

Vocational Higher Secondary
Education (VHSE)

Second Year

LIVE STOCK MANAGEMENT

Reference Book - Teachers' Version



Government of Kerala
Department of Education

State Council of Educational Research and Training (SCERT),
KERALA
2016

Foreword

Dear Teachers

This reference book (**Teachers' Version**) is intended to serve as a transactional aid to facilitate classroom transaction and as a ready reference for teachers of Vocational Higher Secondary Schools. It offers some guidelines for the transaction of the course content and for undertaking the practical work listed in the course content. As the curriculum is activity based, process oriented and rooted in constructivism focusing on the realisation of learning outcomes, it demands higher level proficiency and dedication on the part of teachers for effective transaction.

In the context of the Right- based approach, quality education has to be ensured for all learners. The learner community of Vocational Higher Secondary Education in Kerala should be empowered by providing them with the best education that strengthens their competences to become innovative entrepreneurs who contribute to the knowledge society. The change of course names, modular approach adopted for the organisation of course content, work-based pedagogy and the outcome focused assessment approach paved the way for achieving the vision of Vocational Higher Secondary Education in Kerala. The revised curriculum helps to equip the learners with multiple skills matching technological advancements and to produce skilled workforce for meeting the demands of the emerging industries and service sectors with national and global orientation. The revised curriculum attempts to enhance knowledge, skills and attitudes by giving higher priority and space for the learners to make discussions in small groups, and activities requiring hands-on experience.

The SCERT appreciates the hard work and sincere co-operation of the contributors of this book that includes subject experts, industrialists and the teachers of Vocational Higher Secondary Schools. The development of the teachers' version of reference books has been a joint venture of the State Council of Educational Research and Training (SCERT) and the Directorate of Vocational Higher Secondary Education.

The SCERT welcomes constructive criticism and creative suggestions for the improvement of the book.

With regards,

Dr. J. Prasad
Director
SCERT, Kerala

CONTENT PAGE

Sl. No.	Content	Page No.
1	About the course	5
2	Job roles	6
3	Major skills with sub skills	7
4	Learning outcomes of the course	8
5	Course structure	9
6	Syllabus and list of practicals	9-15
7	Learning outcomes of the units	15-18
8	Scheme of work	19
9	Structure of module 3	19
10	Structure of module 4	20
11	Class room activities (General)	20
12	Practical activities (General)	20
13	Overview of module 3	20
14	Overview, grid, unit, additional information, assessment activities, list of portfolio items (Unit wise of module 3)	20-42
15	Extended activities of module 3	42
16	Overview of module 4	42
17	Overview, grid, unit, additional information, assessment activities, list of portfolio items (Unit wise of module 4)	43-55
18	Extended activities of module 4	56
19	On-the-job Training	57
20	List of References	58-59

ABOUT THE COURSE

Agriculture forms a quintessential part of Indian culture and contributes the lion's share of Indian economy. About 3 per cent of Indians depend on livestock farming for their primary livelihood. Animal products viz., milk, meat and egg form the staple diet of Indians and with the advent of sophisticated machinery the sector is rapidly evolving from small scale/individual ventures into high tech farming systems. Animal husbandry sector met with a lot of basic needs of a family like food, income, job, energy, manure, security, companionship, protective coverings, byproducts etc.

In the wake of this industrialization, live stock management (LSM) course provides students many employment opportunities in Government, Private and co-operative sectors, in addition to the enormous self employment potential of the field. In Kerala, currently many Government jobs are reserved for LSM students as Livestock Inspectors/Farm assistants in Animal Husbandry Department, Vocational Instructor/Laboratory Technical Assistant in VHSE department etc. It also enables students for a snatch of many blue collar/mid tier jobs in dairy, poultry and food processing industries. Even though the main aim of VHSE is to generate self employment, vertical mobility is also reachable with this course as five super numerary seats are reserved for LSM students for B.V.Sc & A.H course at College of Veterinary and Animal Sciences, Kerala Veterinary and Animal Sciences University (KVASU) with effect from 2015. After completion of this course students can also undergo many diploma courses related to Dairy and Poultry Industry, available with KVASU, which will again further their chances of getting a job all over India and abroad.

It is imperative for our educational system to create awareness, generate increased interest in livestock farming leading to a self sufficient and proud community rooted in our culture, staying balanced with nature and contributing to the progress of our nation.

JOB ROLES

Introduction: Livestock management course provides huge employment opportunities in Government, Private and cooperative sectors. In addition, it also enables the students to explore the possibilities of self employment which is the main aim of vocational education and thus opening various avenues to the learner. All this helps in the upliftment of the community both by providing income and through generating quality food products leading to self sustainability. With the escalating unemployment problem and decreasing food availability, the relevance of LSM course is more than ever and the efficient utilization of the skilled labor generated with this course needs to be looked upon. Job roles related to this course are amenable to all sections of people especially women who forms the backbone of every home and community.

Government/Semi-Government	Private	Self employment
Livestock Inspector	Artificial Insemination Assistant	Artificial Insemination Assistant
Vocational Instructor	Chick Sexer	Pet Animal Groomer
Lab Technical Assistant	Poultry Hatchery Supervisor	Pet Animal Breeder
Dairy Farm Supervisor	Dairy Farm Supervisor	Livestock Product Processing and Marketing
Farm Labourer	Farm Labourer	Dairy Farm
Chick Sexer	Poultry Farm Supervisor	Broiler Farm
Lab Animal Handler	Poultry Hatchery Assistant	Layer Farm
Feed Plant Supervisor	Vaccinator	Egger Nursery
Dairy Plant Assistant	Pet Animal Groomer	Rabbitry
	Lab Animal Handler	Aviary
	Feed Plant Supervisor	Kennels
	Veterinary Public Health Worker	
	Veterinary Extension Worker	
	Field Assistant in Banking and Insurance	
	Dairy Plant Assistant	
	Meat Plant Assistant	

MAJOR SKILLS AND SUB SKILLS

Module 3: Poultry, Pet and Lab Animal Management

The module envisages imparting the following skills,

- Calculate the feed requirement for different age groups of chicken
- Identify various feed ingredients for poultry feed formulation
- Set up a brooder for chicks
- Differentiate good and poor layer for culling
- Select and assemble suitable equipment for each class of poultry in sheds
- Assess the quality of egg by candling
- Set the eggs for hatching in the incubator
- Perform fumigation as a method of disinfection in poultry farms
- Selection of good quality pups for dog breeding
- Handling and restraint of laboratory animals for experiments

Module 4: Livestock Products Processing and Food Safety

The module envisages imparting the following skills

- Categorize the different traditional milk products
- Differentiate types of milk commercially available
- Prepare milk products like curd, cream, paneer, ice cream.
- Practice the methods of clean milk production in a farm
- Detect adulterants in milk using laboratory tests
- Assess the milk quality parameters like specific gravity using lactometer
- Explain the steps of animal slaughter
- Sketch the layout of a slaughter house
- Prepare meat products like cutlets, sausage
- Identify zoonotic diseases for prevention and proper healthcare
- Describe the guidelines related to animal transportation
- Practice preservation methods of livestock products

LEARNING OUTCOMES OF THE COURSE

After completing the course, learners will be able to,

1. Calculate the feed requirement for different age groups of chicken
2. Identify the various feed ingredients popularly used for poultry feed
3. Set up a brooder for chicks
4. Differentiate good and poor layer for culling
5. Select and assemble suitable equipment for each class of poultry in sheds
6. Assess the quality of egg by candling
7. Set the eggs for hatching in the incubator
8. Perform fumigation as a method of disinfection in poultry farms
9. Select dogs for breeding
10. Handle and restrain laboratory animals like mouse, rabbit for experiments
11. Prepare milk products like paneer, peda, khoa.
12. Practice the methods of clean milk production in a farm
13. Detect adulterants and contaminants in milk using laboratory tests
14. Assess the milk quality parameters like specific gravity and fat percentage using lactometer
15. Prepare meat products like cutlets, burger
16. Prepare a project report for starting small scale poultry unit
17. Practice preservation methods of livestock products

COURSE STRUCTURE FOR TWO YEARS

The course will have four modules viz,

Module no.	Name of Module	Period
1	Basic Animal Husbandry Practices	340
2	Dairy and Meat Animal Management	340
3	Poultry, Pet and Lab Animal Management	340
4	Livestock Products Processing and Food Safety	340

SYLLABUS

Module 3: Poultry, Pet and Lab Animal Management

Unit 1: Introduction to Poultry Husbandry (10 periods)

Poultry related terms-

- Poultry, broiler, chick, grower, layer, external morphology of chicken

Scientific names of different species of poultry

- Chicken, duck, turkey, quail

Trends in poultry Industry-

- Current scenario of poultry industry in Kerala and India
- merits and demerits of poultry rearing

Unit 2: Anatomy and physiology of poultry (40 periods)

Major organ systems of chicken

- Digestive system- mouth, oesophagus, stomach, liver and pancreas, small intestine, caeca, cloaca
- Reproductive system - Male and female
- Respiratory system- syrinx, airsacs
- Skin and feathers - types of feathers

Egg formation

- Physiology of egg formation
- Effect of light on egg formation

Molting and bleaching

- Definition
- Relation with egg production

Unit 3: Feeds and feeding of poultry (20 periods)

BIS standards for poultry feeds

- BIS standards of crude protein and metabolisable energy for broiler and layer chicken feeds

Poultry feed ingredients

- Common ingredients used for the formulation of poultry feed

Feeding systems

- Adlibitum feeding
- Restricted feeding
- Mash feeding
- Pelleted feeding
- Phase feeding

Feed efficiency and feed additives

- Definitions
- Feed efficiency in layers and broilers
- Feed additives

Feeders and waterers

- Different types of feeders and waterers

Feed requirement for chicken

- Average requirement of total feed for chicks, growers, layers and broilers

Unit 4: Management of chicken

(70 periods)

Management of chicks

- Brooding – types of brooding, brooder set up
- Brooder management
- Debeaking, dubbing and sexing of chicks

Management of growers-

- Space requirement and general management

Management of layers

- Factors influencing egg production
- Culling of layer birds (differentiating good and poor layers), Standards of egg production, Managerial practices for producing good quality eggs

Management of breeders

- Mating methods, Artificial insemination in chicken
- Trap nesting

Management of broilers

- General guidelines for broiler management

Unit 5: Selection of eggs and Hatchery management ***(70 Periods)***

Structure of egg

- Yolk, Albumen, shell membranes, shell

Abnormal eggs

- Double yolked egg, an egg within an egg, pale egg, soft shelled egg, blood spot, meat spot

Candling and grading of eggs

- method of candling and Grade as per quality

Selection of hatching eggs-

- Size, shape, shell quality and internal quality

Incubation

- Natural incubation

- Artificial incubation

Management of incubator

- Types of incubator
- Parts of incubator
- Physical requisites for incubation

Hatchery operations

- Collection of eggs, selection, fumigation, candling, setting, transfer, taking out of hatch, identification, sexing, vaccination, dubbing, debeaking, packing and despatch of chicks

Unit 6: Diseases of poultry

(50 periods)

Bacterial diseases of chicken

- Pasteurellosis
- Pullorum disease

Viral diseases of chicken

- New castle disease (NCD)
- Fowl pox
- Marek's disease (MD)
- Infectious bursal disease (IBD)
- Avian influenza

Fungal diseases of chicken

- Aspergillosis

Protozoan diseases of chicken

- Coccidiosis

Parasitic diseases

- Endoparasites - Round worm infection (*Ascaridia galli*), Caecal worm infection
- Ectoparasites – Lice, mites and ticks infestation

Nutritional deficiency diseases

- Rickets
- Vitamin A deficiency
- Crazy Chick disease
- Curled toe paralysis

Prevention of diseases

- Treatment
- Vaccination
- Litter management
- Disinfection
- Deworming
- Fumigation
- Biosecurity measures
- Screening tests
- Hatchery management for disease prevention

Unit 7: Rearing of duck, turkey and quail

(30 periods)

Husbandry of ducks

- Advantages of duck rearing
- Housing, feeding and management of ducks
- Sex differentiation

Diseases of ducks and health care

- Pasteurellosis
- Duck plague
- Duck hepatitis
- Aflatoxicosis

Husbandry of Turkey

- Housing, feeding and management of Turkey
- Sex differentiation

Diseases of turkey and health care

- Pasteurellosis
- Black head disease

Husbandry of quail

- Advantages of quail rearing
- Housing , feeding and management of quail
- Sex differentiation

Diseases of quail and health care

- Quail enteritis

Unit 8: Husbandry of pet birds

(10 periods)

Common types of pet birds

- Parrots (African grey parrot, Macaws, Budgerigars, African love birds, Cockatoos, Cockatiels, conures), Doves and Pigeons, Finches
- Fancy chicken breeds - silkie, polish cap and frizzled

Housing, feeding and management of pet birds

- Cages, aviary
- Types of feed required for different pet birds

Diseases of pet birds

- sour crop, egg bound, psittacosis

Unit 9: Management of dogs and cats

(20 periods)

Management of dogs

- Important breeds of dogs - German Shepherd, Labrador, Doberman, Rottweiler, Japanese spitz, Pug
- Restraining of dogs
- Selection of pups
- Grooming
- Feeding of dogs
- Breeding of dogs
- Diseases of dogs - rabies, canine distemper, parvo viral enteritis
- Health care of dogs- vaccination and deworming

Management of cats

- Important breeds of cats – Persian, Burmese
- Restraining of cats
- Feeding of cats
- Diseases of cat - feline pan leukopenia

Unit 10: Rearing of rabbits and laboratory rodents (20 periods)

Introduction to mouse, rat and rabbit management

- Importance of rabbits and laboratory rodents
- Restraint and handling
- Different routes of inoculation of materials
- Precautions for blood collection

Husbandry of rabbits

- Breeds of rabbit-Angora, Soviet chinchilla, New Zealand white, Grey giant
- Housing, feeding and reproduction of rabbits
- Diseases of rabbits – Pasteurellosis, sore hock, mange

Husbandry of laboratory mouse

- Breeds/strains of lab mouse- Swiss albino, BALB/C
- Housing, feeding and reproduction of laboratory mouse

Husbandry laboratory rat

- Breeds/strains of lab rat – Wistar, Sprague Dawley.
- Housing, feeding and reproduction of laboratory rat

Module 4: Livestock Products Processing and Food Safety

Unit 1. Milk and milk products (80 periods)

Nutritive value of milk

- Water, fat, protein, lactose, ash

BIS standards of milk and milk products

- Cow milk, buffalo milk, goat milk, toned milk, double toned milk, ice cream, whole milk powder, table butter, ghee

Preservation of milk

- Pasteurization, sterilization, chilling

Types of milk commercially available

- Toned milk, double toned milk, Homogenized milk, Condensed milk

Preparation of various types of milk products

- Acid Coagulated products - Paneer,
- Concentrated products - Khoa, Gulab jamun
- Fermented products - Dahi, Cheese
- Fat rich products – Ghee, Cream
- Byproducts from milk - Butter milk, Whey, skim milk
- Frozen products – Ice cream

Unit 2. Wholesome milk production

(40 periods)

Measures for clean milk production

- Sources of contamination and hygienic measures

Adulterants of milk

- Starch, Cane sugar, Water – specific gravity

Unit 3. Processing of meat and Abattoir management (70 periods)

Terminologies of meat processing

- Abattoir, lairage, humane slaughter, carcass, meat, pork, chevon, mutton, veal, kara beef

Methods of stunning

- Physical, Mechanical, electrical and chemical stunning methods

Various steps in animal slaughter – (buffalo and cattle, pig, chicken)

- Flow chart and definitions – buffalo and cattle, pig, chicken

Ante mortem and post mortem examination

- Definition and purpose

Requirements for a slaughter house

- Space and light requirements of various rooms in an abattoir

Rendering of slaughter house waste

- Definition and importance of rendering

HACCP

- Definition and importance

Unit 4. Egg and meat products

(50 periods)

Nutritive value of egg and meat

- Water, protein, fat, carbohydrate, ash, vitamins

Preservation of egg

- Chilling, freezing, pickling, house hold methods (water glass method, lime sealing)

Preservation of meat

- Chilling, freezing, thermal processing, canning, curing, smoking, irradiation

Egg products

- commercial egg products like Egg powder and egg pickle

Meat products

- Sausage, meat cutlet

Unit 5. Zoonotic diseases

(70 periods)

Definition of zoonosis and classification

- Anthroozoonosis, zooanthroponosis, amphixenosis

Common zoonotic diseases –

- Tuberculosis, Anthrax, rabies, brucellosis, leptospirosis, bird flu

Important Food borne diseases originating from livestock products-

Colibacillosis, botulism, cholera, taeniasis

Unit 6. Animal welfare and food safety guidelines (30 periods)

Prevention of cruelty to animals (PCA) act

- Purpose, general cruelties to animals

Guidelines related to transportation of animals

- By foot, by road and by rail - cattle and chicken

Food safety and standards act (FSS act)

- Purpose, general provisions as to articles of food

LIST OF PRACTICALS

Module 3: Poultry, Pet and Lab Animal Management

1. Body parts of adult chicken
2. Identification of digestive system of chicken
3. Poultry feed ingredients
4. Setting up a brooder using locally available materials
5. Poultry house equipment
6. Candling of eggs
7. Immunization of poultry against prevalent diseases
8. Sex differentiation in duck, quail and turkey
9. Identification of different types of pet birds
10. Categorize the given photographs of pet birds into different categories
11. Breeds of dogs and cats
12. Handling and restraint of laboratory animals

Module 4: Livestock Products Processing and Food Safety

1. Preparation of traditional milk products
2. Determination Of Specific Gravity Of Milk By Lactometer
3. Detection Of Adulteration Of Milk
4. Layout of the slaughter house
5. Preparation of egg and meat products
6. Prevalence of zoonotic diseases in the locality
7. BIS standards of common livestock products

LEARNING OUTCOMES OF THE UNITS

After the end of third and fourth modules, the learners will be able to,

MODULE 3: POULTRY, PET AND LAB ANIMAL MANAGEMENT

Unit 1: Introduction to Poultry Husbandry

- 3.1.1. Differentiate and select different types of poultry
- 3.1.2. List out the scientific names of poultry
- 3.1.3. Analyse the present situation of poultry industry and apply in field conditions

Unit 2: Anatomy and physiology of poultry

- 3.2.1. Illustrate and identify the structure of digestive and reproductive system of chicken
- 3.2.2. Explain the function of digestive, reproductive, respiratory systems and skin and feathers of chicken
- 3.2.3. Describe different stages of egg formation
- 3.2.4. Practice proper light management in layers
- 3.2.5. Assess the production capacity of layers

Unit 3: Feeds and feeding of poultry

- 3.3.1. Apply the feed standards for preparation of poultry feeds
- 3.3.2. Identify the locally available poultry feed ingredients
- 3.3.3. Select and practice suitable feeding system for poultry
- 3.3.4. Assess the feed efficiency and add appropriate feed supplements and additives
- 3.3.5. Select suitable feeders and waterers for different age groups of poultry
- 3.3.6. Calculate the total feed requirement for different types of chicken

Unit 4: Management of chicken

- 3.4.1. Design and construct a standard brooder for chicks
- 3.4.2. Practice debeaking in chicks
- 3.4.3. Differentiate male and female chick
- 3.4.4. Explain management of grower chicken
- 3.4.5. Identify good and poor layers for selection and culling
- 3.4.6. Explain practices for producing good quality eggs
- 3.4.7. Select suitable mating system for chicken
- 3.4.8. Describe the importance of artificial insemination in chicken
- 3.4.9. Practice rearing of broiler chicken

Unit 5: Selection of eggs and Hatchery management

- 3.5.1. Illustrate and identify the parts of egg
- 3.5.2. Identify abnormal chicken eggs
- 3.5.3. Assess the quality of chicken egg and grade as per quality
- 3.5.4. Select good quality eggs for hatching
- 3.5.5. Select the required incubation method
- 3.5.6. Setting the incubator for proper incubation
- 3.5.7. Practice routine hatchery activities

Unit 6: Diseases of poultry

- 3.6.1. Identify major bacterial diseases from symptoms for proper health care

- 3.6.2. Identify of major viral diseases from symptoms for proper health care
- 3.6.3. Identify major fungal diseases from symptoms for proper health care
- 3.6.4. Identify major protozoan disease from symptoms for proper health care
- 3.6.5. Identify major parasitic diseases from symptoms for proper health care
- 3.6.6. Identify major deficiency diseases from symptoms for proper health care
- 3.6.7. Describe the control and preventive measures of diseases under field conditions
- 3.6.8. Perform vaccination of poultry
- 3.6.9. Disinfect the poultry shed, hatchery and equipments

Unit 7: Rearing of duck, turkey and quail

- 3.7.1. Explain the rearing of ducks
- 3.7.2. Identify major duck diseases from symptoms
- 3.7.3. Explain the rearing of turkey
- 3.7.4. Identify major turkey diseases from symptoms
- 3.7.5. Explain the rearing of quail
- 3.7.6. Identify quail disease from symptoms

Unit 8: Husbandry of pet birds

- 3.8.1. Identify and differentiate common pet birds for suitable purposes
- 3.8.2. Describe the management practices used for pet birds
- 3.8.3. Identify major diseases of pet birds from symptoms

Unit 9: Management of dogs and cats

- 3.9.1. Identify and select suitable dog breeds according to purpose
- 3.9.2. Control different types of dogs according to purpose
- 3.9.3. Explain the different managerial practices of dog rearing
- 3.9.4. Identify major diseases of pet dogs from symptoms
- 3.9.5. Assist vaccination in dogs
- 3.9.6. Identify important cat breeds
- 3.9.7. Control different types of cats according to purpose
- 3.9.8. Explain the different managerial practices of cat rearing

Unit 10: Rearing of rabbits and laboratory rodents

- 3.10.1. Control and handle lab animals for different purposes
- 3.10.2. Identify and select suitable rabbit breeds according to purpose
- 3.10.3. Explain the different managerial practices of rabbit rearing
- 3.10.4. Identify major diseases of rabbit from symptoms
- 3.10.5. Identify important breeds of mouse
- 3.10.6. Explain the different managerial practices of mouse rearing
- 3.10.7. Identify important breeds of rat
- 3.10.8. Explain the different managerial practices of rat rearing

MODULE 4: LIVESTOCK PRODUCTS PROCESSING AND FOOD SAFETY

After the end of fourth module, the learner will be able to,

Unit 1. Milk and milk products

- 4.1.1. Describe the chemical composition and nutritional value of milk
- 4.1.2. Assess and differentiate the standards of various milk products in the market
- 4.1.3. Choose the suitable preservation method of milk according to purpose
- 4.1.4. Identify and select appropriate type of milk as per need
- 4.1.5. Prepare common milk products for commercial and household purposes

Unit 2. Wholesome milk production

- 4.2.1. Practice hygienic methods for clean milk production in cattle
- 4.2.2. Identify common adulterants present in milk

Unit 3. Processing of meat and Abattoir management

- 4.3.1. Describe the terms associated with meat technology
- 4.3.2. Select the suitable stunning method for different species
- 4.3.3. Prepare the flow chart of slaughter operations of cattle, pig and chicken
- 4.3.4. Explain the importance of ante and post mortem examinations in animals
- 4.3.5. Prepare the layout of an abattoir
- 4.3.6. Describe the importance of rendering of slaughter house waste
- 4.3.7. Define the importance of HACCP

Unit 4. Egg and meat products

- 4.4.1. Describe the chemical composition and nutritional values of egg and meat
- 4.4.2. Choose the suitable preservation method of egg according to purpose
- 4.4.3. Choose the suitable preservation method of meat according to purpose
- 4.4.4. List out various commercial egg products
- 4.4.5. Prepare different egg products
- 4.4.6. Prepare different meat products

Unit 5. Zoonotic diseases

- 4.5.1. Describe and differentiate various zoonotic diseases
- 4.5.2. Identify different zoonotic diseases in animals
- 4.5.3. Identify different food borne diseases originating from livestock products

Unit 6. Animal welfare and food safety guidelines

- 4.6.1. Identify various cruelties to animals
- 4.6.2. Describe specifications for transportation of animals
- 4.6.3. Describe important food standard and safety practices

SCHEME OF WORK (MODULE 3 AND 4)

Month	Module	Unit	Period
June	3	Introduction to Poultry Husbandry Anatomy and physiology of poultry Feeds and feeding of poultry Management of chicken	80
July	3	Management of chicken Selection of eggs and Hatchery management	80
August	3	Selection of eggs and Hatchery management Diseases of poultry	80
September	3	Diseases of poultry Rearing of duck, turkey and quail Husbandry of pet birds Management of dogs and cats	80
October	3	Rearing of Rabbits and laboratory rodents	20
	4	Milk and milk products	60
November	4	Milk and milk products Wholesome milk production Processing of meat and Abattoir management	80
December	4	Processing of meat and Abattoir management Egg and meat products	80
January	4	Egg and meat products Zoonotic diseases	80
February	4	Zoonotic diseases Animal welfare and Food Safety guidelines	40

STRUCTURE OF MODULE 3 AND MODULE 4

The second year VHSE course is divided into two modules. Each module of six month duration

Module 3 Poultry, Pet and Lab Animal Management

340 periods

Unit No.	Name of unit	Period
3.1	Introduction to Poultry Husbandry	10
3.2	Anatomy and physiology of poultry	40
3.3	Feeds and feeding of poultry	20
3.4	Management of chicken	70
3.5	Selection of eggs and Hatchery management	70
3.6	Diseases of poultry	50
3.7	Rearing of duck, turkey and quail	30
3.8	Husbandry of pet birds	10
3.9	Management of dogs and cats	20
3.10	Rearing of Rabbits and laboratory rodents	20

30 % Theory 70 % Practical

Unit No.	Name of unit	Period
4.1	Milk and milk products	80
4.2	Wholesome milk production	40
4.3	Processing of meat and Abattoir management	70
4.4	Egg and meat products	50
4.5	Zoonotic diseases	70
4.6	Animal welfare and Food safety guidelines	30

30 Theory 70 % Practical

CLASS ROOM ACTIVITIES (GENERAL)

General discussion, debate, brainstorming, chart preparation, model preparation, demonstration, spotting, power point presentation, video analysis, live animal demonstration, seminars, album preparation, quiz, role play etc.

PRACTICAL ACTIVITIES (GENERAL)

Field/farm /hatchery visit, surveys, farm layout preparation, hands-on training in animal farms, field data collection, interview with farmers, specimen/sample collection, simulated experiments, processing of livestock products, microscopic examinations

MODULE 3: POULTRY, PET AND LAB ANIMAL MANAGEMENT

Overview: This module provides the fundamental concepts of poultry husbandry and a general awareness on pet and laboratory animal management. This module is very relevant at this time for our state and country. Poultry industry in Kerala is not developed in par with other southern states and a huge amount of income and job opportunities are draining to other states. Also in Kerala due to urbanization, shortage of land, change in social situations etc, people are shifting to rearing of pet animals and birds from conventional styles. In all firms/institutions where animals are used for study or experimental purposes compulsorily need the service of laboratory animal management expert or assistant for animal welfare purpose. So a lot of job opportunities and income sources are arising in these sectors day by day in India and abroad. This module can equip the students to grab these opportunities. This module also favors the students for vertical mobility.

This module is comprised of topics which introduce the students to basic aspects of poultry husbandry, knowledge of poultry anatomy/physiology, management of different categories of poultry, hatchery management, common diseases and their control, management of pet birds, dog and cats, rearing of laboratory animals like rabbit, mice and rat etc.

UNIT 1. INTRODUCTION TO POULTRY HUSBANDRY

Overview of the unit-This unit provides fundamental concepts to students about poultry husbandry including common terms, scientific names and current trends in poultry industry. It also deals with the major constraints faced by the poultry industry.

Ideas/Concepts/Skills	Learning Outcome (LO)	Suggested activities	Assessment
Poultry related terms- Poultry, broiler, chick, grower, layer, external morphology of chicken. <u>Skills</u> Communication skill Drawing skill Observation skill Analytical skill	Differentiate and select different types of poultry	General discussion Video presentation Field visit Chart preparation	Participation in discussion Field visit report Chart Notes
Scientific names of different species of poultry Chicken, duck, turkey, quail <u>Skills</u> Communication skill Observation skill Analytical skill	List out the scientific names of poultry	General discussion Reference Quiz Chart preparation	Participation in discussion Performance during Quiz Chart
Trends in poultry Industry- Current scenario of poultry industry in Kerala and India -Merits and demerits of poultry rearing <u>Skills</u> Observation skill Comparison skill Skill of charting	Analyse the present situation of poultry industry and apply in field conditions	General discussion Field visit Reference Debate Chart preparation Unit test	Field visit report Participation in discussion and debate Chart

ADDITIONAL INFORMATION

- Current scenario in poultry husbandry sector can be obtained from the websites of Kerala and national Animal Husbandry Departments.
- Study of other species of birds that are not included in poultry is called ornithology

ASSESSMENT ACTIVITIES

1. Prepare a chart as assignment showing the pictures and scientific names of chicken, duck, turkey and quail.

LIST OF PORTFOLIO EXPECTED IN THE UNIT

- Field visit report - visit nearby poultry farms and veterinary hospitals. Collect data and prepare a report regarding the common terms, production standards etc
- Notes/report - obtained after group discussion, presentation, reference and debate.
- Chart - including pictures and scientific names of poultry
- Unit test paper

UNIT 2: ANATOMY AND PHYSIOLOGY OF POULTRY

Overview of the unit- This unit deals with detailed anatomy of digestive, reproductive and respiratory systems of poultry. Learners will understand the basic concepts of feather types and bones of chicken. The basic physiology of egg formation, molting and bleaching are also dealt with.

Ideas/Concepts/Skills	Learning Outcome (LO)	Suggested activities	Assessment
<p>Major organ systems of chicken Digestive system- mouth, oesophagus, stomach, liver and pancreas, small intestine, caeca, cloaca Reproductive system- Male and female Respiratory system- syrinx, airsacs Skin and feathers- types of feathers <u>Skills</u> Communication skill Understanding skill Skill for application Skill of identification Skill of preservation Charting and collecting skill</p>	<p>-Illustrate and identify the structure of digestive and reproductive system of chicken</p> <p>-Explain the function of digestive, reproductive, respiratory, systems and skin and feathers of chicken</p>	<p>General discussion Charts/Assignment Pictures Power point presentation Brainstorming Preparing organ models Slaughter house specimens Referring standard textbooks</p>	<p>Participation in discussion Preparation of chart/assignment Participation in brain storming Perfection of prepared charts and models Based on collected specimens and its preservation</p>
<p>Egg formation Physiology of egg formation Effect of light on egg formation</p>	<p>-Describe different stages of egg formation</p> <p>-Practice proper</p>	<p>General discussion Chart preparation Picture collection Power point presentation</p>	<p>Participation in discussion Preparation of chart Content of pictures Report of presentation</p>

<u>Skills</u> Communication skill Collection skill Skill for choosing Charting skill	light management in layers		
Moulting and bleaching Definition Relation with egg production <u>Skills</u> Communication skill Identification skill Skill for choosing Charting skill	Assess the production capacity of layers	General discussion Picture/ Power point presentation Seminar	Participation in discussion Seminar report pictures and presentation report

ADDITIONAL INFORMATION

Pneumatic bones -are special type of bones seen in birds which are hollow and communicating with the respiratory system.

Internal layers - Sometimes Infundibulum fails to receive the yolk and then yolk falls into the abdominal cavity and get absorbed. As ovulation occurred, the hormonal play has started and thus the bird shows the signs of laying but never lay eggs as no ovum in the oviduct. Commonly shown by young hens in their first laying season.

Peck order- When chicken are housed in groups/flocks, they develop a definite hierarchical order for all activities like feeding and breeding. Some birds will be dominant and others submissive. Such as order is called peck order.

ASSESSMENT ACTIVITIES

1. Collect the specimens of digestive and reproductive system of chicken from nearby slaughter house and label the parts.

LIST OF PORTFOLIO EXPECTED IN THE UNIT

- Collected specimen - specimens of digestive and reproductive systems of chicken
- Model - digestive and reproductive systems of chicken in thermocol or plaster of Paris
- Chart – charts showing digestive and reproductive systems of chicken
- Consolidated report/notes - obtained after group discussion, presentation, reference and debate
- Unit test paper

UNIT 3: FEEDS AND FEEDING OF POULTRY

Overview of the unit- knowledge about BIS standards of poultry feed is necessary for formulating feeds for different categories of chicken. This unit fulfills this concept. It also comprises the topics of feeding systems, feed requirements and equipments.

Ideas/Concepts/Skills	Learning Outcome (LO)	Suggested activities	Assessment
<p>BIS standards for poultry feeds BIS standards of crude protein and metabolisable energy for broiler and layer chicken feeds <u>Skills</u> Communication skill Observation skill Skill for demonstration Performance skill</p>	<p>Apply the feed standards for preparation of poultry feeds</p>	<p>Tables Chart preparation power point presentation field visit quiz</p>	<p>Prepared tables and chart Field visit report Performance in quiz</p>
<p>Poultry feed ingredients Common ingredients used for formulation of poultry feed. <u>Skills</u> Communication skill Observation skill Collection skill Skill for charting</p>	<p>Identify the locally available poultry feed ingredients</p>	<p>Table and chart preparation Collection of feed ingredients Field visit</p>	<p>Tables Chart Feed ingredients Field visit report</p>
<p>Feeding systems Adlibitum feeding Restricted feeding Mash feeding Pelleted feeding Phase feeding <u>Skills</u> Communication skill Observation skill Skill for charting Performance skill</p>	<p>Select and practice suitable feeding system for poultry</p>	<p>Field visit Chart preparation Referring books Video presentation</p>	<p>Field visit report Chart Notes</p>
<p>Feed efficiency and feed additives Definitions Feed efficiency in layers and broilers Feed additives</p>	<p>Assess the feed efficiency and add appropriate feed supplements and additives</p>	<p>General discussion Chart preparation Demonstration of materials Field visit</p>	<p>Participation in discussion Chart Field visit report</p>

<u>Skills</u> Communication skill Observation skill Skill for charting Performance skill			
Feeders and waterers Different types of feeders and waterers <u>Skills</u> Communication skill Observation skill Performance skill	Select suitable feeders and waterers for different age groups of poultry	Picture and video presentation Field visit Demonstration of equipments and models	Notes Reports Participation in demonstration
Feed requirement for chicken Average requirement of total feed for chicks, growers, layers and broilers	Calculate the total feed requirement for different types of chicken	Table and chart preparation Field visit Calculation of feed required	Table Chart Report Result of calculation

ADDITIONAL INFORMATION

Non-nutritive feed additives

1. Prebiotics - Prebiotics help to prevent disease producing bacteria. Eg: Mannan oligosaccharides (MOS).
2. Probiotics - Probiotics are live microbial cultures used as growth promoting agents. Eg: *Lactobacilli*.
3. Acidifiers and pH optimizers - Acidifiers and pH optimizers are effective against disease causing microbes in gut. Eg: acetic acid, propionic acid, citric acid etc.
4. Antioxidants - Antioxidant helps in preserving the nutritive value and freshness of diet by preventing oxidative rancidity. It also protects natural pigments. Eg: Butylated Hydroxyl Anisole (BHA), Ethoxyquin etc.
5. Feed enzymes - Feed enzymes improve feed digestibility and nutrient availability.
6. Toxin binders - Toxin binders are adsorbent materials beneficial in minimizing the toxic effect of feed toxins. Eg: activated charcoal, hydrated sodium calcium alumino-silicate (HSCAS), bentonites etc.
7. Herbal products - Many products like growth stimulators, liver tonics, anti-stress factors, coccidiostats and immune-modulators are prepared from herbal plants. These natural products are safe and eco-friendly.
8. Anticoccidials - Ionophores and chemical compounds are regularly used in the feed to prevent coccidiosis. Commonly used ionophores are salinomycin, lasalocid, monensin etc and chemical compounds such as diclazuril, amprolium etc.
9. Emulsifiers – They help in efficient utilization of fat. Eg: phospholipids.
10. Flavours - They increase palatability and feed intake. There is need for flavoring agents when highly unpalatable medicants are mixed in the feed or when less palatable feedstuffs are incorporated in the ration etc.

11. Carotenoid - Carotenoids have growth promoting and immune stimulating effect. Carotenoids are also used in colouring of yolk in egg and pigmentation of meat. There are both synthetic and natural colouring agents.

ASSESSMENT ACTIVITY

1. Collect locally available ingredients used for the preparation of poultry feeds in individual transparent plastic covers or bottles and label it

LIST OF PORTFOLIO EXPECTED IN THE UNIT

- Collected specimen - locally available feed ingredients in plastic covers or bottles
- Table- showing the BIS standards for various poultry feeds
- Field visit report - visit nearby poultry farms and feed mills and prepare a report regarding feed ingredients, additives, feeding systems, equipment etc.
- Consolidated report/notes - obtained after group discussion, presentation, reference and debate
- Unit test paper

UNIT 4: MANAGEMENT OF CHICKEN

Overview of the unit- This unit provides all the fundamental concepts of general management of different age groups of chicken viz, chicks, growers, layers, breeders and broilers.

Ideas/Concepts/Skills	Learning Outcome (LO)	Suggested activities	Assessment
Management of chicks Brooding – types of brooding, brooder set up Brooder management Debeaking, dubbing and sexing of chicks <u>Skills</u> Communication skill Understanding skill Performing skill Skill of presentation	-Design and construct a standard brooder for chicks -Practice debeaking in chicks -Differentiate male and female chick	General discussion Power point presentation. Field visit Demonstration Video presentation	Participation in discussion Field visit report Participation and performance in demonstration and presentation
Management of growers- Space requirement and general management <u>Skills</u> Observation skill Communication skill Performing skill	- Explain management of grower chicken	General discussion Reference books Field visit	Participation in discussion Field visit report

<p>Management of layers Factors influencing egg production Culling of layer birds (differentiating good and poor layers), Standards of egg production, Managerial practices for producing good quality eggs <u>Skills</u> Communication skill Understanding skill Performing skill Skill of presentation</p>	<p>-Identify good and poor layers for selection and culling - Explain practices for producing good quality eggs</p>	<p>General discussion Power point presentation. Field visit Demonstration Video presentation</p>	<p>Participation in discussion Field visit report Participation and performance in demonstration and presentation</p>
<p>Management of breeders Mating systems, Artificial insemination in chicken Trap nesting <u>Skills</u> Communication skill Understanding skill Performing skill Skill of presentation</p>	<p>-Select suitable mating system for chicken -Describe the importance of artificial insemination in chicken</p>	<p>General discussion Power point presentation. Field visit Video presentation</p>	<p>Participation in discussion Field visit report performance in presentation</p>
<p>Management of broilers – General guidelines for broiler management <u>Skills</u> Communication skill Understanding skill Performing skill Skill of presentation</p>	<p>Practice rearing of broiler chicken</p>	<p>Power point presentation. Field visit Video presentation</p>	<p>Field visit report performance in presentation</p>

ADDITIONAL INFORMATION

Culling on the basis of pigmentation: Yellow pigmentation of the skin, especially in yellow skinned breeds like White Leghorn and RIR, is because of a carotenoid pigment known as xanthophylls in rations containing yellow maize. Yellow pigmentation of the skin surface especially vent, eye rings, ear lobes, beak, shank etc of a hen gives an indication about its laying capacity. Birds in lay lose their pigments and the exposed parts present a bleached appearance. The order of losing pigment is vent, inner edges of eyelids, ear lobes, beak, and finally, the shank. When a bird stops laying, the yellow pigment reappears in the same order that it disappeared, twice as fast. The approximate period that a bird has been in production can be judged from the disappearance of yellow pigment from different parts of the body in the following order: vent: 1-2 weeks; eye rings and ear-lobes: 2-4 weeks; beak: 6-8 weeks; and shanks: 12-20 weeks.

Egg: Feed price ratio (EFPR): It is used to find out the ratio between the receipts from egg and expenditure on feed.

$$\text{EFPR} = \frac{\text{Total value of egg produced}}{\text{Total value of feed consumed}}$$

An EFPR ratio of 1.4 and above is desirable.

ASSESSMENT ACTIVITY

1. Set up a brooder for 250 chicks with locally available materials
2. Illustrate the distribution of chicks under the hover in high, low and optimum temperatures inside the brooder.

LIST OF PORTFOLIO EXPECTED IN THE UNIT

- Chart - showing the characters of good and poor layers
- Field visit report - visit nearby poultry farms and prepare a report on rearing of chicks, grower, layer and broiler birds
- Consolidated report/notes - obtained after group discussion, presentation, reference and debate
- Unit test paper

UNIT 5: SELECTION OF EGGS AND HATCHERY MANAGEMENT

Overview of the unit- This unit deals with topics like structure of egg, egg quality, candling and selection of eggs. It also provides basic information about incubation of eggs and hatchery management.

Ideas/Concepts/Skills	Learning Outcome (LO)	Suggested activities	Assessment
Structure of egg Yolk, Albumen, shell membranes, shell <u>Skills</u> Skill of drawing Presentation skill Skill of charting	Illustrate and identify the parts of egg	General discussion Chart preparation Pictures/power point presentation demonstration	Participation in discussion Chart Performance in presentation and demonstration
Abnormal eggs Double yolked egg, an egg within an egg, pale egg, soft	Identify abnormal chicken eggs	General discussion Chart preparation Reference books	Participation in discussion Chart

shelled egg, blood spot, meat spot, <u>Skills</u> Observation skill Demonstrating skill Skill of charting Skill of presentation		Picture/video presentation quiz	Notes Performance in quiz and presentation
Candling and grading of eggs -Method of candling and Grade as per quality <u>Skills</u> Drawing skill Skill of collection Skill of preservation Skill of identification	Assess the quality of chicken egg and grade as per quality	General discussion Demonstration Power point/video presentation Chart/table preparation	Participation in discussion Participation in demonstration and discussion Chart/table
Selection of hatching eggs- Size, shape, shell quality and internal quality <u>Skills</u> Understanding skill Skill of charting Skill of presentation Skill for demonstration	Select good quality eggs for hatching	General discussion Chart s Reference books Hatchery visit Video/picture presentation demonstration	Participation in discussion Perfection of prepared chart Participation and performance in demonstration
Incubation Natural incubation Artificial incubation <u>Skills</u> Understanding skill Skill of communication	Select the required incubation method	General discussion Reference books Hatchery visit	Participation in discussion Note Report
Management of incubator Types of incubator Parts of incubator Physical requisites for incubation <u>Skills</u> Understanding skill Skill for model preparation Skill of charting Skill of selection	Prepare the incubator for proper incubation	General discussion Chart preparation Model preparation Picture/video presentation Hatchery visit	Participation in discussion Model Perfection of prepared chart Hatchery visit report
Hatchery operations Collection of eggs, selection, fumigation, candling, setting, transfer, taking out of hatch, identification, sexing,	Practice routine hatchery activities	Hatchery visit Demonstration Chart preparation Video /power point presentation	Report Chart Performance in demonstration and presentation

vaccination, dubbing, debeaking, packing and despatch of chicks <u>Skills</u> Understanding skill Skill of charting Skill of presentation Skill for demonstration			
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ADDITIONAL INFORMATION

Grading Based on egg weight

Sl. No.	Size/Weight	Weight per egg (g)	Weight per dozen (g)
1	Extra large	60 and above	715 and above
2	Large	53 to 59	631 to 714
3	Medium	45 to 52	535 to 630
4	Small	38 to 44	456-534

Incubation period

Pigeon	- 17-18 days
Ostrich	- 42 days
Emu	- 49-52 days
Goose	- 28 days

Incubation problems and remedies:

Troubles	Probable causes	Suggested remedies
1. Eggs candling clear, without embryonic development	a) Males sterile or of poor fertility	Proper breeding, nutrition and flock management
	b) Too many or too few males	Use male-female ratio of 1:10-15 for light breeds and 1: 8-10 for heavy breeds for breeding.
	c) Males too old	Do not use old males.

2. Eggs upon candling showing blood rings or very small embryos	a) Eggs held at high temperature before incubation	Store eggs at 10-12°C
	b) Improper incubation temperature	Operate incubator at proper temperature
	c) Improper nutrition of the flock.	Feed balanced breeder ration.
3. Many dead germs	a) Incubator temperature too high or too low	Operate incubator at proper temperature.
	b) Lack of ventilation	Provide proper ventilation to the room and to the incubator.
	c) Improper turning of eggs	Turn eggs at regular interval (6-8 times a day).
4. Chicks fully formed but dead without pipping.	a) Low average humidity in the incubator. b) Improper humidity at transfer time in the Hatcher.	Maintain optimum humidity in the incubator.
5. Eggs piped but chicks dead in shell	a) Low humidity	Maintain proper humidity
	b) Inadequate ventilation	Provide adequate Ventilation
	c) High temperature for a short period	
	d) Low average temperature	Check working of thermostat Maintain proper temperature.
6. Sticky chicks, chicks smeared with egg contents	a) Low average temperature b) High humidity	Maintain proper temperature and humidity.
7. Shell sticking to chicks.	a) Eggs dried down too much	Maintain proper ventilation and humidity during incubation.
	b) Low humidity at hatching time	Maintain proper humidity at hatching time.

8. Delayed hatch	a) Average temperature too low	Maintain proper temperature.
	b) Eggs held too long Before incubation.	Do not hold eggs for more than 7 days.
9. Weak chicks	Over heating of the incubator unit	Temperature regulating gear should be efficient
10. Hatching too soon	Incubator temperature too high	Maintain proper temperature.

ASSESSMENT ACTIVITIES

1. Select the good quality eggs for incubation from the given lot by candling method. (Assess the shell, air cell, albumen and yolk quality)

LIST OF PORTFOLIO EXPECTED IN THE UNIT

- Collected specimen- abnormal eggs can be collected from markets or houses
- Chart- showing the structure and parts of eggs
- Hatchery visit report- visit nearby poultry hatchery and prepare a report on management of hatchery
- Consolidated report/notes - obtained after group discussion, presentation, reference and debate
- Unit test paper

UNIT 6: DISEASES OF POULTRY

Overview of the unit- This unit provides basic awareness about bacterial, viral, fungal, protozoan, parasitic and nutritional deficiency diseases of chicken. It also deals with basic concepts of health care management.

Ideas/Concepts/Skills	Learning Outcome (LO)	Suggested activities	Assessment
Bacterial diseases of chicken Pasteurellosis Pullorum disease <u>Skills</u> Understanding skill Observation skill Analytical skill Skill for diagnosis	Identify major bacterial diseases from symptoms for proper health care	General discussion Farm visit Videos/power point presentation Chart preparation	Participation in discussion Performance during farm visit and presentation Farm visit report Quality of the prepared chart
Viral diseases of chicken New castle disease (NCD) Fowl pox Marek's disease (MD)	Identify major viral diseases from symptoms for proper health care	General discussion Farm visit Videos/power	Participation in discussion Performance during farm visit and

<p>Infectious bursal disease (IBD) Avian influenza</p> <p><u>Skills</u> Understanding skill Observation skill Analytical skill Skill for diagnosis</p>		<p>point presentation Chart preparation</p>	<p>presentation Farm visit report Quality of the prepared chart</p>
<p>Fungal diseases of chicken Aspergillosis,</p> <p><u>Skills</u> Understanding skill Observation skill Analytical skill Skill for diagnosis</p>	<p>Identify major fungal diseases from symptoms for proper health care</p>	<p>General discussion Farm visit Videos/power point presentation Chart preparation</p>	<p>Participation in discussion Performance during farm visit and presentation Farm visit report Quality of the prepared chart</p>
<p>Protozoan diseases of chicken Coccidiosis</p> <p><u>Skills</u> Understanding skill Observation skill Analytical skill Skill for diagnosis</p>	<p>Identify major protozoan disease from symptoms for proper health care</p>	<p>General discussion Farm visit Videos/power point presentation Chart preparation</p>	<p>Participation in discussion Performance during farm visit and presentation Farm visit report Quality of the prepared chart</p>
<p>Parasitic diseases Endoparasites - Round worm infection (<i>A. galli</i>), Caecal worm infection Ectoparasites – Lice, mite and tick infestation</p> <p><u>Skills</u> Understanding skill Observation skill Analytical skill Skill for diagnosis</p>	<p>-Identify major parasitic diseases from symptoms for proper health care</p>	<p>General discussion Farm visit Videos/power point presentation Chart preparation</p>	<p>Participation in discussion Performance during farm visit and presentation Farm visit report Quality of the prepared chart</p>
<p>Nutritional deficiency diseases Rickets Vitamin A deficiency Crazy Chick disease Curled toe paralysis</p> <p><u>Skills</u> Understanding skill Observation skill Analytical skill Skill for diagnosis</p>	<p>-Identify major deficiency diseases from symptoms for proper health care</p>	<p>General discussion Farm visit Videos/power point presentation Chart preparation</p>	<p>Participation in discussion Performance during farm visit and presentation Farm visit report Quality of the prepared chart</p>
<p>Prevention of diseases Treatment</p>	<p>- Describe the control and</p>	<p>General discussion</p>	<p>Participation in discussion and</p>

Vaccination Litter management Disinfection Deworming Fumigation Biosecurity measures Screening tests Hatchery management for disease prevention <u>Skills</u> Understanding skill Observation skill Analytical skill Skill for diagnosis	preventive measures for diseases under field conditions - Perform vaccination of poultry - Disinfect the poultry shed, hatchery and equipment	Farm visit Videos/power point presentation Chart preparation demonstration	demonstration Performance during farm visit and presentation Farm visit report Quality of the prepared chart
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ASSESSMENT ACTIVITIES

1. Prepare a chart showing the vaccination schedule of chicken from 0-8 weeks of age

List of items in portfolio

- Chart- showing vaccination schedule and classification of different poultry diseases
- Field visit report – visit nearby poultry farms and veterinary hospitals. Prepare a report of various poultry diseases.
- Consolidated report/notes- obtained after group discussion ,presentation, reference and debate
- Unit test paper

UNIT 7: REARING OF DUCK, TURKEY AND QUAIL

Overview of the unit – This unit includes fundamental concepts of husbandry, diseases and health care of duck, turkey and quail.

Ideas/Concepts/Skills	Learning Outcome (LO)	Suggested activities	Assessment
Husbandry of ducks Advantages of duck rearing Housing ,feeding and management of ducks Sex differentiation <u>Skills</u> Understanding skill Observation skill Presentation skill	Explain the rearing of ducks	General discussion Farm visit Videos/power point presentation Chart preparation	Participation in discussion Performance during farm visit and presentation Farm visit report Quality of the prepared chart

<p>Diseases of ducks and health care Pasteurellosis Duck plague Duck hepatitis Aflatoxicosis <u>Skills</u> Understanding skill Observation skill Analytical skill Skill for diagnosis</p>	<p>Identify major duck diseases from symptoms</p>	<p>General discussion Farm visit Videos/power point presentation Chart preparation</p>	<p>Participation in discussion Performance during farm visit and presentation Farm visit report Quality of the prepared chart</p>
<p>Husbandry of Turkey Housing , feeding and management of Turkey Sex differentiation <u>Skills</u> Understanding skill Observation skill Presentation skill</p>	<p>Explain the rearing of turkey</p>	<p>General discussion Farm visit Videos/power point presentation Chart preparation</p>	<p>Participation in discussion Performance during farm visit and presentation Farm visit report Quality of the prepared chart</p>
<p>Diseases of turkey and health care Pasteurellosis Black head disease <u>Skills</u> Understanding skill Observation skill Analytical skill Skill for diagnosis</p>	<p>Identify major turkey diseases from symptoms</p>	<p>General discussion Farm visit Videos/power point presentation Chart preparation</p>	<p>Participation in discussion Performance during farm visit and presentation Farm visit report Quality of the prepared chart</p>
<p>Husbandry of quail Advantages of quail rearing Housing , feeding and management of quail Sex differentiation <u>Skills</u> Understanding skill Observation skill presentation skill</p>	<p>Explain the rearing of quail</p>	<p>General discussion Farm visit Videos/power point presentation Chart preparation</p>	<p>Participation in discussion Performance during farm visit and presentation Farm visit report Quality of the prepared chart</p>
<p>Diseases of quail and health care Quail enteritis <u>Skills</u> Understanding skill Observation skill Analytical skill Skill for diagnosis</p>	<p>Identify quail disease from symptoms</p>	<p>General discussion Farm visit Videos/power point presentation Chart preparation</p>	<p>Participation in discussion Performance during farm visit and presentation Farm visit report Quality of the prepared chart</p>

ADDITIONAL INFORMATION

Black head disease

Causative organism – The protozoa *Histomonas meleagridis*

The disease generally affects young growing turkeys. It primarily affects the liver and caecum. *Histomonas meleagridis* is in turn transmitted by the caecal worm *Heterakis gallinarum*. A characteristic symptom of the infection is the development of cyanotic (bluish) discolouration on the head, giving rise to the common name of the disease, "blackhead". The most common symptom of blackhead disease is yellow, watery droppings.

ASSESSMENT ACTIVITIES

1. Collect the pictures of male and female poultry (duck, quail, turkey) and prepare a chart

LIST OF PORTFOLIO EXPECTED IN THE UNIT

- Chart - showing the pictures of duck, turkey and quail
- Field visit report- visit nearby poultry farms and veterinary hospitals .Prepare a report on Management and diseases of duck, turkey and quail
- Consolidated report/notes- obtained after group discussion, presentation, reference and debate
- Unit test paper

UNIT 8: HUSBANDRY OF PET BIRDS

Overview of the unit- This unit gives preliminary knowledge about the types of pet birds, their housing, feeding and common diseases.

Ideas/Concepts/Skills	Learning Outcome (LO)	Suggested activities	Assessment
Common types of pet birds Parrots (African grey parrots, macaws, budgerigars, African love birds, cockatoos, cockatiels, conures), dove and pigeons, finches Fancy chicken breeds-silky, polish cap and frizzled <u>Skills</u> Skill of collection Classification skill Skill of presentation Identification skill	Identify and differentiate common pet birds for suitable purposes	General discussion field visit Videos/power point presentation Picture collection/album preparation	Participation in discussion Performance during field visit and presentation field visit report Quality of the prepared picture /album

Housing, feeding and management of pet birds Cages, aviary Types of feed required for different pet birds <u>Skills</u> Understanding skill Observation skill Presentation skill	Describe the management practices used for pet birds	General discussion Field visit Videos/power point presentation Chart preparation	Participation in discussion Performance during field visit and presentation Farm visit report Quality of the prepared chart
Diseases of pet birds- Sour crop, egg bound, psittacosis <u>Skills</u> Understanding skill Observation skill Analytical skill Skill for diagnosis	Identify major diseases of pet birds from symptoms	General discussion Farm visit Videos/power point presentation Chart preparation	Participation in discussion Performance during farm visit and presentation Farm visit report Quality of the prepared chart

ADDITIONAL INFORMATION

Tidbits about pet birds

- Identification of pet birds is done using celluloid, aluminum or stainless steel rings attached to legs. Micro chipping is also prevalent these days.
- In case of cockatiels, pigeons etc. both male and female birds sit for brooding.

Bantams: Miniature birds of any breed are called as **Bantam**. Popular bantams are Sebright, Millie fleur, English game, Phoenix, Araucana etc. Sebright bantams are a very special breed of bantam chicken in that the males and females have exactly the same feathering. Popular because of their sweet nature and beautiful plumage. **Sultans** are at the very height of ornamental oddity in the chicken world. Not only do they have feathers on top of their head, a v-shaped comb, beard, and 5 toes instead of the usual 4 and feathered shank.

Feed formulation for pet birds

Ingredients	Quantity
Bread powder	30 g
Boiled egg with shell	1
Soya flakes	15 g
Garlic paste	1 teaspoon
Gingely oil	2 ml
Cod liver oil	2 ml
Mineral mixture	1 g
(Probiotic) Bifilac/Lactiflora capsule	1

Method of preparation: Shell of the boiled egg should be ground in the mixer. After fine grinding, powdered bread and boiled egg can be incorporated. Then add soya flakes to this mixture, grind for uniform mixing and kept aside. Grind garlic paste, mineral mixture and probiotic capsule together and then add the oils - gingely oil and cod liver oil. Mix the ingredients thoroughly and add this to the previously prepared mix of boiled egg and bread. The final mix should not be too pasty, but powdery. Remnants of feed should be removed from cages/feeders daily before putting fresh feed.

ASSESSMENT ACTIVITIES

1. Collect the pictures of pet birds and categorize them into different groups

LIST OF PORTFOLIO EXPECTED IN THE UNIT

- Collected pictures/album- pictures of pet birds are collected and preparation of album
- Charts- showing the names and pictures of different pet birds
- Field visit report- visit nearby pet bird rearing shops or houses and prepare a report on management of pet birds
- Consolidated report/notes- obtained after group discussion ,presentation, reference and debate
- Unit test paper

UNIT 9: MANAGEMENT OF DOGS AND CATS

Overview of the unit- A pet is an animal kept for companionship and enjoyment or a household animal. Keeping pets has been shown to help relieve stress to those who like having animals around. Walking a dog can provide both the owner and the dog with exercise, fresh air, and social interaction. Now a day pet rearing has evolved into a business opportunity and is an organized sector with lot of newer and exotic animals being introduced. Dogs and cats still remain as the most popular pet animals.

Ideas/Concepts/Skills	Learning Outcome (LO)	Suggested activities	Assessment
Management of dogs Important breeds of dogs- German Shepherd, Labrador, Doberman, Rottweiler, Japanese spitz, Pug Restraining of dogs Selection of pups Grooming Feeding of dogs Breeding of dogs Diseases of dogs- rabies, canine distemper, parvo viral	-Identify and select suitable dog breeds according to purpose - Control different types of dogs according to purpose - Explain the different managemental practices of dog rearing -Identify major diseases of dogs from symptoms - Assist vaccination in dogs	General discussion Power point presentation. Field visit Demonstration Video presentation	Participation in discussion Field visit report Participation and performance in demonstration and presentation

enteritis Health care of dogs- vaccination and deworming <u>Skills</u> Understanding skill Observation skill presentation skill Demonstration skill			
Management of cats Important breeds of cats- Persian, Burmese Restraining of cats Feeding of cats Diseases of cat- feline panleukopenia <u>Skills</u> Understanding skill Observation skill presentation skill Demonstration skill	-Identify important cat breeds - Control different types of cats according to purpose - Explain the different managemental practices of cat rearing	General discussion Power point presentation. Field visit Demonstration Video presentation	Participation in discussion Field visit report Participation and performance in demonstration and presentation

ADDITIONAL INFORMATION

Pseudo pregnancy: This is a phenomenon seen in many adult bitches. After the oestrous period, the mammary glands are enlarged and will show secretion of milk. The bitch shows all the symptoms of pregnancy and impending parturition. But the bitch will not be carrying any pup. This does not in any way interfere with its breeding capacity. They become pregnant and litter normally during the subsequent seasons. Pseudo pregnancy may exist without much apparent external signs of pregnancy.

Breeding of cats: Male cat (Tom) reach puberty at 1 year of age. The female cat or queen also reach puberty at this age, but will be willing to mate only during estrus. Signs of oestrous are mewing frequently, arching of back, queen shows more affection towards the owners, falling down and rolling in the ground. Oestrous cycle occurs in every 15-51 days and period of Oestrous is for 4 days. For mating take the queen to the tom cat. Mating causes severe pain in queen, because of the backwardly directed spine on the tip of the penis - so ovulation is pain induced (induced ovulator). Ovulation occurs 22-30 hours after mating. Gestation period is 55-60 days at the time. After parturition, mother cat opens the amniotic sac and will clean the kitten; no human interference is needed. Kittens open their eyes at the age of 4-5 days. **Sexing the kitten:** In the female, the urethral and the anal orifices are closely situated but in males the distance between these two are more. By 4-5 weeks the hump of the testicles of the males is quite obvious and can be felt easily. Kittens are weaned at 7-8 weeks of age.

ASSESSMENT ACTIVITIES

1. Collect the pictures of common breeds of dogs and cats. Prepare power point slides with salient features and present in the class

LIST OF PORTFOLIO EXPECTED IN THE UNIT

- Power point slides- prepared from pictures of dogs and cats with salient features
- Field visit report- visit nearby pet shops or breeding places and prepare a report on management of dogs
- Consolidated report/notes- obtained after group discussion ,presentation, reference and debate
- Unit test paper

UNIT 10: REARING OF RABBITS AND LABORATORY RODENTS

Overview of the unit- Rabbits and laboratory rodents including rats and mice are have been central to the advancement of knowledge that has led to a vast array of benefits to both human and animal health. Worldwide, new drug research as well as tests meant for assuring the quality and efficacy of pharmaceutical products /vaccines/cosmetics are based on experiments involving animals. Rabbit belongs to the order lagomorpha while rodents belong to rodentia. They are small animals, easy to handle, short generation cycles, easy to breed and similar to human beings in many respects

Ideas/Concepts/Skills	Learning Outcome (LO)	Suggested activities	Assessment
Introduction to mouse, rat and rabbit management Importance of rabbits and laboratory rodents Restraint and handling Different routes of inoculation of materials Precautions for blood collection <u>Skills</u> Understanding skill Observation skill Presentation skill Demonstration skill	-Control and handle lab animals for different purposes	General discussion Power point presentation. Field visit Demonstration Video presentation	Participation in discussion Field visit report Participation and performance in demonstration and presentation
Husbandry of rabbits Breeds of rabbit-Angora, Soviet chinchilla, New Zealand white, Grey giant	-Identify and select suitable rabbit breeds according to purpose	General discussion Power point presentation. Field visit	Participation in discussion Field visit report Participation and

Housing, feeding and reproduction of rabbits Diseases of rabbits – Pasteurellosis, sore hock, mange <u>Skills</u> Communication skill Observation skill Presentation skill Demonstration skill	- Explain the different managerial practices of rabbit rearing -Identify major diseases of rabbit from symptoms	Demonstration Video presentation	performance in demonstration and presentation
Husbandry of laboratory mouse Breeds/strains of lab mouse - Swiss albino, Balb/c Housing, feeding and reproduction of laboratory mouse <u>Skills</u> Communication skill Observation skill Presentation skill Demonstration skill	- Identify important breeds of mouse - Explain the different managerial practices of mouse rearing	General discussion Power point presentation. Field visit Demonstration Video presentation	Participation in discussion Field visit report Participation and performance in demonstration and presentation
Husbandry laboratory rat Breeds/strains of lab rat- Wistar, Sprague Dawley. Housing, feeding and reproduction of laboratory rat <u>Skills</u> Communication skill Observation skill Presentation skill Demonstration skill	- Identify important breeds of rat - Explain the different managerial practices of rat rearing	General discussion Power point presentation. Field visit Demonstration Video presentation	Participation in discussion Field visit report Participation and performance in demonstration and presentation

ADDITIONAL INFORMATION

CPCSEA - Committee for the Control and Supervision of Experiments on Animals. This Committee is empowered to take care of the legal and ethical aspects of experimental animals being used in research and enact preventive measures wherever there is violation of the law in India.

Barbering: While group housing some strains will show a peculiar behaviour called barbering where one dominant mouse will pluck the hair of other mice in that group. Barbering can also be a result of overcrowding or deficiency of certain nutrients.

Coprophagy: Rabbits void, apart from the normal dark green hard faecal pellets, soft green faecal pellets (Caecotrophs) in the dawn hours, which have a high content of nitrogen and B - complex vitamins. Caecotrophs produced in the caecum are ingested directly from the anus

without mastication. These faecal pellets contain nearly three times the amount of protein than hard faecal pellets. Laboratory rodents also show coprophagy.

ASSESSMENT ACTIVITIES

1. Restrain the presented rabbit by neck hold method

LIST OF PORTFOLIO EXPECTED IN THE UNIT

- Power point slides- prepared from pictures of rat, mouse and rabbit with salient features
- Field visit report- visit nearby laboratory animal centres and prepare a report on management of rat, mouse and rabbit
- consolidated report/notes- obtained after group discussion ,presentation, reference and debate
- Unit test paper

EXTENDED ACTIVITIES

Farm visits, field visits ,hatchery visit, expert classes, visit in pet shops, exhibitions of products, pet shows, camps associated with animal husbandry department, OJT

MODULE 4 – LIVESTOCK PRODUCTS PROCESSING AND FOOD SAFETY

OVERVIEW

Animal products namely milk, meat and egg are excellent sources of nutrients especially essential amino acids. The use of these products by the common man is increasing day by day. Many people cannot even imagine a day without a cup of tea / coffee with milk. As a fast developing country, the living standards of Indian citizens are also boosting up leading to overwhelming demand for animal products which are delicious as well as nutritious. As far as the farmer / producer is concerned, the perishability of animal products especially milk and meat is a major problem. In order to enhance their shelf life many preservation techniques have been employed. Knowledge about these techniques helps them to substantially reduce the losses. It also enables efficient utilization of milk, meat and egg in surplus season thereby eliminating profound price fluctuations in the market.

Value addition of animal products provides tremendous job opportunities to the unemployed youth of our country. Practical knowledge on preparation of some of these value added products will help the learner to build up confidence for preparing a variety of milk, meat and egg specialties. Food business is of course directly related to the health of people. When it comes to animal products the chances of contamination are also more. So a basic knowledge about the hygienic production and processing of animal products is inevitable for providing safe

and wholesome animal source foods to the consumers. The increasing demand, high price and low shelf life of animal products increase the chances of malpractices in this sector. The Government is vigilant about this and so many rules and regulations have been brought with a view to abolish such practices. Persons operating food business should have an up-to-date knowledge about such regulations to provide standard products to the consumers and to avoid penalties. A basic know-how about zoonotic diseases will help all the animal handlers as well as animal product processing plant workers to take appropriate precautions.

With increasing use of animal products the animal husbandry sector has grown far from a mere household enterprise to a huge business. Any business has only one motive - 'the profit' and so animal welfare is often forgotten. Animals are living creatures and so need to be handled humanely. This module emphasizes the humane aspect of animal husbandry sector too.

UNIT 1. MILK AND MILK PRODUCTS

Overview – Milk is a complete food and forms the staple diet for human beings. The value of milk can be enhanced by converting it into various products (value addition). This chapter deals with the various categories of milk products and byproducts, their preparation and the nutritive benefits of milk. The various standards and guidelines pertaining to the manufacture of these products are also included.

Ideas/Concepts/Skills	Learning Outcome (LO)	Suggested activities	Assessment
<p>Nutritive value of milk- Water, fat, protein, lactose, ash</p> <p><u>Skills</u> Communication skill Observation skill Analytical skill</p>	<p>Describe the chemical composition and nutritional value of milk</p>	<p>General discussion Reference Quiz Chart preparation</p>	<p>Participation in discussion Performance during Quiz Chart</p>
<p>BIS standards of milk and milk products -Cow milk, buffalo milk, goat milk, toned milk, double toned milk, ice cream, whole milk powder, table butter, ghee</p> <p><u>Skills</u> Communication skill collection skill Skill for choosing Charting skill</p>	<p>Assess and differentiate the standards of various milk products in the market</p>	<p>General discussion Field visit Reference Chart preparation Specimen collection</p>	<p>Report Participation in discussion Chart Notes Specimen</p>

Analytical skill			
Preservation of milk – Pasteurization, sterilization, chilling <u>Skills</u> Communication skill collection skill Skill for choosing Charting skill Analytical skill	Choose the suitable preservation method of milk according to purpose	General discussion Field visit Reference Chart preparation	Report Participation in discussion Chart Notes
Types of milk commercially available Toned milk, double toned milk, Homogenized milk Condensed milk <u>Skills</u> Communication skill collection skill Skill for choosing Charting skill Analytical skill	Identify and select appropriate type of milk as per need.	General discussion Field visit Reference Chart preparation Specimen collection	Report Participation in discussion Chart Notes Specimen
Preparation of various types of milk products Acid Coagulated products - paneer, Concentrated products - Khoa, gulab jamun Fermented products - dahi, cheese Fat rich products – ghee, cream Byproducts from milk - Butter milk, whey, skim milk Frozen products – ice cream <u>Skills</u> communication skill Observation skill presentation skill demonstration skill	Prepare required milk products for commercial and household purposes	General discussion Power point presentation. Field visit Demonstration Video presentation Unit test	Participation in discussion Field visit report Participation and performance in demonstration and presentation

ADDITIONAL INFORMATION

Indian Standard Specifications for condensed milk

Characteristics	Requirement for	
	Condensed milk	Skim sweetened
Total milk solids (% wt.) Min	31.0	26.0
Fat (% wt)	Not less than 9.0	Not more than 0.5 %
Sucrose (% wt.) Min	40	40
Acidity(% lactic) Max	0.35	0.35
Bacterial count (per g.)	500	500
Coliform count (per g)	Negative	Negative
Yeast and mould count (per g.) Max	10	10

Some tidbits on cheese making

Rennet is the crude preparation or extract from the abomasum, rennet contains two principal enzymes viz., rennin, and pepsin. Rennin is an extremely powerful clotting enzyme, which causes rapid clotting without much proteolysis. Rennet is available as liquid or powder or as tablet.

Heating of curd cubes: it begins within 15 minutes of cutting. The rate of heating is such that the temperature rises to 32°C in about 15 minutes and thereafter to a maximum cooking temperature (37 to 39°C) at the rate of 1° C every 4 minutes.

Cheddaring: This refers to the combined operations of packing, turning, piling and repiling the curd cubes. After the bulk drainage of whey, the curd cubes are kept closely together in two heaps with a channel in between. This is known as packing and takes 5 to 15 minutes after drainage. It results in the formation of two long slabs of curd. These are cut with a cheese knife into blocks or strips of 15 to 20 cms wide. Turning is carried out every 15 minutes till the curd is ready for milling and salting. Within 30 to 45 minutes of packing, blocks of curd are turned and laid one over another in two or threes. This is called piling. Then the position of the curd block is altered and this is known as repiling.

Curing of cheese: During curing the physical, chemical and bacteriological properties of cheese are profoundly changed, resulting in the development of a characteristic flavour, body and

texture. The term ‘green cheese’ is usually applied to hard-pressed cheese in the early stages of ripening before the characteristic flavour, body and texture of ripened cheese developed.

Methods of chilling

- Can Immersion
- In Can Cooling
- Surface Cooler
- Tubular Cooler
- Plate Chiller
- Bulk Milk Cooler

ASSESSMENT ACTIVITIES

1. Prepare a chart showing types of milk commercially available in the local market and its BIS standard.

LIST OF ITEMS IN PORTFOLIO

- Chart – contains table showing types of milk available in the market and its BIS standards
- Field visit report- visit nearby market and dairy plant. Prepare a report showing types of milk products available, its BIS standards, preservation methods of milk and milk products.
- Consolidated report/notes- obtained after group discussion ,presentation and reference
- Unit test paper

UNIT 2. WHOLESOME MILK PRODUCTION

Overview: Milk is rich in nutrients which makes it susceptible to spoilage by microorganisms. Wholesome milk production involves avoiding all such sources of bacterial contamination of milk. To increase the profitability and reduce perishability, chemicals and other substitutes are added to milk which are called adulterants, are also dealt in this chapter.

Ideas/Concepts/Skills	Learning Outcome (LO)	Suggested activities	Assessment
Measures for clean milk production- Sources of contamination and hygienic measures <u>Skills</u> communication skill Observation skill presentation skill demonstration skill	Practice hygienic methods for clean milk production in cattle	General discussion Power point presentation. Field visit Demonstration Video presentation	Participation in discussion Field visit report Participation and performance in demonstration and presentation

Adulterants of milk Starch Cane sugar Water – specific gravity method <u>Skills</u> Communication skill collection skill Skill for choosing Charting skill Analytical skill	Identify common adulterants present in milk	General discussion Chart preparation Demonstration Video presentation Unit test	Participation in discussion Chart Note
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ADDITIONAL INFORMATION

1. Lacto peroxidase (L-P) system

Even though not permitted in India, this method also preserves milk without any heat treatment. The enzyme lactoperoxidase naturally available in milk is activated and acts on its substrate (thiocyanate) to produce products (hypothiocyanate) which destroy the microbes in milk.

2. Pricing Policy for milk: Two-axis pricing policy is the popular policy. Here pricing of milk is based on fat and SNF contents of milk. In Dairy co-operative societies readymade charts are available so that the price can be determined by referring the fat and Lactometer reading. To enhance the quality of milk emphasis is being given for microbial quality of milk and additional price will be paid for high quality milk. Microbial quality of milk is being assessed by conducting MBRT and other dye reduction tests. Larger dairy co-operative societies handling more than 500L of milk a day uses automatic milk collection equipments wherein fat, S.N.F, quantity, cost and other particulars are arrived at by installing computer and other electronic devices.

ASSESSMENT ACTIVITY

1. Detect the adulterant present in the given sample of milk using iodine and resorcinol solutions

LIST OF PORTFOLIO ITEMS

- Chart – prepare a chart showing the common adulterants in milk and methods used for its detection
- Field visit report- visit nearby dairy farms and cattle sheds to prepare a report on measures for clean milk production
- Consolidated report/notes- obtained after group discussion ,presentation and reference
- Unit test paper

UNIT 3. PROCESSING OF MEAT AND ABATTOIR MANAGEMENT

Overview: Meat processing industry is burgeoning fast in India with many players entering the field. A general idea about the slaughter techniques of various species of animals, slaughter house requirements and activities in an abattoir are presented in this unit.

Ideas/Concepts/Skills	Learning Outcome (LO)	Suggested activities	Assessment
<p>Terminologies of meat processing Abattoir, lairage, humane slaughter, carcass, meat, pork, chevon, mutton, veal, kara beef</p> <p><u>Skills</u> Communication skill Observation skill Charting skill</p>	Describe the terms associated with meat technology	General discussion Reference Quiz Chart preparation	Participation in discussion Performance during Quiz Chart
<p>Methods of stunning- Physical, Mechanical, electrical and chemical stunning methods</p> <p><u>Skills</u> communication skill Observation skill Presentation skill</p>	Select the suitable stunning method for different species.	General discussion Power point presentation. Field visit Video presentation	Participation in discussion Field visit report Participation and performance in presentation
<p>Various steps in animal slaughter (buffalo, cattle, pig, chicken) Flow chart and definitions – buffalo and cattle, pig, chicken</p> <p><u>Skills</u> communication skill Observation skill Presentation skill</p>	Prepare the flow chart of slaughter operations in cattle, pig and chicken	General discussion Power point presentation. Field visit Video presentation Chart preparation	Participation in discussion Field visit report Participation and performance in presentation Chart
<p>Ante mortem and post mortem examination- Definition and purpose</p> <p><u>Skills</u> communication skill Observation skill Presentation skill</p>	Explain the importance of ante and post mortem examinations in animals	General discussion Power point presentation. Field visit Video presentation	Participation in discussion Field visit report Participation and performance in presentation
<p>Requirements for a slaughter house- Space and light</p>	Prepare the layout of an abattoir	General discussion Power point presentation.	Participation in discussion Field visit report

requirements of various rooms in an abattoir <u>Skills</u> Communication skill Observation skill presentation skill Demonstration skill		Field visit Chart preparation Video presentation	Chart Participation and performance in presentation
Rendering of slaughter house waste Definition and importance of rendering <u>Skills</u> Communication skill Observation skill Presentation skill	Describe the importance of rendering of slaughter house waste	General discussion Power point presentation. Field visit Video presentation	Participation in discussion Field visit report Participation and performance in presentation
HACCP – Definition and importance <u>Skills</u> Communication skill Presentation skill	Define the importance of HACCP	General discussion Reference Quiz Unit test	Notes Participation in discussion

ADDITIONAL INFORMATION

1. Voltage required for electrical stunning in different animals

Smaller animals - 198 watt for 1 sec

Cattle - 285 watt

Domestic fowl of an average wt of 2 kg requires a current of 70 volts for 2-3 seconds.

2. Classification of Preservation of Meat

The methods of preservation of meat can be classified as follows

A. Preservation by Moisture Control

- Drying
- Intermediate Moisture Foods
- Freeze Drying or Lyophilisation
- Salting
- Curing and smoking

B. Preservation by Temperature Control

Preservation by Low Temperature

- Chilling
- Freezing

Preservation by High Temperature

- Canning
- Retort Processing

C. Preservation by Direct Microbial Inhibition

- Irradiation
- Antibiotics
- Chemicals

3. The seven principles of HACCP:

1. Conduct a Hazard Analysis
2. Identify Critical Control Point (CCP)
3. Establish Critical Limits for CCP
4. Establish Monitoring Procedures
5. Establish Corrective Actions
6. Establish Recordkeeping Procedures
7. Establish Verification Procedures

4. Good Manufacturing Practices

GMP is a system to ensure that products meet food safety, quality and legal requirements. It is a set of technical standards and guidelines involving hygienic, sanitary and operational procedures, intended to ensure the quality, compliance and product safety.

ASSESSMENT ACTIVITIES

1. Prepare a chart showing various steps in the slaughtering procedure of cattle

LIST OF ITEMS IN PORTFOLIO

- Chart – showing the layout of abattoir and various steps in the slaughtering of livestock
- Field visit report- visit nearby meat plants and prepare a report on various activities and management procedures following in the plant
- Consolidated report/notes- obtained after group discussion ,presentation and reference
- Unit test paper

UNIT 4. EGG AND MEAT PRODUCTS

Overview: Animal proteins are the best proteins available to human beings which supply certain amino acids absent in plants. Just like milk, egg and meat are perishable and thus necessitates prompt and scientific processing and preservation. The nutritive benefits of egg/meat, various preservation techniques and common products are presented here

Ideas/Concepts/Skills	Learning Outcome (LO)	Suggested activities	Assessment
Nutritive value of egg and meat- Water, protein, fat, carbohydrate, ash,	Describe the chemical	General discussion	Participation in discussion

vitamins <u>Skills</u> Communication skill Observation skill Analytical skill	composition and nutritional values of egg and meat	Reference Quiz Chart preparation	Performance during Quiz chart
Preservation of egg – Chilling, freezing, pickling, house hold methods (water glass method, lime sealing) <u>Skills</u> Communication skill collection skill Skill for choosing Charting skill Analytical skill	Choose the suitable preservation method of egg according to purpose	General discussion Field visit Reference Chart preparation	Report Participation in discussion Chart notes
Preservation of meat – Chilling, freezing, thermal processing, canning, curing, smoking, irradiation <u>Skills</u> Communication skill collection skill Skill for choosing Charting skill Analytical skill	Choose the suitable preservation method of meat according to purpose	General discussion Field visit Reference Chart preparation	Report Participation in discussion Chart notes
Egg products Commercial egg products like egg powder and egg pickle <u>Skills</u> communication skill Observation skill presentation skill	List out various commercial egg products Prepare different egg products	General Discussion Field visit Reference Chart preparation Specimen Collection Survey	Report Participation in Discussion Chart Notes Specimen Survey report
Meat products – Sausage, meat cutlet <u>Skills</u> communication skill Observation skill presentation skill	Prepare different meat products	General Discussion Field visit Reference Chart preparation Specimen Collection Unit test	Report Participation in discussion Chart Notes specimen

ADDITIONAL INFORMATION

Packaging of meat and meat products

Packaging materials used for fresh meat

- Trays- made of polystyrene

- Transparent films- cellophane, LDPE (most commonly used for fresh meat), PVC
- Shrink films- PVC, cellophane, polypropylene, PVDC etc.

Advanced and emerging systems of packaging of meat and meat products

1. Vacuum packaging

It is the placing of meat into plastic bags or pouches and extracting air from them by means of a nozzle type vacuumizing machine or a vacuumizing chamber. The bags are then sealed to effect closure. The most commonly used film for fresh meat vacuum packages is PVDC.

2. Modified atmosphere packaging (MAP)

It is a technology where in foods are packaged in high barrier packages in which air has been replaced with an artificial (modified) atmosphere. For red meats, high-oxygen MAP systems utilize atmospheres containing approximately 20% to 30% carbon dioxide, 60% to 80% oxygen, and up to 20% nitrogen. The elevated oxygen concentration enhances the bright red meat color and the elevated carbon dioxide concentration inhibits the growth of aerobic spoilage microorganisms.

High-oxygen MAP, which provides a chilled product life of only 5 to 10 days, is not suitable for prolonged storage of meat. The excessive space occupied by deep tray packs, compared to net weight of meat sold, tends to restrict MAP packaging to high value products catering to the upper end of the market.

Classification of sausage

Sausages may be classified as the following 5 types

1. Fresh sausages – Eg: Fresh pork sausage
2. Dry and semidry sausages– Eg: Pepperoni
3. Cooked sausages– Eg: Summer sausage
4. Cooked, smoked sausages– Eg: Frankfurters, Bologna, Cotto salami
5. Uncooked, smoked sausages– Eg: Smoked, country-style pork sausage

The formula for a sausage

Ratio of Lean meat to Offal Meat 7: 3

The other ingredients are to be added in terms of % weight of meat (i.e 2% means - 2% of the weight of meat added)

- Fat-10%
- Salt-2.5%
- Sodium or Potassium nitrite- 200 ppm
- Phosphates -0.3%
- Spice mix -2%
- Condiments - 4% (3% onions and 1% garlic)
- Binder or extender - 10%
- Added water, preferably as crushed ice. - 10%

ASSESSMENT ACTIVITIES

1. Collect commonly available egg and meat products from local markets and conduct an exhibition

LIST OF ITEMS IN PORTFOLIO

- Chart – showing the method of preparation of egg pickle and meat cutlet
- Field visit report- visit nearby meat plants and prepare a report on various methods used for the preservation of meat and meat products
- Collected samples- samples of egg and meat products collected from market
- Consolidated report/notes- obtained after group discussion ,presentation and reference
- Unit test paper

UNIT 5. ZONOTIC DISEASES

Overview: Zoonotic diseases are those diseases transmitted from animals to man and vice versa. An awareness of such diseases can prove helpful for those persons who handle animals and work in animal related fields.

Ideas/Concepts/Skills	Learning Outcome (LO)	Suggested activities	Assessment
Definition of zoonosis and classification- Anthroozoonosis, zooanthroponosis, amphixenosis <u>Skills</u> Communication skill Observation skill Analytical skill	Describe and differentiate various zoonotic diseases	General discussion Reference Quiz Chart preparation	Participation in discussion Performance during Quiz chart
Common zoonotic diseases – Tuberculosis, Anthrax, Rabies, Brucellosis, Leptospirosis, Avian influenza <u>Skills</u> Communication skill collection skill Skill for choosing Charting skill Analytical skill	Identify different zoonotic diseases in animals	General discussion Power point presentation. Field visit Video presentation	Participation in discussion Field visit report Participation and performance in presentation
Important Food borne diseases originating from livestock products- Colibacillosis, Botulism, Cholera, Taeniasis <u>Skills</u> Communication skill Collection skill Skill for choosing	Identify different food borne diseases originating from livestock products	General discussion Power point presentation. Field visit Video presentation	Participation in discussion Field visit report Participation and performance in presentation

Additional information

1. Occupational diseases of slaughter house personnel

Bacterial – Tuberculosis, anthrax, brucellosis, leptospirosis, listeriosis, erysipelas etc.

- Viral – Rabies, Foot and Mouth Disease, Orf, New Castle disease.
 Rickettsial – Q-fever, Ornithosis and Psittacosis
 Fungal – Ring worm

2. Meat - borne infections

Bacterial - *Salmonella, Escherichia coli, Shigella, Streptococci, Vibrio, Listeria, Campylobacter, Yersinia.*

Parasitic - Taeniasis, Trichinellosis, Toxoplasmosis, Sarcocystis.

ASSESSMENT ACTIVITIES

1. Prepare slides of common zoonotic diseases for power point presentation

LIST OF PORTFOLIO ITEMS

- Power point slides – slides showing details of various zoonotic diseases for presentation
- Field visit report- visit nearby veterinary hospital and prepare a report on common zoonotic diseases in that locality
- Consolidated report/notes- obtained after group discussion, presentation and reference
- Unit test paper

UNIT 6. ANIMAL WELFARE AND FOOD SAFETY GUIDELINES

Overview – Human beings are the dominant species on this planet now. With this prevailing anthropocentric view point, animals are considered inferior and several cruelties are done on small and large animals like in the form of poaching, illegal transportation and slaughtering, unethical animal experimentation, hunting etc. To prevent such incidences several guidelines which are presented here. Animal products like milk, meat and egg form the staple diet of human beings. Various hazards could occur during the processing of these foods and an understanding of guidelines for food processing is aimed in this chapter.

Ideas/Concepts/Skills	Learning Outcome (LO)	Suggested activities	Assessment
<p>Prevention of cruelty to animals (PCA) act- Purpose, general cruelties to animals</p> <p><u>Skills</u> Communication skill Observation skill Analytical skill</p>	Identify various cruelties to animals	General discussion Reference Quiz Chart preparation	Participation in discussion Performance during Quiz Chart
<p>Guidelines related to transportation of animals- By foot, by road and by rail - cattle and chicken</p>	Describe specifications for transportation of animals	General discussion Power point presentation.	Participation in discussion Field visit report

<u>Skills</u> Communication skill Observation skill Presentation skill		Field visit Video presentation	Participation and performance in presentation
Food safety and standards act (FSS act)- Purpose, general provisions as to articles of food <u>Skills</u> Communication skill Observation skill Presentation skill	Describe important food standard and safety practices.	General discussion Power point presentation. Field visit Video presentation	Participation in discussion Field visit report Participation and performance in presentation

ADDITIONAL INFORMATION

Sanitary and hygienic requirements for food manufacturer/ processor/handler (FSS regulations, 2011)

The place where food is manufactured, processed or handled shall comply with the following requirements:

1. The premises shall be located in a sanitary place and shall maintain overall hygienic environment.
2. The premises to conduct food business for manufacturing should have adequate space for manufacturing and storage.
3. The premises shall be clean, adequately lighted and ventilated.
4. Floors, ceilings and walls must be smooth and easy to clean with no flaking paint or plaster.
5. The floor and skirted walls shall be washed as per requirement with an effective disinfectant. The premises shall be kept free from all insects. No spraying shall be done during the conduct of business, but instead fly swats/flaps should be used to kill flies getting into the premises. Windows, doors and other openings shall be fitted with net or screen, as appropriate to make the premise insect free.
6. Continuous supply of potable water shall be ensured in the premises. In case of intermittent water supply, adequate storage arrangement for water used in food or washing shall be made.
7. Equipment and machinery when employed shall be of such design which will permit easy cleaning. Arrangements for cleaning of containers, tables, working parts of machinery, etc. shall be provided.
8. No vessel, container or other equipment, the use of which is likely to cause metallic contamination injurious to health shall be employed in the preparation, packing or storage of food. (Copper or brass vessels shall have proper lining).
9. All equipments shall be kept clean, washed, dried and stacked at the close of business to ensure freedom from growth of mould/ fungi and infestation.
10. All equipment shall be placed well away from the walls to allow proper inspection.
11. There should be efficient drainage system and there shall be adequate provisions for disposal of refuse.

12. The workers working in processing and preparation shall use clean aprons, hand gloves, and head wears.
13. Persons suffering from infectious diseases shall not be permitted to work. Any cuts or wounds shall remain covered at all time and the person should not be allowed to come in direct contact with food.
14. All food handlers shall keep their finger nails trimmed, clean and wash their hands with soap, or detergent and water before commencing work and every time after using toilet.
15. All food handlers should avoid wearing, loose jewellery or other items that might fall into food. Touching their body parts or hair shall be avoided during food handling processes.
16. Eating, chewing, smoking, spitting and nose blowing shall be prohibited within the premises especially while handling food.
17. All articles that are stored or are intended for sale shall be fit for consumption and have proper cover to avoid contamination.
18. The vehicles used to transport foods must be maintained in good repair and kept clean.
19. Foods while in transport in packaged form or in containers shall maintain the required temperature.
20. Insecticides / disinfectants shall be kept and stored separately and away from food manufacturing / storing/ handling areas.

ASSESSMENT ACTIVITIES

1. Prepare a chart showing the common cruelties to animals in your locality

LIST OF ITEMS IN PORTFOLIO

- Chart – showing cruelties to animals and BIS standards of common livestock products
- Field visit report- visit nearby veterinary hospital and make a report on problems with animal transportation and animal welfare
- Consolidated report/notes- obtained after group discussion, presentation and reference
- Unit test paper

EXTENDED ACTIVITIES

Veterinary Hospital visits, field visits to milk/meat product marketing units, meat plant/slaughter house visit, expert classes, exhibitions of products, dairy co-operative society visit, dairy plant, camps associated with animal husbandry department, OJT, dairy farm visit

ON-THE-JOB TRAINING

On the job training is an integral part of vocational education system. It provides hands-on experience and awareness about latest field level trends related to each vocational course which cannot be taught in class room situations. OJT helps the students to understand the application of their vocational knowledge and skill in different field level situations properly. Also students can

understand the nature of their job roles in different institutions and fields, interaction with different groups, job prospects etc. Able students shall get jobs in the OJT centers regularly. OJT boost the confidence of the students to achieve jobs or pursue higher studies in the respective vocation.

Four modules of livestock management course need 4 weeks OJT programme. It may be conducted as 2 weeks in first year and 2 weeks in second year. Flexibility should be given for each course on the time of conducting OJT. Normally it can be conducted at the time of second and fourth module in each year.

In case of livestock management (LSM) course OJT is mainly conducted in Government or Semi-Government institutions as private firms in this area are rare in Kerala. So the VHSE department can make MOU with these government firms for smooth and proper conduct of OJT in LSM course. The list of institutions are given below,

1. Government Veterinary Hospitals
2. ATMA centres
3. Livestock farms of Animal Husbandry Department
4. Kerala Agriculture University (KAU)
5. Kerala Veterinary and Animal Sciences University (KVASU)
6. Kerala livestock development board (KLDB)
7. Kerala state poultry development co-operation (KSPDC)
8. Meat Products of India (MPI), Koothattukulam
9. KEPCO (Kerala Poultry Cooperation)
10. LMTC (livestock management training centres) of AHD
11. Central Hatchery, Chengannur
12. Regional Poultry farm, Malampuzha
13. MILMA Milk Cooperative Societies
14. Private pet shops/owners
15. Dog breeding Kennels (Private owners)

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