



Australian Government

Department of Education, Employment and Workplace Relations

FDFCH4001A Carry out sampling and interpret tests for cheese production

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Modification History

April 2012: Minor typographical corrections.

Unit Descriptor

This unit of competency covers the skills and knowledge required to carry out sampling and basic testing, and to interpret the results, for artisan cheese production.

Application of the Unit

This unit applies to production managers for artisan cheese enterprises which use small scale methods to produce specialty cheeses. The unit typically applies to staff with responsibility for developing and implementing procedures, preparing ingredients and maintaining product safety and quality throughout production. This unit includes setting and implementing sampling requirements, applying knowledge of microbiological and chemical processes in cheese making, and analysing test results and production processes to achieve the required characteristics for the cheese.

Licensing/Regulatory Information

Not applicable.

Pre-Requisites

MSL973001A Perform basic tests

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. Implement sampling procedures in cheese making	1.1 Sampling points for physical, chemical and microbial properties are identified and documented 1.2 An appropriate sampling size is determined 1.3 Sampling equipment is selected and sterilised 1.4 The sampling plan is documented and implemented
2. Monitor chemistry in cheese making	2.1 An acidity (either pH or titratable acidity) profile is recorded for each stage in the production process 2.2 Tests are carried out at stages for indicators, including salt levels, moisture levels and fat levels 2.3 Whey content is analysed for fat to gauge efficiency of curd cutting and yield potential 2.4 Safe work procedures for processes requiring handling of chemicals and/or involving chemical reactions in cheese making are reviewed and/or established
3. Monitor microbiological changes through the cheese making process	3.1 Samples are prepared for testing 3.2 Serial dilutions are accurately and aseptically carried out 3.3 Stained specimens are compared to reference samples to identify bacterial composition 3.4 Tests are performed on cultures to ensure they have adequate activity before inoculating the vat 3.5 Observations are made and data recorded for yeasts and moulds, total coliforms and staphylococci 3.6 Sampling and testing is carried out for inhibitory substances in milk 3.7 Whey is sampled for bacteriophage levels and the results interpreted
4. Carry out testing and interpret results to make adjustments to cheese making processes	4.1 Tactile and visual senses are used to detect physical and chemical changes during cheese making 4.2 Organoleptic properties of final cheese product are evaluated using sensory testing 4.3 Test results and reporting formats for information on composition, properties and reactions are recorded and interpreted 4.4 Recommended specifications for physical, chemical and microbial properties are documented 4.5 Yield efficiency is evaluated by comparing to established process control parameters 4.6 Specifications are referenced against test data 4.7 Changes to cheese making process are implemented based on test results

Required Skills and Knowledge

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

Required skills include:

Ability to:

- apply sampling procedures in relation to the process chart for a cheese product
- sample hard cheeses using a cheese trier or sample shaft
- prepare a liquid cheese homogenate and a sample from the homogenate for microbiological analysis
- interpret measurements at stages in a cheese making process covering:
 - salt to moisture ratio (S/M)
 - moisture in the non fat substance (MNFS)
 - fat in the dry matter (FDM)
- safely perform tasks for the isolation, identification and cultivation of microorganisms
- set up and use microscope slides and a microscope
- apply the use of the Gram reaction in the identification of common types of bacteria
- interpret test results for yeasts and moulds, coliforms and staphylococci
- correctly and safely perform tests to assist in the identification of microorganisms
- apply methods for the control of growth of microorganisms
- identify safety hazards and control methods required when handling chemicals and working with processes that involve chemical reactions
- review and/or develop workplace procedures to include advice on hazards and related instructions on control methods, including advice on action required in the event of an incident, such as a chemical spill or an emergency
- read and interpret technical information to describe food properties and/or reactions, including recognising and applying appropriate units of measurement and terms
- interpret a sampling plan.

Required knowledge includes:

Knowledge of:

- use of technical terms used to communicate information on properties of food and materials commonly used in the food industry
- physical characteristics or phenomena that occur through cheese processing, including:
 - chemistry (e.g. acidity, calcium phosphate and salt levels)
 - microbiological counts
 - handle and feel of the product
 - total solids (or moisture)
 - heat and temperature
 - taste, smell and appearance of the final cheese product
- the processes where characteristics and phenomena can be observed
- processes for the making of different types of cheese

- the processing stages designed to affect the structure of these compounds (e.g. the use of fermentation to coagulate the casein micelles for acid coagulated cheeses compared to the use of rennet for rennet coagulated cheeses)
- common chemical reactions that occur, factors required to cause a reaction, and the effect of reactions are identified for cheese making, including both spontaneous and controlled reactions, such as:
 - oxidation
 - enzymic
 - Maillard
 - acid-based reactions
 - other reactions relevant to a given cheese type and production process
- physical changes that occur to ingredients and product through cheese making
- reactions and properties of carbohydrates, proteins and fats through the cheese making process
- behaviour of each type of matter and its relationship to the production process
- changes in acidity through the cheese making process and its influence on spoilage, moisture and mineral content, texture and flavour
- temperature control and its impact throughout a cheese making process
- acidity ranges for the different types of cheeses
- the significance of fermentation for the control of spoilage and pathogens in cheese, and its influence on moisture levels, mineral content, texture and flavour
- the basic molecular structures of carbohydrates, proteins and fats
- the role of enzymes in generating biological reactions (e.g. the use of rennet as a coagulating agent)
- coagulation time and setting time for rennet
- factors that influence syneresis and its importance in cheese making
- types of microbial cells and their components and functions
- the main types of microorganisms and their activity in cheese making, both those that enhance the process and those that impact negatively on cheese characteristics
- types of pathogenic bacteria that can be present in milk and cheese products
- sampling requirements for cheese making
- pH, moisture and salt gradients in brine salted cheese (need for homogeneity in sampling)
- buffering in milk and the role of casein and phosphate levels
- basic molecular structures of carbohydrates, proteins and fats
- disinfection and sterilisation as applied to practical aspects of microbiological diversity and growth
- microorganisms of significance in the production and spoilage of cheese
- testing methods and interpretation of results for salmonella, staphylococcus, listeria and E. coli in raw milk cheese
- testing methods and interpretation for bacteriophage in whey
- chemical and physical methods available for controlling microbial growth
- safety hazards and control methods
- technical information resources.

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 carry out sampling and basic testing, and to interpret the results for cheese production.
Critical aspects for assessment and evidence required to demonstrate competency in this unit	Critical aspects of assessment must include evidence of the ability to sample and interpret the results of testing, including sensory testing, and relate the results of testing to the properties of the cheese being produced.
Context of and specific resources for assessment	Assessment of performance requirements in this unit should be undertaken within the context of food cheese production. 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: • production process and related equipment, manufacturers' advice and operating procedures • sampling and testing equipment and results • methods and related software systems, as required, for collecting data and calculating yields, efficiencies and material variances appropriate to the type of cheese and the production environment.
Method of assessment	The following assessment methods are suggested: • observation of candidate conducting a range of processes and tests • interpretation of milk and cheese analysis • simulation for sampling and interpreting tests using milk and cheese samples • written and/or oral questioning to assess knowledge and understanding • a report on a review of the sampling, testing and possible modifications to process for the manufacture of a type of cheese.
Guidance information for assessment	Evidence should be gathered over a period of time against a range of cheese types.

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.

Legislation	Legislative requirements are typically reflected in procedures and specifications. Legislation relevant to this industry includes: - the Food Standards Code, including labelling, weights and measures legislation - legislation covering food safety, environmental management, occupational health and safety (OHS), anti-discrimination and equal opportunity.
Policies and procedures	Work is carried out according to: - company procedures - regulatory and licensing requirements - legislative requirements - industrial awards and agreements.
Cheese types	Cheese types may include any type of fermented cheese product, including: - acid-coagulated (e.g. Cottage and cream cheese) - acid/heat-coagulated (e.g. Ricotta) - rennet-coagulated (e.g. Cheddar, Parmesan, Gouda, Swiss and Camembert).
Cheese classification criteria	Cheese classification criteria may include: - species of animal - milk standardisation process - coagulation - moisture level - pH control method - acidity - salting procedures - ripening procedures - type of rind - texture - melting properties.
Sampling requirements	Sampling requirements may include: a range of sampling plans which apply to fresh milks, processing milk and production stages for the range of cheeses.

Sampling tools and equipment	Sampling tools and equipment may include: • personal protective equipment (PPE) • sampling frames • sampling tubes • weighted sample bottles • variety of sterile containers • milk samplers • cheese triers.
Raw milk quality tests	Raw milk quality tests may include: • organoleptic • total plate counts • coliforms • psychrotrophes • somatic cell counts • rapid test for inhibitors • disk assay • composition (fat and protein, casein, whey protein and non-protein nitrogen, minerals and salts) • pH.
Cheese tests	Sampling and interpretation of tests may be required for: • pH • milk fat • cheese salt • culture activity test • bacteriophage detection • inhibitory substances (growth inhibition, enzymatic colorimetric, microbial receptor assays and immunoassays) rennet activity and microbiological analysis (yeasts and moulds, total coliforms and staphylococci).
Principles of optimising yield	Principles of optimising yield include • obtain highest moisture in non-fat substance (MNFS) with good quality • standardise milk protein to fat ratio (P/F) to obtain maximum value for milk components • minimise fat and protein losses in the whey.

Unit Sector(s)

Cheese.