

Bachelor of Vocational Programme **in** **Dairy Production and Technology**

SYLLABUS *(w.e.f. July 2017)*



The Gandhigram Rural Institute
(Deemed to be University)
Gandhigram, Dindigul Dist – 624 302.
Tamil Nadu.

**B.Voc. Dairy Production and Technology
Syllabus Outline - I Year**

Course code	Category	Title of Course	Credits	NSQF	Job role
I Semester					
17ENGV0101	GEC	Technical Writing & Communication Skills	4	4	Dairy Farm Assistant
17DPTV0101	GEC	Dairy Development Plans	2		
17DPTV0102	GEC	Dairy Hygiene	3		
17YOGV0001	GEC	Yoga Education	1		
Total			10		
17DPTV0103	SDC	Dairy Husbandry	2		
17DPTV0104	SDC	Fodder Production and Dairy Cattle Nutrition	3		
17DPTV0105	SDC	Dairy Cattle Management	2		
17DPTV0106	SDC	Practical I – Dairy Husbandry Practices	3		
17DPTV0107	SDC	Practical II - Zootechny	3		
17DPTV0108	SDC	Practical III – Dairy Cattle Management	3		
17DPTV0109	SDC	Experiential Learning I – Dairy Farm Training	4		
Total			20		
Grant total			30		
II Semester				NSQF	Job role
17DPTV0210	GEC	Rural Resource Appraisal	5	5	Chilling Plant Technician
17DPTV0211	GEC	Milk Hygiene and Public Health	4		
17DPTV0212	GEC	Milk Procurement	3		
Total			12		
17DPTV0213	SDC	Dairy Engineering I (Refrigeration and Chilling Equipment)	2		
17DPTV0214	SDC	Dairy Chemistry	2		
17DPTV0215	SDC	Dairy Microbiology	2		
17DPTV0216	SDC	Practical IV (Dairy Chemistry)	3		
17DPTV0217	SDC	Practical V (Dairy Microbiology)	3		
17DPTV0218	SDC	Inplant training – Chilling centre	6		
Total			18		
Grant total			30		

SEMESTER - I

Semester I
17ENGV0101-TECHNICAL WRITING AND COMMUNICATION SKILLS
(Credits 4)

Objectives:

- To improve the English language skills of students with very limited abilities to use the language;
- To focus on the language skills of the learners in a graded manner.

Learning Outcome

- Students know improve the English language skills with very limited abilities to use the language;
- Students focus on the language skills of the learners in a graded manner.

Unit I : **Grammar:** What is grammar? - The capital letter - Nouns and pronouns and Tenses.

Unit II : **Listening:** Teacher narrations

Unit III : **Speaking Skills:** Self – introduction - Descriptions of persons, objects, places

Unit IV : **Reading and Vocabulary:** Graded reading comprehension passages

Unit V : **Writing Skills:** Sentence construction - Descriptive Paragraph writing, Précis writing, Essay and letter writing, CV and Resume.

Textbook

1. Course material prepared by the English faculty

References:

1. Seaton, Anne & Y.H. Mew. Basic English Grammar Book 1. Irvine: Saddleback, 2007. Print.

Semester I

17DPTV0101 - DAIRY DEVELOPMENT PLANS (Credits 2)

Objectives

- To enlighten the students about the dairy development.
- To understand the organizational structure of dairy co-operatives at village, district and state levels.

Learning Outcomes

- Students learn about the role of dairying and status of milk production in India
- Students will acquire skill on dairy cooperative functions and management system
- Students will know about the government and institutional activities and schemes related to dairy development.

Unit I : Role of dairying in Indian economy and rural development. Dairying as source of additional income and employment. Advantages in dairying. Principle involved in successful dairying. Total milk production in country and state with reference to Global milk production – Per capita availability of milk – consumption pattern – annual rate of growth of milk production. Role of milk and milk products in human nutrition. ICMR recommendation.

Unit II : Dairy development programme implemented in India. Operation flood programme. Key village scheme - Intensive Cattle Development Programme (ICDP) - Intensive Dairy Development Programme (IDDP). Institution for dairy development: NDRI, NDDDB, NDC and TCMPPF.

Unit III : Cooperative dairying – structure of dairy cooperatives, OBJECTIVES and functions, primary milk cooperative societies, district milk producer's cooperative union, state level federations. ANAND pattern and perspectives.

Unit IV : National Dairy Plans: NDPI – NPBB and DD – CCDO- Dairy development under various five year plans- Expenditure on Animal husbandry and Dairying during various plans – Important developments in Different five year plans.

Unit V : Dairy problems; Resource inadequacy, Strategies and Policies: SWOT analysis of Indian dairy industry.

References

Textbooks

1. Anantha Krishnan, C.P., (1991), Technology of milk processing, Sri Lakshmi Publications, Chennai -10.
2. Banerjee, G.C. 1998. A Textbook of Animal husbandry. Oxford and IBH Publ. Co. Ltd., New Delhi.
3. Dairy India Year Book. 2007 & 2017. P.R. Gupta Publ., New Delhi.
4. Mudgal, V.D., Singhal, K.K. and Sharma, D.D. 1995. Dairy animal production.1st ed. International Book Distributing Co., Lucknow.
5. Nataraj, B.S. 2007. Marketing of milk and milk products: opportunities for entrepreneurship. In: Souvenir, National workshop on Entrepreneurship Development in Dairy and Food Industry, NDRI, Karnal, December 2005.
6. Sastry, N.S.R. and Thomas, C.K. 1996. Livestock Production Management. Kalyani Publ., New Delhi.
7. Verma, D.N. 1999. Livestock Production Management in tropics. Kalyani publ., New Delhi.

Semester I

17DPTV0102 – DAIRY HYGIENE (Credits 3)

Objectives

- To provide knowledge in hygiene practices so as to improve health status of animal and to produce clean milk
- To impart skill in farm management practices to cope with climate change

Learning Outcome

- Students will get to know about the various sources of contamination
- Students will learn how to manage and protect cattle hygienically.
- Students will learn on the process of cleaning and sanitization at farm.

Unit I Water Hygiene: Definition: hygiene and animal hygiene. Uses of water in Dairy farm - water requirement- sources of water - factors influencing water supply – impurities and contaminants in water – water quality - water purification methods – ground water. Hardness of water its significance and treatment. Disinfection of water or sterilization of water. Physical method and chemical method

Unit II Air Hygiene: Ventilation and principles of ventilation – Natural and mechanical ventilating - Pollution of air with in animal house from outside – noxious gases – Dusts – odour -Microclimatic requirement for livestock - Quality of indoor air. Environmental pollution -causes, and effects.

Unit III Waste Management: Definition for sanitation - Waste from livestock production - solid waste and liquid waste - Method of disposal. General principles of drainages system and traps. Construction of manure pit - Composting, vermin-composting, biogas production and value added manure management - Fly control methods

Unit IV Cleaning and Disinfection: Physical method and chemical method –different types of disinfectants. Clean milk production. Prevention of infection- isolation and quarantine – disposal of carcass of dead animal – commonly used disinfectants.

Unit V Climate change and coping strategies: Climate change and coping mechanism – Temperature humidity index – impacts of climate change in livestock – adaptation and mitigation options

Practical:

1. Collection and labeling of water samples
2. Physical quality of water
3. Estimation of total solids in water
4. Qualitative analysis of water – non-metallic impurities
5. Qualitative analysis of water – metallic impurities
6. Estimation of chlorides in water
7. Test of chlorination
8. Recording of air temperature and relative humidity in animal house
9. Microbial quality of water (Coliform count)
10. Waste management – calculation of manure storage requirements
11. Composting of animal manure
12. Composting of dairy farm waste
13. Vermi composting
14. Disposal of carcass of dead animals

References**Textbooks**

1. Banerjee, G.C., 2006. Text book of Animal Husbandry 8thEd.Oxford and IBH Publishing Company Ltd., New Delhi.
2. ICAR, 2013. Hand book of Animal Husbandry, 4thEd.ICAR Publication, Pusa, New Delhi.
3. Jagdish Prasad, 2002. Principles and practices of Dairy Farm Management, 3rd Ed. Kalyani Publishers, Ludhiana.
4. Sastry, N.S.R., C.K.Thomas and R.A.Singh, 2015. Livestock Production Management, 4thEd.Kalyani Publishers, New Delhi.

E-Resources

5. <http://www.thedairysite.com/articles/881/livestock-housing-ventilation-natural-ventilation-design-and-management-for-dairy-housing/>
6. http://www.who.int/water_sanitation_health/water-quality/en/
7. <https://dairy.ahdb.org.uk/technical-information/animal-health-welfare/mastitis/working-arena-prevention-of-infection/housing/ventilation-in-livestock-buildings/#.WT9ZwFWGOM8>
8. <https://data.unicef.org/topic/water-and-sanitation/overview-2>

Semester I

17YOGV0001 - YOGA EDUCATION (Credit 1)

Objective:

- To learn Yoga for keeping body and mind in good condition

Learning Outcomes

- Recognize the importance of preparatory exercise
- To demonstrate the suryanamaskar and various asanas
- To practice meditation
- Able to teach mudras
- Explain about the bandhas
- To know about the Gandhian way of meditation
- Realize the difference between the asanas and physical exercises

Unit I : History of Yoga – Definition of them Yoga – Comprehensive Nature and Scope Yoga – Aims and Objectives of Yoga – Various School of Yoga.

Unit II : Pantanjali yoga – Astangayoga – Tantrayoga – Mantrayoga – Hathayoga – Layayoga –RajayogaGanayoga – Bhaktiyoga – Karmayoga.

Unit III : Yoga as an ideal system of physical culture – Do’s and Don’ts of specific yogic Techniques Differences between practice of Asanas and Physical Exercise – Modern vs. Yogic concept on diet.

Unit IV : Preparing Oneself for Yogic practices – Different kinds of Yogic practices – SuryanamaskarAsanas (Padmasana – Vajrasana – Gomukhasana – Ustrasana - Varkrasana –Shalabhasana – Dhanurasana – Paschimottanasana – Yogamudra – Utkatasana – Savasana – Makarasana).

Unit V : Padmayamas (Anuloma – Viloma Pranayama, Nadisuddi) – Bandhas – Mudras –Dhyana – Meditation – Gandhian way of Meditation.

References

Textbooks

1. Asanas, Swami Kuvalayananda, Kaivalaydhama, Lonavla, 1993.
2. Light on Yoga, B.K.S IyengarHarpine Collins Publication, New Delhi, 2000.
3. Sound Health Through Yoga, K.Chandrasekaran, PremKalyan Publications, Sedapatti,1999

4. Yoga for all, Maharishi Patanjali, Sahni Publications,2003
5. Yoga for Health, Institute of Naturopathy and Yogic Sciences, Bangalore, 2003.
6. Yoga for Health, K. Chandra Shekar, KhelSahitya Kendra, Theni, 2003.
7. Yoga for the Modern Man, M.P. Pandit, Sterling Publishers Private Limited, New Delhi, 1987.
8. Yoga for You, Indira Devi, Jaico Publishing house, Chennai, 2002.

Semester I

17DPTV0103 - DAIRY HUSBANDRY (Credits 2)

Objectives

The General objective of this course is to establish basic knowledge of how to manage and operate dairy farm.

- This course is designed to impart basic technical knowledge and skills required for entry level positions or to successfully run a dairy farm enterprise by developing competencies concerning the breeding of dairy cattle, housing and health care.
- To provide hands-on experiences with Artificial insemination and other dairy husbandry practices.

Learning Outcome

Unit I: Instruction in lessons in Unit I should result in students achieving the following objectives

1. Describe the size and contribution of dairying to Indian economy and rural livelihood
2. Describe the various breeds of dairy cattle, giving their origin and breed characteristics and milk production capacity.
3. Identify the anatomical parts of the dairy animal
4. Identify various breeds of cattle and buffalo by viewing photographs or live animals.
5. Name the parts of dairy cattle and describe economically important traits.
6. Describe the characteristics of a good dairy cow
7. Select desirable breeding and production animals.
8. Differentiate desirable from undesirable traits

Unit II: Instruction in lessons in Unit II should result in students achieving the following objectives

1. Describe the female reproductive organs.
2. Identify the signs of heat and right time for insemination.
3. Able to identify signs of impending parturition
4. Acquire knowledge in factors affecting age at puberty of heifers
5. Able to identify suitable method of breeding for improving the productivity of herd

6. Able to determine the breeding efficiency of cows and bulls

Unit III: Instruction in lessons in Unit III should result in students achieving the following objectives

1. Describe the male reproductive organs
2. Acquire knowledge in structure of testis and mechanism of sperm production
3. Able to take care of breeding bulls in accordance with good farm practice.
4. Acquire knowledge on basic principles of semen collection and evaluation.
5. Acquire knowledge in freezing of bull semen.
6. Able to handle liquid nitrogen containers
7. Well versed with thawing of frozen semen straws and loading of AI guns.

Unit IV: Instruction in lessons in Unit IV should result in students achieving the following objectives

1. Able to describe the advantages and disadvantages of different types of animal housing
2. Acquire knowledge in planning and designing of animal housing
3. Acquire knowledge in floor space requirement for different class of animal and importance of ventilation in cow shed.
4. Ability to prepare plans for housing of dairy cows.
5. Acquire knowledge in construction details of cow shed.

Unit V: Instruction in lessons in Unit V should result in students achieving the following objectives

1. Able to understand about clean milk production.
2. Able to understand about organic milk production.
3. Acquire knowledge on various methods of milking and sanitation.

Unit I : **Breeds:** Introduction – advantages of dairying – role of dairying in Indian Economy. Livestock census – milk production and availability. Meaning of commonly used terms - Zoological classification of bovine - classification of breeds of cattle - Indigenous and exotic breeds - Red Sindhi – Sahiwal - Gir – Kangayam – Jersey - Holstein Friesian - Brown Swiss. Breeds of buffalo – Murrah – Surti - Nili-Ravi. Selection of dairy cattle – choice of breed.

Unit II : **Cattle Breeding:** Female reproductive system – estrous cycle – signs of heat

– ovulation – fertilization – gestation – parturition – puberty – factors influencing onset of puberty – concept of breeding – inbreeding - out breeding – breeding efficiency.

Unit III : Artificial insemination - Male reproductive system - Puberty in male animals – Spermatogenesis - Management of breeding bulls – Semen collection – Semen and its components - Evaluation – Freezing technique – Insemination – Advantage and disadvantages of frozen semen

Unit IV : Housing: Types of animal housing – Conventional barn – Loose housing. Selection of site for the farm buildings — Planning and designing – Floor space requirements - Air and ventilation – lighting – Arrangement of farm building - construction details – Foundation – Wall, floor, roof, manger, drain etc.. Building, flooring and roofing materials – roofing pattern – Flooring pattern - Different units of Organised Dairy Farm - Footbath – Farm fence

Unit V : Clean milk production: Production of clean milk and organic milk – Animal Hygiene – Milker’s hygiene - milking environment – utensils - preparation for milking – methods of milking. – milk handling - Cleaning and disinfection of dairy farm and milk room

References

Textbooks

1. Banerjee, G.C., 2006. Text book of Animal Husbandry 8thEd.Oxford and IBH Publishing Company Ltd., New Delhi.
2. ICAR, 2013. Hand book of Animal Husbandry, 4th Ed., ICAR Publication, Pusa, New Delhi.
3. Jagadish Prasad, 2002. Principles and practices of Dairy Farm Management, 3rd Ed. Kalyani Publishers, Ludhiana.
4. Ranjhan, S.K., and N.N.Pathak, 2003. Text book on buffalo production, 4 Ed. Vikas Publishing House Pvt. Ltd., New Delhi.
5. Sastry, N.S.R., C.K.Thomas and R.A.Singh, 2015. Livestock Production Management, 4thEd.Kalyani Publishers, New Delhi.

Semester I
17DPTV0104 - FODDER PRODUCTION AND DAIRY CATTLE
NUTRITION (Credits 3)

Objective

- The course is designed to provide a foundation in the principles of Agricultural operations and Forage Crop Production technologies with emphasis on cultivation of various fodder crops and its utilization in dairy farms.
- To impart the skills and knowledge in cultivation of fodder crops from sowing up to harvest including preservation of fodder that can be applied at farm level.

Learning Outcome

- Students will be able to understand the principles of agricultural operations
- Students will acquire skills on the forage crop production technologies
- Students will learn the method of cultivation of fodder crops and its utilization in dairy farms.

Unit IV: Instruction in lessons in Unit IV should result in students achieving the following objectives

1. Able to list key nutrients for animals
2. Be able to describe the functions of various nutrients in animals and list the sources
3. Able to classify feeds according to their nutritive values
4. Acquire knowledge in feeding value of locally available feed
5. Able to list key nutrients for animals
6. Able to outline how carbohydrates, lipids and proteins can be classified
7. Able to describe the functions of minerals and vitamins in the nutrition of animals, and list the sources as well as the clinical signs associated with deficiency symptoms of these nutrients.
8. Acquire knowledge in the use of urea as protein supplement
9. Able to prepare good quality hay and silage
10. Acquire knowledge to improve the digestibility of poor quality roughage.

Unit V: Instruction in lessons in Unit V should result in students achieving the following objectives

1. Describe the functions of the parts of the digestive systems of cow
2. Able to describe the process of digestion in ruminants
3. Able to calculate the nutrient requirements for dairy cow
4. Able to formulate low cost dairy cattle ration using locally available feedstuffs
5. Able to feed economically according requirement and milk production
6. Design feeding strategies and systems for cattle of different physiological status using feed additives

Unit I : **Introduction to forage crop production:** Importance of fodder crop production-Definition of fodder and forage- Classification of fodder crops- Characteristics of an ideal fodder crop- Harvesting techniques- Agro-forestry- Definition and benefits- Agro forestry systems-Silviculture, silvi pasture, Hortipasture, Agri-silvi-pasture. Hydroponic fodder.

Unit II : **Production technologies for fodder cereals and fodder grasses:** Agronomic packages of practices for Fodder sorghum, Fodder cumbu, Fodder maize, Cumbu-Napier hybrid grass, Guinea grass, Buffel grass(Kolukattai grass), Deenanath grass.

Unit III : **Production Technologies for fodder legumes and fodder tree crops:** Agronomic packages for following crops: - Lucerne –Fodder Cowpea – Desmanthus – Stylo – Subabul - Sesbania and Glyricidia.

Unit IV : **Common feedstuffs:** Nutrients of the feeding stuff – Classification of feed – Roughages – concentrates – root crops and tubers – pasture – Energy feeds – mill by products – oil cakes – urea feeding – silage making – hay making - improving the digestibility of roughage – chaffing - urea treatment –molasses spray.

Unit V : **Digestion and Feeding:** Digestion in ruminants. Nutrient requirements of dairy cattle – DM, TDN and DCP requirements - Thumb rule method of feeding - Desirable characteristics of a ration - feed additives -probiotics – yeast culture - feeding of bypass proteins. Unconventional feeds.

References

Textbooks

1. Balasubramanian, P and S.P.Palaniappan, 2002. Principles and Practices of Agronomy. Agro bios(India), Jodhpur
2. Chatterjee, B.N and P.K.Das, 1989. Forage crop production – Principles and practices, Oxford and IBH, Publishing Co. Pvt.Ltd., New Delhi.
3. ICAR, 1996. Hand book of Agriculture. Indian Council of Agricultural Research, New Delhi
4. Sankaran, S and V.T.SubbiahMudaliar, 1997. Principles of Agronomy. The Bangalore printing and publishing company Ltd., Bangalore
5. Singh, R.V., 1982. Fodder trees of India, Oxford and IBH publishing Co. Pvt.Ltd., New Delhi.
6. Thakur, C.1980. Scientific crop production. Vol.I and II. Metropolitan Book Co.Pvt.Ltd. New Delhi

Semester I

17DPTV0105 - DAIRY CATTLE MANAGEMENT (Credits 2)

Objectives

The General objective of this course is to establish basic knowledge of how to manage and operate dairy farm.

- This course is designed to impart basic technical knowledge and skills required manage calves, heifers, lactating animals and pregnant animals.
- To provide skill for managing the health of animals and to understand on various diseases that infects animals.

Learning Outcomes

Unit I: Instruction in lessons in Unit I should result in students achieving the following objectives

1. Able to take care of calves immediately after birth in accordance with good farm practice.
2. List the major roles of colostrum: energy, warmth, laxative, passive transfer
3. Know the correct amount and time frame for colostrum intake
4. Describe the feeding requirements of calves from birth to weaning.
5. Select suitable calf rearing systems for given requirements.
6. Prepare milk replacer in accordance with good farm practice.
7. Feed calves with liquid and solid feed in accordance with good farm practice.
8. Clean feeding equipment in accordance with good farm practice.
9. Maintain healthy and productive calves.
10. Identify good and ill health in calves.
11. Give first aid to common ailments of calves

Unit II: Instruction in lessons in Unit II should result in students achieving the following objectives

1. Develop a better understanding of basic dairy heifer nutrition, management and healthcare.
2. Identify the external signs of pregnancy
3. Identify the external signs of parturition
4. Able to take care of dry cows immediately in accordance with good farm practice

5. Able to take care of cows immediately after calving in accordance with good farm practice
6. Able to dispose placenta in accordance with good farm practice.
7. Able to take care of aborted cows
8. Able to take care of cows with retained placenta

Unit III: Instruction in lessons in Unit III should result in students achieving the following objectives

1. Demonstrate knowledge of cow udder and mammary glands
2. Able to describe the process of milk synthesis in mammary gland.
3. Able to take care of lactating cows in accordance with good farm practice.
4. Able to maintain fat and SNF content of milk through feeding at genetically determined level.

Unit IV: Instruction in lessons in Unit IV should result in students achieving the following objectives

1. Able to take care of sick animals
2. Able to identify healthy and sick animals
3. Able describe the basic physical examination of animals for health assessment
4. Able to control common Endoparasites and Ectoparasites
5. Acquire skill in vaccination
6. Able to give first aid to common ailments like Bloat, Carbohydrate engorgement, Diarrhea – Indigestion and Wounds

Unit V: Instruction in lessons in Unit V should result in students achieving the following objectives

1. Able to list and describe the common diseases of cattle
2. Able to diagnose and treat mastitis
3. Able to identify the symptoms and take control measures for common viral diseases like FMD and Rinderpest
4. Able to identify the symptoms and take control measures for common bacterial diseases like, anthrax, black quarters and Hemorrhagic Septicemia
5. Able to identify the symptoms and take control measures for Zoonotic diseases Tuberculosis, Brucellosis and Rabies

- Unit I** : **Management of calves:** Care of calf at birth – Muconium - Colostrum feeding - System of raising calves – weaning - Milk replacer - Calf starter - Common ailments and their control.
- Unit II** : **Management of heifers and pregnant animals:** Heifer management - Management of pregnant animals – signs pregnancy and diagnosis of pregnancy – feeding of pregnant cows – care of expectant cows - care at and after calving – Management of dry cows - abortion – retention of placenta.
- Unit III** : **Management of Lactating Animals:** Milk secretion - Factors affecting milk yield and quality – General care of lactating animals - Strategies to improve fat and SNF content of milk - milking methods – hand and machine milking
- Unit IV** : **Health care management:** Care of sick animals – Signs of health and ill health – Temperature – Respiration – Pulse. Endoparasites and deworming – Ectoparasites – Vaccination procedures - Storage and preservation of vaccines – Needles and instrument sterilization – treatment of wounds Common ailments – Bloat – Carbohydrate engorgement(Acidosis) – Diarrhoea – Indigestion..
- Unit V** : **Common diseases:** Mastitis - Common contagious diseases – Foot and Mouth disease – Rinderpest – Anthrax – Black quarter – Tuberculosis – Johne’s disease – Brucellosis – Rabies, Hemorrhagic Septicemia.

References

Textbooks

1. Banerjee, G.C., 2006. Text book of Animal Husbandry 8thEd.Oxford and IBH Publishing Company Ltd., New Delhi.
2. ICAR, 2013. Hand book of Animal Husbandry, 4thEd.ICAR Publication, Pusa, New Delhi.
3. Jagadish Prasad, 2002. Principles and practices of Dairy Farm Management, 3rd Ed. Kalyani Publishers, Ludhiana.
4. Ranjhan, S.K., and N.N.Pathak, 2003. Text book on buffalo production, 4 Ed. Vikas Publishing House Pvt. Ltd., New Delhi.
5. Sastry, N.S.R., C.K.Thomas and R.A.Singh, 2015. Livestock Production Management, 4thEd.Kalyani Publishers, New Delhi.

Semester I

17DPTV0106 - Practical I (Credits 3)

DAIRY HUSBANDRY PRACTICES

1. Identification of breeds of cattle
2. Identification of breeds buffalo
3. Study of reproductive organs of cow
4. Study of reproductive organs of bull
5. Heat detection in dairy cow
6. Demonstration of semen collection
7. Demonstration of semen evaluation
8. Handling of LN₂ containers
9. Hands on training in Artificial insemination
10. Preparation of plans for animal housing
11. Record keeping in dairy farm
12. Visit to frozen semen bank
13. Preparation of project for starting a dairy farm

Semester I
17DPTV0107 - Practical II (Credits3)

ZOOTECHNY

1. Points of Dairy Cattle, Buffalo and Bull
2. Handling of dairy cattle
3. Cattle head restraint techniques
4. Cattle limb restraint techniques
5. Restraining of calves
6. Casting of cattle
7. Hands on training in disbudding of calves
8. Tattooing
9. Ear tagging
10. Dentition and ageing
11. Estimation of body weight by body measurement
12. Hands on training in grooming
13. Castration of bull calves
14. Transportation of cattle

Semester I
17DPTV0108- Practical III (Credits3)
DAIRY CATTLE MANAGEMENT

1. Care of newborn calf
2. Care of Heifers
3. Care of pregnant cows
4. Care of cow at the time of calving
5. Hands on training in hand milking
6. Hands on training in machine milking
7. Oral administration of solid and liquid medicine
8. Hands on training in deworming
9. Hands on training in vaccination
10. Identification and control of ectoparasites
11. Visit to veterinary Hospital
12. Study on first aid kit and practice on first aid to burns and scalds of cattle
13. First aid to mastitis
14. Recording of Temperature, pulse and Respiration

Semester I

17DPTV0109 – EXPERIENTIAL LEARNING I (Dairy Farm Training)(Credits 4)

Objective

To provide practical exposure on managing a dairy farm

Learning Outcome

- Students will attain practical knowledge by performing assigned work.
- Students will learn to manage the cattle that infected with diseases and during pregnancies.
- Students will learn documentation at farm level
- Students will get to know about the fodder and management of fodder produced.
- Students will gain knowledge on marketing of farm milk.

Work Plan

Students have to undergo Experiential learning at GRI dairy farm and a private sector dairy farm. They have to study and gain skills on managing dairy farm, fodder production, feed formulation and dairy cattle. They have to gain knowledge on the following exercise at dairy farm. Also students are admitted to maintain and manage the farm activities, carry out collection of milk and sales of collected milk.

Cattle management

1. Recognize different cattle and buffalo breeds
2. Calculate feed and fodder requirement for different classes of animals
3. Vaccination of animals
4. First aid and treatment of basic health problem
5. Diagnose heat period
6. Artificial insemination techniques and pregnancy diagnosis
7. Assisting the animal during parturition
8. Removal of retained placenta

Farm management

1. Maintenance of dairy equipments
2. Milk collections and transportation
3. Establishing dairy farm
4. Maintenance of stores for dairy farms and dairy plants

5. Maintaining of records and registers
6. Advertisement for dairy farms and dairy plant
7. Conducting farmers training
8. Techniques for improvement of milk production
9. Techniques in disposal of farm waste
10. Raising of calves, heifers
11. Disposal of dead animals
12. Transportation of semen.

Fodder production and management

1. Production of fodder crops
2. Planning and layout of dairy farms
3. Formulation of cattle feeds

Assessment

Students who underwent the experiential learning should submit a report based on the daily routine activities that performed by them at the farm with the details of date and timing. After the successful completion of experiential learning at farm the evaluation will be done on the basis of following criteria.

Evaluation of Experiential Learning Programme

S.No.	Parameters	Max. Marks
1.	Project Planning and Writing	10
2.	Presentation	10
3.	Regularity	10
4.	Monthly Assessment	10
5.	Output delivery	10
6.	Technical Skill Development	10
7.	Entrepreneurship Skills	10
8.	Business networking skills	10
9.	Report Writing Skills	10
10.	Final Presentation	10
	Total	100

SEMESTER - II

Semester II

17DPTV0210 -RURAL RESOURCE APPRAISAL (Credits 5)

Objective

- To learn the real dairying situation at rural level
- To know the status of animal husbandry at village level
- To know the milk production details at village level

Learning Outcome

- Students will get expose to the current scenario of dairy in rural and urban area.
- Students will acquire knowledge about the health, maintenance and various milking practices carried out in farm.
- It provides practical knowledge to students by engaging themselves in field work.

Work Plan

The students should get exposed to field experience through Rural Resource Appraisal programme. Students will stay with farmers in a village and study the agro dairy practices carried out by the farmer. A separate record note book should be submitted by the students to record the socioeconomic status of farmers, dairy farming system, livestock production, cattle population, animal feeding methods, animal health awareness, milking practices, milk production, sale and economic details, clean milk production, milk consumption and value addition in the sample field selected by the students. The evaluation will be made purely on internal basis by the course teacher.

Tools used may be survey by questionnaire, interview schedule and PRA techniques.

Semester II

17DPTV0211- MILK HYGIENE AND PUBLIC HEALTH (Credits 4)

Objectives

- To discuss the importance of hygiene and sanitation of milk handling at different levels
- To explain public health administrative set up in Centre- State-District-Block- village levels.

Learning Outcome

- Students will attain knowledge on various sources of contamination.
- Students acquire knowledge on various hygiene practices to be carried out in farm.
- Students will come to know about importance of cleaning and sanitization and CIP.
- It provides information about the public organizations involved in hygiene practices.

Unit I : Maintenance of hygiene and sanitation at dairy farm premises:

Sanitizers: definition – types – heat, chemicals, UV and Bio Detergents – its application to dairy farm premises. Disinfectants: definition – natural disinfectants and chemical disinfectants- applications to dairy farm premises. Hygienic handling / management of dairy equipments: principles of cleaning and sanitation – ideal properties of detergents and sanitizers – methods of cleaning dairy equipments – tests of sterility. Hygiene control in milk chilling centers.

Unit II : Package of hygienic practices at farm level:Animal hygiene - milker hygiene- utensils/equipment hygiene- hygiene during milking process - environmental hygiene.Sources of contamination of milk.Diseases Transmitted Through Milk - Classification of milk Borne Diseases.

Unit III : CIP: Expansion – definition – application of CIP in food industry. CIP – Dairy Industry. CIP applicable dairy machineries. Selection and use of dairy cleaners and sanitizers. Various chemicals used for CIP of dairy plant. Types of cleaning. Cleaning procedure. Cleaning efficiency.

Unit IV : **Historical development of public health:** Changing concepts of public health. Various committees on health development in India. Public Health set up at State- District – Block - Sector - Village level -organization-functions. Public Health Laws - Definition – importance – Statutory laws -The Tamil Nadu Public Health Act.

Unit V : **Animal products safety:** Indian scenario, role of veterinarians in milk hygiene and public health. Pesticide residues in milk and milk products. Heavy metal contamination in milk and milk products. Drugs, drug resistance, toxicity, allergy - safe use and precautions.

References:

Text books:

1. Anantha Krishnan, C.P., (1991), Technology of milk processing, Sri Lakshmi Publications, Chennai -10.
2. Britz, T.J. and Robinson, R.K 2008. Advanced Dairy science and Technology. 1sted, BackwellPubl.Ltd., UK.
3. Harry S. Mustard.,(1960) An Introduction to Public Health, The Macmillan Co., New York.
4. Sukumar De (1980), Outlines of Dairy Technology, Oxford University Press, New Delhi
5. V.K.Muthu., (2005) A Short Book of Public Health, , JAPEE Brother Medical Pub.(P)Ltd New Delhi.
6. Walstra, P. Wouters, J.T.M. and Geurts, T.J. 2006. Dairy Science and Technology. CRC Press, New York.

Semester II

17DPTV0212 -MILK PROCUREMENT (Credits 3)

Objectives

- To discuss the concept and importance of milk procurement
- To provide knowledge on methods and techniques of milk procurement, milk transport and distribution.

Learning Outcome:

- Students will learn on various historical facts which are important for dairy development.
- Students get to know on various activities like collection, pricing, distribution and transportation of milk to chilling centers.

Unit I : Introduction: Status and importance of milk procurement in India and Tamilnadu. Milk procurement and pricing pattern in India.

Unit II : Milk production: Principles of milk production- selection of milk shed area – milking practices - milk handling.

Unit III : Milk procurement: Source of milk procurement – classification. Organization of rural milk procurement. Collection of milk – definition - classification- methods, milk collection centers and their functions.

Unit IV : Transportation of milk: Modes of transport – earlier methods – recent developments – selection of mode of transportation of milk.

Unit V : Distribution of milk: Importance – raw milk distribution – attribution of pasteurized milk – bulk distribution – retail distribution of pasteurized milk – consideration for organizing and distribution.

References:

Text books:

1. Dairy India year book 2007 & 2017, A- 25 Priyadarshinivihar, Delhi 110092, India.
2. Jagadish Prasad (1992), Principles and Practices of Dairy Farm Management, Kalyani Publishers, Ludhiana.
3. Ramasamy. D. 1999. Dairy technologist hand book, International book distributing Co. Luknow.

4. Robinson (1986), Modern Dairy Technology, Vol.I, Advances in Milk Processing, Chapman and Hall India, Madras.
5. Sukumar De (1980), Outlines of Dairy Technology, Oxford University Press, New Delhi
6. Walstra, P. Wouters, J.T.M. and Geurts, T.J. 2006. Dairy Science and Technology. CRC Press, New York.

Semester II

17DPTV0213 - DAIRY ENGINEERING -I (Credits 2) (REFRIGERATION AND CHILLING EQUIPMENT)

Objective

- To understand the principles of Refrigeration.
- To obtain knowledge on working at chilling plant.
- To gain skills on repair and maintenance of refrigeration and cooling unit.

Learning Outcome

- Students acquire knowledge on types of refrigeration cycles
- Students will learn the process of refrigeration
- Students will learn on various tools and equipments involved in chilling process
- Students get practice on working of BMC and chilling centre and also cleaning and sanitation process of BMC.

Unit I : **Introduction:** Basic refrigeration cycle and concepts, standard rating of refrigerating machines: Air Conditioning – Importance of refrigeration in dairy industry. Methods of refrigeration: Units of refrigeration

Unit II : **Refrigeration cycles:** Different types of refrigeration cycles- Vapour compression refrigeration system –compressors, condensers and evaporators – types of evaporators – block diagram of vapour compression refrigeration system – desirable characteristics of refrigerants – properties of refrigerants and comparison.

Unit III : **Refrigeration plant and control devices:** Automatic expansion valve – solenoid valve- pressure control and thermostat. Common troubles in refrigeration system. Cooling tower. Ice bank systems. Factors affecting the performance of refrigeration plant- Efficient use of refrigeration.

Unit IV : **Refrigeration in milk processing:** Mode of transportation of milk tankers, Bulk milk cooler – construction and operation, Chilling plant – construction, hygiene and sanitation, safety precaution at cold storage, types of chillers, tests to check leakage of refrigerants – bubble test, halide torch test, nessler's reagent test, sulphur candle test, electronic test detector, Merits and demerits of refrigeration in milk.

Unit V : **Care and maintenance:** Cleaning and sanitation of BMC and chilling plant, precaution to be taken by workers, factors affecting refrigeration.

References

Textbooks

1. GostaBylund (1995), Dairy processing hand book, Tetra pak processing systems AB, Swedwn
2. James. N. Marner (1975), Principles of dairy processing, wiley eastern limited, New Delhi.
3. Ramasamy D, 1999. Dairy Technologists Hand Book, International Book Distributing Co, Lucknow
4. Sukumar De 1980, Outlines of Dairy Technology. Oxford University Press, New Delhi.
5. Tuffel Ahmad 1995, Dairy Plant Engineering and Management, KitabMachal Distributers, New Delhi

Semester II

17DPTV0214 - DAIRY CHEMISTRY (Credits 2)

Objectives

- To understand the physiochemical components present in milk
- To study the structure, role, and chemical interactions of milk

Learning Outcome

- Students will gain knowledge on various components present in milk.
- Students will acquire knowledge on various physical and chemical properties of milk.
- Students will learn various methods to analysis the proximate composition of milk.

Unit I : **Composition of milk:** Milk - definition – Gross composition of milk (cow, buffalo, goat, sheep and human) - Nutritive value of milk and energy calculation. Colostrum: composition – importance of colostrum. Factors influencing the composition of milk. Factors affecting quality of milk yield. Physical properties of milk.

Unit II : **Milk Carbohydrates:** Definition, classification, Lactose structures, physical forms, status of lactose in milk, uses of lactose.

Unit III : **Milk fat:** Definition, composition and size of fat globules, fat soluble vitamins, phospholipids. Properties of milk fat- density, Refractive index, Iodine value, RM value, Polenske value, Saponification value.

Unit IV : **Milk Proteins:** Classification, isolation, major and minor milk proteins – Properties of milk proteins – hydration, solubility.

Unit V : **Minor constituents:** Definition, types of enzymes - functions – influence of processing parameters and effect on storage. Minerals and vitamins of milk: distribution of major minerals in milk- trace elements in milk.

References:

Text books:

1. Eeckles.CH.Combs, W.B and Macy.H (1955), Milk and Milk Products, Tata McGraw Hill Publishing Co.Pvt.Ltd., New Delhi.

2. Mathur MP, Roy DD and Dinakar P.1999. *Textbook of Dairy Chemistry*. ICAR.
3. Sukumar De (1980), *Outlines of Dairy Technology*, Oxford University Press, New Delhi.
4. Walstra, P. and Jenness, R. (1984) *Dairy Chemistry and Physics*. Wiley – Inter Sci.Publ., John Wiley and Sons, USA.
5. Webb, B.H., Johanson, A.H., and Alford, J.A. (Eds) (2008). *Fundamentals of Dairy Chemistry*, CBB Publishers and Distributors, New Delhi.
6. Wong N.P, Jenness.R. Keeney.M. Marth E.H (1998); *Fundamentals of Dairy Chemistry*, CBB Publishers and Distributors, New Delhi.

Semester II

17DPTV0215- DAIRY MICROBIOLOGY (Credits 2)

Objective

- To understand about various microbes and their characters
- To understand on merits and demerits of microbes in field of dairy
- To gain knowledge on various test for estimation of microbes

Learning Outcome

- Students will learn various microbes, their characters and taxonomy nomenclature.
- Students will learn about various methods to detect the microorganisms.
- Students will get knowledge about importance of microbes in dairy processing.

Unit I : **Introduction to Microbiology:** Classification of bacteria– major characteristics – Prokaryote and Eukaryote – aerobes and anaerobes – Microbial Taxonomy – Nomenclature and classification of bacteria – fungi.

Unit II : **Microbiology of Milk:** Introduction, Types of micro-organisms present in milk, Milk borne diseases (pathogens), Microbial standards of raw and pasteurized milk, Microbial spoilage of milk, Role of microbes in dairy, Fermentation process and control.

Unit III : **Microbial spoilage of milk:** Physiological grouping; acid producers, gas producers, proteolytic, lipolytic, sweet curdling, ropiness, flavour producing, colour fermentations.

Unit IV : **Microbiology of milk products:** Spoilage of milk products – FSSAI standards – Grading

Unit V : **Bacteriology of starter cultures:** Definition – types of starters, Classification of starter culture- function- propagation-preservation methods- factors affecting activity of starter cultures – role of starter in dairy fermentation –characteristics of good starter culture.

References:**Text books:**

1. Fernandes, R.2009 . Microbiology Hand book: Dairy Products. Royal Society of Chemistry, Revised ed., London
2. Foster E.M (1957) Dairy Microbiology, Prentice Hall Inc, USA.
3. Mani. A., A.M. Selvaraj, L.M. Narayanan, N.Arumugam, Microbiology (General and Applied), Saras Publication, A.R.P. Camp road, Periaivilai, Kottar (PO), Nagercoil, KanyakumariDist – 629 002.
4. Pelczar.Reid and Chan, 1977 - Microbiology, Tata McGraw-Hill Publishing company Ltd., New Delhi.
5. Ramasamy, D., 1999, Dairy Technologist's Hand Book, International book distributing Co., Lucknow.
6. Srivastava.L. (2002)., Hand Book of Milk Microbiology, Daya Publishing House, Delhi.
7. Yadav, J.S. (1993) A Comprehensive Dairy microbiology, Metropolitan Book Co. Pvt Ltd, 1, NetajiSubashMarg, New Delhi-11002, India.

Semester II
17DPTV0216- PRACTICAL IV (Credits 3)
(DAIRY CHEMISTRY)

Objectives

- To practice on methodology of sampling
- To practice on various methods to detect the composition of milk
- To practice on platform test

Learning Outcome

- Students will gain practical knowledge on proximate, adulterants and preservatives in milk.
- Students will gain knowledge on handling of equipments and devices in chemical analysis.

1. Sampling of milk for physical and chemical examination
2. Platform tests for milk
3. Sediment test
4. Clots on boiling
5. Determination of specific gravity of milk by lacto meter
6. Fat test by Gerber's method
7. Fat test by milkotester
8. Fat test by milk analyser
9. Estimation of TS,SNF
10. Determination of titratable acidity in milk
11. Detection of adulteration in milk
12. Detection of preservatives in milk
13. Alcohol test

Semester II
17DPTV0217- PRACTICAL - V (Credits 3)
(DAIRY MICROBIOLOGY)

Objective

- To get knowledge on various equipments used in microbiology laboratory
- To gain practice on various microbial tests

Learning Outcome

- Students will gain practical knowledge on handling of microbial equipments
- Students will get practiced on various microbial analysis
 1. Familiarity with common equipments used in microbiology lab
 2. Handling of microscopes.
 3. Cleaning and sterilization of glasswares
 4. Preparation of dilution blank, agar plates and agar slants
 5. Preparation of various agar.
 6. Gram staining techniques.
 7. Methylene blue reduction(MBR) test
 8. Resazurin Test
 9. Standard Plate count test(SPC)
 10. Direct microscopic (DMC) test
 11. Coliform count
 12. Yeast and Moulds

Semester II
17DPTV0218 - INPLANT TRAINING (Credits 6)
(CHILLING CENTRE)

Objective

- To provide practical exposure in refrigeration and chilling operations in milk chilling centre

Learning Outcome

- Students will attain practical knowledge by performing assigned work.
- Students will learn to operate RMRD, chilling unit and BMC.
- Students will learn documentation of milk at reception unit.

Work Plan

Students have to undergo In-Plant training in milk collection and chilling centre and they have to study and gain skills on repair/ maintenance of various equipments and machineries and they have to gain knowledge on the following operations of chilling plant.

1. Reception of milk –collection of milk at reception dock.
2. Sampling milk- labeling of sample and storing for analysis
3. Quality analysis at reception dock – platform tests
4. Can washers – sanitizing solution preparation
5. Study the filters and clarifiers arranged in reception.
6. Chiller
 - a. Parts of chillers
 - b. Dismantling of chiller plates
 - c. Assembling of chiller plates
7. Study the flow of milk through chiller
8. Study of cream separator and parts-assembling
9. Study the refrigeration section
 - a. Compressor
 - b. Evaporation coil
 - c. Fixing pipe flow lines
 - d. Installation at chilling plant
10. Study on refrigeration control devices

11. BMC

- a. Construction
- b. Temperature gauge
- c. Pressure gauge
- d. Insulation

12. Documentation and record keeping

- a. Process parameters
- b. Quantity and quality of milk and storage

13. Study on malfunction of

- a. Can washers
- b. Chiller
- c. BMC

14. Calibration of equipments and gauges-

15. Cleaning and sanitizing

- a. Preparation of solutions
- b. Procedure for cleaning and sanitization of process area
- c. Procedure for cleaning and sanitation of BMC and chilling section
- d. Maintenance of personal hygiene
- e. Check for sources of contamination

16. Safety precaution

- a. Check for safety measurements
- b. Check for leakage of refrigerant

17. Calculation of ton of refrigeration

18. Exercise on checking leakage of refrigerants – bubble test, halide torch test, nessler's reagent test, sulphur candle test ,electronic test detector

Assessment

Students who underwent the In-Plant training should submit a report based on the daily routine activities that performed by them in the chilling centre. Also, they should submit report on the daily activities that they carried out with the details of date and timing. After the successful completion of In-Plant training an examination along with a viva voce will be conducted and evaluated.