

V SEMESTER

COURSE 15 A: FOOD AND DAIRY MICROBIOLOGY

credits -3

Course Outcomes: By the Completion of the course the learner should be able to–

1. Understand the factors influencing microbial growth, contamination in foods, and sources of microbial contamination.
2. Gain knowledge of Microflora of milk, microbial contamination of raw milk and butter, and spoilage of various food types.
3. Use dairy starter cultures in fermented dairy products, other fermented foods, and probiotics.
4. Differentiate Foodborne diseases, intoxications, and infections
5. To adopt food sanitation, control measures, Follow HACCP; Carry out tests to detect pathogens in foods

Unit1: Microbes in Food and Dairy

No. of Hours: 9

1. Intrinsic and extrinsic factors that affect growth and survival of microbes in foods, natural flora and source of contamination of foods in general.
2. Microflora associated with milk and milk products and their importance. Sources of microbial contamination of raw milk and butter
3. Sources of microbial contamination and spoilage of vegetables, fruits, meat, eggs, bread, canned Foods;

Unit 2: Food Preservation

No. of Hours: 9

1. Principles of food preservation: temperature, canning, drying, irradiation, microwave processing and aseptic packaging, chemical methods of food preservation: salt, sugar, organic acids, SO₂, citrates, benzoates, nitrite and nitrates etc.
2. Microbial and chemical changes in raw milk during chilling and refrigeration.
3. Naturally occurring preservative systems in milk like LP system, Immunoglobulins, Lysozyme, Lactoferrin. Food grade Biopreservatives (GRAS), Bacteriocins of lactic acid bacteria; Nisin and other antimicrobials produced by Lactic Acid Bacteria (LAB)

Unit 3: Fermented foods

No. of Hours: 9

1. Dairy starter cultures, fermented dairy products: yogurt, acidophilus milk, kumiss, kefir, dahi and cheese
2. Other fermented foods: dosa, sauerkraut, soy sauce and tempeh, Probiotics: Health benefits, types of microorganisms used, probiotic foods available in market.
3. Utilization and disposal of dairy by-products – whey.

Unit 4: Food borne diseases**No. of Hours: 9**

1. Food borne diseases (causative agents, foods involved, symptoms and preventive measures)
2. Food intoxications: Staphylococcus aureus, Clostridium botulinum and mycotoxins;
3. Food infections: Bacillus cereus, Vibrio parahaemolyticus, Escherichia coli, Salmonellosis,
4. Shigellosis, Yersinia enterocolitica, Listeria monocytogenes and Campylobacter jejuni

Unit 5: Food Sanitation**No. of Hours: 9**

1. Food sanitation and control; HACCP; National and International microbiological standards for dairy products (BIS, ICMSF, Codex Alimentarius Standards).
2. Cultural and rapid detection methods of food borne pathogens and introduction to predictive microbiology.
3. Genetically modified foods, Nutraceuticals, Biosensors in food, Applications of microbial enzymes in dairy industry [Protease, Lipases].

Skill Outcomes:

1. Mastering the MBRT method and standard plate count technique, interpreting MPN results, assessing milk quality based on microbial load, and understanding the significance of microbial analysis in ensuring milk safety.
2. Check the efficiency of pasteurization of milk include understanding the principle of the test, performing the enzymatic reaction, interpreting results, and assessing the effectiveness of milk pasteurization in ensuring food safety.
3. Mastering aseptic techniques, perform sample preparation and isolation techniques, identify potential pathogens and spoilage microorganisms, and understand the role of microorganisms in food safety and spoilage.
4. Follow yogurt fermentation protocols, controlling fermentation conditions, assessing yogurt quality, and understanding the role of microbial cultures in yogurt production.

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credits -1

1. MBRT of milk samples and their standard plate count.
2. Alkaline phosphatase test to check the efficiency of pasteurization of milk.
3. Isolation of any foodborne bacteria from food products. Isolation of spoilage microorganisms from spoiled vegetables/fruits.
4. Isolation of spoilage microorganisms from bread. 5.Preparation of Yogurt/Dahi.