

Title	Describe the composition of, and chemical and physical changes to, milk during dairy processing		
Level	3	Credits	5

Purpose	People credited with this unit standard are able to describe: the composition of cow's milk and the chemical and physical changes that may occur during dairy product processing; and methods used for determining the composition of raw milk, in a dairy processing operation.
----------------	--

Classification	Dairy Processing > Milk Processing
-----------------------	------------------------------------

Available grade	Achieved
------------------------	----------

Guidance Information

Legislation and regulations relevant to this unit standard include but are not limited to:

- Animal Products Act 1999;
- Health and Safety at Work Act 2015;
- Animal Products (Dairy) Regulations 2005.
and any subsequent amendments.

Outcomes and performance criteria

Outcome 1

Describe the composition of cow's milk and the chemical and physical changes that may occur during dairy product processing in a dairy processing operation.

Performance criteria

- 1.1 Describe the definition of milk in terms of legislative requirements.
- 1.2 Describe the composition of milk in terms of typical levels and variations due to lactation, seasonal, and environmental factors.
- Range composition includes but is not limited to – water, fat, protein, lactose, minerals.
- 1.3 Describe the water phase of milk in terms of the distribution of the solid components, their stability in milk and how they influence the density of milk.
- Range water phase includes but is not limited to – true (ionic and molecular) solution, colloidal dispersion, oil-in-water emulsion.

- 1.4 Describe milk fat in terms of physical and chemical structure, melting point range, causes of rancidity and changes that may occur during processing.
- Range structure includes but is not limited to – fat globule structure and size range, triglyceride structure;
rancidity includes but is not limited to – lipolytic, oxidative;
changes may include but are not limited to – creaming, homogenisation, crystallisation, phase reversal;
evidence of two changes is required.
- 1.5 Describe milk proteins in terms of the structure and concentration of caseins and whey proteins in milk and changes that may occur during processing.
- Range structure includes but is not limited to – casein and whey protein molecules, casein micelle;
changes include but are not limited to – precipitation, denaturation, proteolysis.
- 1.6 Describe lactose in terms of its disaccharide structure, breakdown by microorganisms into lactic acid or alcohol, and the potential reactions that could occur during processing.
- Range reactions may include but are not limited to – Maillard Browning and Caramelisation Browning;
evidence of one reaction is required.
- 1.7 Describe minor components of milk in terms of their nutritional significance or effects in terms of milk processing or testing.
- Range components include but are not limited to – minerals, vitamins, somatic cells, gases, enzymes, non-protein nitrogen.

Outcome 2

Describe methods used for determining the composition of raw milk in a dairy processing operation.

Performance criteria

- 2.1 Describe milk component testing in terms of difficulties in obtaining accurate measurements and reporting of milk components.
- Range testing difficulties include but are not limited to – representative sampling, indirect measurement, conversion factors.

2.2 Describe milk component testing methods in terms of their purposes and applications.

Range milk component testing includes but is not limited to – protein, fat, minerals, lactose;
methods may include but are not limited to – Fourier Transform Infra Red, Rose-Gottlieb, Kjeldahl, Chloramine-T, infra-red absorption;
evidence of one method for each milk component test.

2.3 Describe rapid automated analytical methods in terms of the importance of accurate reference testing and calibration to specific product type in obtaining accurate and reliable results.

Planned review date	31 December 2025
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	22 June 1995	31 December 2014
Review	2	5 July 1999	31 December 2014
Review	3	26 August 2002	31 December 2014
Revision	4	13 June 2003	31 December 2014
Rollover and Revision	5	17 July 2009	31 December 2016
Review	6	18 June 2015	31 December 2024
Review	7	25 March 2021	31 December 2024
Revision	8	29 July 2021	N/A
Revision	9	26 January 2023	N/A

Consent and Moderation Requirements (CMR) reference	0022
--	------

This CMR can be accessed at <http://www.nzqa.govt.nz/framework/search/index.do>.

Comments on this unit standard

Please contact the Hanga-Aro-Rau Manufacturing, Engineering and Logistics Workforce Development Council qualifications@hangaarorau.nz if you wish to suggest changes to the content of this unit standard.