



University of Sadat City
Faculty of Veterinary Medicine
Dept. of Food Hygiene and Control
(2014-2015)



Dairy Microbiology

(705P)

MVSC COURSE SPECIFICATION

A. BASIC INFORMATION

| | |
|--|---|
| University: | Sadat City |
| Faculty: | Veterinary Medicine |
| Program on which the course is given: | PhD in Veterinary Medical Sciences (Dairy Hygiene and Control) |
| Department offering the Course: | Food Hygiene and Control |
| Course code: | 705P |
| Course title: | Dairy Microbiology |
| Lecture (hr/week): | 2 |
| Practical (hr/week): | 2 |
| Course coordinator: | Dr. Ahmed Moustafa Hammad |

B. PROFESSIONAL INFORMATION

1) Overall aims of course

Upon successful completion of the course, the student will gain recent concepts and theories about industrial dairy microbiology, tracking bacteria contaminants in the dairy plant, survival of foodborne pathogens in milk and dairy products and finally, the international criteria for selection of starter and probiotic strains.

2) Intended learning outcomes of course (ILOs)

a) KNOWLEDGE AND UNDERSTANDING

By the end of this course, the graduate should be able to:

- a.1. Explain basic and recent concepts about industrial dairy microbiology and its expected role for production of enzymes, pharmaceuticals and natural antimicrobials in the laboratory.
- a.2. Be aware with the concepts and protocols for tracking bacterial contamination sources throughout a complete dairy production system.
- a.3. Explain the effect of temperature, pH, water activity and relative humidity on the survival and growth patterns of food borne pathogens.
- a.4. List the microorganisms causing spoilage of milk and dairy products.
- a.5. Recognize the different types of starter culture and probiotics and their utilization in prevention of growth of pathogenic and spoilage microorganisms in dairy industry, besides their benefits on human health.

b) INTELLECTUAL SKILLS

By the end of this course, the student should be able to:

- b.1. Construct new protocols to for identification of enzymes, pharmaceuticals and natural antimicrobials produced from beneficial microorganisms.
- b.2. Interpret the results of the protocol used for tracking bacterial contamination sources.
- b.3. Assess the spoilage potential of food spoilage microorganisms and differentiate between microbial and manufacturing defects of milk and dairy products.
- b.4. Relate between factors affecting growth and survival of food borne pathogens in milk and dairy products.
- b.5. Categorize the criteria for safe probiotic and starter culture strains.

c) PROFESSIONAL AND PRACTICAL SKILLS

By the end of this course, the student should be able to:

- c.1. Perform phenotypic tests for detection of spoilage potential of spoilage microorganisms.
- c.2. Apply modern techniques as PCR and Real time PCR for identification of bacterial contaminants of milk and dairy products.
- c.3. Carry out inhibitory tests for detection of natural antimicrobials produced from microorganisms.

- c.4. Isolate and identify starter culture and probiotic strains from milk and dairy products.
- c.5. Carry out molecular and phenotypic tests designed by international health agencies to ensure safety of using isolated starter culture and probiotic strains on human.

d) GENERAL AND TRANSFERABLE SKILL

By the end of this course, the student should be able to:

- d.1. Utilize the electronic and digital instruments for analysis, monitoring and reporting data in the modern dairy farms and factories.
- d.2. Cooperate effectively as part of a team.
- d.3. Efficiently make use of library facilities and IT tools.
- d.4. Describe his/her duties and responsibilities for milk and dairy products handlers, in a gentle and polite manner, when working as an official milk and dairy products inspector.
- d.5. Discuss with the general public about the risk of consumption of raw milk and dairy products made from raw milk.

3) Topics and contents

| Topic | No. of hours | | |
|--|--------------|--------|-------|
| | Lect. | Pract. | Total |
| Basic and recent concepts and theories about industrial dairy microbiology | 15 | - | 15 |
| Tracking pathogenic and spoilage microorganisms in the dairy plant | 17 | - | 17 |
| Survival of food borne pathogens in milk and dairy products | 18 | - | 18 |
| Spoilage potential of bacterial contaminant of milk and dairy products | 18 | - | 18 |
| Starter culture and Probiotics | 20 | - | 20 |
| Laboratory evaluation of spoilage potential of bacterial contaminants of milk and dairy products | - | 16 | 16 |
| Isolation of pathogenic and spoilage microorganisms according to international standards | - | 16 | 18 |
| Identification of bacteria contaminants with PCR and Real-time PCR | | 16 | |
| Detection and characterization of natural antimicrobials | - | 10 | 16 |
| Isolation and characterization of probiotics and starter culture | - | 20 | 20 |
| International standard for selection of safe probiotics and starter culture | | 10 | 18 |
| Total | 88 | 88 | 176 |

4) Teaching and learning methods

- a. Lectures to gain knowledge and understanding skills. The teacher usually uses all the available teaching tools like data show. The lectures usually take the form of open discussion.
- b. Writing a review paper about the field of specialization to gain the skills of information collection, self-learning and presentation.
- c. Practical and lab sessions to gain practical skills.

5) Student assessment

METHODS:

- 4.1. Lectures.
- 4.2. Practical.
- 4.3. Self-learning activities.

a. MATRIX ALIGNMENT OF THE MEASURED ILOs/ ASSESSMENTS METHODS:

| | K.U (a) | I.S (b) | P.P.S (c) | G.S (d) |
|---|---------|---------|-----------|------------|
| Written exam | 1-5 | 1-5 | | - |
| Practical exam | | | 1-5 | - |
| Oral exam | 3 | 1-4 | | - |
| Student activities (assay, seminar, etc.) | 2,4,5 | | | 1-5 |

b. WEIGHT OF ASSESSMENTS:

| | |
|--------------------------|---|
| 1- Written examination | For assessment of knowledge, back calling and Intellectual skills |
| 2- Practical examination | For assessment of practical and professional skill. |
| 3- Oral examination | For assessment of knowledge and Intellectual skills |
| 4- Student activities | For assessment of knowledge and general and transferable skills |

6) List of references

6.1. Essential textbooks

- 1) Dairy microbiology. Robinson K. R. handbook 3rd ed. Wiley-VCH, Inc. USA., 2002.
- 2) The Handbook of Microbiological Media for the Examination of Food,

Ronald M. Atlas, 2006

6.2. Recommended books

- J **Dairy microbiology. Robinson K. R. handbook 3rd ed. Wiley-VCH, Inc. USA., 2002.**
- J **The Handbook of Microbiological Media for the Examination of Food,** Ronald M. Atlas, 2006
- J **Antimicrobial Susceptibility Testing Protocols,** Richard Schwalbe, Lynn Steele-Moore, Avery C. Goodwin, 2007
- J **Microbiology in Practice, a Self-Instructional Lab Course.** Bieshir, L., Harper/Row, 6th ed. 2003
- J **Study Guide for Microbiology, an Introduction.** Funke, B. R., Benjamin Cummings Pub., 6th ed., 2005.
- J **Listeria, Listeriosis, and Food Safety, Third Edition,** Elliot T. Ryser, Elmer H. Marth, 2007

6.3. Periodicals

- J J. Food Microbiology
- J J. of Dairy Science
- J J. of Microbiology
- J Bulletin of the international Dairy Federation

6.4. Web sites

- J www.dairy science.com

7) Facilities required for teaching and learning

- 7.1 Data-show.
- 7.2 Laboratory animals for experimental toxicology.
- 7.3 Network for technology transfer.
- 7.4 Laboratory kits for experimental toxicology.
- 7.5 Computer.

| | Course coordinators | Head of department |
|------------------|----------------------------|------------------------------------|
| Name | Dr. Ahmed Moustafa Hammad | Prof. Dr. Abd El Rahman El Bagoury |
| Signature | | |

Matrix alignment of course topics and ILOs

| Topic | No. of hours /week | | Total hours | ILOs | | | |
|--|--------------------|-----------|-------------|------|-----|-------|-------|
| | Lect. | Pract. | | K.U | I.S | P.P.S | G.T.S |
| | (a) | (b) | | (c) | (d) | | |
| Basic and recent concepts and theories about industrial dairy microbiology | 15 | - | 15 | 1 | 1 | - | 1-5 |
| Tracking pathogenic and spoilage microorganisms in the dairy plant | 17 | - | 17 | 2 | 2 | - | 1 |
| Survival of food borne pathogens in milk and dairy products | 18 | - | 18 | 3 | 3 | - | 1 |
| Spoilage potential of bacterial contaminant of milk and dairy products | 18 | - | 18 | 4 | 4 | - | 1 |
| Starter culture and Probiotics | 20 | - | 20 | 5 | 5 | - | 1 |
| Laboratory evaluation of spoilage potential of bacterial contaminants of milk and dairy products | - | 16 | 16 | - | - | 1 | 1 |
| Isolation of spoilage microorganisms according to international standards | - | 16 | 16 | - | - | 1 | 1 |
| Identification of bacteria contaminants with PCR and Real-time PCR | - | 16 | 16 | - | - | 2 | 1 |
| Detection and characterization of natural antimicrobials | - | 10 | 10 | - | - | 3 | 1 |
| Isolation and characterization of probiotics and starter culture | - | 20 | 20 | - | - | 4 | 1 |
| International standards for selection of safe probiotics and starter culture | - | 10 | 10 | - | - | 5 | 1 |
| Total | 88 | 88 | 176 | | | | |