

Describe cleaning systems and analyse data to optimise CIP performance in dairy manufacturing

Level 4

Credits 12

Purpose People credited with this unit standard are able to: describe the characteristics of soils encountered in dairy manufacturing, the properties of cleaning agents and chemical sanitisers used in clean in place systems (CIP), CIP methodologies, CIP control systems, and performance monitoring of CIP system, and analyse data to optimise performance of a CIP system in dairy manufacturing.

Subfield Dairy Manufacturing

Domain Dairy Product Safety and Risk Management

Status Registered

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Entry information Open.

Accreditation Evaluation of documentation and visit by NZQA and industry.

Standard setting body (SSB) New Zealand Industry Training Organisation

Accreditation and Moderation Action Plan (AMAP) reference 0022

This AMAP can be accessed at <http://www.nzqa.govt.nz/framework/search/index.do>.

Special notes

- 1 Definitions
CIP refers to clean in place systems used for plant cleaning and sanitising.
Organisational requirements refer to instructions to staff on policy and procedures that are documented in memo and/or manual format and are available in the workplace. These requirements include but are not limited to site-specific and company standard operating procedures (SOP), occupational health and safety, food safety and quality management requirements.

- 2 Legislation relevant to this unit standard includes but is not limited to – Health and Safety in Employment Act 1992, Animal Products (Dairy) Regulations 2005, and Resource Management Act 1991.

Elements and performance criteria

Element 1

Describe the characteristics of soils encountered in dairy manufacturing.

Performance criteria

- 1.1 Soil characteristics are described in terms of processes from which they are derived.
- Range processes may include but are not limited to – evaporation, drying, membrane filtration, separation, clarification.
- 1.2 Soil characteristics are described in terms of milk compositional groups they possess.
- Range fats, carbohydrates, minerals, denatured proteins, un-denatured proteins.
- 1.3 Soil characteristics are described in terms of the effects of processing conditions on the deposition of soils.
- Range includes but is not limited to – pH, temperature, product concentration, time.

Element 2

Describe the properties of cleaning agents and chemical sanitisers used in CIP systems in dairy manufacturing.

Range cleaning agents – water, surfactants, sequesterants, chelants, acids, alkalis, enzymes, acid replacers;
sanitising agents – quaternary ammonium compounds, peracetic acid compounds, oxidising agents, amphoteric surfactants, glutaraldehydes, peroxides.

Performance criteria

- 2.1 Cleaning agents are described in terms of the properties of their active ingredients and their general uses.
- 2.2 Cleaning agents are described in terms of their mode of cleaning action.
- Range dissolution, saponification, ionisation, suspension.

- 2.3 Cleaning agents and sanitizers are described in terms of factors that influence their effectiveness.
- Range includes but is not limited to – pH, temperature, concentration, time.
- 2.4 Cleaning agents and sanitizers are described in terms of their suitability for cleaning equipment involved in various processes.
- Range may include but are not limited to – evaporation, drying, membrane filtration, separation, clarification.
- 2.5 The properties of sanitising agents are described in terms of their functional chemical groups and mode of action.

Element 3

Describe CIP methodologies used in dairy manufacturing.

Performance criteria

- 3.1 CIP is described in terms of equipment and methods used for provision of mechanical action and factors that influence their effectiveness.
- Range spray nozzles, spray balls, flow rate, turbulence.
- 3.2 CIP methods are described in terms of the type of process used for cleaning and/or sanitising.
- Range single use, reuse, recovered.
- 3.3 CIP methods are described in terms of modes of recovery after cleaning and/or sanitising.
- Range decanting, filtration, separation, reuse.
- 3.4 CIP cleaning methods are described in terms of suitability for equipment type and associated soil type.
- Range methods – combinations of acid and/or caustic replacers, concentration, sequence, timing, flushing, rinsing; equipment may include but is not limited to – evaporator, flavourtech, separator, clarifier, membrane, silo, pipes, dryer.
- 3.5 Sanitising methods and agents are described in terms of suitability for equipment type.
- Range methods – applicator, contact time; equipment may include but is not limited to – evaporator, flavourtech, separator, clarifier, membrane, silo, pipes, dryer.

Element 4

Describe CIP control systems used in dairy manufacturing.

Performance criteria

- 4.1 Temperature control is described in terms of control objectives, means of heating and consequences of non-conformance.
- Range control objectives – optimum temperature maintenance, minimising downtime/holds;
methods of heating – plate heat exchange, shell and tube, direct steam injection.
- 4.2 Concentration control is described in terms of methodology and means of measurement.
- Range methodology – spanned dose, slugged dose;
measurement – conductivity, timer dosing, calibrated vessel, volumetric dosing, graphical trend display and interpretation.
- 4.3 CIP time control is described in terms of requirements to achieve optimum conditions and impact of holds.
- Range sequencing, pulsing, rinsing, circulating.
- 4.4 Flow and pressure control are described in terms of requirements to achieve optimum CIP performance.
- Range cavitation, pump type and performance, vortexing, suction line leaks.

Element 5

Describe performance monitoring of CIP systems used in dairy manufacturing.

Performance criteria

- 5.1 Manual monitoring is described in terms of methods used and their effectiveness.
- Range manual monitoring includes but is not limited to – visual monitoring of cleaning, inspection of plant and cleaning and rinse solutions, chemical titration, rinse water sediment testing.
- 5.2 Automated monitoring is described in terms of the equipment used and data generated.
- Range equipment – probes, sensors, timers, meters;
data – conductivity, time, temperature, pressure, flow rate, turbidity.

- 5.3 Bacteriological assessment is described in terms of factors influencing effectiveness for monitoring trends and pinpointing trouble spots.
- 5.4 Data interpretation is described in terms of use for monitoring of system performance and for system improvement.
- Range control limits, out-of-specification situations, corrective action, alarm limits.

Element 6

Analyse data to optimise performance of a CIP system in dairy manufacturing.

Performance criteria

- 6.1 CIP data is analysed to identify problems in a CIP system.
- Range flow chart, CIP monitoring data, trace-back procedure, product analyses, product grades.
- 6.2 CIP data is analysed to optimise performance of the CIP system in terms of time, cost, product safety, and environmental impact.
- Range chemical usage, downtime, energy use, water use, waste discharge.

Please note

Providers must be accredited by NZQA, or an inter-institutional body with delegated authority for quality assurance, before they can report credits from assessment against unit standards or deliver courses of study leading to that assessment.

Industry Training Organisations must be accredited by NZQA before they can register credits from assessment against unit standards.

Accredited providers and Industry Training Organisations assessing against unit standards must engage with the moderation system that applies to those standards.

Accreditation requirements and an outline of the moderation system that applies to this standard are outlined in the Accreditation and Moderation Action Plan (AMAP). The AMAP also includes useful information about special requirements for organisations wishing to develop education and training programmes, such as minimum qualifications for tutors and assessors, and special resource requirements.

Comments on this unit standard

Please contact the New Zealand Industry Training Organisation mail@nzito.co.nz if you wish to suggest changes to the content of this unit standard.