

DRUG DOSAGE FORMS IN VETERINARY MEDICINE

The dose is the amount of drug taken at any one time. It can be expressed as *the weight of drug* (e.g. 250 mg), *volume of drug solution* (e.g. 10 mL, 2 drops), *the number of dosage forms* (e.g. 1 capsule, 1 suppository) or some *other quantity* (e.g. 2 puffs).

The dosage regimen is the frequency at which the drug doses are given. Examples include 2.5 mL twice a day, one tablet three times a day, one injection every four weeks.

The total daily dose is calculated from the dose and the number of times per day the dose is taken.

The dosage form is the physical form of a dose of drug. **Common dosage forms** include tablets, capsules, creams, ointments, aerosols, and patches. Each dosage form may also have a number of specialized forms such as extended-release, buccal, dispersible, and chewable tablets. **The strength** is the amount of drug in the dosage form or a unit of the dosage form (e.g. 500 mg capsule, 250 mg/5 mL suspension).

The route of administration is the way the dosage form is given. Common routes of administration include oral, rectal, inhalation, nasal and topical.

The optimal dosage is the dosage that gives the desired effect with minimum side effects.

There are many factors taken into consideration when deciding a dose of drug - including animal species, age, health state, etc. Other medicines may also affect the drug dose.

Dosage instructions are written on the vet's prescription and on the pharmacy label of a prescribed medicine. Dosage instructions are also found on the packaging and **inserts** of over-the-counter medicines.

Please note that **animal welfare regulations prohibit the use of expired drugs on research animals**, except if the animal is anesthetized for a terminal study. The anaesthesia drugs may not be expired under any circumstances.

Species Code:

Can = canine

Fel = feline

Bov = bovine

Ov = ovine

Cap = caprine

Por = porcine

Rod = rodents (individual species listed by name)

Rab = rabbit

NHP = nonhuman primate

Av = avian

Rep = reptiles (species listed by name)

Am = amphibians (species listed by name)

Fish (species listed by name)

ORAL DRUG DOSAGE FORMS

Oral dosage forms comprise liquids (solutions, suspensions, and emulsions), semi-solids (pastes), and solids (tablets, capsules, powders, granules, premixes, and medicated blocks).

A **solution** is a mixture of 2 or more components that form a single phase that is homogeneous down to the

molecular level. Solutions offer several advantages over other dosage forms. Compared with solid dosage forms, solutions are absorbed faster and generally cause less irritation of the GI mucosa. The disadvantages of solutions include susceptibility to microbial contamination and the hydrolysis in aqueous solution of susceptible active ingredients. In addition, the taste of some drugs is more unpleasant when in solution. Oral solutions provide a convenient means of drug administration to neonates and young animals.

A **suspension** is a coarse dispersion of insoluble drug particles, generally with a diameter exceeding 1 μm , in a liquid (usually aqueous) medium. Suspensions are useful for administering insoluble or poorly soluble drugs or in situations when the presence of a finely divided form of the material in the GI tract is required.

An **emulsion** is a system consisting of 2 immiscible liquid phases, one of which is dispersed throughout the other in the form of fine droplets; droplet diameter generally ranges from 0.1-100 μm . Creaming, as occurs with milk, also occurs with pharmaceutical emulsions. However, it is not a serious problem because a uniform dispersion returns upon shaking.

A **paste** is a 2-component semi-solid in which drug is dispersed as a powder in an aqueous or fatty base. The particle size of the active ingredient in pastes can be as large as 100 μm . The vehicle containing the drug may be water. Pastes are a popular dosage form for treating cats and horses, and can be easily and safely administered by owners.

A **tablet** consists of one or more active ingredients and numerous excipients and may be a conventional tablet that is swallowed whole, a chewable tablet, or a modified-release tablet (more commonly referred to as a modified-release bolus due to its large unit size). Conventional and chewable tablets are used to administer drugs to dogs and cats, whereas modified-release boluses are administered to cattle, sheep, and goats.

A **capsule** is an oral dosage form usually made from gelatin and filled with an active ingredient and excipients. Two common capsule types are available: hard gelatin capsules for solid-fill formulations, and soft gelatin capsules for liquid-fill or semi-solid-fill formulations.

A **powder** is a formulation in which a drug powder is mixed with other powdered excipients to produce a final product for oral administration.

A **granule** is a dosage form consisting of powder particles that have been aggregated to form a larger mass, usually 2-4 mm in diameter.

A **premix** is a solid dosage form in which an active ingredient, such as a coccidiostat, production enhancer, or nutritional supplement, is formulated with excipients. They are administered to poultry, pigs, and ruminants.

A **medicated block** is a compressed feed material that contains an active ingredient, such as a drug, anthelmintic, surfactant (for bloat prevention), or a nutritional supplement, and is commonly packaged in a cardboard box. Ruminants typically have free access to the medicated block over several days, and variable consumption may be problematic.

PARENTERAL DOSAGE FORMS

Parenteral dosage forms and delivery systems include injectables (ie, solutions, suspensions, emulsions, and dry powders for reconstitution), intra-mammary infusions, intra-vaginal delivery systems, and implants.

A **solution** for injection is a mixture of 2 or more components that form a single phase that is homogeneous down to the molecular level. "Water for injection" is the most widely used solvent for parenteral formulations.

A **suspension** for injection consists of insoluble solid particles dispersed in a liquid medium, with the solid particles accounting for 0.5-30% of the suspension. The vehicle may be aqueous, oil, or both. Injectable suspensions are commonly used.

An **emulsion** for injection is a heterogeneous dispersion of one immiscible liquid in another; it relies on an emulsifying agent for stability. Parenteral emulsions are rare because it is seldom necessary to achieve an emulsion for drug administration.

A **dry powder** for parenteral administration is reconstituted as a solution or as a suspension immediately prior to injection. The principal advantage of this dosage form is that it overcomes the problem of instability in solution.

Mastitis **intra-mammary infusion products** are available for lactating and non-lactating (dry) cows. Lactating cow intra-mammary infusions should demonstrate fast and even distribution of the drug and a low degree of binding to udder tissue. These properties result in lower concentrations of drug residues in the milk.

Intra-vaginal delivery systems include controlled internal drug release (CIDR) devices, progesterone-releasing intra-vaginal devices (PRID), and vaginal sponges. These systems are used for oestrus synchronization in sheep, goats, and cattle.

The majority of **implants** used in veterinary medicine are compressed tablets or dispersed matrix systems in which the drug is uniformly dispersed within a non-degradable polymer.

TOPICAL DOSAGE FORMS

The topical dosage forms available for treating animals include solids (dusting powders), semisolids (creams, ointments, and pastes), and liquids (solutions, suspension concentrates, suspoemulsions, and emulsifiable concentrates). Of special interest are transdermal delivery systems that elicit clinical responses by carrying medications across the skin barrier to the bloodstream. Examples of these are transdermal gels and patches that are used in companion animals. Also of interest are dosage forms that are unique to veterinary medicine, such as spot-on, pour-on, and backliner formulations developed for the control of parasites.

A **dusting powder** is a finely divided insoluble powder containing ingredients such as talc, zinc oxide, or starch.

A **cream** is a semisolid emulsion formulated for application to the skin or mucous membranes. Droplet diameter in topical emulsions generally ranges from 0.1-100 μm .

An **ointment** is a greasy, semisolid preparation that contains dissolved or dispersed drug. Ointments are indicated for chronic, dry lesions and contraindicated in exudative lesions.

A **paste** for topical use is a stiff preparation containing a high proportion of finely powdered solids such as starch, zinc oxide, calcium carbonate, and talc. Pastes are less greasy than ointments because much of the fluid hydrocarbon fraction is absorbed onto the solid particles. Pastes are indicated for ulcerated lesions.

A **solution** for topical use is a mixture of 2 or more components that form a single phase down to the molecular level. Topical solutions include eye drops, ear drops, and lotions.

A **suspension concentrate** for topical use is a mixture of insoluble, solid active ingredients, which are normally at high concentrations, in water or oil.

A **suspoemulsion** combines the elements of an emulsion and a suspension, allowing active ingredients with widely varying physical properties to be formulated in a single product. Typically, a suspoemulsion contains one

or more solvent-soluble active ingredients in an

Adapted from the following sources:

<http://www.petalk.com/drug-dosages.html>

<http://www.drugs.com/dosage/>