

Comparison of the results of acoustic freezing (AEF) and standard shock freezing of trout

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1. Sample T 12 (acoustic freezing regime AEF 12)

Particles of ice of small size are formed. In the overwhelming majority the size of crystals is less than the diameter of muscle fibers of the product or approximately equal to them. At the same time there are no large crystals in the sample which are formed due to the joining of several smaller particles. Most of the crystals are located in the areas of perimission and endomysis, located either between the fibers of the tissue or between their groups. An important point is the absence of the formed ice particles directly inside the fibers of the tissue which reduces the probability of its destruction. No lesions of the sarcolemma have been detected (Figure 1), but the overall degree of tissue structure disturbance is estimated as insignificant. The densification of tissues into groups is noticeable a significant part of which is characterized by poorly isolated endomysis. The total content of individual, non-sticky ice particles is within 13% of the total volume of frozen tissues.

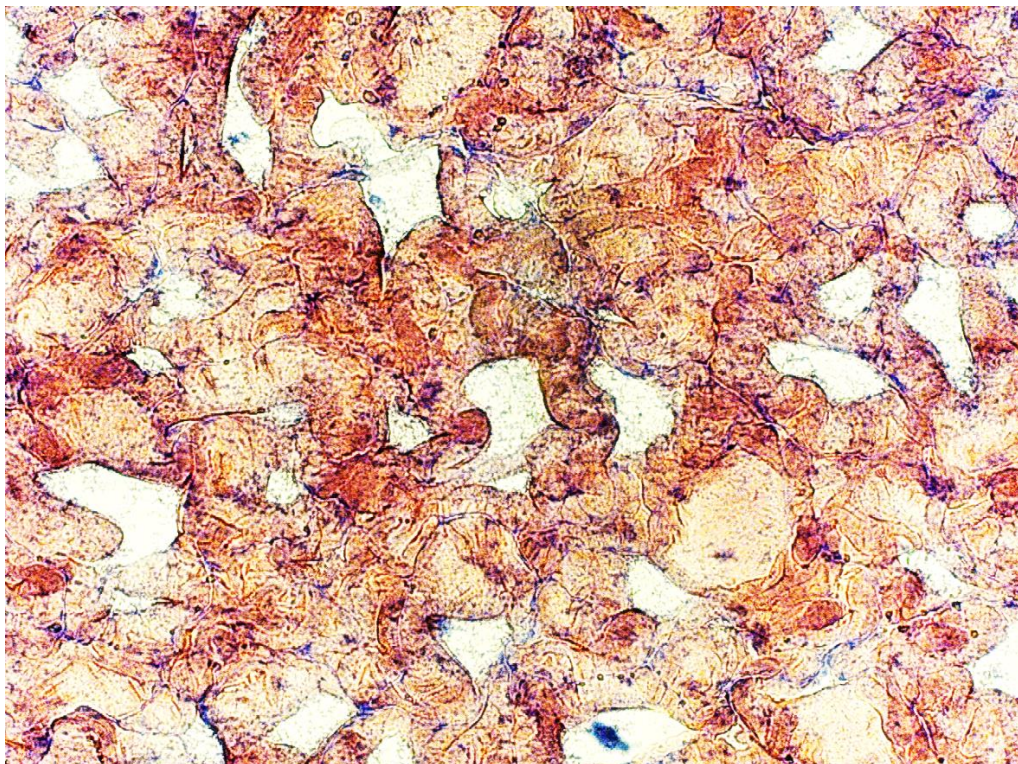


Fig. 1. The cross-sectional view of the muscle fibers of the trout of sample T 12. 20x.

Sample T 9 (shock freezing regime)

Clearly visible are the irregularly shaped ice particles of different sizes - from medium to large. Based on the shape and size of the crystals, it can be concluded that the largest of them are formed due to the combination of two or more separate particles. Particles of the largest size are in perimysium and, in part, in endomysia. Their size significantly exceeds the size of fibers of frozen tissue.

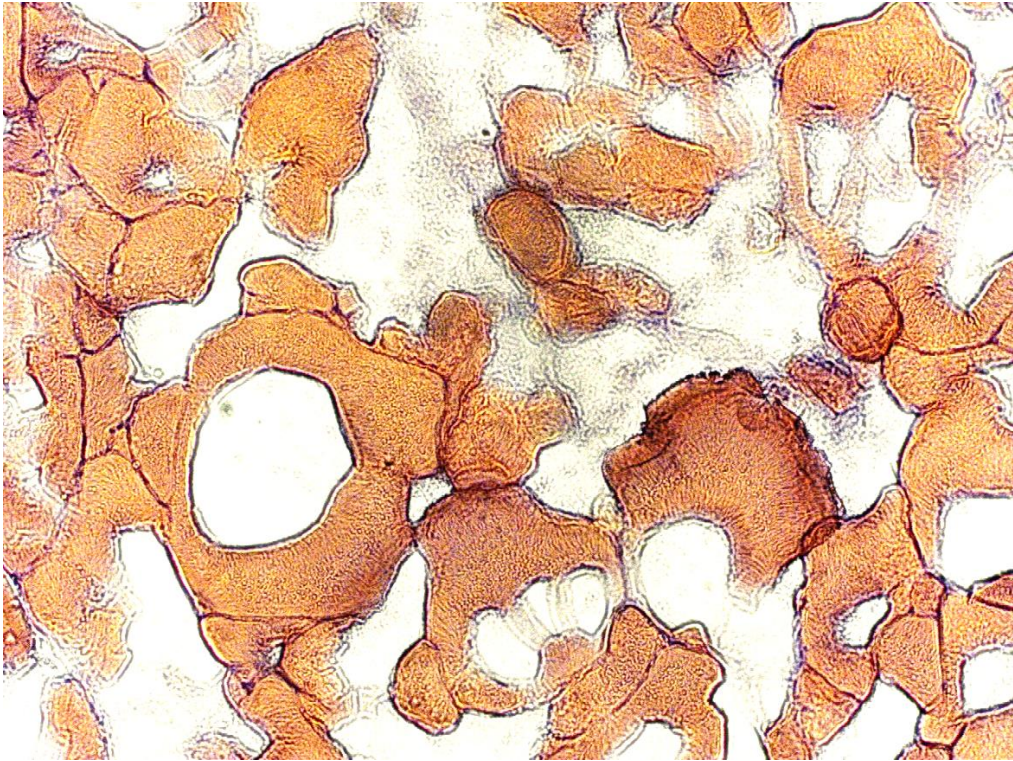


Fig. 2. The cross-sectional view of the muscular fibers of the trout of sample T 9. 20x.

When considering the cut, it can be concluded that almost the entire volume of frozen water is in the perimysium and, to a lesser extent, endomysium. The ice particles formed during freezing are also found inside the fibers of the tissue. This can cause a partial destruction of the structure of sarcoplasm and sarcolemma (Fig. 2). If you evaluate the area of defects in muscle tissue, then it can be argued that it is very extensive and a significant portion of frozen meat is damaged. The total number of individual ice particles (the percentage of porosity of the muscle tissue) is within 34% of the total muscle mass.

Comparative test of pieces of frozen meat in the mode of acoustic freezing AEF and in the mode of usual shock freezing.

Photo 1 - Acoustic mode AEF



RESULTS OF THE TESTS FROM JULY 14, 2017

1. Sample № 1 - Meat packed in sealed bag Meat Test2 26/01/01
(name of a particular product, characteristic of the sample)

2.

(manufacturer, supplier, product code)

3. _____

(name of the client's company, accompanying document)

4.

(amount of the sample and its mass, the date of receipt of the sample)

5. _____

(sample registration number, test date (s))

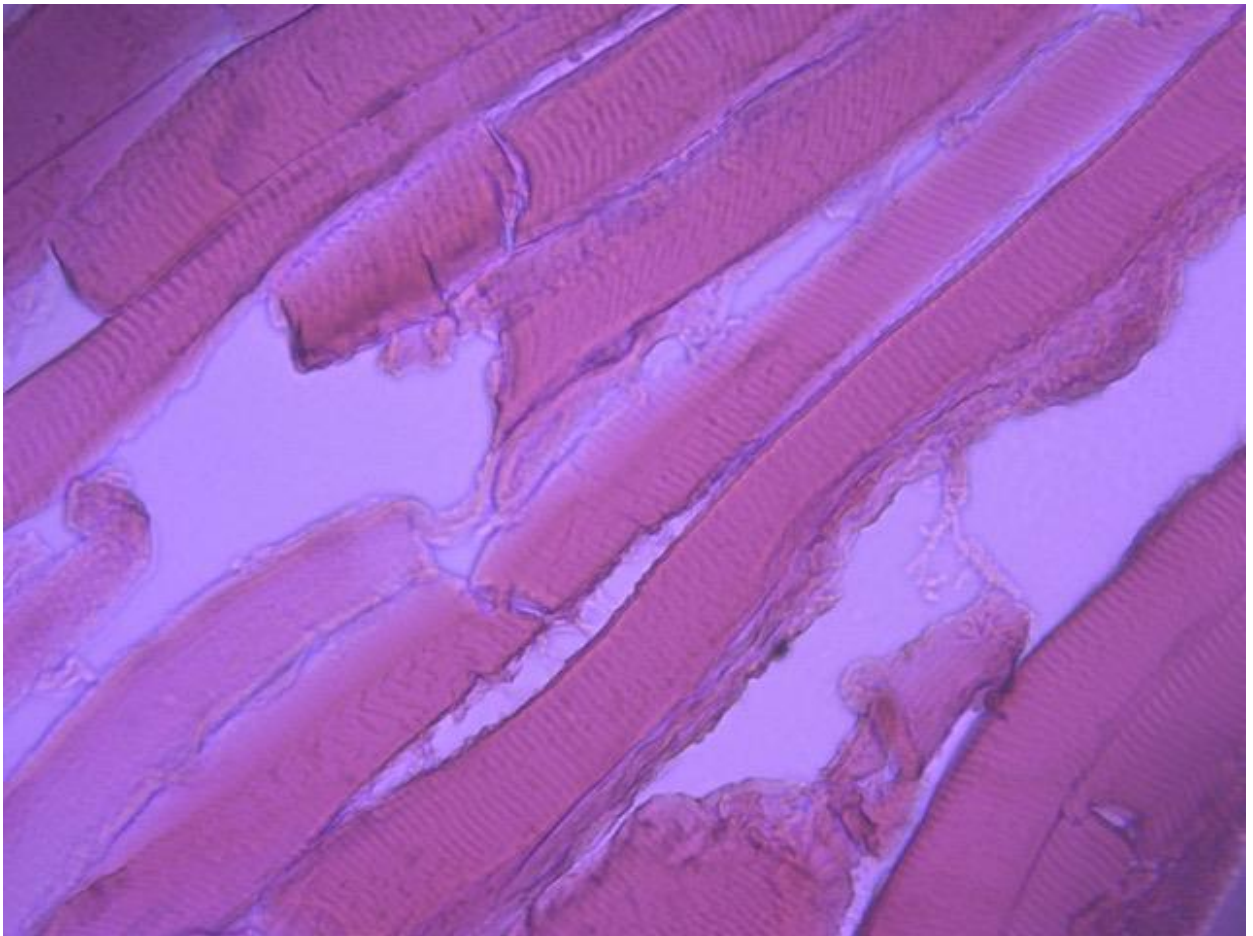
6. pH; histological identification _____

(ID, the conformity of which the products are tested in agreement with the customer)

7. Total number of pages: 1 _____

<i>Indicator name</i>	<i>Unit of measurement</i>	<i>Test procedure</i>	<i>Test result</i>
<i>pH</i>	<i>Un.pH</i>	<i>Standard authorized by the State P 51478-99</i>	<i>5,5 ±0,1</i>
<i>Indicator name</i>	<i>Test procedure</i>	<i>Test result</i>	
<i>Identification of the composition of the product (histological method)</i>	<i>Standard authorized by the State 19496- 2013, Standard authorized by the State 31479- 2012</i>	<i>Muscle tissue microstructure: fractures of the integrity of the transversal muscle fibers are detected in the cross sections of the meat and fragments of the structure of the nuclei are conserved. The muscle fibers are clearly defined. The coloring is good, uniform. The connective tissue and fatty intermediate layers are contained in the sample in a small amount, do not have visible changes. No microflora spots.</i>	

Photo 2 - Freezing mode



RESULTS OF THE TESTS FROM JULY 14, 2017

1. Sample No. 4 - Meat in a polyethylene bag Meat T1K 06/02/17
(name of a particular product, characteristic of the sample)

2.

(manufacturer, supplier, product code)

3. _____

(name of the client's company, accompanying document)

4.

(amount of the sample and its mass, the date of receipt of the sample)

5. _____

(sample registration number, test date (s))

6. pH; histological identification _____

(ID, the conformity of which the products are tested in agreement with the customer)

7. Total number of pages: 1 _____

<i>Indicator name</i>	<i>Unit of measurement</i>	<i>Test procedure</i>	<i>Test result</i>
<i>pH</i>	<i>Un.pH</i>	<i>Standard authorized by the State P 51478-99</i>	<i>5,8 ±0,1</i>
<i>Indicator name</i>	<i>Test procedure</i>	<i>Test result</i>	
<i>Identification of the composition of the product (histological method)</i>	<i>Standard authorized by the State 19496- 2013, Standard authorized by the State 31479- 2012</i>	<i>Muscle tissue microstructure: fractures of the integrity of the transversal muscle fibers are detected in the cross sections of the meat and fragments of the structure of the nuclei are conserved. The muscle fibers are clearly defined. The coloring is good, uniform. The connective tissue and fatty intermediate layers are contained in the sample in a small amount, do not have visible changes. No microflora spots.</i>	