DETAILED SYLLABUS FOR THE POST OF FARM ASSISTANT GRADE II (VETERINARY) IN KERALA VETERINARY AND ANIMAL SCIENCES UNIVERSITY

CAT NO:239/2024 – TOTAL MARKS : 100

Module 1: Dairy Husbandry and Farm Management - (10 Marks)

Forage Production and Fodder Management. Basics of agronomy – tillage, soil tilth, land selection and preparation. Cultivation essentials – light, water, manure application, irrigation and seasonal considerations. Types of fodder – common grasses, legumes, fodder trees and shrubs. Classification based on nutritional value – dry vs green, leguminous vs non-leguminous. Nutrient composition and proximate principles of fodder. Fodder Conservation and Storage. Importance of fodder preservation during surplus seasons. Hay making. Silage making – trench/pit silos, ensiling process, additives used, advantages. Introduction to hydroponics Agri-silvi pasture.

Breeds of cattle and buffaloes- Indian & exotic breeds - characters- productivity-breed associations. Farm Routines -feeding, cleaning, milking and milk disposal. Cattle Housing, Shed Hygiene and Waste Management: Types of housing – loose housing vs conventional barns, space requirements for different age groups. Features of ideal cattle shed – slope, flooring, drainage, ventilation and lighting. Cleaning routines – frequency, materials used, biosecurity protocols. Waste disposal – dung and urine management, composting, slurry use. biogas plants – function, benefits, integration with daily operations.

Management of different classes of cattle- summer management-milking and milk recording- Record keeping in farm- Identification methods -computerisation. Factors affecting health of cattle- -Disease, signs of illness, Common ailments -metabolic disorders -first aid- isolation and general prophylaxis, vaccination and - External and internal parasites - deworming -culling

Module 2: Cattle Physiology, Nutrition and Breeding - (10 Marks)

Basic Physiology of Dairy Cattle: Structure and function of animal cells, tissues, organs, and organ systems. Circulatory and respiratory systems – key organs, functions, parameters like heart rate and respiration rate, and mechanisms of regulation. Endocrine

system – major glands, hormonal control of body functions. Reproductive physiology – anatomy of male and female reproductive organs, gametogenesis, folliculogenesis, oestrous cycle, signs of heat, fertilisation, gestation and parturition. Mammary gland structure and function – stages of mammogenesis, lactogenesis, milk secretion, milk let-down reflex, galactopoiesis, drying-off and udder involution. Impact of climate change – heat stress, thermoregulation, diurnal temperature variation, and adaptive mechanisms.

Dairy Cattle Nutrition: Classification and importance of nutrients – carbohydrates, proteins, fats, vitamins (fat- and water-soluble), and minerals (macro and micro). Digestive system of ruminants – structure and function of the rumen, reticulum, omasum, and abomasum; microbial fermentation and volatile fatty acid production. Digestive processes – mechanical, secretory, enzymatic, microbial digestion; absorption and metabolism. Factors influencing digestibility and strategies to improve feed utilisation. Classification of feedstuffs – roughages (green and dry), concentrates, mineral mixtures, salt blocks. Feed quality and proximate principles – DM, CP, CF, EE, NFE, and ash. Feeding technologies – urea-treated straw, NPN sources, bypass protein and fat, total mixed rations, complete feed blocks, non-conventional feeds (e.g. azolla, brewery waste).

Breeding and Genetic Improvement of Dairy Animals: Basics of inheritance – cell division, gene structure and function, qualitative and quantitative traits. Importance of genetic variation, heritability, and trait selection. Identification of economically important traits – milk yield, reproductive performance, disease resistance. Selection and culling criteria in dairy herds. Breeding methods – natural service, artificial insemination, crossbreeding, grading-up, and inbreeding control. Use of superior sires and modern tools – progeny testing, sire evaluation, and molecular breeding (basic level). Importance of hybrid vigour and sustainable genetic improvement strategies in farm settings.

Module 3: Milk and Milk Product Handling, Chemistry and Microbiology - (10 Marks)

Microbiology of Milk and Dairy Products: Classification and characteristics of microorganisms – bacteria (including lactic acid bacteria), viruses, yeasts and moulds. Growth requirements and growth curve of bacteria; spoilage and pathogenic organisms in milk. Milk-borne pathogens and diseases. Spoilage indicators – curdling, ropiness, gas

production, discolouration, proteolysis and lipolysis. Bacteriological quality of milk – mesophilic, thermoduric, thermophilic and psychrotrophic bacteria. Microbial quality control techniques – pasteurisation, thermisation, sterilisation, delvo test. Starter cultures – preparation, maintenance and role in fermentation (dahi, yoghurt, acidophilus milk, kefir). Microbiology of common dairy products – cheese, butter, ghee, ice cream, milk powder, fermented and indigenous dairy items. Use of probiotics and prebiotics; microbial defects and indicators in dairy products.

Chemistry of Milk and Milk Products: Composition of milk – water, fat, protein, lactose, minerals, vitamins. Physical and chemical properties – density, pH, acidity, heat stability, specific gravity. Milk fat – structure, fat globules, rancidity, and its prevention. Milk proteins – casein, whey proteins, denaturation, coagulation (rennet action). Lactose – forms, crystallisation, fermentation, commercial use. Vitamins and minerals in milk – nutritional importance and deficiency symptoms. Enzymes in milk – types and significance. Chemistry of dairy products – changes during processing and preservation. Common chemical defects in dairy products – off-flavours, oxidation, stability issues. FSSAI standards for milk and dairy products.

Milk Handling and Processing: Milk procurement chain – collection, chilling, transportation. Milk reception – testing for quality and adulterants, neutralisers, preservatives. Processing steps – filtration, clarification, bactofugation, standardisation. Thermal processing – pasteurisation , sterilisation, UHT treatment. Packaging – materials used, aseptic packaging, types of milk . Cleaning and sanitisation – detergents, sanitisers, CIP systems. Storage and handling of milk and products under hygienic conditions to ensure safety and shelf life.

Module 4: Dairy Farm Operations, Business and Extension - (10 Marks)

Dairy Engineering and Equipment Handling: Basic farm machinery – tractors, tillage implements, harvesting tools. Dairy-specific equipment – milking machines (parts, functioning), manure spreaders, feed mixers, seed processing machines. Milk processing equipment – milk receiving tanks, clarifiers, homogenisers, pasteurisers (batch and continuous), UHT plants, milk silos. Dairy product equipment – butter churns, cheese vats, khoa kettles, ice cream freezers, spray driers, cold rooms, packaging systems. Refrigeration –

principles, components of mechanical vapour compression and absorption systems, refrigerants. Electricity – single and three-phase power, electric motors, automation, and safety.

Dairy Farm Business, Marketing and Record Keeping: Management functions – planning, organising, staffing, supervision, leadership styles. Labour management – recruitment, training, hygiene, safety, welfare, and labour laws. Farm economics – budgeting, financial planning, credit and loans, depreciation, cost of milk and fodder production. Procurement and inventory – site selection for farms, land requirement, purchase of animals, equipment and inputs, maintenance of farm records. Marketing of milk and dairy products – types of marketing channels, pricing strategies, advertising and sales promotion.Public relations – communicating with customers, local authorities, and government departments.

Dairy Extension, Co-operation and Accountancy: Extension education – principles, objectives, teaching methods, communication process, feedback, barriers, message development. Rural sociology – society, groups, leadership, social change, mobilisation of farmer groups. Organisation of milk producers' co-operatives – structure, formation, functions, Kerala Co-operative Societies Act basics, model bye-laws, auditing. Livestock development programmes – historical perspective in India and Kerala. Basic accountancy – journal, ledger, trial balance, profit and loss account, balance sheet. Audit and inventory – internal checks, verification of assets and stock.

Module 5: Poultry Biology and Commercial Production - (10 Marks)

Common poultry species (chickens, ducks, turkeys, quails) and their uses; important breeds and strains –commercial varieties. Unique anatomical features – feathers, crop, gizzard, and air sacs; reproductive physiology – stages of egg formation in hens. Life cycle from embryo to mature bird; incubation periods and age at sexual maturity; factors affecting growth rate. Natural behaviours – foraging, dust bathing, nesting, roosting; social hierarchy; indicators of welfare and stress.

Broiler production phases – brooding, growing, finishing; key performance indicators – daily weight gain, FCR, mortality rate. Layer management – pullet rearing, lighting programs for laying, phase feeding (starter, grower, layer), maintaining peak and persistent

production. Farm layout for broilers and layers – cage systems vs deep litter; equipment – automatic feeders, nipple drinkers, egg collection systems for labour efficiency. Cost analysis – chick, feed, medication, labour, utilities. Break-even analysis and cost-saving strategies. Marketing – batch planning, market age/weight for broilers, egg grading and packaging, and supply chain management.

Module 6 : Poultry Breeding, Housing and Hatchery Management - (10 Marks)

Inheritance of traits – growth, egg production, egg size; hybrid vigour; sex-linked traits . Breeding systems – pure-line development, crossbreeding, inbreeding, and outbreeding. Selection methods – mass and family selection; use of pedigree and performance records; trait indices. Breeder flock management – male to female ratio, natural mating vs artificial insemination, culling of underperformers.

Types – deep litter, battery cage, free-range; design features – flooring, ventilation, roofing suited to climate. Environmental control – temperature, humidity, airflow management using fans, foggers, insulation. Lighting – schedules and intensity for brooding, growing, and laying.Feeders – trough, pan; drinkers – bell, nipple; brooders, nest boxes; automated feeding and egg collection systems. Recommended space, feeder, and drinker allowance per bird to avoid overcrowding and performance losses.

Incubation requirements – temperature, humidity, ventilation, turning. Egg selection and storage – cleanliness, size, shape. Setter and hatcher management; candling to monitor embryo development. At hatch: chick pulling, sexing, Marek's disease vaccination, beak trimming if practiced. Hatchery sanitation – disinfection of incubators and trays, restricted access. Performance metrics – fertility %, hatchability %, and record-keeping.

Module 7: Poultry Nutrition, Health Care and Product Quality - (10 Marks)

Essential nutrients – proteins/amino acids, energy, vitamins, minerals. Feed ingredients – maize, wheat, barley, soybean meal, fish meal, mineral and vitamin supplements. Additives – enzymes, probiotics, coccidiostats. Types of feed – broiler, layer

mash/pellets. Feed formulation basics using Pearson's square and premixes. Feeding methods – ad libitum vs restricted, phase feeding in layers, reducing waste, ensuring clean water, automation in intensive systems. Nutritional deficiency diseases

Major diseases – viral (ND, Marek's, AI, IBD), bacterial (fowl cholera, salmonellosis, coryza), parasitic (coccidiosis, worms). Prevention – vaccination schedules, biosecurity measures (footbaths, sanitation, rodent control). Disease diagnosis – clinical signs, post-mortem findings, lab confirmation. Treatment – antibiotics based on sensitivity, anticoccidials, outbreak management (culling, isolation). Important zoonoses – avian influenza, Salmonella, Campylobacter. Safety practices – protective clothing, hygiene, safe handling of poultry and products.

Meat processing – pre-slaughter handling, humane slaughter, defeathering, evisceration, chilling. Meat quality – colour, texture, odour, cold chain maintenance. Egg handling – collection frequency, cleaning/sanitising, grading (candling, shell quality, Haugh unit, yolk index), and packaging. Egg storage – temperature and humidity control. Value-added products – egg powder, liquid egg, cut-up chicken parts, sausages, nuggets. Packaging – MAP and retail-ready formats.

Module 8: Diagnostic Techniques in Veterinary Parasitology - (10 Marks)

Microscopy, safe handling of laboratory equipment such as centrifuges, balances, glassware and plasticware; concepts of molality and molarity; preparation of stains, solutions, and mounting media; scientific handling and disposal of clinical samples; collection and preservation of antemortem and post-mortem materials; specimen maintenance and basic serological techniques.

Helminthology diagnostics – understanding morphological features of nematodes, trematodes and cestodes; recognition of demonstrable life cycle stages; qualitative and quantitative faecal examination; copro-culture and copro-antigen detection; use of micrometry in diagnosis; assessment of anthelmintic resistance.

Entomology and acarology – principles of arthropod vector identification and their role in disease transmission; collection, processing and permanent mounting of flies, fleas,

lice, bugs, ticks and mites; xenodiagnosis and skin scraping examination; dissection of arthropods for larval parasite detection.

Protozoology diagnostics – identification of haemoprotozoa and tissue protozoa based on morphology; detection of diagnostic stages from excretions and secretions; application of faecal smear techniques and recent diagnostic trends; basic serological methods for protozoan infections.

Module 9: Techniques in Veterinary Diagnostic Pathology and Laboratory Procedures - (10 Marks)

Haematology techniques – general principles of haematology; preparation of site and blood collection from various species; use of anticoagulants and serum separation; estimation of TEC, TLC, DLC, ESR, PCV, Hb, erythrocyte indices, reticulocyte and platelet counts; assessment of bleeding and clotting times; differential count staining using common haematological stains.

Clinical chemistry and urinalysis – collection, preservation and dispatch of clinical samples such as urine, milk and semen; physical, chemical and microscopic examination of urine, milk and semen; analysis of serum biochemistry including enzymes, electrolytes, blood sugar and serum proteins.

Post-mortem and cytology techniques – post-mortem examination principles and procedures; collection and preservation of tissues; use of fixatives, biopsy and cytology methods; tissue processing, microtomy and staining for diagnostic interpretation.

Staining and museum techniques – principles and types of staining; factors influencing staining outcomes; preparation of simple, compound and special stains; slide preparation, staining, mounting and labelling; slide storage and inventory management; museum specimen preparation and preservation techniques.

Module 10: Veterinary Microbiology and Diagnostic Laboratory Practices - (10 Marks)

Laboratory practices and microbiology basics – good laboratory practices and sterilisation methods; types and handling of microscopes; staining techniques and types of

stains; culture media – definition, ingredients, types, preparation, sterility checks and storage; introduction to laboratory animals – handling, care and management.

Infectious diseases and sample handling – defence mechanisms of the body; bacterial, viral and fungal infections including nosocomial, iatrogenic and zoonotic diseases; disease-wise clinical sample collection, preservation, transport and processing of specimens.

Diagnostic microbiology and molecular tools – principles of disease diagnosis; isolation and identification of bacteria, viruses and fungi using culture media, staining and biochemical characterisation; basics of egg inoculation and cell culture; serological techniques – agglutination, precipitation, ELISA, AGID, FAT, CFT, lateral flow tests; introduction to molecular diagnostics – PCR types, ribotyping and animal inoculation methods.

Quality control and assurance – definitions and concepts of quality control, quality assurance and quality management; national quality agencies – BIS, PFA, MMPO, MFPO, AGMARK; international organisations – Codex Alimentarius, FAO, WHO; food industry quality systems – HACCP, BPS, TQM and ISO series; microbiological quality control tests.

NOTE: - It may be noted that apart from the topics detailed above, questions from other topics prescribed for the educational qualification of the post may also appear in the question paper. There is no undertaking that all the topics above may be covered in the question paper