Increasing value of the Atlantic mackerel 
(*Scomber scombrus*)
Total mackerel catch 2006 - 2016
Fat content of mackerel caught around Iceland (2008-2013)

- June (13-18%)
- August (24-30%)
Muscle: Water content 54%

Viscera: Water content 73%
6. Storage/transport
Atlantic mackerel fillets

Hildur Inga Sveinsdóttir
Supervisors: Magnea Karlsdóttir Ph.D., Professor María Gudjónsdóttir and Professor Sigurjón Arason

hilduringa@matis.is
Research questions

• Can mackerel fillets caught in Iceland have a shelf life of 12 months or more in frozen storage?
• Can spectroscopy be used to gain information about sensory attributes of Atlantic mackerel?
• Can Atlantic mackerel be skinned and high quality fillets without skin be produced?
Fillets

• Specific procedure during filleting needed.

• How do we prolong shelf life?
  – Antioxidants
  – Packaging
Fillets

How do we evaluate the shelf life?
• Many measurements performed, focusing mainly on lipid oxidation.
• Sensory evaluation
Fillets

How do we evaluate the shelf life?

• Many measurements performed, focusing mainly on lipid oxidation.

• Sensory evaluation
Fillets

• Without treatment and in traditional packaging mackerel fillets have a shelf life of 4 – 8 months at -25°C.
• With antioxidants – Shelf life of 15 months
• With vacuum packaging – Shelf life of up to at least 15 months (measurements still ongoing)
Fillets

• Without treatment and in traditional packaging mackerel fillets have a shelf life of 4 – 8 months at -25°C.

• With antioxidants – Shelf life of 15 months

• With vacuum packaging – Shelf life of up to at least 15 months (measurements still ongoing)
Fillets

- Without treatment and in traditional packaging, mackerel fillets have a shelf life of 4 – 8 months at -25°C.
- With antioxidants – Shelf life of 15 months
- With vacuum packaging – Shelf life of up to at least 15 months (measurements still ongoing)
Deep skinning

- Why deep skinning?
  - Dark muscle under skin sensitive
  - New possible markets
  - Valuable products from skin and dark muscle
Deep skinning

- Results show deep skinning is possible
- Vacuum packed skinless fillets had a shelf life of 12-15 months at -25°C
Research grants - Participants
Effect of *Calanus finmarchicus* on pelagic fish processing

Stefán Por Eysteinsson

Supervisors: María Gudjónsdóttir, Magnea Karlsdóttir, Sigrún Jónasdóttir and Sigurjón Arason

Stefan@matis.is
Research Questions
Research questions

• Properties of *Calanus* around Iceland
• Which factors have negative effects on mackerel cut offs as a raw material
• The effects of *Calanus* on fishmeal and oil processing
Properties of *Calanus* around Iceland

Picture: Sampling (Clara Jegousse)

Picture: Spring survey (Anouk Ly)
Which factors have negative effects on mackerel cut offs as a raw material

Pelagic fish processing

Sampling
1. Offal
2. Big Drum
3. Redox drum
4. Foaming tank
   I. Foam
   II. Foamless water
5. Post foam tank

Fish meal factory

I. Foam II. Foamless water
The effects of *Calanus* on fishmeal and oil processing
Publications

- Life history of *Calanus finmarchicus*
- How it’s utilized today
- Future potential
- Environmental impact of catching *C. finnmarchicus*

Picture: *Calanus finmarchicus* (Jón Baldur Hlíðberg)
Results
• Preliminary results
  – Observed differences in lipid profile and lipid amounts depending on location
  – Astaxanthin and chitin amounts similar

Results

Mynd: Sýnataka (Clara Jegousse)
Results

- Observed differences in lipid profile
  - C20:1n9 & C22:1n11
    - Highest in the south
  - C20:5n3 (EPA)
    - Highest in the west
  - C22:6n3 (DHA)
    - Highest in the north

Picture: Sampling (Clara Jegousse)
Results

• Which factors have negative effects on mackerel cut offs as a raw material
  – Increased stomach content
  – Temperature
  – Amount of fish caught
    • Increased FFA, PV and secondary oxidation
    • Loss of phospholipids
Results

• The effects of *Calanus* on fishmeal and oil processing
  – Low TVN in the raw material
  – Higher ratio of dry material in stickwater
  – Increase in Cadaverine, Tyramine and Putrescine in fish meal
  – Not a significant increase in FFA in fish oil
Research grants - Participants
Fishmeal for Human Consumption

Guðrún Svana Hilmarsdóttir
Supervisors: Professor María Gudjónsdóttir, Magnea Karlsdóttir Ph.D., and
Professor Sigurjón Arason

gsh9@hi.is
Research questions

• How can we get higher-value product from traditional fishmeal plants?
  
  – We need to see and analyse what we’ve got
    • Production line and different raw materials
  
  – We need to optimise it accordingly / redesign
Traditional process

- Traditional processing in fishmeal and oil differentiates between
  - Fat
  - Dry matter
  - Water

- Doesn’t differentiate if there is quality difference within each phase categories
  - Proposed to investigate each processing step
Síldarvinnslan hf.

- Fishmeal and -oil processing line 2017
  - Each step was sampled to see what’s happening
Síldarvinnslan hf.

- Fishmeal and -oil processing line 2017
  - Circulates
  - Is mixed all together
    - **LOWER QUALITY?**
• First steps are crucial
• Proteins are sensitive
• Not mix the material
• Evaluate each side stream
  – Some material cooked more
  – How much does temperature matter?

What about the different raw materials at the beginning?
Pilot project

- Fresh material
- Different parts of the mackerel
Next steps

- Get the pilot project working with better equipment
- Try with different raw materials / species and different parts of the fish
- Apply that knowledge to the processing line at Síldarvinnslan hf. and see how it works in a full size production
Research grants - participants
Thank you for your attention