Title	**Describe the spray drying process used in a dairy processing operation**		
Level	**5**	**Credits**	**15**

Purpose	People credited with this unit standard are able to describe: the composition and properties of milk; the evaporation and spray drying processes for spray dried dairy products; product properties and process control strategies for a spray dried dairy product; the fouling and cleaning of an evaporation and spray drying process; sampling and grading of evaporated and spray dried products, 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 composition and properties of milk in a dairy processing operation.

Performance criteria

1.1 Describe the properties of the major solid components in milk in terms of their influences on the evaporation and spray drier processes and on the product.

Range fat, protein, lactose, minerals.

1.2 Describe deteriorative mechanisms in milk in terms of their effect on product quality.

Range mechanisms may include but are not limited to – high microbial count, mechanical damage, aeration, thermal damage; evidence of three mechanisms is required.

Outcome 2

Describe the evaporation and spray drying processes for spray dried dairy products in a dairy processing operation.

Performance criteria

2.1 Describe a falling film evaporator in terms of the process flow and contributing units of operation.

Range processes may include but are not limited to – separation, milk distribution, heat treatment, heat transfer, temperatures controls, vapour recompression;
evidence of five processes is required.

2.2 Describe a spray drier in terms of the process flow and contributing units of operation.

Range processes may include but are not limited to – heating heat transfer, mass transfer (particle drying), humidity, minimising of wall deposits and blockages, atomisation, powder transport, fine particle separation;
evidence of five processes is required.

Outcome 3

Describe product properties and process control strategies for a spray dried dairy product in a dairy processing operation.

Performance criteria

3.1 Describe microbrial growth areas and their control measures in terms of a milk powder process.

Range microorganisms may include but are not limited to – thermophiles, coliforms, yeasts, moulds, salmonella, listeria;
evidence of four microorganisms is required.

3.2 Describe control strategies in terms of product quality parameters.

Range evidence of four quality parameters for one selected spray dried product is required.

3.3 Describe control strategies in terms of the main unit operations of the milk powder drying process.

Range unit operations may include but are not limited to – evaporation, spray drying;
evidence of four control strategies for each unit operation.

Outcome 4

Describe the fouling and cleaning of an evaporation and spray drying process in a dairy processing operation.

Performance criteria

4.1 Describe the fouling of an evaporator and spray drier process in terms of its detection and impacts on production.

Range impacts may include but are not limited to – flow rate, evaporation efficiencies, drying efficiencies, microbial counts;
evidence of thee impacts is required.

4.2 Describe cleaning variables in terms of their influence on cleaning effectiveness of an evaporator and spray drier process.

Range variables may include but are not limited to – temperature, time, chemical concentration, mechanical action;
evidence of three variables is required.

4.3 Describe types of cleaning regimes in terms of their influence on the cleaning and processing effectiveness.

Range regimes may include but are not limited to – chemical cycling, physical cleaning, baghouse cleaning;
evidence of two regimes is required.

Outcome 5

Describe sampling and grading of evaporated and spray dried products in a dairy processing operation.

Performance criteria

5.1 Describe sampling and grading of evaporated and spray dried products in terms of achieving specifications.

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

Replacement information	This unit standard replaced unit standard 21801 and 21802

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	18 June 2015	31 December 2024
Review	2	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.