

Name of Programme: M.Sc. (Ag.) Animal Husbandry & Dairying

Academic eligibility for admission: - B.Sc. (Ag.)

Curriculum and Syllabus

Semester	Course Code & No.	Course Title	Credit Hrs.	Mid Exam.	Final Exam		Total
					Theory	Practical	
Ist Sem.	AHD-501	A.H. & DAIRYING - AN INTRODUCTION	3 (2+1)	20	40	40	100
	AHD-502	CHEMISTRY OF MILK & MILK PRODUCTS	3 (2+1)	20	40	40	100
	AHD-S03	PRINCIPLES OF ANIMAL NUTRITION	3 (2+1)	20	40	40	100
	AST-501	STASTICAL METHODS	3 (2+1)	20	40	40	100
	Total			12			

IInd Sem	AHD-504	MICROBIOLOGY OF MILK & MILK PRODUCTS	3 (2+1)	20	40	40	100
	AHD-505	MILK PROCESSING TECHNOLOGY	3 (2+1)	20	40	40	100
	AHD-506	FEEDS & FEEDING MANAGEMENT OF LIVE STOCK	3 (2+1)	20	40	40	100
	AST-502	DESIGN OF EPXERIMENTS	3 (2+1)	20	40	40	100
	Total			12			

IIIrd Sem	AHD-507	TECHNOLOGY OF MILK PRODUCTS	3 (2+1)	20	40	40	100
	AHD-508	BREEDING MANAGEMENT IN LIVESTOCK	3 (2+1)	20	40	40	100
	AHD-509	PRODUCTION AND MANAGEMENT OF SHEEP, GOAT, SWINE & POULTRY	3 (2+1)	20	40	40	100
	AHD 510	REPRODUCTION & THEIR MANAGEMENT IN LIVESTOCK	3(2+1)	20	40	40	100
	Total			12			

IVth Sem	AHD-511	DAIRY PLANT MANAGEMENT & QUALITY CONTROL	3 (2+1)	20	40	40	100	
	AHD-512	SHELTER & HEALTH MANAGEMENT OF LIVESTOCK	3 (2+1)	20	40	40	100	
	AHD-599	SEMINAR	1	Satisfactory/Unsatisfactory				
	Optional (any one from two)							
	AHD-513	RESEARCH, TEACHING, & TRAINING METHODOLOGY IN A.H. & DAIRYING	12 (9+3)	20	40	40	100	
	or							
	HOR-598	Thesis Research	12	40 % Internal +60% External)			100	
	Total			19				
Grand Total			55					

M.Sc. Ag. Animal Husbandry & Dairying

Isr Semester

AHD-6451: A.H. & DAIRYING - AN INTRODUCTION

(Credit Hours: 2+1 = 3)

(MARKS: MID 20 + THE 40 + PRA. 40 = 100)

Review of Animal Production V/s farming system of different parts of the country and abroad. Present status and future prospects of livestock production development in India. Production trends of cattle, buffalo, sheep, goat, swine and poultry in last two decades and factors affecting them. Elements of livestock production and management - a general idea. Management of livestock in Indian agroclimatic and socio economic condition. General behaviour and handling practice of different categories of livestock. Important breed of cattle, buffalo, sheep, goat, swine and poultry and their traits of economic importance.

Brief history of dairy development and cooperative movement in India. Principles of cooperatives. Organization and functioning of milk cooperatives since beginning to end in India & Uttar Pradesh. Present status of dairy Industry. in India, current milk production and their trends. Operation flood programmes, technology mission on dairying, National milk grid and marketing federations - their concepts, achievements, limitation and impact on dairy Industry. Method of milk procurement. payments, storage, handling, transportation, packaging, distribution and vending. Recent policy related to dairy sector & their impact on dairy industry in the country.

Practical: Related with the Course.

AHD-6452 : CHEMISTRY OF MILK & MILK PRODUCTS

(Credit Hours: 2+1 = 3)

(MARKS: MID 20 + THE 40 + PRA. 40 = 100)

Secretion & Synthesis of milk in mammary glands. Detailed composition, structure and physio-chemical properties of colostrums milk and its significance in milk processing. Chemistry and behaviour of lactose, milk lipids and proteins during processing & storage of milk. Inorganic and other minor constituents of milk and their significance. Chemistry of Coagulation & denaturation of milk proteins. Nutritive value of milk and processing effect on its. Physio-chemical changes during manufacturing process & storage of indigenous, fat rich, condensed, dried and coagulated milk products. Milk clotting enzymes, cheese enzymes & fermentation. Physical equilibrium of milk.

Practical: Related to the Course

AHD-6453: PRINCIPLES OF ANIMAL NUTRITION

(Credit Hours: 2+1 = 3)

(MARK MID 20 + THE 40 + PRA. 40 = 100)

Feed and animal body composition. Function of water in a animal body. Metabolism and utilization of nutrients. Methods of assessing nutritive value of feeds & fodders. Energy and protein value evaluation and protein energy interrelationships. Digestion in rumen and_ rumen metabolism. Rumen: microbial ecosystem and factors affecting of its. Control of feed intake in reinnants. Importance of applied nutrition and feed biotechnology. Manipulation of feeding and rumen ecosystem. Role of antibiotics, hormones and others biostimulates. Importance of trace minerals in ruminant feeding and their relationship with vitamins & hormones. Statistical design & evaluation of feeding trials.

Practical: Related to the Course

IInd Semester

AHD-6455: MICROBIOLOGY OF MILK & MILK PRODUCTS

(Credit Hours: 2+1 = 3)

(MARK : MID 20 + THE 40 + PRA. 40 = 100)

General Microbiology- The five kingdom classification of living organism and Evolutionary relationship between five kingdom. Major differences between prokaryotes and eukaryote. History and Significance of microorganism associated with milk & milk products. Taxonomy classification of bacteria. Generalized structure of bacterium and their cell shape & size, locomotion, reproduction, nutrition, population growth & growth curve, respiration and morphology of colony formation. Method of staining bacteria & microscopy. A very centralized idea of viruses & bacteriophages, yeast & mould, algae, protozoa, actinomycetes etc. Factors affecting growth of microorganism. Bacteriological laboratory techniques and method of bacteria' enumeration, isolation, cultivation identification, sterilization & media preparation for microorganism.

Dairy Microbiology- Microbiology of spoilage of milk & milk products. Microbiology of raw & market milk. Microbiology of cream, butter, concentrated & dry milk products. Microbiology of fermented milk & starter culture, cheese and indigenous milk products. Microbiological consideration of marketing of dairy products. Principles of control on spoilage microorganism of milk & milk products through use of chemicals, irradiation, temperature (Low & High), Drying and fermentation.

Practical: Related with the Course.

AHD-6456: MILK PROCESSING TECHNOLOGY

(Credit Hours: 2+1 = 3)

(MARKS: MID 20 + THE 40 + PRA. 40 = 100)

Milk preservation - method of chilling milk, preservation of milk by LP system.

Centrifugal separation, clarification & bacto-fugation and factors affecting their efficiency. Automatic desludge separator and clarifier. Homogenization - process and its significance in dairy processing. Theories of Homogenization and its effect on milk constituents and properties. Efficiency of Homogenization and factors affecting it. Thermal processing of milk - principles and method of thermization, pasteurization, sterilization, uprization, stantization etc. Ultra high temperature (UHT) processing of milk and aseptic packaging. Theoretical basis for UHT processing. Types of UHT processing plants. Bacterial, physical, chemical, biological and nutritional effect of UHT processing of milk. Legal standards for market and other designated milks. Special milks - principles of production, processing and marketing of toned, double toned, reconstituted, re combined, sterilized, flavoured, standardized, fermented and filled milk. Advances in dairy technology irradiation preservation of milk & milk product and micro wave heating. Use of membrane processing in dairy industry.

Practical: Related with the Course.

AHD-6457: FEEDS & FEEDING MANAGEMENT OF LIVE STOCK

(Credit Hours: 2+1 = 3)

(MARK : MID 20 + THE 40 + PRA. 40 = 100)

Feed & Fodder resources available and their requirement for feeding of livestock and poultry in India. nutritive value of feed & fodders. Conservation and preservation of feeds & fodders. Strategies for round the year fodder production. Annual and perennal fodder crops. Pasture development and their management.: Enrichment of poor quality roughages and improving bioavailability of nutrients. Nutritional requirement of cattle, buffalo, sheep, goat, pig and poultry at various stage of growth, production and reproduction. Present feeding standards & their limitation. Factors affecting nutritional requirement of livestock. Formulation of economic balance ration & calf starters. Feeding value of agro-industrial by product and its incorporation in meal mixture. Feed conversion efficiency of various categories of livestock & poultry.

Practical: Related with the Course.

IIIrd Semester

AHD-7451: TECHNOLOGY OF MILK PRODUCTS

(Credit Hours: 2+1 = 3)

(MARKS: MID 20 + THE 40 + PRA. 40 = 100)

Basic principles & Technology of manufacturing, packaging and storage of different categories of milk products - (i) Fatrich milk products - Cream, butter, butter oil and ghee. (ii) Frozen milk products Ice-cream, frozen desserts kulfi & malai-ice-baraf, Filled and imitation Ice-cream. (iii) Cheese & fermented milk products - Cheddar, Gouda, mozzarella, swiss, processed cheese, cheese spread, process cheese food, dahi, shrikhand, lassi & misti dahi. (iv) Concentrated and dry milk products - SCM, EM, RSCM, REM, UHT Sterilized concentrated milk WMP, SMP, Instant milk powder, infants food,

weaning foods, cream powder, butter powder, cheese powder, ice-cream mix powder and malted milk powder (v) Indigenous milk products - Khoa, Chhana, Paneer and sweet based on its. (vi) Milk by products - Casein, Na & CaCaseinates, edible casein, hydrolysate, co-precipitate, whey protein concentrate, whey beverages, whey syrup, lactose, use of butter milk. Practical: related with the Course.

AHD-7452: BREEDING MANAGEMENT IN LIVESTOCK

(Credit Hours: 2+1 = 3)

(MARKS: MID 20 + THE 40 + PRA. 40 = 100)

Basic principles of inheritance, variation, source of variation. Concept of population genetics-gene pool, allele frequency genotypes frequency, the Hardy-Weinberg equation, factor producing changes in populations. Traits of economic important and their complexity in farm animals. Heritability and repeatability. Important method of selection and systems of breeding, hybrid & heterosis. Genetic progress-what controls it genetic gain and. estimation of breeding value. Coefficient of relationships, coefficient of inbreeding depression. Breeding records & their maintenance.

Practical: Related with the Course.

AHD-7453: PRODUCTION AND MANAGEMENT OF SHEEP, GOAT, SWINE & POULTRY

(Credit Hours: 2+1 = 3)

(MARKS: MID 20 + THE 40 + PRA. 40 = 100)

Sheep & Goat- important breed of sheep & goat and their traits of economic importance, reproduction and breeding-system management in sheep & goat. Nutrients requirement and feeding practice for economic raising of sheep & goat. Routine operation, housing, care of kid & lamb. Scope at intensive milk, meat, mutton & wool production. Low cost shelter management of sheep & goat. Health management package.

Swine - Piggery development programme in India. Characteristic of swine and their production. Breeds reproduction & their problems management, housing, nutrition, nutrients requirement and feeding of swine. Care & management of pregnant sow and unweaned piglet, future of pig production programme in India with special reference to weaker section of society.

Poultry- The digestive and reproductive system of fowl. Formation of eggs. Structure and nutritive value of egg. Egg producing carrier of a laying hen and factors affecting egg size. Abnormal eggs. Hatching of eggs. Management of incubator & light. Breeding & rearing management of chick in brooders. Housing equipments Housing requirements. Housing system of poultry. Breeding system. Poultry nutrition. Modern feed additives for poultry. Requirements of poultry feeds. Method of feeding. Computation & Mixing of ration. Use of agro-industrial by products in poultry feeding. Management of replacement pullets. Culling of laying flocks. Maintenance of farms records. Health & sanitation problem & their control. Strategy to promote back yard poultry farming commercial

broiler production.

Practical: Related with the Course.

AHD 7454 : REPRODUCTION & THEIR MANAGEMENT IN LIVESTOCK

(Credit Hours: 2+1 = 3)

(MARKS: MID 20 + THE 40 + PRA. 40 = 100)

Anatomy of male & female reproductive tract. Hormonal control of spermatogenesis, oogenesis and oestrous cycles. Method of heat detection, control of estrus and oestrous synchronization, mating & insemination of cow fertilization, pregnancy embryogenesis, implantation, foetal development, Hormonal control and its. Pregnancy testing, parturition, post partum period, maintenance of lactation and factors affecting. Hormonal control of rumenogenesis and lactogenesis, reproductive efficiency and disorders of reproduction. Effect of climate and nutrition on male & female reproduction. Summer & winter problems in reproduction & their solution. Scope of reproductive biotechnology in augmenting animal productivity. Assisted reproduction technologies. Common method of development of transgenic animals.

Practical: Related with the Course.

IVthsemester

AHD-7455: DAIRY PLANT MANAGEMENT & QUALITY CONTROL

(Credit Hours: 2+1 = 3)

(MARK : MID 20 + THE 40 + PRA. 40 = 100)

Facilities decisions - operation function, plant location product selection & variety, process selection & planning, service and utilities requirements and selection of metals. Layout of facilities advantage of good dairy plant layout, layout of intermittent process, layout of process section, layout of service accommodation, siting the plant section, siting of auxiliary services. Layout decisions and floor plan of a composite milk plants. Equipment maintenance. Quality assurance programmes. Principles & practices of hygienic milk production. Concept and classification of zoonoses. Human disease spread by animals. Epidemiology and control of zoonoses of public health importance. Milk and its products borne disease, infection, intoxication and toxin-infection. Basic principles of cleaning and sanitization of dairy equipments, properties of important dairy detergents & sanitizers. Choice of detergents & sanitizers - guiding principles & limitation factors. Automation cleaning & sanitization process. Quality of water in detergency. Effluent treatment & disposal. Adulteration and use of preservatives in milk & their detection. Packaging its role, existing system, package materials and package performance. Principles of packaging equipment. Packaging standards and new trends in packaging of food. Safety aspects of milk with reference to use of antibiotic, pesticides and weedicides. HACCP as applied to quality assurance of milk & milk products. Legal standards & quality indices of milk and milk products. Various tests used in quality control of milk & milk products. Significance of mastitis milk & its detection test.

Practical: Related with the Course.

AHD-7456: SHELTER & HEALTH MANAGEMENT OF LIVESTOCK

(Credit Hours: 2+1 = 3)

(MARKS: MID 20 + THE 40 + PRA. 40 = 100)

Purpose of housing, housing system, selection of site arrangement of animals house. Space requirement of livestock. Housing design based on different agro-climatic region. BIS standards for livestock housing. Layout plan of house building for different species and categories of livestock. Microclimatic changes and modification in animal houses. Engineering aspects and cheap livestock house, housing problems in tropic and subtropics. Improvement of the existing housing system. Common disinfectant and sanitizers used in animal farms. Disposal of animal wastes under urban & rural condition. Disposal of carcasses.

General approach to livestock health programme. Symptom of ill health. Important infectious disease of livestock vaccination schedules in livestock. Internal and external parasites & their control. Important ailment associated with reproduction. Nutritional & metabolic disease of livestock. Accidental health disorders & their control. Role of management in calf mortality. Segregation & quarantine management for large animals. Concept of first aid at farm.

Practical: Related with the Course.

AHD-7457: RESEARCH, TEACHING, & TRAINING METHODOLOGY IN A.H. & DAIRYING

General idea of basic, applied, operational and adaptive research. Experimental technique-scientific methods, prerequisite of experimental programmes, laboratory work, writing procedure of research papers, review Papers, progress & final reports. Preparation of research project proposals. Prime parameter of quality research and higher education. Challenges in research & Higher Education. Significance and dilemmas of value education in contemporary India. Parameters of effective teaching and learning. Motivation of students for better performance and success. Essentials of making effective oral presentation, poster, presentation and power point presentation.

Knowledge of National & International agricultural institution, agricultural and veterinary universities, different funding agencies, doctoral & post doctoral fellowship and scholarship. Different all India coordinated research programme & technology mission. Suggested area of research in A.H. & Dairying. National & international association related to A.H. & Dairying and their publications. General idea of organizing and participating in seminar, symposia, conference and workshop.

Practical: Related with the Course.

AST 6364: STATISTICAL METHODS

(Credit Hours: 2+1 = 3)

(MARK :MID 20 + THE 40 + PRA. 40 = 100)

Frequency distribution, classification and tabulation of data, graphical and diagrammatic representation of data, measures of central tendency, measures of dispersion, coefficient of variance, standard error, skewness & kurtosis.

Consensus & sample survey, population and sample, probability concept of random sampling, simple random sample, stratified sampling systematic & cluster sampling parameter & sample value. Testing of hypothesis test of significance based on Z t and F test χ^2 - test for goodness of fit and independence of attributes.

Scattered diagram. Linear regression & correlation, regression and correlation coefficient.

Practical: Related with the Course.

AST 6368: DESIGN OF EXPERIMENTS

(Credit Hours: 2+1 = 3) (MARKS: MID 20 + THE 40 + PRA. 40 = 100)

Analysis of variance. Basic principles of experimental design, CRD, RBD, LSD with their analysis missing plot techniques in R.B.D. and L.S.D. Factorial experiments its concepts and analysis of 2^3 , factorial. Confounding in symmetrical factorial (in 2^3 experiments), split plot design, strip plot design, uniformity trials. Progeny row trials. Complete family block design, with over trials & simple rotational experiments. Statistical organization, statistics of livestock & fisheries. Source of livestock and agriculture in general. Source of official statistician. Crop cutting experiments.