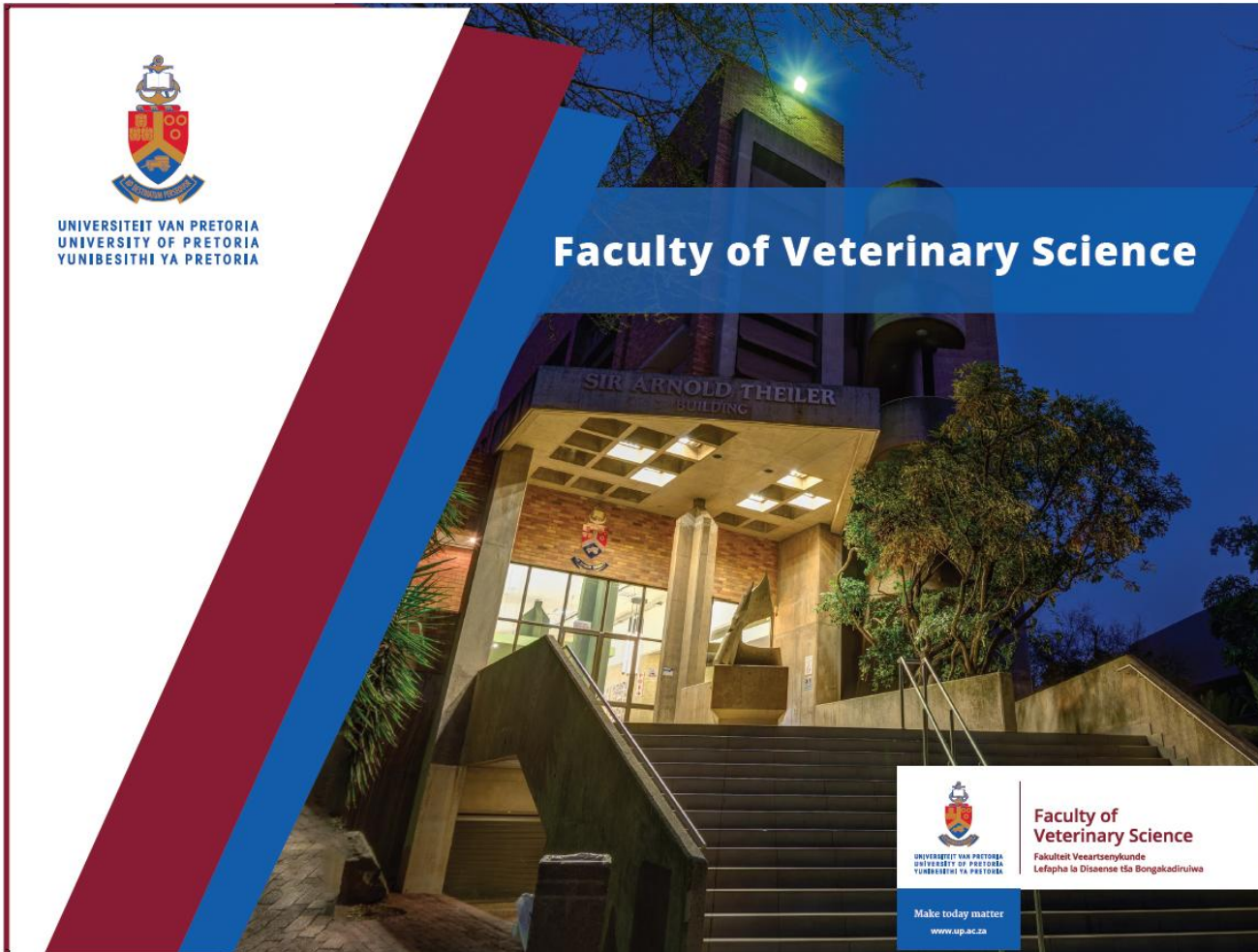




Regional Workshop on Advancing WOAH AMR Standards in Veterinary Practice

8 – 10 April 2026, Nairobi, Kenya



VEE Twinning Programme and Benchmarking

**Dr. Hassan Ibrahim Zubairu (DVM, MSc,
PhD)**

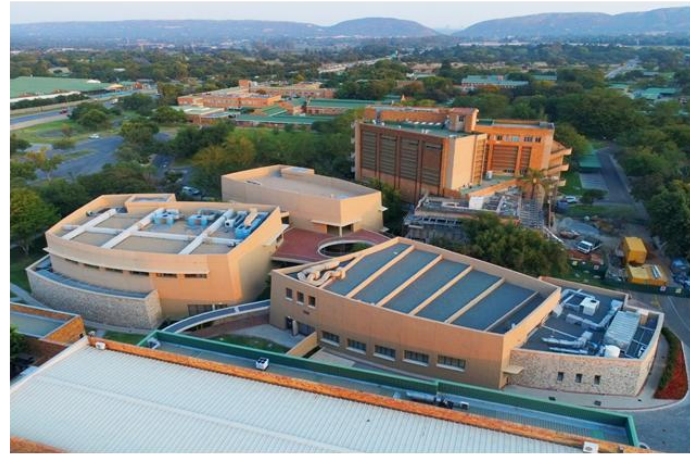
Section of Pharmacology

Department of Paraclinical Sciences

Faculty of Veterinary Science,

University of Pretoria.

Faculty of Veterinary Science





Faculty of Veterinary Science

- **Onderstepoort Campus**

- Specialist Referral hospital (All species)
 - >20 000 patients a year
 - >3000 specialist cases
- Skills Laboratory
- Laboratory animal research centre
 - large animal Vector Protected Facilities
 - Poultry BSL3

- **Campus laboratories**

- ISO accredited: Bacteriology, virology, serology, molecular biology, mast
- Research, training and general diagnostics: EM, clinical pathology, histopathology and immunohistochemistry, pharmacology and toxicology, embryo laboratory





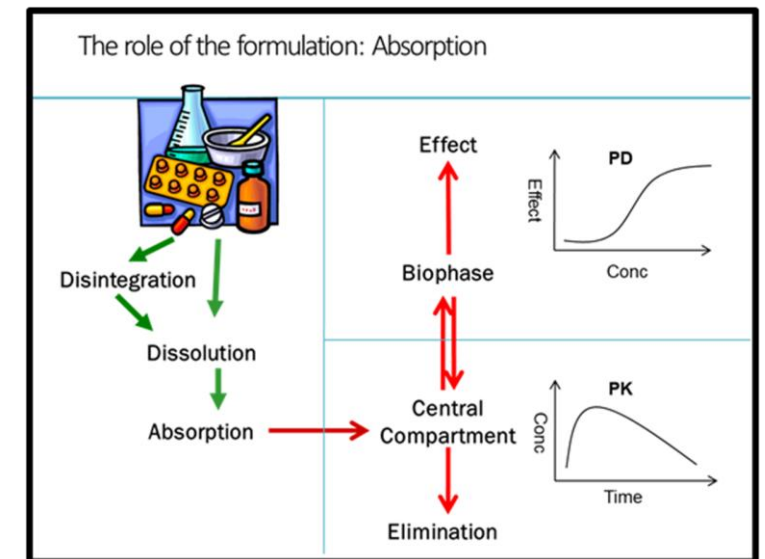
Preclinical exposure to AMR standards

- Exposure to **disease causing agents**
 - **Identity** (structure and physiological processes)
 - Bacteria, Fungi, Helminth, Protozoa, Virus
 - Sampling/Culture and isolation to confirm diagnosis
 - **Predilection site and microenvironment**
 - Drug penetration
 - Aerobic vs anaerobic
 - pH
 - Isotonic/Hypertonic
 - **Pathophysiology** and manifestation of associated disease
 - Support **rational selection of drug** (safety issues, biophase desired drug concentration)



Continued

- Exposure to **fundamental pharmacology**
 - **Pharmaceutics**
 - Formulation + Physicochemical properties of API + Dosage forms
 - **Pharmacokinetics (ADME)**
 - Translocation of drugs across membrane barriers
 - Drug metabolism
 - Drug and/or metabolite excretion
 - **Pharmacodynamics**
 - Drug effects on the body
 - **Pharmacotherapeutics**
 - **Rational selection and use of drugs**
 - **Dose calculation/regimen**





Continued

• Drug resistance

- **Microbes**, Helminths & Ectoparasite resistance
- Types of microbial resistance and mechanisms involved
 - **Intrinsic**
 - **Acquired** (genetic mutation, **mobile plasmids**, **transposons**)
- **Culture and sensitivity testing** (VETCAST/CLSI/EUCAS)
 - Disc diffusion method
 - Broth/Agar dilution method (MIC and MBC)
 - Agar gradient
- Monitor **MIC 90** of bacterial population



Results: **S** – Sensitive **I** – Intermediate **R** – Resistant



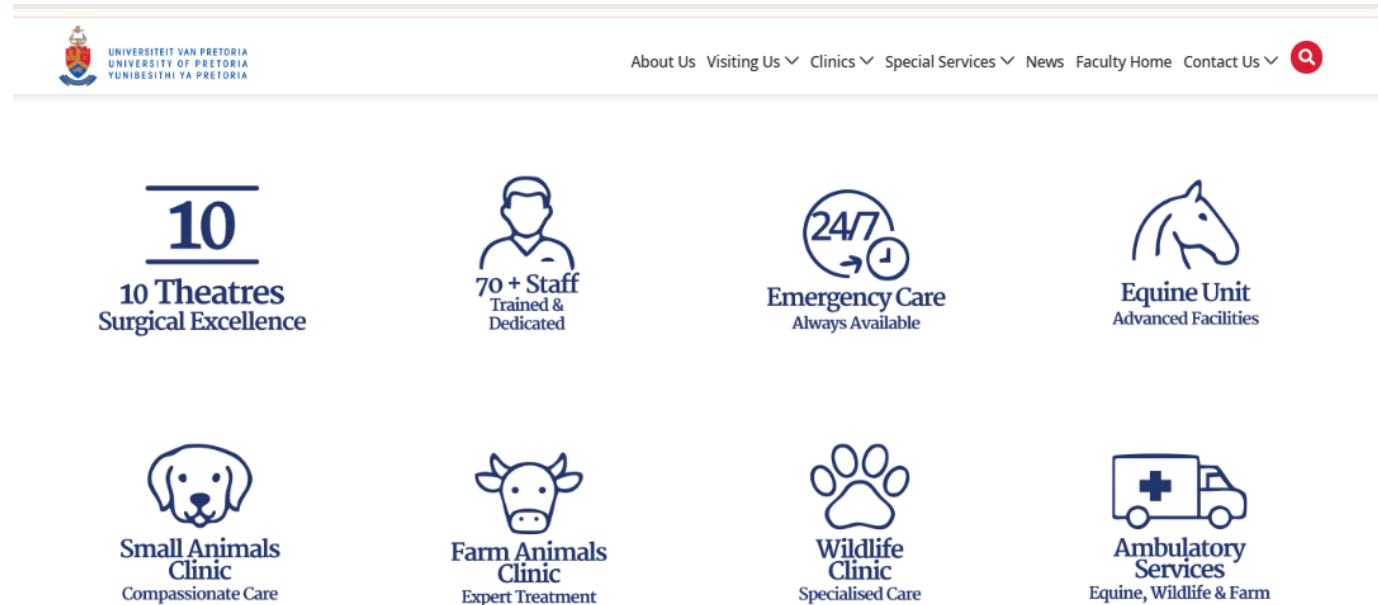


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- Exposure to **chemotherapeutics**
 - **Antibacterial, Antifungal**, Anthelmintic, Antiprotozoal, Antiviral
 - Mechanism of action
 - Bacteri- cidal or static
 - Concentration/Time dependent activity
 - **Spectrum of activity**
 - **Absorption & Disposition of drug**
 - Adverse/Side effect
 - Clinical **indications** and contraindications
 - Drug resistance reported
 - Veterinary **drug legislation** and **control (Prescription & OTC)**

Clinical exposure to AMR standards

- Exposure to **clinical pharmacology**
 - Small Animals Clinic
 - Farm Animals Clinic
 - Poultry
 - Bovine and Small stock
 - Porcine
 - Equine Clinic
 - Wildlife Clinic



The screenshot shows the website for the Faculty of Veterinary Science at the University of Pretoria. The header includes the university's name in Afrikaans, English, and isiXhosa, along with navigation links for About Us, Visiting Us, Clinics, Special Services, News, Faculty Home, and Contact Us, and a search icon. The main content area features eight service icons: 10 Theatres Surgical Excellence, 70+ Staff Trained & Dedicated, Emergency Care Always Available, Equine Unit Advanced Facilities, Small Animals Clinic Compassionate Care, Farm Animals Clinic Expert Treatment, Wildlife Clinic Specialised Care, and Ambulatory Services Equine, Wildlife & Farm.

Continued

- **Rational selection of drugs**
 - **Disease causing agent** confirmatory diagnosis
 - Isolation and characterization (Gram +ve, Gram –ve, Aerobic, Anaerobic)
 - Antibiogram sensitivity
 - Location of disease (**biophase**)
 - **Species of animal**
 - Bioavailability, Metabolism, Safety, Dose etc
 - **Physiological status/Underlying disease/Pathophysiology of disease**
 - **Antibiotics stewardship**
 - Narrow spectrum- First line, Second line, and Reserved protocol
 - MIC 90 monitoring of bacterial species
 - Empirical treatment



Continued

- **Empirical treatment**

- **Initiation of treatment** before diagnosis is confirmed
 - Emergency situation with pus/septicaemia
 - Cost of confirmatory diagnosis or lack of resources in remote areas
- Rely on **clinical manifestation** and previous experience/data
- **Direct Gram stain** with pus can be presumptive
- Use **narrow spectrum** and **first line** protocol
- For emergency, **samples taken prior** to treatment initiation
- Antibigram result may **modify treatment protocol** initiated



Clinical Training

- Final year clinical training
 - 18 months of rotations within and outside of University facilities
- Work with client-owned animals
 - Make a diagnosis
 - Necropsies and laboratory diagnostics
 - Selection of correct antimicrobials – Clinical and Empirical
 - Prescribing and dispensing of antimicrobials
 - Management of hospitalized cases and associated treatments



Research & Monitoring

- Preclinical screening of phytochemicals for antimicrobial efficacy
- Monitoring of AMR in clinics (MIC 90)
- Research to identify risk factors in clinics
- Pharmacovigilance research on quality veterinary formulations
- Research on alternatives to antibiotics/disinfectants
- Surveillance research on AMR
 - Resistant isolate in food animals
 - Drug residues in food products
- Community engagement on AMU & AMR
 - Continuous education (Farmers, Veterinarian, Para-Vets)



Areas for Twinning

- ISO17025 accredited microbiology laboratory for general culture and sensitivity, including milk from mastitis animals
- Good pharmacy practice under hospital conditions
- Understanding clinical training and current constraints in prudent selection practices
- Pathology and sampling for AMR
- Research project activities on AMR/S
- Preclinical drug R&D





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Faculty of Veterinary Science

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Thank You for Listening