

COMPLETED PROJECT REPORT

Project Title: Nontarget hazards to ring-necked pheasants and California quail from broadcasting a 2% zinc phosphide oat groats bait for control of gray-tailed voles in alfalfa

Research Agency: National Wildlife Research Center

Principal Investigator: C. Ramey

Budget: \$160,500

Background:

Zinc phosphide was being considered for reregistration by the U.S. Environmental Protection Agency (EPA). In anticipation of EPA's reregistration requirements, the California Department of Food & Agriculture sought efficacy and nontarget data for their label titled "Rodent bait zinc phosphide treated grain (2.0%)

Objectives:

To determine the potential nontarget hazards to ring-necked pheasants and California quail when using 2.0% zinc phosphide treated grain in alfalfa to control gray-tailed voles.

Summary:

Zinc phosphide is an acute rodenticide, and its mode of action is attributed to the release of phosphine gas (PH_3) during hydrolysis in the gastrointestinal tract of poisoned animals. Death typically results from cessation of respiration. Of the nontarget avian species tested, waterfowl and gallinaceous birds are the most sensitive to this toxicant. An investigation was conducted by the Denver Wildlife Research Center (NWRC) at Oregon State University's (OSU) Hyslop Farm to determine the potential nontarget hazards to ring-necked pheasants (*Phasianus colchicus*) and California Quail (*Callipepla californica*) when using a California rodenticide titled "Rodent Bait Zinc Phosphide Treated Grain (2 %)" (Reg. No. CA890027). The simulated field study was undertaken in 12 0.2-ha (0.5-ac) enclosures separated by 1m metal walls that were planted in alfalfa (*Medicago sativa*). The research was performed in cooperation with staff from the OSU Department of Fisheries and Wildlife. Efficacy data from broadcast baiting using 2% zinc phosphide steam-rolled-oat (SRO) groats for control (e.g. > 94% mortality) of gray-tailed voles (*Microtus canicaudus*) was obtained for the California Department of Food and Agriculture (CDFA) (sponsors). Voles were introduced and established within each enclosure (23 or 24) prior to baiting. Similarly, pen raised pheasants (52) and quail (51) were randomly assigned, controlling for weight, to either pheasant or quail enclosures, with 8 or 9 birds per enclosure. All birds were wing-clipped and provided water and game bird flight conditioner as an alternative food. Following an acclimation and pre-baiting period of 7 days, 0 % zinc phosphide (control)

or 2 % zinc phosphide bait was randomly applied on September 30, 1993 to 6 enclosures assigned to each bird species (e.g. 3 enclosures were baited with either 0 % zinc phosphide or 2 % zinc phosphide). Twenty four pheasants and 24 quail were also equipped for radio telemetry and their locations and movements were monitored twice daily, morning and late afternoon. Zinc phosphide deaths were confirmed by necropsy and the number of treated SRO groats eaten by each bird was determined. Recaptured surviving birds were euthanized and also examined for baits. Zinc phosphide mortality, supported by necropsy results, was associated with 62 % (16/26) of the baited pheasants and none (0/26) of the baited quail. Analysis of the survival ratios between 0 % zinc phosphide baited and 2 % zinc phosphide baited birds was significantly different ($p < .01$) for pheasants, indicating the nontarget hazard to ring-necked pheasants was significant, but not to quail. In addition, 2 pheasants from control enclosures escaped to 2% Zinc phosphide baited enclosures and died. The resulting 18 zinc phosphide poisoned pheasants had an average of 180 (SD+/- 93) zinc phosphide SRO groats in their crops. At the completion of the study, control pheasants and quail showed no evidence of consuming the 0 % zinc phosphide bait, and surviving pheasants and quail from 2 % zinc phosphide baited enclosures did not have SRO groats in their crops. Mortality associated with other factors [predators (6 %, accidents and sickness (4 %), and escapes (3 %)] was not significantly different between avian species, baited groups, or presence of radio collars. Eight birds (~ 8 %, 8/103) were missing at the completion of the study. The occurrence of all but one zinc phosphide death (17/18) within 24 hours of exposure was highly significant ($p < .00001$) versus mortality observed pre-baiting and > 1 day post-baiting. Sublethal toxic effects of zinc phosphide were observed in 2 pheasants. Postulated attributes of the efficacious bait (>94 % mortality for voles) that may have decreased nontarget exposure and environmental risks (particularly to quail) are discussed. Nontarget hazards to other wildlife were limited to one suspected death of a Savannah sparrow. Plans to assess the potential hazard of zinc phosphide to wild, free-ranging pheasants following a typical vole control program in alfalfa are underway.

Last Updated: