

INTRODUCTION



A formulary is defined as having information regarding guidance on prescribing drugs, including preparations and dosage, indications, contraindications, efficacy, potential side effects, drug interactions, and legal regulations (British National Formulary: UK).

Brooke Working Equid Veterinary Formulary is specifically tailored towards the working equid context. Each country programme will be able to personalise the formulary by calculating dose rates based on the formulations of medicine most frequently used in country and the average weight of the equids seen. Please do this in conjunction with your regional veterinary advisor. This doesn't mean never having to do an individual dose calculation on a case by case basis, but does mean that a rough guide to the volume to be administered is given and if the calculated dose varies a lot from this a recalculation may be needed.

The format was designed so that each clinician, be they vet or para-professional, only needs to carry information of those medicinal products they have access to.

The best formularies are maintained up-to-date and revised regularly. Research is constantly ongoing, new products become available to the market and other products gain licences in new places. It should be the responsibility of a nominated person in each country programme to update their local formulary.

This formulary is a quick reference guide for use in the field "patient-side" and the information is based on manufacturers' product literature, medical and pharmaceutical literature, regulatory authorities, and professional bodies. Advice is sourced where possible from equine species specific clinical literature and also takes into account national guidelines and emerging safety concerns. References are not included within the formulary to keep it as lightweight for carrying around as possible. Access to references is online via www.thebrooke.org where there is a link to the online formulary, this may be different to the formulary you have in your hands as it contains all the products available across Brooke countries of operation and will not have the photographs of the drug packaging or country specific dose calculation table.

There are some brief overview pages for many sections and topics to ensure that basic information is available in the field but the formulary is not a comprehensive veterinary manual and there are many other texts that can be consulted including The Working Equid Veterinary Manual <https://www.thebrooke.org/for-professionals/working-equid-veterinary-manual>

The information available on each drug monograph is limited to ensure it is more easily useable in the field. There are other commercially available formularies where more detail can be found on the pharmacology of each medication if required.

The following information will be available for each medication in the formulary:

Sub-heading	Explanation	Example
Name: generic	Universal chemical name for drug	Phenylbutazone
Class	What type of drug it is	Non-steroidal anti-inflammatory
Dose	Including the basic dose in mg/kg and the frequency of administration	1) 4.4mg/kg BID initially, then 2.2mg/kg BID 2) 4.4mg/kg single dose
Route	How the drug should be given	1)PO 2)IV
Use	Disease or symptom treated	Analgesic and anti-inflammatory used in colic, lameness and other painful conditions
Warnings	Contraindications (reasons not to use the drug), possible side-effects and any precautions to take when handling	Never give to equids for human consumption Never use IM Ensure animals are rehydrated before administering May cause stomach ulcers
Legal status	Is the drug licenced in horses? In other animals? Only in humans	Legal in horses
Storage information	Should it be kept in the fridge? Out of sunlight?	None
Country specifics	Local name Local formulation (mg/ml of active ingredient) Dose calculation based on average size of horse/donkey/mule (depending on relevance to country)	e.g. Pakistan Butadine 200mg/ml injectable solution Average horse 250kg Dose calculation 250 x 4.4 = 1100 mg 1100/200 = 5.5mls IV



For further information visit www.thebrooke.org/formulary

KEY TO ICONS



Store below 25C



Care with disposal

To simplify the use of the formulary as a quick reference field guide we have used icons for common indications, contraindications and storage considerations. A key to these icons is presented here for reference.



Not to be used in pregnant animals



Not to be used in animals for human consumption



Store in the dark



Not licenced for equines



Caution when handling



Take care administering



Must be stored in the fridge



Suitable for all animals



SUITABLE FOR THESE ANIMALS



Dose for horses



Dose for mules



Dose for donkeys



Safe for use in foals



NOT SUITABLE FOR THESE ANIMALS



NOT for donkeys



NOT for horses



NOT for foals



NOT for mules



ROUTES OF ADMINISTRATION



Subcutaneous



Oral



Intravenous



Intramuscular

CALCULATING DRUG DOSAGES

Drug calculations should always be worked out based on the animal's bodyweight. As we do not generally have any scales to hand in the field there are some formulae for calculating bodyweight (see Bodyweight Estimation in Working Equids section). Once you have gained a general idea of the average bodyweight of your average patient it may be more acceptable to estimate bodyweight but you **MUST** ensure you feel confident doing this. If an animal has a low body condition score then remember that even if it is average size it will be of a lower weight and you will need to calculate a weight accordingly.

THE BASIC DOSE CALCULATION IS:

$$\frac{\text{Bodyweight (kg)} \times \text{dose rate needed (mg/kg)}}{\text{Concentration of ingredient in drug (mg/ml)}} = \text{Number of mls to administer}$$

It is very important that you work in the same units (highlighted in bold). Most drugs have their concentration displayed in mg/kg i.e. the number of milligrams of active ingredient per millilitre of solution. If the amount of active drug in the solution is very small it may be in micrograms (μg) per millilitre of solution.

Other drugs will be a percentage solution. To convert the concentration of a solution expressed in percentages into mg/ml simply multiply the percentage figure by 10. So a 5% solution of Flunixin contains 50mg/ml of flunixin meglumine, the active ingredient.

REMEMBER THAT:

$$1\text{mg} = 1000\mu\text{g} \quad 1\text{g} = 1000\text{mg} \quad 1\text{kg} = 1000\text{g} \quad 1\text{L} = 1000\text{ml}$$

You are treating a donkey weighing 150kg with flunixin which needs to be administered at 1.1mg/kg and you have a 5% solution of flunixin.

- 5% solution = 50mg in 1ml
- Dose rate 1.1mg/kg
- Dose rate x bodyweight (1.1 x 150) = 165mg of drug needed
- Mg of drug required divided by mg in solution (165 divided by 50) = 3.3mls

NOTES ON DRUG CALCULATIONS WITHIN THIS FORMULARY

On each drug monograph the dose is given in mg/kg so you can do a personalised dose calculation for each equid you see. However, on the reverse of each monograph is a table which is personalised to your country. This will have the average dose to give an average size equid, (each relevant species is separately displayed as some drugs have different recommended dose rates for horses, donkey and mules) of the drug formulation that is recommended in your country, by the Brooke team. If you are not confident in performing dose calculations these can be used as a guideline provided you have checked the points below:

- It is vital that you check that you are using the **same drug in the same formulation** as that displayed in the table otherwise the dose will be wrong.
- You must be able to make a **weight estimate on viewing the equine** you are treating to ensure it is about the average size of the animals you see in your country.
- Very thin animals, very small/large animals (compared to the average that you see) and foals will need a separate calculation.
- Due to old age or concurrent illness you may feel you should lower the dose rate.

If any of the points above apply you will have to calculate the weight of the animal (refer to Bodyweight Estimation in Working Equids) and dose from the beginning.

FLUID THERAPY

Treatment of dehydration should commence by offering clean, fresh water in a suitable container and allowing the quiet time (at least 10 minutes) and space for the equid to drink. Most equids that are not severely ill will drink to correct their own dehydration. The best way to then monitor the hydration is to look at the urine output of the equid and also improvement in any clinical signs that are related to dehydration. See chapter 6 of the Working Equid Veterinary Manual for further information on recognising and monitoring dehydration and hypovolaemia including calculating percentage dehydration.

If the equid is very systemically ill and lethargic and not drinking, yet clinical signs indicate that it is suffering from dehydration, then alternative forms of fluid therapy may be considered.

Fluid deficit (litres) = % dehydration x bodyweight (kg)

Therefore, if a 300kg horse is 8% dehydrated it will require 24 litres (L) of fluid to correct, i.e. $300\text{kg} \times 0.08$ (8%) dehydration = 24l

Enteral fluid therapy via nasogastric intubation is the most physiological and least invasive way to rehydrate an equid if it will not or cannot drink. Following the fluid therapy protocol and nasogastric intubation standard operating procedure section, will ensure this is done correctly.

The stomach capacity of a 500kg horse is 18l and most working equids are considerably smaller than this. It is better to give smaller boluses of fluid over a few hours. Do not attempt to give a 300kg horse all 24l at the same time to achieve rehydration as the animal would not even have the stomach capacity for this and you may rupture their stomach.

Give 10–12ml/kg (5–6L/500kg) every 0.5–1 hrs PO. It may be more manageable to give 4–6l every 2–3 hours depending on the size of the animal. Often once you have begun this rehydration process the animal will start to drink by itself after some time if dehydration is the main cause of clinical signs.

Fluids via stomach tube are also used to treat animals suffering from impaction colic. Often there is a temptation to add various powders or salts to the fluid in order to make it more isotonic (a solution having the same osmotic pressure as a body fluid). Unless you can be sure that you are making an isotonic solution it is safer to give just water as giving too much salt can be far more dangerous.

The last resort for providing fluids is via the intravenous route. This should only be attempted if you can place an aseptic intravenous catheter and have large quantities of sterile intravenous fluids available (a 1l bag is not sufficient to correct dehydration). If you do not have the ability/resources to do this and to follow the protocol for intravenous fluid therapy then do not attempt to use this route. It is rare that you will not be able to pass a nasogastric tube and provide fluids via this route.

SELECTING MEDICINES FOR VETERINARY USE

We have a duty to see that medicines are used correctly and within accepted guidelines. Medicines can cause harm, if misused, to the animal being treated, to the vet or technician handling them and/or to the wider public health and environment.

MEDICINE USE AND THE LAW

It is very important to understand the legal position around the use of medicines in your own country. This includes national legislation on who can import, sell, buy, own and administer medicines; these are designed to protect animals, the public and the environment from substandard products which lack efficacy or cause harm and also to prevent overuse and the development of drug resistance. These laws must be respected.

The responsible veterinary authority (likely to be part of the Ministry of Agriculture or equivalent) will have overall responsibility for determining who within the animal health infrastructure in the country can legally administer different veterinary treatments. Associated Veterinary Statutory bodies such as Veterinary Councils may have a role in education and enforcement.

In some countries paraveterinary personnel may only be able to own or administer certain veterinary products if they are under the supervision of a registered vet. All those working within the animal health service infrastructure should have a clear understanding of the legal limits that may apply in their context to them using veterinary medicines.

Only medicines that have been legally imported and registered in the country should be used as they will have undergone appropriate testing and quality control.

They should be used as indicated according to the manufacturer's guidance, unless altered by the registration conditions in country. Occasionally manufacturer's guidelines are contraindicated by more recent research in equids. Check both the manufacturer guidelines AND the formulary e.g. flunixin is licenced for intramuscular use but in reality may cause severe abscesses at the injection site.

There may be a cascade system (see Responsible Medicine Use section) operating in country to assist with using a product in a species, or for a condition, for which it is not indicated by the manufacturer.

MEDICINE PURCHASE ADVICE

Veterinary products should be purchased from licensed or registered premises by a qualified seller. The sale premises should be equipped to store medicines correctly, including effective temperature control.

Only buy medicines in their original packaging and ensure the labelling is clear and legible (examine labels for spelling mistakes or other printing errors which MAY indicate they are not genuine). Preferably buy products that have a full data sheet as an insert in the box.

Check the expiry date on any product before purchase and ensure it is long enough to allow use of the full amount of medicine within the expiry date otherwise there will be wasted product which is not cost effective. Medicines must never be used past their expiry date.

Well known "brands" are likely to be more expensive than generic or those produced locally but are not necessarily better. If a locally produced product or generic is licensed/registered in the country it should be good to use.

A veterinary product sold in larger bulk containers may work out cheaper but only if the entire amount is going to be used quickly. Medicine left in a container after opening is quickly damaged by air and may become contaminated.




Check the concentration of the medicine before purchase to work out the cost of the actual amount of medicine in a container. Some medicines with the same chemical name have more actual medicine in each millilitre in a bottle and may work out cheaper overall as each animal will need less millilitres to get the same amount of active drug.

NORMAL VITAL SIGNS IN WORKING EQUIDS

Normal vital signs (heart/pulse rate, respiratory rate and temperature) vary quite widely in all equids according to circumstances but perhaps more so in working equids which may be working in conditions that cause their vital signs to be considerably raised due to heat and their difficult working environments. The vital signs in the table below will probably therefore differ from those you may have seen in many other textbooks as in other sources data are often used from studies using racing thoroughbreds.

The table here is specifically designed using working equid data (fuller references available online). However you must be able to decide using your clinical judgement, in conjunction with other clinical signs, whether a heart rate that is at the upper end of the reference range (below) is normal given the circumstances, or whether the animal is in pain e.g. colicking.

REPORTED VALUES

	Heart (pulse) rate (beats per minute)	Respiratory rate (breaths per minute)	Rectal temperature (°C)	Reference
 Horse (adult resting)	20-80 (mean 38)	12-60 (mean 31)	33.5-39.6 (mean 36.6)	Upjohn 2013 (personal communication): 852 apparently healthy working horses from Lesotho
 Foal Donkey (adult resting)	38-48 39-56	14-26 21-42	36.0-38.3 36.6-38.0	Lemma and Moges 2009: 85 working donkeys from Ethiopia. Canacoo et al. 1991: 27 apparently healthy donkeys from Ghana.
 Mule (adult resting)	29-37	8-16	37.1-38.1	Ali and Anjum 1998: 700 mules from 7 farms over 3 regions of Pakistan.

RESPONSIBLE MEDICINE USE AND PRESCRIBING PRACTICE

A veterinary qualification provides the legal right to dispense drugs to animals. Although the levels of training required to dispense drugs may vary between countries it is vital that everyone who dispenses medications to animals does so responsibly. The following are some considerations to abide by when administering or dispensing medicines.

1) KNOW THE BASIC PHARMACOLOGICAL PRINCIPLES OF THE MEDICATION.

Although this formulary does not contain detailed information for each drug please ensure you have read the pages on "Pharmacology" and understand the concepts of absorption, distribution, metabolism, excretion and drug interactions.

2) MINIMISE THE POSSIBLE NEGATIVE CONSEQUENCES OF ADMINISTERING MEDICATION BY:

- a) **Always prescribing a full course.** This will minimise the development of drug resistance especially in antimicrobials. Encourage others to do the same.
- b) **Always administer the correct dose.** Overdosing can result in side effects, toxicity and even death. Under-dosing will again encourage the development of resistance and may mean the medication is ineffective thus compromising animal welfare.
- c) **Never administer medicines unnecessarily.** This includes using prophylactic drugs without cause or administering medications because there is pressure from animal owners to "do something".
- d) **Do not use drugs that may not enter the human food chain in animals that may be slaughtered for human consumption.** Ensure owners understand that such drugs may not be used in their other animals which they may consume. Many drugs are carcinogenic or cause blood disorders when consumed by humans inadvertently.
- e) **Follow the prescribing cascade** (see figure overleaf, this is a generic cascade and there may be a specific legal route for you to follow in your own country) and always use drugs that are licenced in equids as your first choice. These will have been researched in equids specifically and will have more predictable results and be less likely to result in side effects/toxicity.
- f) **Follow instructions on medicine storage.** For instance not storing vaccines in the fridge may make them less effective.

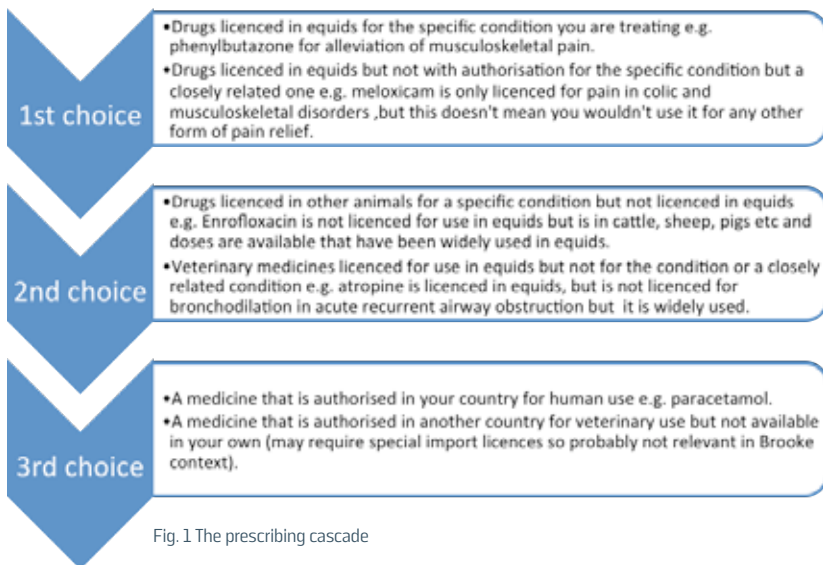


Fig. 1 The prescribing cascade

3) ENCOURAGE OWNER COMPLIANCE

This is part of ensuring that correct doses are administered by the correct routes and for the right length of time. Lack of owner compliance is a huge cause of treatment failure. Clear labelling will help ensure that verbal instructions are followed as these may be forgotten. Verbal instructions should always be given and understanding of these checked. In illiterate communities using pictures and symbols can help confirm instructions are followed. When dispensing drugs ensure they are safely packaged so they are not taken mistakenly by children.

The recommended labelling requirements are:

- Name and address of animal owner
- Name and address of supplying veterinary surgeon or relevant professional
- Date medicine supplied
- Name, strength and quantity of product (unless the drug is being supplied in its authorised packaging)
- Dosage and directions for use (frequency, route of administration, number of days to administer)
- "For animal treatment only"
- If the drug is a topical preparation "For external use only"
- "Keep out of reach of children"