Animal Disease (Current Concepts)

Overview

This module will enable you to appreciate the external and internal components of health, agents of disease and how animals respond to them, at an individual and population level.

Subject areas: immunology; parasitology; microbiology; introduction to veterinary epidemiology; principles of veterinary pathology.

Welcome to the course

Welcome to Animal Disease (Current Concepts). This is a core course in the Livestock Health and Production programme of the Royal Veterinary College. It is designed to provide information and concepts in five subject areas that form the basis of the study of animal disease, namely: pathology, immunology, parasitology, microbiology and epidemiology.

If you have already completed a veterinary degree, some of this material will already be familiar to you. However, you may be surprised by the amount of new information and ideas that have developed since you graduated. If this is this case, you may find that you can work through this course quite quickly. If the subject areas are completely new to you, you will have to work quite hard to assimilate all this information.

Introduction to animal disease

What is disease? According to one definition:

Disease is a state in which normal functions are disturbed or altered at cellular, tissue, organ or whole organism level.

In other words, the homeostatic mechanisms of the body are upset, which leads to malfunction.

This can be caused by:
- micro-organisms - bacteria and viruses causing infectious disease
- parasites, causing clinical and subclinical disease
- poor management, especially related to feeding, causing production diseases
- alterations to the animal's genetic make-up, causing changes in function at cell level that lead to, or predispose to, disease
- toxic agents, causing cell damage and possibly clinical disease.

Why is disease important in livestock production?

For a number of reasons:

- Clinical and subclinical disease cause production losses. If an animal is ill and not consuming its ration, it will not produce as much milk, or put on as much weight as expected. The wool or fibre it produces may be of poor quality. Veterinary services and drugs may have to be paid for, and if the disease is severe enough the animal may die.
- If the animal is ill and suffering, then there are also welfare implications.
- Some infectious diseases that affect livestock are also capable of causing disease in their owners, handlers and attendants – they are zoonoses.
- In some farming systems, especially those in less-developed countries, disease in livestock can have serious social implications. The ox that is unwell and unable to pull a plough may delay the planting of vital harvests. The horse or donkey that cannot pull a cart or carry a load may mean no income for its owner.

What will you learn from this course?

By the end of this course you should be able to:

- describe pathological changes that occur at cellular, tissue and organ level during the disease process
- use the knowledge gained by studying pathology to make diagnostic decisions about diseases at ante- and post-mortem levels
- explain basic immunological mechanisms used by animals to combat diseases
- describe both specific and non-specific mechanisms of defence using relevant cell types, cytokines, complements and other molecules that are involved in these pathways.
- describe how parasites affect animals and their health status
- explain the life cycles of important protozoan, arthropod and helminth parasites that cause diseases in domestic animals
- list and describe the major types of organisms that cause infectious diseases and the structures that are primarily responsible for pathogenetic and antigenic mechanisms
- understand how vaccination and treatment strategies are devised, based on knowledge about the organism
- outline methods of isolating, characterizing and identifying micro-organisms to facilitate clinical diagnosis
- apply relevant concepts of epidemiology that are essential in investigations of disease in animal populations
- describe study types and the validity of tests used in epidemiological investigations and explain how to interpret the findings of these studies.

Course structure

The course follows a structured path through the concepts of animal disease and consists of 15 units of study, all of which you should complete. They make up the following five modules.

Module 1: Veterinary Pathology

Disease causes the malfunction of an animal's homeostatic mechanisms. This malfunction is demonstrated in the alteration of the physiology, and thus the cellular structure of the animal, which in turn leads to pathological changes that can be observed and recognized. The first two units of the course will consider the pathological changes that can occur in the body.

Module 2: Immunology

In this module the course goes on to look at how the body defends itself against the agents that can cause disease, including both the specific and non-specific mechanisms of defence.

Module 3: Veterinary Parasitology

Parasites affect animals in different ways: some cause diseases while others affect production and productivity of farm animals. In this module you will learn about parasites that are of veterinary importance, their life cycles and how to control parasitic infections.

Module 4: Microbiology

In this module you will look at infectious agents that can cause disease and the relevant mechanisms involved in this process. You will also gain an understanding of how to isolate and identify micro-organisms in order to confirm clinical diagnosis.

Module 5: Veterinary Epidemiology

In the final module, you will consider the causation, frequency and distribution of disease in animal populations.

Tutor-marked assignments

In addition to your work on the 15 units, you are required to complete and submit at least one tutor-marked assignment (TMA) for assessment. If you submit more than one - and you may submit up to two - your best TMA will be used in the calculation of your final mark. There are at least two TMAs to choose from per module, with the exception of the Veterinary Pathology module, for which there is no TMA. Full information on how to approach and submit TMAs is provided in the Programme Handbook and in the assignments themselves. You should bear in mind that your TMA will count for 20% of your final mark for the course.

Study time

The entire course, including revision and examination, is designed to take approximately 350 hours to complete. This is made up of between 5 and 20 hours' study time for each unit, 10-20 hours for the TMA(s) – so that the units and assignments will require a total of about 240 hours – and the remaining time for personal study and revision. You may find that some units will take you more or less time than estimated, depending on your familiarity with the subject.

Assessment

Your work for this course will be assessed by means of a 3-hour unseen written examination paper which will take the form of essay questions. In addition, you must submit at least one and up to two TMAs.

The grade awarded will be based on the mark obtained in the written examination (80%) and on the mark for the compulsory TMA (20%).