is an important means of early detection of deterioration in the quality of fish, as the acceptable limits for human consumption in chilled fish meat range between 10-15 mg/100 g. TMA levels are affected by fish species, season, initial bacterial counts and storage conditions (Connell, 1990), and the Food and Agriculture Organization of the United Nations reports that good quality cold-water fish contain less than 63 mg/kg of TMA (Huss, 1988). An EU regulation states that when sensory examination reveals any doubt as to the freshness of fish products, samples may be taken and subjected to laboratory tests to determine TMA levels (Regulation CE No. 854/2004), and although the regulation itself does not provide any reference value, there is Generally accepted values recommended by international organizations, as recommendations issued by national and

international organizations, and scientific research, agree that levels of TMA range between 63-42 mg/kg in marine fish at their maximum (Nevigato et al., 2018). Zhang et al. (2012) showed that TMA levels of mackerel Scomberomorus niphonius stored at -20 and -55°C increased slightly after 40 days of frozen storage. The researchers attributed this to dehydration and loss of fluid exuding the fish muscles at low temperatures. Kumar et al. (2021) observed an increase in the TMA content of Cirrhinus mrigala after 150 days of frozen storage.

Table 1. Some qualitative traits (pH, TVN, Mb, and TMA) in imported salmon fish products (arithmetic mean ± standard error).

TMA (mg/g fish)	Mb (mg/g fish)	TVN(mg nitrogen/100 g fish(	pH	Treatment
15.47±0.23 b	0.076±0.01 b	3.26±0.16 ab	6.20±0.10 b	T1 (cubes)
10.64±0.23 c	0.086±0.01 ab	2.90±0.47 ab	6.45±0.08 a	T2 (fingers)
25.45±0.19 a	0.093±0.01 a	3.60±0.23 a	6.72±0.03 a	T3 (fish with head and tail cut off)
9.13±0.07 d	0.096±0.01 a	2.73±0.14 b	6.70±0.03 a	T4 (rings)
6.63±0.10 e	0.096±0.01 a	3.60±0.10 a	6.72±0.06 a	T5(chipset)
*0.572	*0.015	*0.816	*0.230	LSD value

Averages with different letters within one column differ significantly from each other. P<0.05)*),NS: non-significant.

Conclusion

The study concluded that the qualitative properties of total volatile nitrogen (TVN), pH, and trimethylamine (TMA) were within acceptable limits, and the amounts of myoglobin pigment were low in imported salmon fish products.

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