Aquaculture biomass:
a rich source of nutritional supplements to promote fitness and health

Lesson 3. Aquaculture biomass. Part III: FISHING AND BY-PRODUCTS FROM FISH: Fun facts and what we have learned

Teacher resources

This lesson is based on the following resources, which are accessible at:

https://www.aquabioprofit.eu/

Before teaching this lesson, teachers can get more information

Module 1 Unit 1

1.1 Volumes and qualities of fish side stream biomasses in Europe

Module 1 Unit 2

1.2 Fish proteins and protein hydrolysates - products and applications

Module 1 Unit 3

1.3. Fish collagen and marine oil-based supplements - products and applications

Lesson plan

Aims

To review aquaculture biomass from the fishing industry as a rich source of nutritional supplements to promote fitness and health

Materials

Editable PowerPoint presentation (Presentation3-Part3-Fishing&Byproducts_review.pptx); worksheets (can be used in class, as a test or as a homework assignment); answer key

Terminology

This lesson revises some terminology that your students may or may not be familiar with. If your students are still not familiar with some of this terminology, plan some time to explain it at relevant points throughout the lesson.

Specialized vocabulary used in this lesson: *pelagic fishing, marine fishing, fish farming, fish hatchery, by-product, side-stream biomass, fish mince, restructured fish products, fish burgers, calcium phosphate, hydroxyapatite, PUFA (polyunsaturated fatty acids), omega-3 fatty acids, processed protein, fish protein concentrates (FPC), fish protein hydrolysates, bioactive fish peptides, collagen, gelatin, chitin*

Competences

Your students will be aware of the volume of side-stream biomass from the fishing industry and will be able to talk about different ways to utilise this biomass as a rich source of nutritional supplements to promote fitness and health.

1. **Warm-up: Slides 1–3**
   Aim: To introduce the review lesson and bring attention to the fishing industry and the by-products from fish
   Slide 1 (Title): Tell students that this lesson will review the topic of fish, side-stream biomass and fish by-products.
   Slide 2 (Warm-up): Remind students that a large part of the biomass from the fishing industry is not used directly for food.
   Slide 3 (*Worksheets Part 3 Activity 1*): Ask students: *What types of industrial fisheries do you know?* Tell them to look at *Activity 1* in their *worksheets*. Students work individually or in pairs and provide answers. Finally, reveal the answers for students to check.

2. **Presentation**
   - **Side-stream biomass: Slides 4** and **5**

   Aim: To review the concept of side-stream biomass and raise awareness of its large amount
   Slide 4: (*Worksheets Part 3 Activity 2*) Before you begin, make sure your students are familiar with pie charts and know how to interpret them.

Read the questions aloud to the class. Tell students to look at *Activity 2* in their *worksheets* and to try and guess the correct answers. Give students 1-2 minutes to think and write down their guesses. Students work individually or in pairs.
Reveal the answers. Students check their answers.
Optional cross-curricular activity: Ask students to calculate the percentage of side-stream (left over) biomass: mackerel (100 – 62 = **38%**); herring (100 – 54 = **46%**)
Slide 5: The task is similar to Slide 7. As an extra challenge, the colour scheme in two of the pie charts is different.
You can do a quick vote. How many students think it is colour blue/grey etc.? Write the results on the board. Reveal the answers.
Elicit from students what they notice from the pie charts. Were they surprised? If so, you can ask individual students to share what surprised them the most.

- **Value-added products from side-stream biomass: Slides 6– 12**

Aim: To review a variety of healthy value-added products from side-stream biomass
Slide 6: Remind students that side-stream biomass of marine origin is an important value-added resource.
Slide 7: Ask: *How can we use the side-stream biomass from fish?*
After students give answers, reveal the text.
Slide 8 (*Worksheets Part 3 Activity 3*)**:** Tell students to look at *Activity 3* in their *worksheets*.
Ask: *Can you match the by-products to the side-stream biomass?*
Students complete the activity individually or in pairs. Move to the next slide to check answers.
Slide 9: Students check answers.
Slide 10 (*Worksheets Part 3 Activity 4*)**:** Ask: *What are 6 ways in which ω -3s are good for you?*
Tell students to look at *Activity 4* in their *worksheets*. Students complete the activity individually or in pairs. Reveal the answers to check.
Slide 11 (*Worksheets Part 3 Activity 5*)**:** Ask: *What are the three main types of processed fish protein?*
Tell students to look at *Activity 5* in their *worksheets*. Students complete the activity individually or in pairs. Reveal the answers to check.
Slide 12: Sum up the health benefits of fish and fish by-products.

- **Fun facts: Slides 13-18**

Aim: To give "fun facts" related to fish and fish products.
Slide 13 (Subtitle): Tell students that you will now talk about some interesting facts about fish and fish products
Slide 14: Specific taste and smell of fish products (bitter peptides; fishy smell)
Slides 15-16: Why do fish smell fishy?
A diagram illustrates the conversion of trimethylamine oxide /ˌtraɪˌmeθɪlˈeɪmiːn ˈɒk.saɪd/ (abbreviated as TMAO /tiː em eɪ əʊ/) into trimethylamine (TMO).
Slides 17–18: A list of selected English idioms inspired by fish

Ask individual students to take turns to read out the idioms and their definitions and to suggest equivalents in your native language.

- **Ending the lesson: Slides 19-20**

Slide 19: *The end* sign
Slide 20: Final credits, project-related hyperlinks

Answer key

Activity 1.

1. **Pelagic fishing** is catching wild fish that live in the water column of oceans, seas and lakes (neither near the bottom, nor near the shore).
2. **Marine fishing** is fishing in the sea/the ocean.
3. Fish farming and fish hatchery are forms of **aquaculture**.
4. **Fish farming** means growing fish commercially in tanks, fish ponds or ocean enclosures, usually for food.
5. **Fish hatcheries** grow and release young fish into the wild.

Activity 2. See Slide 4.

Activity 3. 1e, 2g, 3b, 4d, 5f, 6h, 7c, 8a

Activity 4:

1. Good for your **heart**
2. Good for your **brain**
3. Good for your **eyes**
4. Good for your **hair**, **skin** and **nails**
5. Can potentially help prevent some types of **cancer**
6. Can help you **sleep** better

Activity 5. 1b, 2d, 3a

Definition *c* is the odd one out: An important component of connective tissue is **collagen**.