

# Baiting practices for bats' benefit: do bait stations prevent short-tailed bat exposure to anticoagulant rodenticides?

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Toxic baiting to control introduced mammals is essential for wildlife conservation in New Zealand, but also involves risks to non-target species, including the short-tailed bat (*Mystacina tuberculata*). In 2009, 115 short-tailed bats were found dead during a rodent control operation in Pureora Forest Park. During the operation cereal paste baits were delivered in biodegradable bags nailed to tree trunks. Post-mortem examination of the bats confirmed they were poisoned with the anticoagulant rodenticide diphacinone. To determine the route of exposure of the bats to diphacinone, we used infra-red cameras to record whether bats consumed similar non-toxic bait in captive and wild settings, and to record whether bait was consumed in the wild by arthropods known to be prey items for the bats. Our results suggest that the bats are more at risk of poisoning through secondary ingestion of toxicants in contaminated arthropod prey than through direct ingestion of toxic bait. Adjustments were made to bait presentation and delivery in 2012/13, with pelletized cereal baits delivered in bait stations. These adjustments did not completely prevent exposure of wild bats, as revealed by detection of diphacinone in guano, but there were no obvious mortalities. To determine the effect of this level of exposure on wild bats we assessed population survival and physiological measures of fitness in individuals in 2013/14, before, during and after a rodent control operation, again using diphacinone-laced pellets in bait stations. Our results suggest that bat exposure to diphacinone was sub-clinical. However, while the pathway of secondary poisoning remains intact we propose that the risk of adverse effects on bats could vary annually and by site, depending on the abundance of certain arthropod populations. We recommend further review of baiting practices and associated survival monitoring of short-tailed bat populations.