



Calibration

Calibration means to determine, by measurement or comparison with a known standard, that the value of each reading on a particular measuring instrument is in fact correct.

The need to calibrate

In all dairy manufacturing operations that involve a processing step, instrument calibration will be an essential procedure that needs to be carried out periodically.

Under the 'Code of Practice for Dairy Food Safety 2002,' all manufacturers must ensure that food is manufactured in accordance with a Food Safety Program based on Codex HACCP principles.¹

The monitoring of Critical Control Points (CCPs) is one of the basic principles behind any Hazard Analysis and Critical Control Point (HACCP)-based quality assurance system.

Monitoring enables data from each CCP to be recorded in a planned sequence or in the form of continuous observations, which can be assessed to determine if the CCP is effectively under control. The accuracy of these measurements is critical to ensuring food safety parameters are met, and it is therefore important that the readings given are correct.

An example:

With pasteurisation, temperature measurements are to the nearest 0.5°C and may be continuously monitored, or recorded intermittently in a batch system. In either case, it is critical that recording devices are reading accurately.²

If a thermometer is reading higher than the actual temperature, the product will be under-pasteurised, so the possibility for pathogen survival exists and there is a potential food safety risk. Quality attributes, e.g. product shelf-life, may also be compromised due to a higher number of surviving spoilage bacteria.

Conversely, if the product is being over-pasteurised through the recording thermometer reading lower than actual, product deposits may increase on plate heating surfaces. These deposits can be difficult to remove through routine cleaning, and may cause the formation of biofilms, which can lead to on-going contaminations. Furthermore, cooked flavours, textural defects or yield losses through protein, fat or mineral deposition can also occur. The extra

heating and cooling involved will also cause an unnecessary loss of energy.

What to calibrate

Common CCPs in dairy factories may relate to processes such as pasteurisation, product cooling, microbial fermentation and detection of foreign objects.

The 'Guidelines for Food Safety: Dairy Food Manufacturers 2006' provide useful information on what should be included in a Food Safety Program regarding the calibration of equipment.³

Reference to equipment manuals and consultation with equipment suppliers will assist in determining exactly what aspects of the measurement process need calibrating, and what credentials are required for someone to be considered competent or authorised to perform the task.



The following are some examples of other measuring instruments that should also be included in a calibration schedule:

- Pressure gauges often measure steam or air pressures that control critical process operations, therefore their accuracy is important

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for ensuring safety and effective quality assurance.

- Flow meters used to measure and record product quantities must be accurate to ensure product balances, formulation precision or correct supplier payments.
- Scales that are used to weigh product for sale should be periodically certified in order to ensure that the requirements of the 'Trade Measurement Act 1995' are being met. This can be done through agents that are licensed by 'Victoria Consumer Affairs'.^{4, 5}

When to calibrate

Coordination of the calibration schedule will normally fall under the responsibility of the manufacturer's Quality Assurance (QA) team. Formulating a regular schedule will however usually involve members of both the production and maintenance departments, to ensure that the timing is both practical and convenient. The period during lowest production or plant shutdown, when annual maintenance is done, is an ideal time.

The frequency of regular instrument calibration will vary depending on the known equipment reliability, manufacturer recommendations, the operating environment of each instrument, and the difficulty involved in performing the task.

For example, whilst it may be sufficient to calibrate a thermometer mounted in a refrigerated storage tank annually, a pH meter would require at least daily calibration due to probe fouling, and the degree of manual handling it could be subjected to.

Unplanned re-calibrations will also apply following any modifications or changes to plant or equipment related to a CCP processing step. For example, modified pipework, or pump alterations in a pasteurising system may affect the product flow, and consequently the heating and/or holding time of product in the pasteuriser.

Summary

Dairy manufacturing premises vary in size and complexity, and the extent of calibration required will differ accordingly.

Regular calibration will help ensure product safety and quality specifications are being achieved, and that processing efficiencies are being maximised.

References

1. Dairy Food Safety Victoria (2002) 'Code of Practice for Dairy Food Safety.' Available at: www.dairysafe.vic.gov.au/pdf/DFSV_CodeOfPractice2002.pdf
2. Standards Australia International Ltd, (2003), 'AS 3993: Equipment for the pasteurization of milk and other liquid dairy products – Continuous-flow systems.'
3. Dairy Food Safety Victoria, (2006), 'Guidelines for Food Safety: Dairy Food Manufacturers.'
4. Government of Victoria - Department of Premier and Cabinet, (1995), 'Trade Measurement Act, No.59.'
5. Consumer Affairs Victoria - Trade Measurement, (2006), 'Correct measure is good business.' Available at: [www.liquor.vic.gov.au/CA256902000FE154/Lookup/CAV_Publications_Trade_Measurement/\\$file/trade_correct_measure.pdf](http://www.liquor.vic.gov.au/CA256902000FE154/Lookup/CAV_Publications_Trade_Measurement/$file/trade_correct_measure.pdf)

Further information

Other Dairy Food Safety Notes are available at www.dairysafe.vic.gov.au

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