- ANIMAL SCIENCE SYLLABUS

DEPARTMENT OF ANIMAL HUSBANDRY AND DAIRYING

M.Sc. (Ag.) ANIMAL HUSBANDRY AND DAIRYING (ANIMAL SCIENCE)

SEMESTERWISE COURSE STRUCTURE

SEMESTER	CREDIT HOURS	TOTAL
SEMESTER-I		
ASC 501: Basics of Productive and Reproductive Physiology.	**3(2+1)**	
ASC 502: Fundamentals of Animal Nutrition	**3(2+1)**	
ASC 509: Market Milk.	**3(2+1)**	**12**
*ASC 511: Breeding and Reproduction and Managements	**4(3+1)**	
AST 501: Agricultural statistics	**3(2+1)**	
SEMESTER-II		
ASC 503: Cattle and Buffalo Production and Management.	**3(2+1)**	
ASC 504: Animal Genetics and Breeding.	**3(2+1)**	
ASC 505: Ruminant and Non-ruminant Nutrition	**3(2+1)**	**11**
*ASC 512: Management of Sheep, Goat, Pig and Poultry	**4(3+1)**	
AST 503: Computer application	**2(1+1)**	
SEMESTER-III		
ASC 506: Poultry Production and Hatchery Management.	**3(2+1)**	
ASC 507: Sheep, Goat and Pig Production and Management.	**3(2+1)**	**9**
ASC 510: Shelter management	**3(2+1)**	
*ASC 513: Livestock and Poultry Housing Management	**4(3+1)**	
SEMESTER-IV		
ASC 508: Livestock health management	**3(2+1)**	
*ASC 514: Milk Secretion, Composition and Physical Properties	**4(3+1)**	**24**
*ASC 515: Utilization of milk by-products	**4(3+1)**	
ASC 516: Seminar	**1**	
ASC 517: Thesis	**20**	
		56

*** Special papers in lieu of thesis**

AHD501: Basics of Productive and Reproductive Physiology. 3(2+1)

General :Blood: its components, Properties and function of blood as a body fluid.Sites of blood collection. Important physiological parameters of domestic animals.

Digestion physiology: Gross morphological and topographical study of various organs of digestive system of ruminants and non ruminants including poultry. Accessory digestive organs and their functions.Secretary functions of gastro-intestinal tract, Microbial digestion in rumen and intestine.Enzymatic digestion in monogastric and fermentative digestion in rumen.

Endocrinology: Definition,types, chemical nature and mechanism of action of hormones. Different endocrine glands, their hormones and characteristics. Regulation of hormone secretions.

Reproductive physiology: Male and Female reproductive organs,Puberty & its endocrine control. Hormones and growth factors in reproduction**.** Gametogenesis,Semen its components, Spermatozoa – structure and composition, maturation and transportation. Sexual cycles in females, ovulation, fertilization, implantation, placentation. Pregnancy diagnosis. Parturition, involution.Artificial insemination, methods, merits & demerits. Collection, evaluation, dilution and preservation of semen. Physiology of reproductive system of poultry. Common reproductive disorders.

Lactation physiology:
Structure of mammary gland, nerve and blood supply. Prenatal and postnatal mammary development. Mechanism of fat, protein and lactose synthesis and theirsecretion. Hormonal regulation of mammogenesis, lactogenesis and galactopoiesis.Milk ejection and inhibition. Role of oxytocin in milk letdown.

Practical:
Collection of blood samples - Separation of serum and plasma,Enumeration of erythrocytes, leucocytes - differential leucocytic count,Counting of rumen motility,Behavioral signs of oestrus,Rectal palpation of reproductive organs.Sperm motility, sperm concentration - live and dead -abnormal spermCount.Study of bovine udder anatomy, and its arterial and venous supply.Measurement of let-down time of milk.

AHD502: FUNDAMENTALS OF ANIMAL NUTRITION 3(2+1)

Nutritional significance of carbohydrates , lipids, and protein. Metabolism and energy availability from organic materials. Basal metabolic rate. Energy partitioning and balance. Direct and indirect calorimetry. Balance of nutrients. Protein evaluation. Metabolisable protein concept.

Classification, physiological functions, deficiency symptoms and toxicity of minerals and vitamins. Inter relationship, synergism and antagonism. Nutrional role of prebiotics, probiotics and phytochemicals.

Feeding standards NRC, ARC, and Indian. Ration formulation, least cost ration. Evaluation of forage quality in range animals. Role of indicator methods. Advances in silage and hay making, quality and grading. Ration ingredients and its quality. B.I.S. specifications. Methods of feed processing- physical, chemical and biological. Effect of processing on nutrional quality and utilization. Antinutrional factor and toxins in feed and forages. Nutrional deficiency syndroms – bloat, ketosis, milk fever and rumen acidosis. Feeding evaluation technologies viz, digestability, nylon bag techniques, in vitro.

PRACTICAL:

Sampling of feed, feed formulation for various categories of livestock. Analysis of feed for proximate principles and their limitations. Cell wall fractionation. Numerical problems on digestibility, TDN, SE, energy balance, C and N balance. Computation of balance ration for cattle and buffaloes.

AHD503: CATTLE AND BUFFALO PRODUCTION AND MANAGEMENT: 3(2+1)

Introduction – Development of Dairy Industry in India and world - Present status and future prospects of livestock development in India.

Important breeds of cattle and buffalo, traits of economic importance and their inter-elationships - Selection of high quality animals - Role of management in improving the reproduction efficiency in farm animals. - Housing and rearing systems.

Breeding Management: System of breeding Economic traits. Methods of Breeding - Prenatal and postnatal care and management of cattle and buffalo -

General management and feeding practices of calves, heifers, pregnant. lactating and dry animals, and bulls and working animals. Management strategies for reducing mortality in calves, age at first calving and calving interval in cattle and buffaloes.

Routine dairy farms operations and labour management. Milking management, Machine milking and hand milking, Technique of clean and hygienic milk production, transportation of animals, health management. Management of draught animals and summer management.

Dairy farm accounts and records. Concepts of input and output cost of dairy farming (small and large holdings).

Practical:

Visits to cattle farms and critical analysis of various types of managerial practices. Familiarization with body points of animals, Approaching, handling and restraining of cattle, buffalo. Methods of identification (marking, tattooing, branding, tagging and electronic chip). Familiarization with routine farm operations. Determination of age. Determination of body weight using different measurements. Study of breeding management in the farm- Analysis of practical feeding management.

AHD 504: ANIMAL GENETICS AND BREEDING 3(2+1)

History of Genetics; Chromosome numbers and types in livestock and poultry. Mitosis, Meiosis and gametogenesis. Structure of DNA and RNA and replication of DNA; Protein synthesis; gene interaction; linkage and crossing over, Mutation. Chromosomal aberrations.

Population genetics: Genetic structure of population. Gene and genotypic frequency: Hardy - Weinberg law and its application; Forces (e.g. Mutation, migration, selection and drift) changing gene and genotypic frequencies.

Quantitative genetics: Quantitative and Qualitative traits; Components of phenotypic and genotypic variance; Concept of genotype and environment interaction, Heritability, repeatability, genetic and phenotypic correlations. Economic traits of livestock and poultry.

Selection: Response to selection and factors affecting it; Basis of selection: individual, pedigree, family, sib, progeny selection, Multi trait selection (Methods of selection)-random, independent culling level and total score.

Animal Breeding: Classification of mating systems; Inbreeding and out breeding-genetic and phenotypic consequences viz., inbreeding depression and heterosis: Breeding strategies for the improvement of cattle, and buffalo, sheep, goat, swine and poultry; Conservation of germplasm.

Practical:

Calculation of gene and genotypic frequencies. Estimation of heritability, repeatability, genetic and phenotypic correlations. Computation of selection differential, generation interval and expected genetic gain; Construction of selection index; Sire indices, Measurement of inbreeding and relationship coefficients; Estimation of heterosis.

AHD505: Ruminant and non ruminant nutrition: 3(2+1)

Rumen and its environment. Development of functional rumen. Digestion kinetics in reticulo-rumen. Role of rumen microbes, significance of rumen fungi. Defaunation and transfaunation . Microbial fermentation in rumen. VFA production, inter-conversion and utilization. Dietary protein breakdown. Microbial protein synthesis. NPN compounds and their utilization. Ammonia toxicity. Role of slow release urea compounds. Biohydrogenation and utilization of dietary lipids. Methanogenesis and methane inhibitors.

comparative gastrointestinal physiology of monogastrics – digestion and metabolism of organic nutrients in poultry and swine. Significance of minerals and vitamins in monogastrics. Inter relationship in nutrient sparing activity. Feeding systems. Role of feed additives. Factors affecting nutritional quality and performance in poultry and swine.

Energy protein requirements for maintenance and productivity in ruminants and non ruminants. Colostrums feeding of calf, mineral and vitamins requirements. Dry matter intake in relation to productivity. DM: water intake ratio.

PRACTICAL:

Comparative studies of rumen, poultry and pig digestive system. Collection of rumen samples and its analysis. Ration computation for starter, grower and layer bird. Ration formulation for starter, grower and finisher swine.

AHD 506: POULTRY PRODUCTION AND HATCHERY MANAGEMENT

Indian Poultry Industry; poultry statistics; Classification of poultry, common breeds of poultry including duck, quail, turkey & guinea Fowl.
Reproduction in fowl, male and female reproduction systems, formation of eggs, structure of eggs; Important economic traits of poultry: egg production, egg weight, egg quality, growth, feed consumption and feed efficiency, fertility and hatchability, plumage characteristics and comb types. Management principles of incubation. Factors affecting fertility and hatchability, selection, care and incubation of hatching eggs.
Housing management: Different types of rearing system, their advantages and disadvantages. Space requirement for different age groups under different rearing systems. Poultry housing systems Cage Vs floor system, litter management; environmentally controlled housing.
Feeding management: Nutrient requirement for starter, grower, finisher, layer, and broiler. Feeding system; Feed additives; mineral and vitamins supplements.
Brooding management: brooding, Types of brooders; preparation of shed to receive chicks; importance of environment (temperature, humidity and ventilation). Management of chicks, growing, laying and breeding flocks, broiler production, selection and culling of laying flocks. Care and management of quail. Vices in poultry and its remedial measures; Economics of layer and broiler production.

Practical

Diagrammatic illustration of body parts of chicken, duck, quail, guinea fowl and turkey. Male and female reproductive system. Working of hatchery incubation requirement; Hatchery layout and equipments. Handling of eggs prior and during incubation. Candling. Fumigation. Exposure to commercial broiler and layer farms-different system of housing. Demonstration of litter and cage rearing systems. Demonstration of different types of feeder, waterer, fogger, sprinklers etc. Maintenance of farm records.

AHD507: SHEEP, GOAT AND PIG PRODUCTION AND MANAGEMENT

Demography of sheep and goat population and their role in economy. Important sheep and goat breeds- Advantages and disadvantages of sheepand goat farming. Important traits for meat, milk and fibre. General management and feeding. practices during different stages of growth, development and production (milk, meat and wool) in small and large holdings.Range

Management - Stocking rate and pasture improvement and utilization; management understall fed conditions, Transportation of sheep and goat. Breeding schedule and management of ram and buck. Wool: Importance of wool - Fiber structure- Fleece characters - Goat fibres -Characters of mohair and pashmina, fur and Angora - Marketing of goat fibres/ wool.-Planning of sheep and goat farm of various sizes - Economics of sheep and goat farming.

Introduction and scope of swine farming in the country. Demography of swine population. Breeds and their role in economy. Management of different categories of swine for optimal production: breeding and pregnant sows; sows at farrowing and after farrowing; pig-lets, growing stock, lactating sows, feedlot stock. Mating technique in swine. Housing of swine. Swine feeds and feeding. Economics of pig farming.

Practical:
Familiarization with body points of animals, Approaching, handling and restraining of sheep, goatand pig.Clipping, shearing, dipping, spraying and spotting sick animals.Vaccination of sheep, goat and pig.Shearing of wool. Structure of wool and its differentiation from hair fibre. Determination of staple length, crimps, diameter and strength of wool fibre. Sorting, packaging and grading of wool. Layout plans for sheep/goat and pig farms. Familiarization with routine farm operations.

AHD508: LIVESTOCK HEALTH MANAGEMENT 3(2+1)

Health and production inter relationship. General approach to plan animal health programme. Emerging disease problems in India and their management. Major reproductive disorders their prevention and control maintenance of herd reproductive health, mastitic. H, D , FMD, B, O. Blosat, milk fever control . Specific disease problems in calves and their management. Sign of disease out break and procedure for early diagnosis. Predisposing factors of disease immune status of neonates zoonosis concept and classification. Epidemiology of bacterial and viral diseases.
Practical: General examination of animals for signs of health. Package of practical for control and prevention of calf diseases, immunization against different different diseases . Collection preservation and transportation of clinical material for diagnosis purpose. Collection, preservation and examination of blood and blood smear for protozoa parasites. Examination of unne and faecal material. Preparation and use of insecticide solution. Procedures

for autopsy and carcass disposal maintenance of health record. Data base animal health surveillance.

AHD 509: Market Milk: 3 (2+1)

Status of dairy industry in India. Operation flood program. Technology mission on dairying. National Milk Grid Marketing, their concepts, achievements, limitations and impact on dairy industry in India. Milk production trends and dairy development through successive national plans. Recent policy change to dairy sector (MMPO) AND THEIR impact on dairy industry in the country.

Processing: Importance of various milks in milk processing. Impact of milk processing on major and minor constituents of milk. Methods of milk procurements ,payments for quality assessment, handling and transportation of milk to processing dairies. Milk preservation methods of chilling milk, centrifugal separation, clarification and bactofugation and factors affecting their efficiency. Automatic desludging separations and clarifiers. Homogenization process and its significance in dairy industry. Theories of homogenization and factors affecting it. Thermal processing of milk- principles and methods of thermization, pasteurization and sterilization, UHT. Refrigeration and its uses. Special milks- principles of production, processing and marketing of toned, double toned, reconstitute and recombined sterilized, flavoured and filled milk

Practical: Assembling and dissembling of cream separator and separation of milk. Study of parts of LTLT and HTST pasteurizers, refrigeration plants and preparation of report. Preparation of special milks like toned milk, double toned milk, chocolate milk, sterilized milk, flavoured and filled milk. Visits to milk plants and milk products factories and submission of the report. Numerical problems on the standardization of milk

ASC 510: SHELTER MANAGEMENT: 3(2+1)

UNIT-I: General principles in planning animal houses- farmstead and animal houses - Selection of site and planning; layouts for livestock farm of different sizes indifferent climatic zones in India - Farm structures - General principles of construction of enclosures, floor and road.

UNIT-II: Housing requirements of different classes of Livestock - Preparation of layouts, plans, arrangement of alleys- Fitting and facilities in the houses for dairy cattle, calves, bulls, work cattle, pigs, sheep, goats, and poultry.

UNIT-III: Improvement of existing buildings; water supply; feed and fodder delivery systems - Economics of Livestock housing.

UNIT-IV: Housing - Disease control measures and sanitation of all classes of livestock

Practical

Score card for animal houses - Time and motion study in Animal houses - Preparation of plans for Animal houses for cattle, sheep, pigs, goats, and other livestock. Economics of livestock housing - Preparation of plan for animal houses of different sizes and climatic zones of India.

ASC 516: SEMINAR **1 Credit**

ASC 517: THESIS **20 Credit**

OR

FOLLOWING PAPERS IN LIEU OF THESIS

ASC 511: BREEDING AND REPRODUCTION MANAGEMENTS: 4 (3+1)

Functional morphology of male and female reproductive organs of farm animals. Management strategies for attaining early maturity. Heat detect methods association problems and their management. Artificial management. Artificial breeding and its economic importance, post management pregnancy development and diagnosis. Management of down calves post Partum care, factors influencing reproductive efficiency in buffaloes and cross breed cattle and measures for improvement. Management of breeding bulls, methods of semen collection factors affection quality semen production, evaluation processing and preservation of semen. Merits and demerits of different extenders . Maintenance of records for artificial breeding. Basic principles of inheritance, concept of heritability and repeatability importance, methods of

selection and system of breeding in animals. Blood and its composition, properties and function.

Practical: Examination of reproductive organs at various stages of reproductive cycle. Heat detection in cattle , buffaloes. Preparation of heat expectancy chart. Calculation of heat detection index of herd. Artificial insemination by rectovaginal and spectrum method . Pregnancy diagnosis by per rectum method. Calculation of breeding efficiency, heritability and repeatability of the herd preparation of bull semen collection. Evaluation of semen preparation of extendors dilution and preservation of semen , maintenance and handling of liquid semen cell count, cell volume , haemoglobin, blood sugar and blood serum.

ASC 512: MANAGEMENT OF SHEEP,GOAT, PIG AND POULTRY: 4(3+1)

Livestock and poultry development programme currently in operation in the country important breeds of sheep, goat, pig and poultry. their characteristics classification and distribution. Management of sheep, goat, pig and poultry during growth, reproduction and production. Marking for identification. Docking, dehorning, dubbing, clipping and sterilization. Selection and disposal of culled animals. Different records of management of related animals. Economics of sheep, goat, pic and poultry farming.

PRACTICAL: Preparation of management calendar for sheep, goat , pig and poultry. Judging of poultry, identification , debeaking , caponization. Maintenance of records at the farm calculation of cost of meat, egg , wool , hair and milk.

ASC 513: LIVESTOCK AND POULTRY HOUSING MANAGEMENT: 4 (3+1)

Principles of construction of farm building selection of site .Types and design for various livestock and poultry. Space requirements of different categories of livestock and poultry under different housing system. Requirements of various housing components Viz. ventilation , humidity and temperature control types of floors , walls , gates , roofs , stalls , managers tying devices and food storage. Housing for experimental animals methods of drainage and sewage disposal sewage treatment and classification of various types of septic and sedimentation tanks digestion tanks , sewage filtration sludge and lagoons, recycling of waste and sludge farming and biogas, common disinfectants, detergents and sanitizer used on farm premises method of application and factors affecting their

efficiency. Construction of auxiliary building like bull exerciser. Wallowing tank and feed processing unit.

Practical: Drawing of environment profiles in different agro-climatic region. Layout plans including cost kit or different size units and categories of animals. Design and construction of different types of shades. Cleaning disinfection of sanitation of dairy farm equipment, layout plans for waster/sewage disposal and sewage plants management.

ASC 514: Milk Secretion, Composition and Physical Properties: 4(3+1)

Milk secretion, its theories and biosynthesis of milk constituents. Detailed composition of colostrums and milk of cattle and buffalo and factors affecting the same. Determination and significance of colour, specific gravity, refractive index, surface tension, viscosity, specific heat, electrical conductivity, osmotic pressure, boiling point, freezing point, acidity, pH, buffering capacity, oxidation and reduction potential.

Practical: A comparative study of specific gravity of milk by lactometer, Westphal balance and RD Bottle (or pycnometer), Determination of electrical conductivity, viscosity and surface tension of milk. Determination of pH and buffer index of milk. Determination of acidity of milk.

ASC 515: Utilization of milk by-products: **4(3+1)**

Status, availability and utilization of dairy by products. Associated economic and pollution problems. Manufacture of casein, sodium and calcium- caseinate, edible casein, hydrolysate, co-precipitates, whey protein concentrate and whey beverages. Use of butter milk.

Practical: Manufacture of various types of casein.

Preparation of whey drinks.