



Impacts of commonly used anti-parasitic treatment - fluralaner - in companion animal species

on non-target invertebrate populations

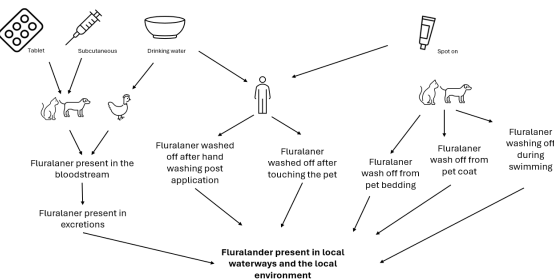
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Introduction

Anti-parasitic drugs used in companion animal species are approved with the understanding that their benefits outweigh their harms. However, there have been unsubstantiated claims by the committee of medical products for veterinary use (CVMP) that fluralaner is excreted relatively unchanged in faeces—90% of the dose is excreted primarily unchanged (CVMP, 2016)—and appears persistent in soil under both aerobic and anaerobic conditions (CVMP, 2017).

With rising pet ownership globally, we are seeing a rise in antiparasitic drug use in companion animal to combat potential zoonotic diseases (Diepens et al., 2023). While agriculture has restricted similar chemicals due to their concerned risks on non-target invertebrates (European Commission, 2019), research on the impact of fluralaner and similar drugs on non-target species remains limited.



Objective:

To assess the environmental transfer of fluralaner, used in companion animals, and its impact on non-target invertebrate populations.

Methods:

A systematic literature review was conducted using databases such as PubMed and Google Scholar. Search terms included “fluralaner AND ecotoxicity” and related topics. Relevant studies on fluralaner environmental impact, toxicity to invertebrates, and excretion pathways were included.

Results:

Fluralaner was found to be highly effective against 28 insect species across 12 orders (figure 1 and table 1), there are unsubstantiated claims of soil persistence (CVMP, 2017) and literature indicating runoff – washing, walking in the rain and swimming- from companion animals could have potential risk to the aquatic environment. (Diepens et al., 2023). This literature review concluded the primary environmental concern is its excretion in animal faeces (CVMP, 2016), but potential contamination from urine, fur and skin was identified as a potential contamination in ecosystems (Perkins et al., 2021).

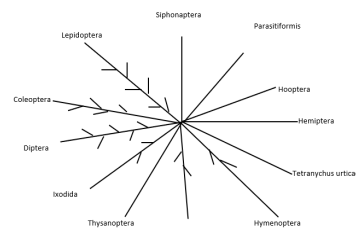


Figure 1: illustrates the species identified in the literature that demonstrate toxicity to fluralaner, categorised by their respective taxonomic orders. Note the number of sub-branches indicates the number of invertebrates affected by fluralaner in that taxonomic group.

SPECIES	LETHALLY	TIME TO DEATH	DOSE
<i>Megalurothrips usitatus</i> (Bean flower thrips) adult females	LC50	24 hrs	0.134mg/ L
<i>Phyllotreta striolata</i> (Striped flea beetle) adults	LC50	24 hrs	0.595mg/L
<i>Henosepilachna vigintioctopunctata</i> (Spotted potato ladybird) second instar larvae	LC50	24hrs	0.098mg/ L
<i>Propylaea japonica</i> (predatory ladybeetle) third instar larvae	LC50	24hrs	1.177mg/L
<i>Plutella xylostella</i> (Black diamond moth)	LC50	48hrs	0.02mg/l
<i>Spodoptera frugiperda</i> (fall armyworm)	LC50	48hrs	0.17mg/ml
<i>Spodoptera exigua</i> (beet armyworm)	LC50	48 hrs	0.12mg/l
<i>Spodoptera litura</i> (Tobacco cutworm)	LC50	48 hrs	0.19mg/ml
<i>Laodelphax striatellus</i> (Small brown planthopper)	LC50	48 hrs	10 mg/l
<i>Tribolium castaneum</i> (Red flour beetle)	LC50	48hrs	131.2mg/ml
<i>Blattella germanica</i> (German Cockroach)	LD50/ LC50	48hrs	26.9ng/insect or 26.9mg/l
<i>Chilo suppressalis</i> (Asiatic rice borer)	LC50	48hrs	3 mg/l
<i>Spodoptera litura</i> (Tobacco cutworm) 3rd instar larvae	LD50/ LC50	48hrs	3.6ng/insect or 88.9mg/l
<i>Blattella germanica</i> (German Cockroach)	LC50	48hrs	8 mg/l
<i>Haematobia irritans</i> (Horn flies)	LD50	48hr	2.86ng/fly
<i>Stomoxys calcitrans</i> (Stable flies)	LD50	48hrs	13.9ng/fly
<i>Apis mellifera</i> . (Honeybee)	LD100	48hrs	0.13µg/ Adult - orally and topically
<i>Solenopsis invicta</i> (Red imported fire ant) Fourth instar larvae	LD50	24hrs	1744.23mg/kg

LC – lethal concentration (chemical applied topically)
LD- Lethal dose (chemical ingested)

Table 1: Integration of known concentrations of fluralaner resulting in a lethal concentration (LC) or lethal dose (LD) for 50% of exposed individuals for 17 species synthesised from published literature. (Shao., et al 2023; Yang et al., 2023; Liu, Z., et al 2021; Burgess et al., 2020; Sheng, C. W. et al. 2017)

Conclusion:

Fluralaner poses a potential threat to non-target invertebrates, with environmental exposure pathways through faecal excretion likely. Further research is needed to assess its full ecological impact and to inform responsible use by animal health care professionals

References

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