

UPSC Mains Animal Husbandry and Veterinary Science

Optional Paper-I Syllabus

1. Animal Nutrition:

1.1 Partitioning of food energy within the animal. Direct and indirect calorimetry. Carbon-nitrogen balance and comparative slaughter methods. Systems for expressing energy value of foods in ruminants, pigs and poultry. Energy requirements for maintenance, growth, pregnancy, lactation, egg, wool, and meat production.

1.2 Latest advances in protein nutrition. Energy protein inter-relationships. Evaluation of protein quality. Use of NPN compounds in ruminant diets. Protein requirements for maintenance, growth, pregnancy, lactation, egg, wool and meat production.

1.3 Major and trace minerals-Their sources, physiological functions and deficiency symptoms. Toxic minerals. Mineral interactions. Role of fat-soluble and water-soluble vitamins in the body, their sources and deficiency symptoms.

1.4 Feed additives-methane inhibitors, probiotics, enzymes, antibiotics, hormones, oligosaccharides, antioxidants, emulsifiers, mould inhibitors, buffers etc. Use and abuse of growth promoters like hormones and antibiotics-latest concepts.

1.5 Conservation of fodders. Storage of feeds and feed ingredients. Recent advances in feed technology and feed processing. Anti-nutritional and toxic factors present in livestock feeds. Feed analysis and quality control. Digestibility trials-direct, indirect and indicator methods. Predicting feed intake in grazing animals.

1.6 Advances in ruminant nutrition. Nutrient requirements. Balanced rations. Feeding of calves, pregnant, work animals and breeding bulls. Strategies for feeding milch animals during different stages of lactation cycle. Effect of feeding on milk composition. Feeding of goats for meat and milk production. Feeding of sheep for meat and wool production.

1.7 Swine Nutrition. Nutrient requirements. Creep, starter, grower and finisher rations. Feeding of pigs for lean meat production. Low-cost rations for swine.

1.8 Poultry nutrition. Special features of poultry nutrition. Nutrient requirements for meat and egg production. Formulation of rations for different classes of layers and broilers. 1.8 Poultry nutrition. Special features of poultry nutrition. Nutrient requirements for meat and egg production. Formulation of rations for different classes of layers and broilers.

2. Animal Physiology:

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

2.2 Blood constituents - Properties and functions-blood cell formation-Haemoglobin synthesis and chemistry-plasma proteins production, classification and properties, coagulation of blood; Haemorrhagic

disorders anti-coagulants-blood groups-Blood volume-Plasma expanders-Buffer systems in blood. Biochemical tests and their significance in disease diagnosis.

2.3 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 and pulmonary circulation, Blood-Brain barrier Cerebrospinal fluid-circulation in birds.

2.4 Respiration. Mechanism of respiration, Transport and exchange of gases- neural control of respiration- Chemo-receptors-hypoxia-respiration in birds.

2.5 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 secretion in chicken-Sweat glands and their function. Bio-chemical test for urinary dysfunction.

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

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

2.8 Physiology of Milk Production, Reproduction and Digestion. Current status of hormonal control of mammary development, milk secretion and milk ejection. Male and Female reproductive organs, their components and functions. Digestive organs and their functions.

2.9 Environmental Physiology. Physiological relations and their regulation; mechanisms of adaptation, environmental factors and regulatory mechanisms involved in animal behaviour, climatology-various parameters and their importance. Animal ecology. Physiology of behaviour. Effect of stress on health and production.

3. Animal Reproduction:

Semen quality - Preservation and Artificial Insemination - Components of semen, composition of spermatozoa, 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, goats, swine and poultry. Detection of oestrus and time of insemination for better conception. Anoestrus and repeat breeding.

4. Livestock Production and Management:

4.1 Commercial Dairy Farming - Comparison of dairy farming in India with advanced countries. Dairying under mixed farming and as specialized farming, economic dairy farming. Starting of a dairy farm, Capital and land requirement, organization of the dairy farm. Opportunities in dairy farming, factors

determining the efficiency of dairy animals. Herd recording, budgeting cost of milk production, pricing policy; Personnel Management. Developing Practical and Economic rations for dairy cattle; supply of greens throughout the year, feed and fodder requirements of Dairy Farm. Feeding regimes for young stock and bulls, heifers and breeding animals; new trends in feeding young and adult stock; Feeding records.

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

4.3 Feeding and management of animals under drought, flood and other natural calamities.

5. Genetics and Animal Breeding:

5.1 History of Animal Genetics. 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; Cytoplasmic inheritance, 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, Transgenesis.

5.2 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.

5.3 Breeding Systems - Breeds of livestock and Poultry. 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; Pregnancy 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, outbreeding, upgrading, cross-breeding and synthesis of breeds; Crossing of inbred lines for commercial production; Selection for general and specific combining ability; Breeding for threshold characters. Sire index.

6. 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 and constraints in transfer of technology. Animal husbandry programmes for rural development.