



Australian Government

Department of Education, Employment and Workplace Relations

FDFST4006A Apply food preservation technologies

Release: 2

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Modification History

April 2012: Minor typographical corrections.

Unit Descriptor

This unit covers the skills and knowledge required to apply food preservation technologies and to review their effectiveness and efficiency based on an understanding of food science and technology.

Application of the Unit

This unit applies to quality assurance and technical staff who must oversight the preservation of food. It covers low and high temperature preservation as well as the evaluation of alternative preservation methods such as irradiation and high pressure processing.

Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Not applicable.

Employability Skills Information

This unit contains employability skills.

Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.

Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Apply high temperature preservation methods for food	1.1 The need for heat treatment of foods is established 1.2 Preparatory procedures for heat treatment processes are implemented 1.3 Heat treatment processes are applied and monitored 1.4 The physical, biochemical and microbiological changes to a food product after heat treatment are assessed
2. Apply low temperature preservation methods for food	2.1 The need for chilling or freezing treatments of foods is established 2.2 Preparatory procedures for chilling or freezing treatment processes are implemented 2.3 Chilling or freezing processes for food preservation are applied and monitored 2.4 The physical, biochemical and microbiological changes to a food product after chilling or freezing treatment processes is assessed
3. Evaluate alternative existing technologies for food preservation	3.1 Effectiveness and consumer acceptance of irradiation is reviewed 3.2 The effect of irradiation on food products is evaluated 3.3 The application of a high pressure preservation process is reviewed 3.4 The effect of high pressure preservation on food products is evaluated 3.5 A process chart for the implementation of alternative food preservation processes is developed

Required Skills and Knowledge

This section describes the skills and knowledge required for this unit.

Required skills include:

Ability to:

Heat treatment processes

- identify the different techniques used in industry to apply heat on food as a preservation method
- identify the most suitable heat application techniques for specific food products
- evaluate physical changes caused by high temperature on food
- assess the relationship between high temperature and deactivation and destruction of micro-organisms
- identify the enzymatic and other chemical changes caused by high temperature
- identify quality defects that arise as a result of heat application of food
- enter processing/operating parameters to heat treatment equipment as required to meet safety and production requirements
- operate, check and adjust heat treatment equipment performance as required

Low temperature processes

- differentiate between chilling and freezing of foods
- identify the effects of slow and quick freezing on the quality and properties of food
- identify the different techniques used in industry to chill and freeze food stuffs
- identify the most appropriate chilling and freezing techniques for specific food products
- review the efficiency, cost effectiveness and environmental impact of refrigerants used in chillers and freezers
- identify critical quality defects associated with long-term chilling and freezing of foods
- enter processing/operating parameters to chilling or freezing treatment equipment as required to meet safety and production requirements
- operate, check and adjust low temperature treatment equipment performance as required

Irradiation processes

- identify foods suitable for irradiation
- analyse surveys and other feedback indicating consumer acceptance of irradiation
- identify the most suitable irradiation techniques for specific food products
- evaluate physical changes caused by irradiation of food
- assess the extent of destruction of micro-organisms
- identify any enzymatic and other chemical changes caused by irradiation
- identify quality defects that arise as a result of irradiation of food
- identify processing/operating parameters of irradiation equipment as required to meet safety and production requirements
- operate, check and adjust irradiation equipment performance as required
- identify labelling and other regulatory requirements of irradiation of food

High pressure processes

- identify foods suitable for high pressure processing
- identify the most suitable high pressure techniques for specific food products
- evaluate physical changes caused by high pressure processing of food
- assess the extent of destruction of micro-organisms
- identify any enzymatic and other chemical changes caused by high pressure processing
- identify the potential for quality defects that arise as a result of high pressure processing of food
- identify processing/operating parameters of high pressure processing equipment as required to meet safety and production requirements
- operate, check and adjust high pressure equipment performance as required.

Required knowledge includes:

Knowledge of:**Heat treatment processes**

- the difference between blanching, steaming, canning and other methods of heat application to food
- the effects of application of heat on qualities and properties of food stuffs
- biochemical, microbiological and physical changes to food as a result of heat application
- critical quality defects which can occur as a result of heat treatment
- how operating conditions, such as temperature fluctuations or water /steam contacts with food affects the nutritional/chemical composition of food
- how product parameters, such as type, size, shape and chemical and biological composition affect the effectiveness of heat treatment on food
- the calculation and interpretation of Fo, Lethality and Fh values

Low temperature processes

- the different techniques adopted in industry for freezing food products
- appropriate freezing techniques, including freeze drying, for specific food products
- industrial refrigerants currently used today to maintain low temperatures in chillers and freezers
- the efficiency, cost and environmental impact of such refrigerants
- biochemical, microbiological and physical changes to food as a result of slow or quick freezing
- critical quality defects which can occur as a result of long term and freezing, of foods
- how operating conditions, such as temperature fluctuations, humidity and air velocity, affect the effective chilling and freezing and refrigeration of food
- how product parameters, such as type, size, shape and chemical and biological composition affect the effective chilling and freezing of foods
- the appropriate freezing techniques for the major types of foods that can be frozen without loss of quality: fruits, vegetables, seafood, meats, baked goods and ready to eat food (eg. pizzas)
- refrigerants used in past eg. CFCs & HCFCs, and the ones currently used including HCFC –

123 and various blends

- why certain refrigerants are a problem for the environment eg. depletion of the ozone layer and 'Greenhouse' effect

Irradiation equipment

- types of foods suitable for irradiation
- consumer acceptance and issues with irradiation
- the most suitable irradiation techniques for specific food products
- physical changes caused by irradiation of food
- impact of irradiation on different species of micro-organisms
- enzymatic and other chemical changes caused by irradiation
- potential quality defects that arise as a result of irradiation of food
- processing/operating parameters of irradiation equipment as required to meet safety and production requirements
- irradiation equipment safety and operating
- labelling and other regulatory requirements of irradiation of food

High pressure equipment

- types of foods suitable for high pressure processing
- the most suitable high pressure techniques for specific food products
- possible physical changes caused by high pressure processing of food
- the impact of high pressure preservation technology on different species of micro-organisms
- enzymatic and other chemical changes caused by high pressure processing
- potential quality defects that arise as a result of high pressure processing of food
- operating procedures of high pressure processing equipment as required to meet safety and production requirements
- labelling and other regulatory requirements of high pressure preservation of food.

Evidence Guide

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Overview of assessment	A person who demonstrates competency in this unit must be able to undertake and review processes for high or low temperature preservation techniques used in food processing.
Critical aspects for assessment and evidence required to demonstrate competency in this unit	Critical aspects of assessment must include evidence of the ability to apply food preservation technologies including applying low or high temperature preservation techniques, and documenting physical, biochemical and biological changes to treated food products.
Context of and specific resources for assessment	Assessment of performance requirements in this unit should be undertaken within the context of food technology. Competency is demonstrated by performance of all stated criteria, including the critical aspects and knowledge and skills elaborated in the Evidence Guide, and within the scope as defined by the Range Statements applicable to the workplace environment. Assessment must occur in a real or simulated workplace where the assessee has access to: • Food preservation equipment, manufacturers' advice and operating procedures • Methods and related software systems as required for carrying out food testing and preservation and collecting data • Tests used to report relevant product/process information and recorded results.
Method of assessment	The following assessment methods are suggested: • Written and/or oral questioning to assess knowledge and understanding • Completing workplace documentation • Third party reports from experienced practitioner • Case studies and practical activities • Field Reports.
Guidance information for assessment	Evidence should be gathered over a period of time in a range of actual or simulated environments.

Range Statement

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Occupational health and safety requirements	- Codes of practice, regulations, MSDSs - Enterprise specific - Relevant state/territory/commonwealth Occupational Health and Safety acts, regulations, national standards, codes of practice and guidance notes which may apply in jurisdiction - Examples of specific task related procedures may include: - Handling of chemicals - Use of PPEs.
Regulations	- Australia New Zealand Food Standards Code - Enterprise specific procedures - Industry regulations - State food regulations - Australian and international standards including: - professional association regulations - industry guidelines - codes of practice - ISO standards - codex alimentarius - relevant Acts of Parliament - EPA protocols and regulations regarding refrigerants.
High temperature preservation methods	- hot fill - aseptic processing - pasteurisation - ultra-high temperature (UHT) - high temperature short time (HTST) processing.
Heating systems	- retort, steam jackets - blanching vessels and pressure cookers - microwave and ohmic and inductive heating equipment - pasteurisation and sterilisation equipment.
Materials, equipment and systems	- refrigeration systems for chilling of food stuffs - freezing systems

for low temperature treatment

- freeze drying systems for heat sensitive products
- temperature measuring and recording devices.

Unit Sector(s)

Technical.