



ARTIFICIAL FEEDING OF MICHIGAN DEER IN WINTER

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Artificial feeding of deer has always been a controversial topic. Some people say that deer should be fed in areas where the herd is smaller than the Department's population objective because winter nutrition is the major factor regulating deer herd size in Michigan. People who support artificial feeding of deer may feel that they are helping deer in winter, may want more deer than the range can hold, or may just enjoy concentrating deer for recreational viewing. Others point out that artificial feeding of deer may cause range damage, disease, deer-vehicle accidents near feed sites, and damage to crops or ornamental shrubs on adjacent properties. These people may say that artificial feeding makes deer less wild, more dependent on humans, and may be detrimental to individual animals or to the deer population. Whenever we get a severe winter, these differences of opinion lead to the following questions:

WHY DOESN'T THE STATE USE PUBLIC FUNDS OR HUNTER MONIES TO ARTIFICIALLY FEED DEER IN WINTER?

It is interesting that after the legislature gave the Natural Resources Commission authority to establish deer management rules in 1956, the first Game Division Policy involved deer management direction and the second involved the artificial feeding of deer. Game Division Policy Number 2 opposed the use of artificial feed on a large-scale basis because the costs of that program would exceed the benefits, the carrying capacity of the natural range would be lowered by increased deer browsing of the range, and because any additional deer saved by the feeding would compound the food shortage problem in future years. The policy also recognized that individuals will feed deer on private land, and that the state should provide the best technical information to increase the benefits and decrease the potential problems that might be caused by those private efforts.

This policy was modified by Public Law 87-152 in 1961, allowing government surplus grains to alleviate emergency conditions for resident wildlife. In response, the Department developed Game Policy Number 82, which established policies and procedures to allow for the feeding of surplus corn to deer for emergency purposes. Michigan used surplus corn during four separate winters (1961/2, 1964/5, 1968/9 and 1970/1) to try to help deer survive on overbrowsed deer range. Lessons learned from these failed efforts follow:

- **Feed was supplied to only a very small percentage of the herd.** The number of deer reached by feeding programs for wild deer was insignificant. Fawns, who needed the feed the most, were kept away by more dominant deer who needed feed the least.
- **Feeding was ineffective.** Despite large quantities of corn distributed, starvation was not averted. There was a serious decline in the number of fawns that survived winter, even in areas with feeding. The percentage of yearlings in the buck harvest by hunters the next fall dropped abruptly.
- **Feeding was very expensive and detracted from the Department's ability to do other deer management work.** The cost of distributing 105,000 bushels of corn in 1971 was about \$100,000, which was almost equal to the Department's budget for deer habitat management that year. Efforts to feed deer reduced the time available for effective programs, such as forest cuttings.
- **Hungry deer were killed by the corn through digestive upset.** Many deer carcasses were found in the immediate vicinity where corn had been fed. Feeding grain late in the season to starving deer produced enteritis, diarrhea, and enterotoxemia.
- **Artificial feeding created new problems;** overbrowsing of plants near feeders, frequent deer-vehicle collisions near feed sites, and trails in wintering areas that increased poaching and predator kills.
- **Feeding sent the wrong message** to the public: it reinforced erroneous ideas about deer management. People thought that deer could be stockpiled beyond the carrying capacity of the range. Government feeding did not increase public willingness to harvest surplus deer through regulated hunting;

despite extensive feeding of deer in the Upper Peninsula in 1970/1, the public asked for a moratorium on antlerless deer hunting in 1971. After these four years of failed winter feeding, the Department changed its policy on emergency winter feeding. Wildlife Division Chief Merrill L. Petoskey and Department Director Ralph A. MacMullan developed the following position statement in 1971: *"We recognize that the corn program and other artificial feeding programs have been carried out by the people for humane reasons. People, and the Department, certainly want to do everything that can possibly be done to relieve all forms of wildlife from harsh and inhumane conditions. However, the Wildlife Division, after careful investigation and evaluation of the use of surplus corn to meet emergency conditions for deer, finds that such use is not in the best interest of the deer herd and that it seriously detracts from the proper management of this, most valuable, wildlife resource. We recommend that the use of surplus corn to feed deer during winter emergencies be discontinued."*

Attempts to feed deer in other states and provinces have often met with similar results. The best documented case involved Minnesota, where 3,955 tons of pelletized feed were distributed by the Department of Natural Resources in the winter of 1988/89 in a 46,000 square mile area. The project cost \$1,071,492, 17,000 hours of Department time, and more than 230,000 hours of volunteer time. Mark Lenarz, a Wildlife Research Biologist with Minnesota's DNR, estimated that 54,038 deer were reached through the feeding program in forested units (9.3% of the population) and 18,294 deer were reached in farmland units (22.3%).

Overall, it was estimated that there were 20,899 more deer in the fall 1989 herd than if the feeding were not done.

Despite the failures of deer feeding on a large-scale, research has shown that private feeding efforts can benefit small localized deer populations, if those feeding programs are done properly and surplus deer are controlled through adequate antlerless deer harvest. John Ozoga, a Wildlife Research Biologist with the Michigan DNR studied the biological and behavioral responses to artificial feeding in a deer herd in a square mile enclosure at the Cusino Wildlife Research Station in Shingleton. The herd increased from 23 to 159 in 5 years. Fawn production by yearling does doubled with supplemental feed, increased 50% among 2-year-olds, and climbed 21% in older mothers. Prior to feeding, a third of the fawns carried by does died shortly after birth. After feeding, this post-natal fawn mortality was cut in half to 17 percent. The program, however, was very expensive. It cost \$82.69 per deer to feed deer supplemental food throughout the year and about \$36.75 per deer through winter (given pelletized feed costs of \$220 per metric ton). Winter feed consumption for an average 127 days between December 1 and April 15 was 166.7 kg. or about three pounds per deer per day of high-quality pelletized feed. This would be equivalent to about five pounds of high-quality natural deer browse.

WHAT ARE CURRENT (1996) THOUGHTS WITHIN THE DEPARTMENT ABOUT WINTER FEEDING OF DEER?

The mission of the Wildlife Division is to conserve, enhance, restore, and sustain the State's wildlife resources, their habitats, and the ecosystems upon which plants, animals, and humans depend for their survival and to provide a variety of wildlife-related recreational, educational, and appreciative opportunities for the benefit of Michigan's citizens, visitors, and future generations.

The Department's deer management program must therefore provide public deer hunting for large numbers of hunters at a relatively low cost. An expensive artificial feeding program for deer on a large-scale basis would defeat this objective. Therefore, the Department is opposed to using Game and Fish Protection Fund monies to support any program where deer are fed on a state, region, or county-wide basis.

There is a need to maintain a balance between the size of the deer herd and the carrying capacity of the winter range, while also considering social constraints such as deer-vehicle accidents, agricultural crop damage, other land uses, and ecological factors, such as biodiversity. Public funds for deer management should be spent to influence the natural food supply through carefully-planned timber harvests, alter agricultural practices that affect wildlife, and to develop leasing and land acquisition programs to provide more and better deer hunting opportunities.

Practical experience has shown that the cost of large-scale deer feeding programs far exceeds the value or advantages that might be gained. Artificial feeding of deer may cause serious range deterioration in the areas where deer are fed, causing a drastic decline in the "natural" carrying capacity of the range. The deer fed successfully one winter will be present to reproduce and compound the food-shortage problem the next year. If feeding is carried out year after year, without an adequate deer harvest, the cost of a feeding program large enough to handle the extra deer will "snowball".

The Department realizes that people will feed deer with private funds on private land, even if this is not recommended by professionals. If people choose to feed deer, they should do so with the best technical information available. However, artificial feeding is not a low cost long-term solution to a winter food-shortage problem. Sooner or later, an increased harvest of deer must be relied on to take the surplus animals. In addition, there may be some private lands where the Department would actively discourage artificial feeding of deer. These would include areas with documented or potential density-dependent diseases, areas where the discharge of firearms or bows is limited so that hunting cannot be used to control herds, and areas with severe over-population of deer, relative to carrying capacity. In all cases, artificial feeding on private land cannot be supported where sound practices are not in place to adequately improve or maintain natural habitat for white-tailed deer.

WHAT ARE THE NUTRITIONAL NEEDS OF DEER?

The Department has been involved in deer nutrition research for more than 30 years at the Houghton Lake Wildlife Research Station, in cooperation with Duanne Ullrey, retired Professor from Michigan State University.

Dr. Ullrey has summarized the nutritional needs of white-tailed deer as including nitrogen, essential fatty acids, and chemical elements. They also need water, which can be obtained through liquid, or in succulent vegetation or snow. Vitamins A, D and E are also required by deer. Some indigestible fiber must be present to support normal digestion. In addition, nursing fawns also need several vitamins and essential amino acids.

Deer satisfy these nutritional demands by selecting from a wide assortment of grasses, forbs, woody plants, fruits, nuts, and other plant material. Grasses, sedges, tree leaves, mushrooms and herbaceous plants are favored in spring and summer when the need for minerals and protein is high to maintain fetal growth, milk production, and antler development. Fall foods, like acorns, are favored in fall when deer are laying down fat in preparation of winter. Deer have a 4-chambered stomach (rumen, reticulum, omasum and abomasum) and chew their cud, like a cow, which allows them to eat and digest plant material. The microbes and protozoa inside the rumen are very important and allow deer to digest browse, such as stump shoots and twigs, as winter approaches.

In winter, deer go into a state of semi-hibernation, with a drop in metabolism and food consumption to save energy. Even deer that are allowed to eat everything they want may lose 10% of their body weight during winter months in Michigan. During this time of year, energy is of critical importance



Cutting timber on the edge of winter deer yards provides a viable alternative to supplemental feeding.



The best deer management involves long-range habitat improvement, along with sufficient antlerless harvest to keep deer in balance with their range.

to whitetails. For example, the energy needs of a deer walking in winter are five times that of a bedded deer. Research has shown that deer in northern climates during winter need dry-matter consumption at a digestible energy density of 2.2 kilocalories per gram.

There is also an association between energy and protein requirements. Energy is greatest when protein levels are at 15%. There is less efficiency of energy metabolism at both higher and lower protein levels. Fawns require about 12% protein for maintenance in winter, if given sufficient energy, while adults require less.

Given these interactions, the ideal winter deer diet has 2.2 kilocalories/gram of digestible energy, 12% protein, required vitamins and minerals, and fiber that provides a matrix for rumination but passes quickly without extensive microbial digestion.

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WHAT IS THE BEST KIND OF ARTIFICIAL FEED FOR DEER?

Pelletized feeds that are specially developed for deer are the best supplemental diets. The most acceptable size for pellets is 1/4 to 1/2 inch, which is the size used for sheep (a little smaller than commercial cattle pellets). Although there may be several commercial producers that market feed for exotic ruminants to zoos and game farms, the current (1996) vendor used by the State is HMS Zoo Diets, Inc at 1222 Echo Lane Bluffton, IN 46714. The cost for the quantities we purchase is \$280.00 per ton. This feed is composed of the following:

Corn Cob Fraction.....	34.0%
Wheat Middlings.....	28.1
Soybean meal (44% CP)	21.4
Corn.....	3.5
Dehydrated alfalfa meal (17% CP).....	5.0
Calcium carbonate (38% CP).....	1.2
Salt	0.5
Cane Molasses	5.0
Soybean oil.....	1.0
Mold Chek	0.1
Vitamin premix	0.1
Trace mineral premix	0.1

Pellets should be introduced slowly, over a 7 to 14-day period to prevent digestive upset.

WHAT ABOUT OTHER KINDS OF DEER FOOD?

SPECIAL CROPS. Pea and bean vines, beet tops, apples, rutabagas, sugar beets, carrots and potatoes may be used by deer as they are high in digestible energy. However, by themselves they do not contain enough nutrients to carry deer through winter.

HAY. None of the hays, except second cut alfalfa, will benefit deer. Many studies have reported starved deer in the vicinity of hay piles. Often, deer will eat the softer ends of hay early in the winter, when nutritional needs are highest, leaving the more fibrous

hay for later winter, when it creates the most problems with digestibility. Hay may also remain in the reticulum of deer, thereby reducing the intake of other food, because it is so high in fiber that it cannot be quickly digested. Deer that have been fed a regular diet of second cut alfalfa hay or good quality June or Alsike clover may not show digestive problems but "new" deer attracted to the hay may suffer problems. High quality second cut alfalfa and high quality clover are only recommended for confined herds, where there is no ingress of deer from adjacent areas, where deer can be slowly acclimated to the diet, and where they are supplemented with corn, oats or other grains.

GRAINS. Shelled corn, barley, wheat, and buckwheat are very high in starch. Deer like these grains so much that they may overeat, often with fatal results. When introduced abruptly, the starch produces bacteria that can cause bloating and severe diarrhea. Excess build up of acid can produce lesions, which become infected with bacteria, like clostridium, and cause death from rumenitis. As in the case of hay, deer that are used to a diet of high-starch grains do not seem to have any problem and may derive excellent nutrients from the feed. "New" deer gorging themselves on the grains may die. Grains that are very high in starch are recommended only for confined herds, where there is no ingress of deer from adjacent areas, where deer can be slowly acclimated to the diet, and where they are supplemented with oats, high quality hay or clover or other feed. Soy bean meal, cottonseed oil meal, soy beans and oats do not appear to create as severe a problem, because deer do not like them quite as much as corn so dangerous overfeeding is not induced.

MINERAL BLOCKS. Although mineral blocks may be useful in Spring to provide key nutrients if an area is deficient in specific compounds, these blocks do not usually contain the energy necessary for



Hungry deer may be killed by feeding through digestive upset.

winter sustenance. Manufacturer claims that the blocks increase the digestibility of native browse have yet to be scientifically substantiated.

WHEN SHOULD ARTIFICIAL FEEDING START AND STOP?

Fall feeding of deer in Michigan is completely unnecessary. Deer can receive all fall nutrients from natural plants on the range and from fall mast crops, when available. They will lay down copious amounts of fat with or without artificial feeding.

Feeding should start as soon as deer arrive in their winter cover. This time varies in different parts of the state and from year to year. In most years, deer move to yards in northern Michigan during December and in southern Michigan in mid-January or early February. Waiting to feed deer until late February or March, when they begin to show signs of winter nutritional stress is worse than not feeding deer at all. Sometimes people do not realize the cost of a feeding program and run out of funds to feed deer long before spring arrives. Once started, feeding must continue until Spring greenup, or deer may be worse off than if they were not fed at all.

HOW SHOULD FEED BE DELIVERED?

Feed can be delivered by 3 methods; (1) piles, (2) bags, or (3) feeders. The pile methods involves dumping pails of feed on top of the snow every 10 yards along trails. The bag methods involves cutting open 25 pound grain bags and placing them every 100 yards along trails. Feeders may include several types of constructed devices made out of wood or 50 gallon drums or they may be commercially produced designs. Pile and bag feeding is often done when deer are fed on an emergency basis, while feeders are more commonly used when deer are fed in the



By the time starvation is evident, it is too late to start artificial feeding to help deer survive.

same areas year and year for longer periods of time. Bags were easier to handle and the feed is less apt to get wet or sink in the snow on sunny days. Less feed is wasted using the bag method. Research in Ontario showed that deer may be reluctant at first to eat from bags. They recommend that piles be used first and then feed be delivered in bags.

Some of the best research on winter feeding of deer has been done by Dennis Voigt and his co-workers in the Ontario Ministry of Natural Resources. Research in Ontario tested several types of feed hoppers and concluded that the best and cheapest was one constructed from a 50 gallon drum; they recommend that these drums be placed together in clusters of three. A wooden trough, placed beneath a shelter, has been used successfully for many years at the Houghton Lake Wildlife Research Station.

Commercial hog feeders, bucket feeders, scatter feeders, and tripod feeders are available from several private companies. Many of these are automatic. Feeders with lids may need to be modified early in winter so fawns can learn to get food. After 7 to 14 days, the lid can be closed and fawns will then learn to lift the lids.

Published research done at Cusino Wildlife Research Station recommended that feeders be constructed to service 50 deer and be placed 100 yards apart. Given the recent (1995) outbreak of tuberculosis in Michigan deer, we would now suggest that deer be fed with smaller feeders so that even fewer than 50 deer be serviced at any one site. Feed sites should be even further than 100 yards apart. Large silo-type feeders that service 200-300 deer are not recommended by the Department because of potential disease transmission. Also, large feeding sites tend to be associated with fighting, and the deer that need the food the most are often kept away by more dominant deer.

Feed should be placed in or immediately adjacent to winter cover. This will maximize the use of feed and also reduce the energy expended to seek food.

WHY SHOULD ANTLERLESS DEER BE TAKEN BY HUNTING IN AREAS WHERE MONEY AND TIME WERE SPENT TO ARTIFICIALLY FEED DEER IN WINTER?

Deer populations that are fed in winter will increase about 30-40% each year. If the management objective is to maintain the herd, then that annual increase should be removed through recreational hunting.

If only bucks are harvested, or if no hunting is done, the herd in areas with winter feeding will grow very rapidly, thereby increasing the food shortage problem that necessitated feeding in the first place.

SUMMARY

Artificial feeding of deer on public lands with public funds is not supported by the Department because of the cost and ineffectiveness of those efforts, compared to the alternative of sound habitat improvement over a long period of time. The Department recognizes that some private individuals and private groups will still feed deer with private funds on private land. In those cases, the Department will provide technical advice to minimize the adverse impacts of winter feeding. There may be some situations where the Department will actively discourage feeding of deer on private land, as in areas with documented or potential disease, severe overpopulation relative to carrying capacity, or where hunting is restricted or limited. The Department will also provide technical advice on habitat improvements such as timber harvest, creation of forest openings, and planting of food patches that are sound alternatives to artificial feeding. To be successful, feeding must begin when deer first arrive on winter range and continue through spring breakup when deer return to their fawning territories. The best type of food to use is commercially-produced deer pellets. Feed should be distributed by small feeders or in small bags that are scattered so that disease transmission is minimized and small deer are able to secure food. A sufficient harvest of antlerless deer through regulated hunting is necessary to control herd growth or artificial feeding will hurt more than help deer populations.

"The artificial feeding of deer is not recommended. But, if you do so on your own property anyway, do it right!" George E. Burgoyne, Jr., Wildlife Division Chief.