# CHOLECALCIFEROL: SECONDARY TOXICITY

## PRODUCT SCOPE

This document discusses secondary toxicity of cholecalciferol (vitamin $D_3$), the active ingredient in Terad$_3$ and Terad$_3$AG.

## SECONDARY TOXICITY

Cholecalciferol rodenticides exert toxicity by elevating blood calcium and phosphorous levels, leading to the formation of deposits in tissues (mineralization), which in turn causes lethal organ damage. Secondary toxicity to rodenticides can occur when an animal ingests another animal that has consumed a poison, and is possible in livestock, pets, and predatory wildlife. The risk of secondary poisoning is affected by many factors, including the sensitivity of the secondary consumer to the active ingredient, the amount/timing of rodenticide ingestion by the primary consumer, and the length of time the rodenticide remains in the rodent tissue.

## LABORATORY STUDIES

Laboratory studies help to estimate the potential for secondary toxicity. These studies involve feeding tissue from poisoned rodents to non-target animals, and the results depend on the dose, species and methodology. The existing studies on cats and dogs demonstrated the potential for secondary toxicity in dogs with high doses of cholecalciferol and repeated exposures:

| NONTARGET ANIMAL | RODENT TREATMENT | EXPOSURE TO NONTARGET ANIMALS | RESULTS |
|---|---|---|---|
| DOG[1] | Rats poisoned with 0.075% cholecalciferol baits (choice feeding) | Beagles fed poisoned rats exclusively for 14 days | • No toxicity |
| DOG[2] | Possums fed 0.8% cholecalciferol baits and killed after 2 days (“acute”) or died after 5-7 days (“chronic”) | Dogs fed variable number of “acute” or “chronic” possums | • No toxicity in dogs fed 1-2 carcasses<br>• Reversible, non-lethal toxicity in dogs fed 5 “acute” carcasses<br>• Reversible, non-lethal toxicity in dogs fed 5 “chronic” carcasses |
| CAT[2] | Possums poisoned with 0.8% cholecalciferol baits | Cats fed poisoned rats exclusively for 5 days | • No toxicity<br>• Slightly increased blood calcium |

Secondary poisoning is a concern in predatory and scavenging birds that consume rodents. Primary toxicity of cholecalciferol in birds varies considerably with species.[2] In a small secondary poisoning study, no toxicity was observed in two turkey vultures and a red-tailed hawk fed rats that consumed 0.075% cholecalciferol bait.[3]

## PREVENTION

As of 2017, to the best of our knowledge, there have been no reported cases of secondary poisoning from cholecalciferol rodenticides. However, rodenticide labels contain standard warning language to alert the user to the potential for unknown secondary toxicity risks. Pest control operators can reduce the risk for secondary poisoning in nontarget animals by employing least hazardous methods and adhering to the label restrictions when using rodenticides. Homeowners can reduce the potential risk for secondary poisoning to pets by consistently removing dead rodents from their property,

[1]Marshall, EF 1984. Cholecalciferol: A unique toxicant for rodent control. *Proceedings of the Eleventh Vertebrate Pest Conference*, Paper 22.

[2]Eason CT, Wickstrom M, Henderson R, Milne L, Arthur D. 2000. Non-target and secondary poisoning risk associated with cholecalciferol. *New Zealand Plant Protection Conference* 53: 299–304.

[3]Marsh, RE and AE. 1991. Potential secondary hazards of cholecalciferol. (Unpublished report cited in Erickson, W and Urban, D. 2004. Potential risks of nine rodenticides to birds and nontarget mammals: a comparative approach. USEPA).

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