

16. Animal Nutrition Syllabus for conducting written Examination for direct Recruitment of Teaching posts in the Cadre of Assistant professors at UASM

NUTRITIONAL BIOCHEMISTRY

Classification of carbohydrates and their functions. Digestion and metabolism of carbohydrate in ruminants and non-ruminants. Carbohydrate synthesis.

Classification and properties of fats and their functions. Digestion and metabolism of fat in ruminants and non-ruminants. Fat synthesis

Classification, structure, properties and function of proteins, amino acids and nucleic acids. Digestion and metabolism of proteins and other nitrogenous compounds in ruminants and non-ruminants. Protein synthesis. Control of metabolism.

ENERGY AND PROTEIN NUTRITION

Measures of feed energy. Partitioning of feed energy. Energy balance, Fasting catabolism. Direct and indirect calorimetry. Efficiency of energy and protein utilization.

Rumen degradable protein (RDP), and rumen undegradable protein (UDP) and fermentation kinetics. Protein turnover. Quantification of microbial protein synthesis. Protein quality determination in ruminants and monogastrics. Supplementary value of amino acids. NPN metabolism, urea fermentation potential and metabolizable protein. Amino acids imbalance, antagonism and toxicity.

Feeding standards: comparative appraisal and limitations. Determination of energy and protein requirements. Nutrients metabolism with special reference to milk, meat and wool production. Energy and protein requirement for maintenance, growth, pregnancy and lactation in farm animals.

MINERALS AND VITAMIN NUTRITION AND FEED ADDITIVES

General role of minerals, factors affecting mineral requirements. Macro-minerals and micro-minerals, their, distribution, metabolism, physiological functions, deficiencies and excesses, and sources and requirements. Probable essential minerals.

Mineral interactions. Chelated minerals and concept of nano-minerals. Bioavailability studies in minerals. Impact of minerals on reproduction, fertility, and immunity. Soil-plant-animal-human relationship, development of area-specific minerals. Toxic minerals; their role in health and production of farm animals. Newly recognized trace minerals.

Definition, history, classification, chemistry, functions, deficiencies and excesses, requirements and sources of water-soluble and fat-soluble vitamins. Role of vitamins in energy metabolism. Vitamin-mineral interrelationship. Vitamin toxicosis. Role of vitamins in reproduction, fertility and immunity.

Feed additives and nutraceuticals. Probiotics, prebiotics and synbiotics; eubiotics. Feed enzymes. Phytochemical feed additives; polyphenols and essential oils; organic acids and acidifiers.

FEED AND FODDER TECHNOLOGY

Various feed mill equipment and their handling; layout and operations in feed mill (small, medium and large feed plants); automated feed mill: merits and demerits. Procurement of feed ingredients: specification and guidelines. Quality control of feed ingredients and finished feeds. BIS standard.

Principles and process of material handling, weighing, grinding, mixing, pelleting, packaging and other major processing operations. Crumbling, flaking, popping and extrusion. Premixes. Codex Alimentarius, HACCP.

Feed and fodder processing and preservation techniques. Densification, chemical and biological treatment of feeds/ fodders. Fodder conservation through hay and silages; Microbiological evaluation of processed and preserved feeds; Effect of preservation on the nutritional value of feed.

Feed storage and godown management; goods sanitation and hygiene of go-down. Traditional and modern farm-level storage structures. Factors affecting feedstuffs during storage. Liquid feed ingredients. Storage losses; insect pests and rodents control measures; Mycotoxins in feedstuffs and its control measures.

RUMINANT NUTRITION II. COURSE CODE

Functional anatomy of the digestive system of ruminants. Introduction to rumen microflora and fauna. Development of rumen. Feeds and fodders for ruminant feeding.

Water requirements. Nutrient requirements and feeding of calves, heifers, dry, pregnant and lactating cows, buffaloes, sheep and goat. Peculiarities of digestive physiology, nutrition and feeding management of camels.

Voluntary feed intake. Determination of digestibility, factors affecting digestibility. Manipulation of rumen fermentation.

Concept of complete feed and total mixed ration. Precision feeding. Phase feeding. Limiting nutrients and strategic feeding of high yielding ruminants. Concept of by-pass nutrients and their impact on production, reproduction and immune status.

Nutritional approaches for increasing the functional properties of milk: role of CLA, omega fatty acids. Different systems of feeding buffalo for beef production. Feeding during stress and natural calamities. Feeding management of migratory/ nomadic small ruminants.

NON-RUMINANT NUTRITION

Feeding of poultry for meat and egg production. Ideal protein concept. Standard ileal digestible amino acids. Nutrient requirements for broilers and layers. Feeding of breeder hens; nutritional factors affecting hatchability. Feeding systems for poultry. Feed additives for poultry. Nutritional approaches for designer egg and meat production. Nutritional disorders in poultry and the role of nutrition in diseases prevention. Water intake and quality in poultry production.

Nutrition and feeding of swine in different stages of growth and production. Nutritional factors affecting the quality of the products: lean meat production. Water intake and quality in pig production.

Feeding of equines. Feeding of rabbits. Hindgut fermentation and its importance. Nutrient requirements of equines. Special features of equine feeding management. Nutritional management of colic and other health disorders. Nutrient requirements of rabbits for wool and meat production. Nutrition-related disorders in rabbits.

COMPANION ANIMAL NUTRITION

Philosophy of companion animal nutrition. Digestion and absorption of nutrients in dogs and cats. Nutrient requirements for dogs and cats during different life stages: energy, protein, fat, minerals and vitamins. Critical nutrients for cats.

Common feed ingredients and supplements for pets. Homemade diets. Commercial pet foods: types and nutritional profile. Processing techniques in pet food manufacturing. Pet food evaluation and quality control.

Feeding management for dogs and cats of different age groups, viz., pregnancy, lactation, neonatal puppies and kitten, growth, adult maintenance, stress and geriatrics including feeding behaviour. Water requirements.

Deficiencies and excesses of nutrients. Nutritionally responsive disorders: inherited disorders of nutrient metabolism, diabetes mellitus, obesity, urinary tract health and kidney diseases. Parenteral nutrition for hospitalized pets.

NUTRITION OF LABORATORY, WILD AND ZOO ANIMALS

Digestive structure and functions of laboratory animals: rats, mice, and guinea pigs. Nutritional requirements of various species of laboratory animals. Feeding of laboratory animals. Concept of purified diets in laboratory animals. Nutrition of non-human primates.

Natural dietary habits of zoo animals. Feeding schedules of various classes captive and zoo animals and birds. Feeding orphan and neonates. Role of nutrition in the management of health disorders in zoo animals. Feeding of sick and old animals: parenteral nutrition.

Feeding habits, and behaviour of wild animals. General aspects of digestive physiology of herbivores and carnivores. Nutrition of semi-wild animals like mithun and yak. Nutritive characteristics of forages for wild animals. Adequacy of forage plants for wild and zoo animals.

NON-CONVENTIONAL FEED RESOURCES

Present and future feed requirements and current availability for livestock and poultry. Use of non-conventional feeds; By-products of agricultural, industrial, food processing units and forest by-products. Slaughterhouse by-products, aquatic weeds. Permissible levels of inclusion of various non-conventional feeds in the ration of different kinds of livestock. Formulation of economical rations using the non-conventional feed.

Classification of toxic principles in animal feedstuffs. Chemico-physical properties of various anti-nutritional factors (ANFs). Rumen microbial adaptation to various ANFs. Effect of anti-nutritional factors on health and production indifferent species of livestock.

Detoxification of toxin principles by various physical, chemical and biological techniques. Insecticide and pesticide residues, heavy metals residues in feeds and fodders.

INTRODUCTORY CLINICAL NUTRITION

Metabolic disorders and peri-parturient diseases: milk fever, ketosis, downer cow syndrome, retained placenta, sub-acute ruminal acidosis, laminitis, abomasal displacement, mastitis. Nutrient parasite interaction. Enterotoxaemia

Nutritional amelioration of biotic and abiotic stress: heat and cold stress, transportation stress. Potential plant toxicity to grazing animals. Toxicity of grazing animals: signs of poisoning. Nitrite poisoning, toxic effects of goitrogens, glucosinolates. Nutritional management of reproductive disorders.

RUMEN BIOTECHNOLOGY

Rumen ecology. Manipulation of rumen fermentation for better utilization of fibrous feeds and reduction in methane production. Biotechnological applications for lignin degradation. Role of feed additives, chemicals, antibiotics and probiotics and their effect on rumen metabolism. Degradation of anti-nutritional factors in the rumen.

Genetic manipulation, DNA recombinant technology for improvement in rumen fermentation. Factors influencing the fate of introduced microbes. Metagenomics for microbial diversity: concept and application.