ATP, IMP, and glycogen in cod muscle at onset and during development of rigor mortis depend on the sampling location

Variation in glycogen, ATP, and IMP contents within individual cod muscles were studied in ice stored fish during the progress of rigor mortis. Rigor index was determined before muscle samples for chemical analyzes were taken at 16 different positions on the fish. During development of rigor, the contents of glycogen and ATP decreased differently in relation to rigor index depending on sampling location. Although fish were considered to be in strong rigor according to the rigor index method, parts of the muscle were not in rigor as high ATP concentrations were found in dorsal and tail muscle.
ATP and glycogen content related to gaping in pre rigor cod (Gadus morhua) frozen in blocks at sea

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Authors: Cappeln, G. (Intern), Jessen, F. (Intern)
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Degradation of ATP and glycogen in cod (Gadus morhua) muscle during freezing

Changes in ATP, IMP, lactate and glycogen contents in the muscle of cod were followed during freezing at temperatures of -20°C and -45°C. ATP degradation was accompanied by a corresponding increase in IMP content. Simultaneous measurement of temperature showed that at both freezing rates, the greatest decrease in ATP content was observed when the temperature reached -0.8°C. Glycolysis occurred during freezing of cod as indicated by an increase in lactate content. The changes found in all measured metabolites were more pronounced when freezing was performed at a slow rate compared to a fast rate due to the thermal arrest time at about 0.8°C.
Glycolysis and ATP degradation in cod (Gadus morhua) at subzero temperatures in relation to thaw rigor

Glycolysis was shown to occur during freezing of cod of decrease in glycogen and an increase in lactate. In addition, the ATP content decreased during freezing. Synthesis of ATP was measured as degradation of glycogen. During storage at -9 and -12 degreesC it was found that degradation of ATP was faster than synthesis of ATP. This was leading to presence of glycogen even at low ATP concentrations. The ATP and glycogen degradation rates and lactate formation rate reached an optimum (both in small samples as well as in whole fish) when stored at -9 degreesC compared to -12 degreesC. Evidence of ATP synthesis at 0 degreesC during thawing was obtained in samples as well as in whole fish. Reduction or elimination of thaw rigor effects (shrinkage and drip loss) during a period of frozen storage were examined. When thawing at 5 degreesC, fillets stored at -9 degreesC showed significantly less shrinkage than fillets stored at -40 degreesC. In addition, pre-rigor fillets (-40 degreesC) showed significantly the smallest drip loss compared with fillets stored at -9 degreesC. (C) 2001 Academic Press.

General information
State: Published
Synthesis and hydrolysis of ATP in frozen fish

General information
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Organisations: National Institute of Aquatic Resources
Authors: Cappeln, G. (Intern)
Synthesis and degradation of adenosine triphosphate in cod (Gadus morhua) at subzero temperatures

This study has demonstrated that the extraction step is very important when analysing ATP and its degradation products. An important factor is whether the sample is fresh, frozen or thawed when homogenised since thawing of the sample will lead to rapid loss of ATP. During frozen storage it was found that ATP in cod (Gadus morhua) was stable at -40 degrees C in small samples for at least 12 weeks. At -20 degrees C it was found that ATP content increases initially and thereafter falls. It was demonstrated that degradation of ATP in small samples occurs faster at 0 degrees C than at -2 and -5 degrees C. Furthermore, it was found that in whole cod ATP could be synthesised at a significant rate at -7 degrees C. (C) 1999 Society of Chemical Industry.
Synthesis and degradation of adenosine triphosphate in cod (Gadus morhua) at subzero temperatures

General information
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Organisations: National Institute of Aquatic Resources
Authors: Cappeln, G. (Intern), Nielsen, J. (Ekstern), Jessen, F. (Ekstern)
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Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.813 SNIP 1.088 CiteScore 2.11
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.819 SNIP 1.153 CiteScore 2.1
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 0.846 SNIP 1.224 CiteScore 2.22
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.891 SNIP 1.129 CiteScore 1.9
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 0.757 SNIP 1.003 CiteScore 1.61
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 0.775 SNIP 0.894
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 0.86 SNIP 1.054
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 2
Scopus rating (2008): SJR 0.751 SNIP 0.838
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 0.732 SNIP 1.14
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 0.704 SNIP 0.963
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 0.565 SNIP 0.89
Web of Science (2005): Indexed yes
Scopus rating (2004): SJR 0.621 SNIP 0.914
Web of Science (2004): Indexed yes
Scopus rating (2003): SJR 0.797 SNIP 1.142
Scopus rating (2002): SJR 0.864 SNIP 1.166
Scopus rating (2001): SJR 0.795 SNIP 0.976
Web of Science (2001): Indexed yes
Scopus rating (2000): SJR 0.61 SNIP 1.063
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Projects:

**Syntese og hydrolyse af ATP i frossen fisk**

Department of Systems Biology
Period: 01/01/1995 → 24/07/2000
Number of participants: 3
Phd Student:
Cappeln, Gertrud (Intern)
Supervisor:
Jensen, Flemming (Intern)
Main Supervisor:
Adler-Nissen, Jens (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: Sektorministerium, Stip-SU
Project: PhD

Thaw-rigor
The metabolic processes related to rigor mortis in fish during freezing, frozen storage and thawing can be related to quality deterioration. In this project these processes are studied in dependence of time and temperature. A special interest is on the relation between thaw-rigor and quality deterioration during processing of fish. The project shall determine the extent and importance of gaping as a result of thaw-rigor and investigate the potential for thaw-rigor in frozen industrial cod blocks. Based on these results an optimized thawing procedure will be developed in order to increase quality and yield of thawed raw material.

National Institute of Aquatic Resources
Thorfisk A/S
Period: 01/01/1995 → 31/03/1999
Number of participants: 2
Project participant:
Cappeln, Gertrud (Intern)
Project Manager, organisational:
Jessen, Flemming (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 1,700,000.00 Danish Kroner
Project