

## Utilization of shrimp shells – sustainable and delicious



### North Atlantic Seafood Forum 2020

Bergen,

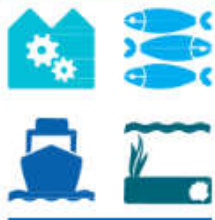
March 5, 2020

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HAV & FISK



Den Europæiske Union



Miljø- og Fødevareministeriet  
Landbrugs- og Fiskeristyrelsen

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## Flavour enhancer based on shrimp shell

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### **Project financed by:**

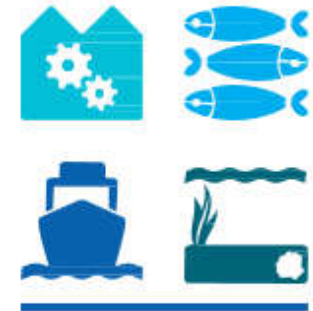
Fællesindsatser fiskeri – innovation under Den Europæiske Hav- og Fiskerifond, Landbrugs- og Fiskeristyrelsen, Miljø- og Fødevareministeriet.

The project will be concluded in 2020.



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Danish Seafood  
Association



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DTU Fødevareinstituttet



Højmarklaboratoriet a/s



## Project partners



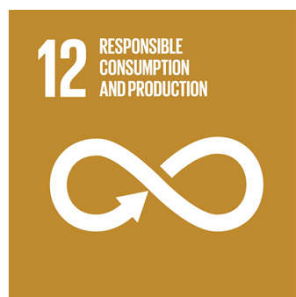
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## Objective

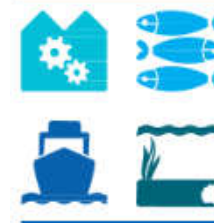
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Develop marine taste enhancers based on shrimp shell from Danish shrimp production

Sustainable use of food resources



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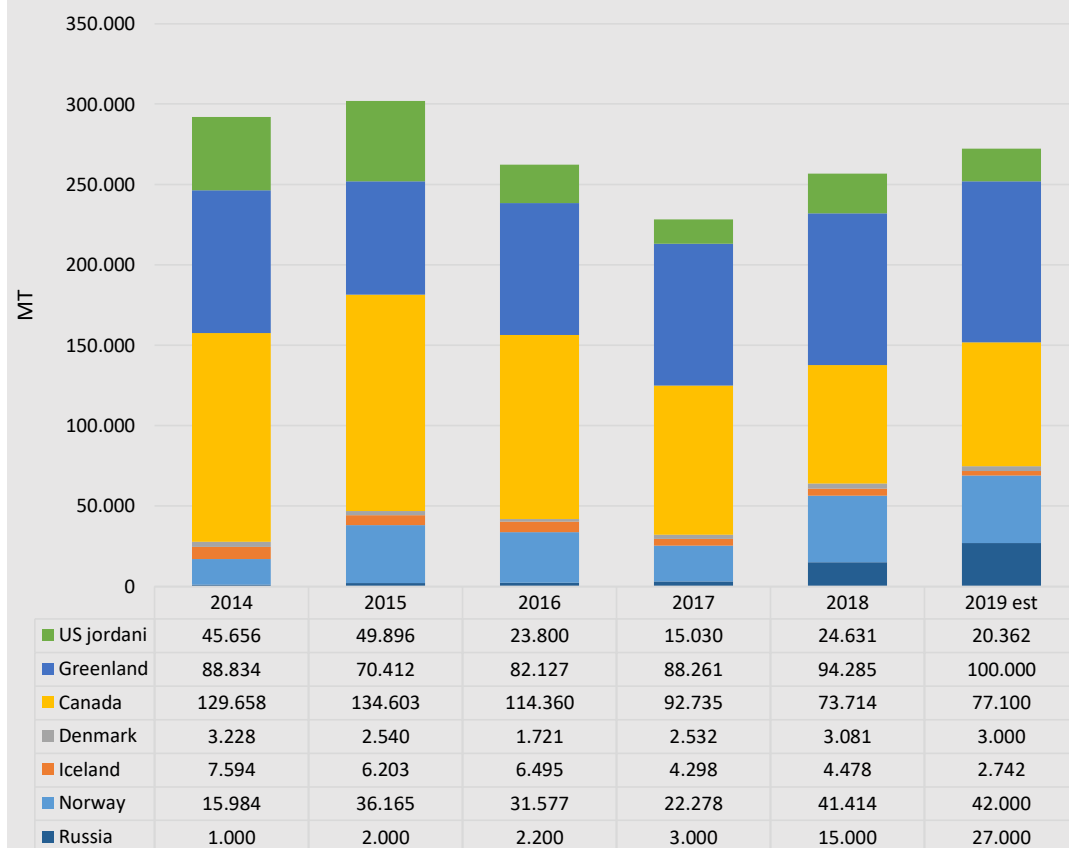


Miljø- og Fødevarerministeriet  
Landbrugs- og Fiskeristyrelsen

## Total coldwater shrimp production

- Total production 2019: 270.000 tonnes
- With 66% shells and heads
- 180.000 tonnes shells and heads
- Half may be sold as shell-on
- 90.000 tonnes shells and heads

Landings of coldwater prawns (*Pandalus borealis* and *Pandalus jordani*) in main fishing countries



## Three process flows

Species	Sea catch and process	Processing	Peeling method
<i>Palaemon adspersus</i>	Small day fishery	Cooked	Hand peeling
<i>Pandalus borealis</i>	caught and kept on ice on fishing vessels	Cooked	Machine peeling
<i>Pandalus borealis</i>	Industry vessels – cooked and frozen	Defrozen	Hand peeling

Shell samples from the three process flows are collected and send for analyses and testing

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## Analyses and testing

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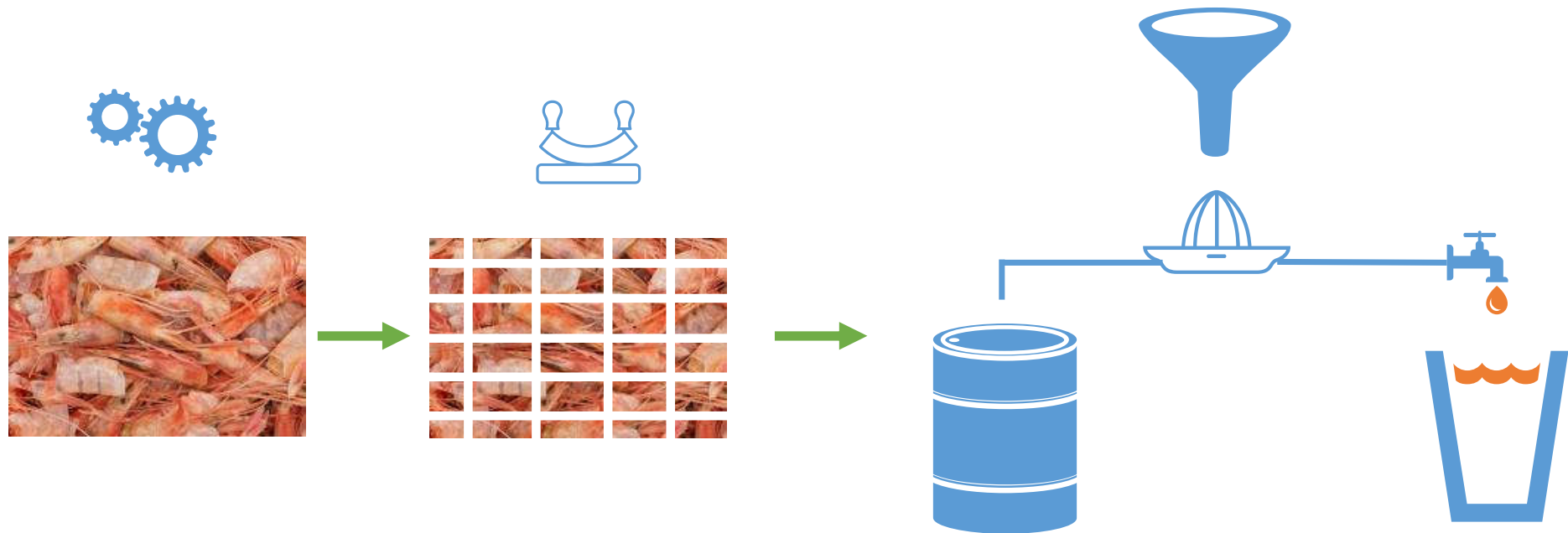
### **Analysed for:**

- Protein, ash, phosphate, TVN, NaCl, lipids, dry matter and more...

### **Tests:**

- **Extracts:** Cooked and enzymatic extraction, and concentrated
- **Powder:** Cooking, drying and milling
- **Process flavours:** browning (Maillard reaction - reaction between protein and sucre) and concentrated
- **Shrimp juice:** Rotary dewatering press

# Shrimp juice: Rotary dewatering press



Input: 100 kg shrimp

33 kg shrimp meat  
66 kg shell

66 kg shells are chopped

33 kg dry matter

33 kg shrimp juice



## Prototype mockups



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## Shrimp juice: Rotary dewatering press

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- Equipment is developed in collaboration between DTU (Danish Technological University) and Larsson Starch (Swedish)
  - Prototype exists



- Potential end product/end use:
  - Used in brine products as it is
  - Heated, stabilised and canned
  - Condensed to a thick creamy shrimp juice
  - Spray drying to powder

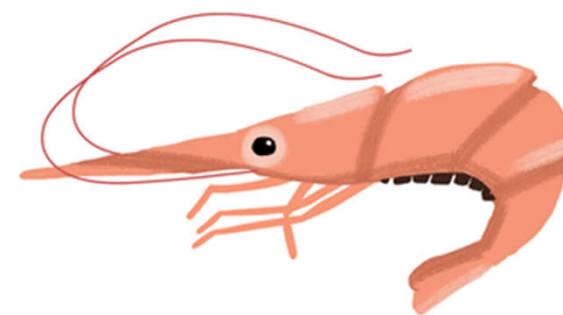


## Costs and benefits

Costs	
Investment costs total (€)	235.000
Maintanance and operation (€/yr.)	52.000
Total costs year 1	287.000
Total costs year 2...	52.000

Production costs	Year 1	Year 2...
Juice (€/kg)	1.10	0.20
Shrimp cream (€/kg)	2.16	0.40
Powder (€/kg)	22.10	4.00

Production capacity	
Shrimp (tonnes)	2.000
Meat (tonnes)	667
Shell (tonnes)	1.333
Juice (tonnes)	267
Drymatter (tonnes)	267
Shrimp cream (tonnes)	133
Powder (tonnes)	13



## Next step – closing the circle

- Possible to make great taste enhancer – large scale test is needed
- Other fractions that may to be utilized:
  - Process water
  - Dry fraction



**Thanks**



**North Atlantic Seafood Forum  
2020**

**Bergen,**

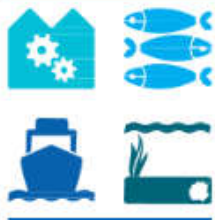
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