



# How safe are dewormers?

AMERICAN CONSORTIUM FOR SMALL RUMINANT PARASITE CONTROL

Any time a drug is given to an animal, there is concern about its safety. Is the drug safe for all animals at the therapeutic (or labeled) dose and what happens if you double the dosage or accidentally give too much? How much is too much? The safety of young animals and pregnant females is of particular concern. There can also be species differences in response to the drugs.

Most dewormers (or anthelmintics) have wide safety margins (or indexes): the dosage that can be given to an animal before adverse effects are seen. For most dewormers, the safety index is usually much higher than the dosage recommended for use.

There are three broad classes of dewormers for small ruminants (in the US): 1) benzimidazoles; 2) macrocyclic lactones; and 3) imidazothiazoles/tetrahydropyrimidines (membrane depolarizers).

## Benzimidazoles

Benzimidazoles (called the “white dewormers”) have the widest margin of safety. Safety indexes range from 3x to 20x and are mostly greater than 10x the labeled dose. Fenbendazole (Safe-Guard®, Panacur®) has an especially low risk of toxicity.

Albendazole (Valbazen®) has a teratogenic effect, meaning it can disturb the development of the embryo or fetus. For this reason, it should not be given during the first 45 days of pregnancy or 45 days



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## Recommended dosage (per 50 lbs.)

Source: American Consortium for Small Ruminant Parasite Control (ACSRPC; wormx.info)

Dewormer	Sheep	Goats	Camelids
Fenbendazole SafeGuard®		2.3 ml	4.6 ml
Albendazole Valbazen®	1.5 ml	4.0 ml	4.0 ml
Ivermectin Ivomec®	5.8 ml	12.0 ml	12.0 ml
Moxidectin Cydectin®	4.6 ml	9.0 ml	9.0 ml
Levamisole Prohibit®	4.0 ml <sup>1</sup>	5.5 ml <sup>1</sup>	4.0 ml <sup>1</sup>
Morantel Rumatel®		23 g <sup>2</sup>	

<sup>1</sup>The levamisole dosage is for when one 52 g packet is mixed in 2 quarts (128 ml) of water. The dosage would be different for different dilutions.

<sup>2</sup>The morantel dosage is for Duravet Rumatel®. For the Manna Pro® product, the feeding rate would be 0.5 lb. per 50 lbs.



## What is the safety index?

The safety index (or margin) is the dosage that can be given to an animal before adverse effects are seen. A safety index of 4x means 4 times the labeled (or therapeutic) dosage) is not known to cause adverse effects in the animal. For most dewormers, the safety index is usually much higher than the dosage recommended for use. Levamisole has the smallest safety index.

after males have been separated from females. The label specifically states this. Most sheep and goat producers err on the side of caution and do not give albendazole to any pregnant female.

According to several sources, albendazole has a narrower margin of safety for camelids (llamas and alpacas). It should not be given to pregnant females or to crias under the age of 6 months (or less than 50 lbs.) and it should not be re-dosed on consecutive days.

## Macrocytic lactones

The macrocytic lactones (ivermectins and milbimycins) are usually well tolerated by small ruminants. In fact, according to one source, “they are safe in just about any host at any time.” Macrocytic lactones can usually be administered up to 10x the recommended dose without causing serious side effects. The safety margin for ivermectin (Ivomec®) is about 30x for sheep. Safety studies have shown no adverse effects when sheep were given 5x the recommended dose of moxidectin (Cydectin®).

Though reproductive safety studies have not been done in the US, moxidectin is considered to be safe for pregnant females. Claims of abortion due to administration of macrocytic lactones are unsubstantiated. While moxidectin has been proven to be safe for young lambs (over 1 month), it is only labeled for sheep/lambs over 4 months of age (in the US).

Ivermectin and moxidectin should not be given to dogs unless directed by a veterinarian. Some breeds (especially herding breeds) are genetically sensitive to ivermectin (avermectins).

## Membrane depolarizers

The safety margin of levamisole (Prohibit®, Leva-Med®) is the lowest of any of the dewormers, especially the injectable form which results in higher blood levels of the drug. The safety index ranges from 4 to 6, depending on the formulation. Toxic levels may be reached at 4x (some claim even at 2x). A 10x dose will cause death. Levamisole comes in a powder that must be mixed with water to make a drench. Because it can be mixed at different dilutions, dosages vary. Be sure to read the label carefully.

A more diluted drench (more water) provides a wider margin of safety if there are small errors in dosing. This is recommended for smaller animals. Animals should not be fasted before being given levamisole. Though uncommon, some animals may be hyperactive for a few minutes after receiving levamisole. Toxicity symptoms include salivation, muscle tremors, ataxia, urination, defecation, and collapse.

There are anecdotal reports that levamisole causes late term abortion, especially in goats. It has been reasoned that the stress of handling during late pregnancy could contribute to the claims of abortion. Regardless, it is probably best to err on the side of caution and not use levamisole in late pregnant goats. One study showed that levamisole could be detrimental to the establishment of pregnancy in sheep. Other studies have shown no effects or only beneficial effects when giving levamisole to pregnant ewes.

Because of their low absorption from the gut, tetrahydropyrimidines have a higher safety margin. Morantel tartrate is an oral feed additive. It has a safety margin of about 20x (in sheep), but it should not be given at the same time as levamisole. Like levamisole, dose varies according to the concentration of the drug in the product and varies from 0.1 to 1 lb. per 100 lbs.

## Combination treatments

Only clinically parasitized animals should be dewormed, and it is recommended that they be given combination treatments (due to the widespread development of resistance worms). A combination treatment is when you give dewormers from different chemical classes to the same animal at the same time (sequentially, not mixed together).



## Goats and camelids

Overall, fewer safety studies have been conducted with goats. On one hand, goats require higher dosages of dewormers than sheep (usually 1.5-2x), due to their higher rates of metabolism. On the other hand, they are more sensitive to higher dosages, especially kids.

Although no drugs have been approved specifically for use in camelids (in the US), dewormers that are generally recognized as safe and effective include the standard classes of drugs administered to ruminants.

There are no known additional risks (besides those already discussed with levamisole and morantel tartrate) when giving more than one dewormer at the same time. The precautions that exist for giving a drug singly also exist when giving the drug as part of a combination treatment.

### General deworming recommendations

Most people are poor at guessing weights. To avoid overdosing (or underdosing), it is recommended that dosing be based on actual weights. This is especially important when deworming young or pregnant animals. If you do not have a scale, you can use a weigh tape or measure your animals with a tape measure to estimate weight. Weight (lbs) equals (heart girth x heart girth x length) divided by 300.

When you are dosing a group of animals, you should calibrate the drench gun (or oral dosing syringe) for

the heaviest in the group or separate animals into weight (or age) groups, as underdosing can accelerate dewormer resistance. Ideally, you should fill the oral dosing syringe based on the weight of each individual animal (separate syringes for each drug).

It is important to avoid unnecessary stress when handling and deworming animals, especially young and pregnant animals. A handling system or crowding pen will simplify management and reduce stress. Ewes/does should not be handled too close to their due dates.

Compared to older drugs and many old-time remedies, today's dewormers are not only more powerful, but they are safer. At the same time, it is important to give an accurate dose of the drug, minimize stress when deworming, and practice caution when treat-

### Selected References

American Consortium for Small Ruminant Parasite Control. Sheep, goat and camelid dewormer charts. (2021). [https://www.wormx.info/deworming \[-> charts\]](https://www.wormx.info/deworming[->charts]). Accessed 03.03.24.

Hobson, Mackie. Levamisole toxicity. SA Mohair Growers Association. (2017). <https://www.angoras.co.za/article/levamisole-toxicity>.

Merck Veterinary Manual. Safety of anthelmintics (Professional version). (2022). <https://www.merckvetmanual.com/pharmacology/anthelmintics/safety-of-anthelmintics>.

Parasipedia.net. (2007-2024). Accessed 03.03.24.

Walker, Pamela. Gastrointestinal parasites in camelids. NAVC Conference (2015). <https://www.cabidigital.library.org/doi/pdf/10.5555/201>.



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