

## ANIMAL SCIENCE

Important breeds of cattle and buffalo, traits of economic importance and their inter-relationships - Selection of high quality animals - Role of management in improving the reproduction efficiency in farm animals. - Housing and rearing systems. Breeding Management: System of breeding Economic traits. Methods of Breeding - Prenatal and postnatal care and management of cattle and buffalo - Care of neonate and young calves - Management strategies for reducing mortality in calves, age at first calving and calving interval in cattle and buffaloes. Management of labour, Milking management, Machine milking and hand milking, Different laws governing the livestock sectors to produce quality products on par with international standards - Technique of harvesting clean and hygienic livestock products, transportation of animals, health management. Wallowing in buffaloes- Management of draught animals and summer management Feed and fodder resources used for feeding of cattle and buffaloes– Scientific technique of feeding, watering – Computation of practical and economical ration, supply of green fodder around the year and enrichment of poor quality roughages. Disease Management: Role of management in the prevention and control of diseases. Importance of deworming.

Introduction - Population structure and importance- Advantages and disadvantages of sheep farming under different systems of management – type of housing and equipments- Important sheep and goat breeds- Advantages and disadvantages of sheep and goat farming. Breeding Management: Breeding seasons - fitness of purchase for first breeding - methods of detection of heat - Natural Service and artificial insemination - Care of the pregnant Animals - Breeding stock - Use of teaser - Culling. Feeding Management: Feeding methods - Principles to be followed in feeding and watering- feeder space, waterer space, Designing feeders and waterers. - Range management - Stocking rate and pasture improvement and utilization; management under stall fed conditions, Transportation of sheep and goat. Disease Management: Role of management in the prevention and control of diseases. Special Management: Deworming - Dipping and spraying- shearing - Avoidance of goatry odour in milk, Topping Wool: Importance of wool - Fiber structure- Fleece characters - Goat fibers - Characters of mohair and pashmina, fur and Angora - Marketing of goat fibers / wool.- Planning of sheep and goat farm of various sizes - Economics of sheep and goat farming.

Breeds of pigs - Selection of breeding stock - Breeding seasons - Age and weight at first services - Methods for detection of heat – Natural service and artificial insemination - Care of pregnant sows, piglets and growers - Care of breeding boar.

Poultry housing systems Cage Vs floor system, litter management and lights for poultry, rearing turkey, duck and quails. Management of chicks, growing, laying and breeding flocks, broiler production, selection and culling of laying flocks. Procuring, care and pre-incubation storage of hatching eggs - Method of incubation, sanitation disinfection and

management of hatchery. Embryonic development and factors effecting fertility and hatchability of eggs. Chick sexing, packing and hatchery business - Transporting management of farm and hatchery waste. Economic traits of egg-type chicken and their standardization – Selection criteria – Aids to selection: Index selection and Osborne index – Restricted selection index – Economic traits of meat – type chicken and their standardization.

Disease Management: Role of management in the prevention and control of diseases. Special Management: Deworming - Dipping and spraying.

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. Rumen degradable Protein (RDP), and rumen undegradable protein (UDN). 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. Relationship of vitamins with other nutrients. Critical vitamins for ruminants and non-ruminants. Feed additives including probiotics Prebiotics, Symbiotics and feed enzymes.

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.

Nutrients and their metabolism with special reference to milk, meat and wool production. 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. Introduction to rumen microflora and fauna. Development of rumen. Role of milk replacers and calf starters 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.

Nutrients, their metabolism and requirements for poultry and swineduring different stages of growth and production. Limiting iminoacids-lysine and methionine. Feeding systems and feed additives, feed formulations for different purposes including least cost

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

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.

Selection of several traits. Evaluation of short term and long term selection experiments viz: bidirectional selection and asymmetry of response, selection plateau and limit. Genetic aspects and consequences of various mating systems. Effects of mating systems on mean and variance. Application of various mating system in animal improvement. Selection for general and specific combining ability. Genetic polymorphysim and its application in genetic improvement.

Scope and limitation of integrated farming systems - Sustainability of integrated Livestock Farming Systems and their economic importance. Integration of fish, arable farming and different livestock enterprises vis-à-vis gobar gas plant, FYM, solar and wind energy utilization, cattle, buffalo sheep, goat, pig, poultry, rabbit, silk worm, bee keeping etc. Project formulation and evaluation of various livestock enterprises.

Role of livestock in the national economy, Marketing - Objectives, strategies - Selecting and managing marketing channels - Pricing strategies - Sales promotion.