

Recommended Books:

1. Venugopalan, A. 2000. Essentials of Veterinary Surgery. 8th Ed. Oxford and IBH Publishers and Distributors, New Delhi, India.
2. Kumar, A. 1997. Veterinary Surgical Techniques. Vikas Publishing House, New Delhi, India.
3. Harari, J., 1993. Surgical Complications and Wound Healing in the Small Animal Practice, W. B. Saunders Co., Philadelphia, USA.
4. Kelly, W. R. 1984. Veterinary Clinical Diagnosis. 3rd Ed. Bailliere Tindall, London, UK.

THERIOGENOLOGY CLINIC - II**1 (0-1)****Learning outcomes:**

At the end of the course, students will be able to:

1. Describe the importance of breeding bull, its selection and clinical evaluation.
2. Basics for semen collection, evaluation and processing.

Clinic:

Method and importance of history questions in case handling, Breeding program in a herd, How to diagnose pregnancy in domestic animals, Breeding soundness examination of male, Preparation of Bull and Artificial Vagina for semen collection, Methods of semen collection (Techniques), Evaluation of semen (characters) and processing (storage methods), Preparation of extenders, Rectal palpation and passing of rod for Artificial Insemination.

Recommended Books:

1. Zemjenis, R., 1970. Diagnostic & Therapeutic Techniques in Animal Reproduction. Williams & Wilkins Company, Baltimore
2. Morrow, D.A., 1986. Current Therapy in Theriogenology, II. W.B. Saunders Company, Philadelphia
3. Ahmad, M. and M.A. Saji, 1997. Manual for Breeding Soundness of Dairy Bulls for use in A.I. Livestock and Dairy development Department, 16-Cooper Road, Lahore.

SEMESTER VIII**BREEDER AND HATCHERY MANAGEMENT****3 (2-1)****Learning outcomes:**

At the end of the course, students will be able to:

1. Describe modern managerial techniques for optimum and cost-effective production of broiler and layer breeder.
2. Describe techniques for optimum production, selection, fumigation of storage of hatching eggs.
3. Ensure disease prevention and control through proper implementation of biosecurity and vaccination procedures.

4. Describe procedures involved in production of good quality chicks
5. Demonstrate maintenance of health and welfare of the breeding birds.
6. Plan, implement, and manage optimum and hygienic hatchery operations.
7. Perform chick sexing, grading, vaccination, packing practices in the hatchery.
8. Handle problems in the breeding poultry and hatchery operations.

Theory:

Status and scope of Poultry Breeding Industry in Pakistan/World; commercial breeding programs; bio-security; breeder house layout and equipment requirements; environment control vs. open sided housing; care and management during brooding period; light and feed management during growing; monitoring body weights and uniformity during growing; grading and selection during growing period; significance of fleshing, feathering, shank and keel length; transportation or shifting of growing flock to breeding house; pre-breeder nutrition; feeding programs for adults; production standards; male management during rear and production; causes of poor fertility and hatchability; major management health concerns with breeders; summer and winter strategies to enhance production; induced molting in the breeder flocks; incubation methods; types of incubators; role of computer in modern hatchery operations; incubation requirements; embryonic development of chick; factors influencing fertility, hatchability and quality of chicks; setting and candling of eggs; taking off the hatch; hatchery sanitation and waste disposal; hazard management during incubation; incubation records; trouble shooting at different stages in the breeder and hatchery operation.

Practical:

Demonstration of commercial breeding programs; reproductive systems of male and female; vaccination programs and methods; blood and tissue sampling; environment control housing; ventilation and heating systems; toe clipping, dubbing and beak trimming; monitoring body weights during growing and uniformity calculations; basic practices for male management; identification of sexing errors; separate-sex feeding system; male to female ratio; artificial insemination; nest management; egg collection, handling, cleaning; hatching egg fumigation, selection, storage and transportation; summer and winter management; calculating cost of producing hatching eggs and chicks; calculations and conversions; feasibility report of 10,000 broiler and layer breeder flocks; Layout and design of hatcheries; selection, candling and setting of hatching eggs; cleaning of hatching eggs; fumigation; types of incubators and their different parts; operation of incubators; sexing, vaccination, grading; packing and transportation of day-old chicks; hatchery sanitation; disinfection and fumigation of incubators; visits to commercial hatcheries; record keeping; feasibility report of hatchery.

Textbook:

1. North, M.O. and D. D. Bell, 2001. Commercial Chicken Production Manual. Van Nostrand Reinhold Co., New York, USA.

Recommended Books:

1. Taylor, L.W., 2003. Fertility and Hatchability of Chicken and Turkey Egg. International book distributing company, Lucknow, India.
2. Lakhotia, R. L., 2003. Reproduction in Poultry. CAB International, Wallingford, Oxon, U.K.
3. Hocking, P. M., 2009. Biology of breeding poultry. CAB International, Wallingford, Oxon, U.K.
4. Austic and Nesheim, 1990. Poultry Production. 13th edition. Lea and Febiger; Philadelphia, Pennsylvania.
5. Leeson, S. and J.D. Summers, 2000. Broiler Breeder Production. University Book Foundation, University of Guleph, Canada.
6. Leeson, S. and J.D. Summers, 2001. Nutrition of the Chicken. International Book Distributing C., Lucknow, India.
7. Sreenivasaiah, P.V., 2006. Scientific Poultry Production. 3rd edition. International Book Distributing Co., UP India.

VETERINARY EPIDEMIOLOGY AND PUBLIC HEALTH 3 (2-1)

Learning outcomes:

At the end of the course, students will be able to:

1. Describe basic principles of epidemiology, including descriptive/analytical epidemiology
2. Elaborate techniques used to conduct disease outbreak investigations and develop disease prevention programs
3. Describe causal models, distribution/patterns and control of disease or other health-related events in populations.
4. Perform epidemiologic data collection, management and analysis, evaluation of analyses and critical evaluation of published information.

Theory:

Introduction to epidemiology & public health, disease occurrence, Mapping, Causality, Determinants of disease, Diagnostic testing, Transmission and maintenance of infection, Descriptive epidemiology, Analytical epidemiology, Case-control studies, Cohort studies, Experimental epidemiology, Animal disease survey, Types of sampling, Surveillance, Prevention, Control and eradication, Outbreak investigation, National and international disease reporting, Trans-boundary disease of veterinary importance, TAD distribution, mapping, regulatory implications, TAD control, International trade framework

Practical:

Nature of veterinary data scale of measurement, Data elements, Representation of data: coding numeric codes, symbols, Presentation of numerical data, Measure of disease occurrence, Vital statistics, Collection, handling and transportation of appropriate samples, Methods of data collection, Survey and sample size calculation, Questionnaire development for field visit, Field visit for detection of weather determinants, global positioning system (GPS) and GIS Arc for mapping of important communicable diseases, entry of data collected during survey and its analysis, Epidemic investigation steps, Questionnaire for epidemic investigation of retrospective, cohort and prospective studies.

Textbook:

1. Thrusfield M., 2007. Veterinary Epidemiology. Blackwell Publisher

Recommended Books:

1. Gordis L., 2008. Epidemiology. 4th Edition. Saunders, Elsevier
2. Bonita, R., R. Beaglehole, T. Kjellstrom, 2006. Basic Epidemiology. 2nd Edition. WHO
3. Merrill, R. M., 2013. Introduction to epidemiology, 6th Edition. Jones and Barletta learning LLC.

SMALL ANIMAL SURGERY**4 (3-1)****Learning outcomes:**

At the end of the course, students will be able to:

1. Correct surgical problems encountered in small animal practice
2. Practice the learned techniques on experimental and clinical cases.

Theory:

General surgical considerations, Fluid and electrolyte therapy in small animals, Affections of mouth & teeth, salivary glands, neck, digestive system, Hip and Shoulder Dislocations, Fracture, Affections of respiratory system, skin and its adnexa, ears, urinary system, Male and female genital systems.

Practical:

Laparotomy techniques in small animals, Tooth extraction procedure, salivary gland resection, Splenectomy, Gastrotomy, Intestinal end-to-end anastomosis, Castration in dog and cat, Ovariohysterectomy in bitches and queens, Cystotomy, Nephrotomy and Nephrectomy, Thoracotomy, correction of auricular haematoma, ear cropping, Tail docking and Dewclaw amputation, repair of prolapse of eye ball, Approaches to different long bones and use of external and internal fixation devices for fracture repair, Anal sac resection.

Textbook:

1. Slatter, D. H. (ed.) 1991. Textbook of Small Animal Surgery. 2nd ed. W. B. Saunders Co., Philadelphia, USA.

Recommended Books:

1. Bojrab, M. J. (ed.) 1998. Current Techniques in Small Animal Surgery. 4th Ed. Lea and Febiger, Philadelphia, USA.
2. Fossum, T. W. (ed.) 1997. Small Animal Surgery. 3rd ed. Mosby-Year Book, Inc., St. Louis, Missouri, USA.
3. Harvey, C. E., C. D. Newton and A. Schwartz, 1990. Small Animal Surgery. J. B. Lippincott. Philadelphia, USA.
4. Knecht, C. D., A. R. Allen, D. J. Williams and J. H. Johnson, 1987. Fundamental Techniques in Veterinary Surgery. 3rd Ed. W. B. Saunders Co., Philadelphia. USA.
5. Piermattei, D. L., 1993. An Atlas of Surgical Approaches to the Bones and Joints of the Dog and Cat. 3rd Ed. W. B. Saunders Co., Philadelphia, USA.
6. Archibald, J. (ed.) 1974. Canine Surgery. 2nd Ed. Santa Barbara, American Veterinary Publications, Inc., California, USA.

FISHERIES AND AQUACULTURE

1 (0-1)

Learning outcomes:

At the end of the course, students will be able to:

1. Differentiate between fish, fisheries & aquaculture.
2. Identify fish species on the basis of morphology.
3. Apply principles of aquaculture for appropriate site selection, designing and pond construction; selection of suitable fish species for sustainable aquaculture.
4. Apply best aquaculture operational and management skills.
5. Formulate and prepare aqua feed, induced breeding techniques, diagnosis and control of diseases in commercially important fish species.

Practical:

Introduction to fish, fisheries and aquaculture; fish diversity, source and consumers preference; fish identification, morphometric and meristic counts, dissection, anatomy and dressing percentage; construction and components of fish ponds; determination of water quality parameters (physical, chemical and biological-phytoplankton and zooplankton sampling and identification); diagnosis and control of infectious and metabolic fish diseases; formulation and preparation of aqua feed; types of fish hatchery and management; induced fish breeding techniques; ornamental fishes and aquarium making; fishing gears and netting.

Textbook:

1. Garg, S. K., A. Bhatnagar, A. Kalla and M.S. Johal, 2002. Experimental Ichthyology. CBS Publishers. INDIA.

Recommended Books:

1. Mirza, M. R. and M. Sharif, 1998. Key to the Identification of Fishes of Punjab. Ilmi Publications, Lahore.
2. Ali, S. S., 2001. Fresh Water Fish Biology. Naseem Book Depot, Hyderabad.
3. Shammi, Q. J. and S. Bhatnager, 2002. Applied Fisheries. Agrobios. India.
4. Pillay, T.V.R., 2002. Aquaculture: Principles and Practices. Blackwell Science Ltd.
5. Bhatti, M. N. and M.R. Mirza, 1995. *Jadeed Fish Culture*. Feroze Sons, Lahore.
6. Bhatti, M. N. and M.R. Mirza, 1993. *Pakistan Ki Machhianaur Mahiparwari*. Feroze Sons, Lahore.

MEDICINE CLINIC-III

2 (0-2)

Learning outcomes:

At the end of the course, students will be able to:

1. Perform disease diagnosis and treatment of clinical cases of musculoskeletal system, eye and ear of large and small animals.
2. Practice emergency handling and critical care of patient in ICU and demonstrate basic skills of diseases outbreak investigation.

3. Use alternative medicine in veterinary practice.
4. Describe principles of storage of dangerous drugs and development of strategies for parasite control in livestock.
5. Demonstrate basic knowledge of diseases diagnosis, treatment and control of zoo and wild animal diseases.
6. Develop core competencies in clinical case handling and recording.

Clinic:

Exercises in diagnosis and treatment of clinical cases of diseases of musculoskeletal system, eye and ear; Practice of emergency handling and critical care (colic, tympany, snakebite, poisonings, drug reactions, hemorrhage, shock, heat stroke etc.), Managing of an outbreak of infectious/contagious disease, Application of different diagnostic and treatment tools (gastric lavage, enema, allergic tests etc.), Screening tests for brucellosis, Health and safety (human, animal, environment), Maintenance and storage of dangerous/poisonous drugs, Practical demonstration of the control measures of ecto- and endo-parasites on individual animals and herd basis, Introduction to the practice of complementary medicine (alternative medicine), Use of biotechnology in disease diagnosis, treatment, control and prevention, Introduction to important diseases of zoo/wild animal species, Recording of minimum 15 cases under the supervision of teacher and making a presentation after consulting veterinary information resources like journals, books and internet. Study tour to livestock farms, Zoo/Wildlife Parks and Veterinary Hospitals.

Recommended Books:

1. Radostitis, O.M., C.C. Gay, K.W. Hincheliff and P. D. Constable, 2007. Veterinary Medicine, 10th Ed. Saunders Elsevier, PA, USA.
2. Kelly, W. R., 1984. Veterinary Clinical Diagnosis. 3rd Ed. Bailliere Tindall & Corsell, London, U. K.
3. Kahn C.M., 2010. The Merck Veterinary Manual. 10th Ed. Merck & Company., INC, Whitehouse Station, N.J., USA.
4. Pinsent, P.J.N. and C.J. Fulle, 1997. Outline of Clinical Diagnosis in Horse. Blackwell Science, Oxford, UK.
5. Howard J.L, 1999. Current Veterinary Therapy, Food Animal Practice. W.B. Saunders, Co., U.S.A.
6. Hungerford. T.G., 1991, Hungerford's Diseases of Livestock 9th Ed. McGraw-Hill Book Company, Sydney, Australia.
7. Smith B.P., 1990. Large Animal Internal Medicine. The C.V. Mosby Company, Baltimore.

SURGERY CLINIC-III

2 (0-2)

Learning outcomes:

At the end of the course, students will be able to:

1. Control and handle different animals for the purpose of surgical manipulations.
2. Manage treatment of animals brought to the Surgery clinic.
3. Prepare animals for surgical operations.
4. Manage pre-operative and post-operative requirements of individual patients.
5. Manage and feed admitted cases.

Clinic:

Management and treatment of burn wounds, Antibiotics, Analgesics, Anti-inflammatory drugs used in surgery, Lameness in large animals, Nerve block, regional and local anaesthesia in clinical cases, Use of firing and counter irritants in veterinary practices, Induction and maintenance of general anaesthesia in field conditions, Surgical management of horn, hoof and tail affections, Teat surgery (instruments, techniques and complications), Castration of large animals, Visits to animal farms and hospitals.

Recommended Books:

1. Crow, S. E. and S. O. Walshaw, 1997. Manual of Clinical Procedures in the Dog, Cat and Rabbit. 2nd Ed. J. B. Lippincott, Philadelphia, USA.
2. Kelly, W. R. 1984. Veterinary Clinical Diagnosis. 3rd Ed. Bailliere Tindall, London, UK.
3. Kirk, R. W., S. I. Bistner and R. B. Ford, 1985. Kirk and Bisner's Handbook of Veterinary Procedures and Emergency Treatment. 6th Ed. W.B. Saunders Co., Philadelphia, USA.
4. Oehme, F.W. and I. E. Prier, 1998. Text book of Large Animal Surgery. 2nd Ed. Williams and Wilkins, Baltimore, London, UK.

THERIOGENOLOGY CLINIC - III

2 (0-2)

Learning outcomes:

At the end of the course, students will be able to:

1. Explain the procedures of Artificial Insemination and their application.
2. Elaborate the use of ultrasonography in reproductive management.
3. Describe and demonstrate; how to handle reproductive disorders.

Clinic:

Approaches to diagnose and record reproductive disorders in clinical cases, Different methods of artificial insemination (AI) in domestic animals, Semen handling and structure of liquid nitrogen container, Thawing of frozen semen, Preparation of AI gun, Pre-requisites for AI procedure, Determination of time of insemination, Method of AI rod & AI gun passing in the female reproductive tract on table and in live animals, Clinical application of hormones in different

reproductive disorders, Ultrasonography in domestic animals, Synchronization for reproductive management in domestic animals, Causes and management of repeat breeding, Diagnosis causes of anestrus, prolapse and its management, Uterine sample collection for culture sensitivity and endometrial biopsy, Diagnosis and prevention of abortion.

Recommended Books:

1. Zemjenis, R., 1970. Diagnostic & Therapeutic Techniques in Animal Reproduction. Williams & Wilkins Company, Baltimore
2. Morrow, D.A., 1986. Current Therapy in Theriogenology, II. W.B. Saunders Company, Philadelphia
3. Kahn, W., D. Wolkman, and R.M. Kenney, 1994. Veterinary Reproductive Ultrasonography, Mosby-Wolfe, London

SEMESTER IX

ANIMAL WELFARE AND ETHICS

2 (2-0)

Learning outcomes:

At the end of the course, students will be able to:

1. Enumerate international and national organizations working for animal welfare
2. Describe challenges of captive animals
3. Elaborate regulations, policies and principles governing care and use of laboratory animals
4. Describe various hazards affecting welfare of animals

Theory:

Care and welfare of different animal species, National / Provincial Legislation for Animal Welfare, Regulations, policies and principles governing the care and use of animals, Code of practice for domestic poultry, farm, captive, laboratory and companion animals, Hazards (Natural and Man-made) affecting the welfare of animals and their management, Difference between hazard and disaster, Ethics, Animal Welfare Organizations like Society for Prevention of Cruelty to Animals (SPCA), Challenges to Zoo and animal welfare, Setting Standards for Evaluating of captive Facilities.

Textbook:

1. Fraser, D., 2008. Understanding Animal Welfare: The Science in its Cultural Context. ISBN: 978-1-4051-3695-2 Wiley-Blackwell.

Recommended Books:

1. NAP, 1996 Guide for the care and use of Laboratory Animals, National Research Council, National Academy Press, Washington D.C.
2. Anonymous, 2014. Animal Welfare Act, Government of the Punjab. (www.punjab.gov.pk)
3. Clark. J. D, Baldwin, K. A., Bayne, M. J. Brown, G. F., Gebhart, J. C. Gonder, J. K. Gwathmey, M. E. Keeling, D. F. Kohn, J. W. Robb, O. A. Smith, W. J.