

Livestock Production Technology & Products Management

ANIMAL NUTRITION

Course Structure - at a Glance

CODE	COURSE TITLE	CREDITS
ANN 601	ANIMAL NUTRITION - ENERGY AND PROTEIN	3+0
ANN 602	ANIMAL NUTRITION - MINERALS, VITAMINS AND FEED ADDITIVES	3+1
ANN 603	FEED TECHNOLOGY	1+1
ANN 604	FEED CONSERVATION ,STORAGE AND QUALITY CONTROL	2+2
ANN 605	RUMINANT NUTRITION	2+1
ANN 606	NON-RUMINANT NUTRITION	1+1
ANN 607	NUTRITION OF COMPANION/LABORATORY, WILD AND ZOO ANIMALS	2+1
ANN 608	RESEARCH TECHNIQUES IN ANIMAL NUTRITION	1+3
ANN 609	NON CONVENTIONAL FEED STUFF AND TOXIC CONSTITUENTS/ANTIMETABOLITES IN ANIMAL FEEDSTUFF	2+1
ANN 691	MASTER'S SEMINAR	1+0
ANN 699	MASTER'S RESEARCH	20
ANN701	MODERN CONCEPTS OF FEEDING RUMINANTS AND FORAGE UTILIZATION	3+0
ANN 702	MODERN CONCEPTS OF FEEDING MONOGASTRIC ANIMALS	2+0
ANN 703	NUTRITION AND RUMEN FERMENTATION	1+1
ANN 704	ADVANCES IN MICRONUTRIENTS	1+0
ANN 705	ADVANCED TECHNIQUES IN NUTRITION AND RESEARCH	1+2
ANN 706	ADVANCES IN FEED TECHNOLOGY	1+1
ANN 707	CLINICAL NUTRITION	1+1
ANN 708	NUTRIENT AND DRUG INTERACTION	2+0
ANN 709	NEW FEED RESOURCES AND TOXICANTS IN ANIMAL FEEDING	2+0
ANN 791	DOCTORAL SEMINAR I	1+0
ANN 792	DOCTORAL SEMINAR II	1+0
ANN 799	DOCTORAL RESEARCH	45

ANN 601: ANIMAL NUTRITION - ENERGY AND PROTEIN

3+0

Objective: Familiarization with fundamental concepts of energy and proteins, metabolism of carbohydrate, fat and protein and their efficiency of utilization. Requirement of carbohydrates, fat and proteins for various physiological functions.

Theory

UNIT I

Basic terminology and classification of carbohydrates, fats and proteins. Fundamental concepts of Digestion and metabolism of Carbohydrate Fat and Protein in different species of animals. Gluconeogenesis, Recent advances in glucogenic precursors on acetate utilization. NPN metabolism, urea fermentation potential and metabolizable protein. Amino acids imbalance, antagonism and toxicity.

UNIT II

Measures of feed energy. Partitioning of feed energy. Efficiency of energy and Protein utilization. Feeding standards- comparative appraisal and limitations.

UNIT III

Rumen degradable Protein (RDP), and rumen undegradable protein (UDN) and Kinetics. Energetics of protein synthesis and turn over. Quantification of microbial protein synthesis. Protein quality determination in monogastrics and utility.

UNIT IV

Energy balance, Fasting catabolism. Direct and indirect calorimetry. Determination of energy and protein requirements. Energy and protein requirement for maintenance, growth, pregnancy and lactation in ruminants, companion animals and poultry.

Suggested Readings

Blaxter K. 1989. *Energy Metabolism in Animal and Man*. Cambridge Univ. Press.

Bondi A. 1987. *Animal Nutrition*. Wiley InterScience.

Crampton EW & Harris LE. 1969. *Applied Animal Nutrition*. WH Freeman.

Maynard LA, Loosli JK, Hintz HF & Warner RG. 1987. *Animal Nutrition*. McGraw-Hill.

McDonald P, Edwards RA & Greenhalgh JFD. 1995. *Animal Nutrition*. Longman.

Ponds WG, Church DC, Pond KR & Schoknecht PA. 2005. *Basic Animal Nutrition and Feeding*. Wiley Dreamtech India.

Singh UB. 1987. *Advanced Animal Nutrition for Developing Countries*. Indo-Vision.

ANN 602: ANIMAL NUTRITION - MINERALS, VITAMINS AND FEED ADDITIVES

3+1

Objective: Role, requirement, functions, deficiency and toxic effects of vitamins, essential, probably essential and toxic minerals. Understanding soil-plant-animal-human relationship for utilization of minerals. Recent trends in the use of feed additives, probiotics, prebiotic and enzymes in animal feeding.

Theory

UNIT I

Essential minerals, general role of minerals, soil-plant-animal-human relationship, requirement of minerals, factors affecting requirements. Macro elements and micro elements, their distribution, metabolism, physiological functions, deficiencies and excesses, requirements and sources. Probable essential minerals. Toxic minerals.

Definition, history, classification, chemistry, functions, deficiencies and excesses, requirements and sources of water soluble and fat-soluble vitamins.

UNIT II

Critical minerals for ruminants and non-ruminants, chelates and chelated minerals. Inter-relationship of minerals with other nutrients. Impact of minerals arising from industrial affluent on animal health and production. Critical limits of minerals in edible herbage. Bioavailability studies in minerals. Impact of minerals on reproduction. Area specific minerals.

UNIT III

Relationship of vitamins with other nutrients. Critical vitamins for ruminants and non-ruminants. Feed additives including probiotics, Prebiotics, Symbiotics and feed enzymes. Research techniques in nutrition.

Practical

General principles of mineral estimation, Sampling and processing techniques, Estimation of macro- and micro-minerals. Determination of bioavailability of minerals. Formulation of mineral mixture for various species. Identification of adulterants and quality control. Atomic absorption spectrometry in mineral estimation. Preparation of diets for mineral studies. Principles of vitamin estimation. Estimation of some important vitamins (vitamin A,E,C). Formulation of vitamin mixture for various species.

Suggested Readings

Banerjee GC. 1988. *Feeds and Principles of Animal Nutrition*. Oxford & IBH.

Krishna G & Ranjhan SK. 1991. *Special Analytical Techniques*. Kalyani.

McDonald P, Edwards RA & Greenhalgh JFD. 1995. *Animal Nutrition*. Longman.

McDowell LR. 2003. *Minerals in Animal and Human Nutrition*. Reed Elsevier India.

Peter RC. 2005. *Applied Animal Nutrition Feeds and Feeding*. Pearson Prentice Hall.

Ponds WG, Church DC, Pond KR & Schoknecht PA. 2005. *Basic Animal Nutrition and Feeding*. Wiley Dreamtech India.

Reddy DV. 2003. *Principles of Animal Nutrition and Feed Technology*. Oxford & IBH.

Underwood EJ & Shuttle 1999. *The Mineral Nutrition of Livestock*. 3rd Ed. CABI.

ANN 603: FEED TECHNOLOGY 1+1

Objective: Introduction to the subject, formula feed manufacturing and different operations involved. Layout, designing, operation and management of feed mill.

Theory

UNIT I

Importance of feed technology in relation to animal productivity. The integrated biological, chemical and physical basis for evaluating the inherent nutritional quality of feed ingredients and feeds.

Familiarization of various feed mill equipments, layout and operations. Problems of feed manufacturing units and control measures. Quarantine measures.

UNIT II

Introduction to the formula feed manufacturing including principles of material handling, grinding, mixing, pelleting and other major processing operations. Crumbling, Flaking, Popping, Extrusion.

Principles of instrumentation and analysis, with emphasis on application to quality control and research in the feed industry.

UNIT III

The formulation of concentrate mixtures, premixes and rations using computer. Automated feed mill. Personal management in feed plants, laws and regulation of feed manufacturing industry. Codex alimentarius, HACCP. Organizational charts for small, medium and large feed plants, labour standard, planning and production programme, handling of plant equipment. Merits and demerits of automated feed plant

Practical

Identification of feed ingredients and their specifications, as well as compound feed for different categories of livestock and poultry. Feed microscopy. Formulating premixes. Introduction to Pulverisers, pelletisers, complete feed blocks equipments Plant layout and design of different capacity of feed mills, problems related to feasibility, records keeping in different sections of feed mill. Experiential learning at the feed plant for preparing feed, urea molasses mineral blocks, mineral mixture.

Suggested Readings

Banerjee GC. 1988. *Feeds and Principles of Animal Nutrition*. Oxford & IBH.

Givens DI. 2000. *Forage Evaluation in ruminant Nutrition*. Great Britain Publ.

Gohl BO. 1985. *Tropical Feeds*. FAO.

Lohan OP, Chahal SM & Kishore N. 1998. *Feed Quality Evaluation Techniques*. CCS Haryana Agricultural Univ. Press.

McEllihner, Robert R. 1994. *Feed Manufacturing Technology*. The American Feed Industry Assoc.

Perry TW. 2004. *Feeds and Feeding*. Prentice Hall. Ponds WG, Church DC & Pond KR. 1995. *Basic Animal Nutrition and Feeding*. John Wiley & Sons.

Zaworski F. 1997. *Feed Industry Red Book*. ZMAG Publ.

ANN 604: FEED CONSERVATION, STORAGE AND QUALITY CONTROL 2+2

Objective: To acquaint with inherent nutritional quality of feed ingredients and feeds. Evaluation of feeds and fodders and feed preservation techniques. Procurement and storage of feed ingredients. Losses during storage and its control.

Theory

UNIT I

Principles of feed and fodder processing and preservation techniques, their merits and demerits. Procurement, planning and purchase procedures; traditional and modern farm level storage structures. Feed storage and godown management, estimation of storage capacity and stack plan.

UNIT II

Evaluation of processed and preserved feeds and forages. Role of moisture, temperature and relative humidity during storage of feedstuffs and their effect on biotic factors. Handling and storage of liquid feed Ingredients. Physical and chemical changes in feeds during storage; storage losses; insect pests and rodents in feed stores and their control; Role of fungi, tolerance limits and measures to check them in stored products.

UNIT III

Factors affecting the quality of feed and feedstuffs on preservation. Microbiological evaluation of processed and preserved feeds, Effect of preservation on nutritional value of feed. Properties and mode of action of pesticides and fumigants; principles of good sanitation and hygiene of godowns.

UNIT IV

Proximate composition, Limitations of various systems of analysis, Partitioning of forage fibre by Van Soest method, Quality control of feed ingredients, Specifications of feed ingredients and finished feeds, BIS standard., Pesticide and insecticide residues in feeds

Practical

Laboratory evaluation of preserved and processed feed and forages. Physical properties of feeds and feedstuffs; identification of insect-pests and fungi in stored products; techniques for detection of hidden infestation in grains; quality control and inspection of stored feed materials; moisture equilibrium determination and estimation of chemical changes including alcoholic acidity, rancidity and uric acid in feeds during storage.

Weende proximate analysis, Van Soest fibre fractionation, Enzymatic evaluation, Pro rata deduction (Feed laws), urea, FFA, peroxide value, adulterants, and heavy metal

Suggested Readings

Givens DI. 2000. *Forage Evaluation in Ruminant Nutrition*. Great Britain Publ.

Khare BP. 1994. *Stored Grain Pests and their Management*. Kalyani.

Krishna G & Ranjhan SK. 1991. *Special Analytical Techniques in Nutritional Biochemistry*. Kalyani.

Lohan OP, Chahal SM & Kishore N. 1998. *Feed Quality Evaluation Techniques*. CCS Haryana Agricultural Univ. Press. McElhenny

Robert R. 1994. *Feed Manufacturing Technology*. The American Feed Industry Assoc.

Ponds WG, Church DC & Pond KR. 1995. *Basic Animal Nutrition and Feeding*. John Wiley & Sons.

ANN 605: RUMINANT NUTRITION

2+1

Objective : Requirement of nutrients for different physiological functions in various ruminant species. Latest concepts of feeding the nutrients for maximising production.

Theory

UNIT I

Nutrients and their metabolism with special reference to milk, meat and wool production.

UNIT II

Feeding standards, their history, comparative appraisal and limitations. Classification of feedstuffs. Nutrient requirements for calves, heifers, dry, pregnant and lactating cows, buffaloes, sheep and goat.

UNIT III

Introduction to rumen microflora and fauna. Development of rumen. Role of milk replacers and calf starters

UNIT IV

Feed formulation of large and small ruminants for different physiological stages. Concept of complete feed. Limiting nutrients and strategic feeding of high yielding ruminants. Concept of by-pass nutrients and their impact on production, reproduction and immune status. Importance of CLA, omega fatty acids, Scope for value addition in milk, Different systems of feeding buffalo for beef production.. Feeding during natural calamities, feeding in various agro-climatic zones of India.

Practical

Design and planning of feeding experiments. Identification of feed and fodder on the basis of its composition. Artificial rumen technique, Methods for evaluation of feedstuffs- in vitro gas, in sacco digestion kinetics. Determination of nutritive value of feeds and fodders by metabolism trial in dairy cattle, determination of nutritive value of pastures by the use of range techniques, study of rumen metabolic profile. Preparation of Bypass Nutrients Identification of rumen microbes and rumen studies.

Suggested Readings

Dhority BA. 2003. *Rumen Microbiology*. Nottingham Univ. Press.

Kellems RO & Church DC. 2002. *Livestock Feeds and Feeding*. Prentice Hall.

Ranjhan SK. 2001. *Animal Nutrition in the Tropics*. Sangam Books.

ANN 606: NON-RUMINANT NUTRITION 1+1

Objective: Requirement of nutrients and feeding of various non-ruminants species for efficient quality production.

Theory

UNIT I

Nutrients, their metabolism and requirements for poultry and swine during different stages of growth and production. Limiting aminoacids-lysine and methionine.

UNIT II

Feeding systems and feed additives, feed formulations for different purposes including least cost rations.

UNIT III

Quality control of poultry and swine rations for efficient egg and meat production. Nutrition in relation to disease and stress.

UNIT IV

Nutritional factors affecting quality of the products. Hind gut fermentation and its importance, Nutrient requirements of rabbits and equines, Nutritional manipulation for producing value added egg, meat / pork

Practical

Design and planning for poultry and swine feeding experiments, formulation and compounding of general and least cost rations, determination of nutritive value of poultry and swine feeds by balance experiments, evaluation of protein quality, Visit to poultry and piggery units, feed and fodder stores, Use of software in least cost feed formulations. Basic principles governing the least cost formulation software's.

Suggested Readings

Leeson S & Summers JD. 2005. *Commercial Poultry Nutrition*. International Publ. House.

Ponds WG, Church DC, Pond KR & Schoknecht PA. 2005. *Basic Animal Nutrition and Feeding*. Wiley Dreamtech India.

Rose SP. 1996. *Principles of Poultry Science*. CABI.

Stevan I, Scott ML & John DS. 2001. *Nutrition of the Chicken*. Univ. of Guelph.

ANN 607: NUTRITION OF COMPANION, LABORATORY, WILD AND ZOO ANIMALS 2+1

Objective :Preparation, storage and evaluation of feeds and feeding standards of companion/ laboratory /wild and zoo animals

Theory

UNIT I

Feed Habbits, food Patterns, digestive structure and functions companion, laboratory , wild and zoo animals. Natural dietary habits. Nutritional requirements of various species of animals.

UNIT II

Feeding standards and feeding habits of companion / laboratory animals. Importance of colostrum and feeding of neonates and growing animals. Feeding and care of nursing mothers. Feeding of sick and old animals. Post Surgical nutrition.

UNIT III

Ration formulation for captive animals. Artificial feeding and feeding during emergency. Nutritive characteristics of forages for wild animals. Adequacy of forage plants for wild and zoo animals. Diets used in captivity. Raising orphans. Nutritional melodies. . Nutrition of semi wild and semi domestic animals like mithun and yak under special topography

UNIT IV

Composition, presentation, sterilization, palatability, assessment and storage of companion/laboratory animal diets. companion food tables and their nutritional assessment. Mistakes and misleading information on companion food labels and labeling.

UNIT V

Nutraceuticals in companion / laboratory foods and animal foods. Nutritional deficiency diseases. Geriatric nutrition - corrective measures

Practical

Formulation and preparation of hygienic, balanced diets and feeding for companion/laboratory animals. Characteristics of ration formulation and feeding schedules wild and zoo animals. Feeding schedules for sick and orphan wild / zoo animals. Artificial and emerging feeding. General feeding habits and different feed constituents of wild and captive animals. Research methodology of companion/laboratory animals. Processing and storage of companion/laboratory diets. Visit to Zoological parks and wildlife sanctuary.

Suggested Readings

Case LP. 1995. *Canine and Feline Nutrition*. St. Louis Publ. Church DC. 1980. *Digestive Physiology and Nutrition in Ruminants*. Oxford Press.

Givens DI, Owel E, Aford REF & Omed HM. 2000. *Forage Evaluation in Ruminant Nutrition*. CABI.

Petter WL & Pearson AEG. 1971. *The Laboratory Animals- Principles and Practices*. Academic Press.

Reddy DV. 2003. *Applied Nutrition*. Oxford & IBH.

Robbins C & Cunha T. 1994. *Wildlife Feeding and Nutrition*. Reed Elsevier.

ANN 608: RESEARCH TECHNIQUES IN ANIMAL NUTRITION 1+3

Objective: Planning and designing of experiments, use of various techniques in estimating chemical and bio-chemical constituents in feeds, fodders, blood, milk, rumen liquor, meat, wool etc.

Theory

UNIT I

Principles of animal experimentation. Specialized feed compounding. Introduction and principle of GLC, HPLC, AAS, tracer technique, flame photometer, NIR, SF6, amino acid analyzer.

UNIT II

Importance and principle of various techniques in estimating chemical and biochemical constituents and toxic principles in feeds, fodders. Importance, principles and procedures for estimating chemical and biochemical constituents in blood, milk, rumen liquor, meat, wool etc.

Practical

Cell Wall partitioning, Lignin as internal marker in feedstuffs, Mineral estimation by atomic absorption spectrophotometer, In-vitro/in-sacco determination of digestibility and digestion kinetics. Determination of energy content of feed, faeces and urine using bomb calorimeter. Methodology for quality improvement of animal feeds. Interpretation and presentation of results. Tracer techniques in Animal Nutrition. Quality evaluation of silage and hay, feed energy estimation; nitrate, urea, aflatoxin, salmonella, glycosides and sedimentation tests. Blood profile, meat quality.

Suggested Readings

Bondi AA. 1987. *Animal Nutrition*. Wiley InterScience.

Gupta PC, Khatta VK & Mandal AB. 1988. *Analytical Techniques in Animal Nutrition*. CCS HAU Press.

Pandey DN & Bajpai A. 2003. *Recent Trends in Animal Nutrition and Feed Technology for Livestock, Pets and Laboratory Animals*. International Book Distr.

Reddy DV. 2003. *Principles of Animal Nutrition and Feed Technology*. Oxford & IBH.

Objective: To understand the importance of alternate feeds and their use in augmenting profit in livestock farm. Different toxins present in feed stuffs, their properties and detoxification techniques.

Theory

UNIT I

Present and future feed requirements and current availability for livestock and poultry. Use of non-traditional feeds - By-products of agricultural, industrial, food processing units and forest by-products. Evaluation by chemical and biological methods. Formulation of economical rations. Level of inclusion of various non conventional feeds in livestock ration

UNIT II

Classification of toxic principles in animal feedstuffs. Chemico-physical properties of various toxins. Effect of toxins on biological system and nutrients utilization in different species of livestock. Detoxification of toxin principles by various physical, chemical and biological techniques. Insecticide and pesticide residue detection.

Practical

Estimation of various protease inhibitors; tannins; and mycotoxins in various feeds and feedstuffs. Nitrates, HCN, oxalates, insecticide and pesticide residues, saponins, Gossypol, mimosine, heavy metals..

Suggested Readings

Banerjee GC. 1988. *Feeds and Principles of Animal Nutrition*. Oxford & IBH. Liner IE. 1980. *Toxic Constituents of Animal Food Stuffs*. Academic Press.

Lohan OP, Chahal SM & Kishore N. 1998. *Feed Quality Evaluation Techniques*. CCS Haryana Agricultural Univ. Press.

McDonald P, Edwards RA & Greenhalgh JFD. 1995. *Animal Nutrition*. Longman.

Ponds WG, Church DC & Pond KR. 1995. *Basic Animal Nutrition and Feeding*. 4th Ed. John Wiley & Sons.

Ranjhan SK. 2001. *Animal Nutrition in the Tropics*. Sangam Books.

Reddy DV. 2003. *Principles of Animal Nutrition and Feed Technology*. Oxford & IBH.

ANN 701: MODERN CONCEPTS OF FEEDING RUMINANTS AND FORAGE UTILAZIATION

3+0

Objective: To impart knowledge of modern concepts in nutrient requirement and feeding and enhanced utilization in ruminant and recent development in analysis of forages.

Theory

UNIT I

Developments in ruminant digestive physiology - Energy protein requirement and measurement - Requirements of other nutrients. Importance of energy and protein quantity and quality Feed input and milk output relationship.

UNIT II

Concept of limiting amino acids for high yielders. Strategic feeding of high yielding dairy cows and meat producing ruminants. Concept of Phase feeding. Bypass Nutrient technology. Feeding during stress. Nutrition-immunity interaction. Designer milk and meat. Rumen manipulation to reduce methanogenesis. Nitrogen oxide emission and heavy metal residues. Metabolic profile tests.

UNIT III

Use of conserved forages in ruminant feeding. Chemical composition of common and newer forage - Factors affecting nutritive value of commonly available grasses, pastures, silage, hay and crop residues, voluntary intake of fodder at different stages of growth.

Newer methods of forage evaluation - calculated in vitro ME and DOMD by using prediction equations. Merits and demerits of using leaf protein. Top feeds and their effective utilization - pasture consumption and evaluation studies.

Seminars on current topics of special interest.

Suggested Readings : Selected articles from journals

ANN 702: MODERN CONCEPTS OF FEEDING MONOGASTRIC ANIMALS

2+0

Objective :To impart knowledge on modern concepts in nutrient requirement and feeding of monogastric livestock

Theory

UNIT I

Nutritional factors affecting egg quality and hatchability in poultry. Feeding for designer eggs. Role of essential fatty acids, amino acids imbalance, toxicity and interactions in monogastrics

UNIT II

Developments in digestive physiology of swine - equines - Measurement of protein and energy requirements - Influence of processing of feeds and fodders in mono-gastric animal nutrition.

UNIT III

Modern concepts of amino acid nutrition at various physiological status - Role of vitamins and minerals in health and disease. Advances in new generation feeds and feed additives.

Suggested Readings

Leeson S & Summers JD. 2005. *Commercial Poultry Nutrition*. International Publ. House.

Ponds WG, Church DC, Pond KR & Schoknecht PA. 2005. *Basic Animal Nutrition and Feeding*. Wiley Dreamtech India. Selected articles from journals

ANN 703: NUTRITION AND RUMEN FERMENTATION

1+1

Objective :To impart knowledge on nutrient requirements for neonatal and post natal development of livestock, recent concepts of rumen fermentation and its manipulation

Theory

UNIT I

Nutrient requirements for fertility and gestation, prenatal growth and foetal nutrition. Post-natal feeding, growth and developments - Body composition at prenatal and postnatal stages, abnormalities due to malnutrition.

UNIT II

Rumen microflora and microfauna -considerations and limitations in relation to ruminant feeding practices. Manipulation of rumen fermentation - physical, chemical and biological means - Role of sulphur and phosphorus in rumen fermentation -. Modeling ruminant digestion and metabolism - principles.

Practical

Microbial and protozoal count, Determination TVFA by chromatography. Estimation of ammonia in rumen liquor - study on protection of protein in relation to degradability ,Rumen fermentation products - Artificial rumen techniques. Rumen enzyme assay

Suggested Readings :Selected articles from journals.

ANN 704: ADVANCES IN MICRONUTRIENTS

1+0

Objective :To impart knowledge on nutrient requirements for neonatal and post natal development of livestock, recent concepts of rumen fermentation and its manipulation

Theory

UNIT I

Developments in the study of major, minor and toxic minerals in animals -animal - soil - plant interrelationship - concepts in absorption and transport of micronutrients - Kinetics and metabolism physiological and biochemical interactions among nutrients - interrelationship of minerals and vitamins in relation to metabolism and requirements - mineral toxicities in relation to livestock feeding.

UNIT II

Developments in vitamin and mineral requirements for growth, reproduction and lactation - Identification and correction of deficiencies and toxicities of minerals in farm animals.

UNIT III

Bio-availability of macro and micro nutrients - factors affecting the bio-availability of minerals - bio-marker concept for mineral requirement for correction of deficiencies and toxicity of minerals.

Suggested Readings

Peter RC. 2005. *Applied Animal Nutrition Feeds and Feeding*. Pearson Prentice Hall.

Ponds WG, Church DC, Pond KR & Schoknecht PA. 2005. *Basic Animal Nutrition and Feeding*. Wiley Dreamtech India. Selected articles from journals.

ANN 705: ADVANCED TECHNIQUES IN NUTRITION AND RESEARCH

1+2

Objective : To impart knowledge on use of advanced analytical techniques in nutrition research

Theory

UNIT I

Developments in analysis of nutrients in feeds. Estimation of toxins and mycotoxins - Application of atomic absorption spectrophotometer, HPLC -Enzymatic methods of feed analysis - Isotopes in nutrition research - Feed microscopy - Analytical aspect of feeds and fodders using N.I.R.

Faecal inoculum as alternative to rumen liquor in *in vitro* studies -Degradability of feeds by various techniques - rates of VFA and microbial production.

Practical

Estimation of major, minor and toxic minerals by atomic absorption spectrophotometer, Estimation of mycotoxin by HPLC, Estimation of oxalate, nitrates, tannin and mimosine, VFA fractionation by GC. SF6 Technique, amino acid analyzer, NIR, HPLC, Purine derivatives, milk fat and FA estimation.

Suggested Readings

Selected articles from journals.

ANN 706: ADVANCES IN FEED TECHNOLOGY

1+1

Objective : To impart knowledge on modern feed processing methods and automated feed plant layout

Theory

UNIT I

Feed and fodder processing - Particle size reduction - bulk density -processing of grains and oil seeds - processing of roughages - feed plant layout and design - feed plant management - storage of feeds.

UNIT II

Non conventional feed resources - Formulation of concentrates, premixes and rations - improvement of nutritive value of poor quality roughages - liquid feed supplements. Solid state fermentation (SSF) technology.

Practical

Feed microscopy tests for certain adulterants and anti nutritional factors, Feed plant design- processing of roughages - feed plant sanitation, Wild seed identification - qualitative tests for rancidity, minerals and adulterants, Visit to commercial feed plant

Suggested Readings : Selected articles from journals.

ANN 707: CLINICAL NUTRITION**1+1**

Objective : Impact of nutrition on health, immunity, digestive/metabolic disorders, reproductive performance, bacterial and parasitic infestations, organic toxins and stress nutrition, feeding management of sick animals.

Theory**UNIT I**

Nutritional factors responsible for disorders. Metabolic disorders and production diseases in farm animals. Prevention of metabolic disorders - recommended dietary regimen.

Effect of coccidiostats and dietary antigens in early weaned livestock. Nutrition in relation to emerging diseases. Effect of nutrition on fertility, reproduction and lactation. Toxic minerals and counter action (Selenium and fluorine).

UNIT III

Stress nutrition and post surgical nutrition. Nutritional manipulation and feeding of sick animals. Pesticides residues in feeds and fodders and their impact on animal health, reproduction and production.

Practical

Determination of blood glucose, blood urea nitrogen, SGOT SGPT, total protein, cholesterol and ketone bodies, Metabolic profile tests.

Suggested Readings : Selected articles from journals.

ANN 708: NUTRIENT AND DRUG INTERACTION**2+0**

Objective : To impart knowledge on the effects of drugs on nutrient utilisation

Theory**UNIT I**

Effects of drugs on digestion and absorption of nutrients - Drugs and intestinal microbial interaction - Effect of drugs and antibiotics as feed additives. Physiological effects - Use and abuse.

UNIT II

Nutrients in drug detoxification - Antagonists - Hormones and their effect on growth and carcass qualities. Drug residues in animal products - milk and meat - effect on food change. Legal aspects of drugs in animal products.

Suggested Readings : Selected articles from journals.

ANN 709: NEW FEED RESOURCES AND TOXICANTS IN ANIMAL FEEDING**2+0**

Objective : To impart knowledge on newer feed resources and their value in animal feeding and various toxic substances prevalent in feeds and fodders.

Theory**UNIT I**

Demand and availability of feed - formulation of database in computer -strategy in food animal production - agricultural by-products - Agroindustrial by-products, Farm waste, crop residues, organic wastes of animal origin. Slaughter house waste, industrial waste and their feeding value in animals.

UNIT II

Processing to enhance feed utilization and availability. Possible health hazards due to waste utilization-chemical and nutritional changes in waste product due to processing. Quality standard and their acceptance.

UNIT III

Naturally occurring toxicants - Toxicants of plants and non-microbial origin. Naturally occurring alkaloids, mycotoxins and their toxicity - Acquired toxicants, pesticides, weedicides and heavy metals.

UNIT IV

Effect of toxins on rumen fermentation and nutrient utilization. Methods of detoxification. Food and feed contaminants - their impact on animal performance

Suggested Readings : Selected articles from journals.