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Mammal Trapping

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INTRODUCTION

Traps are mechanical devices used to capture animals. Trapping often is the most efficient way to selectively remove nuisance animals or reduce rodent densities in urban settings. In agriculture and forestry, trapping is a valuable alternative to nonselective toxicants. Every year, millions of rodents and carnivores are trapped for damage and disease control, and population regulation. This entry reviews trap types and factors that affect their performance, trapping strategies and concerns, and future needs.

TRAP TYPES

Mammal traps can be classified as killing or restraining mechanical devices. Killing traps consist of one or more striking jaws (or snare noose) activated by one or many springs upon firing of a trigger mechanism. Killing traps vary in size and mode of action (Fig. 1). Mousetrap-type devices, where one jaw closes 180° upon a flat surface, are most commonly used for the capture of commensal rodents, i.e., rats (*Rattus* spp.) and mice (*Mus* spp. and *Peromyscus* spp.).[1] Killing boxes, spear- and pincer-type traps, and various models of body-gripping devices are used to capture fossorial rodents (*Thomomys* spp. and *Spermophilus* spp.) and moles.[2] Planar traps, where a spring acts as a killing bar, are used to control rat-size rodents and small carnivores (e.g., weasel family). Rotating-jaw (Conibear-type) traps with a scissor-like closing action are used for a variety of animals ranging from tree squirrels (*Tamiasciurus* spp. and *Sciurus* spp.) to beaver (*Castor canadensis*). Finally, manual locking and power snares are used to kill larger animals such as red fox (*Vulpes vulpes*) and coyote (*Canis latrans*) [1].

Restraining traps are devices designed to capture an animal alive (Fig. 1). Three main types are used in the control of mammal pests. Cage/box traps are produced in a variety of sizes for small insectivores and rodents, carnivores, and ungulates.[1] They are made of wire or nylon mesh, plastic, or wood. The functional parts of these traps include the cage/box, one or two self-closing doors, a door lock mechanism, a trigger, and a treadle or trip pan. Foothold traps are commonly used to capture medium-size animals such as coyote and fox. Typically, these traps consist of two jaws open at 180° at set position, and closing 90° upon each other at firing time. Another foothold design is the EGG trap with a pull trigger that releases a small striking bar to block an animal's paw, and a plastic housing that protects the captured limb from torsion injuries. This trap is specifically used for the capture of raccoons (*Procyon lotor*) and Virginia opossum (*Didelphis virginiana*).[3] Finally, foot snares are spring-powered cables used to capture medium- and large-size mammals.

TRAP EFFICIENCY

Trap efficiency, which is the rate at which a trap catches the intended species, varies greatly within and between years. Factors affecting trap efficiency relate to trapping methods, environmental variables, and biological variables.[4] Trap types, sets, and sites must be carefully selected for target species. However, the number of trapping devices deployed and the selection of bait or lure significantly affect trap performance. Meat, fatty substances, seeds, vegetables, fruits, nuts, and scented lures (conspecific odors or food-related scents) usually increase trapping success. Bait efficiency may vary seasonally due to differences in animals' activity patterns and natural food availability. Prebaiting, where trapping sites or traps themselves are rendered inoperative and baited, is often recommended to effectively remove pest animals. Weather conditions may impact the operation of trapping devices and the behavior of target species. Finally, population density and distribution, animal movements, and the individual response of animals to traps vary greatly between areas and over time.

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TRAPPING STRATEGIES AND CONCERNS

The efficiency and costs of mammal trapping control programs are difficult to estimate because of the above-noted factors, the number and experience of trappers, and the goal of a particular pest control program. Ideally, control trapping should be conducted before pest populations reach high-density levels, e.g., before the birth of young of the year. Eradication through trapping is seldom achievable except on a local scale, and usually at high cost.[5] Sporadic or occasional control is ineffective, as pest numbers usually return to precontrol levels soon after the trapping effort. Sustained control is far more cost-effective as it involves a reduction of populations to low levels and ongoing maintenance (often involving a control buffer zone) to minimize reproduction and immigration.[6–9] This is a "preventive" strategy that is particularly effective to control rodents. A variant of the sustained control strategy is the removal of a small proportion of the population causing the impact. This is a "corrective" strategy often used in the case of wild canids and other large carnivores predating on livestock.[10]

There are growing concerns about trap selectivity and the welfare of mammals, pests included.[1,6] Effective techniques have been developed for avoiding the capture of nontarget species. Responsible trapping is facilitated with the use of restraining traps, which allow one to release unwanted animals and to remove specific individuals. Restraining traps should hold animals with minimal distress and trauma. They should be checked daily, and captured animals should be immediately relocated, released, or euthanized. Killing traps should render animals irreversibly unconscious as quickly as possible. They should be used when there is no risk of injury for humans and domestic animals.[11]

FUTURE NEEDS

Although trapping plays an important role in control programs, little work has been conducted on mammal pest traps from an efficiency, selectivity, and animal welfare point of view. There is a need for trap research and development for the control of commensal rodents, and new trap alternatives for medium- and large-size carnivores.[1] Future efforts aimed at improving animal handling, understanding factors that impact trap performance, and integrating trapping into pest management programs using various control methods should be promoted.

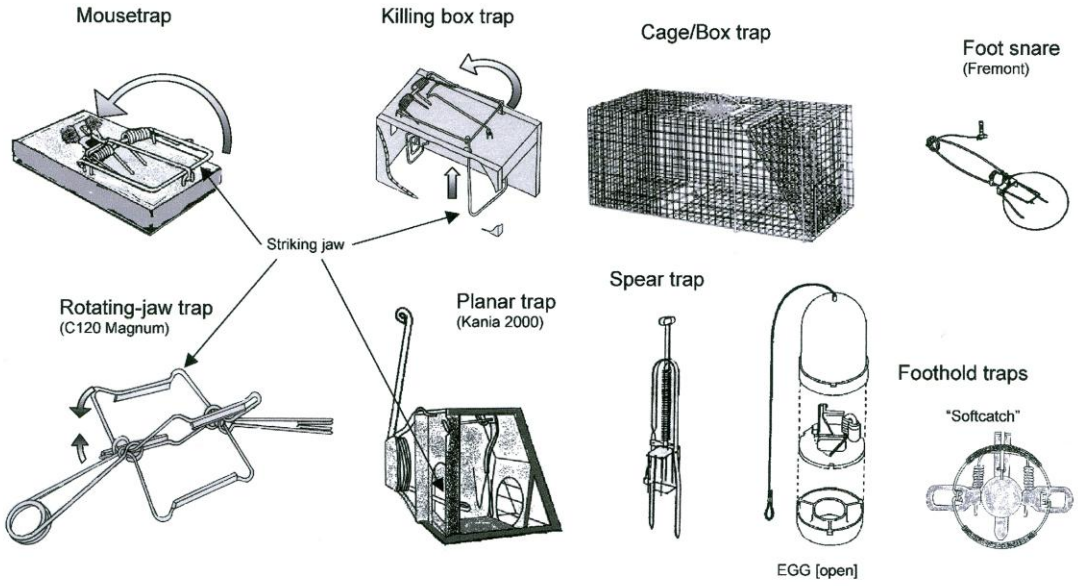

Fig. 1 Diagrams of killing and restraining traps used to capture mammal pests.

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