IPM for Controlling Rodents
Control in Hay and Pasture

Glenn Shewmaker
and Danielle Gunn
POPULATION CONTROL

• Develop an integrated approach based on knowledge of:
  – the animal's ecology and behavior
  – information on all available control techniques.

• Using an integrated pest management (IPM) program will result in an environmentally and economically acceptable approach that will significantly reduce damage to alfalfa crops.
Thresholds

- Threshold levels for rodents and other vertebrate pests in alfalfa are not generally established.
- Experiences of growers give us some ideas about when and if control measures should be taken.
MEADOW VOLES
*Microtus pennsylvanicus* most common

- *Damage alfalfa and grasses by feeding on roots and stems.*
- They are small rodents with heavy bodies, short legs and tails, and small, rounded ears. Their coarse fur is blackish brown to grayish brown in color.
- When full grown, they are 4 to 5 inches long.
MEADOW VOLES

- Active all year
- Normally found in areas with dense ground cover.
- They dig short, shallow burrows and make underground nests of grass, stems, and leaves.
Meadow Vole Control

• Remove or reduce the vegetative cover
• Initiate a program of habitat modification and/or population reduction before their numbers explode
Trapping

- In a small area, trapping may be effective
  - The simple, wooden mousetrap is used. Bait with peanut butter, oatmeal, or apple slices
  - Often, no bait is needed because voles will trigger the trap as they pass over it. Voles seldom stray from their usual travel routes.
  - Place traps at right angles to and flush with the ground in these runways.
Trapping

• A trap line of 50-100 traps should be used.
• Examine traps daily.
• Remove and bury dead voles.
• Do not handle dead voles without gloves.
• Restrictions on trapping animals in Washington!
Toxic Baits

When meadow voles are numerous or when damage occurs over large areas:

• Take care to ensure the safety of children, pets, and non-target animals.
• Do this by following product label instructions carefully.
Idaho Pesticide Product Registrations

http://ww.kellysolutions.com/ID

• For information on endangered species:
  www.epa.gov/oppfead1/endanger/bulletins.htm
Product Name: PROZAP ZINC PHOSPHIDE OAT BAITS
EPA Registration No.: 61282-14
Idaho Registration No.: 18824

Expiration Date: 12/31/2017
Registration Status Date: 1/1/2017
Registration Status: Approved
Company Name and Reg. No.: HACCO INC [61282]
Formulation: Granular
Pesticide Type: Poison, Multiple Dose

Click here to show Active Ingredients in this Product.

Click here to show the Pests Controlled by this Product.

Click here to show the Sites to which this Product may be Applied.

Click here to view the EPA Stamped Labels for the selected product (external link to EPA.gov website).

If you find erroneous data, please e-mail the department at ben.miller@ISDA.IDAHO.gov. We will respond to all inquiries as soon as possible.

ALWAYS READ AND FOLLOW THE PESTICIDE LABEL DIRECTIONS

Database Last Updated: 10/29/2017
PROZAP® ZINC
PHOSPHIDE OAT BAIT

Endangered Species Considerations

- **Whooping Crane (Grus americana)**
  - Do not use this product in habitats occupied or occasionally visited by whooping cranes during the period from 30 days before the expected arrival of cranes to 30 days after the time of their usual departure.

- **Black-footed Ferret (Mustela nigripes)**
  - Do not use this product within 7 kilometers (4.34 miles) of any prairie dog town to limit risks to the black-footed ferret from exposure to Zinc Phosphide or destruction of its prey base, unless . . . . .
Endangered Species Considerations

• Gray Wolf (*Canis lupus*) and Grizzly Bear (*Ursus actos horribilus*)
  - Unless the local U.S. Fish and Wildlife Service office has determined that there are no gray wolves or grizzly bears in the general vicinity of bait applications in Montana and Wyoming, do not apply this product outdoors within occupied habitat of these species.

• Northern Idaho Ground Squirrel (*Spermophilus brunneus brunneus*)
  - Do not use this product within 0.5 miles in critical habitat of the Northern Idaho Ground Squirrel in Adams and Valley counties, Idaho.
**PROZAP® ZINC PHOSPHIDE OAT BAIT**

- **VOLES in Alfalfa**
- **USE RESTRICTIONS**: For control of meadow voles, long-tailed voles, California voles, Oregon voles, mountain voles and Townsend’s voles (*Microtus spp.*) in alfalfa. All applications must occur shortly after a cutting of the hay, and/or prior to the next growth’s attaining a length of 2 inches. Alfalfa forage from treated areas must not be harvested until it reaches maturity.
- This use is restricted to Montana, California, Idaho, Oregon, and Washington.

Prozap® Zinc Phosphide Oat Bait
Page 12 of 17
April 20th, 2015
**PROZAP® ZINC PHOSPHIDE OAT BAIT**

- **VOLES in Alfalfa**
- **BROADCAST BAITING**: This product may be broadcast by air or ground-driven dispensing devices.
- Apply at a rate of up to 10 lbs. per acre (0.2 lb. ai/A).
- For voles, make two applications per year separated by a minimum interval of 25 days.
- A maximum of 20 lbs per acre (0.4 lb ai/A) may be applied per year.
- Do not apply by air when wind velocity exceeds 10 mph. Do not apply in piles or permit piles to be formed by equipment.

Prozap® Zinc Phosphide Oat Bait
Page 12 of 17
April 20th, 2015
**VOLES in Timothy and Timothy / Alfalfa Mixtures For Hay:**

- Do not apply by air. Do not apply to actively growing timothy or timothy/alfalfa mixtures. This use is restricted to California, Idaho, Oregon and Washington.
- Do not apply to timothy or timothy/alfalfa mixtures within 60 days of harvest.

**BROADCAST BAITING:** Broadcast bait using by hand, cyclone seeder, or ground-driven dispensing devices. A maximum of 2 applications by ground may be made at the rate of 5 to 10 lbs. per acre (0.1-0.2 lb ai/A), one in the fall after the last cutting and one in the spring when timothy and timothy-legume mixtures are still dormant. Do not apply in piles or permit piles to be formed by equipment. A maximum of 20 lbs (0.4 lb ai/A) per acre may be applied annually.

Prozap® Zinc Phosphide Oat Bait
Zinc Phosphide Cautions

• **DO NOT GET IT WET!**
  – Moisture activates the chemical, rendering it ineffective very quickly.
• **Not many crops are labeled**—mostly non-crop land, ditch banks, pastures, and orchards.
• Alfalfa, barley, beans, timothy sugar beets, and wheat are labeled for bait applications.
FOLLOW-UP:

• Using waterproof gloves, collect and properly dispose of all dead animals and excess bait properly in accordance with “Pesticide Disposal” instructions.

• Use detergent and hot water to wash spoons for application into burrows.

• Do not use spoon for mixing, holding or transferring food or feed.

• To discourage re-infestation, limit sources of rodent food, water, and harborage as much as possible.
USES ASSOCIATED WITH AGRICULTURAL SITES

Use Restrictions for all Agricultural Sites

- Do not apply this product in a way that will contact workers or other persons, either directly or through drift.
- Only protected handlers may be in the area during application.
- Keep all other persons out of the treated area during this application.
- Do not apply on roads, near residential areas, or over water.
- Do not broadcast over crops unless use directions specifically permit aerial application.
- Apply bait on warm clear days.
Zinc phosphide

• Should not be used in the same field more than once in a 6 month period.
• Rapid acting. You may find dead voles within 12 hours of baiting.
• When practical (e.g. dead voles in the open such as along roads), dispose of dead voles by burying.
Non-target Effects of Zinc Phosphide

• Does not accumulate in the tissue of voles
• Predators or scavengers (dogs and cats) are not likely to be affected by eating the poisoned rodents.
• However, children, as well as pets, birds, and other animals, can be affected by the bait,
• So store it out of reach and use it carefully in a way that will minimize their access to it.
• Zinc phosphide is a Restricted Use Material.
Multiple-feeding baits

- Anticoagulant baits are registered for meadow vole control but not for use in alfalfa crops.
- Use in areas adjacent to the alfalfa field or during crop dormancy or where contact with the alfalfa plant will not occur.
Multiple-feeding baits

• Slow acting and must be consumed over a period of days to be effective.
• Whole grain baits are commonly recommended,
• but pelleted baits are also available.
• Moisture-resistant paraffin block baits are useful around ditches and other areas where high moisture may cause other types of baits to spoil.
Multiple-feeding baits

• Because voles must feed on anticoagulant baits over a period of days, the bait must be available until the population is controlled.
• Bait placement is very important.
• Place it in runways or next to burrows so voles will find it during their normal travel.
Multiple-feeding baits

• Anticoagulants were registered for in-crop use in 2011 with a 24-C application to Idaho Dept. of Ag.
Multiple-feeding baits

- Some anticoagulant paraffin bait blocks are registered for voles.

- Bait blocks should not be used where children or pets might pick them up.
Bait Station

Materials Needed:
3 - 2” PVC pipe cut to 8” lengths
3 - 2” PVC pipe end caps (two partially cut, see diagram)
1 - 2” T-connection for PVC pipe
1 - 12” metal stake (rebar works)
1 - Hose clamp
PVC Pipe prep and cement
¼ sheet of plywood or smaller

Instructions:
Assemble all of the pieces as seen in the diagram below, making sure that you cement all of the pipes to the T-connection and the two partially cut end caps. Do not cement the end cap that will be used to fill the bait station. Drill or cut a hole larger than 2” in the middle of the plywood. The hole must accommodate the PVC pipe and the stake.

Place the bait station in a vole runway and secure to the ground using the stake and hose clamp. Place the plywood over the bait station making sure that the tube and stake fit through the hole. Fill the feed tube with bait and place end cap on top. Place weight such as bricks on top of the plywood to make sure larger animals cannot get access to the bait.

Leave at least ¼ inch lip on the end cap - this will prevent the bait from spilling out of the bait tube.

Diagrams by Sherman Takatori
Note: Place heavy object (bricks, weights) on top of the plywood to prevent larger animals (dogs, foxes, etc.) from disturbing the bait station.
Pocket Gophers

*Thomomys* species, are burrowing rodents that get their name from the fur-lined, external cheek pouches, or pockets, they use for carrying food and nesting materials.
Pocket Gophers

• Well equipped for digging.
• Seldom seen.
• Crescent-shaped mounds.

Photo Credits: Dallas Virchow
Pocket Gophers

• For the most part, gophers remain underground in their burrow system, although you’ll sometimes see them feeding at the edge of an open burrow, pushing dirt out of a burrow, or moving to a new area.
• Gophers form **mounds** as they dig tunnels and push the loose dirt to the surface.
• Typically mounds are crescent or horseshoe shaped when viewed from above.
BIOLOGY AND BEHAVIOR

• Burrow system can cover 200 to 2,000 ft$^2$
• 2.5 to 3.5 inches in diameter.
• Feeding burrows are 6 to 12 inches below ground, and the nest and food storage chamber can be as deep as 6 feet.
Probing for Burrows

- Locate areas of recent gopher activity based on fresh mounds of dark, moist soil.

- Fresh mounds that are visible aboveground are the plugged openings of lateral tunnels.

- Find the main burrow by probing about 8 to 12 inches from the plug side of the mound; it usually is located 6 to 12 inches deep.

http://elkhorn.unl.edu/epublic/pages/publicationD.jsp?publicationId=72
Probing for Burrows

• When the probe penetrates the gopher’s burrow, there will be a sudden, noticeable drop of about 2 inches.
• The gopher might not revisit lateral tunnels, trapping and baiting them is not as successful as in the main burrow.
Bait Options

- **Strychnine**
  - Harsh on Primary/Secondary
  - **NO above ground use**

- **Anticoagulants**
  - Slower Acting, Thorough

- **Zinc Phosphide**
  - Fast Acting, Gases off in contact with moisture, Bird toxicity issues
Trapping

• Safe and effective method for controlling pocket gophers.
• A popular type is the choker-style box trap.
Setting Traps

• Locate the main tunnel with a probe, as described above.
• Use a shovel to open the tunnel wide enough to set traps in pairs facing opposite directions.
• Placing traps with their openings facing in opposite directions means you will be able to intercept a gopher coming from either end of the burrow.
• 20 to 60 % success depending on trap
 Trap Types

- Cinch
- Macabees
- Blackhole

Harvest Efficiency

University of Idaho Extension
Baiting with Toxic Baits

• Always place pocket gopher bait in the main underground tunnel, not the lateral tunnels.

• After locating the main gopher tunnel with a probe, enlarge the opening by rotating the probe or inserting a larger rod or stick.

• Following label directions, place the bait carefully in the opening using a spoon or other suitable implement that you use only for that purpose, taking care not to spill any onto the ground.
Strychnine Hand Bait

• Good control for:
  – Small outbreaks
  – Garden areas
**GOPHER BAIT 50**

**STRYCHNINE TREATED GRAIN BAIT • FOR USE IN SUB-SOIL ONLY**

EPA Reg. No. 53883-23    EPA Est. No. 53883-TX-002

**KEEP OUT OF REACH OF CHILDREN**

**DANGER**

See back panel for additional Precautionary Statements.

**POISON**

**ACTIVE INGREDIENT:**
Strychnine Alkaloid .................................. 0.50%

**INERT INGREDIENTS:** ................................ 99.50%

**TOTAL: ........................................... 100.00%**

**FIRST AID**

**IF SWALLOWED:**
- Call physician or poison control center immediately.
- If less than ten (10) minutes have passed since poison was taken, give 1 or 2 glasses of water and induce vomiting by touching back of throat with finger. Repeat until vomit fluid is clear.
- Have patient lie down in quiet, darkened room and keep warm and quiet.
- If person is unconscious, do not give anything by mouth and do not induce vomiting.

**IF INHALED:**
- Remove victim to fresh air.
- If not breathing, give artificial respiration.
- Get medical attention.

**IF IN EYES:**
- Hold eyelids open and flush with steady, gentle stream of water for 15 minutes.
- Get medical attention.

**IF ON SKIN:**
- Wash with plenty of soap and water.
- Get medical attention.

**NOTE TO PHYSICIAN:** (A) Administer 100% oxygen by positive pressure to provide as much pulmonary gas exchange as possible, despite seizures. (B) Administer ANTICONVULSANT DRUGS intravenously to control convulsions. **NOTICE:** It may be difficult or impossible to stop the seizure activity without stopping respiration. Be prepared to maintain pulmonary ventilation mechanically. Tracheotomy may be necessary if seizures are prolonged.
Pesticide Product Registration Program

Idaho Pesticide Registration information can be searched on the Kelly website at:

http://www.kellysolutions.com/ID/

For information on Endangered Species County Bulletins, go to:

http://www.epa.gov/oppead1/endanger/bulletins.htm

If you wish to register a product in Idaho, please submit your applications in the following manner:

1. Complete and **sign** the first page of the application. The registration fee of $160.00 per product **must** accompany the application.

   - Pesticide Product Registration Application (pdf)

2. **NEW PRODUCT REGISTRATIONS**
   Please submit a complete product name and EPA registration number, as it appears on the label.

3. For each new product, you **must** include one copy of your current label and Proof of Federal Registration, if applicable. Such proof can be an EPA stamped label or a letter of acceptance.

Incomplete registration requests **may be returned**. Upon approval of your application, an Idaho Certificate of Registration will be returned to you. If you have specific questions about your application, please contact:
Toxins

- Strychnine-treated grain is the most common type of bait used for pocket gopher control.
- This bait generally contains 0.5% strychnine and is lethal with a single feeding.
- Baits containing 2.0% zinc phosphide are also available.
- As with strychnine, these baits are lethal after a single feeding.
PROZAP® ZINC PHOSPHIDE OAT BAIT
ALFALFA, LAWNS, GOLF COURSES,
OTHER NONCROP AREAS

USE RESTRICTIONS:
For control of the following pocket gophers: Plains (Geomys bursarius), . . . , and Thomomys spp, in subterranean applications only.
ZP AG OATS

ALFALFA

USE RESTRICTIONS:
For control of meadow voles, long-tailed voles, California voles, Oregon voles, mountain voles and Townsend’s voles (*Microtus spp.*) and Richardson’s ground squirrels (*Spermophilus richardsonii*) in alfalfa. All applications must occur shortly after a cutting of the hay, and/or prior to the next growth’s attaining a length of 2 inches. Alfalfa forage from treated areas must not be harvested until it reaches maturity. This use is restricted to Montana, California, Idaho, Oregon, and the state of Washington.
ALFALFA
PREBAITING: When bait is to be used to control Richardson’s ground squirrels, prebaiting with untreated steamed crimped oats at a rate of 6 lbs. per acre 2-3 days before ZP AG OATS is applied is likely to enhance acceptance of the toxic bait.
Multiple feeding anticoagulants

• You’ll need to set out a large amount of bait—about 10 times the amount needed when using strychnine baits—so enough will be available for multiple feedings.

• Although generally less effective than strychnine baits, anticoagulant baits are less toxic.
• After placing the bait in the main tunnel, close the probe hole with sod, rocks, or some other material that excludes light while preventing dirt from falling on the bait.
• Several bait placements within a burrow system will increase success.
• Tamp down or clear existing mounds, so you can distinguish new activity.
Improperly formed burrow
The Correct Operation of BB
Rozol® Pocket Gopher Bait – Burrow Builder Formula

• Restricted-Use Product.
• **Now Approved for use on Alfalfa!**
• Approved for use in the states of: AR, CA, CO, ID, KS, MT, NE, NV, NM, ND, OK, OR, SD, TX, UT, WA, WI, WY
• EPA Reg. No. 7173-244
Rozol® Pocket Gopher Bait – Burrow Builder Formula

- Apply when soil conditions allow formation of good artificial burrows.
- Make artificial burrows at the same depth as natural burrows, perpendicular and about 20-30 ft. apart.
- Apply at 6-8 lbs. per acre, picking up any spilled bait. See entire label.
Rodenator

- Rodent Pest Control
  - Killing Rodents @ Rodenator
- http://www.rodenator.com
Explosive Method

- Oxygen and acetylene
PERC

• Pressurized Exhaust Rodent Controller systems available from H & M Gopher Control

Words of Caution

• ALWAYS read and follow the instructions printed on the pesticide label.
• The pestcide recommendations in this UI presentation do not substitute for instructions on the label.
• Pesticide laws and labels change frequently and may have changed since this publication was written.
Words of Caution

• Some pesticides may have been withdrawn or had certain uses prohibited. Use pesticides with care.
• Do not use a pesticide unless the specific plant, animal, or other application site is specifically listed on the label.
• Store pesticides in their original containers and keep them out of the reach of children, pets, and livestock.
Words of Caution

• Trade Names--To simplify information, trade names have been used.
• No endorsement of named products is intended nor is criticism implied of similar products not mentioned.
• Groundwater--To protect groundwater, when there is a choice of pesticides, the applicator should use the product least likely to leach.
Meadow voles and pocket gophers cause significant damage to range-land, alfalfa, pastures, and other agricultural crops. Combined or alone, forage losses from gophers and/or voles have been estimated at 10 to 50 percent in pastures and alfalfa. These rodents also cause significant damage in orchards, nurseries, turf farms, ornamental flower plantings, landscapes, lawns, and vegetable gardens.

Both voles and gophers damage plants by eating roots, trunks, stems, tubers, and leaves. Their tunneling habits also cause damage. Large mounds of soil left by rodents, particularly gophers, can dull knives and discs on harvesting equipment. Soil from mounds also contaminates hay bales. Underground rodent burrows and tunnels interfere with irrigation practices and equipment. The burrowing and mounding capabilities of gophers encourage weed invasion through ground disturbance and can cause injury to people, horses, and livestock that step into holes.

Although voles reproduce more rapidly than gophers, both have remarkable reproductive capacity. Population surges can occur frequently when adequate forage and habitat are available.

Voles and gophers are considered non-game mammals in most states and can be legally managed on private property and public lands. Check with your state wildlife agency or department of agriculture regarding legal control methods in your area. Management options depend on the pest, the situation, cost limitations, and equipment and labor availability. It is important to understand the target pest’s biology and habits before implementing management strategies.

Figure 1: Vole (meadow mouse). Photo by Danielle Gunn.

Vole biology

Several species of voles exist in the Pacific Northwest, and it can be difficult to distinguish among them. The meadow vole, or meadow mouse (Microtus pennsylvanicus), is the most common species in pastures, rangelands, crops, and lawns. Meadow voles are heavy-bodied, small rodents with short legs and tails; small, rounded ears; and coarse, blackish to grayish brown fur with black-tipped hairs and bicolored tails. When fully grown, voles generally average 4 1/2 to 5 1/2 inches long, including the tail (Figures 1 and 2). Under good weather and feeding conditions, voles can reach 7 1/2 inches in length.

Figure 2: Vole (meadow mouse). Photo by Danielle Gunn.