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The pH and Total Fat Values of Fish Meat in Different Iced Storage Period

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Abstract: This study was aimed to investigate the effect of different iced storage periods on the pH and total fat values of fish meat. Because, these parameters are very important for shelf life and consumer choice. In this study, 30 meat samples from fish (*Trachurus trachurus* L. 1758) were used. The data was collected for 3 iced storage period that initial (fresh), 1 and 2 week. The concentrations of total fat were higher ($p<0.05$) for initial period than other weeks. However, the concentrations of pH were also lower ($p<0.05$) for this period. During the initial storage period the pH was consistently low (6.2) and this may have contributed to the increased shelf-life of the fish used in this trial. The increase in pH after initial period was associated with the state of rapid spoilage of the fish. In this study, the pH concentrations close to neutral of meat from fish for second week may be advantage for eating quality. However, this pH level is disadvantage for shelf life of product. The high amounts of fat in the initial period may have a negative effect upon consumer's preference.

Key words: Biochemical parameters, meat, fish, sheep, economic, *Trachurus* sp.

INTRODUCTION

Information about handling, processing and storage techniques, including time/temperature histories that can affect the freshness and quality of the products is very important for the partners in the chain (Groom, 1990; Comforth, 2007; Umberger *et al*., 2003). Identifying an optimum meat source according to biochemical parameters at the retail level may allow for production of a more uniform product in the retail setting and allow producers to make sound decisions on the appropriate meat of animals (Amer *et al*., 1997; Cicek, 2007; Sweeter *et al*., 2005). The time passed after catch and the temperature history of fish is very often the key factor determining the final quality characteristics of fish products (Olafsdottir *et al*., 2004). Recently, some researchers (Abbas *et al*., 2006) determined the shelf life and freshness of stored at 0-10°C for 28 days and have found that from sensory and pH point of view under various storage temperatures, the higher the storage temperature the faster is the increase in both sensory and pH values which can be used as measurements for quality deterioration and shelf life prediction in the fish marketing sector. The changes in fish meat biochemical components such as pH and total fat from different iced storage period for retail consumers have not been discussed. Therefore, these parameters have been determined for different iced storage period in this study. This study was aimed to investigate the effect of different iced storage periods on the pH and total fat values of fish meat. Because, this parameters are very important for shelf life and consumer choice.

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MATERIALS AND METHODS

Fish materials (*Trachurus trachurus* L. 1758) were obtained from fish market in Ordu, in the Black Sea coast of Turkey and total 30 fish samples were used in this study. The fish were stored in ice for over a period of 2 weeks. Changes in lipid and pH values of the fish were determined during the storage. At least 10 samples were drawn from the batch for each sampling and analyzed their lipid and pH values. Sampling was done when the fish was received, first week and second week of storage.

Lipids were extracted according to modified Bligh and Dyer method (Hanson and Olley, 1963). Basically, 1 g fish sample was minced with 10 mL of distilled water and pH was measured by pH meter 7020 (Electronic Instruments Ltd., England).

All of data are indicated as Mean±SEM. Comparisons were done by using Duncan test with help of the SPSS (Norusis, 1993).

RESULTS AND DISCUSSION

The concentrations of total fat were higher (1.8%) for initial period than other weeks (1.6 and 1.5%, respectively for 1 and 2 weeks) (Table 1). However, the concentrations of pH were lower ($p<0.05$) for this period (6.2 for initial vs. 6.5 and 6.8 for following weeks).

The low muscle pH in the initial period reflected the good nutritional state of fish. The typical pH of live fish muscle ≈ 7.0. During the initial storage period, the pH was consistently low (6.2) and this may have contributed to the increased shelf-life of the fish used in this trial. However, at the first week of storage pH started to increased, reaching a value of 6.8 by the end of the trial. The increase in pH values after initial period reflected the production of alkaline bacterial metabolites in spoiling fish and coincided with the increase in Total Volatile Basic Nitrogen (TVBN) (Kyrana *et al*., 1997).

The increase in pH after initial period was associated with the state of rapid spoilage of the fish (Kyrana and Lougovious, 2002). However currently, instrumental evaluation had take over most of the sensorial evaluation by human. This is because the estimation of quality of fish based on traditional measures can be difficult. The method to determine the quality parameters of fish are also often complicated and time consuming and the result are often obtained after the product have been distributed to the consumer. Compared to the evaluation by using the instruments was much more faster, easy to handle, has the ability to carry out many samples as routine and more reliable compare to human evaluation even though they are trained (Simeonidou *et al*., 1997).

In this study, the pH concentrations close to neutral of meat from fish for second week may be advantage for eating quality. However, this pH level is disadvantage for shelf life of product. The shorter shelf life negatively effects on salability of meat. The meat quality traits must include suitable pH that indicates eating quality and shelf life. Lower pH value is related to greater losses during further meat processing and high pH value is related to shorter shelf life but also better eating quality (Gregory *et al*., 1994). Abbas *et al.* (2006) determined the shelf life and freshness of stored at 0-10°C for 28 days and have found that from sensory and pH point of view under various storage temperatures, the higher the storage temperature the

Table 1: Biochemical parameters of fish meats from different Iced storage period

	Storage period		
Biochemical components	Initial	1 week	2 week
Total fat (%)	1.8±0.1^{a}	1.6±0.07^{b}	1.5±0.09^{b}
pH	6.2±0.03^{a}	6.5±0.02^{b}	6.8±0.05^{c}

Data is expressed as Mean±SE. Means followed by different superscripted letters differ significantly at $p<0.05$

faster is the increase in both sensory and pH values which can be used as measurements for quality deterioration and shelf life prediction in the fish marketing sector.

The high amounts of fat in the initial period may have a negative effect upon consumer's preference. The consumer preference on meat salability is reduced when meats have excessively fat (Amer *et al*., 1997). While increases in fat and pH may be desirable over some range, excessive levels of these traits can be undesirable.

The changes in chemical components provide a potential opportunity to manipulate economic return in meat to enhance quality characteristics and, consequently, commercial gain. According to results from this study, we can explain that pH can act as indicators of the fish freshness as it start with low reading at the early stage of storage which means the nutritional state was still good and then increased when the fish had been stored for certain period of time. So, by checking the pH of the fish after a certain period of storage can determine the state of it freshness. Meat quality traits including fat and pH will be important in determining meat price and profits in the near future.

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