Increasing value of the Atlantic mackerel (*Scomber scombrus*)

Hildur Inga Sveinsdóttir
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Guðrún Svana Hilmarsdóttir

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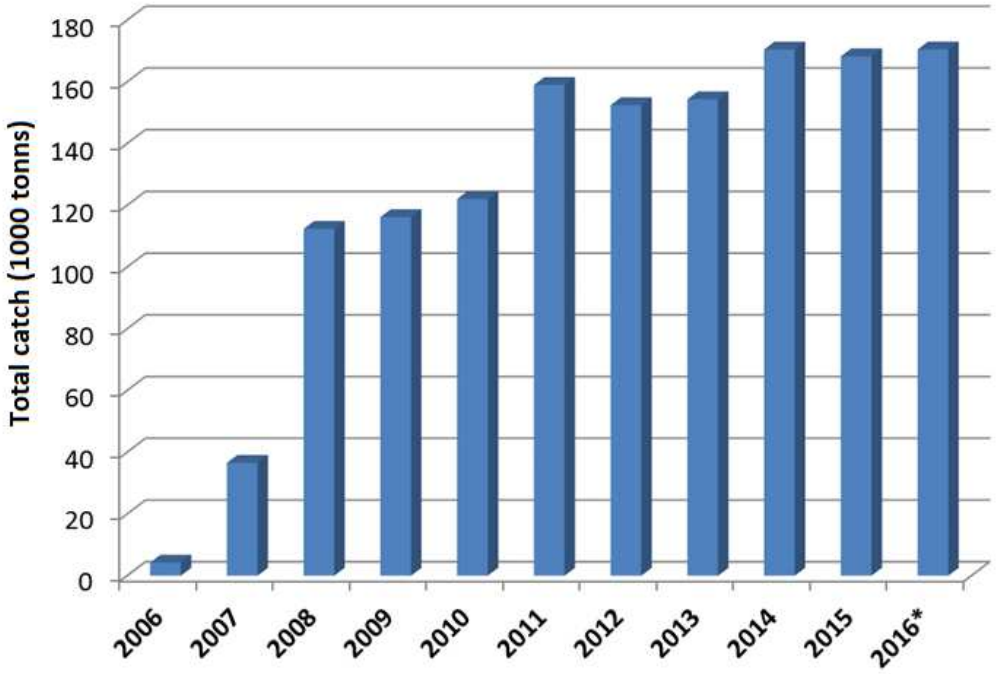
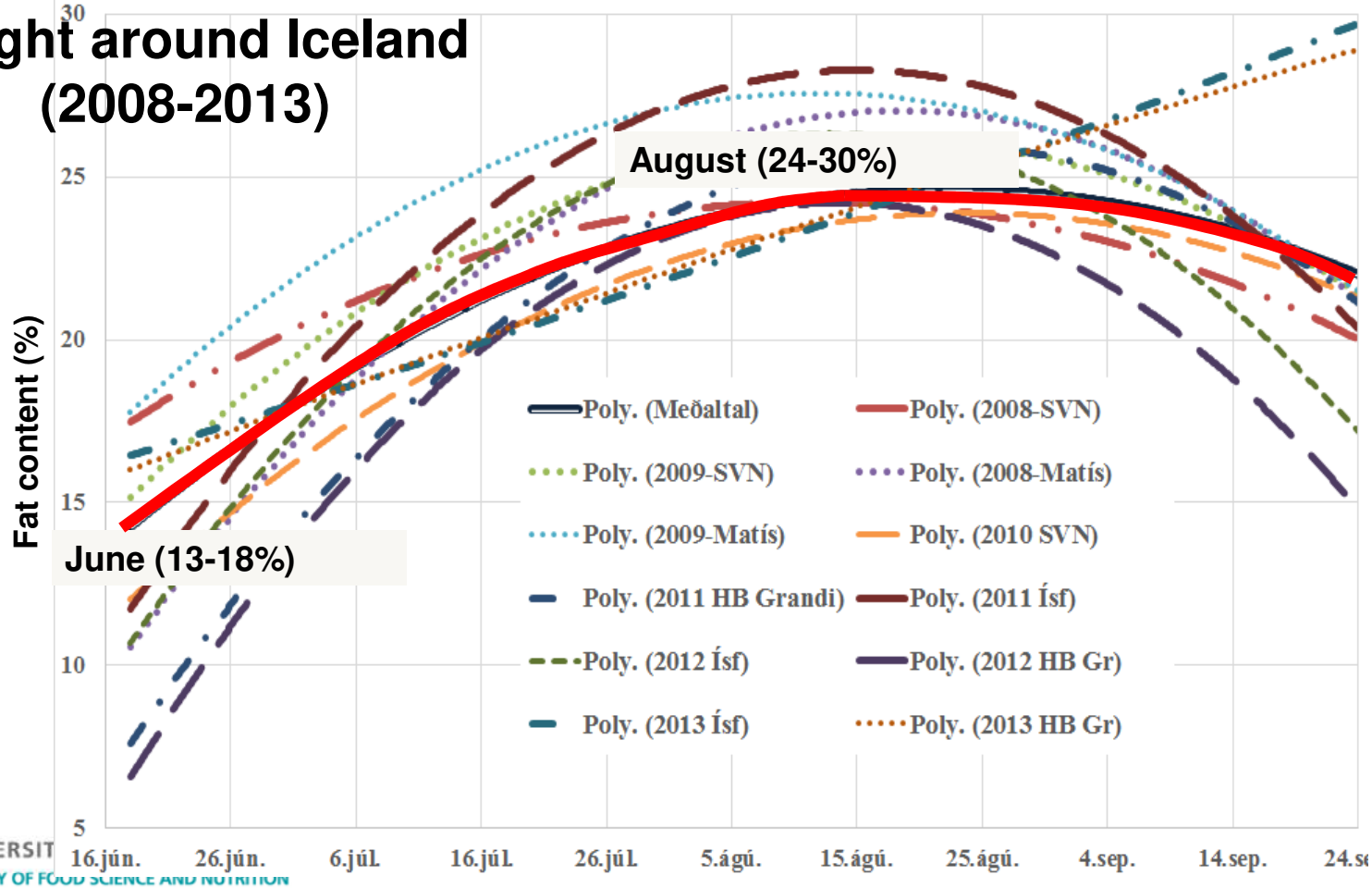
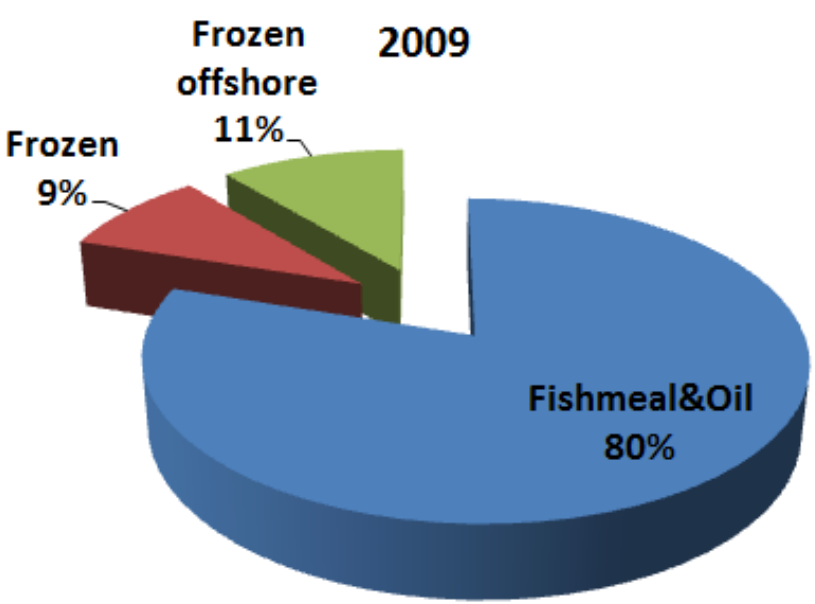
Total mackerel catch 2006 - 2016

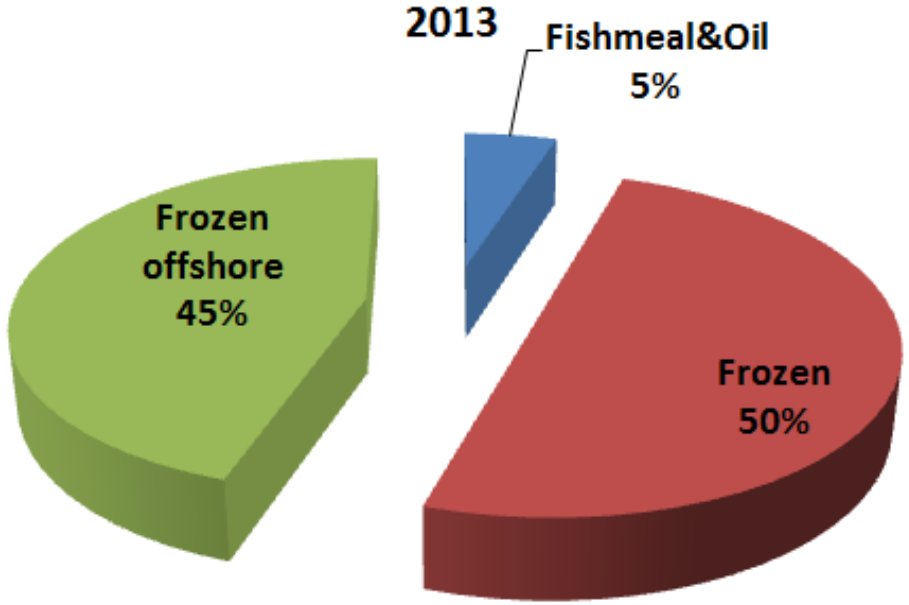


Directorate of Fisheries

Fat content of mackerel caught around Iceland (2008-2013)

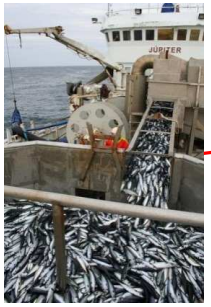


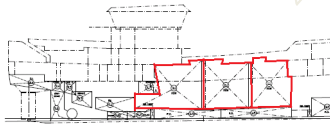

2009
Frozen offshore 11%
Frozen 9%
Fishmeal&Oil 80%

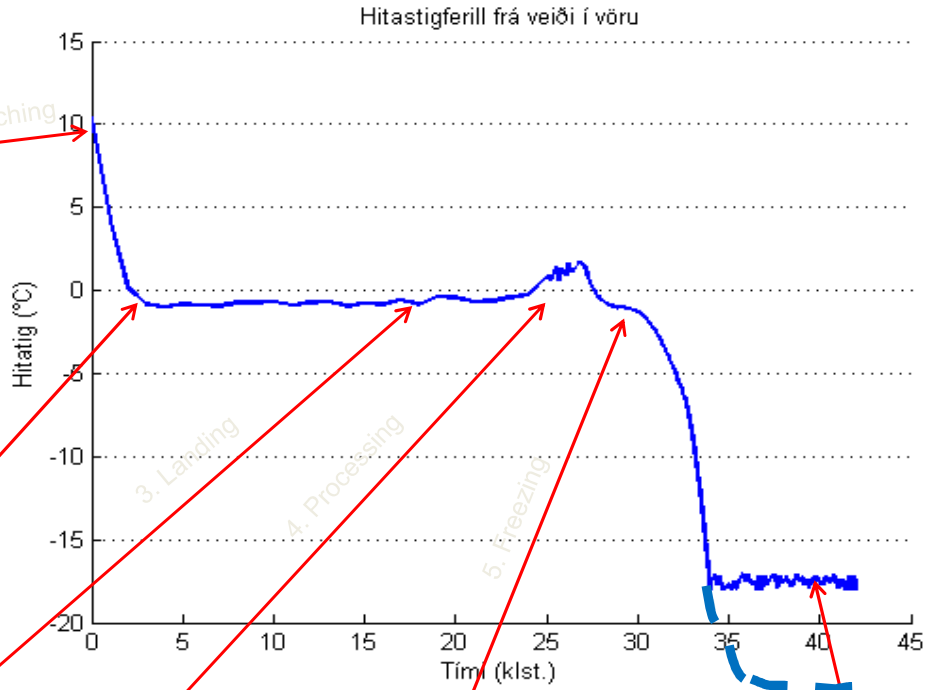

2013
Fishmeal&Oil 5%
Frozen offshore 45%
Frozen 50%

Muscle: Water content 54%

Viscera: Water content 73%






Hitastigferill frá veiði í vöru
Hitatig (°C)
Tími (klst.)
15
10
5
0
-5
-10
-15
-20
0
5
10
15
20
25
30
35
40
45
1. Catching
2. Chilling
3. Landing
4. Processing
5. Freezing
6. Storage/transport

Atlantic mackerel fillets

Hildur Inga Sveinsdóttir
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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

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- 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

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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

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Effect of *Calanus finmarchicus* on pelagic fish processing

Stefan Þór Eysteinsson

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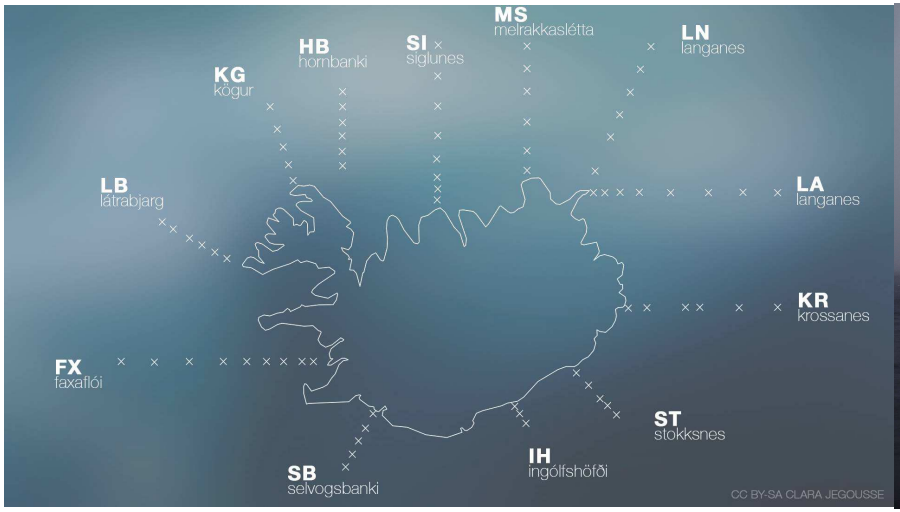
Research Questions

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

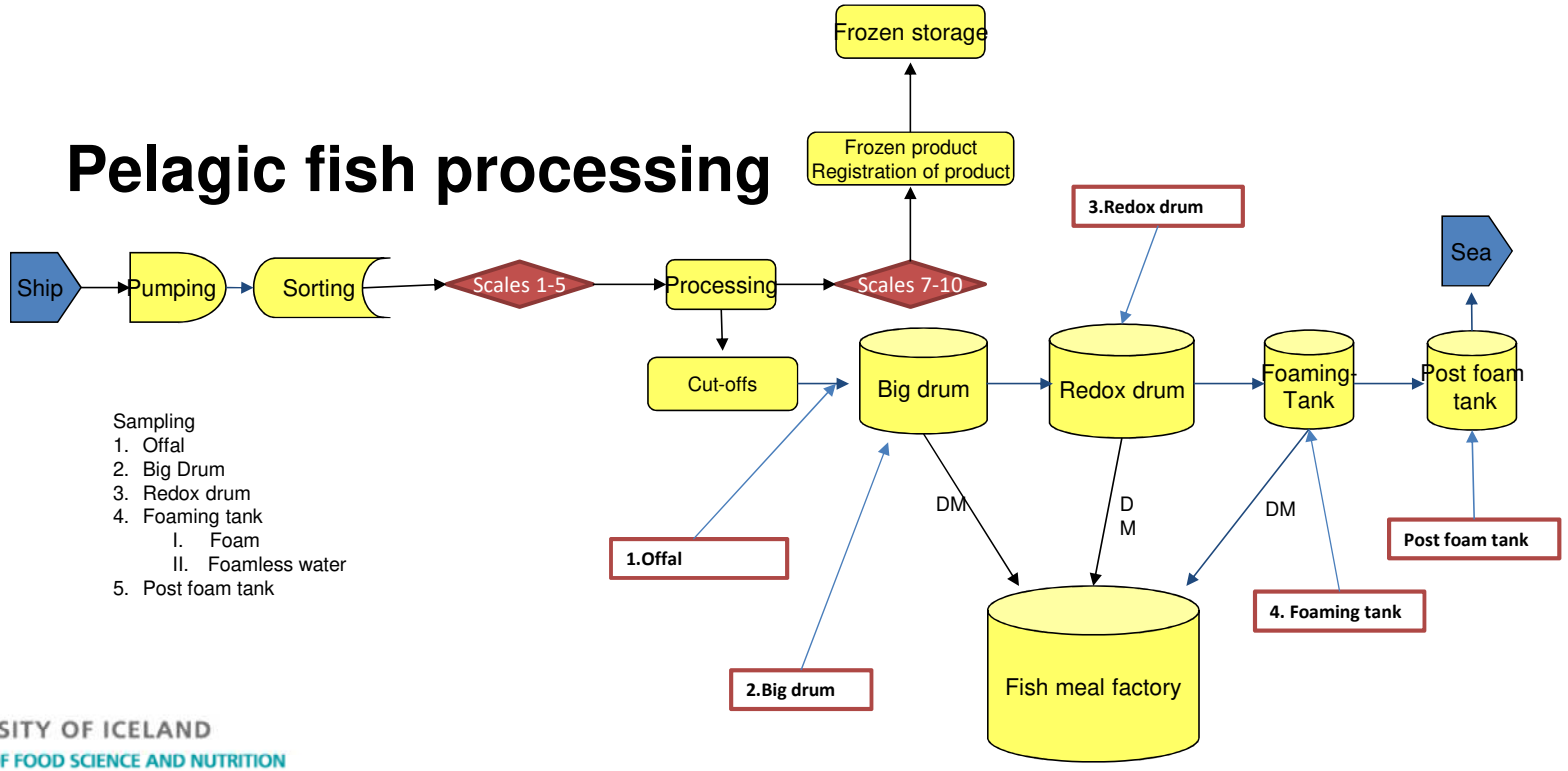
Properties of *Calanus* around Iceland



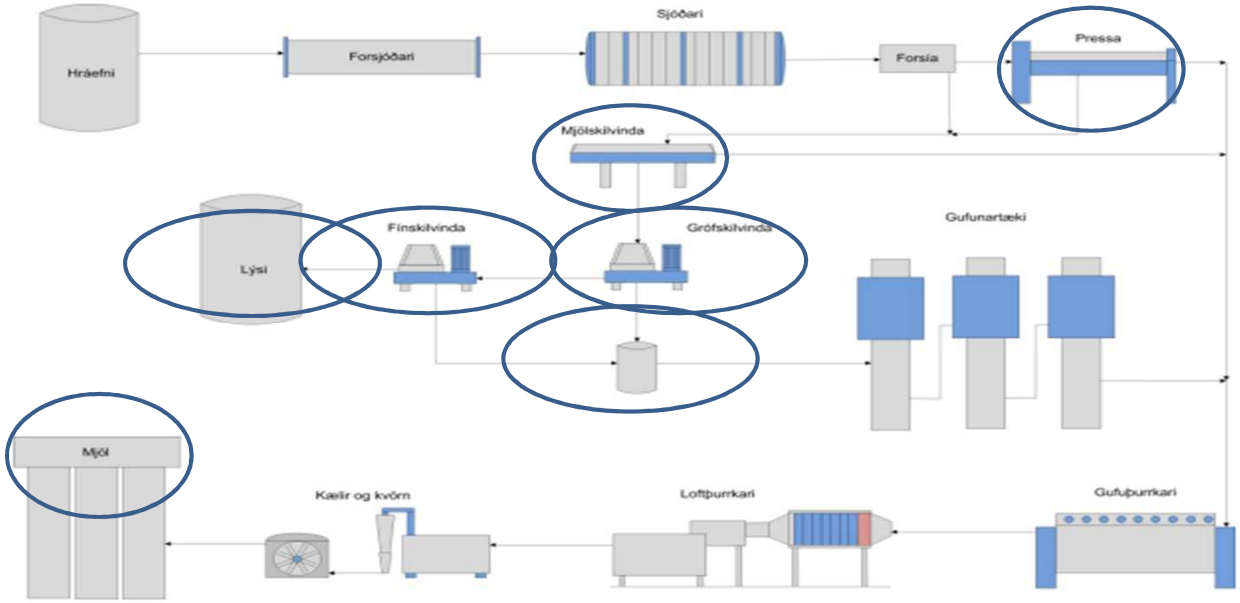
Picture: Sampling (Clara Jegousse)

Picture: Spring survey (Anouk Ly)

Which factors have negative effects on mackerel cut offs as a raw material



The effects of *Calanus* on fishmeal and oil processing



Publications

Contents lists available at ScienceDirect

Trends in Food Science & Technology

journal homepage: www.elsevier.com/locate/tifs

Review

Review of the composition and current utilization of *Calanus finmarchicus* – Possibilities for human consumption

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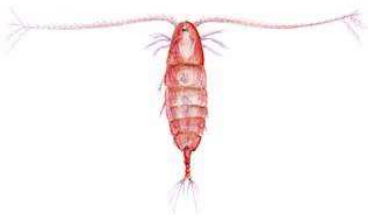
- Life history of *Calanus finmarchicus*
- How it's utilized today
- Future potential
- Environmental impact of catching *C. finnmarchicus*



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)

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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

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Technology Development Fund

Fishmeal for Human Consumption

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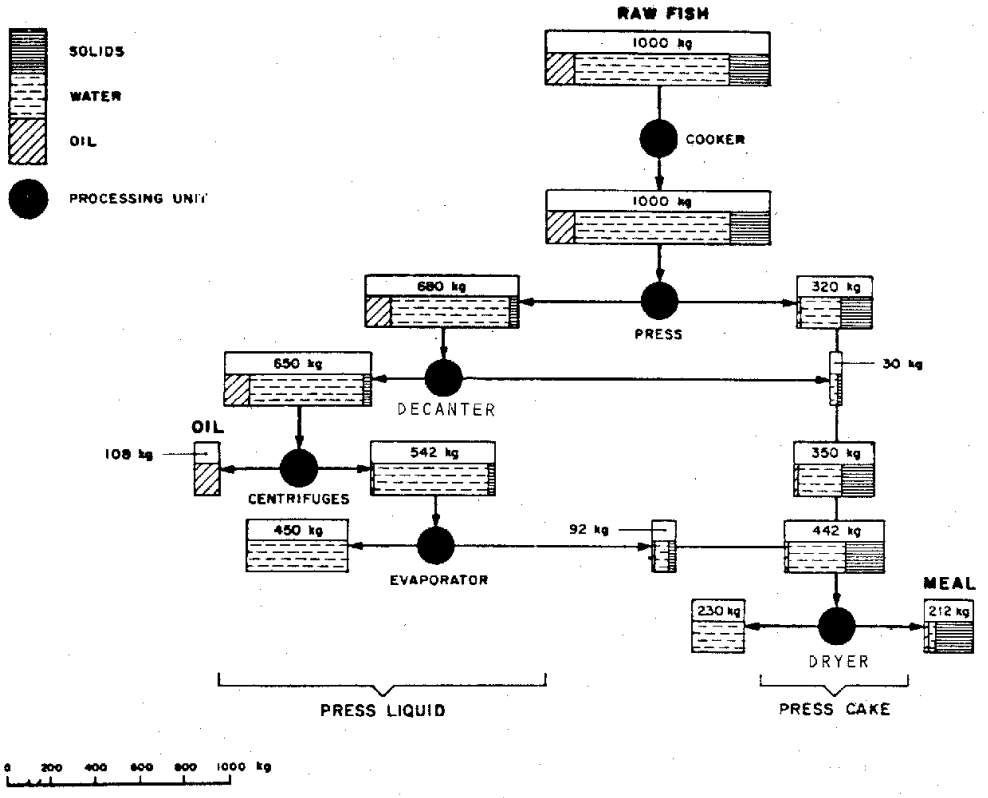
Reseach questions

- 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



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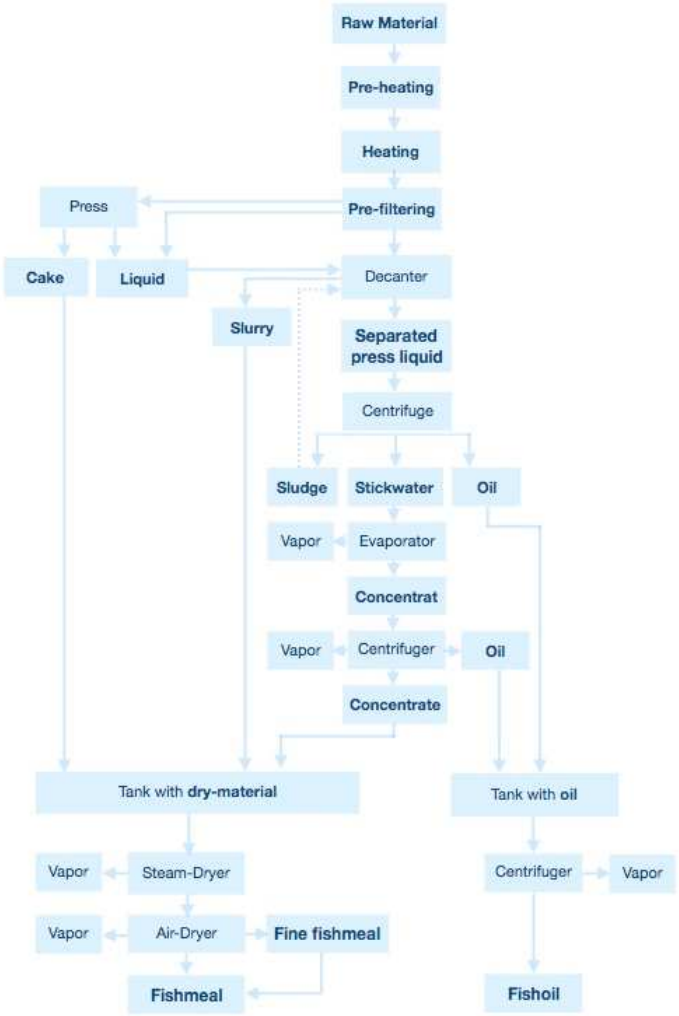
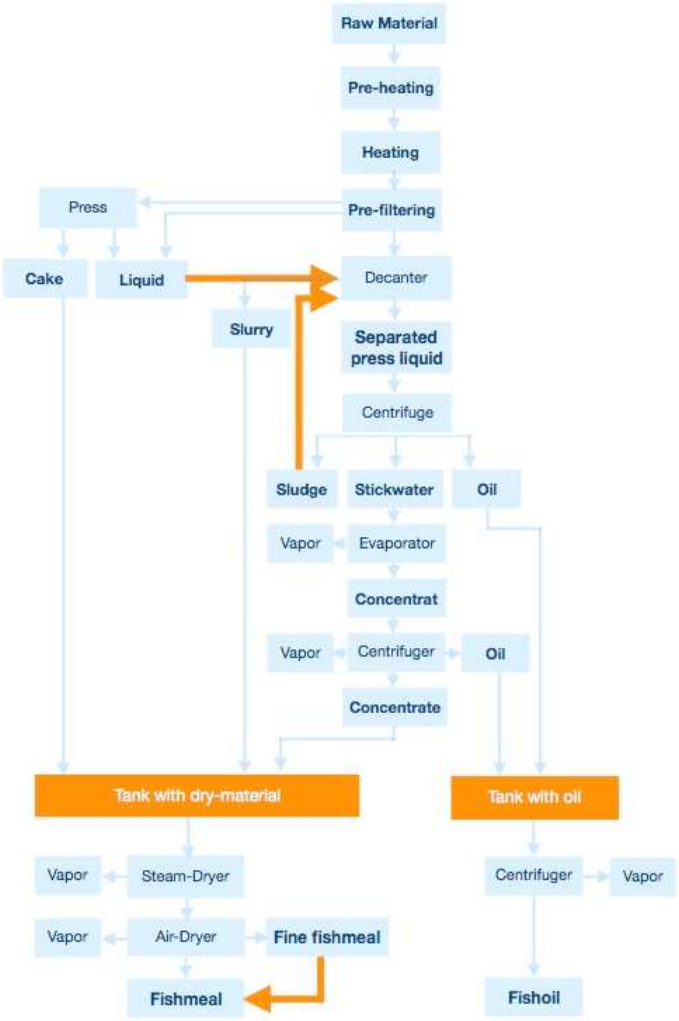
- Fishmeal and -oil processing line 2017
  - Each step was sampled to see what's happening



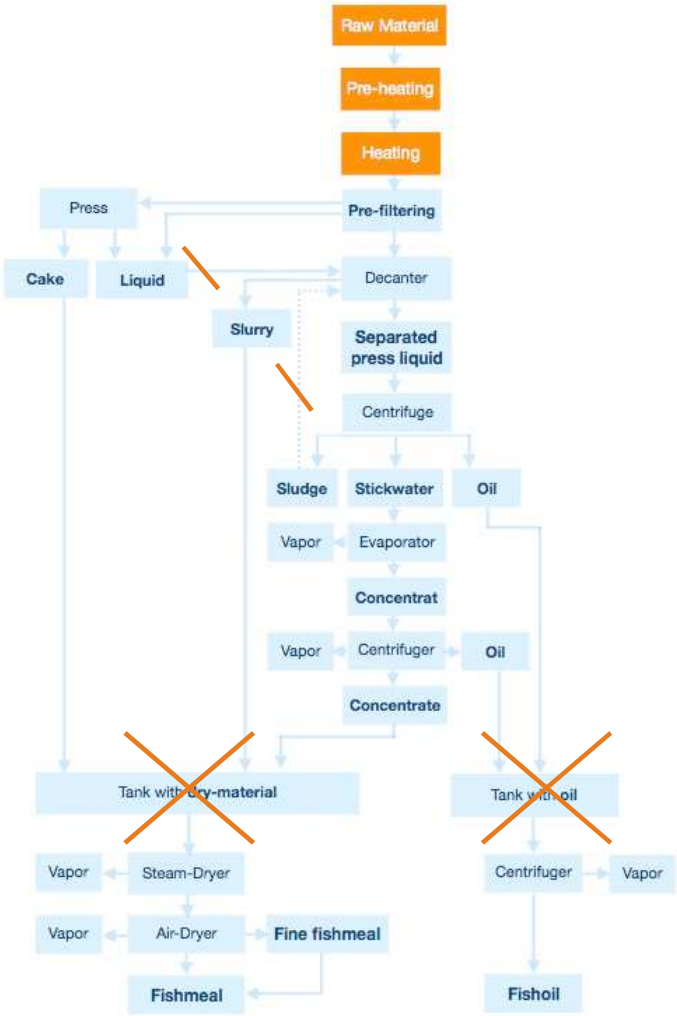
Síldarvinnslan hf.

- 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

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Thank you for your attention

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