LIVESTOCK PRODUCTS TECHNOLOGY

Course Structure – at a Glance Course Contents

CODE	COURSE TITLE	CREDITS
LPT 601	FRESH MEAT TECHNOLOGY	1+1
LPT 602	MEAT PROCESSING, PACKAGING, QUALITY CONTROL AND	2+1
	MARKETING	
LPT 603	POULTRY AND FISH PRODUCTS TECHNOLOGY	2+1
LPT 604	EGG AND EGG PRODUCTS TECHNOLOGY	1+1
LPT 605	ABATTOIR AND POULTRY PROCESSING PLANT PRACTICES	1+1
LPT 606	SLAUGHTER HOUSE BYPRODUCTS TECHNOLOGY	2+1
LPT 607	PROCESSING AND MARKETING OF WOOL	2+1
LPT 608*	MARKET MILK PROCESSING AND DAIRY PLANT PRACTICES	2+1
LPT 609	QUALITY CONTROL OF MILK AND MILK PRODUCTS	1+1
LPT 610	TECHNOLOGY OF MILK PRODUCTS	2+1
LPT 611	BIOTECHNOLOGY OF FOODS OF ANIMAL ORIGIN	1+1
LPT 612*	IN-PLANT TRAINING (NON CREDIT)	0+2
LPT 691	MASTER'S SEMINAR	1+0
LPT 699	MASTER'S RESEARCH	20
LPT 701	ADVANCES IN ABATTOIR PRACTICES AND ANIMAL BYPRODUCTS	2+1
	UTILIZATION	
LPT 702	ADVANCES IN FRESH AND PROCESSED MEAT PRODUCTS TECHNOLOGY	3+1
LPT 703	ADVANCES IN POULTRY PRODUCTS TECHNOLOGY	2+1
LPT 704	ADVANCES IN MILK AND MILK PRODUCTS TECHNOLOGY	3+1
LPT 705	ADVANCES IN QUALITY CONTROL OF LIVESTOCK PRODUCTS	2+0
LPT 706	BIOTECHNOLOGICAL TECHNIQUES AND PROCESSES IN ANIMAL	1+1
	PRODUCTS	
LPT 791	DOCTORAL SEMINAR I	1+0
LPT 792	DOCTORAL SEMINAR II	1+0
LPT 799	DOCTORAL RESEARCH	45

LPT 601: FRESH MEAT TECHNOLOGY

1+1

Objective: To impart knowledge about history, current status of meat industry, muscle composition, functions and sensory quality of meat. To educate on factors influencing quality of meat and nutritive value.

Theory

UNIT I

History and development of meat science and meat industry, current trends and prospects of meat industry-Structure and chemistry of animal tissues, muscle functions and postmortem changes- Rigor mortis - Effect of transport on meat quality - its veterinary and clinical importance - PSE and DFD in meat quality -Conversion of muscle to meat.

UNIT II

Composition, nutritional content and general quality characterization and evaluation of meat and its products- meat microbiology -Factors affecting quality of meat - Essential nutrients in meat and poultry meat - Tenderization. Chemical residues in meat meat and their effects on the health of the consumer.

Practical

Microbiological sampling and evaluation of meat. Evaluation of physico-chemical and sensory properties of meat and meat products. Estimation of pH -Colour - Water holding capacity - ERV - Tyrosine value - Thiobarbituric acid number - Estimation of texture profile of

meat - Estimation of glycogen, R-value, myoglobin, proximate analysis of meat and meat products including poultry products - Estimation of drip loss - Determination of Sarcomere length, fibre diameter and myofibrillar fragmentation index. Retail and wholesale cuts.

Suggested Readings

Gracey JF. 1999. *Thornton's Meat hygiene*. 10th Ed. WB Saunders.

Kerry J, Kerry J & Ledward D. 2005. Meat Processing-Improving Quality.

Woodhead Publishing Ltd., UK. Pearson AM & Dutson TR. 1999. Advances in Meat Research. Vol. IX. Quality Attributes and their Measurement in Meat, Poultry and FishProducts. Aspen Publishers, Inc, Maryland, USA.

Swatland H & Compbell T. 2004. Meat Cuts and Muscle Foods. Nottingham Univ. Press.

LPT 602: MEAT PROCESSING, PACKAGING, QUALITY CONTROL AND MARKETING

2+1

Objective: To impart knowledge on preservations, methods, product development, quality control and packaging practices in meat.

Theory

UNIT I

Factors affecting fresh meat quality, ageing, basic principles of preservation, chilling, freezing, thermal processing, dehydration, irradiation and use of chemicals and antibiotics; meat curing and smoking.

UNIT II

Comminuted meat; preparation of various kinds of fresh and cooked meat products-Canning - Heat processing - Sausages - Ham, Bacon, Tandoori-Barbecueing of Poultry. Senses of taste and olfaction-factors influencing sensory measurements, physical and chemical properties related to sensory evaluation, types of sensory panels, discriminate and descriptive testing.

UNIT III

Meat adulteration and substitution - Different techniques for meat speciation -Agar gel immuno diffusion techniques - Demonstration of CIE, IEF, ELISA, PCR

UNIT IV

Principles of packaging- Product characteristics affecting packaging requirements; packaging material and their characteristics different methods of packaging meat - Vacuum packaging - MAP - Retort pouch processing.

UNIT V

Marketing of meat, setting up of a meat retailing unit and other meat merchandising practices. MFPO, BIS Standards for meat products.National and international specifications and standards.

Practical

Proximate composition of meat, tyrosine value, nitrite content, TBARS value, peroxide value, Formulation of different meat products, emulsion stability, shear force value, cooking determinants, subjectice and objective method of sensory evaluations.

Suggested Readings

Kerry J, Kerry J & Ledward D. 2005. *Meat Processing-Improving Quality*. Woodhead Publishing Ltd., UK.

Pearson AM & Dutson TR. 1999. Advances in Meat Research. Vol. IX. Quality Attributes and their Measurement in Meat, Poultry and Fish *Products.* Aspen Publishers, Inc, Maryland, USA.

Swatland H & Compbell T. 2004. Meat Cuts and Muscle Foods. Nottingham Univ. Press.

LPT 603: POULTRY AND FISH PRODUCTS TECHNOLOGY 2+1

Objective : To impart knowledge on structure, functional quality, microbiology, processing and preservation of poultry meat, eggs and fish.

Theory

UNIT I

History and development of poultry meat and egg processing industry. Different species of poultry and their production potentials- commonly occurring anti nutrients, and antibiotics in poultry feed ingredients and its effect on egg and meat nutrition - Quality identification, quality maintenance, chemical, nutritional and microbiological quality of poultry meat. Preservation and packing techniques of shelled and liquid eggs. Quality identification of shell eggs and factors influencing the quality

UNIT II

Pre-slaughter care, transportation, resting, fasting, ante-mortem examination, methods of slaughter and slaughtering procedure-postmortem inspection-reasons for condemnation of carcass-yield and grading of dressed chicken, cut-up parts and de boned meat.

UNIT III

Structure, nutritive value, compositional chemistry, microbiology and functional properties of eggs. Low cholesterol eggs, GMP, HACCP procedures for food safety - Codex regulation for food products safety - WTO/GOI regulations for import and export of poultry products. National and international regulations, standards, quality control and marketing of fish and fish products, utilization of fish processing waste.

UNIT IV

Fishery resources, marine and fresh water fishes, transportation, processing, preservation, grading, standards. Quality control, labeling and marketing of fish and fish products, utilazation of fish processing waste.

UNIT V

Post processing value added meat for export- Integration, poultry and fish processing and marketing-Storage, packaging and chilling, freezing, dehydration, canning, irradication, curing, smoking, barbecuing, cooking and preparation of further processed poultry and fish products.

Practical

Organization, sanitation and maintenance of poultry processing plants. Slauhtering, ante-mortem and postmortem inspection, meat cutting, grading, production of ready to eat, smoked and cured poultry meatComminuted and other poultry based convenient items. Visit to poultry processing plant/egg processing plant. Postmortem inspection, carcass yield and grading. Meat bone ratio, quality maintenance, tenderization water holding capascitiy. TBA values and preparation of further processed and freeze dried poultry products. Whole egg powder, shell meal processing plant waste meal-HACCP-egg powder processing plant. Grading of shelled eggs, liquid eggs, egg powder foaming property, posteurization of liquid egg, testing microbial load in different foams of egg, visit of egg powder plant/egg processing plant poultry and fish products and its Proximate analysis, microbiological and sensory evaluation and poultry meat and fish.

Suggested Readings

Mead GC.1989. Processing of Poultry. Elsevier.

Mountney GJ. Poultry Products Technology. 2nd Ed. AVI Publ.

Pearson AM & Gillett TA.1996. Processed Meats. 3rd Ed. Chapman & Hall.

Stadelman W & Cotterill OJ. 2002. Eggs Science and Technology. 4th Ed.CBS.

Suziki T. 1981. Fish and Krill: Protein Processing Technology. Applied Science Publ.

LPT 604: EGG AND EGG PRODUCTS TECHNOLOGY

1+1

Objective: To impart knowledge about composition and marketing of eggs and nutritive value of eggs, preservation methods -quality maintenance, functional and value added egg product development, packaging and standards

Theory

UNIT I

Preservation and maintenance of quality of eggs- spoilage of egg and its prevention.-Preparation of fast foods.

UNIT II

Egg breaking plant lay out and organization- freezing- pasteurization-desugarisation-dehydration - quality estimation.

UNIT III

Principles involved in preparation of egg powder and other egg products-Development of convenient egg based products- packaging of egg and egg products.

UNIT IV

Specifications, standards and marketing of egg and egg products-Quality control of egg products.

Practical

Evaluation of physical, chemical, functional and microbial quality of egg and egg products. Preservation of eggs- Preparation of dehydrated and convenient egg products- Visit to egg processing plant.

Suggested Readings

Romanoff AL & Romanoff AJ. 1949. Avian Egg. John Wiley & Sons.

Stadelman WL & Cotterill OJ. 2002. Egg Science and Technology. 4th Ed. CBS.

LPT 605: ABATTOIR AND POULTRY PROCESSING PLANT PRACTICES

Objective : Teaching about abattoir design, sanitation and basic slaughterhouse practices, effluent treatment and proper disposal of wastes.

Theory

UNIT I

Layout, designing - operation and maintenance of slaughter houses and processing plants-disposal of slaughter house effluents and different designs of effluent treatment plants - equipments, organization and Slaughter house, maintenance, record keeping and operation-sanitation of slaughterhouse-Sanitary practices in meat plant and its benefits; quality control.

UNIT II

Pre-slaughter judging, inspection, grading, pre-slaughter care, slaughter of meat animals; Humane slaughter - Principles and methods of stunning - Ritual slaughter of food animals and poultry - Machineries for slaughter and dressing- processing of different kinds of meat animals- Ante-mortem inspection and Post-mortem examination of animals. Disposal and condemnation of unfit materials.

UNIT III

Carcass quality appraisal, judgement and their grading, meat cutting, measuring yields. Application of HACCP, GMP, ISO 9000, ISO 14000, ISO 22000, BIS Standards and any recent standards for meat and processing industries

Practical

Visit to slaughterhouse- Plan and outlay of modern abattoir- Procedure for slaughter of food animals and poultry - Ante-mortem and postmortem inspection, slaughtering, grading and meat cutting, carcass yield, meat bone ratio measurement of effluent characteristics: pH, BOD, COD, suspended solids etc.

Suggested Readings

Gerrard F. 1977. Meat Technology. Northwood.

Gracey JF. 1999. *Thornton's Meat hygiene*. 10th Ed. WB Saunders.

LPT 606: SLAUGHTER HOUSE BYPRODUCTS TECHNOLOGY

2+1

Objective : To Impart knowledge on animal by-products, processing and industrial utilazation.

Theory

UNIT I

Slaughterhouse byproducts industry in India and abroad - Importance of utilizing slaughterhouse offals - Rendering- Planning a by-product plant -Utilization of blood, bones, hooves, glands, intestines, feathers, glandular byproducts and other minor by-products for industrial exploitation.

UNIT II

Meat fat characteristics - Preservation and Processing of ruminal contents - Ensiling of ruminal contents - Value products preparation from slaughterhouse by-products.processing of animal byproducts for pet foods.

UNIT III

Flaying - Classification and factors affecting quality of hides and skin-Physical and chemical characteristics of hide and skin-Processing of hide and skin for manufacture of leather- Preparation and quality control of gelatin and glue. Microscopic, physical and chemical characteristics of leather; testing and marketing of leather- Preservation and packaging practices of various kinds of hides and skin.

UNIT IV

Designing of animal byproduct plant.Collection and scope for further utilization of slaughter house byproducts. Waste treatment and pollution control- Environmental Audits-Regulations on pollution control.

Practical

Identification of quality defects in leather- preparation of sausage casing-blood meal, feather meal and meat meal. Demonstration of carcass meal -Meat meal - Bone meal - Preparation of animal casings - Grading of casings and wool - Preparation of slime meal - Collection and preservation of glandular products - Preparation of pet foods - Visit to local by-products, processing units. Quality evaluation of rendered animal fat.

Suggested Readings

Dilon M & Griffith C. 2001. Auditing in the Food Industry - From Safety and Quality to Environmental and other Audits. Woodhead Publ. Ltd.,UK.

GregoryNG. 1988. Animal Welfare and Meat Science. CABI. Ockerman HW & Hansen CL. 2000. Animal by-product processing and

utilization. Technomic Publ. Co. Ltd., Pennsylvania, USA.

Ockerman HW & Hansen CL. 2002. Animal Byproducts Processing and Utilization. CRC.

LPT 607: **PROCESSING AND MARKETING OF WOOL** 2+1

Objective : To impart knowledge on grading, manufacturing process, marketing and specifications of wool and specialty fibers- growth and structure of wool and fiber, their use.

Theory

UNIT I

Status and prospects of wool -Grading of wool. Faults and impurities in wool and their removal.

UNIT II

Wool types and their uses. Growth and molecular structure of wool fibre; physical and chemical properties of wool. Characteristics of hair fibres and their use, factors influencing quality of wool and hair fibres - Principles and steps involved in manufacturing processes of woolspecialty hair fibres.

UNIT III

Physical and chemical testing of wool. Proclaimed wool and secondary raw material - Marketing of wool, specification and regulation for quality control.

Practical

Visit to wool industry and acquaintance with various steps of manufacturing wool and its quality control, physical and chemical testing of wool. Characterization of wool, grading of wool.

Suggested Readings :Bergen WV. 1963. Wool Hand Book. Vols. I, II. InterScience.

LPT 608: MARKET MILK PROCESSING AND DAIRY PLANT PRACTICES

2+1

Objective: To impart knowledge about milk composition, legislation, milk processing techniques, cleaning and sanitation of dairy equipments.

Theory

UNIT I

Milk standards and legislation and related agencies.

UNIT II

Composition of milk, major and minor constituents of milk, physico-chemical, microbial and nutritional properties of milk and preservation of raw milk.

UNIT III Layout Designing and organization of dairy plant, Milk procurement, handling and transportation. Chilling, centrifugation, separation, clarification, bactofugation and homogenization. Thermal processing- pasteurization, UHT processing, sterilization, bactotherm and packaging, Storage and distribution of processed milk.Fortified, reconstituted and mild floured milks.

UNIT IV

Membrane processing and related techniques; application of ultrafilteration, reverse osmosis; nanofiltration and microfiltration in the dairy industry.

UNIT V

Current trends in cleaning and sanitization of dairy equipment, biological detergents, ultrasonic techniques in cleaning; biodetergents. Disposal of dairy effluents.

Practical

Platform tests. Determination of fat, SNF, TS, protein, lactose and ash contents of milk. Standardization, pasteurization and sterilization. HCT profile of milk systems. Judging of different types of milks. Layout plan of market milk plant.

Suggested Readings

Walstra P, Wouters JTM & Geurts TJ. 2006. Dairy Science and Technology.2nd Ed.

LPT 609: 1+1 **QUALITY CONTROL OF MILK AND MILK PRODUCTS**

Objective : To impart knowledge about quality control, TQM, HACCP, SPS, CAC and legal standards.

Theory

UNIT I

Importance of quality control in dairy industry. PFA Act, BIS standards, AgMark standards and ISO standards of milk products.

UNIT II

Total quality management in processing of milk products - HACCP and SPS.

UNIT III

Types of microorganisms associated with milk and milk products-Milk borne diseases.

UNIT IV

Physico-chemical and microbial changes during procurement, processing and storage of milk and milk products.

UNIT V

Fundamental rules for sensory evaluation, Hedonic scale, score cards and their use for grading of milk and milk products.

Practical

Determination of pH and acidity, electrical conductivity, viscosity, phosphatase test, MBRT, Resazurin test, DMC, SPC. Analysis of milk and milk products in reference to BIS/PFA standards. Grading of milk and milk products.

Suggested Readings

Jennes R & Patton S. 1969. Principles of Dairy Chemistry. Wiley Eastern.

Yadav JS, Grover S & Batish VK. 1993. Comprehensive Dairy Microbiology. Metropolitan Publ.

LPT 610: **TECHNOLOGY OF MILK PRODUCTS**

2+1

Objective : To impart knowledge about techniques for preparation of different milk products.

Theory

UNIT I

Drying of milk and milk products; freeze dehydration, water activity; sorption behaviour of foods- dried ice cream mix - cream and butter powder.

UNIT II

Hurdle technology and its application in development of dairy products.

UNIT III

Manufacture of milk products; butter, evaporated milk, condensed milk, milk powders, ice cream and other frozen desserts. Manufacture of yoghurt-acidophilus milk-bulgaricus milk- kumiss-kefir. Manufacture of cheddar-mozzarella- cottage and processed cheese. Manufacturing of indigenous milk products- paneer- channa- khoa- ghee- dahi and shrikhand.

UNIT IV

Manufacturing of casein- caseinate- co-precipitates- Whey protein concentrate (WPC) - lactose- dairy whiteners; functional properties of whey proteins-casein- co-precipitates- Ultra Filtration retentate and their modifications.

UNIT V

Evaluation of functional properties. Packing, storage and marketing of milk products. Defects in milk products, their preventions and remedies.

Practical

Preparation of butter- panneer- channa- ghee- ice cream- cheese-cheddar-Mozzorella and cottage cheese- khoa- dahi- yoghurt- caseincaseinate-coprecipate- determination of degree of browning chemical/physical methods; measurement of different functional properties of different milk products.

Suggested Readings

Aneja RP, Mathur BN, Banerjee AK & Chandan RC. 2002. Technology of Indian Milk Products. Dairy India.

Spreer E. 1993. Milk and Dairy Products. Marcel Dekker.

Walstra P, Wouters JTM & Geurts TJ. 2006. Dairy Science and Technology.2nd Ed. Taylor & Francis.

LPT 611: BIOTECHNOLOGY OF FOODS OF ANIMAL ORIGIN

Objective :To impart knowledge about new techniques of biotechnology for improving food value.

Theory

Role of Biotechnology in productivity of livestock, Meat Speciation and quality control. Use of Biotechnology in production of food additive. Use of biotechnological tools for the processing and preservation and foods of animal origin, use of biotechnology improved enzymes in food processing industry, consumer concerns about risks and values, biotechnology and food safety. Future of food biotechnology in India.

1+1

Practical

Introduction of basic biotechnological techniques such as western blotting, enzyme isolation and identification, DNA extraction, amplification, different types of PCR, Acquaintance with RT-PCR, Multiplex PCR, gene identification and characterization.

0+2

Suggested Readings: Selected articles from journals.

LPT 612: IN-PLANT TRAINING

(Non Credit: Satisfactory/Unsatisfactory)

Objective : To impart industrial exposure to post graduate students in meat, milk, poultry and fish industry.

Practical

APT students will undergo in-plant training in any one of the specialized area of Animal Products Technology for a period of three weeks in an institute in private/public sector industry. After completion of the training, the student will submit a training report. Evaluation will be based on viva-voce examination and a report submitted by student-Preparation of Project report.

Suggested Readings :Selected articles from journals.

LPT 701: ADVANCES IN ABATTOIR PRACTICES AND ANIMAL BYPRODUCTS UTILIZATION 2+1

Objective:To impart knowledge on advances in animal byproducts utilization such as leather, fat, casings, gelatin and abattoir effluent treatment. To expose the importance of environmental pollution and their pollutants.

Theory

UNIT I

Existing situation of slaughterhouses and processing plants in India -Collection of inedible and edible by-products for industrial uses -Disposal of slaughterhouse effluents - Effluent treatment plant - Different designs of effluent treatment plants- Sanitary and phytosanitary measures- SSOP -Advances in chemistry and technology of leather. Latest techniques in handling, preservation, tannery procedure,

manufacture and testing of leather.

UNIT II

Progress in gelatin, glue and natural casings production. Latest technology for utilization of animal byproducts, industry-waste as food, pharmaceuticals and other miscellaneous byproducts. Characterization, processing and quality control of meat fat.

UNIT III

Current trends in utilization of byproducts of egg, meat and poultry processing industry for feed, fertilizer and other useful products of economic importance-Organization, layout and operation of dry and wet rendering plants-Latest trends in disposal of slaughterhouse effluents and control of environmental pollution.

Practical

Visit to various slaughterhouses and meat processing plants - Plan and outlay of various components of modern abattoir - Designs of ETP - -Estimation of BOD and COD from abattoir effluents - Ante-mortem inspection of food animals - Methods of stunning - Stunning instruments -Electrical stunning -Slaughter and dressing of food animals - Post mortem inspection of carcasses of food animals - Fabrication of carcasses of food animals.

Suggested Readings

Gracey JF. 1999. Thornton's Meat Hygiene. 10th Ed. WB Saunders. Selected articles from journals.

Wilson W. 2005. *Wilson's Practical Meat Inspection*. 7th Ed. Blackwell Publ.

LPT 702: ADVANCES IN FRESH MEAT AND PROCESSED MEAT PRODUCTS TECHNOLOGY 3+1

Objective :To empower students on recent advances in processing, preservation, quality control, packaging, regulations and standards of meat. To bring out knowledge on harmful residues in meat and to impart information on meat species identification.

Theory

UNIT I

Development of muscular tissue - Abnormal growth and developments in muscle - Genetic nutritional and physiological aspects - Muscle proteins -Myofibrillar, sarcoplasmic and connective tissue proteins - Cytoskeletal proteins - Skeletal muscle fibre types - Lipid profile - Factors affecting muscle function and composition - Stress on the animal - Stress and the meat quality- Latest findings in the area of pre-slaughter care of meat animals-Keeping and Eating quality of meat - Properties of fresh meat - Odour, Colour, Water holding capacity - texture profile - Artificial tenderization -Meat in human nutrition - Essential nutrients in meat and poultry meat -

Prefabricated meat - Chemical residues in meat and their effects on the health of the consumer.

UNIT II

Principles of preservation - Methods - temperature control - Refrigeration -Chilling - Freezing - Mechanisation of chiller and freezer - Thermal processing - Canning - retort processing - Intermediate moisture meat -Moisture control - Dehydration - Freeze drying - Curing - Smoking - Direct microbial inhibition - Irradiation - Use of antibiotics and chemical preservatives - Organic acids - Recent advances in preservation of meat. Meat adulteration and substitution - Different techniques for meat speciation -Packaging of meat and meat products-Critical assessment of ageing, chilling, freezing, smoking, curing, tenderization and irradiation techniques.

UNIT III

Basic meat processing procedure-Functional properties of tissue component in meat processing-forming processed meat produts. Approaches for new product development-different equipments used for processing of meat products-Indigenous and heritage meat products-purpose of smoking-composition of smoke-method of smoking-liquid smoke preparataion-Ham, bacon, sausages, patties, burger, meat loaves-various noval meat products.

UNIT IV

Fermented meat products-heat processing-restructured meat products-Reformed meat products-Effect of massaging, tumbling and flaking techniques and quality-intermediate, moisture meat-Enrobed meat products-Meat analogues and substitutes-Thermal processing of meat-Browning reaction-Enzymatic and non enzymatic-Protein changes in processed meat products-lipid changes-protein and lipid interaction-protein and carbohydrate interaction.

UNIT V

Meat additives and regulations pertaining to processed and convenient meat based products-Meat packaging and retailing practices-National and international standards, grading, specifications and quality control of meat and meat products.

Practical

Estimation of Colour - Estimation of texture profile of meat - Estimation of glycogen, Lactic acid, R-value, myoglobin, proximate analysis of

meat and meat products - Estimation of hydroxy proline - Histological structure of muscle - Estimation of emulsion stability, thawing in meat and meat products-Identification of different packaging material - Agar gel immuno diffusion techniques - Demonstration of CIE, IEF, ELISA, PCR - Different methods of packaging of meat and meat products including poultry products - Visit to different cold stores.Evaluation of carcass quality,Estimation of muscle fiber diameter, Estimation of lipid profile of meat.

Organoleptic evaluation of meat-Estiamtion of Nitrate-Preparation of some noval meat products and studies on their shelf life-Total viable count and differential counts of meat and meat products-Visist of meat /poultry processing units.

Suggested Readings

Kerry J, Kerry J & Ledward D. 2005. Meat Processing-Improving Quality.

Woodhead Publ. Ltd., UK. Selected articles from journals.

Swatland H & Compbell T. 2004. Meat Cuts and Muscle Foods. Nottingham Univ. Press.

LPT 703: ADVANCES IN POULTRY PRODUCTS TECHNOLOGY

Objective :Discussion on latest development in processing, preservation, quality control, packaging, regulations and standards of poultry meat.

Theory

UNIT I

Indian scenario of poultry processing industry Advances in poultry dressing, meat yield, preservation, microbiology and quality control methods. Automation in broiler farming, catching, transporting, control of shrinkage and methods of slaughter.

UNIT II

Preservation techniques, Room temperature preservation of poultry fast foods by multi hurdle technology critical evaluation of application of refrigeration, tenderization, canning, dehydration, irradiation, curing, smoking and cooking techniques in poultry processing and development of additional processed products.- Regulation of CAC and European standards of poultry meat and meat products.

UNIT III

Recent trends in packing and marketing of poultry and poultry products. Modified atmosphere packaging- Different packing materials for meat and cooked products.

UNIT IV

Policies and marketing trends in poultry meat -Regulations, specifications, standards and use of additives in poultry products.

UNIT V

Poultry product development formulation and profitability.

Practical

Cooked and uncooked meat quality standards- sensory evaluation of poultry meat- packaging material- Modified Atmosphere Packaging-Factors influencing meat quality at different freezing temperatures and thawing.

Suggested Readings :Selected articles from journals.

LPT 704 ADVANCES IN MILK AND MILK PRODUCTS TECHNOLOGY

3+1

Objective :To disseminate knowledge about production of high quality milk, preservation method, advances in processing of milk and milk products and packaging.

Theory

UNIT I

Principles and practices of production of high quality milk Advances in methods of chilling and preservation of milk. Thermal processing of milk, principles and methods, types of UHT-processing plants. Advances in packaging of milk.

UNIT II

Bacteriological, physical, chemical and nutritional effects of processing on milk - New concepts in milk processing - radiation and microwave processing-Membrane processing in dairy industry such as Reverse Osmosis(R.O), Ultra Filtration (UF), Nano Filtration (NF) and Micro Filtration (MF)- Fouling and cleaning of membranes.

UNIT III

New concepts in technology of dairy products. Cream powder, sterilized cream, frozen products, ice-cream mix, low, medium, high heat milk powder, milk based infant foods. Advances in starter cultures and their application, butter, butter spread, butter powder, cheese and cheese spread, probiotic products.

UNIT IV

Indigenous dairy products, khoa powder, paneer/channa powder, gulab jamum powder, kulfi powder- Recent advances in utilization of dairy byproducts in product development, preservation of milk products. Application of immobilized enzyme in dairy products.

Practical

Use of Starter cultures, lyophilization process, Maintenance of cultures. Demonstration of Memeberane processing Technology, Advances in Packaging-Retort, Vacuum and Control Atmosphere Pacakaging Technology.

Suggested Readings

Selected articles from journals.

Walstra P, Wouters JTM & Geurts TJ. 2006. Dairy Science and Technology. 2nd Ed. Taylor & Francis.

LPT 705: ADVANCES IN QUALITY CONTROL OF LIVESTOCK PRODUCTS

2+0

1+1

Objective :To impart knowledge about the advances in quality control in dairy and meat industry.

Theory

UNIT I

Recent advances in quality control in dairy and meat industry in special reference to Total Quality management, HACCP - good manufacturing practices for manufacturing of quality and safe livestock products.

UNIT II

PFA and BIS standards, international standards organization (ISO 9000), product quality certification, international standards for milk powders, American Dairy Products Institute (ADPI) standards.

UNIT III

Rheology of milk products-Preservatives, antioxidants, antibiotics and pesticides residue in milk- Advances in bacteriological and physicochemical analysis of milk and milk products

UNIT IV

Importance of quality assurance of livestock products for domestic and export trade - quality standards for meat - Effect of processing on nutritional and chemical qualities of meat products - Sensory evaluation of meat products - Physicochemical and microbiological quality assessment and standards -Economics of processing and product development.good manufecturing practices, meat hygine regulations in relation to slaughter houses and processing plants-international regulations-State Municipal and other regulations pertaining to meat trade-Meat Food Products Order-ISO certification-Codex alimentarius-Bureau of Indian standards.

Suggested Readings :Selected articles from journals.

LPT 706: BIOTECHNOLOGICAL TECHNIQUES AND PROCESSES IN ANIMAL PRODUCTS

Objective : To impart knowledge about biotechnological techniques, methods, starter cultures and industrial application of biotechnology in meat industry.

Theory

UNIT I

Introduction, development and prospects of biotechnology in animal products, ancient and traditional food processing biotechniques.

UNIT II

Modern biotechnological methods and processes in animal products development, chemical and physical factors required for growing microbial cultures in nutritive substrate- Meat species identification- Quality control -Screening products for contaminants - Polymerase Chain Reaction (PCR) based products.

UNIT III

Basic principles of the industrial use of bio-reactions for production of biomass-upstream and downstream processing-application of microorganisms as starter cultures in meat industry, microbial production of food ingredients.

Practical

Production, selection and purification of microbial cultures, making products using different microbial cultures, production of acidulation, buttery flavour, pigments, anti-microbial agents to improve the product quality and safety-Polymerase Chain Reaction (PCR).

Suggested Readings :Selected articles from journals.

POULTRY SCIENCE

Course Structure - at a Glance

CODE	COURSE TITLE	CREDITS
PSC 601	POULTRY BREEDING AND GENETICS	2+1
PSC 602	POULTRY NUTRITION AND FEEDING	2+1
PSC 603	COMMERCIAL LAYER PRODUCTION	2+1
PSC 604	COMMERCIAL BROILER PRODUCTION	2+1
PSC 605	BREEDER STOCK, FLOCK HEALTH AND HATCHERY MANAGEMENT	3+1
PSC 606	MANAGEMENT OF POULTRY OTHER THAN CHICKEN	2+1
PSC 607	POULTRY PRODUCTS TECHNOLOGY AND MARKETING	2+1
PSC 608	POULTRY ECONOMICS , PROJECTS AND MARKETING	2+1
PSC 609	PHYSIOLOGY OF POULTRY PRODUCTION	2+1
PSC 691	MASTER'S SEMINAR	1+0
PSC 699	MASTER'S RESEARCH	20
PSC 701	APPLIED POULTRY NUTRITION	2+1
PSC 702	CONCEPTS IN COMMERCIAL POULTRY PRODUCTION	2+1
PSC 703	DEVELOPMENTS IN POULTRY PRODUCTS TECHNOLOGY	2+1
PSC 704	EMERGING DISEASES OF POULTRY AND FLOCK HEALTH	2+1
PSC 705	ADVANCED POULTRY BREEDING METHODS	2+1
PSC 706	POULTRY ECONOMICS, MARKETING AND INTEGRATION	2+1
PSC 791	DOCTORAL SEMINAR I	1+0
PSC 792	DOCTORAL SEMINAR II	1+0
PSC 799	DOCTORAL RESEARCH	45

PSC 601 POULTRY BREEDING AND GENETICS

2+1

Objective: To impart knowledge on different systems of breeding, selection methods, design and implementation of breeding programme in developing egg-type and meat type birds. Modern tools in poultry breeding.

Theory

UNIT I

Genetic classification of Poultry -Origin and breed characteristics of poultry-Development of Poultry Industry in India - Mendel's laws of inheritance related to poultry -Qualitative and Quantitative traits in Poultry breeding -Additive, Non Additive, Epistatic and complementary gene action - Lethal and mutations in poultry - Sex linked, Sex limited and Sex influenced traits - Economic traits -Heritability - Quantitative inheritance – Phenotype, Genotype & environment interactions.

UNIT II

Systems of Breeding - Systems of Mating - Selection methods - Breeding programme for developing egg-type and Broiler type of birds -Developing hybrids - Other species of Poultry breeding and management - Formation and Management of inbred, pure lines, grand parent and parent stock.

UNIT III

Industrual breeding-Artificial insemination in chicken-Autosexing-Random SampleTest. Use of molecular genetics in poultry breeding-Quantitative trait loci and marker-assisted selection-Conservation of poultry genetic resources.

Practical

Breeds of poultry - Factors affecting inheritance of qualitative and quantitative traits in poultry - Constructing index and Osborne index-Estimating heritability -Breeding program for developing commercial hybrid layers, broilers, Japanese quail, duck, turkey, fancy birds, Guinea Fowl and Pigeons - Semen collection, evaluation & insemination in chicken & turkey - Breeding records -Use of computers to maintain breeding records and for selection.

Suggested Readings

Crawford RD. 1990. Poultry Breeding and Genetics. Elsevier.

Singh RP & Kumar J. 1994. BiometricalMethods in Poultry Breeding. Kalyani.

PSC 602: POULTRY NUTRITION AND FEEDING

2+1

Objective: Teaching about nutrients & their functions, nutrient requirements of poultry and factors influencing the same. Imparting knowledge of different types of feeds and feeding methods.

Theory

UNIT I

Digestive system, digestion, metabolism and absorption of feed in poultry -Factors influencing the feed consumption in birds - Macro and micro-nutrients -Nutrient requirements for various species of poultry. Partitioning of energy -

Calorie: protein ratio - Nutrient interrelationships - Factors influencing the nutrient requirements.

UNIT II

Feed ingredients composition, feed storage technique-milling and quality control-Processing of feed - Types & forms of feeds and feeding methods - Commonly occurring anti nutrients and toxicants in poultry feed ingredients - Mycotoxins and their prevention - Feeding chicks, growers, layers, broilers and breeders -Principles of computing feed- - Balanced feeds -Least cost feed formulation and programming - Feeding in different seasons and stress conditions - Nutritional and metabolic disorders in poultry.

UNIT III

Systems of feeding - restricted, forced, controlled and phase feeding -Use of Additives and Non additives- enzymes, probiotics, prebiotics antibiotics, herbs, performance enhancers - Utilization of non-conventional feedstuff - Feeding of ducks, turkeys, Japanese quails, Guinea fowls.

UNIT IV

Organic, functional, designer & SPF feed production - Production of drug residue, pesticide residue & toxin free feeds - regulations for Import and Export of feed and feed supplements.

Practical

Physical and sensory evaluation of feed ingredients- sampling techniques for ingredients and compounded feed-Estimation of proximate principles of feed and feed ingredients - Computing various poultry feed formulae based on commonly available feed ingredients - Estimation of Aflatoxin, Calcium, Phosphorus, Sand, Silica and Salt - Mash, pellet & crumble feed preparation - Feeding procedures. Visit to feed mills - Preparation of Project report for a feed mill-Hands on Training in feed analytical lab- Preparation & quality control of organic and designer feeds.

Suggested Readings

Einsminger ME. 1992. Poultry Science. Poultry International Book Distributing Co.

Mac O' North & Bell D. 1990. Commercial Chicken Production Manual. 4th Ed. Avi Publ. Co. Inc., Westport, Connecticut.

Singh RA & Panda B.1992. Poultry Production. Kalyani Publishers.

PSC 603: COMMERCIAL LAYER PRODUCTION

2+1

Objective: To impart knowledge on different systems of rearing commercial egg laying birds, care and management of commercial layers for optimal egg production.

Theory

UNIT I

Layer Industry in India and the World - Systems of layer farming - Location -Lay out of the farm - Systems of housing - Types of roofs, roof materials, pillars, trusses for poultry houses - Design of different Poultry Houses for large & medium size layer farms - Cages & modified

cages for egg type birds - Layer farm equipments - Automation in poultry houses and its maintenance - Management of layers in different systems of rearing.

UNIT II

Deep litter & cage system of management - Medication and vaccination schedules & procedure for layers - Lighting programme for egg type birds -Water quality standards, watering of layer and water sanitation - Brooder, grower and layer management - All in All out and Multiple batch system of rearing layers.

UNIT III

Management of layers during peak egg production and maintaining the persistency in production-Factors causing uneven growth and low egg production -Monitoring egg production curve.

UNIT IV

Culling of unproductive birds - Record keeping - Biosecurity & health management - Management during different seasons - Induced moulting.-HACCP application for safe egg, value added egg production - Production of eggs free from harmful microbes, Mycotoxins & drug residues- Integration in layer production.

Practical

Layer farm lay out and blue print- Design of different chick, grower & layer houses, their specifications & blue print of deep litter and cage system- Selection & culling of layers, debeaking, dubbing, deworming, delicing, vaccination & other farm routines and operations - Farm sanitation, disinfection & waste disposal - Maintaining farm records - Visit to commercial layer farms - Record keeping - Calculating Hen day egg production, Hen housed egg production and other economic traits - Case study of production loss, reasons and corrective measures - Preparing project reports for layers under different batch systems -Calculating the cost of production of eggs.

Suggested Readings

Mac O' North & Bell D. 1990. Commercial Chicken Production Manual. 4th Ed. Avi Publ. Co. Inc., Westport, Connecticut.

PSC 604: COMMERCIAL BROILER PRODUCTION

2+1

Objective: To deal with different systems of rearing commercial broilers, manage mental practices for higher bodyweight with best feed efficiency in commercial broilers. Marketing of broilers efficiently.

Theory

UNIT I

Broiler Industry in India and the World - Systems of rearing broilers - Location, layout and design of Broiler houses - Broiler farm equipment.

UNIT II

Brooding and rearing of broilers- All in all out and multiple batch systems - Litter materials and deep litter management - Lighting for broilers - Environmentally controlled broiler houses & their management - Water quality and Watering of broiler and water sanitation- Management during different seasons.

UNIT III

Mash, crumble and pellet feeding of Broilers - weekly growth rate, feed conversion and livability in broilers- sex separate feeding - Feeding broilers for optimum growth rate & feed efficiency- Broiler performance indices - Broiler farm records.

UNIT IV

Broiler farm routine, medication and vaccination schedule - Bio-security and health management and their control - Systems of Integration in broiler production and marketing -transport of broilers- Different ways of marketing of broilers- Regulations and specifications for production

of export quality broilers -Organic broiler meat production.

Practical

Location and blue print for a broiler farm - Broiler house design - Preparation of project report for broiler farm - Visit to broiler farms - Judging of live broilers and ready-to-cook broilers- Broiler vaccination, medication, brooding and transportation and farm routines. Record keeping - Calculating the cost of production of broilers - Feeding of broilers at different ages - Working out Feed efficiency - Case study on low body weights, reasons and corrective measures.

Suggested Readings

Mac O' North & Bell D. 1990. Commercial Chicken Production Manual. 4th Ed. Avi Publ. Co. Inc., Westport, Connecticut.

PSC 605: BREEDER STOCK, FLOCK HEALTH AND HATCHERY MANAGEMENT

Objective: To impart knowledge about care and management of breeders, hatchery operation, health management. And to study about common diseases and disorders of poultry, diagnosis, vaccination, prevention, control and treatment. Bio security measures in control of general & hatchery borne diseases.

Theory

UNIT I

History of Natural and Artificial incubation- embryo development-different breeder flocks - Planning a hatchery, breeder farm - Special care of breeder flock -Collection, selection and care of hatching eggs - Breeder male and female management - Flock testing & culling - Farm and hatchery equipments -Incubation practices - Ventilation and temperature control - Hatchery Management, Fumigation and sanitation - Breeder farm and hatchery operations, routine & schedule - Factors affecting fertility and hatchability.

UNIT II

Care of day old chicks and their vaccination - Restricted & controlled feeding of breeders - Sex separate feeding and nutrient supplementation. - Seasonal management of breeders - Location of hatchery - Layout and design of breeder houses, hatchery & other buildings.

UNIT III

Biosecurity, health management and waste disposal - Vaccination & medication schedule for breeders. Control of vertically transmissible & hatchery borne diseases.

Principles of bio security- Farm sanitation and disinfection procedures-Common bacterial diseases- Salmonella, Pasteurella, E.coli, Fowl typhoid, CRD, Infectious Coryza, Viral diseases-Newcastle, Infectious bronchitis, Infectious laryngeo tracheitis, Mareks, Fowl pox, Infectious Bursal disease, Egg drop syndrome-76, Avian Encephalomyelitis, Avian influenza, Duck viral Enteritis, Duck viral hepatitis-Fungal diseases-Aspergillosis, Mycotoxicosis, Metabolic disorders-Fatty liver haemorrhagic syndrome(FLHS), Gout and Ascites, Protozoan diseases-Coccidiosis, Ecto and endo parasitic infestation of poultry.

UNIT IV

Diagnosis, vaccination, prevention, treatment and control - Locational, structural & operational biosecurity in Poultry farms - Water sanitation & control of water borne diseases - Quarantine of poultry. Packaging and transportation of hatching eggs and chicks.

UNIT V

Hatching egg & SPF egg import and export regulations - Maintaining Salmonella and Mycoplasma free breeding flock -Application of HACCP and Good Management Practices (GMP) in hatchery management for better chick quality.

Practical

Breeder farms and hatchery records, selection, fumigation, care and storage of hatching eggs. Layout and blue prints for breeder farm and hatchery -Incubation requirements -Incubator management - Hatchery sanitation & fumigation procedures - Pedigree hatching - Hatchery waste disposal and recycling -Calculating cost of production of hatching eggs and day-old-chicks - Attending breeder farm routines & operation - Flock testing & culling of reactors -Analyzing hatchability results and hatchery records-Economics of layer and broiler hatchery.

Suggested Readings

Crawford.RD. 1993. (Ed.). Poultry Breeding and Genetics. Elsevier.

Mac O' North & Bell D. 1990. Commercial Chicken Production Manual. 4th Ed. Avi Publ. Co. Inc., Westport, Connecticut.

PSC 606: MANAGEMENT OF POULTRY OTHER THAN CHICKEN

2+1

Objective: Care and management of different breeds, varieties of poultry other than chicken, methods of rearing and common diseases affecting them and their control measure.

Theory

UNIT I

Breeds and varieties of Turkey, Duck, Goose, Pigeon, Guinea fowl, Budgerigar, Japanese quail, Emu and Ostrich - Incubation periods & incubation procedure for different species - Housing, cage & equipments for different species - Duck, Turkey, Japanese Quail, Guinea fowl, Emu, Ostrich production and rearing under different systems.

UNIT II

Management and rearing of Turkey, duck, goose, Guinea fowl, Japanese quail, pigeon, emu and ostrich-Feeding standards and feeding, watering and rearing systems and procedure for different species of poultry- Breeding policies of egg and meat production in different species - Preparation of Project reports for different species for commercial exploitation.

UNIT III

Common diseases affecting poultry other than chicken and their control -Regulations for import and export of different species of poultry - prevention of exotic diseases through import of poultry products and live birds.

Practical

Layout and design of housing & cages for other species of poultry. Visit to commercial Japanese quail, turkey and duck farms. Incubation and care of hatching eggs and young ones - Rearing practices followed by duck, quails and turkey farmers under field conditions. Preparing project reports for different species and calculating the cost of production.

Suggested Readings

Einsminger ME. 1992. Poultry Science. Poultry International Book Distr. Co.

PSC 607: POULTRY PRODUCTS TECHNOLOGY AND MARKETING

2+1

Objective: Composition and nutritive value of eggs and chicken meat, grading and preservation methods of eggs and meat, functional and value added poultry products, marketing of eggs and poultry meat.

Theory

UNIT I

Physical and chemical composition and nutritive value of eggs and meat -Grading of eggs & meat by different standards -Preservation of eggs - Egg quality deterioration - Factors affecting egg quality - Handling, processing, packaging materials, packaging, transport and marketing of eggs.

UNIT II

Quality control of poultry meat - Quality preservation - Marketing of egg and poultry meat - Marketing channels - Integration in poultry processing and marketing-Functional and value added eggs and meat - Further processing of eggs and meat - Various egg and meat fast foods.

UNIT III

Sanitary and phyto sanitary measures to ensure food safety - Post oviposition value addition to the eggs & Post processing value addition to the meat for export - Production of low cholesterol eggs - Microbial safety of poultry products -Import and export of poultry products - Further processing of poultry for export -Implementation of GMP and HACCP procedures for food safety - Codex regulations for poultry products safety.

Practical

Measuring internal and external egg qualities - Preservation of table eggs, grading of eggs - Processing of chicken - Further processing of poultry - Preservation of poultry meat - Preparation of various eggs and poultry meat products and fast foods - Preservation, packaging and transport - Quality control of value added poultry products - Estimation of pesticides, antibiotics and mycotoxin residues in eggs and meat - Measures of microbial safety of poultry products for export.

Suggested Readings

Mountney GJ & Parkhairst CR. 1995. Poultry Products Technology. 3rd Ed. AVI Publ.

PSC 608 POULTRY ECONOMICS, PROJECTS AND MARKETING

2+1

Objective: To study about measures of performance efficiency in poultry farms and its allied sector, components of project reports and preparation of viable projects related to poultry Industry.

Theory

UNIT I

Glossary of terms used in poultry economics & projects - Measures of performance efficiency in broiler, layer, breeder and other poultry species, hatcheries and other poultry related operations - Production standards and goals.

UNIT II

Planning poultry enterprise -Bank norms for poultry projects - Poultry insurance - Methods to improve the production efficiency and reduce the production cost -Components of project reports and preparing projects.

UNIT III

Integration in Poultry production - Marketing channels for eggs and meat -Integration in marketing of eggs and meat - Cost of production of egg, broiler, hatching egg, day-old chick, compounded feed - Effect of new economic policies on poultry industry - Viability of poultry projects.

Practical

Preparing different poultry projects for bank finance - Calculating the cost of production of various products under various systems-case study - Preparation of Balance sheet, break even points, benefit: cost ratio & other farm economic indices - Preparation of feasibility & viability reports.

Suggested Readings

Mac O' North & Bell D. 1990. Commercial Chicken Production Manual. 4th Ed. Avi Publ. Co. Inc., Westport, Connecticut.

PSC 609: PHYSIOLOGY OF POULTRY PRODUCTION

2+1

Objective: To study the basic principles of physiology of poultry production in relation to egg formation, production, incubation, stress and role of environment.

Theory

UNIT I

Skeletal system of poultry - Comb pattern, plumage - Physiology of poultry digestive system - Digestion, metabolism and absorption of feed and water - Role of enzymes - Poultry circulatory system - Respiratory system - Physiology of growth- muscle growth-bone growth and growth of body parts-Types of muscle fibre and functions.

UNIT II

Poultry nervous system and its function - Excretory system - Male and female reproductive system-Reproductive tract-Semen productionsemen characteristics-Artificial insemination-Semen extenders-reproductive tract-egg formation-egg laying pattern-photo periodic responses -Role of endocrine glands and their functions. Thermoregulatory mechanism - Stress due to adverse environmental factors -Acid -base balance - Poultry ethology.

UNIT III

Neuro-endocrine control of egg production-Ovulation and Oviposition - Clutch and Pause.

Practical

Demonstration of various systems of birds - structure of feather- Identification of endocrine glands -hormones in poultry production and reproduction-Haematology of poultry species - SGOT, SGPT, free fatty acids - Morphology of Poultry spermatozoa.

Suggested Readings

Rose SP.1997. Principles of Poultry Science. CABI.

PSC 701: APPLIED POULTRY NUTRITION

2+1

Objective: Teaching about nutrients and their functions, nutrient requirements of poultry and factors influencing the same. Different methods and forms of feeds and feeding of poultry.

Theory

UNIT I

Developments in the nutrient requirement for egg and meat-type chicken -Concepts in various poultry feeding procedures and methods for

optimal production - Factors influencing the nutrient requirements, feed intake and feed efficiency in poultry-Problems encountered in nutritional deficiencies - Protein and energy utilization and calorie protein ratio, Vitamins, minerals and their interactions in poultry rations.

UNIT II

In Ovo -Juvenile nutrition for optimal growth rate and feed efficiency - Care in grower feeding - Nutrition and feeding of layers /breeders during peak egg production- Nutritional requirements for higher egg production, broiler meat production, higher fertility and hatchability and other special purposes.

UNIT III

Feeding of broilers for uniform growth rate and feed efficiency - Feeding to enhance egg quality and nutrients-Enzymes-additives-nonadditives in feed production - organic, functional and designer feeds. Advances in feed milling technology - Specialty feed production to produce microbial safe foods, SPF eggs and organic foods.

UNIT IV

HACCP implementation in feed quality control - Production of drug, Mycotoxins and pesticide residue free feeds.

Practical

Computing of specialty and functional feeds - Estimation of available carbohydrate, Aflatoxin, tannins, hydro cyanic acid and other toxins in the feed. Evaluation of various feeds for its quality - Field methods of feed quality control including feed microscopy - Estimation of carotenes, cholesterol and peroxides. Quality control of functional poultry feeds - Preservation of feed quality from production to consumption.

Suggested Readings

Einsminger ME. 1992. Poultry Science. Poultry International Book Distributing Co. Selected articles from journals.

PSC 702 CONCEPTS IN COMMERCIAL POULTRY PRODUCTION

2+1

Objective: To impart knowledge on different systems of poultry rearing, care and management of commercial layers/broilers for optimal egg and meat production.

Theory

UNIT I

Global trends in poultry production - Advances in broiler production in India -concepts in egg production - Latest concepts in breeder management - advances in hatchery operations for higher hatchability & chick quality.

UNIT II

Optimal microclimatic condition in poultry houses and cages for higher production - Management of poultry in environmentally controlled houses -Management of poultry under adverse climatic conditions - advances in the management of other species of poultry - Behaviour patterns of poultry in different growing systems.

UNIT III

Advanced management techniques for egg and meat production - advances in lighting management, feeding management, litter management and manure management.

UNIT IV

The role of integration in poultry production - Factors influencing egg production in different species of poultry - Factors influencing growth rate and egg production - Automation in poultry production.

UNIT V

Regulations for cage-free egg production and organic chicken production -Functional feeds for functional foods - Production of HACCP and GMP certified table eggs, meat, chicks, hatching eggs and other value added products for export.

Practical

Performance study in commercial layer, broiler, Japanese quail, duck, turkey and other species of poultry farms by Interpretation of the farm records -Managemental routines of different species of poultry - calculating the cost of production -Estimation of microclimatic condition and comparing the productive traits- Modern poultry house and cage design for optimal efficiency and cost reduction.

Suggested Readings :Selected articles from journals.

PSC 703: DEVELOPMENTS IN POULTRY PRODUCTS TECHNOLOGY

Objective: Composition and nutritive value of eggs and chicken meat, grading, packaging and preservation methods of eggs and meat, functional and value added poultry products, marketing of eggs and poultry meat.

Theory

UNIT I

Global trends in poultry and egg processing - Indian scenario of poultry processing industry - Nutrients & Non-nutrient components in regular and value added poultry products - various measures of egg and meat quality control -advances in value addition to poultry products.

UNIT II

Concepts in poultry meat and egg preservation - Newer concepts in meat tenderization, canning, dehydration, curing, irradiation, etc. - Modified atmosphere packaging - Other processed products - Room temperature preservation of poultry fast foods by multi hurdle technology.

UNIT III

Egg desugarization - pasteurization - Functional properties of eggs - Industrial uses of eggs - Marketing trends in poultry meat and eggs.

UNIT IV

Improving the product quality to meet Codex & European standards - Standards for egg, meat and their products -Production of immunoglobulins, lecithin, lysozyme, sialic acid and other pharmaceutical products from eggs - Sanitary & phytosanitary measures for food safety.

Practical

Preparation of value added products suitable for preservation at room temperature - Further processing - Barbecuing and Tandoori preparation - preparation of locale specific poultry meat and egg products - Meat balls, meat patties -Estimation of various egg and meat qualities -Preservation of meat and eggs -Measuring the microbial quality of poultry foods - Drug, pesticide, mycotoxin and antibiotic residue assay

Suggested Readings :Selected articles from journals.

PSC 704: EMERGING DISEASES OF POULTRY AND FLOCK HEALTH 2+1

Objective: To study about common diseases and disorders of poultry, their diagnosis, vaccination, prevention & treatment, emphasis on control of emerging poultry diseases of zoonotic importance, disease diagnostic techniques.

Theory

UNIT I

The concepts of disease prevention in poultry - Emerging and reemerging avian diseases -Factors influencing immuno suppression and stimulation - Developing immunity in poultry

UNIT II

Water sanitation, hatchery sanitation procedures - Control of vertically transmissible diseases - non-infectious and metabolic diseases in poultry and their control - Bio security - Mycotoxins and their control.

UNIT III

Stress alleviation - prevention and control of bacterial and viral diseases in poultry - Biosecurity measures - Control measures of problematic re-emerging diseases of poultry like Ranikhet, Avian influenza, Marek's disease, Infectious bursal disease, Infectious Bronchitis, Infectious laryngo tracheitis.

UNIT IV

Flock management for Specific pathogen free egg production - Maintaining the HACCP standards in poultry farms - developments in the Exim policies for flock health.

Practical

Studying the Immune status of birds - Egg inoculation techniques in laboratory diagnosis -differential diagnosis of various poultry diseases by postmortem, and laboratory techniques - Antibiotic sensitivity test - Vaccination - Disinfection and ectoparasite control, medication procedures.

Suggested Readings :Selected articles from journals.

PSC 705: ADVANCED POULTRY BREEDING METHODS

Objective: To impart knowledge about different systems of breeding, selection methods and implementation of breeding programme in

developing egg-type and broiler hybrids. Modern tools in poultry breeding.

Theory

UNIT I

Gene and genotypic frequency- Sex linked, limited and influenced traits-Auto sexing- Qualitative and quantitative traits and its inheritance in poultry- methods of selection - family selection - selection for multi characteristics and construction of selection indices - restricted selection indices - indirect selection - Reciprocal recurrent selection - Recurrent selection - Random bred control populations - Selection limit - Osborne's index - construction of selection index for multiple traits - Advances in commercial poultry breeding.

UNIT II

Modern methods in commercial layer and broiler breeding, performance testing -Pure line breeding - Inbreeding and hybridization - Diallele mating, lethal and semi lethals in poultry. Pedigree hatching. Genotype versus environmental interaction.

UNIT III

Exploitation of additive and non-additive gene action for commercial poultry production - Heterosis - Exploitation of hybrid vigour for commercial production of layers and broilers- Formation of synthetic lines - Development of strains in poultry-Comparative efficiency of different selection methods in poultry.

Practical

Construction of selection index - Analysis of breeding data collected from breeding records - Problem in qualitative and quantitative inheritance- Estimation of heritability and standard error of heritability by different methods - analysis of heritability for different traits - Estimation of inbreeding coefficient - Artificial insemination in poultry.

Suggested Readings

Muir WM & Aggrey SE. 2003. Poultry Genetics and Biotechnology. CABI. Selected articles from journals.

PSC 706: POULTRY ECONOMICS, MARKETING AND INTEGRATION

2+1

Objective: To study about measures of performance efficiency in poultry farms and its allied sectors, hatcheries and developing poultry projects.

Theory

UNIT I

Present practices and future trends in production of egg and meat - consumption -demand and supply-seasonal variations in production and consumption. Marketing channels- procedures of marketing for eggs and meat - Market intelligence-Advertising and branding of poultry products - wholesaling and retailing - quality of eggs and meat.

UNIT II

Various poultry enterprises - choice of production size of business - input and output analysis - calculating cost of various inputs - calculating cost of production . Price determination - Least demand and supply indices of performance - Performance targets and achievements-marketing and business management-market managerial skills and human resource development-cost and financial management.

UNIT III

Future trends in broiler and egg production -factors influencing the profit margin in poultry enterprises.

Practical

Study of marketing channels of egg and meat, calculating cost of production of eggs, meat, day-old chick, feed and processing plantspreparing other related poultry projects.

Suggested Readings

Einsminger ME. 1992. Poultry Science. Poultry International Book Distri. Co. Selected articles from journals.