

Guidelines for the Use of Fluralaner (*Bravecto*[®] Spot-on Solution for Dogs') to Treat Sarcoptic Mange in Wombats

This information sheet was prepared by the research team at the University of Tasmania, taking into account input from a range of stakeholders.

Pending the issuing of an APVMA permit for Bravecto[®], the purpose of this sheet is to assist treaters and veterinarians who have chosen to use Bravecto[®] by providing them with up-to-date information that is based on the best available evidence from current research. As such, the information provided within is an accurate representation of what is presently known and not known regarding the use of fluralaner to treat sarcoptic mange in wombats. This information sheet will be updated as knowledge grows through scientific research and field experience (see page footer for the location of the most up-to-date version).

Drug	Fluralaner Description: systemic insecticide (anti-insect activity) and acaricide (anti-mite activity) belonging to the isoxazoline class of drugs
Product	Bravecto[®] Spot-on Solution for Dogs (MSD Animal Health) Active ingredient: 280 mg/ml Fluralaner Solvent: 339 mg/ml Dimethylacetamide (d-limonene) Description: veterinary medication used to control a range of external and internal parasites in dogs and cats
Background	<p>Fluralaner, which has been scientifically proven to kill all lifecycle stages of the mange mite (<i>Sarcoptes scabiei</i>), including the eggs, is commercially available in the form of the veterinary medication, Bravecto[®].</p> <p>Researchers at the University of Tasmania have tested fluralaner for the treatment of sarcoptic mange in the bare-nosed wombat (common wombat, <i>Vombatus ursinus</i>), using the Bravecto[®] formulation. Safety trials confirmed that fluralaner/Bravecto[®] is safe to use in both adult and juvenile wombats when using the doses recommended below. Efficacy trials found that a single dose resulted in complete resolution of the clinical signs (symptoms) of sarcoptic mange in adult and juvenile wombats within 4 weeks of treatment, and provided protection from re-infestation with mange mites and other ectoparasites for up to 3 months. Field trials in wild bare-nosed wombats are ongoing.</p>
Authorisation Status	<p>Until an APVMA permit has been issued, Bravecto[®] can only be used to treat wombats under the direct supervision of a veterinarian as it is an 'off label' treatment. (N.B. The degree of supervision is at the discretion of the supervising veterinarian).</p> <p>It is also important that treaters comply with jurisdictional rules and acquire licences or permits as required by State and Territory agencies.</p>
Dosage and Frequency	Bravecto [®] Spot-On for Large Dogs is the most appropriate product size for adult wombats. Further information below:

	<table><tr><th>Wombat weight (approx.)</th><th>Wombat age (approx.)</th><th>Bravecto® Spot-on Product to Use</th><th>Safe administration frequency</th></tr><tr><td>5 – 10kg</td><td>Joey</td><td>Bravecto® Spot-on for Small Dogs (1 x 0.89ml pipette)</td><td rowspan="3">Recommended: Once¹ Maximum: Once per month for up to 3 months²</td></tr><tr><td>10 – 20kg</td><td>Large joey or small adult</td><td>Bravecto® Spot-On for Medium Dogs (1 x 1.79ml pipette)</td></tr><tr><td>20 – 40kg</td><td>Adult</td><td>Bravecto® Spot-On for Large Dogs (1 x 3.57ml pipette)</td></tr></table> <div>1. The Recommended doses should be sufficient to resolve mange in bare-nosed wombats. 2. The Maximum dose guidelines apply if there is concern about treatment response or if an incomplete dose was administered (see explanatory notes in FAQ #4 below).</div>	Wombat weight (approx.)	Wombat age (approx.)	Bravecto® Spot-on Product to Use	Safe administration frequency	5 – 10kg	Joey	Bravecto® Spot-on for Small Dogs (1 x 0.89ml pipette)	Recommended: Once ¹ Maximum: Once per month for up to 3 months ²	10 – 20kg	Large joey or small adult	Bravecto® Spot-On for Medium Dogs (1 x 1.79ml pipette)	20 – 40kg	Adult	Bravecto® Spot-On for Large Dogs (1 x 3.57ml pipette)
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Application	<p>Spot-on: When treating wombats in care, the dose can be given as a spot-on by parting the fur and applying directly to the skin on the neck or between the shoulder blades. For Large Dog pipettes, the dose can be applied at a single location or at two or three points on the neck and upper back (avoiding the rump), as per the manufacturer’s instructions. This is to avoid the treatment dripping or running off the application site.</p> <p>Pour-on: When treating wombats in the wild, the dose can be applied as a pour-on treatment via burrow flap or with a pole-and-scoop to the wombat’s back, aiming for skin that is unaffected by mange. Because the dose is tiny, it may require a carrier (dilutant). The most appropriate carrier is approximately 5-20ml of <i>Orange Power Sticky Spot & Goo Dissolver</i> (Aware Environmental Products), available at most supermarkets. (See explanatory notes below in the FAQs).</p> <p>Note: <u>Mixing Bravecto® with Cydectin®/moxidectin, is not recommended</u> because:</p> <div>1. Bravecto® has been shown to be highly efficacious when used singularly 2. The impact of giving multiple drugs to wombats is not currently understood. There may be serious consequences for health and recovery, particularly for individuals in poor condition 3. Anecdotal results from combination treatments suggest that therapeutic doses of Bravecto® may not have been delivered effectively when mixed with Cydectin®</div> <p>Refer to the manufacturer’s guidelines regarding handling and personal protective equipment.</p>														
FAQs	<div>1. Q: <i>Does fluralaner cure mange in wombats?</i> A: In scientific trials, all wombats treated with a recommended dose of fluralaner showed complete recovery from mange within four weeks of treatment. Although there are reports of incomplete recovery following treatment with Bravecto® products, we suspect that these cases are most likely due to drug delivery failure and the wombat receiving only a partial dose.</div> <div>2. Q: <i>Is it appropriate to use Bravecto on wombats affected with mange at all stages of infection, included seriously debilitated individuals?</i> A: Wombats with severe mange are often suffering from secondary disease complications. Such animals are unlikely to recover despite treatment, and euthanasia may be necessary for animal welfare reasons. Although it can be difficult to tell how severely affected an animal is, if one or more of the following are observed then euthanasia should be considered: – The wombat is extremely thin/emaciated</div>														

	<ul style="list-style-type: none"> – Presence of infected/smelly wounds or excessive fly activity/fly strike – Apparent blindness (due to severe facial crusting), difficulty breathing or eating – Signs of weakness or incoordination – Hair loss and skin crusting/scabs affecting 50% or more of the side of the animal <p>If you are unsure as to whether euthanasia is required, contact your veterinary surgeon.</p> <p>3. Q: <i>Is Bravecto® safe to use in female wombats with pouch young or a joey-at-foot?</i> A: Scientific trials safely tested Bravecto® in wombats as young as 10 months old. Although it is possible that variation between species exists, evidence from several species of domestic animal suggests that fluralaner is also unlikely to pose a health risk to developing wombat embryos or nursing young.</p> <p>4. Q: <i>When is it safe to give another dose of Bravecto® to a wombat?</i> <i>(i) If only part of the treatment was delivered during application, when can the wombat be re-treated to ensure it gets a full treatment dose?</i> <i>(ii) If the wombat does not appear to be responding to treatment, when is the right time to apply further treatment?</i> A: Scientific trials show that a single recommended dose of fluralaner is sufficient to treat mange and protect from reinfestation for approximately three months. As such, <u>multiple doses should not be required</u>. However, evidence from safety trials has also shown that fluralaner has a wide safety margin and may be administered at a maximum frequency of once per month for up to 3 months, where justified. <i>(i)</i> As such, if there is concern regarding incomplete drug administration, it is safe to re-attempt treatment with the recommended dose (provided that the maximum administration frequency is not exceeded, see table above). <i>(ii)</i> If there is concern that the affected animal is not responding to treatment, consult with your supervising veterinarian. They may recommend re-attempting treatment (provided that the maximum administration frequency is not exceeded, see table above). N.B. Treating wombats with Bravecto® for more than 3 months is not recommended because: <ul style="list-style-type: none"> – Both the ‘Recommended’ and ‘Maximum’ treatment regimes specified in the table above should result in the resolution of sarcoptic mange in wombats. If this is not the case, refer to Q10 below. – Prolonged or excessive use of pharmacological compounds in wild animals can promote drug resistance in the parasite, adverse health consequences for the host, and result in adverse environmental impacts. <p>5. Q: <i>Can the treatment still be applied if</i> <i>(i) The wombat to be treated is wet from rain, or</i> <i>(ii) rain is forecast shortly after the intended time of treatment.</i> A: <i>(i)</i> The effect of wet skin or fur on the ability of any mange treatment to reach the skin and be absorbed is unknown. As a matter of precaution, and to avoid any potential interference, treatments should be applied to dry animals wherever possible. <i>(ii)</i> Pharmacokinetic data from wombats and other species shows that fluralaner is rapidly absorbed through the skin into the blood stream, suggesting that coat-wetting following drug application is unlikely to interfere with treatment. However, if heavy rain is forecast in the 72 hours following treatment, it is advisable to postpone drug application until drier weather is forecast to lower any risk of reduced drug absorption.</p> <p>6. Q: <i>How and why was Orange Power chosen as the carrier for pour-on application?</i> A: Interdisciplinary scientific evaluation (including by chemical and veterinary specialists) deemed that the most appropriate carrier is <i>Orange Power Sticky Spot & Goo Dissolver</i> (Aware Environmental Products). The rationale for using <i>Orange Power</i> is that:</p> </p>
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	<ul style="list-style-type: none"> – It does not interact pharmacologically with fluralaner – Its ingredients are similar to the solvent in Bravecto® and not harmful to wombats – It mixes readily with Bravecto® into a solution that will not separate – It is inexpensive and readily available in most supermarkets. <p>7. Q: <i>5-20ml of Orange Power doesn't sound like enough carrier fluid. Can this volume be increased?</i></p> <p>A: Increasing the volume of the carrier above 20ml is not recommended. This is to reduce the risk of losing any fluralaner by dripping or running off the wombat. In trials we have found this volume to penetrate through the fur of wombats to the skin.</p> <p>8. Q: <i>Won't the smell of Orange Power be a deterrent to wombats?</i></p> <p>A: The product has an orange scent that is of similar intensity to the smell of Bravecto® itself and is therefore unlikely to contribute additional sensory impact on the wombat. It is worth noting that wombats can exhibit aversion to other treatments as well and can avoid or destroy burrow flaps regardless of the type of treatment.</p> <p>9. Q: <i>If the dose has already been dispensed into a pole-and-scoop device but the wombat evades treatment, can the dose be retained for future use?</i></p> <p>A: As per the manufacturer's guidelines, Bravecto® should not be removed from its pipette until ready for use. Once removed from the manufacturer's packaging, the lifespan of the product is unknown but is likely to be less than 7 days. If storage is required, keeping the contents in a dark plastic or glass container away from direct sunlight is considered appropriate, but not guaranteed to be effective.</p> <p>10. Q: <i>Adverse effects have been observed following treatment administration. What should be done?</i></p> <p>A: In the event of any suspected adverse effects or incomplete response to treatment, contact your supervising veterinarian as soon as possible. Such reports should also be sent to the UTAS research team by the veterinarian or the treater to contribute to further research on the safety and efficacy of Bravecto® as a treatment for mange in wombats.</p>
Further Reading	<p><u>Wilkinson V, Takano K, Nichols D, Martin A, Holme R, Phalen D, Mounsey K, Charleston M, Kreiss A, Pye R, Browne E. Fluralaner as a novel treatment for sarcoptic mange in the bare-nosed wombat (<i>Vombatus ursinus</i>): safety, pharmacokinetics, efficacy and practicable use. <i>Parasites & Vectors</i>. 2021 Dec;14(1):1-21.</u></p> <p><u>Sarcoptic mange in Australian wildlife. Wildlife Health Australia factsheet (May 2017)</u></p> <p>Van Wick M and Hashem B. (2019) Treatment of Sarcoptic Mange in an American Black Bear (<i>Ursus americanus</i>) with a Single Oral Dose of Fluralaner. <i>Journal of Wildlife Diseases</i>: January 2019, Vol. 55, No. 1, pp. 250-253.</p> <p>Taenzler J, Liebenberg J, Roepke RK, Frenais R, Heckeroth AR. Efficacy of fluralaner administered either orally or topically for the treatment of naturally acquired <i>Sarcoptes scabiei</i> var. <i>canis</i> infestation in dogs. <i>Parasites and Vectors</i>. 2016;9(1):392.</p> <p>Curtis CF, Bourdeau PJ, Barr PA, Mukherjee R. Use of the novel ectoparasiticide fluralaner in the treatment of feline sarcoptic mange. <i>Veterinary Record Case Reports</i>. 2019;7(1):e000772.</p>
Contact	<p>For further information, contact the research team at the University of Tasmania: Dr Scott Carver, scott.carver@utas.edu.au</p> <p><u>Citation:</u> Wilkinson, V., Carver, S. 2021. Guidelines for the Use of Fluralaner ('Bravecto® Spot-on Solution for Dogs') to Treat Sarcoptic Mange in Wombat</p>