

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

POULTRY SCIENCE

Course Contents

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

Industrial 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. *Biometrical Methods 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 3+1

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.

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.

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-non-additives 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

PSC 703

DEVELOPMENTS IN POULTRY PRODUCTS TECHNOLOGY

2+1

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

2+1

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.

TheoryUNIT 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 plants– preparing other related poultry projects.

Suggested Readings

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

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List of Journals

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|---------------------------------------|---|
| ❖ Avian Diseases | ❖ Journal Avian Biology |
| ❖ Avian Pathology | ❖ Poultry Abstract |
| ❖ Avian Research | ❖ Poultry Science |
| ❖ British Poultry Science | ❖ World Poultry Science Channel |
| ❖ Indian Journal of Poultry Science | ❖ Tamilnadu Journal of Veterinary and Animal Sciences |
| ❖ International Poultry Production | ❖ Indian Journal of Veterinary and Animal Sciences |
| ❖ Japanese Poultry Science | |
| ❖ Journal of Applied Poultry Research | |

e-Resources

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| ❖ http://www.alabamapoultry.org | http://www.ag.auburn.edu/dept/ph/index.html |
| ❖ http://www.egg.com | ❖ http://www.aes.ucdavis.edu |
| ❖ http://www.dpicken.com | ❖ http://animalscience.ucdavis.edu/ |
| ❖ http://www.georgiaeggs.org | ❖ http://animalscience.ucdavis.edu/extension/ |
| ❖ http://www.ansc.purdue.edu/ISEB | ❖ http://www.calstate.edu |
| ❖ http://www.ansc.purdue.edu/ISP | ❖ http://www.csupomona.edu |
| ❖ http://www.MidwestPoultry.com | ❖ http://www.animalscience.calpoly.edu |
| ❖ http://www.MinnesotaTurkey.com | ❖ http://www.clemson.edu/avs/ |
| ❖ http://www.nebraskapoultry.org | |
| ❖ http://www.ncegg.org | |
| ❖ http://www.ohiopoultry.org | |
| ❖ http://www.aeb.org | |
| ❖ http://www.fb.org | |
| ❖ http://www.afia.org | |
| ❖ http://www.albucusa.org | |
| ❖ http://www.amerpoultryassn.com | |
| ❖ http://www.avianresearch.co.uk | |
| ❖ http://www.canr.uconn.edu/ansci/ | |
| ❖ http://www.ansc.cornell.edu | |
| ❖ http://www.castscience.org | |
| ❖ http://www.enconline.org | |
| ❖ http://www.internationalegg.com | |
| ❖ http://www.eatchicken.com | |
| ❖ http://www.foodsafety.gov/~dms/fs-toc.html | |
| ❖ http://www.nmaonline.org | |
| ❖ http://www.eatturkey.com | |
| ❖ http://www.naga.org | |
| ❖ http://www.mtgplace.com | |
| ❖ http://www.poultryscience.org | |
| ❖ http://www.posc.tamu.edu/library/dother.html | |
| ❖ http://www.poultryegg.org | |
| ❖ http://www.usapeec.org | |
| ❖ http://www.wattpoultry.com | |
| ❖ http://www.afns.ualberta.ca/http://www.poultryresearchcentre.ch | |
| ❖ http://www.poultryscience.uark.edu/poult | |

Suggested Broad Topics for Master's and Doctoral Research

- ❖ Breeding programs for different species of poultry to improve the economic traits.
- ❖ Utilization of conventional and unconventional feeds in poultry rations.
- ❖ Study on exogenous enzymes, probiotics for increasing the feed efficiency in poultry.
- ❖ Evolving ways and means for the improving the performance of commercial, broilers and layers for higher economic gains.
- ❖ Micro and trace minerals requirements study for broiler and layers.
- ❖ Designing and development of eco friendly and environmentally controlled houses for large commercial poultry farms.
- ❖ Standardizing the disinfections procedures for sustainable poultry production.
- ❖ Standardizing the sanitary and phyto sanitary measures for safe production of eggs and broilers.
- ❖ Prevention and control of toxin, pesticides and antibiotic residues in egg and meat.
- ❖ Value added egg and poultry meat products program
- ❖ Development of fast foods by utilizing poultry egg and meat.
- ❖ Development and standardization of designer eggs and low fat high protein poultry meat.
- ❖ Preservation, storage, packaging of value added egg and meat products and their standardization.
- ❖ Reduction of pollution from poultry farms and processing plants.
- ❖ Profitable utilization of Poultry waste and manure.
- ❖ Development and standardization of organic poultry farming and standards for phyto sanitary measures
- ❖ Standardization of managemental, nutritional methods and schedules for rearing turkeys, guinea fowls, geese, Japanese quails and domesticated ratites.
- ❖ Development of suitable varieties of turkeys and guinea fowl suitable for different agro climatic conditions.
- ❖ Development of suitable birds for backyard poultry.
- ❖ Poultry bio security measures in organized farms.
- ❖ Studies on diseases affecting turkeys, guinea fowl, Japanese quail and their preventive measures.
- ❖ Disease surveillance, forecasting and development of field level diagnostic kits.