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FACT SHEET

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SAMPLING SEAFOOD FOR MICROBIOLOGICAL ANALYSIS

Purpose: The purpose of this fact sheet is to provide guidance on how to sample seafood for microbiological analysis.

Target Audience: Anyone, directly or indirectly, associated with the production and sale of seafood products in Nova Scotia, as well as individuals looking to better understand the Nova Scotia fish and seafood sector.

Best Practices:

Sampling and testing finished products for the presence of microbiological contamination is one way to verify the effectiveness of control measures that have been put in place to prevent, eliminate or reduce biological hazards to an acceptable level. These control measures can include preventive controls such as sanitation or critical control points, i.e., cooking or cooling. Microbiological testing may be a regulatory or customer requirement, and operations must ensure they are meeting both, where applicable.

When sampling finished product for microbiological contamination, two important factors that need to be defined are the sample unit and the sampling plan. The Canadian Food Inspection Agency (CFIA) defines a sample as a collection of one or more units from a lot. A sample unit is one of many individual units and could be entire packages of food, portions of packaged food, or portions of food being prepared. A lot is a defined quantity of food that has been manufactured, prepared, produced, stored, graded, packaged, or labelled under the same conditions, such as product produced on the same day.

A sampling plan refers to the number of samples required and the criteria used to decide whether the lot should be accepted or rejected. There are many different types of sampling plans. The CFIA has recommended **bacteriological guidelines for fish and fish products in end products**. These guidelines are based on the product type, such as cooked or ready-to-eat products, raw bivalve molluscs, or all other types. Test organisms include *Escherichia coli*, *Staphylococcus aureus*, *Salmonella spp.*, *Vibrio cholerae*, *Vibrio parahaemolyticus*, and *Listeria monocytogenes*. There is also more information on sampling plans for fish and shellfish for **microbiological analysis in the document Microorganisms in Foods 2: Sampling for microbiological analysis: Principles and specific applications** by the International Commission on Microbiological Specifications for Food. These sampling plans were adopted by the Codex Alimentarius Commission in 1981 and are used internationally. Customers may also have specific sampling plans that they expect suppliers to follow. Sampling plans must contain the following information:

- The microorganism(s) to be tested for
- The number of samples to be tested (n)
- The recognized testing method (**refer to Health Canada's Compendium of Analytical Methods**)
- The microbiological limits (e.g., "m", "M", and "c")
    - "m" is the acceptable concentration of bacteria in a sample
    - "c" is the maximum number of samples that may exceed "m"

- "M" is the unacceptable concentration of bacteria in a sample
- Note that in some sampling plans, values for "c", "m" and "M" may not be specified as the acceptance criteria may be 'absent' or 'none detected' in all samples.

When collecting samples, they can be taken from storage in the final packaging or taken from the line during production, but they must always be random and representative of the lot. One method for ensuring the sample is random is to assign a numbering system to the lot and use an online random number generator or collect samples at predetermined times during production (e.g., beginning, middle and end). Based on the sampling plan, always ensure enough sample is taken for the lab analysis. It may be beneficial to contact the lab to determine the required quantity.

To ensure samples are not contaminated during collection, good hygiene practices and aseptic techniques must be followed. Before taking a sample, individuals responsible for sampling should wash their hands and wear protective clothing items as appropriate such as a hair net and gloves. The container or bag used to store the sample and any tools used to collect the sample must be sterile. When opening and closing the container or bag, be sure not to contaminate the lid or inside and work as quickly as possible. If sampling packaged finished product, the package must be unopened. Do not forget to label the sample with appropriate identifying information such as what the sample is (product type, lot code), when it was collected, where it was taken from and who took the sample. Ensure all samples taken for analysis are documented for traceability purposes. When finished, ensure the container or bag is completely sealed and stored at the appropriate temperature for storage and transport to the lab. Refrigerated samples must be stored and transported between 0-4°C, and frozen samples must be kept at -18°C. Refrigerated or frozen samples must be transported in a clean, insulated cooler with the appropriate amount of ice or ice packs, and samples must be properly secured. The ice or ice packs must not directly contact the samples. The insulated cooler should be stored in refrigerated storage (0-4°C) at the beginning of the sampling day.

Samples should be analyzed by an accredited lab using recognized testing methods as soon as possible and refrigerated samples should be analyzed within 24 hours of sampling. It may be beneficial to contact the lab to determine the best time to collect the sample and drop it off. If samples are analyzed in-house, ensure all lab personnel are trained and competent in lab procedures. Proficiency testing must be conducted on a regular basis to verify the accuracy of the in-house lab test results against the results of an accredited third-party laboratory. Lab personnel must follow aseptic sampling procedures and only use tools and materials that are intended for use, within their expiry date, and calibrated, where applicable. All lab sampling and testing results must be legible and maintained on file. The length of time to maintain records will depend on regulatory and customer requirements. When possible, hold and release procedures should be followed when testing finished product. Retention samples may be kept for a fixed amount of time in the event that a sample needs to be retested or a customer complaint is received on a particular lot, it can be investigated by retesting or sending the sample to a third-party accredited lab.

Key Take Aways:

- When sampling finished product for microbiological analysis, define the sample unit and sampling plan.
- Samples must be randomly selected and representative of the lot.
- Appropriate measures should be taken when collecting, storing, and transporting samples to prevent contamination and/or deterioration.

References

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