Title	**Describe membrane processing in a dairy processing operation**		
Level	**5**	**Credits**	**15**

Purpose	People credited with the unit standard are able to describe: the principles of membrane separation; the control of membrane processing; the fouling and cleaning of membrane production areas; and the sampling and grading of membrane processed products, and the sources and effects of microorganisms, in a dairy processing operation.

Classification	Dairy Processing > Milk Products

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.

Outcomes and performance criteria

Outcome 1

Describe the principles of membrane separation in a dairy processing operation.

Performance criteria

1.1 Describe the composition and physical properties of the feed source in terms of factors affecting them and how they affect the performance of the membrane plant and composition of the retentate and permeate.

Range factors include but are not limited to – feed source, pre-treatment impacts, target applications, processing effects.

1.2 Describe the application of membrane separation technologies in terms of products and separation mechanisms.

Range applications include but are not limited to – reverse osmosis, nanofiltration (loose reverse osmosis), ultrafiltration, microfiltration.

1.3 Describe membrane separation technologies in terms of similarities and differences in their separation mechanisms.

Range separation mechanisms may include but are not limited to – pressures, fluxes, membrane configurations, temperatures, concentration factors;
evidence of three separation mechanisms is required.

1.4 Describe diafiltration in terms of how it enables high protein concentrations to be attained in an ultrafiltration plant.

1.5 Describe the impact of a membrane plant backing up in terms of what happens and why.

1.6 Describe factors influencing membrane processing efficiency in terms of plant design and operation.

Range factors may include but are not limited to – membrane selection, plant layout, pre-treatment, temperature control, speed control; evidence of three factors is required.

Outcome 2

Describe the control of membrane processing in a dairy processing operation.

Performance criteria

2.1 Describe the control of membrane processing in terms of process variables that affect membrane plant performance and products.

Range process variables may include but are not limited to – pH, flowrate, time, concentration, temperature, pressure drop, transmembrane pressure, diafiltration, feed type and composition, pre-treatment; evidence of six process variables is required.

2.2 Describe the control of membrane processing in terms of the function and use of instrumentation and feedback control.

Outcome 3

Describe the fouling and cleaning of membrane production areas in a dairy processing operation.

Performance criteria

3.1 Describe the fouling of membranes in terms of its detection and influence on flux rates.

3.2 Describe cleaning variables in terms of their influence on the cleaning effectiveness of membrane production areas, and factors which determine their upper limits.

Range cleaning variables include but are not limited to – temperature, time, chemical concentration, mechanical action.

3.3 Describe types of cleaning regimes in terms of their influence on the cleaning effectiveness and membrane longevity.

Range cleaning regimes may include but are not limited to – caustic chlorine steps, enzyme soaks;
evidence of two regimes is required.

3.4 Describe quality requirements for membrane plant water in terms of factors affecting the composition of water, methods for treatment, and reasons why water used in a membrane plant must meet specified standards.

Outcome 4

Describe the sampling and grading of membrane processed products, and the sources and effects of microorganisms in a dairy processing operation.

Performance criteria

4.1 Describe sampling and grading of membrane processed products in terms of achieving specification.

Range specifications may include but are not limited to – microorganism limits, chemistry limits, solid loading, sensory evaluation, measurement of functionality;
evidence of three specifications is required.

4.2 Describe the sources and effects of microorganisms in terms of maintaining hygiene during membrane processing, concentration of microorganisms during processing, and controls for food safety.

Planned review date	31 December 2026

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	10 January 1994	31 December 2012
Revision	2	16 September 1997	31 December 2012
Review	3	5 July 1999	31 December 2012
Revision	4	13 June 2003	31 December 2012
Rollover and Revision	5	20 June 2006	31 December 2014
Rollover	6	17 July 2009	31 December 2016
Review	7	18 June 2015	31 December 2024
Review	8	28 April 2022	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.