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# CHAPTER 11

# USE OF NETTED CAGE TRAPS FOR CAPTURING WHITE-TAILED DEER

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Photo: K.C. VerCauteren

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**Abstract**: The safe and humane live capture of deer may be an important component of management and research projects. Growing populations of white-tailed deer (*Odocoileus virginianus*) in both urban and agricultural settings often conflict with local human interests and present challenges to natural resource managers. Netted cage traps can be an important tool when managing deer populations where traditional control methods may not be appropriate or acceptable. Netted cage traps can also be used by researchers to acquire deer for marking, measurements, or other non-lethal purposes. We discuss the design of netted cage traps, trapping techniques, and the handling of trapped deer.

## INTRODUCTION

Throughout history, humans have used their ingenuity to capture ungulates. Historically, the goal was to secure food, hides, and other useful materials. Today the capture of white-tailed deer (*Odocoileus virginianus*) may be necessary for population management or research activities. Recent conflicts with deer in urban and agricultural settings have required non-traditional population control measures because hunting and other lethal control methods were either deemed not appropriate or were not acceptable (Craven and Hygnstrom 1994, Clark 1995, Deblinger and Rimmer 1995, Drummond 1995, Ishmael et al. 1995, Jones and Witham 1995, Jordan et al. 1995, Mayer et al. 1995, McAninch 1995, Stradtmann et al. 1995, Warren et al. 1995).

Considerable time, effort, and expense is required to trap large numbers of deer (Rongstad and McCabe 1984, Clark 1995, Ishmael et al. 1995). The intent of any deer trapping program should be the efficient, safe, and humane capture of the number of deer required to meet predetermined goals. The most common methods of capturing deer are with cage traps, rocket nets, drop nets, and remote chemical immobilization. Unlike other methods, cage traps do not require constant monitoring and can be fitted with telemetry devices to notify biologists when the trap is sprung. Further, cage traps can be concealed and used in areas where rocket nets or drop nets will not work. Also, deer captured in cage traps have a lower incidence of capture myopathy than those captured in rocket nets (Beringer et al. 1996).

Cage traps have been used with euthanization, translocation, and sterilization in deer population reduction efforts in urban areas (Drummond 1995, Ishmael et al. 1995, Jordan et al. 1995, Mayer et al. 1995). Cage traps have also been used by biologists to equip individual deer with identification tags or radiotransmitters in order to study herd demographics and collect biological data, e.g., physical measurements, tissue samples, or blood samples.

Although used commonly, specifics of cage trap design and trapping are seldom reported. This is likely because catching deer is usually not the primary goal of most management or research efforts. Also, many trapping programs are short term and sufficient data for rigorous statistical analysis are not available and therefore not reported in the literature. We made more than 1,000 deer captures with cage traps over the past 10 years. Our study areas were between 38° 00′ N and 43° 30′ N latitudes and 90° 00′ W and 96° 00′ W longitudes, in Missouri, Nebraska, Iowa, and Wisconsin, USA. In this report we review the cage trapping experiences of others, synthesize their experiences with our own, and suggest improved trap design and techniques for capturing and handling deer with cage traps.

## CAGE TRAPS

Cage trap design and function have undergone a variety of changes and modifications since their inception in the 1930s. Wooden box traps, primarily Stephenson and Pisgah designs, were used in early restocking efforts (Rongstad and McCabe 1984).

By 1950 the need for a better deer trap was necessitated by increasing deer populations and translocation efforts. Clover (1954, 1956) developed more efficient single-catch deer traps. The Clover deer trap is essentially a steel-pipe frame surrounded with netting. It is lighter and more portable than traditional wooden box traps and deer may more readily enter net-covered traps because they can see through the trap. In addition, the netted sides may absorb the shock of struggling deer and reduce injuries. Conversely, deer in netted cage traps are unprotected from predators and may be easily excited by other disturbances. Current traps are more efficient versions of Clover's original design.

A reliable trigger system is essential for capturing deer in netted cage traps. Some researchers have had success with Clover's rat-trap trigger system while others feel it leads to excessive falsely sprung traps due to non-target animals and weather. The rat-trap trigger system also inhibits the adjustment of trip string position and pressure.

Roper et al. (1971) developed a different trigger system while trapping mule deer (*Odocoileus hemionus*) in Colorado that resulted in fewer falsely sprung traps. We further modified the system to stand alone, trip more smoothly, have more adjustability, and require less maintenance. Our system consists of a trip string tied to a stake 10 cm outside the trap and about 46 cm from the back of the trap. The trip string is run through the trap about 35 cm above the ground to a second stake that has a 5-cm length of 1.9-cm diameter pipe attached to it. A cotter key tied to the trip string is inserted into the end of the pipe on the second stake and through a s-hook that has been inserted into a slot cut into the pipe. The s-hook is tied to a string that is run up, through a strand of netting, and tied to the door (Fig. 1). The trip string should be far enough back in the trap to allow the door to drop behind a large deer stretching to reach bait near the back of the trap. Trip string tension determines the pressure required to release the door. The door drops when a feeding deer puts enough pressure on the trip string to pull the cotter key free and release the door. A heavy monofilament (20 kg) or Dacron (40 kg) line works well as a trip string. Cotter keys and s-hooks should be clean and free of rust to ensure smooth operation.

A deer will occasionally feed on bait in a manner that does not disturb the trip string. We are usually able to capture these deer by modifying the trigger system with vertical trip strings. Tie two additional strings to the horizontal string and attach them to the top netting on the trap. The added trip strings should be about 30 cm apart and centered along the original string. Any side to side movement from a deer's head will put tension on the vertical trip strings causing the door to drop. We use a lighter material for the vertical trip strings to avoid the risk of snaring a captured deer.

McCullough (1975) modified Clover's design to pivot at the corners, allowing handlers to collapse the trap flat to the ground when a deer is captured. He kept the trap erect with guy lines off the top corners attached to stakes. We found this to be adequate, however, guy lines and stakes can be a safety concern to deer and handlers. Also, in some cases it may not be possible to get stakes into the ground. Another method we have had success with is attaching

a length of nylon cord diagonally along each side from the front lower corner to the back upper corner and tying it with a quick-release knot. This creates a self-supporting trap that can be collapsed quickly and folded backwards and downward to restrain the deer with minimum struggling. Traps should still be anchored; we recommend using a 15-cm length of chain attached to each bottom corner of the trap and secured with a 75-cm stake that is driven just below the surface of the ground. If stakes are not practical, weights can be fashioned to hold the trap down.

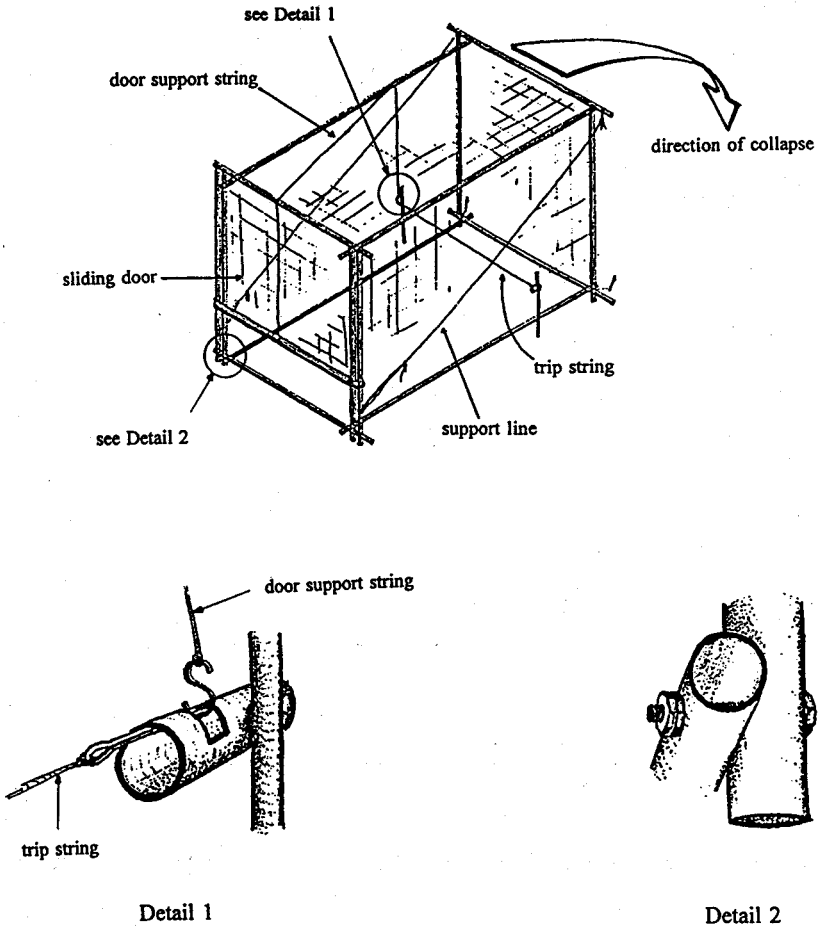


Figure 1. Cage trap for deer.

Traps can be constructed with 1.9-cm diameter galvanized water pipe or 3.7-cm schedule 40 aluminum pipe. The optimal trap size for deer in our study areas was about 91 cm wide, 188 cm long, and 122 cm high. We recommend a #84 nylon netting with a 5-cm square mesh size (Nylon Net Company, Memphis, Tennessee, USA). Cut the netting so that the sides and back

are one piece. The net should fit loosely to allow the trap to collapse. The top and gate should also be a continuous length of netting. Lace the netting to the frame with treated 0.6-cm nylon rope.

Pipes can be bolted together with 5 mm x 65 mm hardened-steel bolts. Install washers between pipes at the pivot points to facilitate trap collapse. Bolts should be double nutted or secured with self-locking nuts. We have had success in securing the netting to the gate by looping the gate guides through the netting. We have also used #9 or larger steel-wire rings to secure the netting to the gate guides (Fig. 1). The drop gate should be weighted (~ 3 kg) to ensure it falls completely. Depending on materials and size, completed steel frame traps weigh from 40 to 60 kg, aluminum traps weigh around 30 kg. Costs will vary with locale and availability of hardware. We recently constructed aluminum traps for $200 (U.S.) each, and steel traps cost $150 (U.S.) It takes one person about four hours to completely assemble a trap.

Netted cage traps are fairly portable, because they collapse and are relatively lightweight. Eight traps can fit into the bed of a full-sized pickup truck and two people can easily carry a trap.

## CAGE TRAPPING TECHNIQUES

Place traps in areas that receive high use by deer. Trails between bedding and feeding areas are ideal. Trails in corridors and in open habitats can also be productive. Place traps so that the opening faces the direction from which the handler will approach so that the trapped deer is forced to the back of the trap and movement is minimized. Also, be sure there are no obstructions for at least 15 m in front of the trap, to reduce the likelihood of a deer getting injured upon release.

Place traps far enough from roads or trails so they are not visible to the public. We concur with Rongstad and McCabe (1984) that it is not necessary to camouflage netted cage traps because deer acclimate to them. We suggest, however, using brown- or green-colored netting so that traps are less obvious to people.

It is important to prebait a trapsite until deer regularly use the area. Once the area is being visited by deer, set up a trap and tie the door open to allow free passage into and out of the trap. When deer are consuming the bait regularly, set the trap. Take care in setting the trap to ensure that it will trip and function properly. Traps should be checked twice per 24-h period, after periods of deer feeding activity. We usually rebait and set our traps in the afternoon and then check them 4-5 h after sundown and 1-2 h after sunrise. Traps can be checked more frequently, depending on success rates and the density of predators. At one good trapsite, we caught 5 deer in the same trap in 24 h.

The trap can be reset at the same site repeatedly until success declines. After several captures, moving the trap as little as 10 m may result in an increased capture rate. Relocate a trap if it is unsuccessful for 4-8 consecutive days. In one study, 27% ($n$ = 221) of captured deer were caught two or more times (VerCauteren and Hygnstrom, unpublished data). No deer were caught more than twice in the same month and therefore none were considered "trap happy."

In general, trapping success is best during January through March, when deer are food-stressed and easiest to attract to bait (Hirth 1977, Dusek et al. 1989, Fuller 1990, VerCauteren and

Hygnstrom 1998). Throughout the Midwest, the bait of choice is shelled corn because it is highly attractive to deer, relatively inexpensive, easy to obtain, and easy to handle. Other baits, or combinations of baits, that we have used with some success include: salt, alfalfa, apples, and browse. In the north, salt may be the most attractive year-round bait because deer are chronically sodium deficient (Belovsky 1981, Beauchamp and Mason 1991). Some researchers have had success catching mule deer in summer with salt (Mattfield et al. 1972, Morgan and Dusek 1992). In agricultural-wetland complexes, corn was found to be a better bait in summer than salt (Naugle et al. 1995). The best bait may depend on what foods local deer are familiar with and the time of year. Before beginning a trapping program, it is helpful to experiment with baits. The best foods available in the local environment usually work best, but not if they are abundant outside of traps.

When baiting a trap, spread a small amount of bait in front of the trap and leading into it. Place a larger pile under and behind the trip string. Keep bait away from the sides of the trap so that deer do not try to get at it through the net.

In some areas, non-target species, primarily tree squirrels (*Sciurus* spp.), raccoons (*Procyon lotor*), and cottontail rabbits (*Sylvilagus floridanus*), may reduce trapping success by releasing the trap door, chewing holes through netting, or eating the bait. Running the trip string at least 35 cm above the ground keeps it out of reach of most nontarget animals. Holes can be repaired with No. 120 braided-nylon mending twine (Nylon Net Company, Memphis, Tennessee, USA) using a weaving-knot sequence (Knake 1947). To allow nontarget animals in and out of traps freely, netting can be attached to a bar 15 cm above the base and around the perimeter of the trap. Except when set, traps should be tied open to allow both deer and nontargets free access to bait. To ensure that bait will be available for deer, set and rebait traps late in the afternoon.

## DEER HANDLING TECHNIQUES

Several techniques have been used to restrain captured deer, including collapsing the trap, manual restraint, catch or purse nets, and chemical immobilization. Trapped deer are, in most cases, calm until they perceive the approach of a human. At this time the deer struggles inside the trap and it is important to quickly subdue the animal to minimize stress and injury.

Collapsing the trap is likely the most effective and safe method of restraining a trapped deer. The trap should be approached from the front, forcing the deer to the back. When the deer faces forward, the handler should release the support lines and lean on the trap to collapse it and pin the deer to the ground. The door is then slid open to gain access to the deer for processing, or the deer can be chemically immobilized through the net.

We have also had excellent success at manually restraining deer for ear tagging and collaring. Our method is to quickly enter the trap, grasp the deer over the back in a "bear hug" fashion, and tackle it to the ground. Pin the deer on its side and hold the front legs close to the body. Keep your body weight positioned over the back of the deer and avoid the hind legs. Handlers must act directly and confidently for the safety of themselves and the captured deer. For their protection, handlers should wear insulated coveralls and a helmet with a facemask.

Prepare all capture and tagging equipment in advance, so the deer can be quickly and quietly processed. Once restrained, the deer is blindfolded to help keep it calm. An 18-cm length of sweatshirt sleeve works well as a blindfold. Minimize noise or talking. The most

efficient crew size is three: one person to handle the deer; one to euthanize, chemically immobilize, or mark the deer; and one to assist. With an experienced crew, the time from reaching the trap to restraining the deer can be less than five seconds. If marking is the goal, the animal can be tagged or radio-equipped and released in three minutes. Use of ropes or harnesses to restrain deer captured in netted cage traps is not necessary or recommended.

Deer should be chemically immobilized if they must be handled for more than 10 min or if invasive surgical procedures are used. To immobilize, collapse the trap onto the deer and restrain it with the weight of a handler while another administers the immobilant.

If live deer are to be removed from a trapping site, they can be transferred to wooden transport crates and loaded onto a truck (Drummond 1995, Ishmael et al. 1995). They can then be taken to a release site, holding facility, deer farm, or meat processor.

Cage traps are safe and humane. In over 1,000 captures, less than 4% of captured deer suffered injuries due to being trapped and handled. External injuries were always minor, bloody noses being the most common. We were not able to determine or assess internal injuries and deer occassionally died within two weeks of capture. These deaths were usually attributed to capture myopathy resulting from the trapping experience, but could have been due to predation or other natural causes.

Reports of the costs of capturing deer in cage traps vary greatly and depend on what operational costs the authors choose to include. Traps will usually last >10 years and if the cost is amortized over several captures, or years, the cost/animal captured is reduced. Reported cost/animal in projects involving trap-and-transport and trap-and-shoot have ranged from $97 to $637 (U.S.) and average about $350 (U.S) (Ishmael and Rongstad 1984, O'Bryan and McCullough 1985, Clark 1995, Drummond 1995, Ishmael et al. 1995, Jordan et al. 1995).

## CONCLUSIONS

Control of deer populations is a complex social, economic, political, and biological issue. We are responsible for stewardship of deer populations and must therefore consider all the options and tools available. Live capture may be more socially acceptable or practical than hunting or sharp-shooting in restricted areas. Netted cage traps may be the most appropriate method of live capture, especially in situations involving the growing number of deer in urban areas. The need for effective cage traps, sound techniques, and expertise will become even more important in the future.

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## LITERATURE CITED

**Beauchamp, G. K., and J. R. Mason.** 1991. Comparative hedonics of taste. Pages 159-184 *in* R. C. Bolles, editor, The hedonics of taste, Lawrence Erlbaum and Associates, New York, New York.

**Belovsky, G. E.** 1981. Food plant selection by a generalist herbivore: the moose. Ecology 62:1020-1030.

**Beringer, J., L. P. Hansen, W. Wilding, J. Fischer, and S. L. Sheriff.** 1996. Factors affecting capture myopathy in white-tailed deer. Journal of Wildlife Management 60: 373-380.

**Clark, W. E.** 1995. Capture and handling techniques for urban deer control. Page 81 *in* J. B. McAninch, editor, Urban deer: a manageable resource? Proceedings of the 1993 Symposium of the North Central Section of The Wildlife Society, St. Louis, Missouri.

**Clover, M. R.** 1954. A portable deer trap and catch-net. California Fish and Game 40: 367-373.

**Clover, M. R.** 1956. Single-gate deer trap. California Fish and Game 42: 199-210.

**Craven, S. R., and S. E. Hygnstrom.** 1994. Deer. Pages D25-40 *in* S. E. Hygnstrom, R. M. Timm, and G. E. Larson, editors, Prevention and control of wildlife damage. University of Nebraska Cooperative Extension, Lincoln, Nebraska.

**Deblinger, R. D., and D. W. Rimmer.** 1995. Development and implementation of a deer management program in Ipswich, Massachusetts. Pages 75-79 *in* J. B. McAninch, editor, Urban deer: a manageable resource? Proceedings of the 1993 Symposium of the North Central Section of The Wildlife Society, St. Louis, Missouri.

**Drummond, F.** 1995. Lethal and non-lethal deer management at Ryerson Conservation Area northeastern Illinois. Pages 105-109 *in* J. B. McAninch, editor, Urban deer: a manageable resource? Proceedings of the 1993 Symposium of the North Central Section of The Wildlife Society, St. Louis, Missouri.

**Dusek, G. L., R. J. Mackie, J. D. Herriges, Jr., and B. B. Compton.** 1989. Population ecology of white-tailed deer along the lower Yellowstone River. Wildlife Monographs 104. 68 pages.

**Fuller, T. K.** 1990. Dynamics of a declining white-tailed deer population in north-central Minnesota. Wildlife Monographs 110. 37 pages.

**Hirth, D. H.** 1977. Social behavior of white-tailed deer in relation to habitat. Wildlife Monographs 53. 55 pages.

**Ishmael, W. E., and R. O. Rongstad.** 1984. Economics of an urban deer-removal program. Wildlife Society Bulletin 12: 394-398.

**Ishmael, W. E., D. E. Katsma, T. A. Isaac, and B. K. Bryant.** 1995. Live-capture and translocation of suburban white-tailed deer in River Hills, Wisconsin. Pages 87-96 *in* J. B. McAninch, editor, Urban deer: a manageable resource? Proceedings of the 1993 Symposium of the North Central Section of The Wildlife Society, St. Louis, Missouri.

**Jones, J. M., and J. H. Witham.** 1995. Urban deer "problem-"solving in northeast Illinois: an overview. Pages 58-65 *in* J. B. McAninch, editor, Urban deer: a manageable resource? Proceedings of the 1993 Symposium of the North Central Section of The Wildlife Society, St. Louis, Missouri.

**Jordan, P. A., R. A. Moen, E. J. DeGayner, and W. C. Pitt.** 1995. Trap-and-shoot and sharpshooting methods for control of urban deer: the case history of North Oaks, Minnesota. Pages 97-104 *in* J. B. McAninch, editor, Urban deer: a manageable resource? Proceedings of the 1993 Symposium of the North Central Section of The Wildlife Society, St. Louis, Missouri.

**Knake, B. O.** 1947. Methods of net mending - New England. United States Fish and Wildlife Service, Fishery leaflet number 241, Washington, D. C.

**Mattfield, G. F., J. E. Wiley III, and D. F. Behrend.** 1972. Salt versus browse - seasonal baits for deer trapping. Journal of Wildlife Management 36: 996-998.

**Mayer, K. E., J. E. DiDonato, and D. R. McCullough.** 1995. California urban deer management: two case studies. Pages 51-57 *in* J. B. McAninch, editor, Urban deer: a manageable resource? Proceedings of the 1993 Symposium of the North Central Section of The Wildlife Society, St. Louis, Missouri.

**McAninch, J. B.** 1995. Urban deer management: lessons from the past. Page 1 *in* J. B. McAninch, editor. Urban deer: a manageable resource? Proceedings of the 1993 Symposium of the North Central Section of The Wildlife Society, St. Louis, Missouri.

**McCullough, D. R.** 1975. Modification of the Clover deer trap. California Fish and Game 61: 242-244.

**Morgan, J. T., and G. L. Dusek.** 1992. Trapping white-tailed deer on summer range. Wildlife Society Bulletin 20: 39-41.

**Naugle, D. E., B. J. Kernohan, and J. A. Jenks.** 1995. Seasonal capture success and bait use of white-tailed deer in an agricultural-wetland complex. Wildlife Society Bulletin 23: 198-200.

**O'Bryan, M. K., and D. R. McCullough.** 1985. Survival of black-tailed deer following relocation in California. Journal of Wildlife Management 49: 115-119.

**Rongstad, O. J., and R. A. McCabe.** 1984. Capture techniques. Pages 655-676 *in* L. K. Halls, editor, White-tailed deer: ecology and management. Stackpole Books, Harrisburg, Pennsylvania.

**Roper, L. A., R. L. Schmidt, and R. B. Gill.** 1971. Techniques of trapping and handling mule deer in northern Colorado with notes on using automatic data processing for data analysis. Proceedings of the Western Association of Game and Fish Commissioners 51: 471-477.

**Stradtmann, M. L., J. B. McAninch, E. P. Wiggers, and J. M. Parker.** 1995. Police sharpshooting as a method to reduce urban deer populations. Pages 117-122 *in* J. B. McAninch, editor, Urban deer: a manageable resource? Proceedings of the 1993 Symposium of the North Central Section of The Wildlife Society, St. Louis, Missouri.

**VerCauteren, K. C., and S. E. Hygnstrom.** 1998. Effects of agricultural activities and hunting on home ranges of female white-tailed deer. Journal of Wildlife Management 62: 280-285.

**Warren R. J., L. M. White, and W. R. Lance.** 1995. Management of urban deer populations with contraceptives: practicality and agency concerns. Pages 164-170 *in* J. B. McAninch, editor, Urban deer: a manageable resource? Proceedings of the 1993 Symposium of the North Central Section of The Wildlife Society, St. Louis, Missouri.