

Consider your Dung Beetles when using Parasiticides



The grazing industry currently uses a large range of veterinary chemicals. Those applied to control livestock parasites are referred to as *parasiticides*. In the Queensland cattle industry, chemicals are used to control both internal parasites (e.g. gastrointestinal worms) and external parasites such as ticks, lice and buffalo fly. The degree of use depends mainly on the locality, cattle breed and the herd management system.

Parasiticides can be divided into three main groups, namely endectocides, ectocides and anthelmintics. Endectocides, such as ivermectin, doramectin and moxidectin are effective against a wide range of internal and external parasites. Ectocides are used against external parasites and anthelmintics against internal parasites.

Each parasiticide has one or more active constituents, which may be used by more than one company, resulting in up to several trade names for the same basic product. Trade names often give no indication as to the active constituent/s present. The active constituents are always listed on the container label beneath the trade name.



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Impact of Parasiticides on Dung Beetles

Reports of laboratory studies have led to a growing realization that the active constituents of many parasiticides or their breakdown products may harm dung beetles.

Effects can range from the death of adult beetles, eggs or larvae to some form of impairment such as lowered breeding capacity of adults or retarded growth of larvae. The resultant impact on dung beetle populations is not known at present. Unfortunately there is also little or no available information about the toxicity of many chemicals for dung beetles.

Repeated use of some known higher risk products during the beetle-breeding season could reduce beetle populations on individual properties, with effects possibly extending to adjoining holdings. It is in the best interests of the cattle industry to encourage these beneficial insects, which, in returning dung to the soil, improve its aeration, increase nutrient recycling and assist in the control of cattle parasites that breed in dung.

The risk of harmful effects from chemical treatment coupled with a general lack of easily accessible information has created confusion amongst some producers who desire to treat parasites without harming their dung beetles.

The key to choosing appropriate parasiticides for your cattle is to:

1. Determine the parasite(s) that you want to treat
2. Identify the active constituents registered for their effective control
3. Be aware of the side effects these chemicals may have on dung beetles

Use this leaflet to help select an active constituent for your parasite problem that is low-risk for dung beetles. If circumstances require a higher risk chemical, try to reduce its impact by following the suggestions in this leaflet and in the AgForce Leaflet 'Strategic use of Parasiticides can help your Dung Beetles'.

Known effects of different types of active constituents on dung beetles are shown in *Table 1*. Note that, at most, only a few dung beetle species have been tested against some of the active constituents currently available. The possible impact of higher risk chemicals on dung beetle survival will vary depending on method and timing of application, frequency of treatment and the proportion of your total herd treated.



Table 1. Effects on dung beetles exposed to dung from cattle treated with various parasiticides as either pour-on, injectable or spray formulations.

REPORTED EFFECT ON DUNG BEETLES *				
	Mature adults	Young adults	Breeding females	Eggs/larvae
ENDECTOCIDES - Macrocyclic Lactones				
Avermectins: Abamectin, Doramectin, Eprinomectin, Ivermectin	No known Effect	Increased Mortality	Reduced Breeding	Increased Mortality
Moxidectin**	No Known Effect			
ECTOCIDES - Synthetic Pyrethroids				
Cypermethrin	Increased Mortality	Increased Mortality	Reduced Breeding	Increased Mortality
Deltamethrin	Increased Mortality	Increased Mortality	Reduced Breeding	Increased Mortality
Flumethrin [^]	Not Tested			
ECTOCIDES - Organophosphates				
Chlorfenvinphos	Not Tested			
Diazinon	Not Tested			
ECTOCIDES - Growth Regulators				
Fluazuron	Not Tested			
ECTOCIDES - Amines				
Amitraz	Not Tested			
ANTHELMINTICS				
Albendazole Fenbendazole Levamisole Mebendazole, Morantel Oxfendazole	No Known Effect			

* This is a synthesis of information contained in CSIRO Contracted Report #56 by K. G. Wardhaugh (2000) and scientific papers or reports either mentioned therein or located independently. Effects noted have been reported at least once for one or more species.

** When used at recommended rates for cattle, has no known impact on *Onthophagus gazella*, *O. taurus*, *Euoniticellus intermedius* and *E. fulvus*. Effects on other dung beetle species have not been fully evaluated.

[^] Refers to the spray formulation only; the pour-on is no longer available.

The trade names under which commonly used active constituents are registered in the same formulations are shown in Table 2.



Table 2. Trade names and active constituents of endectocides and ectocides registered for cattle as pour-on, injectable or spray formulations.

ENDECTOCIDES - Macrocyclic Lactones	
Abamectin	Avomec Antiparasitic Injection, Cattlegard Injectable, Duofin Antiparasitic Injection, Genesis Antiparasitic Cattle Injection, Genesis Pour-On, Paramectin Injection, Paramectin Pour-On, Paramectin RV Pour-On, Rycomectin Antiparasitic Cattle Injection, Vetmec Antiparasitic Cattle Injection, Virbac Virbamec Antiparasitic Injection, Virbamec Pour-On, Virbac Virbamec Pour-On, Virbac Beefmec Pour-On, WSD Abamectin Pour-On Antiparasitic, WSD Abamectin Pour-On Endectocide
Doramectin	Dectomax Injectable Endectocide, Dectomax Pour-On Endectocide
Eprinomectin	Ivomec Eprinex Pour-On for Beef & Dairy Cattle
Ivermectin	Baymec Pour-On, Bomectin Antiparasitic Injection, Cevamec Injection, Coopers Paramax Pour-On, Ecomectin Injection, Ecomectin Cattle Pour-On, Genesis Injection, Genesis Ultra Injection, Genesis Ivermectin Pour-on, Ivermectin Baymec Pour-on, Ivomec Antiparasitic Injection, Ivomec Plus Broad Spectrum Antiparasitic Injection, Ivomec Pour-On, Virbac Virbamax Plus Antiparasitic Injection, Noromectin Injectable, Noromectin Pour-On, Virbac Dairymec Pour-On, Virbac Beefmec Pour-On, Virbamax Plus Antiparasitic Injection, Virbac Virbamax Pour-On, Virbac Virbamec LA Injection, Virbac Virbamec Plus Injection, Virbac Virbamec LV Pour-on, Virbac Ivermectin Pour-On
Moxidectin	Cydectin Injection, Cydectin Pour-On
ECTOCIDES - Synthetic Pyrethroids	
Deltamethrin	Arrest Easy-Dose Pour-On, Arrest Pour-On, Bombard Pour-On, Coopers Easy-Dose Pour-On, Coopers Coopafly Pour-On, Todel Pour-On, Virbac Deltamethrin Pour-On
Cypermethrin	Cypafly Buffalo Fly Spray
Flumethrin	Baytical Cattle Dip & Spray
ECTOCIDES - Organophosphates	
Chlorfenvinphos	Supona Buffalo Fly Insecticide
Diazinon	Nucidal 200 Insecticide & Acaricide, WSD Diazinon for Sheep, Cattle, Goats
ECTOCIDES - SP/OP Combinations	
Cypermethrin + Chlorfenvinphos	Barricade 'S' Cattle Dip & Spray, Coopers Blockade 'S' Cattle Dip & Spray
Deltamethrin + Ethion	Arrest Fly & Tick Dip & Spray for Cattle, Coopers Tixafly Cattle Dip & Spray
ECTOCIDES - Growth Regulators	
Fluazuron	Acatalk Pour-On Tick Development Inhibitor
ECTOCIDES - Amines	
Amitraz	Amitraz EC Cattle & Pig Spray, Coopers Amitik EC Cattle & Pig Spray, Coopers Amitik Cattle Dip & Spray, Taktic WP Cattle Dip & Spray, Taktic EC Acaricidal Spray for Cattle & Pigs, Tickoff WP Cattle Tickicide

Usage, excretion routes and toxic effects of Parasiticides



Macrocyclic Lactones (MLs)

- MLs have the broadest spectrum of activity of all. Avermectins have been used in beef cattle for years against worms and cattle tick, with a bonus of buffalo fly and louse control. Moxidectin is used to treat worms and cattle tick.
- Eprinomectin and moxidectin are now registered for use on dairy cattle.
- Macrocyclic lactones are excreted in the dung of treated animals.
- *Avermectins* exert their most harmful effects in dung for a period of 2 to 3 weeks after treatment.
- If used in accordance with the manufacturer's instructions for the treatment of cattle, *moxidectin* is not known to be harmful to dung beetles.
- Some dung beetle species are more susceptible to *avermectins* than others.

Synthetic Pyrethroids (SPs)

- Once used extensively for cattle tick control, these are now employed mainly against buffalo fly. The fly has developed a high level of resistance to most SPs in some areas.
- Probably all synthetic pyrethroids are excreted in the dung of treated animals, but their toxicities for dung beetles vary. Most SPs tested showed some insecticidal effects.
- Some SPs can cause high mortality in adult beetles for up to a week or more after treatment and thus have considerable potential to affect beetle populations.
- Some dung beetle species are more susceptible to SPs than others.

Organophosphates (OPs)

- OPs can provide effective and economical control of ticks, buffalo flies and lice.
- Two OPs (chlorfenvinphos & diazinon) are also registered for use in both backrubbers and ear tags.
- There are reports of low-level resistance to both chlorfenvinphos and diazinon in buffalo fly.
- A useful strategy for buffalo fly control in southeast Queensland is to fit OP ear tags to cattle in January, which provide control until the

end of the fly season. OP sprays can be used earlier in the season if control is necessary.

- No information is available about possible toxic effects of OPs for dung beetles – *chlorfenvinphos* and *diazinon* are mainly excreted in the urine and thus unlikely to be harmful.

Growth Regulators & Amines

- Used for the control of ticks.
- Inadequate information is currently available about excretion routes of *fluazuron* and *amitraz* and their effects on dung beetles.

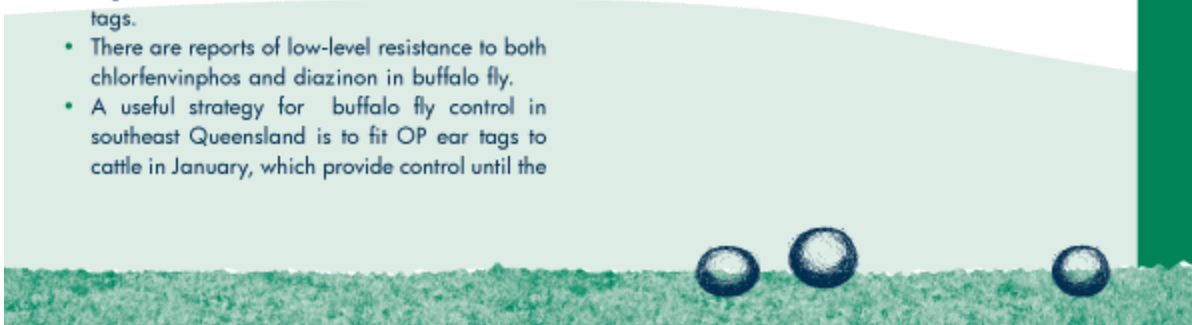
Anthelmintics

- Used for control of gastrointestinal worms and flukes.
- Generally not harmful to beetles. Main excretion route of the drugs or their residues can be via either urine or dung.

Other Chemicals

SP/OP combinations

- These blends were developed largely to control the widespread DDT-resistant cattle ticks exhibiting a low level of cross-resistance to the SPs. These are:
 - cypermethrin plus chlorfenvinphos (in Barricade 'S', Blockade 'S'); and
 - deltamethrin plus ethion (in Tixafly and Arrest Dips & Sprays for Cattle)
- These are commonly used but, because they contain much less SP than products containing the same SPs alone, they may be less harmful to dung beetles than the latter.



Minimising the damage to Dung Beetles



1. Can you change to less toxic chemicals?
Avoid using avermectins and all SP pour-ons or backliners whenever possible during the beetle breeding season. For buffalo fly control alone, consider changing the application method (see 5 below).
2. Timing of treatment is critical.
If possible, don't use potentially harmful chemicals during the season when most dung beetles are active (October to March in most areas), extending to June in southeast Queensland to cater for the future spread of the autumn-active species *Onitis caffer*.
3. Reduce the frequency of treatment.
Ensure the decision to treat with a parasiticide focuses on production and economic benefits. Is it really necessary?
4. Target treatment to specific animals or groups of animals.
Does your whole herd need treatment e.g. do you only need to treat the weaners for worms, or perhaps the bulls for flies?
5. The method of application.
Injectables, pour-ons and plunge dips are thought to deliver the most chemical to the tissues of treated animals. Residues of MLs and SPs are then excreted in the dung. For buffalo fly control, remember that oversprays, backrubbers, dust bags and ear tags result in less chemical contamination of the dung.
6. Use recommended dose rates.
Where research has shown a chemical to be safe for dung beetles, this is based on its use at the recommended dose rate.

Further Information



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National Dung Beetle Website: www.dungbeetle.uwa.edu.au
AgForce Website: www.agforceqld.org.au
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This publication is intended to provide producers with information to enable them to choose pesticides and parasite control strategies to minimise the impact on their dung beetles. The information is not intended to reflect upon the efficacy of any product as a parasiticide. The material is derived from CSIRO Contracted Report #56 by K. G. Worthaugh (2000) : *Parasiticides registered for use in cattle in Australia - an annotated bibliography and literature guide prepared for the National Dung Beetle Planning Forum* and from the scientific literature either mentioned therein or located independently. Trade names for each active constituent and composition of products were checked with the Australian Pesticides & Veterinary Medicines Authority and other sources prior to printing.

This Note is provided for general information only. For application to specific circumstances, professional advice should be sought. While AgForce Queensland and the Qld Dung Beetle Project Management Committee have taken all reasonable steps to ensure accuracy at the time of publication, no warranty is made as to the completeness of the information.

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"Dung today, gone tomorrow"