

Title	Describe heat transfer and heat treatment in a dairy processing operation		
Level	3	Credits	5

Purpose	People credited with this unit standard are able to describe: heat transfer mechanisms; heat transfer and heat exchange systems; and heat treatment of milk, in a dairy processing operation.
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Classification	Dairy Processing > Milk Processing
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Available grade	Achieved
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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 heat transfer mechanisms in a dairy processing operation.

Performance criteria

- 1.1 Describe mechanisms of heat transfer in terms of conduction and convection.
- 1.2 Describe heat transfer in terms of factors influencing the rate of heat transfer and operational limitations.
- Range factors include but are not limited to – temperature differential, contact area, fouling.
- 1.3 Describe heat transfer in terms of the use of regeneration for optimum energy recovery.

Outcome 2

Describe heat transfer and heat exchange systems used in a dairy processing operation.

Performance criteria

2.1 Describe direct and indirect forms of heat transfer in terms of their relative advantages and disadvantages for heat treatment of milk.

Range advantages and disadvantages include but are not limited to – temperature-time profile, product denaturation, service media dilution or contamination.

2.2 Describe indirect heat exchange systems in terms of dairy processing applications including product characteristics and temperature.

Range indirect systems may include but are not limited to – tubular, plate, scraped surface; evidence of two indirect systems is required.

Outcome 3

Describe heat treatment of milk in a dairy processing operation.

Performance criteria

3.1 Describe purposes of the heat treatment process in terms of product safety and extension of the shelf life of milk products.

3.2 Describe categories of heat treatment of milk in terms of primary purpose and typical time and temperature combinations.

Range categories include but are not limited to – low temperature long-time, high temperature short-time, ultra-high temperature.

3.3 Describe effects of heat treatment of milk in terms of the end product and the relationship between time and temperature in the heat treatment process.

Range effects may include but are not limited to – protein denaturation, texture, viscosity, microbial load; evidence of two effects is required.

Planned review date	31 December 2025
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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	N/A
Revision	8	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 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.