Dairy Food Safety

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23 Note

Microbiological Sampling and Testing of Dairy Products

This note outlines the reasons why dairy manufacturers need to test products they manufacture for microbial contaminants. It provides information on what organisms to test for, how frequently to sample and what standards need to be complied with.

Why test for microbial contaminants?

Regardless of the type of dairy product being manufactured, there is always a risk of microbial contamination occurring. Depending on the type and number of bacteria concerned, this could result in product spoilage or, worse still, food-borne illness to consumers.

Contamination can be caused by a failure in the company's Food Safety Program (FSP), or by failing to adhere to Good Manufacturing Practices (GMP). Contamination sources may originate from the product (or raw materials), the process, personnel, or the manufacturing environment itself. Some examples are:

- Poor temperature control of refrigerated product, (or raw material), allowing organisms to multiply to levels where a portion consumed represents an infectious dose, or where toxins can be produced (most toxins are not destroyed by pasteurisation)
- Inadequate heat treatment, or a failure in the heat treatment process e.g. pasteuriser malfunction
- Organisms present in raw materials that are able to survive the heat treatment processes (spore-forming or thermoduric bacteria)
- Product contamination occurring after heat treatment, and before packaging e.g. operator handling, unclean contact surfaces, packaging or environmental contamination

What tests will be conducted?

The type of organisms to test for will depend on a number of factors. These include:

- Regulatory requirements, such as compliance with the *FSANZ Food Standards Code*[1] (FSC) and *User Guide*[2], or Australian Quarantine & Inspection Service (AQIS) and importing country requirements (if product is for export)
- Potential consumers of the product (high risk categories such as infants, the aged, pregnant women or those immunocompromised)
- Customer specifications and requirements
- The type of product being manufactured, and the shelf life expectation

Different contaminating organisms will survive and multiply under different conditions. For example, high moisture ripened cheese should be tested for the presence of *E. coli*, coagulase-positive staphylococci, and *Listeria monocytogenes.* These potentially pathogenic organisms are capable of surviving and multiplying in the relatively mild conditions of this type of product. Milk powders on the other hand are more likely to be at risk of contamination by organisms such as *Salmonella* species or *Enterobacter sakazakii*, both of which can readily survive in dry environments.

All of these factors need to be considered when determining what specific organisms to test for in your company's Sampling Plan, a component of the Food Safety Program.

How the program is conducted

The Victorian *Code of Practice for Dairy Food Safety 2002*[3] (CoP) mandates that testing programs must verify the effective operation of the company's FSP. Aspects that should be identified are stipulated in the *Guidelines For Food Safety: Dairy Food Manufacturers*[4]*,* and are explained in more detail in this note.

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In addition to testing for the presence of pathogenic (disease-causing) organisms, testing for contamination by spoilage organisms can give an indication as to whether the product shelf life may be compromised e.g. by spore-formers in mature cheese or liquid milk products, yeast and moulds in yoghurts, or coliforms in mature cheese.

Indicator tests for coliforms, Total Plate Count (TPC) or *Enterobacteriaceae* are often used in end product testing to give a general indication of the levels of hygiene through production. In-line process or environmental sampling may also use these tests to proactively monitor for possible contamination in day-to-day operations.

Acceptable levels and specifications

The *FSC Standard 1.6.1* and the *User Guide* provide schedules on the microbial limits for a range of the pathogenic food borne micro-organisms that may affect food safety. Product lot samples that exceed these levels pose a risk to human health, and should not be offered for sale. As stipulated in the CoP, manufacturers must also comply with the pathogen levels specified in the FSC *User Guide.*

AQIS export requirements[5] stipulate that every product lot must comply with the FSC sampling protocol (or alternatively, the importing country's requirements).

Frequency of testing

Your company's Sampling Plan will need to specify the number of samples to be taken to verify that the FSP is effectively preventing contamination. The number will vary for different premises, processes and products, but must be evaluated then validated. Factors such as the operation's total production output and the risk associated with each product need to be considered.

The Australia New Zealand Dairy Authorities' Committee *Minimum Sampling Guidelines for Dairy Products*[6] provides a guide for small manufacturers. A more intensive testing regime will however need to be implemented to provide evidence of the consistent production of safe food before the adoption of these absolute minimum levels can be accepted. Similarly, microbiological failures identified through routine testing would warrant more intensive sampling until effective process control is re-established. Again, the details of the specific actions to follow in these cases will need to be documented in the FSP.

The FSC stipulates that five random samples should be taken within each lot, with greater numbers for some high risk foods e.g. Infant Formula Powders. It is also important that when samples are taken they are representative of the batch or "lot" produced.

Records to support the testing protocols

Records on how the company's sampling and testing regime were developed and validated for all products need to be maintained.

The product testing results primarily provide evidence (verification) of the effectiveness of the HACCP program, and must be retained for the mandatory three year period. Additionally, the regular on-going analysis of the test results can provide a useful tool for comparing operational trends over time, and may be used to support any later reassessment of the FSP.

Summary

All dairy manufacturers in Victoria must have a documented FSP based on HACCP principles. The FSP will include a sampling and testing program that can verify that the FSP is effectively preventing contamination. Variations will exist between what organisms are tested for and the number of samples taken. As each operation is different, a validated, documented plan needs to be developed and followed, so that the results generated can verify that products are complying with standards and contamination is effectively being prevented.

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References

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3. Dairy Food Safety Victoria (2002) '*Code of Practice for Dairy Food Safety*. Section 5: Dairy Manufacturing Premises' Available from: www.dairysafe.vic.gov.au/pdf/DFSV_CodeOfPractice2002.pdf
4. Dairy Food Safety Victoria (2006) '*Guidelines for Food Safety: Dairy Food Manufacturers*. Section 5.7: Testing Programs' Available from: www.dairysafe.vic.gov.au/pdf/ManufacturingGuidelines.pdf
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6. Australia New Zealand Dairy Authorities' Committee (formerly Australian Dairy Authorities' Standards Committee) (2000) *Minimum Sampling Guidelines for Dairy Products.* Available from http://www.dairysafe.vic.gov.au/pdf/MinimumSamplingGuidelinesforDairyProducts.pdf

Further information

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

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