



FooCom

## Available Technologies for Secondary Processing of Stocked Food

Preventing Food Waste through Innovative Solutions

# Description of the Objectives and Content

## Objective 1



Introduce participants to various available **technologies** for secondary processing of stocked food and **familiarize** them with **different** techniques.

## Objective 2



Highlight the **importance** of secondary processing in **preventing** food waste and creating **value-added** products and **encourage** participants to explore and **implement** these technologies in their **own** contexts to prevent food waste.

## Contents



The module aims to provide participants with a comprehensive **understanding** of innovative solutions to prevent food waste. This module covers a wide range of **techniques** and **methods** that can transform **stocked food** into **new products** while extending its **shelf life** and preserving its **nutritional value**.



Co-funded by the  
Erasmus+ Programme  
of the European Union



# Teaching Method

## Description

The participant of this training activity must read the slides carefully and follow the proposed exercises in order to get an overview of the importance of the proposed content.

At the end of this pill, a series of self-assessment exercises could be found, intended to be a manner of verification of the proposed contents.



Co-funded by the  
Erasmus+ Programme  
of the European Union



# EQF Definition

## Knowledge

- Understanding of various available technologies for secondary processing of stocked food
- Knowledge of different techniques for secondary processing of stocked food
- Knowledge of the benefits and applications of each technology in preventing food waste

## Skills

- Skill in applying various secondary processing techniques
- Ability to select appropriate technologies based on the characteristics of the stocked food and desired outcomes
- Ability to assess and monitor food quality using smart packaging and sensory indicators

## Competences

- Preventing food waste through the application of technologies for secondary processing
- Making informed decisions regarding the selection and implementation of appropriate secondary processing techniques
- Advocating for sustainable practices and initiatives to reduce food waste within communities and organizations

# Why secondary processing?

- involves transforming stocked food into **new products**



## Extends the Shelf Life of Food

Secondary processing enables **longer** storage periods, reducing the likelihood of food waste due to expiration or **spoilage**.



## Reduces Waste

Through secondary processing, food that might otherwise go to waste can be transformed into **usable products**.



## Creates Value-Added Products

These value-added products not only reduce waste but also offer **diverse and desirable food choices** to consumers.





# 1. DEHYDRATATION

## Techniques of Secondary Processing

Dehydration is the process of **removing moisture** from food. It increases **shelf life** and **preserves nutrients**.

- Dehydration **reduces** the water content of food, inhibiting the growth of microorganisms and enzymes that cause **spoilage**.
- It also reduces the **weight** and **volume** of the food, making it **easier** to store and transport while retaining its **nutritional value**.

### Techniques:

- air drying, sun drying, freeze-drying, and vacuum drying

### How to Do It?

- Air drying can be done by placing sliced fruits or vegetables on a rack and allowing them to dry naturally.

### Example:

- Making homemade dried fruit snacks or vegetable chips.



## 2. CANNING

### Techniques of Secondary Processing

Canning involves **sealing food** in airtight containers to prevent spoilage.

- Canning is suitable for **preserving** fruits, vegetables, and even cooked meals.
- The process typically involves preparing the food, heating it to **kill microorganisms**, placing it in sterilized containers, and sealing the containers. The heat treatment **destroys bacteria, yeasts, and molds**, ensuring the safety and extended shelf life of the canned food.
- Canned foods have a **long shelf life**.
- They retain their flavor, texture, and nutritional value, providing consumers with a wide range of preserved food options.

### How to Do It?

- Sterilize jars, fill them with prepared food, and seal them with lids. Process the jars in a water bath or pressure canner.

### Example:

- Preserving fresh tomatoes as canned tomato sauce.



Co-funded by the  
Erasmus+ Programme  
of the European Union





## 3. FERMENTATION

### Techniques of Secondary Processing

Fermentation is a natural preservation technique that uses **microorganisms**, such as bacteria, yeasts, or molds, to transform food components.

- It **enhances** flavors, extends shelf life, and increases the nutritional value of food.
- During fermentation, microorganisms **break down sugars** and other compounds in the food, producing by-products such as lactic acid, acetic acid, and carbon dioxide. These by-products **create** an acidic or alcoholic environment that inhibits the growth of **harmful** bacteria, preserving the food.

### How to Do It?

- Prepare a brine or a fermenting liquid, submerge vegetables or fruits in the liquid, and let them ferment at room temperature.

### Example:

- Sour cabbage, kimchi, yogurt, and pickles.



## 4. FREEZING

### Techniques of Secondary Processing

Freezing is a widely used preservation method. It slows down the growth of microorganisms and enzyme activity.

- Food is rapidly cooled to very **low temperatures**, typically below  $-18^{\circ}\text{C}$  ( $0^{\circ}\text{F}$ ). This low temperature **inhibits** the growth of microorganisms, preventing spoilage.
- Freezing **helps** retain the texture, color, and **nutritional content** of the food.
- Proper packaging is crucial for freezing food. It is recommended to use **airtight containers** or **freezer bags** to prevent freezer burn and maintain the quality of the food.

#### How to Do It?

- Clean and chop the food, then place it in airtight freezer-safe containers or bags before placing them in the freezer.

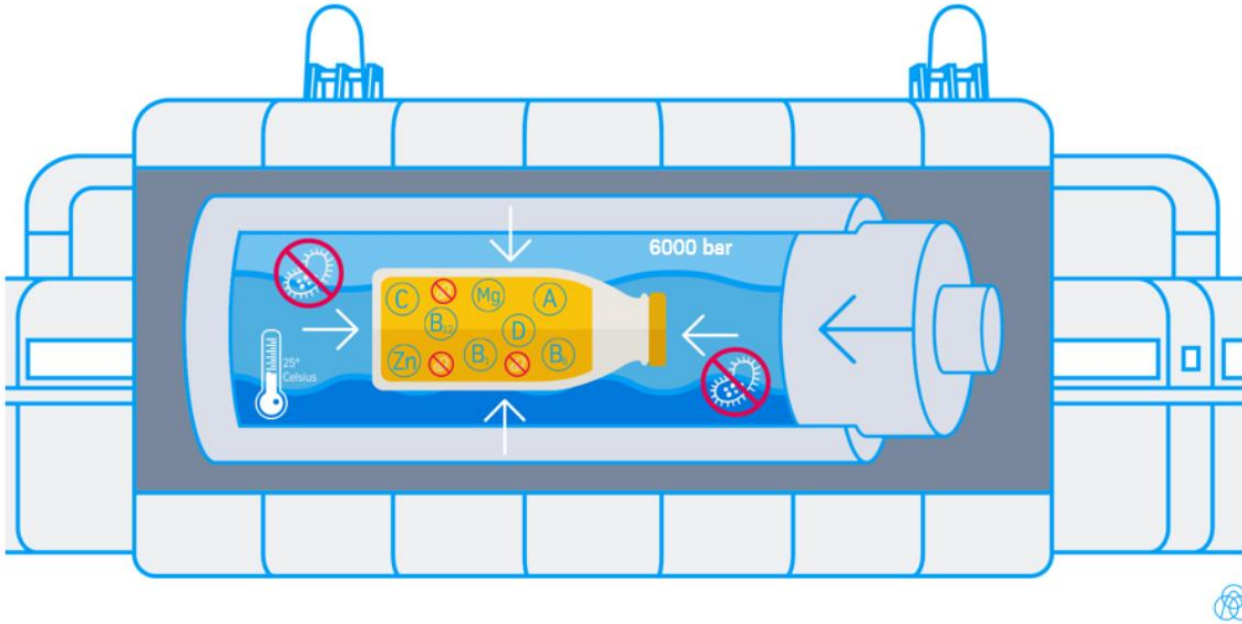
#### Example:

- Suitable for fruits, vegetables, meat, and seafood.



Co-funded by the  
Erasmus+ Programme  
of the European Union





Source: Máster Logística (2023)

<https://www.masterlogistica.es/procesamiento-de-alimentos-a-alta-presion-tecnologia-hpp/>

## 5. HIGH-PRESSURE PROCESSING

### Techniques of Secondary Processing

High-pressure processing (HPP) uses **high-pressure water**, typically between 100 and 600 MPa, to kill bacteria and other pathogens.

- It maintains the **nutritional quality and sensory attributes of food**.
- Ideal for beverages, deli meats, and ready-to-eat meals.
- This process helps **extend the shelf life** of the product **without** the need for heat or chemical additives.
- HPP is considered a **gentler** alternative to traditional thermal pasteurization methods. It **reduces the risk** of nutrient loss and **preserves** the natural characteristics of the food.

### How to Do It?

- Place food in a high-pressure chamber filled with water, apply pressure, and then release the pressure.

### Example:

- Using HPP to extend the shelf life of fresh juices.



## 6. PASTEURIZATION

### Techniques of Secondary Processing

Pasteurization is a heat treatment method used to kill harmful bacteria and extend the shelf life of food.

- The purpose of pasteurization is to eliminate pathogenic microorganisms while retaining the quality and nutritional value of the food. The specific temperature and time requirements vary depending on the type of food and the desired outcome.
- There are different methods of pasteurization, such as batch pasteurization, flash pasteurization, and ultra-high temperature (UHT) pasteurization.

#### **How to Do It?**

- Heat food to a specific temperature for a certain period to destroy pathogens. Use a pasteurization machine or follow specific recipes.

#### **Example:**

- Commonly used for milk, juices, and canned goods
- Pasteurizing homemade fruit preserves to ensure their safety.



## 7. VACUUM PACKAGING

### Techniques of Secondary Processing

Vacuum packaging removes air from the package before sealing. It inhibits the growth of spoilage-causing microorganisms.

- It involves placing the food in a specially designed bag or container and using a vacuum sealer to remove the air.
- By removing oxygen from the packaging, vacuum packaging slows down the degradation processes that lead to spoilage, such as oxidation and microbial growth.
- This preservation method is commonly used for a wide range of foods, including meats, cheeses, fruits, and vegetables. It helps maintain the quality, flavor, and nutritional value of the food, reducing waste and extending shelf life.

### How to Do It?

- Use a vacuum sealer to remove air from the packaging and create an airtight seal.

### Example:

- Vacuum sealing leftovers to extend their freshness.



Co-funded by the  
Erasmus+ Programme  
of the European Union





## 8. MODIFIED ATMOSPHERE PACKAGING

### Techniques of Secondary Processing

MAP **replaces** the air in a package with a controlled gas mixture and helps preserve the **quality** and **appearance** of these perishable items, allowing for longer storage, transportation, and extended shelf life.

- MAP involves modifying the **composition** of the atmosphere surrounding the food, typically by adjusting the levels of **oxygen, carbon dioxide, and nitrogen**.
- By reducing the **oxygen** content, MAP slows down oxidative reactions, inhibits the growth of aerobic spoilage microorganisms, and helps maintain the color and flavor of the food. The controlled levels of **carbon dioxide** can further inhibit microbial growth, while **nitrogen** is often used to fill the remaining space in the package, providing protective cushioning.

### How to Do It?

- Replace the air in the package with a controlled gas mixture using specialized packaging equipment.

### Example:

- Widely used in the packaging of fresh produce and meat, poultry, and seafood.



Co-funded by the  
Erasmus+ Programme  
of the European Union





## 9. PULPING AND PUREEING

### Techniques of Secondary Processing

Pulping and pureeing are methods to process overripe or damaged fruits and vegetables.

- Pulping is the process of removing the skin, seeds, and other undesirable parts of the fruit or vegetable to obtain a pulp.
- Pureeing, on the other hand, involves blending the entire fruit or vegetable into a smooth texture.
- These methods are especially useful for utilizing products that may not be visually appealing or suitable for direct consumption but still retains its nutritional value.

#### **How to Do It?**

- Blend or process overripe or damaged fruits and vegetables until they reach a smooth consistency.

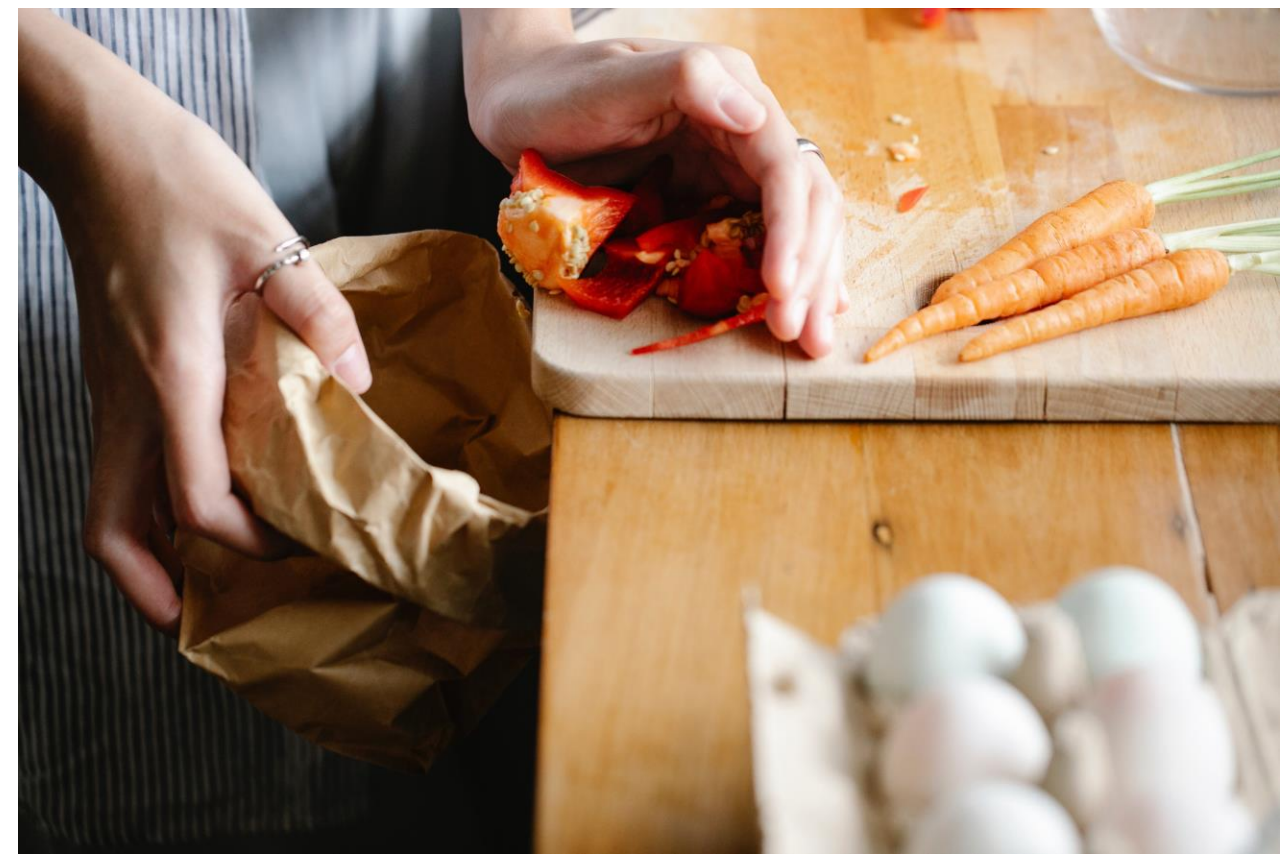
#### **Example:**

- The pulp can be used to make jams, sauces, and fruit-based products.
- Purees can be used for making soups, baby food, and smoothies.



Co-funded by the  
Erasmus+ Programme  
of the European Union





## 1. FOOD RECYCLING

### Innovative Approaches

Innovative technologies can transform food waste into valuable resources. These methods can generate biogas, fertilizers, and animal feed.

#### **Anaerobic digestion**

- a process where food waste is **broken down** by microorganisms in the absence of oxygen, resulting in the production of biogas.
- **biogas** can be used as a **renewable energy source** for electricity generation or as a replacement for fossil fuels.

#### **Composting**

- involves the **decomposition** of organic materials into nutrient-rich compost.
- **compost** can be used as a natural fertilizer to enrich soil and **support plant growth** in agriculture, horticulture, and landscaping.

#### **Bioconversion**

- a process that **utilizes insects or microorganisms** to convert food waste into **protein-rich animal feed** or other valuable by-products.
- this approach not only reduces waste but also contributes to the **circular economy** by creating additional resources from what would otherwise be discarded.



Co-funded by the  
Erasmus+ Programme  
of the European Union





## 2. SMART PACKAGING

### Innovative Approaches

Smart packaging utilizes **sensors** and indicators to **monitor** food quality. It can provide information about **freshness, temperature, and spoilage**.

### Time-temperature indicators

- change colour or display a digital readout to indicate if the food has been exposed to unfavourable conditions or has exceeded its recommended shelf life. Gas sensors can detect changes in the package's atmosphere, indicating spoilage or the presence of harmful gases.

### RFID (Radio Frequency Identification) tags or QR codes

- can provide detailed information about the food's origin, production methods, and storage recommendations, enabling consumers to make informed decisions.

Helps consumers and businesses reduce food waste by providing real-time information on the condition of the food, and allows for more accurate inventory management, better quality control, and improved traceability throughout the supply chain.

### How to Do It?

- Incorporate sensors and indicators into packaging to monitor temperature, freshness, and spoilage.

### Example:

- Smart labels that change color when food is no longer fresh.



Co-funded by the  
Erasmus+ Programme  
of the European Union





## 3. COMMUNITY INITIATIVES

### Innovative Approaches

Community-based organizations and platforms play a crucial role in preventing food waste and promoting a more sustainable approach to food consumption.

#### **Food sharing apps and platforms**

- connect individuals, businesses, and organizations to redistribute excess food that would otherwise go to waste. These apps facilitate the donation of surplus food to local charities, community fridges, or food banks, ensuring that it reaches those in need.

#### **Community fridges**

- communal refrigerators placed in public spaces where individuals and businesses can donate surplus food. They provide a convenient way to share food within a community, reducing waste and addressing food insecurity.

#### **Food recovery programs**

- collecting surplus food from grocery stores, restaurants, and events to redirect it to charitable organizations or food banks. These initiatives help prevent waste at the source and ensure that edible food is utilized before it becomes unsuitable for consumption.



Co-funded by the  
Erasmus+ Programme  
of the European Union





## 4. EDUCATIONAL CAMPAIGNS

### Innovative Approaches

Educational campaigns play a crucial role in raising awareness about food waste and empowering individuals to take action.

- These **campaigns** focus on educating the **public** about the environmental, social, and economic **impacts of food waste**. They provide information and practical **tips** on reducing waste through **responsible** consumption, meal planning, proper storage, and utilizing **secondary processing techniques**.
- Highlight the value of **food** and the **resources** that go into its production, encouraging individuals to **appreciate** and **respect** the food they consume. They promote **behaviour change**, emphasizing the importance of conscious food choices, portion control, and minimizing food waste at home, in restaurants, and throughout the supply chain.
- By **empowering** individuals with knowledge and practical strategies, educational campaigns contribute to a **collective effort** in preventing food waste, conserving resources, and building a more **sustainable future**.



Co-funded by the  
Erasmus+ Programme  
of the European Union





# SUMMARY



Dehydration, canning, fermentation, freezing, HPP, pasteurization, vacuum packaging, MAP, pulping, and pureeing are effective **secondary processing techniques** for preserving food and preventing waste.



**Innovative approaches** like food recycling and smart packaging contribute to the efficient utilization of resources and the **reduction** of waste throughout the **food supply chain**.



Community initiatives and educational campaigns play a crucial role in raising **awareness**, promoting **responsible** consumption, and fostering collaboration to prevent food waste.




Co-funded by the  
Erasmus+ Programme  
of the European Union




# Thank you!


FooCom



New Edu, n.o. 

+421 905 206 963 

[newedusk@gmail.com](mailto:newedusk@gmail.com) 

[newedu.info](http://newedu.info) 

*The European Commission's support for the production of this publication does not constitute an endorsement of the contents, which reflect the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.*