Title	**Describe the manufacture of cream products using scraped-surface heat exchange in a dairy processing operation**		
Level	**5**	**Credits**	**20**

Purpose	People credited with this unit standard are able to describe: the properties of the components of raw materials and the chemical and biological reactions associated with cream products manufactured by scraped-surface heat exchange processes; the handling and processing of raw materials used for the manufacture of scraped-surface heat exchange cream products; and scraped-surface heat exchange processes for the manufacture of scraped-surface heat exchange cream products, in a dairy processing operation.

Classification	Dairy Processing > Milk Products

Available grade	Achieved

Guidance Information

1 Legislation and regulations relevant to this unit standard includes but are not limited to:
- Animal Products Act 1999;
- Health and Safety at Work Act 2015;
- Animal Products (Dairy) Regulations 2005.

2 Definitions
Ammix butter refers to butter manufactured using a blend of concentrated milkfat, cream and salt, processed through scraped-surface heat exchange equipment.
Organisational requirements – instructions to staff on policies and procedures which are documented in memo or manual format and are available in the workplace. These requirements include but are not limited to – manufacturer specifications, company quality management requirements, site procedures, and legislative requirements.
Scraped-surface heat exchange products – cream products manufactured using scraped-surface heat exchange plant including spreadable, ammix and pastry butters, as well as fat spreads and prepared edible fats.

3 For assessment against this unit standard it is expected that the candidate will be experienced in the operation of a cream products plant. This experience will include the handling of raw materials for the processing and packaging of the finished product.

Outcomes and performance criteria

Outcome 1

Describe the properties of the components of raw materials and the chemical and biological reactions associated with cream products manufactured by scraped-surface heat exchange processes in a dairy processing operation.

Performance criteria

1.1 Describe components of milkfat in terms of their influence on the properties of final products.

Range components include but are not limited to – sterols; vitamins; phospholipids; colouring compounds; short, medium, long, and unsaturated fatty acids;
properties include but are not limited to – melting properties and crystallisation of triglycerides, seasonal variation.

1.2 Describe causes of lipolysis and oxidation of milkfat in terms of their influence on final product specifications, flavour and shelf-life.

1.3 Describe conditions for microbial contaminants, growth and control in terms of achieving product specifications.

Range contaminants include but are not limited to – pathogens, psychrotrophs, coliforms, thermophiles, yeasts, moulds.

Outcome 2

Describe the handling and processing of raw materials used for the manufacture of scraped-surface heat exchange cream products in a dairy processing operation.

Performance criteria

2.1 Describe cream handling in terms of the manufacture and achievement of final product specifications of scraped-surface heat exchange cream products.

Range specifications include but are not limited to – emulsion stability, fat globule membrane, gelling, microbial growth, lipolysis.

2.2 Describe purposes of cream treatment in terms of the manufacture and achievement of final product specifications of scraped-surface heat exchange cream products.

Range purposes include but are not limited to – flavour management, pasteurisation, lipase inactivation, shelf-life.

2.3 Describe advantages and disadvantages of cream treatment equipment in terms of process flexibility and operating costs.

Range equipment includes but is not limited to – Flavourtech and Vacreators.

2.4 Describe concentrated milkfat manufacture in terms of organisational requirements.

Range requirements include but are not limited to – emphasis on how phase inversion and dehydration/steam deodorisation affect the achievement of final product specifications of scraped-surface heat exchange cream products.

2.5 Describe multi-stage milkfat fractionation in terms of yields and melting points of fractions from each stage.

Range stages include but are not limited to – crystallisation, separation, milk fat composition.

Outcome 3

Describe scraped-surface heat exchange processes for the manufacture of scraped-surface heat exchange cream products in a dairy processing operation.

Performance criteria

3.1 Describe the function and operation of scraped-surface heat exchange equipment in terms of the manufacture of scraped-surface heat exchange cream products.

Range equipment includes but is not limited to – scraped surface heat exchangers, pinworkers, resting tubes, blending plant, packing equipment, remelt heat exchanger, refrigeration plant.

3.2 Describe composition control in terms of the manufacture of scraped-surface heat exchange cream products.

Range composition includes but is not limited to – raw material composition and blends, moisture solids not fat, blend mixing, solid fat content, product hardness.

3.3 Describe scraped-surface heat exchange processes in terms of milkfat and edible oil crystallisation.

Range crystallisation includes but is not limited to – crystal forms, rate of crystallisation, nucleation, crystal growth.

3.4 Describe process variables in terms of the manufacture of scraped-surface heat exchange cream products.

Range process variables include but are not limited to – raw materials, specific scraped area, pinworker residence time and speed, refrigerant temperatures.

3.5 Describe scraped-surface heat exchange processes in terms of the manufacture and functionality of bakery fats and fat mixes.

Range functionality includes but is not limited to – solid fat content, product hardness, colour, flavour, oxidative stability, functional consistency, vegetable oils, hydrogenation, creaming performance.

3.6 Describe scraped-surface heat exchange processes in terms of the manufacture and functionality of ammix and spreadable butter and comparison between the two.

Range comparison includes but is not limited to – spreadability, costs, flavour, solid fat content, reworking.

3.7 Describe manual and automated cleaning of scraped-surface heat exchange plants in terms of factors affecting cleaning performance and operator safety.

3.8 Describe quality control and final product grading in terms of the manufacture of scraped-surface heat exchange cream products to organisational requirements.

Range quality control includes but is not limited to – sensory evaluation, functionality, carton head space.

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	5 July 1999	31 December 2014
Revision	2	13 June 2003	31 December 2014
Rollover and Revision	3	20 June 2006	31 December 2014
Rollover and Revision	4	17 July 2009	31 December 2016
Review	5	18 June 2015	31 December 2024
Revision	6	19 November 2015	31 December 2024
Review	7	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.