Andhra Pradesh State Council of Higher Education

Dairy Science - MINOR

w.e.f AY 2023-24 onwards

COURSE STRUCTURE

Year	Semester	Course	Title	No. Hrs./ Week	No. of Credits
I	II	1	Breeds and breeding of dairy cattle and buffaloes - (T)	3	3
			Breeds and breeding of dairy cattle and buffaloes - (P)	2	1
II	III	2	Dairy Chemistry (Chemistry of fluid milk) - (T)	3	3
			Dairy Chemistry (Chemistry of fluid milk) - (P)	2	1
	IV	3	Processing of milk- (T)	3	3
			Processing of milk- (P)	2	1
		4	Technology of fat- rich dairy products- (T)	3	3
			Technology of fat- rich dairy products- (P)	2	1
III	V	5	Traditional Indian Dairy Products - (T)	3	3
			Traditional Indian Dairy Products- (P)	2	1
		6	Dairy development and Dairy cooperatives. - (T)	3	3
			Dairy development and Dairy cooperatives. - (P)	2	1

II Semester
Course 3: Breeds and breeding of dairy cattle and buffaloes

Credits -3

Unit-1: Livestock census; Breeds of Dairy cattle, Buffaloes and Goats. Indigenous, Exotic and Crossbred Cattle breeds – classification of Indian breeds of cattle based on utility Classification of Indian breeds of buffaloes – conservation of indigenous local breeds of cattle.(15 Lectures)

Unit-2: Anatomy of Udder; Development of udder; Lacto genesis and Galactopoises; Letdown of milk – composition of milk and colostrum – Difference between milk of cows, buffaloes and goats. (10 Lectures)

Unit-3: Artificial insemination- advantages and disadvantages. Differences between natural service and artificial insemination. Oestrous cycle; Symptoms of heat in cows and buffaloes. Conception, Pregnancy diagnosis in cattle. Multi-ovulation and embryo transfer technique. Cloning - (15 Lectures)

Unit-4: Economic traits of Dairy cattle - factors influencing yield and composition of milk. Methods of selection of dairy animals – progeny testing program. (15 Lectures)

Unit-5: Systems of Dairy cattle breeding. Inbreeding, Out breeding, Cross breeding, Grading up. Breeding systems suitable to enhance milk production in India (Cross breeding of cattle and Grading up of buffaloes). (5 Lectures)

II Semester
Course 3: Breeds and breeding of dairy cattle and buffaloes
Credits -1

---

1. Points dairy cow.
2. Identification of different breeds of dairy cattle and buffaloes.
3. Male and female reproductive systems.
4. Symptoms of heat in cow and buffalo.
5. Artificial insemination.
6. Pregnancy diagnosis in cattle.
7. To study the comparative merits of cows and buffaloes; zebu and crossbred cows
8. Differences between swamp and river water buffaloes.
9. Importance of dairy wedges in dairy animal selection.

Reference Books

1. Text book of Animal Husbandry - G C Benarjee
2. Hand book of Animal Husbandry - ICAR Edition
3. Principles and practices of Dairy Farm –Jagdish Prasad

III Semester
Course 5: Dairy Chemistry (Chemistry of fluid milk)

Credits -3

Unit-1: Composition of Milk: Definition of milk as per FSSAI, composition of cow milk, differences in the composition of milk from cow, buffalo, goat, sheep, human. Colostrum: Significance, Composition, difference between normal milk and colostrum

Unit-2: Constituents of milk: Minor and major constituents; proteins, casein, whey proteins, NPN compounds, milk fat, triglycerides, phospholipids, sterols, fat globule membrane, enzymes in milk and their significance.

Unit-3: Factors affecting composition and yield of milk –Species, Breed, individuality, Stage of lactation, Age of the animal, Season, Interval between milking, Stage of milking, Feed, Estruses, Exercise, Milker and Drugs.

Unit-4: Physico-chemical properties of milk- Colour, Flavour, Density and Specific gravity,Freezing point, Boiling point, Surface tension, Viscosity, Specific heat, Refractive index, Electrical conductivity, Germicidal property, PH and acidity, Ionic balance . Physicochemical constants of milk fat, RM value, Polenske Value, saponification value, Iodine number.

Unit-5. Nutritive value of milk. Platform tests; Tests for detection of adulteration of milk; Preservatives and Neutralizers. FSSAI Specifications for milk.

III Semester
Course 5: Dairy Chemistry (Chemistry of fluid milk)

Credits -1

1. Estimation of specific gravity of milk
2. Estimation of Fat in milk
3. Estimation of SNF in milk
4. Estimation of Protein in milk using Pyne's constant
5. Estimation of acidity in milk
6. Estimation of pH in milk
7. Platform tests.
8. Tests for detection of adulteration of milk
9. Tests for Preservatives and Neutralizers.
10. Comment on the quality of given milk sample

Reference Books

1. Dairy chemistry and Animal Nutrition - M M Roy
2. Text of practical Dairy Chemistry - N K Roy
3. Fundamentals of Dairy Chemistry - Webb Johnson and Alfred
4. Dairy chemistry and Physics - Pieter Walstra, Robert Jenness.
5. Fundamentals of Dairy Chemistry - Noble P W

IV Semester

Course 9: Processing of Milk (Market milk)

Theory 03 hours /Week Credits -3

UNIT-I. a) Reception of Milk- Unloading, Grading, Sampling, Testing, Weighing and Recording.

b) Storage of Milk c) Straining, Filtration and Clarification of Milk.

UNIT- II. Pasteurization of Milk- Definition, Objectives, Principles of Heat exchange, Methods of Pasteurization.-(LTLT, HTST, Uperization). UHT and Sterilization of Milk.

UNIT- III. a) Homogenization of Milk- Factors influencing Homogenization of Milk (Temperature and Pressure), Effect of Homogenization on Milk. (b) Standardization of Milk: Standardization using Pearson square method.

Unit-IV : a) Market Milk- Toned milk, Double toned milk, Reconstituted milk, Standardized milk, and Full cream milk - Standards and methods of manufacture. (b) Packaging of Milk- Desirable characters and types of packaging materials, Forms of Packaging.

UNIT V. (a) Cleaning and sanitation of dairy equipment: Types of cleaning and sanitizing agents, mode of action, different types of cleaning methods, (i) Hand washing, (ii) Mechanical washing (iii) Cleaning inplace(CIP). (b) Disposal of Dairy effluents: Sources of Dairy wastes, Necessity of treating Dairy wastes, methods of treatment, Low cost methods, Conventional methods, Activated sludge process and trickling filters.

IV Semester

Course 9: Processing of Milk (Market milk)

Credits -1

1.RMRD Testing of Milk (Platform tests)

2.Standardization of Milk

3.Homogenization of Milk

4.Pasteurization of Milk

5.Sterilization of Milk

6.Preparation of Toned Milk

7.Preparation of Double Toned Milk

8.Preparation of Reconstituted Milk

9.Cream Separation.

REFERENCE BOOKS

1.Outlines of Dairy Technology – Sukumar De

2.Milk Products Preparation and Quality Control- C.P.Anantha Krishnan

3.The Technology of Milk Processing- C.P. Anantha Krishnan

4.Modern Dairy Products- Lincoln M Lampert

IV Semester
Course 11: Technology of Fat- Rich Dairy Products
Credits -3

Unit-1: Cream: Definition & Legal standards, efficiency of cream and factors responsible for fat loss in butter milk. Control of fat concentration in cream. Packaging and storage of cream. Methods of manufacture of cream.

Unit-2: (a) Neutralization, standardization, pasteurization and cooling of cream. (b) different types of cream; table cream, sterilized cream, whipped cream, plastic cream and frozen cream. (c) UHT processing of cream. d) factors affecting quality of cream; ripening of cream e), defects in cream and their prevention.

Unit:3: Butter: a) Introduction to the butter making process; theory of churning, Legal standards. b) Technology of Butter manufacture, Batch and continuous methods.

(c) Over-run in butter; control of fat loses in butter-milk; packaging and storage; transportation; defects in butter; uses of butter; Preparation of Desi butter.

Unit-4: (a) Ghee : Preparation of ghee from cream and butter. Methods of ghee making -batch and industrial processes, innovations in ghee production, procedure, packaging and preservation of ghee. (b) AG Mark Standards and PFA Standards for Ghee.

Unit-5: Utlization of dairy by-products – skim milk, butter milk, whey etc. Butteroil: Manufacture of butteroil, packaging and storage.

IV Semester
Course 11: Technology of Fat- Rich Dairy Products

Credits -1

1.Preparation of White butter and Table butter

2.Calculation of Over run in butter

3.Cream separation

4. Estimation of fat percentage in cream

5. Estimation of fat% in butter milk

6. Estimation of fat% in butter

7. Neutralization of cream

REFERENCE BOOKS

1.Outlines of Dairy Technology- Sukumar De

2.Milk and Milk Products – Eckles, Combs and Macy

3.Milk, Milk Products and Quality Control- C.P. Anantha Krishnan

4.The Technology of Milk Processing- C.P. Anantha Krishnan

V Semester

Course 13: Traditional Indian Dairy Products

Credits -3

Unit-1: Status and significance of traditional Indian milk products in India.

Khoa: Classification of types, standards methods of manufacture and preservation, factors affecting yield of khoa. Khoa based sweets: Burfi, Peda, Milkcake, Kalakhand, Gulabjaman and their compositional profile and manufacture practices.

Unit- 2: (a)Rabri and Basundi: process description, factors affecting yield, physico-chemical changes during manufacture.

(b)Bio-preservative principles in enhancing the self-life of indigenous milk products including active packaging.

Unit- 3: Channa: standards, method of manufacture, packaging and preservation. Chhana-based sweets: Rasogolla, Sandesh, Rasomalai.

Paneer: standards, method of manufacture, packaging and preservation. Mechanization of Paneer manufacturing/packaging process.

Unit- 4: Chakka/Maska and Shrikhand: standards, method of manufacture, small scale and industrial process of production, packaging and preservation aspects.

Unit-5: Misti Dahi: Product description method of manufacture and packaging process. Kheer and Payasam: Product description methods of manufacture, innovations in manufacturing and packaging processes.

V Semester

Course 13: Traditional Indian Dairy Products

Credits -1

1. Preparation of Khoa from cow, buffalo and concentrated milk.
2. Preparation of Burfi, Peda, Kalakand, Milkcake and Gulabjamun.
3. Preparation of Paneer from cow, buffalo and mixed milk.
4. Preparation of Chhana from cow and buffalo milk and mixed milk.
5. Preparation of Sandesh and Rasogolla.
6. Preparation of kheer.
7. Preparation of Rabri, Misti Dahi, Chhaka and Shrikhand.
8. Visit to industry.

REFERENCE BOOKS

1. Outlines of Dairy Technology- Sukumar De
2. Milk, Milk Products and Quality Control- C.P. Anantha Krishnan
3. The Technology of Milk Processing- C.P. Anantha Krishnan

V Semester
Course 14: Dairy Development and Co-operatives
Credits -3

Learning objectives:

1. The student will be able to understand various dairy development programs implemented in India before and after independence.
2. The students will learn the impact of cooperative dairying on the dairy development in India.
3. Students will also learn the status of India in the world in terms of milk production.

Theory

Unit-1 : Advantages of Dairying. Principals involved in successful dairying. Systems of dairy farming-Mixed farming and Specialized dairy farming – organic farming system.

Unit–2: Methods of procurement of milk; Transportation of milk; Pricing of milk, methods of Marketing of milk.

Unit-3: Cooperative Dairying-Structure of Dairy cooperatives- Anand pattern - Primary milk producer's cooperative society; District milk producer's cooperative union; State level dairy development cooperative Federation, objectives and functions - Milk and milk products order MMPO(1992)- Role of private dairies in India.

Unit-4: Dairy development programs implemented in India. Statistical analysis of progress in development of Dairy industry in India, Operation Flood Program., Key village scheme. Quantity of milk produced in India over the past five decades vis-a vis other countries.

Unit-5: Economics of maintaining Dairy farm- Income and expenditure in dairy farms. Estimating the production cost of milk.

V Semester
Course 14: Dairy Development and Co-operatives
Credits -1

Learning outcomes:

After successful completion of the course, both theoretically and practically,

- Students learn about various dairy development programs implemented in India.
- Students will get knowledge about various methods of pricing of milk
- The students will also have knowledge about various methods used for procurement, transport and marketing of milk.

Practicals:

1. Estimation of production cost of milk for 5 animals and 10 animal dairy units.
2. Estimating income and expenditure involved in dairy farming
3. Preparation of project report for different sizes of dairy farms
4. Essentials for setting up of dairy farm

5. On Farm training for one month is suggested and a comprehensive training report should be submitted as mandatory requirement while appearing for semester practical exam which would carry 20 marks out of 50 marks as weightage.

References

1.Text book of Animal Husbandry - G C Benarjee
2. Principles and practices of Dairy Farm –Jagdish Prasad