

**UNIVERSITY GRANTS COMMISSION  
CURRICULUM AND TRAINING DIVISION  
SECTOR H-9, ISLAMABAD**

**CURRICULUM REVISION COMMITTEE MEETING  
IN  
VETERINARY PATHOLOGY**

A meeting of the National Curriculum Revision Committee for Veterinary Pathology to finalize the draft syllabus prepared in its preliminary meeting was held on June 12-14, 2001 at UGC, Regional Centre, Lahore. The following attended the meeting:

- |    |   |          |
|----|---|----------|
| 1. | Dr. Wali Muhammad Bhatti<br>Chairman/Associate Professor<br>Department of Veterinary Pathology<br>Sindh Agriculture University, Tandojam.   | Convener |
| 2. | Dr. Muhammad Zaman Khan<br>Professor (Retired)<br>Nominee of Pakistan Veterinary Medical Council,<br>Islamabad.                             | Member   |
| 3. | Dr. Muhammad Anwar<br>Department of Veterinary Pathology<br>Institute of Animal Husbandry and Vet. Sciences,<br>Gomal University, D.I. Khan | Member   |
| 4. | Dr. M. Akhtar Qureshi,<br>Assistant Professor,<br>University College of Agriculture,<br>Rawalakot, AJK.                                     | Member   |
| 5. | Dr. Shakeel Akhtar Khan<br>Associate Professor<br>Section of Veterinary Pathology<br>College of Veterinary Sciences, Lahore.                | Member   |
| 6. | Dr. Asim Aslam<br>Lecturer,<br>Section of Veterinary Pathology<br>College of Veterinary Sciences,<br>Lahore.                                | Member   |

7. Dr. Ahrar Ahmad Khan  
Assistant Professor  
Department of Veterinary Pathology  
University of Agriculture, Faisalabad.

Member/Secretary

The meeting started with recitation from the Holy Quran by Dr. Ahrar Ahmad Khan.

Mr. Muhammad Javed Khan, Director Curriculum, UGC, welcome the participants and briefed them of the obligations of the Commission for review, revision and development of curricula as per provisions of the Act of Parliament, 1976. He suggested the committee to go through the curriculum of D.V.M., M.Sc. (Hons.) and Ph. D. degrees in the subject proposed in first meeting held in April, 2001 and review the same in light of comments and suggestions as received from different universities/institutions and finalize its recommendations to make it available to universities before 30<sup>th</sup> June, 2001. He stated that the objectives behind the whole exercise of reviewing Vet. Sciences curricula to **inculcate the latest knowledge** amongst the future graduates in the field of Veterinary Pathology which is considered as the core subject and a diagnostic tool for confirmation of diseases in livestock, poultry and pet animals. The Director informed the members that the present exercise of curriculum revision for Agriculture, Basic Sciences, Applied Sciences, Engineering and Technology, Animal Husbandry and Veterinary Sciences is being carried out with the financial support of Ministry of Science and Technology.

Prof. Dr. Altaf Ali G. Shaikh, Adviser (Curriculum and Training) introduced the members of the committee of the different academic programmes of the commission aimed at enhancing the academic capabilities of in-service university/ college teachers. He suggested to the members to devise the minimum baseline curriculum which every university/college imparting education in this economically important sector should offer. He emphasized inclusion of latest books in list of suggested readings so that new concepts and ideas are imparted by future graduates.

The Committee unanimously appointed Dr. Wali Muhammad Bhatti as its convener and Dr. Ahrar Ahmad Khan as Secretary. Prof. Bhatti in his opening remarks thanked the members and the University Grants Commission for reposing confidence in him and for providing this national forum wherein Veterinary Pathologists can discuss wide range of issues they are confronted with and suggest measures for resolution of their common problems. He assured the commission of his own and on behalf of the members of the committee of full cooperation and intellectual contribution in revamping the curriculum. He stressed the members to avail this unique opportunity for developing lasting bonds of friendship and close interaction amongst them. The committee, after discussing the existing curricula of Vet. Pathology at graduate and postgraduate levels agreed to the uniform draft curricula as detailed below:

**SCHEME OF STUDIES  
FOR  
GRADUATE COURSES OF VETERINARY PATHOLOGY**

| <b><u>Title of Course</u></b> | <b><u>Credit Hours</u></b> |
|-------------------------------|----------------------------|
| General Pathology             | 5(3-4)                     |
| Systemic Pathology            | 5(3-4)                     |
| Clinical Pathology            | 2(0-4)                     |
| Poultry Pathology             | 3(2-2)                     |
| Poultry Clinic                | 2(0-4)                     |

**GENERAL REMARKS**

**a) General Pathology 5(3-4)**

To be offered during 3rd semester (or 1st term of 2nd year) when the students have already taken courses on anatomy, histology, physiology and biochemistry.

This course is being taught at University of Agriculture, Faisalabad, College of Veterinary Sciences, Lahore, Sindh Agriculture University, Tandojam and Institute of Animal Husbandry and Veterinary Sciences, Gomal University, D.I. Khan.

**b) Systemic Pathology 5(3-4)**

To be offered during 4th semester (or 2nd term of 2nd year) when the students have learned General Pathology.

This course is being taught at University of Agriculture, Faisalabad, College of Veterinary Sciences, Lahore, Sindh Agriculture University, Tandojam and Institute of Animal Husbandry and Veterinary Sciences, Gomal University, D.I. Khan.

**c) Clinical Pathology 2(0-4)**

To be offered during 5th semester (or 1st term of 3rd year) when the students have learned General and Systemic Pathology.

This course is being taught at University of Agriculture, Faisalabad, College of Veterinary Sciences, Lahore, Sindh Agriculture University, Tandojam and Institute of Animal Husbandry and Veterinary Sciences, Gomal University, D.I. Khan.

**d) Poultry Pathology 3(2-2)**

To be offered during 6th semester (or 2nd term of 3rd year).

At present this course is being taught at University of Agriculture, Faisalabad and College of Veterinary Sciences, Lahore and Institute of Animal Husbandry & Veterinary Sciences, Gomal University, D.I. Khan but not at Agriculture University, Tandojam.

**e) Poultry Clinic 2(0-4)**

To be offered during 8th semester (or 1st term of 4th year).

At present this course is being taught at University of Agriculture, Faisalabad and College of Veterinary Sciences, Lahore and Institute of Animal Husbandry & Veterinary Sciences, Gomal University, D.I. Khan but not at Agriculture University, Tandojam.

**f) Meat Hygiene and Inspection 2(1-2)**

At present this course is being taught by the Department of Parasitology. More suitably it should be offered by the Department of Pathology.

## DETAIL OF COURSES

### GENERAL PATHOLOGY

5(3-4)

#### Theory

Introduction to terminology and historical background of the subject. Cellular adaptation and cell injury. Disturbances of cell metabolism: various degenerative and infiltrative conditions. Cell death: necrosis and gangrene. Postmortem autolysis. Disturbances of mineral and pigment metabolism; exogenous and endogenous pigments. Growth, circulation and coagulation disorders. Shock. Inflammation: characteristics, types, process, vascular, exudative changes, chemotaxis, chemical mediators and inflammatory cells. Repair and healing. Fever and pyrexia. Neoplasia: classification, etiology, effects on the host, structure, and metastasis. Important neoplasms of domestic animals and their treatments.

#### Practical

Demonstration of basic tissue alterations and autolytic changes on postmortem and slaughter house specimens. Demonstration of tissue section cutting and staining techniques. Demonstration of tissue slides of pathological conditions.

#### Books Recommended

1. Irfan, M., 1997. A Text Book of General Pathology. University of Agriculture Press, Faisalabad.
2. Vegard, J.L. , 1995. Textbook of Veterinary General Pathology, Vakkas Publishers, India.
3. Khan, M. Z., 1991. General Pathology. Mahmood Masaud Printing Press, Faisalabad.
4. Slauson, D.O. and B.J. Cooper, 1990. Mechanisms of Disease. 2nd Ed. Williams & Wilkins, London.
5. Thomson, R.G., 1984. General Veterinary Pathology. W.B. Saunders Company, London, Toronto.

### SYSTEMIC PATHOLOGY

5(3-4)

#### Theory

Congenital and developmental anomalies. Pathology of various systems including alimentary, respiratory, urinary, circulatory, lymphatic, reproductive, nervous, musculoskeletal and skin and appendages. Metabolic diseases.

## **Practical**

Demonstration of postmortem procedure in small and large animals. Practice to recognize gross and histopathological changes affecting different systems of the body. Visits to slaughter house.

## **Books Recommended**

1. Sastry, G. A., 1999. Veterinary Pathology. 7th Ed. CBS Publishers, India.
2. Khan, S. A., K. M. Chaudhry and A. Aslam, 1999. Manual of Necropsy Practice. Maktaba-e-Danishwaran Publications, Lahore.
3. Vegard, J. L., 1998. Text Book of Systemic Pathology. Vikkas Publishers, India.
4. Jones, T.C. and R.D. Hunt, 1997. Veterinary Pathology. 6th Ed. Lea and Fibiger, Philadelphia.
5. Jubb, K.V.F., P.C. Kennedy and N. Palmer, 1993. Pathology of domestic animals. 4<sup>th</sup> Ed., Academic Press, New York and London.

## **CLINICAL PATHOLOGY**

**2(0-4)**

## **Practical**

Collection, preservation and despatch of laboratory samples/specimens. Abnormalities of hematological changes and their interpretations. Evaluation of blood cells. Anaemias. Polycythemia. Leukaemias. Bone marrow response in various diseases and its evaluation.

Urinalysis. Faecal examination. Liver and kidney function tests. Exfoliative cytology. Skin scrappings. Visit(s) to diagnostic laboratories.

## **Books Recommended**

1. Khan, S. A., and A. Aslam, 2000. Manual of Clinical Pathology. Maktaba-e-Danishwaran Publications, Lahore.
2. Coles, E.H., 1998. Veterinary Clinical Pathology, 5th Ed. W.B. Saunders Co., Philadelphia, USA.
3. Kaneko, J.J., J. W. Harvey and M.L. Bruss (Eds), 1997. Clinical Biochemistry of Domestic Animals. 5<sup>th</sup> Ed. Academic Press, USA.
4. Chauhan, 1995. Veterinary Clinical & Laboratory Diagnosis. Jaypee Brothers, India.
5. Mohi-ud-Din. S.H., 1994. Hand-Book of Veterinary Clinical Pathology. CBS Publishers, India.

6. Duncan, J. R. and K.W. Prasse, 1994. Veterinary Laboratory Medicine. 3<sup>rd</sup> Ed. The Iowa State University Press, Ames, Iowa, USA.
7. Benjamin, M.M., 1978. Outline of Veterinary Clinical Pathology. 3<sup>rd</sup> Ed. The Iowa State University Press, Ames, Iowa USA.

## **POULTRY PATHOLOGY**

**3(2-2)**

### **Theory**

Introduction to poultry industry in Pakistan. Viral, bacterial, parasitic and fungal diseases. Nutritional deficiencies. Environmental and management problems. Intoxications. Current disease situation in Pakistan.

### **Practical**

Demonstration of postmortem procedures in poultry. Demonstration of common laboratory tests in poultry disease diagnosis. Investigation of field outbreaks of disease. Visit(s) to poultry farms, hatcheries and Research Institute(s).

### **Books Recommended**

1. Calnek, B.W., H. J. Barnes, C.W.Beard, L.R. McDougald and Y. M. Saif, (Eds), 1997. Diseases of Poultry. 10<sup>th</sup> Ed. Iowa State University Press, Ames, Iowa, USA.
2. Anjum, A.D., 1996. Poultry Diseases Diagnosis - A Coloured Atlas. Arbi Publications, Faisalabad.
3. Anjum, A.D., 1994. Poultry Diseases. F.Y. Corporation, Karachi.
4. Hofsted, M. S., H.J. Barnes, B.W. Calnek, W.M. Reid and H.W. Yoder, Jr. 1992. Diseases of Poultry. 9<sup>th</sup> Ed. Iowa State university Press, Ames, Iowa, USA.
5. Jordan, F.T.W., 1990. Poultry Diseases, 3<sup>rd</sup> Ed. Bailliere Tindal, London.

## **POULTRY CLINIC**

**2(0-4)**

### **Practical**

Postmortem procedures for birds, recognition of various lesions and tentative diagnosis. Laboratory aids for the diagnosis of chicken. Flock/herd health monitoring. Biosecurity measures at poultry farms, hatchery and feed mills. Investigation of a field outbreak. Hatchery-borne diseases and their prevention. Effect of house design on health of poultry. Routine and emergency vaccination programmes for different types of birds. Water quality. Practical training of vaccination of birds through different routes.

### **Books Recommended**

1. Anjum, A.D., 1996. Poultry Disease Diagnosis: A coloured Atlas. Arbi Publications, Faisalabad.
2. Herenda, D.C. and D. A. Franco, 1996. Poultry Diseases and Meat Hygiene. The Iowa State University Press, Ames, Iowa, USA.
3. Randall, C.J., 1985. A colour atlas of Diseases of the Domestic Fowl and Turkey. Wolfe Medical Publications, London.

**SCHEME OF STUDIES  
FOR  
POSTGRADUATE COURSES OF VETERINARY PATHOLOGY**

| <b><u>Title of Course</u></b>      | <b><u>Credit Hours</u></b> |
|------------------------------------|----------------------------|
| Advanced General Pathology         | 4(3-2)                     |
| Advanced Clinical Pathology        | 3(1-4)                     |
| Necropsy Practice                  | 2(0-4)                     |
| Diagnostic Techniques in Pathology | 3(1-4)                     |
| Oncology                           | 3(2-2)                     |
| Pathology of Intoxications         | 3(2-2)                     |
| Ruminants Pathology                | 4(3-2)                     |
| Advanced Poultry Pathology-I       | 4(3-2)                     |
| Advanced Poultry Pathology-II      | 3(2-2)                     |
| Equine Pathology                   | 3(2-2)                     |
| Camel Pathology                    | 3(2-2)                     |
| Canine and Feline Pathology        | 3(2-2)                     |
| Wildlife Pathology                 | 3(2-2)                     |
| Fish Pathology                     | 3(2-4)                     |
| Special Problem                    | 1(1-0)                     |
| Seminar                            | 1(1-0)                     |

## GENERAL REMARKS

1. The M.Sc (Hons) students should fulfil the following requirements.
  - i) Course work including:
    - a) 24-25 credit hours of major discipline i.e., Veterinary Pathology.
    - b) 10-11 credit hours of minor courses from related departments.
    - c) Compulsory (deficiency) course of Biochemistry and Statistics.
  - ii) Thesis based on research work.
  
2. After a thorough discussion on course work to be taken from major department it was decided that it should consist of some basic courses of Pathology, some courses on Animal Pathology and Poultry Pathology. This will provide an opportunity to postgraduate students to make choice between livestock and poultry for specialization. After putting this scheme into practice for few years, it will be evaluated whether the Department of Veterinary Pathology needs to offer two degrees i.e., Animal Pathology and Poultry Pathology separately or not.
  
3. The Ph.D. students should fulfil the following requirements.
  - i) Course work including:
    - a) 24-25 credit hours of major discipline i.e., Veterinary Pathology.
    - b) 10-11 credit hours of minor courses from related departments.
    - c) Compulsory (deficiency) course of Biochemistry and Statistics.
    - d) Courses taken under M.Sc.(Hons) must not be repeated in Ph.D. course work.
  
  - ii) Comprehensive examination (written and oral) should be according to the University rules.
  
  - iii) Thesis based on research work.

## DETAIL OF COURSES

### ADVANCED GENERAL PATHOLOGY

4(3-2)

#### Theory

Mechanisms and ultrastructural changes in cell injury. Cell death: necrosis, apoptosis gangrene and autolysis. The genetic basis of disease and genetic disorders. Inflammation. Fever. Healing and repair. Disturbances of circulation and coagulation and disorders of growth. Shock and stress. Radiation effects. Immunological mechanisms of disease.

#### Practical

Proficiency to recognize and describe gross lesions and histopathological changes in tissues. Proficiency in differentiating between retrogressive, inflammatory/proliferative and neoplastic changes.

#### Books Recommended

1. Chivelle, N.F., 1999. Introduction to Veterinary Pathology. 2<sup>nd</sup> Ed. The Iowa State University Press, Iowa, USA.
2. Walter, J.B. and I.C. Talbot, 1996. General Pathology. 7<sup>th</sup> Ed. Churchill Livingstone, New York, USA.
3. Slauson, D.G. and B.J. Cooper, 1990. Mechanisms of Disease. 2nd Ed. Williams and Wilkins, London.
4. Thomson, R.G., 1984. General Veterinary Pathology. W.B. Saunders Company, London.

### ADVANCED CLINICAL PATHOLOGY

3(1-4)

#### Theory

Organization of a clinical laboratory. Selection, collection, preservation and despatch of morbid material for laboratory examination. Sampling strategies for animal disease surveys and choosing an appropriate test. Evaluation of various blood components. Anaemias. Leukaemias. Exfoliative cytology. Fluid, electrolyte and acid-base balance. Intoxications. Laboratory safety codes.

## **Practical**

Hematological procedures and interpretation of results. Urinalysis and faecal examination. Impression smears, staining, examination and interpretation. Skin scrapings. Biochemical and functional tests of various organs.

## **Books Recommended**

1. Coles, E.H., 1998. Veterinary Clinical Pathology. 5th Ed., V.B. Saunders and Co., Philadelphia.
2. Kaneko, J.J., J. W. Harvey and M.L. Bruss (Eds). 1997. Clinical Biochemistry of Domestic Animals. 5<sup>th</sup> Ed. Academic Press, USA.
3. Mohi-ud-Din. S.H., 1994. Hand-Book of Veterinary Clinical Pathology, CBS Publishers, India.
4. Benjamin, M.M., 1978. Outline of Veterinary Clinical Pathology. 3<sup>rd</sup> Ed. Iowa State University Press, U.S.A.

## **NECROPSY PRACTICE**

**2(0-4)**

## **Practical**

Postmortem room layout, construction and organization. Postmortem examination procedures. Interpretation of lesions and postmortem changes in tissues. Autolytic changes in different tissues. The vetero-legal aspects of death. Determination of age of different animals. Death from drowning, lightening, electrocution and poisoning. Selection of specimens for laboratory examination. Writing of necropsy reports, death certificates and veterolegal implications. Postmortem room safety codes.

## **Books Recommended**

1. Khan, S.A., K.M. Chaudhry and A.Asalam, 1999. Manual of Necropsy Practice. Maktaba-e-Danishwaran Publications, Lahore.
2. Saxena, 1998. Veterinary Postmortem Examination, A Laboratory Manual. CBS Publishers, India.
3. Bancroft, J.D. and A. Stevens, 1990. Theory and Practice of Histological Techniques. Churchill Livingstone, London.
4. Andrews, J.J. (Ed), 1986. Necropsy Techniques. The Veterinary Clinics of North America, 2(1): 1-202.
5. Sharma, S.N., 1981. Veterinary Jurisprudence. 3rd Ed. Oxford and IBH Publishing Col.(Pvt) Ltd, New Delhi.

**Practical**

Histological laboratory techniques and staining methods. Special stains for detection of various substances in tissue sections. Immunological tests. Histochemistry. Immunocytochemistry. Autoradiographic techniques. Light and electron microscopy. *In-situ* hybridization. Molecular biological techniques. Diagnostic procedures for important infectious/non-infectious diseases. Visits to Research Institute(s) and diagnostic centres.

**Books Recommended**

1. Kaneko, J.J., J. W. Harvey and M.L. Bruss (Eds). 1997. Clinical Biochemistry of Domestic Animals. 5<sup>th</sup> Ed. Academic Press, USA.
2. Corner, L.A. and T.J. Bagust, 1993. Australian Standard Diagnostic Techniques for Animal Diseases. CSIRO Publications, Australia.
3. Prasad, B., 1992. Veterinary Clinical Diagnostic Technology. CBS Publishers, India.
4. Bancroft, J.D. and A. Stevens, 1990. Theory and Practice of Histological Techniques. Churchill Livingstone, London.

**ONCOLOGY****3(2-2)****Theory**

Cell growth and multiplication. Neoplasia. Nomenclature and classification of tumors. Effects of tumors on the host. Occurrence, aetiology, pathogenesis, structure and metastasis of tumors. Diagnosis of tumors. Mechanisms of carcinogenesis. Genetic aspects of neoplasia. Immunity against tumors. Important tumors of various domestic animals and poultry and their treatments.

**Practical**

Differences between benign and malignant tumors. Differentiation of neoplasia from non-specific swellings and growths. Gross and histologic identification of common tumors of different animals.

**Books Recommended**

1. Peiffer, R. L., 2002. Ocular Tumors in Humans and Animals. The Iowa State University Press, Ames, Iowa, USA.

2. Morris, J. and J. M. Dobson, 2001. Small Animal Oncology. British Small Animal Veterinary Association, Gloucester, GL2 4AB, UK.
3. White, R. A. S., 1991. Manual of Small Animal Oncology. British Small Animal Veterinary Association, Gloucester, GL2 4AB, UK.
4. Moulton, J.E., 1978/Latest Edition. Tumors of Domestic Animals, 2nd Ed. University of California Press.

## **PATHOLOGY OF INTOXICATIONS**

**3(2-2)**

### **Theory**

Chemical toxins. Phytotoxins. Mycotoxicosis. Bacterial toxins. Drugs toxicity. Gases, vapours and radioactive materials. Insecticides and pesticides. Snake/insect bites.

### **Practical**

Recognition of lesions induced by toxins and their differential diagnosis from non-toxic lesions. Laboratory methods for diagnosis of intoxications.

### **Books Recommended**

1. Chapman, M. and A. Campbell, 2002. Veterinary Toxicology. The Iowa State University Press, Ames, Iowa, USA
2. Kaneko, J.J., J. W. Harvey and M.L. Bruss (Eds), 1997. Clinical Biochemistry of Domestic Animals. 5<sup>th</sup> Ed. Academic Press, USA.
3. Lorgue, G., 1996. Clinical Veterinary Toxicology. Blackwell Publishers, U.K.
4. Amdur, M.O., J.Doull and C.D. Klaassen, 1991. Toxicology. 4th Ed. McGraw Hill, Inc., New York.
5. HMSO, 1984. Manual of Veterinary Investigation Laboratory Techniques. 3rd Ed. Vol.2. Her Majesty's stationery office, London.

## **RUMINANTS PATHOLOGY**

**4(3-2)**

### **Theory**

Aetiopathology of diseases of various systems including digestive, respiratory, urinary, reproductive and endocrine, cardiovascular and nervous system. Disorders of bones, joints and muscles. Diseases of skin and appendages. Disorders of haemopoietic and lymphatic systems. Metabolic and nutritional disorders.

## **Practical**

Recognition and differential diagnosis of gross and histopathological lesions in various organs. Biochemical changes in various diseases. Seminars. Livestock Farms/slaughter house visit(s).

## **Books Recommended**

1. Kahrs, R., 2001. Viral Diseases of Cattle. 2<sup>nd</sup> Ed. The Iowa State University Press, Ames, Iowa, USA
2. Jones, T.C. and R.D. Hunt, 1997. Veterinary Pathology. 5<sup>th</sup> Ed. Lea and Febiger, Philadelphia, U.S.A.
3. Carlton, W.W. and M.D. McGavin, 1995. Thomson's Special Veterinary Pathology. 2<sup>nd</sup> Ed. Mosby-year Book Inc. St. Louis, USA.
4. Jubb, K.V.F. and P.C. Kennedy and N. Palmer, 1993. Pathology of Domestic Animals. 4<sup>th</sup> Ed. Academic Press, Inc. New York.

## **ADVANCED POULTRY PATHOLOGY-I**

**4(3-2)**

## **Theory**

Bacterial, viral, parasitic and protozoan diseases. Respiratory diseases. Neoplastic conditions. Nutritional imbalances and deficiency diseases. Mycotoxicosis and mycotic diseases.

## **Practical**

Avian anatomy and physiology in relation to diagnosis of poultry diseases. Gross and histopathological features of various diseases of poultry. Proficiency to conduct postmortem examination. Seminar on current research work on poultry. Farm visit(s). Visit to Veterinary Research Institute(s).

## **Books Recommended**

1. Calnek, B.W., H. J. Barnes, C.W.Beard, L.R. McDougald and Y. M. Saif, (Eds), 1997. Diseases of Poultry. 10<sup>th</sup> Ed. Iowa State University Press, Ames, Iowa, USA.
2. Herenda, D.C. and D. A. Franco. 1996. Poultry Diseases and Meat Hygiene. The Iowa State University Press, Ames, Iowa, USA.
3. Jordan, F. T. W. and M. Pattison, 1996. Poultry Diseases. 4<sup>th</sup> Ed. WB Saunders Company Ltd. London.
4. Hofsted, M. S., H.J. Barnes, B.W. Calnek, W.M. Reid and H.W. Yoder, Jr. 1992. Diseases of Poultry. 9<sup>th</sup> Ed. Iowa State university Press, Ames, Iowa, USA.

## **ADVANCED POULTRY PATHOLOGY-II**

**3(2-2)**

### **Theory**

Genetic resistance to diseases. Environmental and management problems. Problems related to improper housing. Sanitation problems. Drug induced problems and residual effects of medicines. Stress and welfare. Heat stress. Biosecurity. Immunity, vaccines, vaccination and immunosuppression. Zoonotic problems. Hatchery-borne diseases. Early chick mortality. The yolk sac infection. Water quality. Vertically transmitted diseases. Pathology and differential diagnosis of lesions in various organs/systems. Strategies for disease control. Seminars on disease diagnosis and investigation.

### **Practical**

Organization, management and control of poultry diagnostic laboratory. Monitoring health programmes. Demonstration of disease preventive measures. Describing disease occurrence and field surveys on diseases. Group discussion on poultry diseases. Breakout analysis of unhatched eggs. Hatchery visit(s). Visit(s) to Poultry Research Institute(s).

### **Books Recommended**

1. Thrusfield, M., 1997. Veterinary Epidemiology. 2<sup>nd</sup> Ed., Butterworths, London.
2. Anjum, A.D., 1996. Poultry Diseases diagnosis. Coloured Atlas. Arbi Publications, Faisalabad.
3. Pattison, M., 1993. The Health of Poultry. Longman Group, UK.
4. Hitchner, S.B., C.H. Domermuth, H.G. Purchase and J. Williams, 1980/Latest Edition. Isolation and identification of Avian Pathogens. American Association of Avian Pathologists, Texas A & M. University, Texas, USA.

## **EQUINE PATHOLOGY**

**3(2-2)**

### **Theory**

Aetiopathology of diseases of various systems including digestive, respiratory, urinary, reproductive and endocrine, cardiovascular and nervous system. Disorders of bones, joints and muscles. Diseases of skin and appendages. Disorders of haemopoietic and lymphatic systems. Metabolic and nutritional disorders.

## **Practical**

Recognition and differential diagnosis of gross and histopathological lesions in various organs. Biochemical changes in various diseases. Seminar. Visit(s) to stud farms.

## **Books Recommended**

1. Sastry, G.A., 1999. Veterinary Pathology. 7th Ed. CBS Publishers, Delhi, India.
2. Jones, T.C. and R.D. Hunt, 1997. Veterinary Pathology. 6<sup>th</sup> Ed. Lea and Febiger, Philadelphia, U.S.A.
3. Rooney, J. R. and J. L. Robertson, 1996. Equine Pathology. The Iowa State University Press, Ames, Iowa, USA
4. Jubb, K.V.F. and P.C. Kennedy and Nigel Palmer, 1993. Pathology of Domestic Animals. 4<sup>th</sup> Ed. Academic Press, Inc. New York.

## **CAMEL PATHOLOGY**

**3(2-2)**

### **Theory**

Aetiopathology of diseases of various systems including digestive, respiratory, urinary, reproductive and endocrine, cardiovascular and nervous system. Disorders of bones, joints and muscles. Diseases of skin and appendages. Disorders of haemopoietic and lymphatic systems. Metabolic and nutritional disorders.

### **Practical**

Recognition and differential diagnosis of gross and histopathological lesions in various organs. Biochemical changes in various diseases. Seminar. Slaughter house visit(s).

### **Books Recommended**

1. Wernery, U. and O. R. Kaaden, 2001. Infectious Diseases of Camelids. British Small Animal Veterinary Association, Gloucester, GL2 4AB, UK.
2. Smuts, M.M.S. and A.J. Bezuidenhout, 1987/Latest Edition. The Anatomy of Dromedary. Oxford Science Publication. Oxford U.K.
3. Higgins, A., 1986/Latest Edition. The Camel in Health and disease. Eastbourne, Bailliere Tindall. U.K.

## **CANINE AND FELINE PATHOLOGY**

**3(2-2)**

### **Theory**

Aetiopathology of diseases of various systems including digestive, respiratory, urinary, reproductive and endocrine, cardiovascular and nervous system. Disorders of bones, joints and muscles. Diseases of skin and appendages. Disorders of haemopoietic and lymphatic systems. Metabolic and nutritional disorders.

### **Practical**

Recognition and differential diagnosis of gross and histopathological lesions in various organs. Biochemical changes in various diseases. Seminar. Kennel visit(s).

### **Books Recommended**

1. Ramsey, I. And B. Tennant, 2001. Manual of Canine and Feline Infectious diseases. British Small Animal Veterinary Association, Gloucester, GL2 4AB, UK.
2. Gaskell, R. and M. Bennett, 1996. Feline and Canine Infectious Diseases. British Small Animal Veterinary Association, Gloucester, GL2 4AB, UK.
3. Thomson, R. G., 1995. Special Veterinary Pathology. 2<sup>nd</sup> Ed. Mozby, U. K.
4. Jubb, K.V.F. and P.C. Kennedy and Nigel Palmer, 1993. Pathology of Domestic Animals. 4<sup>th</sup> Ed., Academic Press, Inc. New York.

## **WILDLIFE PATHOLOGY**

**3(2-2)**

### **Theory**

Managemental problems. Capturing Myopathy. Nutritional diseases and intoxications. Emergencies. Zoonosis. Infectious, parasitic and fungal diseases. Pathology of various system. Behavioural problems.

### **Practical**

Handling of birds. Examination of blood, urine, skin scraping and faeces. Examination of biopsy and other morbid material.

### **Books Recommended**

1. Williams, E.S. and I. K. Barker, 2001. Infectious Diseases of Wild Mammals. 3<sup>rd</sup> Ed., Manson Publishing, USA.

2. Fowler, M.E. and R.E. Muller, 1999. Zoo and Wildlife Animal Medicine. 3<sup>rd</sup> Ed. W.B. Saunders Company, Philadelphia, London.
3. Cannon, M. J., 1996. Basic Health and Disease in Birds. Australian Birdkeeper, NSW 2486, Australia.
4. Fairbrother, A. L. N. Locke, G.L. Hoff, 1996. Non-infections Diseases of Wildlife. 2<sup>nd</sup> Ed. Iowa State University Press, Ames, Iowa.

## **FISH PATHOLOGY**

**3(2-2)**

### **Theory**

Applied anatomy and physiology of fish. Skeletal anomalies. Pathology of viral, bacterial, fungal and parasitic diseases. Effect of water temperature on health. Intoxications. Drug induced lesions. Nutritional deficiencies.

### **Practical**

Sampling and despatch of sick fish for laboratory investigation. Freshness determination of dead fish. Blood changes associated with diseases. Recognition and differential diagnosis of gross and histopathological lesions in various organs. Seminars on common problems of fish. Fish farm visit(s).

### **Books Recommended**

1. Noga, E. J., 2000. Fish Disease: Diagnosis and Treatment, The Iowa State University Press, Ames, Iowa, USA.
2. Chakrabarti, M., 1994. Diseases of Cultivable Freshwater Fishes & their Control. International Book & Periodical Publishers, India.
3. Biswas, K.P. 1992. Prevention & Control of Fish & Prawn Diseases. Oxford Publishers, IBH, India.
4. Equis, S., 1991. Infections Diseases of Fish. Oxford Publishers, IBH, India.

## **SPECIAL PROBLEM**

**1(1-0)**

## **SEMINAR**

**1(1-0)**

## RECOMMENDATIONS

1. There should be a composite degree for Veterinary/Animal Husbandry graduates at University of Agriculture, Faisalabad, Gomal University, D.I. Khan and NWFP Agricultural University, Peshawar as being practiced at Sindh Agricultural University, Tandojam.
2. The objectives and scope of education of Veterinary Pathology keeping in view of National requirements may further be explored by a panel of renowned Veterinary Pathologists in Workshop(s)/Conference(s) preferably at the platform of University Grants Commission.
3. Foreign scholarships for MSc/PhD degree programmes, in disciplines which are offering these degrees in local Institutions, should not be encouraged. However, 9 months to one year foreign trainings/post doctoral fellowships be encouraged for in-service professionals to refresh their professional knowledge.
4. Annual Conference/Workshop for teachers and researchers in Veterinary Pathology may be arranged under the umbrella of UGC with rotation at various Institutions of the country.
5. UGC should develop a monitoring system to assess uniformity in syllabi of Veterinary Pathology at different Universities both at undergraduate and postgraduate levels.
6. UGC should develop a rating/evaluation system for Department of Veterinary Pathology involved in different institutions of Pakistan on the basis of annual performance and achievements. UGC should give some incentives to good teachers.
7. Teachers supervising Ph.D. students in Veterinary Pathology other than indigenous Ph.D. Scholarship Scheme (UGC) may be given honorarium/incentives equivalent to those covered under indigenous scheme.
8. A national academy for university teachers training should be established by the UGC, where short training on teaching skills, administrative skills, budgeting and accounts, etc should be imparted to university teachers.
9. Facilities for teaching should be regularly assessed by the UGC for each department in relation to basic infra-structure, the number of students, student: teacher ratio, etc.
10. Meat Hygiene and Inspection course, at present, is being offered by the Department of Parasitology, more suitably, it should be offered by the Department of Pathology.
11. UGC should ensure that the recommended books are available in libraries of each institution.
12. Centre of Excellence in the field of Veterinary Pathology may be established at National Level.