SPOILAGE AND PRESERVATION OF FOOD

2nd November, 2015

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Historical Perspective

Ancient food-handling practices:

1. Prehistoric humans struggled to maintain an adequate food supply.
2. Food had to be consumed quickly.

- They gradually learned simple techniques that could extend the storage time of their food either by accident or by trial and error. E.g. Covered vessels, drying, smoking.

- It is likely that naturally desiccated or fermented foods were also noticed and produced routinely to provide a more stable supply of edible food.

Historical Perspective Contd.

Human Civilizations

- Close to 10,000 years of recorded history describes advances such as the development of agricultural and food preservation technologies.

- Food preservation was accomplished by quite simple, but not completely effective, technologies. Drying, salting, smoking, fermentation, and cool storage when possible.

Historical Perspective Contd.

- In the past 200 years: humans developed more advanced technologies for advanced food production, preservation, and distribution.
- Canning began in the early nineteenth century.
- In the middle of the 18th century Louis Pasteur and the first microbiologists began to understand and control the microbiological causes of disease, foodborne illness, and food spoilage.

Historical Perspective Contd.

After 1945, development of reliable mechanical refrigeration systems, logistical systems for the refrigerated transportation and distribution of food, and widely available home refrigerators and freezers.

Historical Perspective Contd.

- In the past several decades there have been improvements in food production and management systems.
- Implementation of Good Manufacturing Practices (GMPs) in the United States. E. g. employee practices, sanitary design of food production facilities and equipment, and cleaning and sanitation procedures have improved food quality.

Historical Perspective Contd.

- HACCP (hazard analysis and critical control point) system, while developed to assure food safety, has also improved food quality.
- HACCP's essential functions include product design, process control, and management accountability.

Historical Perspective Contd.

Certain regulations and practices that are used to improve public health protection against foodborne pathogens will also improve the microbiological quality of food, thereby reducing the incidence of microbiological spoilage and extending the shelf life of foods.

Detection of Microbiological Spoilage

Organoleptic Methods for Spoilage Detection

- **Odor**: volatile metabolites are detectable by their odor. Foul-smelling amines are often produced during proteolysis.
- Fruity and alcoholic odors can be produced by sugar catabolism. Instrumental procedures are available for the detection of many volatile compounds, the simple “sniff” test is still a very important procedure for the detection of spoilage in fresh meats, poultry, and fish

Visual

- Detection of spoilage by visual examination. Ropy baked goods :stringy, mucilaginous appearance when the crumb is pulled apart
- Fermentation of high sugar products: visible bubbling of the product from gas.
- Surface growth of spoilage microorganisms: visible as slime or isolated colonies that are sometimes pigmented. Mold spoilage is visible on the surface of products as fuzzy white colonies that turn various colors as spores are produced. When mold spoilage occurs in the interior of a product, it is not visible until the spores are produced

Taste

- Yeast spoilage of condiments and syrups by alcohol production results in a medicinal
- taste. In fruit juices, yeast spoilage produces a buttery taste caused by diacetyl.

Microbiological Methods for Spoilage Detection

- foods that are obviously spoiled usually have microbial counts >10^7 cells/g but for fermented foods such as cheese and sausage
- However, sometimes it useful to perform quantitative microbiological analyses for the assessment of initial spoilage before it becomes organoleptically detectable

Microbiological Methods for Spoilage Detection Contd.

- Conventional microbiological testing procedures such as total aerobic count, yeast count and mold counts.

Chemical Methods for Spoilage Detection

- Acid production: pH meter
- Detection of volatile, short-chain alcohols, carbonyls, amines, aldehydes, and aromatic compounds by gas chromatography