

# General Introduction of Veterinary Microbiology and Microbial Diseases

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# Microbiology

- Biological science involved with the study of microscopic organisms
- Study of all living organisms that are too small to be visible with the naked eye
- Includes bacteria, archaea, viruses, fungi, prions, protozoa and algae, collectively known as 'microbes'
- Microbiology (from Greek, *mīkros*, "small"; *bios*, "life"; and *-logia*, study)
- The term microbiology was given by French chemist Louis Pasteur

- Early investigation- existence of microorganisms and their role in disease development even before microorganisms were detected
- In 1665, Robert Hooke: English scientist
  - :devised compound microscope, used lenses to observe slices of cork and viewed little boxes that he called cells
- The scientific study of microorganisms - observation under the microscope in the 1670s by Antonie van Leeuwenhoek
  - :first person to view a living microorganisms, which he called Animalcules

## The Scope And Relevance of Microbiology

- Microbiology- Basic aspects and applied aspects
- Microbiologist- A scientist working in the field of microbiology
- Focus on a specific group of microorganisms
- Virologist (Virology is the study of viruses)
- Bacteriologist (Bacteriology is the study of bacteria)
- Phycologist (Phycology is the study of algae)
- Mycologist (Mycology is the study of fungi)
- Protozoologist (Protozoology is the study of protozoa)

- Immunology: Study of the immune system in a diversity of organisms, insight about bodies' response to these microorganisms, defence mechanisms

Microbes- trigger immune response and manipulate the immune system during infection

- Study of microbial physiology, microbial cytology, microbial ecology, and microbial taxonomy
- Other microbiologists- Applied fields
- Medical Microbiology: Deals with human diseases
- Veterinary Microbiology: Deals with animal diseases
- Agricultural Microbiology: Application of microorganisms in agriculture
- Public health Microbiology: Control of the spread of diseases.

- Food and dairy Microbiology: Application of microorganisms to make foods (cheese, bread, and other important products)
- Industrial Microbiology: Industrial application of microorganisms (production of vaccines, antibiotics, vitamins and enzymes)
- Microbial Ecology or Environmental microbiology: Relationship between microorganisms and their environments
- Microbial physiology and Biochemistry: Physiology of microorganisms and effects of physical and chemical agents on the survival of microorganisms

- Living cells: Smallest units capable of independent existence, :differentiated into two groups, eukaryotes and prokaryotes
- Pathogenic microorganisms: microorganisms that can cause disease in animals or humans
- Bacteria- prokaryotes, unicellular, smaller and less complex than eukaryotic cells, cell that does not have a true nucleus
- Fungi- unicellular or multicellular, non-photosynthetic eukaryotes
- Virus particle or virion: consists of nucleic acid, either DNA or RNA, enclosed in a protein coat called a capsid, some have envelope

## Scope of Veterinary Microbiology

- Concerned with the etiology (causation), pathogenesis (Mechanism of attack on tissues), laboratory diagnosis and treatment of infection in animals
- Prevention and control of infection in the community
- Close linked with other veterinary disciplines such as pathology, medicine, surgery, pharmacology and preventive medicine
- Linked with precise diagnosis and the rational treatment of infectious diseases
- Suggestion of exact/suitable drug by performing drug sensitivity test
- Essential for the development of rapid, sensitive diagnostics and suitable, effective vaccines for diseases of livestock

## Microbial diseases

- **Pathogen:** micro-organism having potential to cause disease
- **Infection:** invasion and multiplication of pathogenic microbes in a individual host or population
- **Disease:** when the infection causes damage to the host's vital functions or systems
- Sicknesses or ailments caused in animals and humans by different types of microbes

# Microbial diseases

- Various microbial (bacterial, fungal, viral) diseases in animals especially that supply food, other useful products or companionship and in wild animals
- Knowledge and understanding of both immunology and microbiology- essential for the study of infectious diseases

## Challenges:

- Microbes are far better at adapting to new environments
- Developing new properties to resist drug treatments
- Emerging diseases are an increasing global health concern

## Microbial biotechnology

- Any technological application that uses microbiological systems, microbial organisms, or derivatives thereof, to make or modify products or processes for specific use

### Role of Microbial biotechnology in Veterinary Microbiology

- Enabled by genome studies, will lead to:
  - ❖ Improved vaccines for disease control
  - ❖ Immune-booster
  - ❖ Better disease-diagnostic tools
  - ❖ Improved microbial agents for biological control of pathogens
  - ❖ Modifications of pathogens for reduced virulence etc.