

Introduction to Veterinary Pharmacology

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Key concepts, terminology, and practical considerations for the study of drugs used in animal health.

1. What Is Veterinary Pharmacology?

Aspect	Description
Definition	The science of how drugs interact with animal bodies to prevent, diagnose, or treat disease.
Scope	Includes drug discovery, formulation, dosage, administration, metabolism, therapeutic monitoring, and safety.
Goal	Achieve the desired therapeutic effect while minimizing adverse reactions and resistance.

2. Fundamental Pharmacological Principles

Principle	Meaning	Veterinary Relevance
Pharmacokinetics (PK)	What the body does to the drug: Absorption ? Distribution ? Metabolism ? Excretion (ADME)	Species-specific differences in gut flora, gastric pH, hepatic enzyme activity, and renal function affect PK.
Pharmacodynamics (PD)	What the drug does to the body: interaction with receptors, enzymes, or ion channels ? therapeutic or toxic effect	Target receptor density, affinity, and downstream signaling can vary between species (e.g., dogs vs. cats).
Therapeutic Index (TI)	Ratio of toxic dose to effective dose (LD ₅₀ /ED ₅₀). A wide TI = safer drug.	Many veterinary drugs have a narrow TI (e.g., ivermectin in certain dog breeds).
Dose-Response Relationship	Relationship between drug concentration and effect (graded vs. quantal).	Determines the optimal dose for a specific species, age, and disease state.

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Principle

Meaning

Veterinary Relevance

Drug Interactions	Additive, synergistic, or antagonistic effects when two or more agents are used together.	Important in multi?drug protocols (e.g., anesthesia + analgesia).
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3. Species?Specific Considerations

Species	Key Pharmacokinetic Traits	Notable Sensitivities
Dogs	Moderate gastric emptying; hepatic CYP450 enzymes similar to humans.	Certain breeds (e.g., Collies) are sensitive to ivermectin (MDR1 mutation).
Cats	Limited glucuronidation; slower hepatic metabolism of many drugs.	High susceptibility to acetaminophen, certain NSAIDs, and some sulfonamides.
Cattle	Rumen fermentation can alter oral drug availability; large volume of distribution.	Milk withdrawal times critical; some drugs (e.g., tetracyclines) can cause residues.
Horses	Fast gastric emptying; high hepatic blood flow; large body mass.	Sensitivity to certain NSAIDs (e.g., phenylbutazone) and opioids.
Exotic/Companion Birds	High metabolic rate; rapid drug clearance.	Dosing often based on body weight (g) rather than kg; limited drug data.
Reptiles & Amphibians	Variable skin permeability; poikilothermic metabolism.	Temperature influences drug metabolism; dosing must account for ambient conditions.

4. Routes of Drug Administration

Route	Advantages	Limitations	Typical Uses
Oral (PO)	Easy, non?invasive; suitable for mass medication.	Variable absorption; first?pass metabolism.	Anthelmintics, feed additives, oral antibiotics.
Intramuscular (IM)	Rapid absorption; bypasses GI tract.	Painful; risk of tissue damage.	Vaccines, antibiotics, analgesics.

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Route	Advantages	Limitations	Typical Uses
Subcutaneous (SC)	Slow		