

Processes and Quality in the Food Industry

CHALLENGE 3: BREWER'S SPENT GRAIN (BSG) A WORLD OF ALTERNATIVES.

Food microbiology (36 h)

Quality and Environmental Management in the Food Industry (10 h)

Integrated Processes in the Food Industry (16 h)

Food Innovation (18 h)

Duration: 80 h

Organization: groups of 4 people



BRIEF DESCRIPTION OF THE CHALLENGE: Optimize the preparation of brewer's grains for use in the production of food products

Co-financed by the European Union · Funded by the European Union — Erasmus+ KA210-VET · Ref. 2024-1-ES01-KA210-VET-000247832.

The views expressed are the sole responsibility of the author(s) and do not necessarily reflect those of the European Union or the European Education and Culture Executive Agency (EACEA). Neither the European Union nor EACEA can be held responsible.

Consortium partners: CIFP Don Bosco LHII · Ciofs/Fp Puglia · Zambul Kadın Girişimi Üretim İşletme Kooperatifi · ABARKA ONGD. Methodological reference: ETHAZI (Tknika, FP Euskadi).

CHALLENGE 3: BREWER'S SPENT GRAIN (BSG) A WORLD OF ALTERNATIVES.

1. Presentation of the Challenge

Basqueland, a brewery committed to sustainability and innovation, seeks to enhance the valorization of its brewer's spent grain (BSG), the main by-product of the brewing industry. BSG consists primarily of barley husks, residual starch, proteins, and fiber. With its high nutritional value, BSG offers an opportunity to develop innovative food applications instead of being discarded or used solely as animal feed. Your working group has to develop an innovation project for Basqueland, focusing on two key stages: obtaining a dry and microbiologically safe BSG and creating new food products aligned with the company's sustainability goals and market vision.

The first phase involves sourcing fresh BSG from Basqueland and documenting key parameters such as moisture content, pH, and microbial load. Understanding its composition is essential for designing a drying process that ensures both safety and nutritional preservation. Various drying techniques can be explored, including oven drying for uniform moisture removal, freeze drying to preserve nutrients while reducing microbial load, and air drying as a cost-effective approach. Your working group has to analyze drying efficiency, final moisture content, texture, and suitability for food applications, as well as assess microbial safety using standard microbiological techniques.

To ensure microbiological safety, your group has to conduct tests for contaminants such as total bacterial count, yeast and mold analysis, and foodborne pathogens like Salmonella, E. coli, and Listeria. You have to propose interventions such as heat treatment or pH adjustments to improve stability. Once a safe and stable BSG powder is obtained, your working group has to proceed to the second phase, developing innovative food products that align with Basqueland's brand and values.

Your team has to experiment with different food applications, incorporating BSG into products such as baked goods, snack bars, plant-based meat alternatives, and fermented products. You have to document ingredient ratios, processing methods, and functional properties of BSG in each product. Each prototype has to undergo sensory evaluation based on taste, texture, aroma, and overall



Funded by
the European Union



CC BY-NC-SA 4.0
Attribution-NonCommercial-ShareAlike
4.0 International

acceptability. Additionally, your working group has to conduct basic nutritional analyses, including fiber content, protein levels, and caloric value, to determine the impact of BSG incorporation on the final product.

2. Objectives/Learning Outcomes and identified competencies

➤ Technical Competencies

Quality and Environmental Management in the Food Industry

1. Applies quality management systems, describing the standard on which they are based and its requirements.
2. Applies environmental management systems, describing the standard on which they are based and its requirements.

Food Innovation

1. Supervises the production of foods with a longer shelf life, describing the technological foundations.

Integrated Processes in the Food Industry

4. Leads the production of a plant-based food product, describing the production activities, equipment, and automatic process systems.

Food microbiology

1. Organize the microbiology laboratory by recognizing the facilities, equipment, resources and safety measures.
2. Perform microbiological tests, describing the fundamentals of the technique used.

Identified Competences



Funded by
the European Union



CC BY-NC-SA 4.0
Attribution-NonCommercial-ShareAlike
4.0 International

1. **Problem-solving and critical thinking:** Involves the ability to identify, analyze, and effectively solve complex problems, making informed decisions through thorough analysis and evaluating different alternatives before taking action.
2. **Project management:** Involves the planning, execution, and monitoring of projects to ensure that established goals are achieved within deadlines and with available resources, coordinating tasks, teams, and outcomes efficiently.

Identified Competences rubrics

1. Problem-solving and Critical Thinking

- **Level 1 - Basic:** The student demonstrates limited ability to identify problems and provide solutions. Their thinking process is mostly reactive and lacks a structured approach to problem-solving.
- **Level 2 - Intermediate:** The student shows some ability to identify problems and offer solutions. They demonstrate an inconsistent approach to critical thinking and problem resolution but may struggle with more complex issues.
- **Level 3 - Advanced:** The student is capable of identifying problems effectively and applying structured problem-solving methods. They demonstrate strong critical thinking skills and are able to analyze complex issues in most situations.
- **Level 4 - Expert:** The student consistently demonstrates advanced problem-solving abilities. They approach problems with a high level of critical thinking, systematically analyzing and evaluating all aspects, and they can provide innovative solutions in any situation.

2. Project Management

- **Level 1 - Basic:** The student demonstrates limited understanding of project management principles. They struggle to plan and organize tasks and resources effectively and rarely meet deadlines.
- **Level 2 - Intermediate:** The student has a basic understanding of project management. They can plan and organize tasks with some degree of success but may have difficulty managing resources or meeting deadlines consistently.
- **Level 3 - Advanced:** The student shows strong project management skills, planning and organizing tasks and resources efficiently. They are able to meet deadlines and ensure most project goals are achieved successfully.



Funded by
the European Union



CC BY-NC-SA 4.0
Attribution-NonCommercial-ShareAlike
4.0 International

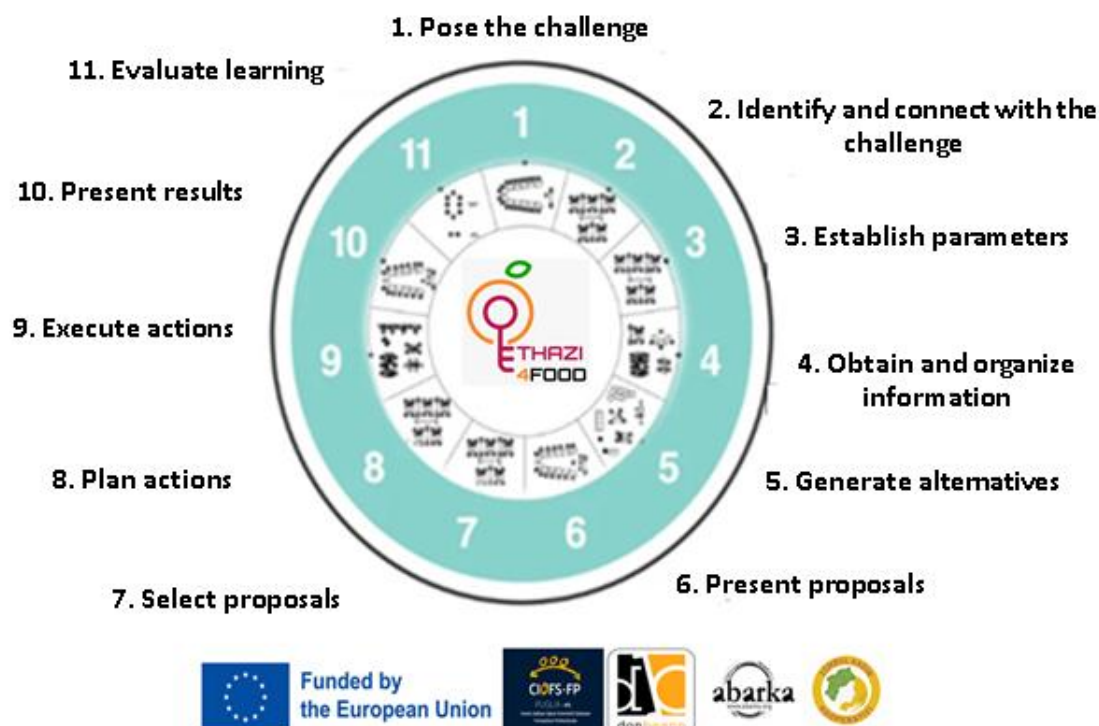
- **Level 4 - Expert:** The student consistently demonstrates expert-level project management skills. They effectively plan, organize, and manage all aspects of a project, ensuring resources are utilized optimally and all goals are met within set deadlines.

3. Tasks

The tasks to be carried out are:

1. Form groups and create the group contract.
2. Respond to the challenge, following and applying the 11 steps required to solve the problem and explaining everything that has been done (documents, graphics, mind maps, etc.). Read the challenge statement.

ETHAZI Skill Harvest: Cultivating the Future of Food Industry



4. Evaluation Criteria

The evaluation process will be as follows:

4. 1. Based on competencies

Technical Competencies – 70% Rubrics will be used.

The evaluation will be based on the specified knowledge outcomes (IE/RA).

- 20% of the indicated percentage corresponds to the exam.
- 50% corresponds to section 4.2 and the other indicators specified in that section.

Soft skills – 30%



In relation to the Soft Skills, each team of teachers will decide which ones are evaluated in each challenge.

Self-assessment

Peer assessment will be calculated based on the teachers' evaluation, multiplied by the group factor.

The **group factor** will be decided among the team members and must be between **0.5 and 1.5**.

→ **Attendance:**

Attendance of **at least 80%** of the challenge hours is required to pass. If absences exceed **20%**, the student will not pass the transversal competencies.

Lack of attendance will impact engagement. The following factors will be applied:

0% – 5% absences → factor = 1

5% – 10% absences → factor = 0.9

10% – 20% absences → factor = 0.8

> 20% absences → factor = 0

4. 2. Based on Technical Competencies

When assessing the learning outcomes (IE/RA), the following activities will be taken into account:

1. Initial **physicochemical analysis report** on brewer's grains (M)
2. Technical report on **microbiological analysis** of treated brewer's grains (M)
3. **Flow chart** of new products (M)
4. **Technical sheet** of manufactured products (M)
5. **Project management presentation** (objectives, parameters, timing of activities, execution, results, impact, evaluation and points for improvement) (R)
6. Online form on **pretreatment techniques** (M)
7. **Heat treatment** exercises (M)
8. **Challenge exam** (R)



Funded by
the European Union



CC BY-NC-SA 4.0

Attribution-NonCommercial-ShareAlike
4.0 International

5. Group Dynamics

Group Dynamics

- You will form **small groups** of four members. (*Roles: secretary, coordinator, time manager, materials manager*)
- **Three small groups** will form a **medium-sized group**: The coordinators of the small groups will meet to agree on the conclusions of the medium-sized group. You will need to select a **group leader** for the medium-sized group.
- **Two medium-sized groups** will form the **full group**: The coordinators of the medium-sized groups will meet to agree on the conclusions for the entire group.

6. Resources

Equipment/Materials:

- Reagents
- Laboratory equipment and materials
- Safety data sheets
- Computers (Internet access)
- Personal protective equipment (PPE)
- Waste management

Experts:

- **Food microbiology** – *Teacher name*
- **Quality and environmental management in the food industry** – *Teacher name*
- **Integrated processes in the food industry** – *Teacher name*
- **Food innovation** – *Teacher name*



Funded by
the European Union



CC BY-NC-SA 4.0
Attribution-NonCommercial-ShareAlike
4.0 International

7. Scheduling

Monday	Tuesday	Wednesday	Thursday	Friday

8. Feedback

Once the challenge is completed, feedback will be conducted with the students. Additionally, the teaching team will carry out a global assessment of the challenge.



Funded by
the European Union



CC BY-NC-SA 4.0
Attribution-NonCommercial-ShareAlike
4.0 International