

Revolution® and Revolution Plus® for Virginia Opossums

AT A GLANCE

- The use of Revolution® or Revolution Plus® in Virginia opossums is not recommended.
- Simparica®, a sarolaner chewable, is advisable for the treatment and prevention of ectoparasites such as fleas and ticks.
- We continue to advise that ivermectin-based products are better suited for the treatment of internal parasites in Virginia opossums.
- Healthy, releasable opossums do not necessarily need to be dewormed. Ridding them of parasitic organisms they may have established evolutionary relationships with may be harmful to their overall health and may impact their ability to thrive in the wild. For more information, please see our deworming advisory.

Background

Revolution® and Revolution Plus® are topical medications containing the antiparasitic drugs selamectin and selamectin with sarolaner, respectively. They combat both internal and external parasites. Revolution Plus® is approved for use in cats only, while the original Revolution® is approved for dogs as well as cats. This advisory compares the two formulas, evaluates safety concerns, and makes recommendations for antiparasitic treatment in Virginia opossums.

Figure 1: Revolution Plus® in its manufacturer packaging



<https://www.zoetispetcare.com/products/revolution-plus>

Dosing

Both formulas are administered monthly as a single dose. Though the medication is applied topically, dosing is weight-dependent, and each individual weight class has its own tube size. The entire tube is applied at once to constitute a given month's dose. Body weight and tube size for each formula are listed below. An average Virginia opossum would theoretically need 15-45 mg of Revolution® or a 0.25-0.5 ml tube of Revolution Plus® depending on age and weight.

Revolution®¹

<i>Body Weight (CATS)</i>	<i>Appropriate Tube Size*</i>
Up to 5 lb	15 mg
5.1-15 lb	45 mg
15.1-22 lb	60 mg

<i>Body Weight (DOGS)</i>	<i>Appropriate Tube Size*</i>
Up to 5 lb	15 mg
5.1-10 lb	30 mg
10.1-20 lb	60 mg
20.1-40 lb	120 mg
40.1-85 lb	240 mg
85.1-130 lb	360 mg

Revolution Plus®²

<i>Body Weight (CATS only)</i>	<i>Appropriate Tube Size*</i>
2.8-5.5 lb	0.25 ml
5.6-11 lb	0.5 ml
11.1-22 lb	1 ml

Active Ingredients and Modes of Action

Each tube size is designed to provide the recommended minimum dosage of active ingredient(s) per weight class. Both formulas deliver the minimum dosage of selamectin at 6 mg/kg bodyweight, while Revolution Plus® also contains 1 mg/kg bodyweight of sarolaner.² The addition of sarolaner is the principal difference between the two medications. Both selamectin and sarolaner are neurotoxins that treat parasites by inducing paralysis and death, but their modes of action differ.

Selamectin, an insecticide of the avermectin class, acts on neuronal chloride-channel receptors to force a rapid increase of the permeability of nerve cells to chloride ions, which disrupts the electrical signaling of neural cells and leads to paralysis.^{3,4}

Sarolaner belongs to the isoxazoline class of ectoparasites and achieves neurotoxicity in parasites by binding to invertebrate-specific inhibitory glutamate receptors that are not found in mammals.⁵

Figure 2: The various endo- and ectoparasites against which each formula is effective

Pest Protection	revolution[®] PLUS (selamectin and sarolaner topical solution)	REVOLUTION^{®2}
Adult fleas	✓	✓
Ticks	3 types ✓ Black-legged/deer ✓ American Dog ✓ Gulf Coast	
Ear mites	✓	✓
Roundworms / Hookworms	✓	✓
Heartworms**	✓	✓

(n.d.). Retrieved from <https://www.zoetispetcare.com/products/revolution-plus>

Safety

Figure 3: Brief comparison of the safety information for each formula (cats only)

Safety	revolution[®] PLUS (selamectin and sarolaner topical solution)	REVOLUTION^{®2}
Youngest age	8 weeks	8 weeks
Lowest weight	2.8 lbs	None [†]
FDA or EPA approved	FDA	FDA
Separation requirements	None	None

(n.d.). Retrieved from <https://www.zoetispetcare.com/products/revolution-plus>

Adverse effects of both selamectin and sarolaner are relatively rare.^{3,4,6,7} However, when side effects do occur with neurotoxins such as these, they can be severe and even fatal. Reactions to selamectin may include diarrhea, vomiting, muscle tremors, lethargy, and tachypnea (rapid breathing). The only available treatment, should toxicity occur, is supportive therapy.⁴ Because selamectin only affects channel receptors shared by both parasites and mammals, toxicity is more likely to occur. While

the targeted chloride-channels in mammalian cells are less sensitive to selamectin's mode of action, they can still be overstimulated along with invertebrate receptors when exposed to the drug.^{3,4} Members of the isoxazoline class such as sarolaner bind to the same chloride-gated receptors acted upon by selamectin, but with greater affinity in parasites than in mammals, meaning they reduce the risk of side effects. This class of drugs also acts on arthropod-specific receptors that mammals lack entirely.⁵ Therefore, of the two active ingredients found in Revolution Plus[®], sarolaner poses less of a safety risk. Sarolaner is designed for oral administration, maximizing its efficacy and reducing the risk of accidental ingestion while grooming.⁵ Despite this, since Revolution[®] products are topical, they therefore cannot claim such benefits. An alternative sarolaner product, Simparica[®] for dogs, *is* administered orally and circumvents the aforementioned safety issues.

Recommendations

Though there is no direct evidence that Revolution[®] products may be less safe for Virginia opossums than for domestic species, the development of related drugs with lower potential for neurotoxic side effects tends to discourage its use by rehabilitators to combat parasites. Most other anti-ectoparasitic drugs on the market for dogs and cats have similar risks as Revolution[®] and Revolution Plus[®], but Simparica[®], a chewable tablet marketed for dogs, relies solely on sarolaner as its active ingredient, making it a more suitable choice for use in other mammals versus products containing selamectin. Studies have shown Simparica[®] to be both efficacious and extremely safe.^{6,7} A Sanctuari-affiliated veterinarian has seen no cases of adverse effects of Simparica[®] with extensive use in dogs and cats. To address internal parasites, established drugs like ivermectin are the best option for Virginia opossums. For this species, we recommend treating external and internal parasites separately rather than relying on a single drug with the side effect risks of selamectin.

Sanctuari is always striving to keep its content current. If you have questions or additions you would like to ask or offer, contact us at sanctuari.org@gmail.com and reference the title of this piece.

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