# Off Flavors

- **Bitty flavour:** caused by proteolytic microorganisms especially *Bacillus* spp. and *Pseudomonas* spp.
- **Potato flavour:** by *Pseudomonas mucidolens* and *Pseudomonas graveolens*
- Cooked flavor- **sulfhydryl** compounds – due to overheating
- Cowy flavor – in ketosis due to acetone
- Barny Flavor – poor ventilation
- Malty Flavor: *Streptococcus lactis var. maltigenes*
- *Phenolic flavor – Bacillus circulans*
- *Unclean flavor- E.coli*

- Metallic, oily, stale, tallowy, - Metal-induced oxidized off- flavor: Due to lipid oxidation-metal catalyzed
- Light-induced oxidized off-flavour: light catalyzed lipid oxidation as well as protein degradation both are involved.
- Rancid: Extremely unpleasant, due to volatile fatty acids formed through enzymatic hydrolysis of **fat (Caproic, Butyric acid production)**

# Acid fermented milk products

- Sweet, sour, sweetened dahi and yoghurt
- Gassy: contaminant yeasts or coli aerogenus organisms
- Bitter: sweet curdling organisms
- Cheesy: due to proteolysis of milk
- **Wheying off**: Free whey floats either on the top or curd floats on top with free whey at the bottom
- Free whey appearance at the top is associated with high acidity, higher temperature and prolonged storage
- Appearance of whey at bottom with curd floating on the top gives an indication of contamination of either milk or starter

# Defects in Cream

- Oxidized/oily/Metallic/Tallowy:
- Fat oxidation due to direct contact of milk with copper or iron,
- exposure of milk or cream to sunlight, etc.

- Rancid: Fat hydrolysis due to lipase action in milk or cream

- Bitterness and thinning: Bacillus subtilis

- Highly acid/sour
- i. Using sour milk for separation
- ii. Acid development in cream

# Bitty cream

- lecithinase enzyme of *Bacillus cereus var mycoides*
- attacks phospholipid part of fat globule membrane and partly from the coagulation of casein

# Defects in Butter

- Gritty - Undissolved coarse salt, incorrect salting
- Grainy - Incorrect neutralization of high acid cream with lime
- *Yeasty flavour and odour*: fermentation of the cream by Torula Cremoris and Torula sphaerica
- Fishy flavor - Hydrolysis of phospholipid to form trimethylamine is one of the reasons attributed for the 'fishy' flavor defect in butter
- Skunk like odor- P. mephitica
- Apple taint – P. fluroscrns

# Defects in Ghee

- Rancidity: lipase action (incidence is low), oxidation of fat (more chances) through exposure to light and contact with metal ions e.g. Cu, Fe, etc.
- Dark/Burnt color: Excessive high temperature (> 120 C for some period) of clarification of ghee can lead to 'dark brown' colored ghee

# Defects in KHOA

- At room temperature (24-30°C) a rancid flavor is developed on *khoa*

- low temperature (5-10°C) a stale and sour flavor is observed and there is mould growth on the surface

# Defects in Cheese

- **Rind rot** – excessive acidity or moisture in cheese before curing
- **Gassiness/ Late blowing in cheese**: Clostridium tyrobutyricum
- **Fish eyes/yeast holes**: Contamination with yeasts (Torula sp.)

# Defects in Cheese

- "wheytaint": Acid/ high acid/sour
- Fruity/ Fermented: psychrotrophic bacteria
- Bitter: pseudomonas organisms
- Too firm body: over use of rennet; cooking of curd at too high temperature ; or cutting of curd at a pH more than 4.7
- Weak/soft/mushy: high moisture, low-solid cottage cheese

# GMP and HACCP

GMP- Good Manufacturing Practices

HACCP- Hazard Analysis Critical Control Point

# HACCP

**Hazard Analysis and Critical Control Point (HACCP) System** - In order to enhance food safety, every stage of the food production (from purchasing, receiving, transportation, storage, preparation, handling, cooking to serving) should be carried out and monitored scrupulously.

- The HACCP system is a scientific and systematic approach to identify, assess and control of hazards in the food production process.

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- The seven principles of a HACCP System are-

- 1.Analyze hazards
- 2.Determine critical control points
- 3.Establish limits for critical control points
- 4.Establish monitoring procedures for critical control points
- 5.Establish corrective actions
- 6.Establish verification procedures
- 7.Establish a record system

# Food safety standards for milk and milk products

- **Food Safety and Standards Authority of India (FSSAI)** is an autonomous body established under the Ministry of Health & Family Welfare, Government of India.
- The FSSAI has been established under the Food Safety and Standards Act, 2006 which is a consolidating statute related to food safety and regulation in India.
- FSSAI is responsible for protecting and promoting public health through the regulation and supervision of food safety.

- The FSSAI has its headquarters at New Delhi.
- The authority also has 6 regional offices located in Delhi, Guwahati, Mumbai, Kolkata, Cochin, and Chennai.
- 14 referral laboratories notified by FSSAI, 72 State/UT laboratories located throughout India.

# Legislations

- Prevention of Food Adulteration (PFA) Act (1954) and Rules (1955)
- ISO 9000 Series – 1987 Basically, it consists of five standards, ISO 9000, 9002 and 9003 and ISO 9000 and ISO 9004.
- Agricultural and Processed Food Products Export Development Authority (APEDA) - Indian Apex-Export Trade Promotion Active government body


**Empowered by BIS Act, 1986**

**Aims to provide Third Party Guarantee of quality, safety and reliability**

**Standard Mark on a product is an assurance of conformity**


Enforced by the Agricultural Produce (Grading and Marketing) Act, 1937 under Directorate of Marketing and Inspection (DMI)

Prescribes Grade standards for agricultural and allied sector

## Quality Certification Mark

## Ensures quality and purity of product

## Certifies Third Party Guarantee of Quality

# OIE

Office International des Epizooties - January 25th 1924

In May 2003 the Office became the World Organization for Animal Health but kept its historical acronym OIE

The OIE is the intergovernmental organization responsible for improving animal health worldwide.

- Headquarter: Paris

# MILK AND MILK PRODUCT ORDER, 1992


**The Government of India had promulgated the Milk and Milk Product Order (MMPO) 1992 on 9/6/92 under the provisions of Essential Commodities Act, 1955 consequent to de-licensing of Dairy Sector in 1991.**

## Objective:

- **To maintain and increase the supply of liquid milk of desired quality in the interest of the general public.**
- **To regulate the production, processing and distribution of milk and milk products.**

# Cleaning & Sanitation

- Cleaning is the process in which complete removal of soil (unwanted matter on food-contact surfaces) is accomplished using appropriate detergent chemicals under recommended conditions from the internal and external surface of the equipment

- Some of the precipitates remains intact to equipment after cleaning and forms a film over equipment surface called water stone

- Heat denaturation of protein present on the equipment surface or absorbed by other components forms

# Cleaning agents/ detergents

- strong alkali: Sodium hydroxide (caustic soda) potassium hydroxide (caustic potash) – corrosive
- mild alkali: Sodium carbonate and sodium silicates, Trisodium phosphate (TSP) - commonly used
- Mild Acids- phosphoric, tartaric, citric, gluconic acid
- Strong acids- Nitric acid- 1% for stainless steel, HCL, Sulphuric acid
- Polyphosphate and chelating chemicals: tetra phosphate, hexametaphosphate
- Surface active/ wetting agents: Teepol, Acinol – N, common soaps

| Material | Cleaning | Sanitization |
|---|---|---|
| Tinned steel/ copper | Weak alkalis, together with sodium sulphite as inhibitor, should be used. | All sanitizers may be used. |
| Bronze | -do- | -do- |
| Galvanized | -do- | -do- |
| Aluminium alloy | Weak alkalis, together with sodium silicate as inhibitor, should be used. | -do- -do- |
| Glass | All alkalis and acids may be used. | -do- |
| Vitreous enamel | Weak alkalis, together with sodium silicate as inhibitor, should be used. | -do- |
| Plastics | Cleaning temperatures should not be above the softening point of plastic. | Only chemical sanitizers should be used. |
| Rubber | Strong alkalis should be used to remove any fatty material stuck to the surface. | -do- |

*Choice of detergents in organized dairies*

| S. No. | Ingredients | Quantity | Remarks |
|---|---|---|---|
| 1. | Tri-sodium phosphate | 850 g. | For general use |
| | Wetting agent | 150 g. | |
| 2. | Tri-sodium phosphate | 650 g. | For aluminium utensils |
| | Sodium meta-silicate | 200 g. | |
| | Wetting agent | 150 g. | |
| 3. | Tri-sodium phosphate | 750 g. | For tinned utensils |
| | Sodium sulphite | 100 g. | |
| | Wetting agent | 150 g. | |

- CIP ( Clean In Place) has been opted in milk industry for good cleaning and sanitation.
- The cleaning cycle in dairy comprises following steps-
- Recovery of product residue by scrapping, drainage with water or compressed air.
- Pre- rinsing with water to remove dirt.
- Cleaning with0.15-0.6% alkaline detergent
- Rinsing with clean water.
- Cleaning with acidic detergent.
- Rinsing with clean water ( Hardness not exceeding 112mg/L)
- Sodium Hypochlorite/ Chlorine: 200ppm
- Iodophores:25mg/L QUATS: 200mg/L

# Residues in milk

| Source | Residue |
|---|---|
| 1. Farm animal | Veterinary drugs e.g. antibiotics, hormones, antiparaciticides, etc. |
| | Feed additives e.g. Trace elements, antioxidants, feed drugs |
| 2. Environment | Agrochemicals e.g. pesticides, growth promoters |
| | Emissions e.g aerosols, fumes, dusts |
| | Minerals of the soil e.g. lead, cadmium. |
| | Environmental organics e.g. mycotoxins |
| | Radionuclides |
| 3. Milking and processing | Hygiene formulations e.g. cleaning and disinfecting agents, insecticides |
| | Surfaces e.g. metals, plasticisers |
| | Microbial products e.g. mycotoxins, bacterial enzymes |

# Milk-borne diseases

- Food infection: ingestion of viable pathogenic bacteria along with the food
- Food intoxication: Ingestion of toxins already produced by microorganisms in the food
- Toxi-infection: A certain group of organisms which can infect intestines when ingested along with the food and produce toxins in situ to bring about symptoms of poisoning.

# Bacterial Disease

- Anthrax: Bacillus anthracis
- Brucellosis: Brucella abortus B. melitensis B. suis
- Campylobacteriosis: Campylobacter jejuni
- Diphtheria: Corynebacterium diphtheriae
- Listeriosis: Listeria monocytogenes
- Salmonellosis: Salmonella typhi S. paratyphi S.enteritidis
- Shigellosis: Shigella dysenteriae
- Streptococcosis: Streptococcus pyogenes
- Tuberculosis: Mycobacterium tuberculosis M.bovis M.avium
- Vibrio parahaemolyticus infection
- Yersiniosis: Yersinia enterocolitica

- Rickettsial disease- Q fever - Coxiella burnetti
- Fungal intoxication - Aflatoxicosis Aspergillus flavus
- Viral Diseases

- Polio myelitis- Polio virus
- Infectious hepatitis - Hepatitis A virus
- Tick borne encephalitis - Group B Arbo virus
- FMD

* Parasitic diseases – Toxoplasmosis, Giardiasis

- Milk borne toxi infections

1. Bacillus cereus poisoning
2. Clostridium perfringens poisoning

- Milk borne intoxication:

- Botulism
- Cholera
- E.coli poisoning
- Staphylococcal poisioning

# Mastitis

- Contagious mastitis: *Streptococcus agalactiae* (as natural inhabitant of udder)
- Summer mastitis: *Corynebacterium pyogenes*
- Environmental mastitis: *Streptococcus uberis, coliforms*

- **Direct leucocyte count:** The presence of ≥5,00,000 somatic cells per ml – Acute mastitis (2-5 lakh: subclinical)
- ***Hotis test***: *Streptococcus agalactiae*
- bromocresol purple indicator

- Strip cup test: finding out the presence of fibrin, mucous and clots
- Chloride test: Normal milk has a chloride content of 0.08 to 0.14%. Abnormal milk has more than 0.14%
- Catalase test: measure the increase in catalase depending on the ability of it to break down hydrogen peroxide
- CMT: based on the increase in number of leucocytes and alkalinity of mastitic milk

- Late blowing of cheese is due to:

(A) Coliforms

(B) Bacillus subtilis

(C) Clostridium bothrium

(D) Staphylococcus aureus

- Consumption of even boiled milk may cause:
  (A) Tuberculosis
  (B) Brucellosis
  (C) Q-fever
  (D) Staphylococcal gastroenteritis

# RPSC 2019

- The ingestion of viable pathogenic bacteria along with food leads to their lodgement and establishment in consumers organ is termed as
- a) Food infection
- b) Food intoxication
- c) Toxi-infection
- d) Food infestation

# RPSC 2019

- Milk and Milk Products Order (MMPO) was promulgated by Government of India in

a) 1973 b) 1975 c) 1992 d) 1995

- The Food Safety Management System (FSMS), main system of export inspection and certification being followed in the Indian food sector is based on international standards Including

(1) HACCP (2) APIDA (3) Auditing

(4) Inspecting the books only of the manufacturer

- Bitter taint and thinning of cream are caused by:

(A) B. stearothermophilus

(B) B. subtilis

(C) Coliforms

(D) Lactococcus

- The pathogenic organisms that contaminate milk from milkers and milk handlers:

(A) S. agalactiae

(B) S. aureus

(C) Bacillus sp.

(D) Micrococci

- Microbial inhibitor used in detergent solution for cleaning of aluminium surfaces:

(A) Sodium sulphate

(B) Sodium metasilicate

(C) Sodium hydroxide

(D) Sodium carbonate

- Salmonellosis is an example for which of the following?

(A) Infectious type of food poisoning

(B) Non-infectious type of food poisoning.

(C) Chemical food poisoning

(D) None of the above