Lec.7 Food Technology

***Food Microbiological Criteria and Indicator Microorganism***

Indicator organisms are used as a proxy to monitor conditions in a particular environment, ecosystem, area, habitat, or consumer product.

*Microbiological Risk Management Matrices*:

The products criterion (PdC) specifies chemical or physical characteristics of food (pH, water activity) which if met contribute to the safety of a food products.

Different elements are related to PdC such as:

1- The frequency and the level of contamination.

2- The effectiveness of control measures.

3- The condition under which the products will be used.

4- Other parameters ensuring that it will not have the pathogen at an unacceptable level.

***Process Criterion***: There are a number of parameters

1- The initial levels of the pathogen.

2- The type and resistance of target pathogen.

3- The impact of the food matrices, which influences the expected effect.

***Microbiological Criterion****:*

Microbiological Criteria is used for the examination of food at a specified point of the food chain to determine the compliance of a food to a pre-established limit.

***Food Safety Objectives***:

Food Safety Objectives metric expresses the maximum concentration of a pathogen in a food at the time of consumption that contributes to the appropriate level of protection.

*Indicator Microorganism: Microorganism or groups of Microorganisms or Microbial metabolites whose presence in numbers exceeding specific limits* would indicate a failed in the adherence to Good Hygiene Practices.

The intended role and purpose of indicator microorganisms are thus to serve as an indicator predictor of the presence of the pathogen, it's therefore an indication of an increased risk related to a deviation of the implemented hygiene control measures.

Several of the key properties are listed below for its use as indicator:

1- History of concomitant presence of indicators and associated pathogen or its toxin.

2- Presence usually at higher levels than associated pathogen.

3- Presence indication of an increased risk for faulty process.

4- Survival similar to or greater than that of the target pathogen.

5- Easy detectable.

6- Methods for indicator M.O. need to fulfill the same requirements as the one for pathogens.

7- Quantitative results should show correlation between indicator concentration and level of pathogen.

8- Result need to be applicable to process control.

9- Analyst health is not at risk.

10- Analytical method is suitable for in-plant use.

The choice of an appropriate hygiene indicator will depend on the knowledge of a number of factors related to the products manufactured and in particular:

1- The microbiota of raw materials.

2- The processing condition applied and effect on the microbiota.

3- The food composition and characteristics and the effect on the behavior of *microorganism*.

4- The microbial ecology of the processing environments.

5- The effects of different types of cleaning and sanitization procedures.

Certain bacteria can be used as indicator organisms in particular situations, the presence of bacteria commonly found in human feces, termed [coliform bacteria](https://en.wikipedia.org/wiki/Coliform_bacteria) (e.g. [*E. coli*](https://en.wikipedia.org/wiki/E._coli)), in [surface water](https://en.wikipedia.org/wiki/Surface_water) is a common indicator of [faecal contamination](https://en.wikipedia.org/wiki/Water_quality#Measurement). For this reason, sanitation programs often test water for the presence of these organisms to ensure that drinking water systems are not contaminated with feces. This testing can be done using several methods which generally involve taking samples of water, or passing large amounts of water through a filter to sample bacteria, then testing to see if bacteria from that water grow on [selective media](https://en.wikipedia.org/wiki/Selective_media) such as [MacConkey agar](https://en.wikipedia.org/wiki/MacConkey_agar" \o "MacConkey agar). Alternatively, the sample can be tested to see if it utilizes various nutrients in ways characteristic of coliform bacteria.

Coliform bacteria selected as indicators of faecal contamination must not persist in the environment for long periods of time following efflux from the intestine, and their presence must be closely correlated with contamination by other faecal organisms. Non-coliform bacteria, such as [*Streptococcus bovis*](https://en.wikipedia.org/wiki/Streptococcus_bovis) and certain [clostridia](https://en.wikipedia.org/wiki/Clostridia) may also be used as an index of faecal contamination.

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