Toward Full Utilization of the Green Crab Biomass: Food and Feed Ingredients

Denise Skonberg, PhD
School of Food and Agriculture
University of Maine

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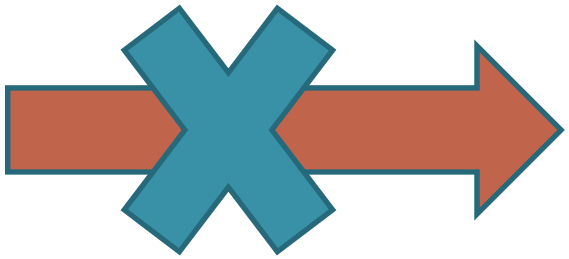
Lack of Established Markets for Commercial Food Use of Green Crabs in U.S.



Carapace Width

Green crab: 5 - 85 mm

Dungeness crab: > 180 mm

Blue crab: > 140 mm

-Oregon Dept of Fish & Wildlife

-www.cameronsseafood.com

Potential Food/Feed Utilization Streams of Harvested Green Crab

Whole crab meal

Whole crab for restaurants

http://www.salemnews.com

Mechanical separation

Mince:

- Seafood-based recipes
- Functional isolated protein powders
- Low ash meal

Shell:

- Pigments
- Chitin/chitosan
- Soup stock

Mince Production

- Mechanical separation using “deboner”
- Yields mince meat (puree) and solids stream

Key Results

- Learned best operational parameters for deboning green crabs using Paoli separator
- Best results with smaller crabs
- Average mince yield ~ 50%
- Satisfactory microbial quality for human consumption
- Average composition (wet weight): 81.5% moisture, 10.4% protein, 5.1% ash, 1.5% fat

Food Product Development Study

- Empanada with green crab mince
  - Popular South American stuffed and fried pastry
  - Consumer acceptability of empanadas containing 30, 50 and 70% green crab mince in filling
  - 87 people tested appearance, texture, flavor, and overall acceptability

- How likely would you be to purchase?
  - 63% “probably or definitely would buy”
- 30% and 50% mince empanadas were preferred to 70% mince

2018 Boston Seafood Show

Functional Protein Powders for Food Use

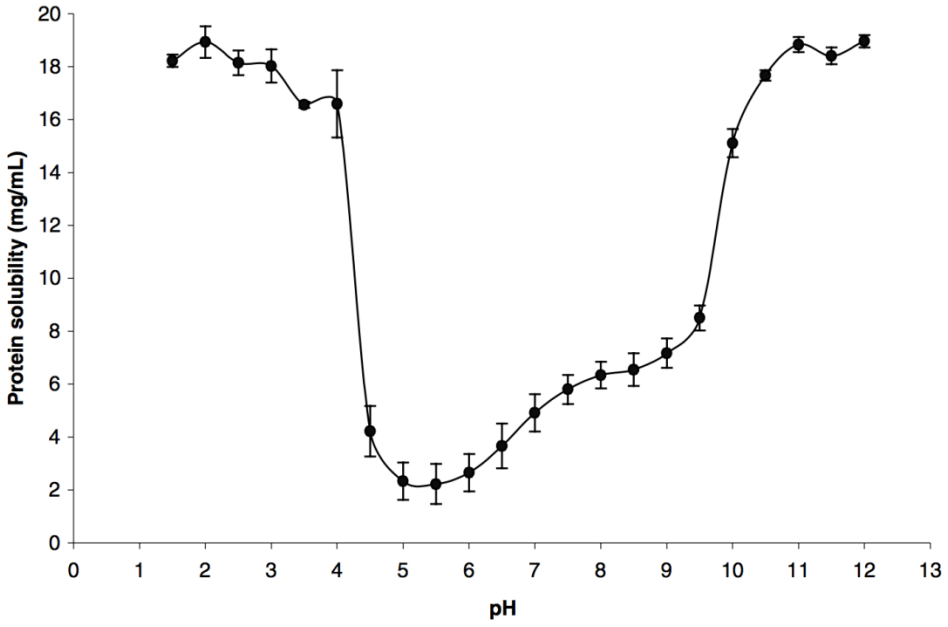
- Application of isoelectric solubilization/precipitation (ISP)

- Allows separation of lipids, bone/shell, increases protein content

- Can be applied to low value fish and processing by-products

- Method for producing protein-rich powders as food ingredients

- Not previously reported for crab or for crustacean by-products



Kristinsson, H. G., and Y. Liang. *Journal of Food Science* 71.5 (2006): C304-C312.

Objectives

- Evaluate use of ISP method to recover functional proteins from green crab mince stream
- Assess the effects of low (PP2) and high (PP10) pH solubilization on:
  - Protein recovery
  - Nutritional profile
  - Protein molecular weight
  - Functional properties in food: gelation, solubility, emulsifying, foaming

Results

- ISP method obtained functional proteins from raw green crabs:
  - Gelation: PP2 > PP10
  - Emulsifying: PP10>>PP2
  - Solubility at neutral pH: PP10>>PP2

Potential uses as food ingredients:

- PP10: Sauces, chowders, souffles, sausages …..
- PP2: Food gels, eg. surimi or other meat analog products

Dried Mince

PP2 powder

PP10 powder

Proximate Composition

	Mince	PP2	PP10
Moisture (%)	77.3 ± 0.1	82.6 ± 0.2	80.3 ± 0.5
Protein (%) - DM	48.0 ± 0.6	76.4 ± 0.0	69.0 ± 0.0
Fat (%) - DM	7.7 ± 0.2	16.0 ± 0.6	23.8 ± 0.9
Ash (%) - DM	23.0 ± 0.1	5.4 ± 0.2	2.3 ± 0.1

Whole Green Crab
(McNiven et al 2013)

Ash, DM: 32.9 – 40.7%
Protein, DM: 6.2 – 18.4%
Lipid, DM: 1.9 – 4.7%

- ISP concentrated protein and fat, and reduced ash content of mince
- Potential low ash crab meal for fish feeds

Shell stream: pigments

- Carotenoid pigments (eg astaxanthin) for food, supplement, and aquaculture feed use
- **Objective:** Extract pigments using natural, food grade solvents
- Pressurized Fluid Extraction
- **Variables:**
  - Solvent, pressure, temperature, cooked/raw shell
- Quantity, quality, and stability of antioxidant pigments

In Summary:
Mechanical separation of green crab

- Produces mince meat and solid streams
- Potential for wide variety of value-added products for full utilization
  - Recipe development (food service application)
  - Functional proteins for formulated foods
  - Carotenoid pigments for multiple applications
  - Low-ash meal for fish/animal feeds
  - Many other potential products

Thank you for your attention!

Comments?
Collaborations?

Denise.Skonberg@maine.edu