Unit 17: Food Preservation and Extension of Shelf Life

Level: 4
NLH: 30
Value: 3

This unit is internally set and internally assessed

Unit aim
At the end of this course of study it is expected that the learner will understand the origins of food preservation and have an historical perspective on how the rules about safe preservation have developed. They will understand the limits of safety and be able to explain the interaction between the composition of the food, the storage environment and the role of packaging in the determination of safe shelf life. The learner will also be able to make a clear distinction between unsafe foods and spoiled or unacceptable foods. It would be useful if learners who wished to study the units on thermal processing, cold chain management or fermented foods used this as a general introduction to the subject of preservation.

Successful candidates will understand the origins and science of a variety of food preservation methods and be able to explain what limits should be applied to ensure consumer safety. The learner will have an appreciation for more technical aspects of the preservation techniques.

Unit introduction
This unit deals with the techniques used to preserve foods to make it possible to manage food distribution through complex delivery systems to the final consumer. The unit will explain the origins of food preservation and how traditional methods have been developed to meet the demands of modern society. Some of the concepts introduced in this unit are developed more fully in other units covering thermal process management, cold chain management, fermented foods and supply chain controls.
## Outcomes of learning and assessment criteria

To pass this unit, the learner needs to demonstrate that they can meet all the outcomes of learning. The assessment criteria determine the standard required to achieve the unit.

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<thead>
<tr>
<th>Outcomes of learning</th>
<th>Assessment criteria</th>
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<tbody>
<tr>
<td>1. Understand the origins and reasons for the development of food preservation techniques.</td>
<td>1.1 Explain the purpose of food preservation as a method of extending the period of food availability and the role of the environment on the choices of traditional preservation techniques.</td>
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<td>1.2 Explain how cooking techniques have been combined with other methods of preservation e.g. rapid cooling can cold storage and hermetically sealed packaging.</td>
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<td>1.3 Explain how the development of accepted methods of safe and reliable preservation was driven by careful measurement and analysis.</td>
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<td>2. Evaluate the benefits and risks associated with traditional methods of preservation.</td>
<td>2.1 Explain why some methods of preservation may make the food a “high risk food”</td>
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<td>2.2 Explain the relationship between food safety and food spoilage.</td>
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<td>2.3 Explain how microbiological testing and physical measurement of preservation processes can be used to assess risk.</td>
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<td>3. Understand the need for measurement and validation of food processing.</td>
<td>3.1 Evaluate the best experimental method for validating and controlling the shelf life performance of a cooked product in various packaging materials.</td>
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<td>3.2 Explain what might happen if a preservation process is changed and no validation is performed.</td>
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<td>3.3 Explain the basis for using published data and the method by which it can be used to validate a process.</td>
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<td>4. Explain the difference between verification and validation.</td>
<td>4.1 Give at least one example of a process validation explaining how the validation data relates to the process.</td>
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<td>4.2 Give at least one example of a process verification explaining how the verification data relates to the process and the assurance of the process controls.</td>
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<td>5. Understand the law relating to food safety.</td>
<td>5.1 Explain the meaning of the terms safe and unsafe in relation to food products.</td>
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<td>5.2 Explain the law relating to labelling with regard to shelf life declaration.</td>
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<td>Outcomes of learning</td>
<td>Assessment criteria</td>
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<td>6</td>
<td>Explain the interaction between foods, the food packaging and the storage environment.</td>
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<td>6.1 explain why food packaging can play an important role in food preservation and why packaging defects can affect shelf life.</td>
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<td>6.2 understand the factors affecting product shelf life after opening and how this can be assessed.</td>
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<td>7</td>
<td>Be able to explain how a shelf life declaration can be validated</td>
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<td>7.1 explain the difference between best before and use by dates.</td>
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<td>7.2 understand the factors that should be considered when setting best before expiry dates.</td>
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Unit Content

1 What is the purpose of food preservation?
   - The need to store food
   - The changes in foods during storage
   - Increasing value by preservation
   - Legislation relating to declarations of food expiry dates

2 Frozen Food
   - Freezing process
   - Modern developments in freezing and freeze drying
   - The role of packaging in temperature control

3 Chilled food
   - Segregation of high and low risk foods
   - Temperature limits
   - Monitoring systems across the chill chain
   - Investigating and dealing with temperature deviation

4 Cooking, pasteurisation and sterilisation
   - Heat and the destruction of bacteria, moulds and yeasts
   - Cooking, cooling and storage
   - Packaging and the prevention of post process contamination
   - Hermetically sealed food containers
   - Measurement of temperature

5 Dried foods
   - Traditional sun drying
   - Herbs, spices, nuts and grains
   - Spray drying
   - Oven drying
   - Fluidised bed drying
   - Freeze drying

6 Foods preserved by pickling, curing and sugar
   - Cureing of meats and fish
   - Pickling of vegetables and fruits
   - Pickling of eggs
   - Jams and preserves
   - Smoking
7 Fermentation

- The microbiology of fermentation
- Dairy fermentation products
- Meat fermentation products
- Vegetable fermentation products
- Fermented drinks

8 Chemical preservatives

- The law on permitted additives in foods
- Typical uses for chemical preservatives

9 Validating shelf life claims

- The use of published data in shelf life validation
- Designing an shelf life validation experiment
- Instructions for storage
**Information for tutors**

**Essential requirements**
There are no essential elements for this unit.

**Delivery**
This is a self managed leaning programme where the learner is entirely in control of the pace of learning and the stage at which they receive assessment. This method of delivery has been chosen because it allows learners maximum flexibility to programme their study around any other work or home commitments. The learning materials are provided as a set of notes that can be combined with other modules in a learning programme to provide a systematic and comprehensive set of reference documents. There is no time limit for the completion of the programme but it is expected that each module would be assessed within a 12 month period. Circumstances and possible exceptions to his operational limit would be considered on a case by case basis. The main reason for the 12 month limit is that the printed learning material is reviewed along with feedback from assessors and learners once per year by an editorial board who update the material to ensure currency and relevance.

The notes provided are self contained and provide guidance on the sustainable development of food supplies and the responsible use of resources. The examples used to illustrate operational implementation of good practice are intended to help the learner to think about the underlying principles within the materials and to apply them to real world situations. The leaning is entirely desk based with the learner expected to read and understand the material provided. There is guidance to reference material that can be used to read around the subject and a list of assessment criteria at the end of the module that the learner can use to conduct self assessment before they ask for assessment. Learning groups are not organised within the programme but cooperation of learners is not discouraged in any way, in some cases it can be very beneficial for groups of students to discuss and compare views.

Contact telephone numbers and an e-mail address is provided for learners who may be experiencing difficulties with the material, wish to provide feedback or have a complaint about the programme. All contacts are recorded and where appropriate, investigated and/or referred to the editorial board for consideration during the annual review of the leaning materials.

**Assessment**
Assessment is by multiple choice questionnaire and an open book assessment interview. The aim of the assessment is not to gauge the learner’s ability to retain facts and figures but their understanding of the information provided and knowledge of where to find detail should this be required. The assessment interview may be organised using electronic VOI Protocols (Skype or similar), telephone or as a face to face meeting.

When the learner is confident that they understand the unit materials he/she sends the written assignment to the program manager and an assessor is assigned. The assessor is selected from the Institute of Food Science and Technology register of assessors and mentors. This is a list of food industry professionals who have their qualifications, background and experience assessed once per year and are recognised experts in specific food industry sectors. Once an assessor has been assigned he/she arranges a mutually convenient time to arrange the multiple choice exam. The final stage of the assessment process takes place when the assessor marks the exam and conducts the closing interview.
The multiple exam includes questions relating to the developments of food preservation techniques (1.1 and 1.3) and the way in which different aspects of preservation have been combined (1.2) to provide a wide range of options for extending the life of food products. The impact of preservation techniques on the microbiological flora in the food and the effect this has on the categorisation of food as high or low risk (2.1-2.3) and the legal definition of safe food and difference between use by and best before shelf life declarations (5.1, 5.2 and 7.1) are included in the exam but are also discussed during the assessment interview. The learners understanding of validation and verification (3.1, 3.2, 4.1 and 4.2) are also assessed by a combination of multiple choice questionnaire and assessment interview with the learner providing examples of different methods of validation and cases where validation data is rendered invalid due to changes in the preservation process (3.2). During the assessment interview the learner is expected to demonstrate an understanding of the interaction between a packaging material (6.1) and the product it contains and how the storage conditions will affect this interaction and how these factors can be considered when setting an expected shelf life for the product (5.1, 5.2, 6.2 and 7.2).

In the case of this unit the time taken for this assessment should be at least 30 minutes and no more than 45 minutes long. The assessor is required to record the assessment and send it to the program manager with a recommendation that the learner has passed the unit or has been unsuccessful. The results of the assessment are reported to the learner within 1 week.

**Suggested resources**


**IFST Food Industries Manual**