



## UPSC IFS Animal Husbandry & Veterinary Science Syllabus

### Paper – I

#### 1. Animal Nutrition:

- Energy sources, energy, metabolism and requirements for maintenance and production of milk, meat, eggs and wool. Evaluation of feeds as sources of energy.

##### 1.1 Trends in protein nutrition:

- sources of protein metabolism and synthesis, protein quantity and quality in relation to requirements. Energy protein ratios in ration.

##### 1.2. Minerals in animal diet :

- Sources, functions, requirements and their relationship of the basic minerals nutrients including trace elements.

##### 1.3. Vitamins, Hormones and Growth Stimulating, substances :

- Sources, functions, requirements and inter-relationship with minerals.

##### 1.4. Advances in Ruminant Nutrition-Dairy Cattle:

- Nutrients and their metabolism with reference to milk production and its composition.
- Nutrient requirements for calves, heifers, dry and milking cows and buffaloes.
- Limitations of various feeding systems.

**1.5 Advances in Non-Ruminant Nutrition-Poultry-Nutrients and their metabolism with reference to poultry, meat and egg production, Nutrients requirements and feed formulation and broilers at different ages.**

**1.6 Advances in Non-Ruminant Nutrition-Swine-Nutrients and their metabolism with special reference to growth and quality of meat production, Nutrient requirement and feed formulation for baby-growing and finishing pigs.**

**1.7. Advances in Applied Animal Nutrition-A critical review and evaluation of feeding experiments, digestibility and balance studies. Feeding standards and measures of food energy. Nutrition requirements for growth, maintenance and production. Balanced rations.**

#### 2. Animal Physiology :

##### 2.1 Growth and Animal Production :

- Prenatal and postnatal growth, maturation, growth curves, measures of growth, factors affecting growth, conformation, body composition, meat quality.

##### 2.2 Milk Production and Reproduction and Digestion :

- Current status of hormonal control of mammary development, milk secretion and milk ejection.

- Male and Female reproduction organ, their components and function.
- Digestive organs and their functions.

### **2.3 Environmental Physiology :**

- Physiological relations and their regulation; mechanisms of adaption, environmental factors and regulatory mechanism involved in animal behaviour, methods of controlling climatic stress.

### **2.4 Semen quality :**

- Preservation and Artificial Insemination-Components of semen, composition of spermatozoe, chemical and physical properties of ejaculated semen, factors affecting semen in vivo and in vitro.
- Factors affecting semen production and quality preservation, composition of diluents, sperm concentration, transport of diluted semen.
- Deep Freezing techniques in cows, sheep and goats, swine and poultry.
- Detection of oestrus and time of insemination for better conception.

### **3. Livestock Production and Management :**

- Commercial Dairy Farming-Comparison of dairy farming in India with advanced countries.
- Dairying under fixed farming and as a specialised farming, economic dairy farming, Starting of a dairy farm.
- Capital and land requirement, organisation of the dairy farm. Procurement of goods; opportunities in dairy farming, factors determining the efficiency of dairy animal, Herd recording, budgeting, cost of milk production; pricing policy; Personnel Management.
- Developing Practical and Economic ration for dairy cattle; supply of greens throughout the year, field and fodder requirements of Dairy Farm, Feeding regimes for day and young stock and bulls, heifers and breeding animals, new trends in feeding young and adult stock; Feeding records.

### **3.2. Commercial meat, egg and wool production:**

- Development of practical and economic rations for sheep, goats, pigs, rabbits and poultry. Supply of greens, fodder, feeding regimens for young and mature stock.
- New trends in enhancing production and management.
- Capital and land requirements and socio-economic concept.

### **3.3. Feeding and management of animals under drought, flood and other natural calamities.**

### **4. Genetics and Animal Breeding :**

- Mitosis and Meiosis; Mendelian inheritance; deviations to Mendelian genetics; Expression of genes; Linkage and crossing over; Sex determination, sex influenced and sex limited characters; Blood groups and polymorphism; Chromosome aberrations; Gene and its structure; DNA as a genetic material; Genetic code and protein synthesis; Recombinant DNA technology, Mutations, types of mutations, methods for detecting mutations and mutation rate.

### **4.1 Population Genetics Applied to Animal Breeding:**

- Quantitative Vs.
- Qualitative traits; Hardy Weinberg Law; Population Vs.
- Individual; Gene and genotypic frequency; Forces changing gene frequency; Random drift and small populations; Theory of path coefficient; Inbreeding, methods of estimating inbreeding coefficient, systems of inbreeding; Effective population size; Breeding value, estimation of breeding value, dominance and epistatic deviation; partitioning of variation; Genotype X environment correlation and genotype X environment interaction; Role of multiple measurements; Resemblance between relatives.

#### **4.2 Breeding Systems :**

- Heritability, repeatability and genetic and phenotypic correlations, their methods of estimation and precision of estimates; Aids to selection and their relative merits; Individual, pedigree, family and within family selection; Progeny testing; Methods of selection; Construction of selection indices and their uses; Comparative evaluation of genetic gains through various selection methods; Indirect selection and Correlated response; Inbreeding, upgrading, cross-breeding and synthesis of breeds; Crossing of inbred lines for commercial production; Selection for general and specific combining ability; Breeding for threshold character.

#### **Paper – II**

#### **1. Health and Hygiene:**

##### **1.1. Histology and Histological Techniques :**

- Stains-Chemical classification of stains used in biological work-principles of staining tissues-mordants-progressive & regressive stains-differential staining of cytoplasmic and connective tissue elements-Methods of preparation and processing of tissues-celloidin embedding-Freezing microtomy-Microscopy-Bright field microscope and electron microscope.
- Cytology-structure of cell, organelles & inclusions; cell division-cell types-Tissues and their classification-embryonic and adult tissues-Comparative histology of organs:- vascular, Nervous, digestive, respiratory, musculo-skeletal and urogenital systems-Endocrine glands-Integuments-sense organs.

##### **1.2 Embryology:**

- Embryology of vertebrates with special reference to aves and domestic mammals-gametogenesis-fertilization-germ layers-foetal membranes & placentation-types of placenta in domestic mammals-Teratology-twin & twinning-organogenesis-germ layer derivatives-endodermal, mesodermal and ectodermal derivatives.

##### **1.3 Bovine Anatomy-Regional Anatomy :**

- Paranasal sinuses of OX-surface anatomy of salivary glands. Regional anatomy of infraorbital, maxillary, mandibuloalveolar, mental & coronal nerve block-Regional anatomy of paravertebral nerves, pudental nerve, median, ulnar & radial nerves-tibial, fibular and digital nerves-Cranial nerves-structures involved in epidural anaesthesia-superficial lymph nodes-surface anatomy of visceral organs of thoracic, abdominal and pelvic cavities-comparative features of locomotor apparatus & their application in the biomechanics of mammalian body.

**1.4 Anatomy of Fowl :** Musculo-skeletal system-functional anatomy in relation to respiration and flying, digestion and egg production.

**1.5 Physiology** of blood and its circulation, respiration; excretion, Endocrine glands in health and disease.

**1.5.1 Blood constituents :** Properties and functions-blood cell formation-Haemoglobin synthesis and chemistry-plasma proteins production, classification and properties; coagulation of blood; Haemorrhagic disorders-anticoagulants-blood groups-Blood volume-Plasma expanders-Buffer systems in blood. Biochemical tests and their significance in disease diagnosis.

**1.5.2. Circulation:** Physiology of heart, cardiac cycle-heart sounds, heart beat, electrocardiograms, Work and efficiency of heart-effect of ions on heart function-metabolism of cardiac muscle, nervous and chemical regulation of heart, effect of temperature and stress on heart, blood pressure and hypertension, Osmotic regulation, arterial pulse, vasomotor regulation of circulation, shock. Coronary & pulmonary circulation, Blood-Brain barrier-Cerebrospinal fluid-circulation in birds.

**1.5.3 Respiration :** Mechanism of respiration, Transport and exchange of gases-neural control of respiration-chemoreceptors-hypoxia-respiration in birds.

**1.5.4 Excretion:** Structure and function of kidney-formation of urine-methods of studying renal function-renal regulation of acid-base balance; physiological constituents of urine-renal failure-passive venous congestion-Urinary recreation in chicken-Sweat glands and their function. Biochemical tests for urinary dysfunction.

**1.5.5 Endocrine glands :** Functional disorders, their symptoms and diagnosis. Synthesis of hormones, mechanism and control of secretion-hormonal receptors-classification and function.

**1.6. General knowledge of pharmacology and therapeutics of drugs :** Cellular level of pharmacodynamics and pharmaco-kinetics-Drugs acting on fluids and electrolyte balance-drugs acting on Autonomic nervous system-Modern concepts of anaesthesia and dissociative anaesthetics-Autocoids-Antimicrobials and principles of chemotherapy in microbial infections-use of hormones in therapeutics-chemotherapy of parasitic infections-Drug and economic poisons in the Edible tissues of animals-chemotherapy of Neoplastic diseases.

**1.7. Veterinary Hygiene with reference to water, air and habitation :** Assessment of pollution of water, air and soil-Importance of climate in animal health-effect of environment on animal function and performance-relationship between industrialisation and animal agriculture-animal housing requirements for specific categories of domestic animals viz. pregnant cows & sows, milking cows, broiler birds-stress, strain & productivity in relation to animal habitation.

## **2. Animal Diseases :**

2.1 Pathogenesis, symptoms, postmortum lesions, diagnosis, and control of infectious diseases of cattle, pigs and poultry, horses, sheep and goats.

2.2 Etiology, symptoms, diagnosis, treatment of production diseases of cattle, pig and poultry.

- 2.3 Deficiency diseases of domestic animals and birds.
- 2.4 Diagnosis and treatment of nonspecific condition like impaction, Bloat, Diarrhoea, Indigestion, dehydration, stroke, poisoning.
- 2.5 Diagnosis and treatment of neurological disorders.
- 2.6 Principles and methods of immunisation of animals against specific diseases-hard immunity-disease free zones-'zero' disease concept-chemoprophylaxis.
- 2.7 Anaesthesia-local, regional and general-preanaesthetic medication, Symptoms and surgical interference in fractures and dislocation, Hernia, choking, abomassal displacement-Caesarian operations, Rumenotomy-Castrations.
- 2.8 Disease investigation techniques-Materials for laboratory investigation-Establishment Animal Health Centres-Disease free zone.

### **3. Veterinary Public Health:**

**3.1 Zoonoses :** Classification, definition; role of animals and birds in prevalence and transmission of zoonotic diseases-occupational zoonotic diseases.

**3.2. Epidemiology :** Principles, definition of epidemiological terms, application of epidemiological measures in the study of diseases and disease control, Epidemiological features of air, water and food borne infections.

**3.3 Veterinary Jurisprudence :** Rules and Regulations for improvement of animal quality and prevention of animal diseases-state and control Rules for prevention of animal and animal product borne diseases-S.P. C.A.-veterolegal cases-certificates-Materials and Methods of collection of samples for veterolegal investigation.

### **4. Milk and Milk Products Technology :**

#### **4.1 Milk Technology :**

- Organization of rural milk procurement, collection and transport of raw milk. Quality, testing and grading raw milk, Quality storage grades of whole milk, Skimmed milk and cream.
- Processing, packaging, storing, distributing, marketing defects and their control and nutritive properties of the following milks : Pasteurized, standardized, toned, double toned, sterilized, homogenized, reconstituted, recombined and flavoured milks.
- Preparation of cultured milks, cultures and their management, yoghurt, Dahi, Lassi and Srikhand. Preparation of flavoured and sterilized milks. Legal standards, Sanitation requirement for clean and safe milk and for the milk plant equipment.

#### **4.2 Milk Products Technology :**

- Selection of raw materials, assembling, production, processing, storing, distributing and marketing milk products such as Butter, Ghee, Khoa, Channa, Cheese; Condensed, evaporated, dried milk and baby food; Ice cream and Kulfi; by products; whey products, butter milk, lactose and casein.
- Testing Grading, judging milk products-BIS and Agmark specifications, legal standards, quality control nutritive properties. Packaging, processing and operational control Costs.

## **5. Meat Hygiene and Technology : 5.1 Meat Hygiene :**

5.1.1 Ante mortem care and management of food animals, stunning, slaughter and dressing operations; abattoir requirements and designs; Meat inspection procedures and judgement of carcass meat cuts-drading of carcass meat cuts-duties and functions of Veterinarians in Wholesome meat production.

5.1.2 Hygienic methods of handling production of meat-spoilage of meat and control measures-Post slaughter physicochemical changes in meat and factors that influence them-quality improvement methods-Adulteration of meat and defection-Regulatory provisions in Meat trade and Industry.

## **5.2. Meat Technology**

5.2.1 Physical and chemical characteristics of meat-meat emulsions-methods of preservation of meat-curing, canning, irradiation, packaging of meat and meat products; meat products and formulations.

**5.3. Byproducts :** Slaughter house by products and their utilisation-Edible and inedible byproducts-social and economic implications of proper utilisation of slaughter house byproducts-Organ products for food and pharmaceuticals.

**5.4. Poultry Products Technology :** Chemical composition and nutritive value of poultry meat, pre slaughter care and management. Slaughtering techniques, inspection, preservation of poultry meat, and products. Legal and BIS standards. Structure, composition and nutritive value of eggs. Microbial spoilage. Preservation and maintenance. Marketing of poultry meat, eggs and products.

**5.5. Rabbit/Fur Animal farming :** Care and management of rabbit meat production. Disposal and utilization of fur and wool and recycling of waste byproducts. Grading of wool.

## **5. Extension :**

- Basic philosophy, objectives, concept and principles of extension. Different Methods adopted to educate farmers under rural conditions. Generation of technology, its transfer and feedback. Problems of constraints in transfer of technology. Animal husbandry programmes for rural development.