STUDY TITLE:

Field Efficacy Studies Comparing 0.005% and 0.01% Diphacinone and Chlorophacinone Baits for Controlling California Ground Squirrels *(Spermophilus beecheyi)*

PROJECT LEADER:

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EXECUTIVE SUMMARY

The U.S. Environmental Protection Agency (EPA) has stipulated in the Rodenticide Cluster Reregistration Eligibility Decision (RED) document that above ground uses of anticoagulant rodenticides containing greater than 0.005% of either chlorophacinone or diphacinone are ineligible for reregistration because of concerns over potential risks to non-target species. The California Department of Food and Agriculture (CDFA) supports all efforts to enhance the safety of its products, however, there are significant questions about the effect of this change on product efficacy, as well as the overall impact such a reduction would have on the potential secondary hazards when using these materials. The primary objective of this study is to determine the field efficacy of 2 rodent bait treated grains (chlorophacinone and diphacinone), each at 2 different strengths (0.005% and 0.01% a.i.), when applied by 2 different techniques (spot baiting and broadcast baiting) to control the California ground squirrel *(Spermophilus beecheyi)*. A secondary objective of the study is to generate data useful for assessing and comparing the potential primary and secondary hazards associated with application of the different products.

We selected 4 study areas Sites 1 and 2 were near Bakersfield in Kem County, and Sites 3 and 4 were near King City in Monterey County. We established 9 treatment plots and 2 control plots per site for a total of 44 plots. We used 2 methods to index ground squirrel population levels on each plot, visual counts and active burrow counts. We conducted bait acceptance tests with clean grain prior to baiting. The test materials (baits), prepared by the Fresno County and the Kings County Agriculture Commissioners, consisted of the anticoagulants chlorophacinone and diphacinone, each formulated at 0.005% and 0.01% active ingredient. We applied 11 treatments at each site, applying the bait or clean grain 2 times on each plot either by spot baiting and broadcast baiting. We systematically searched each plot for 12 days to recover dead target and non-target species. On Site 1 staff from the National Wildlife Research Center (NWRC) searched ground squirrel burrows using a video burrow probe device. Carcasses found during plot searches or recovered from burrows were sent to the NWRC lab in Colorado for residue analyses. We used TrailMaster cameras and a video surveillance system to identify species scavenging ground squirrel carcasses. We collected samples of all baits applied on the plots for analysis of active ingredient at the CDFA lab and the University of California lab.

We observed excessive declines in the numbers of ground squirrels on the control plots of Site 1, making the data from this site unreliable for assessing efficacy. Thus, all data from Site 1 were excluded from efficacy analyses. Based on ground squirrel counts, treatments exceeded the EPA 70% minimum efficacy requirement on 8 of 9 plots on Site 2, 9 of 9 plots on Site 3, and 7 of 9 plots on Site 4. There were significant decreases in ground squirrel numbers from the pre- to post-treatment periods resulting from the rodenticide treatments. We conclude there are no large differences in efficacy between chlorophacinone and diphacinone or spot or broadcast baiting. However, results from this study and previous field trials suggest the 0.01% baits outperform the 0.005% baits.

Overall we recovered 236 ground squirrel carcasses and 15 non-target carcasses, mostly kangaroo rats *(Dipodomys* spp.). An additional 23 ground squirrel carcasses were retrieved from burrows by NWRC personnel. Residue analyses of the carcasses have not yet been completed by NWRC. A complete evaluation of secondary hazards cannot be made until the residue results are available. From carcass monitoring we determined that 44 of 104 carcasses placed on the plots were taken or consumed by scavengers. We identified 4 species feeding on carcasses including common ravens *(Corvus corax),* turkey vultures *(Cathartes aura),* ground squirrels, and wild pigs *(Sus scrofa).*

Comparison between the analyses from UCD and CDFA for bait strength were generally in agreement. Only 1 of 16 lots was outside the acceptable deviation from the claimed bait strength. This lot was 0.0001% below the acceptable range so close that it would not affect results.

Issues of concern are addressed including estivation, overlapping buffer zones, carcass recovery on control plots, and bait weathering. Hot weather may have triggered estivation or a torpor in some squirrels at Sites 1 and 2 in Bakersfield. We did not observe squirrels traveling between plots and conclude the slightly overlapping buffers

on Sites 1 and 2 had no significant effect. One or more dead squirrels were found on 5 of 8 control plots. Without residue analyses, we cannot confirm whether these deaths resulted from the anticoagulant treatments. Due to significant depredation of the bait weathering samples by insects and rodents, little useful data was obtained on changes in bait strength over time.

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