



VIKRAMA SIMHAPURI UNIVERSITY::NELLORE

Common Framework of CBCS for Colleges in Andhra Pradesh

(A.P. State of Council of Higher Education)

B.Sc. Dairy Science Core Syllabus under CBCS

(with effect from the Academic Year 2020-21)

Course Structure

Structure of B.Sc. Dairy Science Core Syllabus under CBCS

Sem	Paper	Title of Course	Hrs/W	Credits	Marks		
					Int	SEE	Total
I	Core- I	Dairy Husbandry-I	4	4	25	75	100
		Practical	2	1	0	50	50
II	Core- II	Dairy Husbandry-II	4	4	25	75	100
		Practical	2	1	0	50	50
III	Core- III	Dairy Cattle Nutrition	4	4	25	75	100
		Practical	2	1	50	75	50
IV	Core - IV	Dairy Chemistry	4	4	25	75	100
		Practical	2	1	0	50	50
IV	Core - V	Dairy Development and Co-Operatives	4	4	25	75	100
		Practical	2	1	0	50	50
		Total Credits	30	25	175	650	750

B.Sc. DAIRY SCIENCE SYLLABUS
(Choice-Based Credit System - W.E.F. 2020-21)

SEMESTER I

COURSE-I : DAIRY HUSBANDRY-I

Suggested outcomes for the course 'DAIRY HUSBANDRY I'

(Five Units with each unit having 12 hours of classwork. At the end of the course the student will demonstrate the following,

The student will be able to –

- A. Remember and explain in a systematic way and acquire knowledge with comprehensions*

The student is exposed and given an introductory output on dairying in India in comparison to global scenario. He is given an input on the livestock census and on various breeds of dairy cattle, buffaloes, goats etc,

The student is also exposed to the anatomy of udder and milk secretion process in addition to the composition of milk, visavis colostrum.

He is made to understand the importance of artificial insemination in cows and buffaloes. And also in pregnancy diagnosis and other related topics.

Efforts will be made to provide knowledge on economic traits of dairy cattle, selection of dairy animals and progeny testing.

A brief introduction of various kinds of cattle breeding is also provided to the students which would make the student aware on necessities to be followed while in dairy industry.

- B. Understand uses (Application**)

As far as the application part is concerned the students on getting enriched with the basic principles will be able to know on how a dairy farm can be started with the inputs provided to the students

C. Critically explains, judges and solves. (Analytical, Evaluative and Problem Solving***)

While in the course the students are given enough exposure by taking them to a conventional dairy farm and are taught on various aspects and in the meanwhile they will be assessed on their analytical, evaluative and problem solving skills.

B.Sc. DAIRY SCIENCE
SYLLABUS
I Semester
COURSE-1 : DAIRY HUSBANDRY-I

THEORY

(4 Credits)

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. Multiovulation 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)

Practical:

1 Credits

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.
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
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SEMESTER II

COURSE-II : DAIRY HUSBANDRY-II

Suggested outcomes for the course 'Dairy Husbandry II' which is offered in II semester of B.Sc Dairy Science Programme.

(Five units with each unit having 12 hours of class work). At the end of the course student will demonstrate the following.

The students will be able to

A. Remember and explain in a systematic way (Knowledge and Comprehensions*)

In this course all the students are given enough exposure on various systems of housing of dairy cattle, selection of site for establishing of dairy farm, water management, drainage system, disposal of dairy farm waste, establishing gobar gas plants etc,

Students are taught on various diseases which the animals are susceptible such as bacterial, viral, parasitic and nutritional disorders.

They are also enlightened on management of different classes of dairy animals, quarantine, sanitation and hygiene etc,

Inputs are given to the students on various methods of identification, dehorning, castration, deworming, vaccination schedule to be followed, disinfection and milking management.

Enough exposure is given to the students for maintaining high level fertility in the herd.

B. Understand uses (Application**)

As far as the application part is concerned students are given inputs on the measures to be taken while establishing a new dairy farm and also on various managerial aspects while maintaining a dairy farm. They are also given practical training so as to get hands on experience while maintaining a dairy farm.

C. Critically explains, judges and solves. (Analytical, Evaluative and Problem Solving***)

The students are assessed for their analytical, evaluative and problem solving skills while on training in a dairy farm.

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SEMESTER II

COURSE-II : DAIRY HUSBANDRY-II

THEORY

(4 Credits)

- Unit-1:** Systems of Housing of Dairy cattle- Loose Housing and Conventional Dairy Barns. Drawing of layouts for dairy cattle dwellings; Criteria for selecting site for establishing Dairy farm buildings; Water requirement of dairy animals – drainage system in dairy farms –disposal of dairy farm wastes–composting– establishment of small scale gobar gas units (20 Lectures)
- Unit-2:** Symptoms of ill health of Dairy animals. Diseases of Dairy animals- Bacterial, Viral, Parasitic and Nutritional diseases and their control –Economically important diseases – mastitis and foot and mouth disease. (10 Lectures)
- Unit-3:** Management of different classes of Dairy animals- Milk producing animals, Pregnant animals, dry animals, heifers and calves –management of sick animals – quarantine, sanitation and hygiene –Management during transport, drought and summer season.
- Unit-4:** Management practices for Dairy farm; Identification, Dehorning, Castration, Deworming, Vaccination, Disinfection, and Milking management. (15 Lectures)
- Unit-5:** Maintenance of high level of fertility in the herd. Importance, reasons for low fertility, methods of maintaining high level of fertility in the herd. Methods of determining reproductive efficiency :(i) by no return percentage of cows, (ii) by calving interval period, (iii) by pregnancy days of cows per year.- Reducing prolonged calving intervals. (15 Lectures)

Practical's

1 Credits

1. Dairy Farm layout
2. Identification of cows,
3. Dehorning of calves
4. Castration of bulls
5. Deworming of dairy cattle
6. Preparation of vaccination schedule of dairy cattle
7. Identification of sick animals
8. Tests for hardness of water.
9. Determining the strength of detergent solution.

Reference Books :

1. Text book of Animal Husbandry - G C Benarjee
 2. Hand book of Animal Husbandry ICAR Edition
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SEMESTER III

COURSE-III : DAIRY CATTLE NUTRITION III

Suggested outcomes for the course 'Dairy Cattle Nutrition III'

(5 units with each unit having 12 hours of classwork). At the end of the course the student will demonstrate the following,

The students will be able to

A. Remember and explain in a systematic way (Knowledge and Comprehension*)

The student is given exposure on various cattle feeds and fodders, importance of proteins, fats and carbohydrates in cattle feeding in livestock feeding.

As India is a tropical country, there is a need of conserving fodders for various seasons so as to provide best quality fodder which has good nutritive value to the cattle. In order to attain the goal the students are given knowledge on how to conserve the fodders while emphasizing preparation of hay and silage.

Inputs are given on different feeding standards and on providing balanced ration for dairy cattle.

Cultivation practices for growing various fodder crops including legumes, non-legumes, seasonal and perinial fodders is given to the student.

Students are also enlightened on how industrial wastes and agricultural byproducts can be fed to the cattle as substitute to green fodder.

B. Understand Uses (Application**)

Students are taken to various institutions / Dairy farms where different types of fodders are cultivated and they are given hands on experience. By the end of course every student is made to identify and know the cultivation practices so as to grow various fodder crops.

C. Critically explains, judges and solves (Analytical, Evaluative and Problem Solving***)

During the course each student is subjected to a compulsory farm training through which they are tested for their analytical, evaluative and problem solving skills.

SYLLABUS

III SEMESTER COURSE-III: DAIRY CATTLE NUTRITION

THEORY

(4 Credits)

Unit-1: Classification of Feeds and Fodders. Importance of proteins, fats and carbohydrates in livestock feeding – Importance of vitamins and minerals in cattle feeding (15 Lectures)

Unit-2: Conservation of Fodder–Hay and Silage –Fodder security measures during summer and drought seasons. (10 Lectures)

Unit- 3: Feeding standards: Balanced rations for Dairy cattle; Feeding practices of Dairy cattle(i) Soiling (ii) Ensiling, (iii) Pasturing, (iv) Hay feeding, (v) General feeding practices with regard to management – Azolla feeding - Hydroponic fodder production. (20 Lectures)

Unit-4 : Types of Fodder varieties-legumes and non-legumes, seasonal and perennial fodder crops. Cultivation practices of fodder crops-Para grass, Hybrid Napier, Berseem, Cow pea, Jowar – fodder trees – Silvi pasture system – Horti pasture system. (10 Lectures)

Unit-5: Utilization of agricultural and industrial by-products for livestock feeding. Enrichment of poor quality roughages – Urea treatment of paddy straw – Total mix ration(TMR).(5 Lectures)

Practical:

(1 Credits)

1. Identification of feeds and fodders.
2. Computation of rations.
3. Hay making.
4. Silage making.
5. Estimation of dry matter of feed or fodder

Reference books

1. Text book of Animal Husbandry - G C Benarjee
 2. Principles and practices of Dairy Farm –Jagdish Prasad
 3. Animal Nutrition and feeding practices – Dr Surendra K .Ranjhan
 4. Dairy Chemistry and Animal Nutrition – M M Roy
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SEMESTER IV

COURSE-IV : DAIRY CHEMISTRY

Suggested outcomes for the course ‘Dairy Chemistry and Dairy Microbiology IV’

(5 units out of which 3 units are earmarked for dairy chemistry and 2 units for dairy microbiology with a total of 12 hours of class work for each of the unit is taken care in this course.) At the end of the course the student will demonstrate the following.

The students will be able to,

A. Remember and explain in a systematic way (Knowledge and comprehensions*)

The students are given introductory lessons on composition of milk drawn from different categories of cattle, buffalo, sheep, human etc, in comparison with colostrum. They are given inputs on constituents of milk, factors affecting composition and yield of milk, physico chemical properties etc,

Milk is called an almost perfect food with wonderful nutritive value and each student is explained on its importance and made to understand on different standards with which quality of milk can be assessed.

Enough knowledge is created among the students on the necessity of cleaning and sanitizing the equipment and about maintaining hygiene in a dairy plant.

Every student is given an introduction on basic dairy microbiology with various types of dairy microbes, sources in contamination of milk, various types of microorganisms which are present in the milk, bacterial growth curve etc,

They are also made to understand on various milk borne diseases including bacterial, viral and other diseases.

B. Understand Uses (Application**)

The students are given exposure on various chemical and bacteriological tests which help them understand the quality of milk and they are trained in such a way with which they will be helpful to dairy industry provided they are given the recruitment as laboratory assistance.

C. Critically explains, judges and solves (Analytical, Evaluative and Problem Solving***)

The students in the process are given exposure by taking them to various dairy plants located in and around the institution and they are assessed on their analytical, evaluative and problem solving skills.

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SEMESTER IV

COURSE-IV : DAIRY CHEMISTRY

THEORY

(4 Credits)

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

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

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.

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

Unit-2: Nutritive value of milk.

Physicochemical constants of milk fat, RM value, Polenske Value, saponification value, Iodine number, Refractive index Platform tests; Tests for detection of adulteration of milk; Preservatives and Neutralizers.
FSSAI Specifications for milk.

Unit-3: 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 in place(CIP). Environmental hygiene in dairy plant, personnel hygiene;

DAIRY MICROBIOLOGY

Unit-4: Definition, Microscopy – Simple, Compound - bright-field microscopy, Structure and functions of prokaryotic cells; Taxonomy of Microorganisms - Classification, nomenclature, identification; Differences between cell wall of Gram positive and Gram negative bacteria

Sources of contamination of milk and their control: exterior of the animal, interior of the udder, utensils, water, milker, flies and insects, soil and manure, milking barn, cattle shed and surroundings. Methods of clean milk production

Sources and Significance of specific groups of microorganisms in milk i.e. psychrotrophic, mesophilic, thermophilic and thermophilic bacteria - their morphological and biochemical characteristics

Types of Microorganisms in milk such as acid producing, gas producing, protein splitting, fat splitting microbes; Pathogens associated with raw milk and inert organisms. Chemical changes observed during storage of milk and abnormal fermentations observed in milk: souring, gassy fermentation, proteolysis, lipolysis, ropiness, and flavour fermentations

Bacterial growth curve; factors affecting growth of bacteria, Common nutrient requirements and nutritional types of microorganisms

Unit-5: Milk borne diseases: bacterial, viral and other diseases

Microbiological examination of milk: direct microscopic count, standard plate count, methylene blue reduction test, resazurin reduction test and coliform test.

Microbiological grading and legal standards of raw and processed milk.

Practical:

1. Microbiological equipment; autoclave, hot air oven, incubator centrifuge, colorimeter, laminar airflow, membrane filter.
2. Staining of Microbes: Simple staining- methylene blue and Differential staining (Gram)
3. Preparation of commonly used growth media liquid and solid
4. Grading of raw milk by direct microscopic count.
5. Grading of raw milk by standard plate count
6. Grading of raw milk by coliform counts
7. Grading of raw milk by methylene blue reduction time.
8. Grading of raw milk by resazurin reduction test
9. Enumeration of psychrophilic and thermophilic microorganism in milk
10. Enumeration of thermophilic and spore counts in milk
11. Grading of pasteurized milk by total viable count, coliform and methylene blue reduction time
12. Estimation of Fat in milk
13. Estimation of SNF in milk
14. Estimation of Specific gravity in milk
15. Estimation of acidity in milk
16. Estimation of pH in milk

17. Estimation of Protein in milk using Pyne's constant.
18. Estimation of Surface tension in milk
19. Estimation of Viscosity in milk
20. Analysis of milk using electronic method
21. Tests for detection of adulteration of milk;
22. Tests for Preservatives and Neutralizers.
23. Comment on the quality of given milk sample

Reference books :

1. Dairy Microbiology – R K Robinson
 2. Milk products preparation and quality control - C P Ananthakrishnan
 3. Food Microbiology - W C Frazie
 4. Dairy chemistry and Animal Nutrition - M M Roy
 5. Text of practical Dairy Chemistry - N K Roy
 6. Fundamentals of Dairy Chemistry - Webb Johnson and Alfred
 7. Dairy chemistry and Physics - Pieter Walstra, Robert Jenness
 8. Fundamentals of Dairy Chemistry - Noble P Wong
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SEMESTER IV

COURSE-V : DAIRY DEVELOPMENT AND CO-OPERATIVES

Suggested outcomes for the course Dairy Development and Co-operatives

(5 units with each unit having 12 hours of classwork. At the end of the course the student will demonstrate the following)

The students will be able to

A. Remember and explain in a systematic way (Knowledge and comprehension*)

In this course the students are equipped with the knowledge and comprehension through the below given modes.

The students are made to understand on various principles involved in successful dairying and on advantages of dairying.

Different methods of procuring, transporting, pricing and marketing of milk are communicated to the students.

The students are made to understand on anand pattern of cooperative dairy industry where the milk producing farmer is considered as part and parcel of the society and on how the system runs in 3 tier structure. They are also made to understand on the role of private dairies in India.

They are educated with various dairy development programmes which are implemented in India including Operation Flood Program, Key Villiage Scheme and also on the statistical analytical picture on dairy industry in India.

Economics of maintaining a dairy farm are taught to the students and umpteen number of cost estimate problems on milk production are solved by the students in this course.

B. Understand uses (Application **)

Through this course the student on understanding on the various advantages involved in starting of a dairy farm he is so encouraged to be an entrepreneur.

C. Critically explains, judges and solves (Analytical, Evaluative and Problem Solving***)

The students on understanding the profitability on establishing a dairy farm is made to analyze, evaluate and lot of opportunity is given to them in problem solving.

SYLLABUS

COURSE V : DAIRY DEVELOPMENT AND CO-OPERATIVES

(4 Credits)

Unit-1 : Advantages of Dairying. Principals involved in successful dairying. Systems of dairy farming-Mixed farming and Specialized dairy farming – organic farming system. (10 Lectures)

Unit-2: Methods of procurement of milk; Transportation of milk; Pricing of milk, Marketing of milk. (10 Lectures)

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. (20 Lectures)

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 (10 Lectures)

Unit-5: Economics of maintaining Dairy farm- Income and expenditure in dairy farms- Estimating the production cost of milk. (10 Lectures)

Note: On Farm training for one month (four hours a day) is compulsory during 1st to 4thsemester (Students would go in batches without effecting the regular class work) and a comprehensive training report should be submitted as mandatory requirement while appearing for IV semester practical exam which would carry 20 marks out of 50 marks as weight age.

Practical' s :

(1 Credits)

1. Identification of feeds and fodders.
2. Computation of rations.
3. Hay making.
4. Silage making.
5. Estimation of dry matter of feed or fodder
6. Record keeping
7. Preparation of project reports for various sizes of dairy farm
8. Calculations on cost of milk production
9. Calculating the cost of milk production: exercises for various sizes of farms.

Reference books:

1. Text book of Animal Husbandry - G C Benarjee
2. Principles and practices of Dairy Farm –Jagdish Prasad
3. Animal Nutrition and feeding practices –DrSurendra K .Ranjhan
4. Dairy Chemistry and Animal Nutrition – M M Roy
5. Dairy Management in India -Madhan Mohan

Structure of Question Paper
B. Sc Dairy Science Degree Course (CBCS Semester pattern)

Time: 3 Hrs

Max Marks: 75

PART - A

Answer any FIVE questions

5×5=25M

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.

PART - B

Answer ONE question from each unit

5×10=50M

UNIT-I

9.

(OR)

10.

UNIT-II

11.

(OR)

12.

UNIT-III

13.

(OR)

14.

UNIT-IV

15.

(OR)

16.

UNIT-V

17.

(OR)

18.