

Title	Describe a wet and dry process for the production of casein and caseinate in a dairy processing operation		
Level	5	Credits	15

Purpose	People credited with this unit standard are able to describe: the wet and dry process for the production of casein products; the wet and dry process for the production of caseinate; the fouling and cleaning of a casein or caseinate process; and the analysis and grading of casein or caseinate products in a dairy processing operation.
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Classification	Dairy Processing > Milk Products
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Available grade	Achieved
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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

Lactic acid casein production principles consist of lactic acid starter selection and addition, casein coagulation, casein cooking, acidulation of whey and curd, dewheying, casein curd washing, casein curd dewatering. Methods used to produce lactic acid casein include direct steam injection, indirect cooking, combination cooking.

Mineral acid casein production principles consist of complete precipitation, curd uniformity, low fines in whey, minimum curd breakdown during washing, non-sticky curd in the hot wash and during drying. Methods used to produce mineral acid casein include dewheying, washing, dewatering.

Rennet casein production principles consist of kappa casein peptide bond specificity, reaction rates for the enzymic and clotting stages, casein concentration, enzyme concentration, temperature pH, calcium ion concentration, heat treatment of the milk, disruption of gel formation, rennet addition. Methods used to produce rennet casein include cold set, hot set, cooking, batch washing, continuous washing, concurrent washing, counter-current washing.

Outcomes and performance criteria

Outcome 1

Describe the wet and dry process for the production of casein products in a dairy processing operation.

Performance criteria

- 1.1 Describe the composition of whole milk for processing in terms of the influence on casein production.
- Range influences include but are not limited to – seasonal variations, form of solution or dispersion, physical state and stability, trends in the casein to fat ratio; evidence of three influences is required.
- 1.2 Describe the casein fraction of milk in terms of its physical micelle structure, destabilisation and precipitation by acid and enzyme, and dissolving of acid casein by alkali.
- 1.3 Describe the principles of whole milk separation and pasteurisation in terms of their influences on casein and whey processing.
- Range influences include but are not limited to – skimming efficiencies, market requirements, fat content, microbiological flora, control of lactic acid starter incubation; evidence of three influences is required.
- 1.4 Describe the precipitation of casein and whey proteins from skim milk in terms of the methods used.
- Range methods may include but are not limited to – acid precipitation at the isoelectric point of casein, proteolytic enzyme precipitation at neutral pH, use of heat and alkali treatment, resultant solubility of the precipitates in sodium hydroxide; evidence of two methods is required.
- 1.5 Describe the principles of casein production in terms of the methods used to produce casein.
- Range lactic acid casein, mineral acid casein, rennet casein; evidence of six principles for two casein types is required.
- 1.6 Describe the principles of drying and blending of casein to achieve final specification in terms of the methods used.
- Range principles may include but are not limited to – casein drying, cooling casein, tempering casein, grinding casein, sieving casein, blending casein and fines re-inclusion; evidence of four principles is required.

Outcome 2

Describe the wet and dry process for the production of caseinate in a dairy processing operation.

Performance criteria

- 2.1 Describe the caseinate conversion reaction process in terms of differences between the ideal caseinate reaction and the commercial caseinate process.
- Range caseinate conversion reaction process includes but is not limited to – particle size reduction, mixing of alkali with the casein suspension, high shear mixing after alkali addition, reaction dissolving.
- 2.2 Describe the sodium caseinate conversion process in terms of chemical, physical and microbiological requirements, factors that influence the rate of dissolving and limitations on the total solids content at which sodium caseinate solutions can be produced and spray dried.
- 2.3 Describe the calcium caseinate conversion process in terms of reasons, requirements, critical steps, temperature, total solids and pH influences on viscosity and gelation.
- 2.4 Describe the process of atomisation and spray drying of soluble caseinate concentrate in terms of viscosity control and prevention of heat denaturation, the purpose of atomisation, the process variables that affect the degree of atomisation and the main stages involved.

Outcome 3

Describe the fouling and cleaning of a casein or caseinate process in a dairy processing operation.

Performance criteria

- 3.1 Describe the fouling of a casein or caseinate process in terms of its detection and impacts on production.
- Range impacts on production may include but are not limited to – flow rate, microbial growth, casein and whey separation; evidence of two impacts is required.
- 3.2 Describe cleaning variables in terms of their influence on the cleaning effectiveness of a casein or caseinate process.
- Range variables may include but are not limited to – temperature, time, chemical concentration, mechanical action; evidence of three variables is required.

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

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

Outcome 4

Describe the analysis and grading of casein or caseinate products in a dairy processing operation.

Performance criteria

- 4.1 Describe the analysis and grading of casein in terms of grading specifications.

Range specifications may include but are not limited to – moisture content and homogeneity, protein, fat, acidity, pH, lactose, ash, solubility, colour, particle size, purity, aerobic plate count, coliforms, E.coli, thermophiles, staphylococci, yeasts and moulds, bacterial spores, trace elements, pesticides, inhibitory substances, phosphatase, nitrates and nitrites, bulk density, sediment and discolouration, appearance, flavour and odour, functional tests; evidence of six specifications is required.

Replacement information	This unit standard replaced unit standard 768 and unit standard 8959.
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Planned review date	31 December 2026
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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
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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.