



# RPM

RODENT  
PEST  
MANAGEMENT



THE WORLD LEADER IN RODENT  
CONTROL TECHNOLOGY®



# RPM

## RODENT PEST MANAGEMENT

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# RODENT IDENTIFICATION



# PHYSICAL ATTRIBUTES



**NORWAY RAT**

*Rattus norvegicus*



**ROOF RAT**

*Rattus rattus*



**HOUSE MOUSE**

*Mus musculus*



**MEADOW VOLE**

*Microtus pennsylvanicus*



**DEER MOUSE**

*Peromyscus maniculatus*



WEIGHT

10 – 17 oz.

Norway rats can be twice the size of Roof rats

5 – 9 oz.

0.75 oz.

1 – 2 oz.

Meadow voles can be twice the size of house mice and deer mice

0.5 – 1 oz.



APPEARANCE

Reddish-brown fur, blunt nose, small eyes & ears, thick body

Pointy nose, large eyes & ears, tail longer than body

Pointy nose, large eyes & ears

Stocky round shape, short tail & ears, blunt nose

Large black eyes, white feet, brownish-black-and-white belly



LENGTH

12-18” including tail

13-17” including tail  
(7-10” for head & body)

6-7” including tail

6” including tail

4-9” including tail

- All rats have 4 digits on each front paw and 5 on each back paw



# DROPPINGS



## NORWAY RAT

*Rattus norvegicus*

3/4" long

Various sizes  
Blunt ends



## ROOF RAT

*Rattus rattus*

1/2" long

Pointed ends



## HOUSE MOUSE

*Mus musculus*

1/8"-1/4" long

Pointed ends  
Contains hair



## MEADOW VOLE

*Microtus pennsylvanicus*

Elongated 1/8"-1/4" long

Pointed ends  
Contains hair



## DEER MOUSE

*Peromyscus maniculatus*

1/8"-1/4" long

Pointed ends  
Contains hair

50-75 per day













\*Dropping images actual size





# NON-TARGET DROPPINGS



	<b>BAT</b>		1/3"- 1" long
	<b>RABBIT</b>		1/2" diameter
	<b>SQUIRREL</b>		3/8" long
	<b>LIZARD</b>		1/8" long
	<b>COCKROACH</b>		1/25" long

\*Actual Size



BAT



RABBIT



SQUIRREL



LIZARD



COCKROACH

# NAME THAT SPECIES

Smaller Ears

Blunt Nose



A

Larger Ears

Pointy Nose



B

A: Norway Rat B: Roof Rat



# BIOLOGY

## NORWAY RAT

*Rattus norvegicus*



### SEXUAL MATURITY

2-3 Months



### GESTATION PERIOD

23 Days



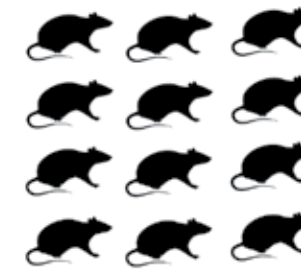
### LIFESPAN

9-18 Months

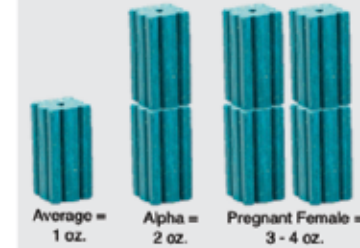


### OFFSPRING PER LITTER

6 - 12 Offspring



### FOOD CONSUMPTION



\* Images of blocks are not intended to represent toxicant treated bait.

### WATER CONSUMPTION

1 oz.



## ROOF RAT

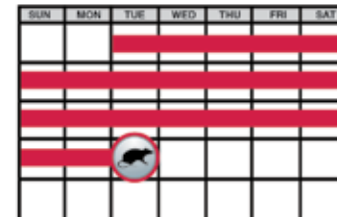
*Rattus rattus*



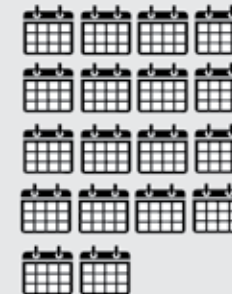
2-3 Months



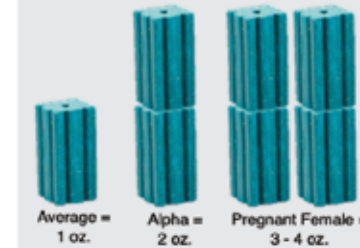
22 Days



18 Months



6 - 8 Offspring



\* Images of blocks are not intended to represent toxicant treated bait.

1 oz.

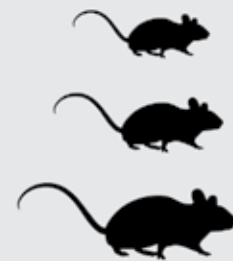


## HOUSE MOUSE

*Mus musculus*



4-6 Weeks



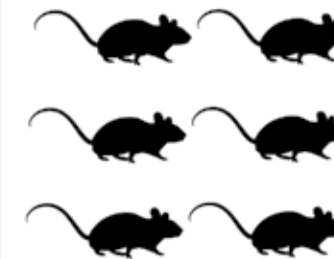
19 Days



15-18 Months



5 - 6 Offspring



1/10 oz.

\* Images of blocks are not intended to represent toxicant treated bait.

1/20 oz.



Unlike rats, mice & voles can absorb daily water requirements from food!

- Values may vary based on environment



# BEHAVIOR



ACTIVITY	Most active at night
	Distinct hierarchy
	Tend to travel along lines

BEHAVIOR	CLIMBING ABILITY		
	Great	Superior	Excellent
	JUMPING ABILITY		
	Excellent	Superior	Excellent
	APPROACHING NEW OBJECTS		
	Fearful	Fearful	Curious

WHERE THEY NEST	Burrows, 90-450 ft. from food & water	Trees/Rooftops, 100-300 ft. from food & water	Corners, 10-30 ft. from food & water

WHERE THEY CAUSE DAMAGE	Indoor & Outdoors	Indoor & Outdoors	Indoor





# RODENT SENSES

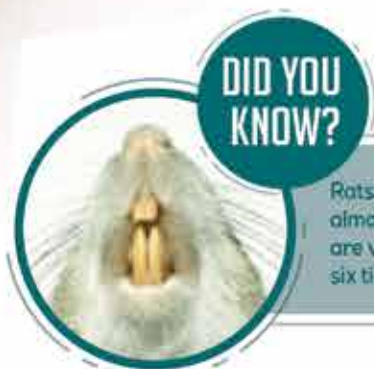
## TOUCH

- Rodents' long whiskers, or VIBRISSAE, are located all over the body but are most prominent on face.
- These hairs are used for guidance as they move along walls and other objects.



## SMELL

- Rodents have an excellent sense of smell and use it to find food.
- They produce and release pheromones to communicate information with other rodents (i.e., colony status, reproductive behavior, etc.).



DID YOU KNOW?

Rats can chew through almost anything – their teeth are very hard and can bite six times per second.\*

## TASTE

- Rodents can taste down to 250 parts per billion.\*\*
- Newborn rodents can taste their mother's diet through her milk and favor those foods when they mature.
- When baiting, remember that fresh bait should provide the best results.

\*Photo may not be representative of a label-consistent bait placement



## KINESTHETIC

- A rodent's kinesthetic sense detects bodily position, weight, or movement of the muscles, tendons, and joints.
- This develops when the rodent gets very comfortable and used to its environment.
- Rodents display memorized muscle movement in which they essentially memorize their surroundings.

"Rats develop a muscle memory, a kinesthetic sense that allows them to remember the turns, the route, the course of movement"

EXAMPLE: Maze



SOURCE: Sullivan, Robert "Rats: Observation on the History & Habitat of the City's Most Unwanted Inhabitants" Bloomsbury USA, 2004





# INSPECTION: Areas of concern





# CONDUCTING PROPER RODENT CONTROL

Proper rodent control **methods** include:

- INSPECTION
- EXCLUSION
- RODENT CONTROL TECHNOLOGY



## IMPORTANCE OF INSPECTION

### PROPER INITIAL INSPECTION IMPROVES:

- Customer service
- Elimination of current pest problem
- Prevention of future pest problems
- Overall profitability



### GOALS OF AN INSPECTION:

- Invest all the time needed during the initial inspection
- Identify key factors to solving or preventing a rodent problem
- Educate the customer during inspection
- Communicate with the customer to establish clear needs from them and set realistic expectations



## COMMON AREAS TO EXAMINE

- Lines and pathways around buildings
- Pipes and utility lines
- Poor sanitation areas
- Abutting water sources or vegetation
- Door sweeps and general gaps
- Food storage areas
- New construction or renovations sites



## INSPECTION TOOLS

- Flashlight
- Black Light
- Paper Towel
- Eye Protection
- Respirator
- Gloves
- Phone/Camera
- Ruler
- Your Customer
- **COMMUNICATION** with your customer





# INSPECTION CHECKLIST

Is this  
your first  
call to a  
PMP?



Why  
are you  
calling?



Abutting any water  
sources or vegetation?



Where are  
the sanitation  
issues?



Do you  
have  
children  
or pets?



Have you used any  
over-the-counter  
rodenticides?  
If so, where  
have they  
been placed?



Where is the  
customer  
seeing rodents?



If getting into food, what food source  
or what proper baiting techniques  
are you applying?



Gaps  
sealed?



Pipes enter  
structure  
sealed?  
Exhaust,  
pipes,  
etc.?



Branches trimmed that  
overlap/touch buildings?



Droppings  
and/or  
sebum:  
where are  
the signs?



Any new construction  
or changes in neighborhood,  
residential or commercial?



Door sweeps; are they  
properly installed?





## IDENTIFY ACTIVITY

### SEBUM

- Rub marks left behind by rodents
- Shows where rodents have been traveling
- If rub marks smear, you know they are fresh



Marks  
come from  
grease on  
rodent  
fur

### SEBUM EXAMPLES





## URINE

- Micro droplets of urine
- Left behind wherever rodents travel
- Linked to health risks; known to cause or worsen asthma



External laboratory studies from wild house mice over a 24 hr. period showed urine production of 1.0 – 5.6 mL/day (0.03 – 0.19 oz./day). Evaporation and seasonal humidity differences were attempted to be minimized. Urine production varied with age, weight, sex, reproductive status, and social ranking.



### GENERALLY:

- Males produced 1.5 – 2 times more than females, presumably to territory marking
- Output correlated with body weight (larger mouse produced more urine)
- Urine output increased with age, pregnancy progression, lactation, and social ranking
- Urinary output may differ between laboratory and wild house mice, as food and water consumption may vary

Reference  
Drickamer, L.C. Rates of urine excretion by house mouse (*Mus domesticus*): differences by age, sex, social status, and reproductive condition. *Journal of chemical ecology*, 21(10), 1481-1493.

## DROPPINGS

### DROPPINGS INDICATE:

- Direction of travel
- Size of colony
- Whether rodents are reproducing or not





## ■ GNAW MARKS

- Rats must constantly be gnawing, or their teeth could grow to be a foot long in two years!



Grow about 1/2" per month

### MICE

- 1-2 mm in width ●
- Holes are small, clear cut

### RATS

- 4 mm in width ●
- Holes are big with rough, torn edges

RATS CAN CHEW THROUGH:	MOH'S SCALE OF HARDNESS
Plastic	Varies
Brick	Varies
Copper	3
Wood	3-5
Cement	3
Lead	1.5
Aluminum	2.5-3
Steel	6.5
Rodent Teeth	5.5

Rodents can cause building fires by chewing through wires and/or gas pipes, they are also known to chew through car wires!





## ■ DISEASES OF CONCERN

- Foodborne Illnesses
- Typhus
- Lymphocytic Choriomeningitis
- Asthma
- Hantavirus Disease
- Lyme Disease

### POTENTIAL EXPOSURE FROM:



A study done by Johns Hopkins and the National Cooperative Inner City Asthma Study Group confirmed that mouse allergens can cause life-threatening or fatal reactions in people.

Source: Airborne mouse allergen in the homes of inner-city children with asthma. Matsui EC, Simons E, Rand C, Butz A, Buckley TJ, Breyse P, Eggleston PA. J Allergy Clin Immunol. 2005 Feb; 115(2):358-63.



## ■ PRECAUTIONARY MEASURES



**WEAR GLOVES** when picking up dead animals, handling bait stations and handling any type of bait (waterproof gloves may be required)



**WEAR A RESPIRATOR OR DUST MASK** when in dusty, dry and poorly ventilated areas (i.e. attics, crawlspaces, dirt floors, vacant buildings)

Use HEPA filtration when necessary, especially when dealing with biohazards, other hazards (allergens, irritating particles), or activities like vacuuming/sweeping

**ALWAYS FOLLOW THE LABEL AND STATE GUIDELINES**



Visit the  
CDC Website:  
[cdc.gov/rodents](https://www.cdc.gov/rodents)



## ■ EXCLUSION

### OVERVIEW

- Figure out how they are getting in (commercial/residential)
- Inspect or survey the outside foundation of the building for any gaps, cracks or foundation flaws (look for rub marks, droppings, or gnawing)



- Inspect for opportunities to climb to the roof and enter (vines, pipes, conduits)

- Look at surrounding properties for indications of a rodent population



Inspect all entryway doors for gaps and evidence of gnawing

## ■ AREAS OF CONCERN

Damaged, gnawed, worn, or missing door sweeps are one of the most common entry points for mice, rats and other pests



### UNDER SINKS



### ENTRY DOORS



### ROOF LINES



### WEEP HOLES



### AROUND UTILITY LINES



### GARAGE DOORS







## EXCLUSION TIPS

- Fill small holes with steel wool. Put caulk around the steel wool to keep it in place. Use lath screen or lath metal, cement, hardware cloth, or metal sheeting to fix large holes.
- Fix gaps and use flashing around the base of the house or building. If you do not remember to seal up entry holes, rodents will continue to get inside.
- Outbuildings and garages should also be sealed to prevent the entrance of rodents.

## SEALING DOCK LEVERS

- Loading dock levers are a natural entry way for a rodent
- Gaps as large as 1" on each side make for an easy path for any rodent to enter a building



CAN YOU SPOT THE RODENT IN THIS PHOTO?



BEFORE

## GROUPS & LANDSCAPING

The area shown to the right was infested with rats and burrows. One way to practice exclusion is to create a concrete barrier underneath landscaping materials, eliminating the ability to burrow.



DURING



AFTER



# RODENT CONTROL SOLUTIONS





## TYPES OF RODENTICIDES



\*photo may not be representative of a label-consistent bait placement

**CHRONIC RODENTICIDES**  
- Anticoagulants

**ACUTE RODENTICIDES**  
- Metabolic inhibitors



### ANTICOAGULANTS

- Kills by preventing blood from clotting, meaning formerly slight hemorrhages can now kill
- Most widely used in professional rodent control
- People are prescribed anticoagulants as blood thinners (heparin, warfarin)
- Slow onset of symptoms prevents in bait shyness
- Vitamin K<sub>1</sub> serves as antidote

### ACUTE RODENTICIDES

- Metabolic inhibitors interfere with chemical processes in the body, resulting in organ failure

### BROMETHALIN ACUTE

- Interferes with energy production needed to remove water from brain and spinal cord, causing tissues to swell
- Quick onset of symptoms; rodents usually consume a lethal dose in a single night's feeding, but it may take two or more days from the time of bait consumption for these rodents to die
- No antidote
- The nervous system is the major target

### ZINC PHOSPHIDE ACUTE

- Converted to phosphine gas in the stomach
- Phosphine gas causes:
  - Hyperactivity and agitation, followed by lethargy
  - Decrease in efficiency of energy production
  - Cellular oxidative stress
- May kill in as little as 24 hours
- Rodents usually consume a lethal dose in a single night's feeding, but it may take two or more days from the time of bait consumption for these rodents to die

### VITAMIN D<sub>3</sub> CHOLECALCIFEROL SUB-ACUTE

- Increases blood calcium levels by acting on the small intestine, kidney and bone
- Rodents usually consume a lethal dose in a single night's feeding, but it may take two or more days from the time of bait consumption for these rodents to die
- Treatments are available

THIS ACTIVE IS PARTICULARLY **DANGEROUS** TO USE AROUND **DOGS**

## LETHAL DOSE LEVELS

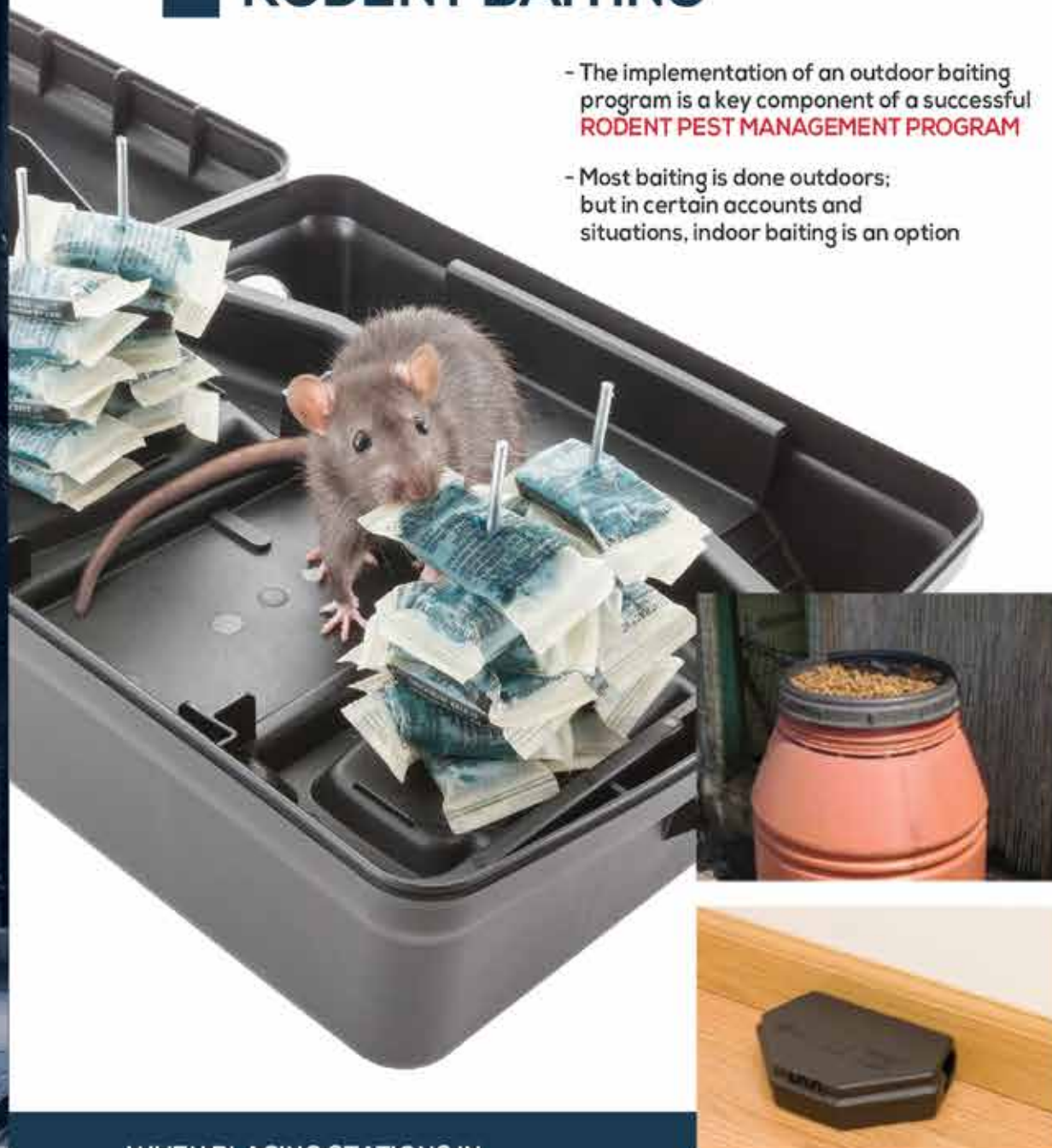
ACTIVE INGREDIENT	TRADE NAMES	ACTIVE CONTENT	Useful Bait Consumption for Rats (grams)*	Useful Bait Consumption for Mice (grams)*	Typical First Deaths May Occur within: (days)
Brodifacoum	Final, Talon, Weatherblox	0.005% w/w	1-3	0.2-1	4
Bromadiolone	Contrac, Maki	0.005% w/w	2-6	0.7-2	4
Bromethalin	Fastrac, Top Gun	0.01% w/w	5-15	1-3	1
Cholecalciferol	Terad3, Terad3 AG	0.075% w/w	12-30	1-3	3
Difenacoum	Multi Kill, Sorexa	0.005% w/w	7-20	0.3-1	4
Difethialone	Generation, Blue Max, First Strike	0.0025% w/w	4-12	0.4-1	4
Diphacinone	Ditrac, Bait Block	0.005% w/w	15-45	20-60	7
Zinc Phosphide	ZP	2.00% w/w	0.2-0.5	0.5-1.5	1





## RODENT BAITING

- The implementation of an outdoor baiting program is a key component of a successful **RODENT PEST MANAGEMENT PROGRAM**
- Most baiting is done outdoors; but in certain accounts and situations, indoor baiting is an option



### WHEN PLACING STATIONS IN AN INFESTED ACCOUNT:

- Place most stations where the most activity is noticed (droppings, rub marks, etc.)
- Eliminate available food sources that attracted rodents to the location

### USE THE RIGHT TOOLS:

- The appropriate bait station
- The correct active
- Enough tools to get the job done

## OUTDOOR BAITING

### 1ST LINE OF DEFENSE

#### Perimeter

(100ft of manmade structure)

### 2ND LINE OF DEFENSE

#### Building Exterior

### 3RD LINE OF DEFENSE

#### Burrows

Utilize iQ and non-toxic monitoring bait for 1st line of defense

Space your bait placements according to the severity of the infestation, and whether it is preventative or corrective

In burrows further than 100 ft. of structure, bait with an acute pellet

Always read the entire product label before using any rodenticides!



## INDOOR BAITING

### ADVANTAGES

- Rodents may consume a lethal dose in a single-feeding, which may result in population knockdown
- Addresses the problem of learned avoidance to traps by adult rodents

### DISADVANTAGES

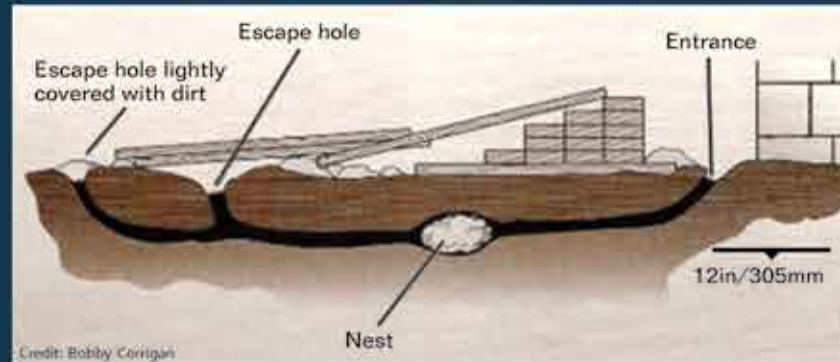
- Bait may be placed where there are likely to be more people present
- Insects related to decomposing rodents (flies, maggots, etc.)



## BURROW BAITING

Of the three types of commensal rodents, **NORWAY RATS** are the most likely to nest in burrows.

Rat burrows typically have one main entrance that is used most frequently, and several escape holes.



### THE CORRECT BAITING OF RAT BURROWS IS IMPORTANT FOR 3 REASONS

- To maximize safety to people, pets, and non-target wildlife.
- To maximize the eradication of the rats living within the burrows.
- To allow for long-term monitoring of the burrow system including follow up treatments, if needed.



Norway rats will typically burrow, and roof rats will nest up high. (attics, palm trees, in between walls...)

Roof rats will also nest in burrows in some cases.

### STEPS FOR BURROW BAITING

- Burrows should be baited with bulk-style pellets using long handle soup ladles, or salad-style serving spoon; or via a hose-and-funnel technique.



**REMEMBER:**  
you **MUST** bait  
a minimum  
of 6 inches  
down

**DO NOT**  
burrow bait  
with soft bait,  
blocks, or  
place pacs



# BAIT STATIONS

## FOR TAMPER RESISTANCE



## FOR DISCRETION



## FOR FAST SERVICE



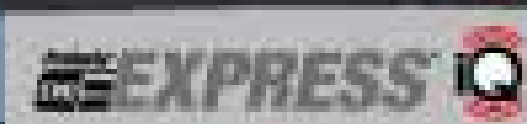
## FOR PROOF

### INTEGRATED SENSOR

### INTEGRATED ANTENNA

### INTEGRATED BATTERY

Sensor, antenna, and battery are fully enclosed

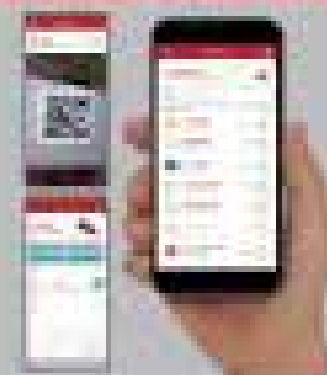


### INTEGRATED SENSORS



- Record activity
- Generate time reports
- Know when & where intruders are traveling

### OPTIMIZED MOBILE APP



- Collects data from sensors
- Interprets results by filtering out noise
- Fast reprogramming

### CUSTOMIZED PORTAL



- Define service rules
- Review data
- Monitor results
- Communicate with customer



## BAITING STRATEGIES

### THE POWER OF iQ

Include monitoring technology to find out when, where, and why rodents are traveling. Rodent data gathered will help you place the stations where they're needed most.

### PULSE BAITING

#### PRE-BAIT USING DETEX® NON-TOXIC BAIT

Pulse baiting is the use of a non-toxic monitoring bait to first diagnose activity in bait stations. Once activity is proved via Bell Sensing App, an active bait is placed in the bait station.

#### SWITCH TO ACTIVE BAIT

When rodent activity is proven via Bell Sensing App, swap out non-toxic monitor for an active bait.



### BAITING OVERVIEW

#### WHY DO WE USE BAIT?

To provide a "fresh" and "palatable" alternative food source to the human or pet food sources rodents are currently consuming.

#### WHY DO WE CHANGE BAIT?

To make sure there is a constant supply of "fresh" bait.

#### HOW OFTEN DO WE CHANGE BAIT?

Normal environment - change every 30-90 days, depending on conditions, or depending on account and weather-related conditions.

#### WHEN DO WE CHANGE BAIT?

Replace bait every time the account is serviced, even though the old bait might look "ok".



**Remember** you are competing against food sources that attracted them to an account in the first place.

**Keep control of your bait at all times**



\*photo may not be representative of a label-consistent bait placement

Using loose bait will most likely result in translocation to areas that could pose a risk to non-targets.



DETEX® Non-Toxic Monitoring bait is a great tool for identifying rodent behavior & movement.



# TRAPPING

## RAT SNAP TRAPS



- Check whether or not trap has been activated via Bluetooth in the Bell Sensing App
- Magnetic sensor detects whether trap is set or closed
- Great for hard-to-reach locations

NEVER CHECK AN EMPTY TRAP AGAIN



PLACE TRAPS ANYWHERE

## TRAP PLACEMENT

Secured to pipes



Place in rafters



Secure vertically or horizontally



Critical trapping tips so you don't get outsmarted by rodents at your accounts

## MOUSE SNAP TRAPS

- For severe mouse infestations, traps should be placed close together
- Use snap traps in pairs. Some mice react to new objects by jumping; double traps will help to capture jumpy mice
- In areas where there are many food sources, bait the traps with nesting materials, such as cotton balls
- Prebait for mice, just like you would for rats
- January, 2016: Dr. Matt Frye of Cornell University discussed a mouse snap trap research study that suggests for optimum performance, 6 traps per every mouse intended to catch



TRAPPER  
MOUSE iQ

### DO'S



Place trap facing towards the wall on rodent run lines



Place traps back to back, parallel to the wall on rodent run lines



Use zip-ties to fasten snap traps to PVC pipes where sebum or other rodent signs are present

### DON'TS



Place one snap trap parallel to wall



Leave space between the snap trap and wall



Place snap traps in corners



## SNAP TRAP STRATEGIES

- Place on pipes or racking, etc.
- Use in stations – both inside and outside
- Oreo or reverse Oreo with glue boards/trays (as shown in the images to the right)
- Reuse traps that have caught others – rodent pheromones
- Do not place in corners
- MOVE snap traps every visit
- Leave gaps not evenly spaced
- Use in pairs back to back

For a professional look, place traps inside tamper resistant bait stations



- Identify active runways and place mechanical traps in dark areas along walls and behind objects
- Ideal placements in commercial facilities are along both sides of interior and exterior doorways
- For fast and easy servicing, use a glue board in conjunction with a mechanical trap



## PREBAITING

### STEP 1

To allow the rats to get accustomed to the traps, place them backwards against the wall, and bait them without setting for 3-7 days



### STEP 2

Once the rats get used to the traps, return to bait, and set them with the mouth open towards the wall



## WHAT TO USE AS BAIT IN SNAP TRAPS

- DETEX® Blox with Lumitrack™
- PROVOKE® Monitoring Gel
- Cotton balls or other nesting materials





# GLUE

## ■ TYPES OF GLUE BOARDS

### PAPER RELEASE



#### ■ Advantages

- Very convenient
- Low cost
- High versatility with folding feature

#### ■ Limitations

- Success most likely limited to juveniles
- Can be impacted by environment; i.e. dust
- Rodents may develop "learned" avoidance

### USING PAPER RELEASE GLUE BOARDS



- Glue boards can be used to monitor the presence of rodents and insects
- Glue boards should be used in active rodent pathways
- Keep glue boards free of dust, debris, and moisture
- Use glue boards in tight spaces or natural funnels



- Place lengthwise along active rodent pathways
- **DON'T BAIT THE GLUEBOARD.** The idea is for the rodent to hit the glue board on the run
- Make sure the glue board has good placement
- Take advantage of edgeless glue board feature to eliminate the bypassing of the control measure

### PLASTIC TRAY



### USING PLASTIC TRAY GLUE BOARDS

- Place glue trays tight against the wall in a parallel fashion
- Place several glue trays along an active runway spaced apart to minimize the chance of a rodent jumping over the glue trays



#### TECHNICIANS TIP!

Rodent pheromones left in or around a trap will help attract other rodents to the traps



In dusty environments, utilize tunnels to protect the glue





## ■ TYPES OF GLUE PRODUCTS

### TRAPPER® PEST MONITOR

- Ideal to use inside and outside residential accounts, AIB facilities, schools, food processing plants, and commercial accounts



### TRAPPER® 24/7 iQ



Sensor,  
antenna  
and battery  
are fully  
enclosed



- Make the most of your time at large accounts with lots of stations
- Helps PMPs know when and where rodent activity is occurring
- Communicates with mobile app and web portal



**NEVER CHECK AN  
EMPTY TRAP AGAIN**







THE WORLD LEADER IN RODENT CONTROL TECHNOLOGY®