Opportunities and challenges for fishery by-products and by-catches to contribute to the supply of aquaculture feed ingredients.

A study based on the British fishery-aquaculture continuum.

Alban Caratis, M.sc. Sustainable aquaculture.
Why should we use by-products?

• **Aquaculture:** + 70 million tonnes by 2050.

  • **Need resources:**
    industrial fisheries fully exploited.

  • **Substitution with veg. ingredients:**
    cannot replace all the fish meal.

  • **Alternative:**
    fish by-products to make fish meal (35% in 2012).

(World resource institute, 2014), (FAO, 2014)
Are there more by-products?

• Previous study of IFFO & IoA (2016):
  • identify further supplies to make fish meal.

Fish could be more highly processed in the factories.

Opportunities for using fisheries by-catch and by-products produced at sea.
An economic study for this year:

• **1 objective:**
  • Fill knowledge gaps: look at detailed data to establish the facts and figures when it comes to use fishery by-products and by-catch for aquafeed ingredients in a given location.

• **These information are essential in the way that:**
  • Provide IFFO’s members with a summary of the opportunities and challenges for using fishery by-products and by-catch as aqua-feed ingredients.
  • Develop a methodology based on the UK that is transferable to other countries.
Our approach in 3 key milestones:

1. Review of the facts and figures of the fishery sector.
   - Secondary data review.
   - Develop contacts with K.I. persons.
   - 2 months

2. Resource mapping and inventory of the destinations.
   - Inventory of the B.P. and B.C. in the UK. Based on capture and trade statistics.
   - Inventory of the current routes.
   - K.I. interviews/fishing & processing sector.
   - Questionnaires/fishermen & processors.
   - 2 months

3. Assessment of the opportunities and challenge for using BP & BC.
   - Based on the compilation of the knowledge gained through stage 1 and 2.
   - K.I. interviews: aqua-feed sector.
   - 1 month
By-products and by-catches?

• Produced at sea and on-shore:

  AT SEA

  By-catch:
  • No market value.
  • No right to land it.

  1\textsuperscript{st} processing b.p.:
  • Non-edible portion.
  • No market demand.

  ON SHORE

  2\textsuperscript{nd} processing b.p.:
  • Non-marketable portion.
  • No market demand.
Volumes of B.P. & B.C. in the UK (2014):

~1 116 000t.
~244 000t.
~328 255t.

76% on shore
24% at sea

- By-catches: 45 568t.
- 1st by-products: 30 961t.
- 2nd by-products: 251 726t.

*Imports.

*Results from our national statistics analysis: 4360 vessels, 333 processors.
Current routes for B.P. & B.C.:

**At sea:** all discarded.
- **Market:** price offered for FM too low.
- **Logistic:** more convenient to discard.

- ~75 000t. of fish products **discarded at sea.**
- ~30 961t. 1st by-products.
- ~45 568t. By-catches.
- ~251 726t. 2nd by-products.
- ~180-190 000t. **reduced into fishmeal.**
- ~20-70 000t. shells wastes **disposed.**

**On-shore:** current uses, low value added or cost.
- **Fish meal:** ~(+)£80/T.
- **Disposal:** ~(−)£50-120/T.
- **Few remaining:** geographically constrained.

*Results from our national statistics analysis: 4360 vessels, 333 processors.*
First observations:

• **Utilised resource in the UK:** poorly valued, going to fishmeal, only option.

• **Under-utilised resources/ economic constraints:**

  - **ON SHORE**
    - In remote areas or for small volumes, expensive to collect for FM producers.

  - **AT SEA**
    - Lack of economic incentive to land the 1st by-products & by-catches.
Study on higher-value upgrading options:

• Fish protein hydrolysates production (FPH):
  
  Much stricter requirements for sourcing raw materials:
  
  • 1) Need mono-specific whereas fish meal will take up anything as long as it swims.
  • 2) Much more advanced & complex production: need consistency in the volume, composition and freshness.

Suitability for the fishery industry?
Regional disparities: 1st B.P. & B.C.

Regional repartition of the total B.P. & B.C. in the UK:

- PETERHEAD: 95% of fish products
  - Landed: ~176,572 t.
  - 1st B.P.: ~16,466 t.
  - By-catch: ~6,519 t.

- OBAN: 97.5% of shellfish products
  - Landed: ~1339 t.
  - By-catch: ~56 t.
  - 1st B.P.: ~227 t.

>95% of fish products
>97.5% of shellfish products

*Results from our national statistics analysis: 4360 vessels, 333 processors.*
Inconsistent volumes: 1st B.P. & B.C.

- Results from our boat-scale analysis in Peterhead: fleet of 23 demersal trawlers.

**Seasonally**

![Graph showing seasonality of activity for one major company in 2015]

**Weekly**

![Graph showing average boxes landed per day by day of the week]

*Results from our boat-scale analysis in Peterhead: 23 vessels.*
Inconsistent composition: 1\textsuperscript{st} B.P. & B.C.

- Results from our boat-scale analysis in Peterhead: fleet of 23 demersal trawlers.

*Results from our boat-scale analysis in Peterhead: 23 vessels.*
Opportunities for by-catches:

• Landing obligation of the by-catches:
  • Implementation of a discard ban from 2016 to 2019 in the EU (Article 15, CFP regulation 1380/2013).

3 main species (55%):

- Haddock: 1120t.
- Whiting: 7098t.
- Sole: 5455t.

4 main locations (55%):

- Peterhead: 16466t.
- Lerwick: 3871t.
- Scrabster: 2596t.
- Fraserburgh: 2246t.

Total by-catches: 45568t.

*Results from our national statistics analysis: 4360 vessels, 333 processors.*
Opportunities for 1\textsuperscript{st} B.P.:

- Not counted against quotas:
  - Can land as much as we want.
  - The 23 vessels in PD: 49% empty on average in 2015 (3850t. of overcapacity).

- 3 main species (62%):
  - Nephrops heads
  - Anglerfish parts
  - Haddock viscera

- 4 main locations (37%):
  - Peterhead
  - Scrabster
  - Fraserburgh
  - Lerwick

*Results from our national statistics analysis: 4360 vessels, 333 processors.*
Research gaps.

- **Optimise consistency**: solutions to mitigate the constraints implied to B.P. & B.C. derived from multiples sources and species, at different seasons.

- **Optimise quality**: solutions to ensure the preservation of the B.P. & B.C. on-board.

- **Avoid wastage**: bring innovative solutions to shellfish wastes.

- **Support constrained locations**: develop tailored approaches and cost-effective models to improve the utilization of small and geographically remote fishery B.P. & B.C. (*e.g.* West of Scotland).
Recommendations

• **Look site by site:** Clear mapping of locations where there are opportunities for implementing circular models between the fishery sector and aqua-feed sector in the UK.

• **Network well:** promote collaborative works with the fishery organisations to have access the information.

• **Bring the stakeholders together:** call for greater collaborations between the two sectors to develop innovative and adapted upgrading processes and business models.
Thank you.

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