18 ANIMAL NUTRITION

Unit 1: Energy and Proteins

Nutritional significance of carbohydrates, lipids and proteins. Cell-wall fractionation. Available energy from organic nutrients. Partitioning of dietary energy. Basal metabolic rate. Energy retention. Efficiency of energy utilization. Factors affecting energy utilization. Direct and indirect calorimetry. Dietary lipids - their digestion, absorption and metabolism. Essential fatty acids. Effect of dietary fat on milk and body composition. Proteins - digestion, absorption and utilization. Essential, critical amino and limiting acids. Protein evaluation. Metabolizable protein concept. Protein energy inter-relationship. Energetic of protein utilization for maintenance and different productive functions.

Unit 2: Minerals, Vitamins and Feed Additives

Minerals: Classification of minerals, ultra trace elements, newer elements, occasionally possible elements, Physiological functions, Deficiency symptoms and toxicity - Inter-relationships - Synergism and antagonism - Requirements - Different sources and bio-availability - Role of chelated, nano and hydrated minerals. Vitamins: Physiological functions and co-enzyme role - Deficiency symptoms, hyper-vitaminosis. Requirements, Sources and vitamin analogues - Antivitamins –Relationship between mineral and vitamin functioning. Feed Additives: Feed additive regulations. Nutritional role. Prebiotics, Probiotics, synbiotics and eubiotics, phytochemicals other metabolic modifiers. Role of phyto-chemicals as growth promoters.

Unit 3: Rumen Eco-system and Functions

Rumen and its environment. Development of functional rumen. Digestion kinetics in reticulo-rumen. Role of rumen microbes, Classification 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. Recycling of urea in ruminant, Ammonia toxicity - Role of slow release urea compounds. Manipulation of rumen fermentation. Bio-hydrogenation and utilization of dietary lipids. Methanogenesis their mechanism of production, essentiality and methane inhibitors. Carbon trading.

Unit 4: Non-ruminant Nutrition

Comparative gastrointestinal physiology of monogastrics – digestion and metabolism of organic nutrients in poultry and swine. Significance of minerals and vitamins in mono-gastrics. Inter relationship in nutrient sparing activity. Feeding systems. Role of feed additives - Factors affecting nutritional quality and performance. Special nutritional needs of rabbits, horses and companion animals.

Unit 5: Nutrient Requirements

Energy protein requirements for maintenance and productivity in ruminants and non-ruminants. Colostrum feeding of calf, mineral and vitamin requirements. Nutrient intake in relation to productivity. DM: water intake ratio. Palatability. Nutritional intake and energy density. Feeding standards - NRC, ARC, Kearl and Indian etc. Nutrient requirements under temperate and tropical environment. Feeding strategies during different stress conditions and natural calamities - Ration formulation - least cost rations, ration formulation application.

Unit 6: Forage Conservation and Evaluation

Natural and cultivated forges-Their composition and nutritive values. Nutritive value Index. Forage quality evaluation in range animals -Role of indicator methods-Advances in silage and haymaking- Factors affecting quality of conserved forages- Quality criteria and grading of silage and hay under tropics-artificial drying of forages.

Unit 7: Global feed industry and production scenario

Feed Processing and Technology Methods of feed processing - physical, chemical and biological effect of processing on nutritional quality and utilization. Pelleted and extruded feeds. Quality control of raw feedstuffs and finished feeds: Significance of BIS (standards). Handling and storage of raw and finished feeds. Methods to improve shelf life of fat rich feeds, Byproducts of newly introduced commercial crops including residues of genetically modified feeds, Newer and alternative feed resources, Alternative feed resources. Current approaches in enriching tropical feed resources - concept of total mixed ration and advances in complete diet formulation.

Unit 8: Anti-metabolites and Toxic Principles

Naturally occurring anti-nutritionalfactors and common toxins in feeds and forages. Methods of detoxification. Health hazards due to residual pesticides in feeds and forages - Environmental pollutants.

Unit 9: Elements of Research Methodology

Principles of animal experimentation -Experimental designs in nutritional research. Modern methods of feed evaluation – Invitro, gas production and nylon bag techniques, Rumen simulation techniques -Rusitec Tracer techniques in nutrition research - Role of NIR Spectroscopy - Feed microscopy in quality evaluation of feedstuffs.

Unit 10: Clinical Nutrition

Role of nutrition to control digestive and metabolic disorders (milk fever, ketosis, ruminal acidosis-laminitis, bloat), metabolic profile tests. Role of nutrition in immunity, nutrition and reproduction, nutrients as antioxidants. Role of nutrition in management of GI parasites