

**FURTHER DETAILS REGARDING MAIN TOPICS OF  
PROGRAMME NO. 09/2015 (Item No. 6)**

**CHEMIST (CATTLE FEED PLANT)**

**(PART I – GENERAL CATEGORY)**

**KERALA CO-OPERATIVE MILK MARKETING FEDERATION  
LIMITED**

**(CATEGORY Nos. 162/2013)**

**Part I**

**Module 1: Ruminant digestion**

Features of digestion in ruminants – ingestion, prehension, mastication, deglutition, rumination, defecation, vomition. Salivary glands: classification according to location and type of secretion, quantity of salivary secretion, composition of saliva, functions of salivary secretion and regulation of secretion. Functions of stomach, intestine, pancreas; bile secretion; Hunger, appetite control, retching, drinking, belching and eructation.

Ruminant digestion : factors favoring fermentation, functional anatomy of ruminant stomach, developmental aspects of ruminants stomach; Ruminal bacteria, protozoa and fungi; Fermentative and microbial digestion of carbohydrates, protein, and fat; luminous and membranous digestion in rumen and intestine; Modification of toxic substances in rumen. Abomasal and intestinal motility. Permeability characteristics of intestine, forces governing absorption, intestinal transport of electrolyte and water.

**Module 2: Principles of animal nutrition**

Importance of nutrients in animal production and health. Composition of animal body and plants. Nutritional terms and their definitions. Importance of minerals (major and trace

elements) and vitamins in health and production, their requirements and supplementation in feed. Common feeds and fodders, their classification, availability and importance for livestock production. Various physical, chemical and biological methods of feed processing for improving the nutritive value of inferior quality roughages. Preparation, storage and conservation of livestock feed through silage and hay and their uses in livestock feeding. Feed additives in the rations of livestock. Measures of food energy and their applications - gross energy, digestible energy, metabolisable energy, net energy, total digestible nutrients, starch equivalent, food units, physiological fuel value. Protein evaluation of feeds - Measures of protein quality in ruminants, protein equivalent, digestible crude protein, nutritive ratio

### **Module 3 : Feeding standards and nutrient requirements**

Feeding standards - history and classification - Comparative type, Production type and Digestible nutrient type, usefulness and limitations of feeding standards, merits and demerits of various feeding standards. Recommended dietary allowances and nutrient requirements, Nutrient requirements for calves, heifers, dry, pregnant and lactating cows, buffaloes, sheep and goat. NRC standards, ARC Standards and Indian standards. New protein systems –merits and demerits

### **Module 4: Feed quality analysis**

Sampling of feed ingredients and finished feeds. Preparation and processing of samples for chemical analysis. Proximate system of feed analysis- moisture, total ash, crude protein, ether extract, crude fibre and nitrogen free extract. Estimation of moisture by hot air oven and toluene distillation method, Muffle furnace, Kjeldahl apparatus, Soxhlet apparatus, advantages and limitations of proximate system of analysis. Estimation of acid insoluble ash. Van Soest fibre fractionation - neutral detergent fibre and acid detergent fibre. Estimation of gross energy - Bomb calorimeter. Feed microscopy- its application in quality control lab. Enzymatic methods of feed analysis

Estimation of macro and micro minerals. Determination of bioavailability of minerals. Atomic absorption spectrometry in mineral estimation. Principles of vitamin estimation. Estimation of vitamin A and E

Detection of adulterants in animal feed - urea, sand, silica, salt. Spot/platform test in feed analysis lab. Tests for rancidity- estimation of free fatty acid and peroxide value in feeds. Harmful natural constituents and common adulterants of feeds and fodders. Estimating toxic principles in feeds - Estimation of various protease inhibitors; phenolic compounds and mycotoxins in various feeds and feedstuffs. Nitrates, HCN, oxalates, glucosinolates, insecticide and pesticide residues, saponins, gossypol, mimosine and heavy metals.

### **Module 5 : Recent trends in cattle feeding**

Concept of complete feed. Total Mixed Ration - advantages and Limitations. Precision feeding. Ration Balancing Programmes. Limiting nutrients and strategic feeding of high yielding ruminants. Concept of phase feeding and challenge feeding. Importance of CLA, omega fatty acids. Concept of by-pass nutrients and their impact on production, reproduction and immune status. Critical vitamins and minerals for ruminants, chelates and chelated minerals. Area specific minerals. Nutrition in relation to disease and stress – Metabolic disorders and production diseases in farm animals. Prevention of metabolic disorders

### **Module 6: Feed industry**

Importance of feed technology in relation to animal productivity. Current status of Indian feed industry, Role of CLFMA in Indian feed industry. Demand and availability of feed. Introduction to the formula feed manufacturing including principles of material handling, grinding, mixing, pelleting and other major processing operations. Crumbling, Flaking, Popping, Extrusion. Various feed mill equipments. Problems of feed manufacturing units and control measures. Quarantine measures. Laws and regulations of feed manufacturing industry. Codex alimentarius, HACCP

Formulation of concentrate mixtures, premixes and rations using computer. Automated feed mill. Merits and demerits of automated feed plant. Handling of plant equipment, Organizational charts for small, medium and large feed plants. Principles and processing of roughages, their merits and demerits

## **Module 7: Basics in analytical chemistry**

Safety and hygiene in the Chemistry Lab- Storage and handling of chemicals, handling of acids, toxic and poisonous chemicals, antidotes, first aid procedure. Heating methods, stirring methods, filtration techniques. Calibration of pipette, standard measuring flask and burette. Weighing principle in chemical balance and single pan balance. Normal error curve and its importance. Experimental techniques of distillation, fractional distillation, distillation under reduced pressure. Extraction, use of immiscible solvents, solvent extraction. Chemical methods of purification and test of purity. Types of titrations. Requirements for titrimetric analysis.

Concentration systems- Molarity, molality, normality, osmolarity, % w/w, %w/v, ppm, ppb, milliequivalent and millimoles. Preparation of standard solutions, standardization of solutions. pH of strong and weak acid solutions. Buffer solutions. Henderson equation. Preparation of acidic and basic buffers. Relative strength of acids and bases from  $K_a$  and  $K_b$  values. Theory of indicators, choice of indicators.

Principles of colorimetry, spectrophotometry, fluorimetry, turbidimetry, electrophoresis, spectrometry and chromatography. Adsorption and partition chromatography. Column chromatography: adsorbents, classification of adsorbents, solvents, preparation of column, adsorption and applications. Thin Layer Chromatography: choice of adsorbent, choice of solvent, preparation of chromatogram, sample,  $R_f$  value and its applications. Paper chromatography, solvent used,  $R_f$  value, factors which affect  $R_f$  value. Ion exchange chromatography, resins used, experimental techniques, applications. Gas Chromatography, principle, detector (FID, TCD, ECD), Applications.

## **Module 8: Good laboratory practices**

Specimen collection and processing, establishment of reference values. Error in chemical analysis Accuracy and precision. Methods of expressing precision: mean, median, deviation, average deviation and coefficient of variation. Accreditation of labs- NABL. Certification of labs- agencies involved and benefits. ISO, Bureau of Indian Standards (BIS). GMP certification

## **Part II – General Knowledge, Current Affairs & Renaissance in Kerala**

### **Salient Features of Indian Constitution**

Salient features of the Constitution - Preamble- Its significance and its place in the interpretation of the Constitution.

Fundamental Rights - Directive Principles of State Policy - Relation between Fundamental Rights and Directive Principles - Fundamental Duties.

Executive - Legislature - Judiciary - Both at Union and State Level. - Other Constitutional Authorities.

Centre-State Relations - Legislative - Administrative and Financial.

Services under the Union and the States.

Emergency Provisions.

Amendment Provisions of the Constitution.

### **Social Welfare Legislations and Programmes**

Social Service Legislations like Right to Information Act, Prevention of atrocities against

Women & Children, Food Security Act, Environmental Acts etc. and Social Welfare

Programmes like Employment Guarantee Programme, Organ and Blood Donation etc.

## **RENAISSANCE IN KERALA**

### **Towards A New Society**

Introduction to English education - various missionary organisations and their functioning- founding of educational institutions, factories, printing press etc.

### **Efforts To Reform The Society**

#### **(A) Socio-Religious reform Movements**

SNDP Yogam, Nair Service Society, Yogakshema Sabha, Sadhu Jana Paripalana Sangham, Vaala Samudaya Parishkarani Sabha, Samathwa Samajam, Islam Dharma Paripalana Sangham, Prathyaksha Raksha Daiva Sabha, Sahodara Prasthanam etc.

#### **(B) Struggles and Social Revolts**

Upper cloth revolts. Channar agitation, Vaikom Sathyagraha, Guruvayoor Sathyagraha, Paliyam Sathyagraha. Kuttamkulam Sathyagraha, Temple Entry Proclamation, Temple Entry Act .Malyalee Memorial, Ezhava Memorial etc.

Malabar riots, Civil Disobedience Movement, Abstention movement etc.

### **Role Of Press In Renaissance**

*Malayalee, Swadeshahimani, Vivekodayam, Mithavadi, Swaraj, Malayala Manorama, Bhashaposhini, Mathnubhoomi, Kerala Kaumudi, Samadarsi, Kesari, Al-Ameen, Prabhatham, Yukthivadi, etc*

### **Awakening Through Literature**

Novel, Drama, Poetry, *Purogamana Sahithya Prasthanam, Nataka Prashtanam*, Library movement etc

### **Women And Social Change**

Parvathi Nenmenimangalam, Arya Pallam, A V Kuttimalu Amma, Lalitha Prabhu.Akkamma Cheriyan, Anna Chandi, Lalithambika Antharjanam and others

### **Leaders Of Renaissance**

Thycaud Ayya Vaikundar, Sree Narayana Guru, Ayyan Kali.Chattampi Swamikal, Brahmananda Sivayogi, Vagbhadananda, Poikayil Yohannan(Kumara Guru) Dr Palpu, Palakkunnath Abraham Malpan, Mampuram Thangal, Sahodaran Ayyappan, Pandit K P Karuppan, Pampadi John Joseph, Mannathu Padmanabhan, V T Bhattathirippad, Vakkom Abdul Khadar Maulavi, Makthi Thangal, Blessed Elias Kuriakose Chaavra, Barrister G P Pillai, TK Madhavan, Moorkoth Kumaran, C. Krishnan, K P Kesava Menon, Dr.Ayyathan Gopalan, C V Kunjuraman, Kuroor Neelakantan Namboothiripad, Velukkutty Arayan, K P Vellon, P K Chathan Master, K Kelappan, P. Krishna Pillai, A K Gopalan, T R Krishnaswami Iyer, C Kesavan. Swami Ananda Theerthan , M C Joseph, Kuttippuzha Krishnapillai and others

### **Literary Figures**

Kodungallur Kunhikkuttan Thampuran, KeralaVarma Valiyakoyi Thampuran, Kandathil Varghese Mappila. Kumaran Asan, Vallathol Narayana Menon, Ulloor S Parameswara Iyer, G Sankara Kurup, Changampuzha Krishna Pillai, Chandu Menon, Vaikom Muhammad Basheer. Kesav Dev, Thakazhi Sivasankara Pillai, Ponkunnam Varky, S K Pottakkad and others

### **GENERAL KNOWLEDGE AND CURRENT AFFAIRS**

General Knowledge and Current Affairs

***NOTE: - It may be noted that apart from the topics detailed above, questions from other topics prescribed for the educational qualification of the post may also appear in the question paper. There is no undertaking that all the topics above may be covered in the question paper.***