

STUDIES ON FRESHNESS OF REFRIGERATED POULTRY MEAT

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Abstract

The research aimed at assessing the quality of poultry meat stored for 10 days under the refrigeration conditions (temperature of +1.7 °C and moisture of 76%) through a series of tests on pH value, easily hydrolysable nitrogen content and hydrogen sulphide.

The acidity of pectoral muscle increased from the first day (5.87) by the 10-day of storage (6.38), aspect also applies to muscular thighs, the limits of variation ranged from 6.07 to 6.48. Also easily hydrolysable nitrogen content has ascended in both pectoral muscles (from 17.36 mg/100g on the first day, at 28.48 mg/100g in 10-a day), and in the thigh (17.58 mg/100g of fresh meat and 28.01 mg/100g to the 10 days' storage).

Our results concerning the value of indicators which define the state of fresh poultry meat stored under the refrigeration conditions showed, that food may be considered suitable for public consumption until the 6th day of storage.

Keywords: freshness, poultry, pH, easily hydrolysable nitrogen, hydrogen sulphide.

INTRODUCTION

For consumers, assessing the overall quality of poultry meat based on its appearance, especially since more and more appreciate refrigerated poultry meat both nutritionally and also the foods hygienic safety characteristic (Hui Y.H. et al., 2001).

Meat with low pH has also been reported to decrease tenderness and increase shelf-life (Froning et al., 1978; Barbut S., 1993).

During storage, in meat and meat products it me develop highly toxic substances such as ammonia, hydrogen sulphide, peroxidase, and biogenic amine (cadaverine, putresceine and other) that can appear because decarboxylation of amino acids in meat (Maria Kosova, Pavel Kalac, Tamara Pelikanova, 2009).

It was reported that an increase in pH in chicken breast meat due to the accumulation of amine and ammonia by psychotropic bacteria (Quio et al., 2002).

Original quality of poultry meat can be evaluated by sensory attributes besides physical and chemical analysis (Balamatsia, C. C. et al., 2006). To identify the first signs of meat alteration, different indicators were proposed for consideration, most important being pH, easily hydrolysable nitrogen and hydrogen sulphide identification (Halasz, A., et al., 1994).

MATERIAL AND METHOD

Biological material was breast, chicken thighs packed in polyethylene bags, sealed with aluminium clips.

Storage of them, which were in the original package, was realised for a 10 day period of time, in refrigeration conditions, at an average temperature of +1.7 °C and relative moisture of air about 76%.

To realise the determinations were gathered 3 samples from pectoral musculature and 3 samples from thighs musculature. Sampling for analysis was done on the following days: 1, 3, 5, 6, 7, 8, 9 and the 10-a day of storage.

For measuring the meat pH value was use a pH-meter WTW Multi 350i with the successive immersion method into a suspension formed by distilled water and triturate meat (aqueous extraction). Easily hydrolysable nitrogen was determined according to STAS 9065/7-74, in hot weakly alkaline medium, low ammonia released is driven by water vapour and is collected in a given volume of acid solution with known titer. Excess of acid was titrated with a base of the same normality. Based on the volume of acid used to neutralize the ammonia was calculated the quantity of ammonia that resulted in the sample studied. The presence of hydrogen sulphide was identify as a qualitative response by the combined of lead acetate to hydrogen sulphide leading to a brown-black sulphide.

RESULTS AND DISCUSS

pH evolution of meat

The acidity is an important criteria in assessing the initial quality of meat and its behaviour during storage (Allen, C.D. et al., 1998). At the moment of bird slaughtering the pH of the muscles is around 7.0-7.1 and after the increase of the glycogen reserves existed in muscles the pH values decreases accordingly (Wood, D. F. and Richards J. F., 1975). Meat is considered to have a very good quality at a pH of 6.2; when pH value is higher than 6.7 meats became uneatable. During the longer storage, the meat suffers severe changes in terms of quality, one of which is increased pH. After the 10th days of storage, in the case of pectoral muscles studied, the pH increased from 5.87 (at 24 hours after slaughter) to 6.38 (the tenth day of storage). This growth is due to the process of proteolysis and also in the thigh muscles, meat pH increased during storage, from a level of 6.07 resulted in the first day at 6.59 in the tenth day of storage (fig.1).

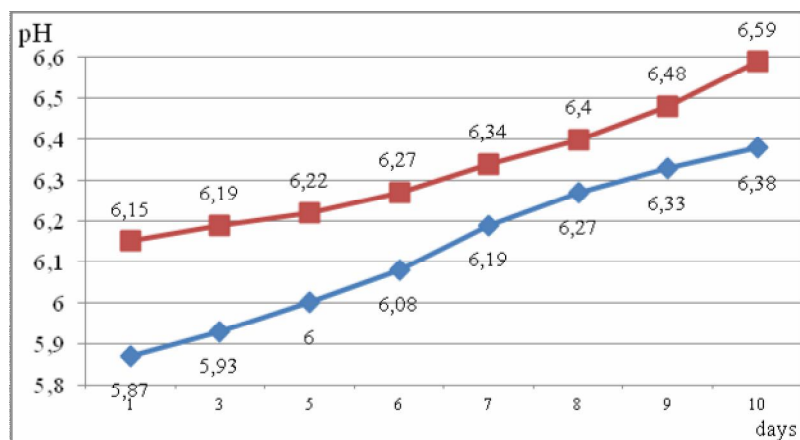


Fig. 1 The pH of meat studied (blue - breast, red - thighs).

Variation content of easily hydrolysable nitrogen

During the ten days of storage the meat was stored at a temperature of 1.7 °C and a relative humidity of 76% and in these conditions we take daily 10 g of meat for the determination of easily hydrolysable nitrogen. Easily hydrolysable nitrogen content increased continuously throughout the storage, in the case of the muscles breast and thighs.

In samples of pectoral muscles, easily hydrolysable nitrogen content ranged from 17.36 mg NH₃/100 g (the first day of storage) to 28.48 mg NH₃/100 g (in the tenth day). In the case of thigh muscles in the first day of storage a 17.58 mg NH₃/100 g was registered and the last day 28.01 mg NH₃/100 g. Increasing the NH₃ content is due to protein hydrolysis under the catalytic action of native enzymes in meat (fig. 2).

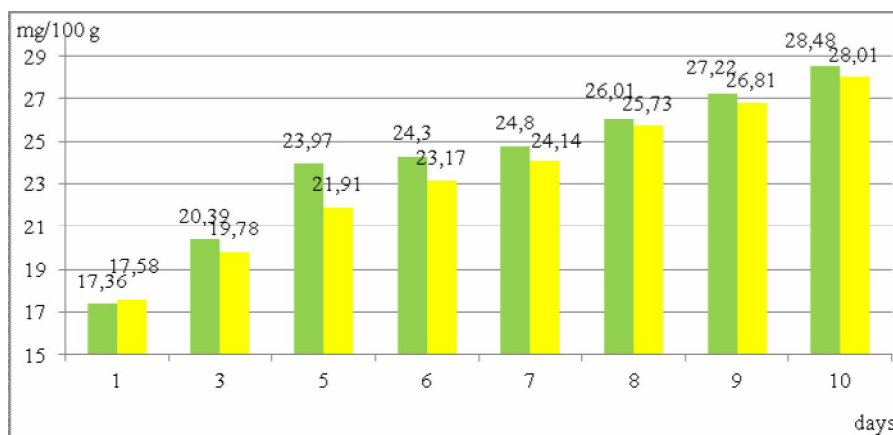


Fig. 2 Easily hydrolysable nitrogen content in meat studied (green - breast, yellow - thighs).

Identify the presence of hydrogen sulphide during storage

Microbial action of amino acids which contain sulphur leads to formation of mercaptans (thiols), hydrocarbons and hydrogen sulphide (Bondoc Ionel and Eusebiu Şindrilar, 2002).

Hydrogen sulphide is formed when meat goes into an advanced stage of decomposition protein.

In regard to H₂S present meat samples taken from the pectoral muscles tests carried out indicated that the state freshness is maintained until the seventh day (tab. 1).

Table 1

Assessment of the degree of freshness in refrigerated breast poultry meat

Sample	Storage time(day)							
	1	3	5	6	7	8	9	10
Sample1	fresh	fresh	fresh	fresh	fresh	relatively fresh	spoiled	spoiled
Sample2	fresh	fresh	fresh	fresh	relatively fresh	relatively fresh	spoiled	relatively fresh
Sample3	fresh	fresh	fresh	relatively fresh	fresh	relatively fresh	relatively fresh	spoiled

In the case of thigh muscles, the degree of freshness of meat rendered by light of hydrogen sulphide, found in all samples, is maintained until 6th day (tab. 2).

Table 2

Assessment of the degree of freshness in refrigerated thigh poultry meat

Sample	Storage time(day)							
	1	3	5	6	7	8	9	10
Sample1	fresh	fresh	fresh	fresh	relatively fresh	relatively fresh	spoiled	spoiled
Sample2	fresh	fresh	relatively fresh	fresh	relatively fresh	spoiled	spoiled	relatively fresh
Sample3	fresh	fresh	fresh	relatively fresh	spoiled	spoiled	relatively fresh	spoiled

CONCLUSIONS

Determinations for the assessment of freshness for the refrigerated poultry meat enlightened the following aspects:

1. in the end of storage of refrigerated poultry meat it was found a higher pH of 7.15% in the thigh muscles compared with pectoral muscles, this increase is the result of intense proteolysis activity;
2. regarding the variation of easily hydrolysable nitrogen content, pectoral muscles presented a higher content (by 64.06% as determined from fresh meat), compared with the content of the thigh muscles at the end of storage period;

3. the degree of freshness appreciated through the H₂S presence was maintained as the period specified by the manufacturer for both breast and thigh.

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