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Supplemental Feeding of White-Tailed Deer

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Supplemental feeding is controversial—in many states, feeding deer is illegal. At present, 22 states have partial or total bans on feeding or baiting deer. In Texas, however, deer may be fed year-round. Across Texas opinions range from those who believe feeding deer is an inappropriate management strategy, to those who feed "24–7–365."

What follows is a discussion about supplemental feeding, how it relates to habitat management, and a set of suggestions regarding forage establishment for white-tailed deer. White-tailed deer managers in Texas can use this information when deciding whether and how to engage in supplemental feeding of white-tailed deer.

Reasons to feed

Reasons to feed deer include:

- to bait deer for enhanced harvest potential or viewing opportunities
- to supplement deer during times of stress such as summer, winter, or during drought
- to increase carrying capacity above that of native habitat

Baiting

Using supplemental feed or forage as bait to attract game animals has been practiced for many years. Native Americans routinely burned vegetation areas to encourage grazing ungulates such as bison or white-tailed deer to choose one area over another[1]. Although this practice only used native forage species, it was a manipulation of the environment that created a baited area.

There is, however, little scientific agreement as to whether supplemental feeding actually increases hunter success. Research from 1994 concluded that supplemental forage plantings were excellent in aiding the harvest of does for population and sex ratio management, but seldom useful for mature buck harvest in the Southeastern United States[2]. One exception related to mature buck harvest in lightly hunted areas where the harvest was

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so low that bucks did not alter their activity in response to hunters. Another study found hunters in Michigan using bait were no more effective in harvesting deer than those who did not[3]. Yet another study indicated Michigan hunters using bait were 20 percent more effective than when they did not[4]. In Texas, there have been reports of higher hunter success, reduced kill distance, more deer observed, and less time to harvest deer when hunting over bait[5].

Other sources report negative results with baiting. South Carolina study[6] indicated that where baiting was prohibited, total deer harvest rates were 33 percent greater, female harvest rates were 41 percent greater, doe to buck harvest ratios were 12 percent higher, hunter effort per deer was 6 percent less, and that deer-vehicle collisions were 7 percent less when compared to areas where baiting occurred. This data suggests a negative relationship between baiting and deer harvest rates at the regional level in South Carolina.

Advocates often promote baiting as a way to increase deer harvests for population control. Scientists, however, rarely agree on whether baiting deer with supplemental feed or planted forages affect white-tailed deer numbers either way. It is certain though, that baiting has the potential to artificially inflate deer density, thereby increasing the transmission rate of diseases. This will be discussed ahead in more detail.

Supplementing nutrition during stress periods

Another rationale for supplemental feeding is to augment native forage during times of reduced availability or nutritive value—to help animals through a time of nutritional stress[7]. To see the potential benefits of this practice, one must understand the nutrient requirements of white-tailed deer.

White-tailed deer nutrition

White-tailed deer are ruminants like cows, but their diet selection is very different. Whereas cattle are grass-roughage eaters, white-tailed deer are concentrate selectors[8]. Their rumen is small relative to body size and they are less suited than sheep, cattle, and bison to degrading long fibrous forages. Deer and other browsers are best suited to digesting the leaves and stems of trees and shrubs (woody browse) and broad leaf herbaceous plants (forbs) that form small particles in the rumen[9]. Therefore, the diet of a deer consists primarily of forbs and browse (80 percent or more), and to a limited extent, grasses (5 percent or less). The only grasses deer use to any extent are ones that are rapidly degraded in the rumen, such as the small grains, ryegrass, and some native species. Other native plants used by white-tailed deer include fruits and acorns (soft and hard mast) and mushrooms (about 15 percent).

Availability of food plants varies by season, climate, soils, and other factors. Forbs and mast are readily consumed and easily digested, but they are seasonal and may not be available each year. Browse is usually the most important source of energy and nutrients for deer in Texas, because these are typically available throughout the year.

Deer typically use forages that are more than 65 percent digestible. A diet containing 6 percent crude protein will maintain muscle when animals consume about 2 percent of body mass as dry forage per day. For growth and reproduction, deer need 3 to 5 percent of body mass per day with a protein concentration of 12 to 16 percent. If available native forages cannot provide these requirements, deer can be considered under nutritional stress and unable to achieve optimal growth and reproduction. During these periods, the goal of the wildlife manager is to provide steady, ample, nutritional forage. This is typically accomplished with planted forages, or food plots and feed rations.

Supplementing white-tailed deer nutrition

Crops planted for deer have traditionally included corn and soybeans in the Midwest, the small grains oat, wheat, or rye across much of the US, and alfalfa in adapted regions[10]. More recently supplemental crops include various clovers, cowpeas, and chicory.

Historically, these plantings diverged from traditional agriculture practices, in that they usually occurred under prolonged abnormal

conditions to supplement natural forage and browse[11]. These practices expanded from planted forages to feed rations in the latter half of the 20th century.

Although some studies suggested supplementally fed, free-ranging white-tailed deer were demonstrably larger and more productive than unfed deer[12, 13]; others point out that providing white-tailed deer with forages during the winter when some starvation would normally occur could cause populations that regulated hunting would be unable to control[14, 15]. This is one possible unintended negative consequence of feeding deer.

Some researchers say that a combination of normal habitat management practices and maintaining deer densities at relatively low levels are sufficient for sustaining deer in good condition. Others have found supplemental feed use by free-ranging deer in the Gulf Prairies and Marshes region of Texas increased both body size and antler size of male white-tailed deer, but had less effect on female deer[16]. These researchers recommended increased feeder density to improve utilization by younger males and females in general. Supplemental feeding in this region also reduces the differences in antler growth of males that is associated with variable rainfall and frequent drought[17].

Enhancing herd size

Supplemental feeding of white-tailed deer to increase carrying capacity beyond that of native habitat is generally not efficient or cost effective. This is especially true if you ignore other critical aspects of deer management such as habitat management, population control, and buck harvest management. Some managers, however, have achieved increased herd sizes and sustained an increased trophy animal harvest in both humid and arid environments[18].

Aesthetic reasons

Wildlife managers focused on the hunting white-tailed deer typically feed for the reasons detailed above. However, others choose to feed deer for cultural or aesthetic reasons apart from hunting. For example, individuals who see emaciated deer during times of nutritive stress may perceive their efforts to provide supplemental feed as "helping the poor deer survive." This view often comes from a closely held belief they should steward wildlife. At the same time, they may not feel that hunters have a right to harvest these animals. Still others may want to supplement white-tailed deer to enhance body condition, as well as visibility, for those who engage in "wildlife watching." Although a white-tailed deer may be commonplace to a rural or even suburban homeowner, many urban residents do not regularly see wildlife. Feeding may be a way of providing the "illusion of the wild," while providing user groups increased chances of seeing these animals.

The human desire to care for malnourished animals or ensure their visibility through feeding should not be overlooked. At the same time, we must carefully weigh the benefits and risks of supplemental feeding. Below, we outline some of the reasons managers may choose not to feed white-tailed deer.

Reasons not to feed

Health risks from deer supplemental feeding

It has been suggested that the influence baiting has on deer populations can be important to the transmission and maintenance of disease[19]. Concentrating animals increases the rate of density-dependent disease transmission among individuals, through direct or indirect contact. For deer, these diseases range from the relatively benign to the catastrophic. Concentrating animals around feeding sites may cause blue tongue disease or epizoonotic hemorrhagic disease (EHD) to manifest. It can also serve as a transmission ground for chronic wasting disease.

The source of disease in white-tailed deer feeding scenarios is usually from other deer, but can also be related to pathogens present in feeds. Aflatoxins, for example, grow freely in corn feed rations, and can degrade health in many species.

Feed rations are also typically alien to the microorganisms in the rumen of white-tailed deer. These microorganisms aid digestion and are specialized to the types of food these animals

consume. When a new feed is introduced, the rumen microbial population must change. When deer are unable to rapidly adapt their gut fauna, they experience digestive stress, degraded body condition, or even death. Common diseases associated with these digestive disruptions are acidosis and enterotoxemia. In the latter case, overeating grains and grain-based feeds is a pathway for a pathogenic bacteria to infect and kill the deer.

Feeding nontarget species

Those who choose to supplement white-tailed deer often find they are also feeding wildlife species other than deer. While some of these nontarget animals, such as quail or turkey may be equally desirable, others may be nuisances or even predators.

The most common nuisance animals at deer feeding stations are wild pigs, raccoons and opossums—they consume large quantities of feed. In addition to increasing the cost of feeding, these species can spread disease to other wildlife. Other nuisance animals include small mammals, such as mice and rats, that consume and scatter feed rations and damage feeders, and may also transmit diseases or host parasites that affect both white-tailed deer and humans.

Predatory animals may also visit feeders. Coyotes, bobcats, mountain lions, black bears, red and gray foxes, and wild pigs all make frequent visits to deer feeding stations. While those who place cameras at their feeding stations may enjoy viewing these animals, the added risk of predation may run counter to their wildlife management goals.

Aside from the direct effects of predation on white-tailed deer and fawns, concentrating predators near feeders may have consequences for other wildlife species. In southwest Texas, researchers investigated whether feeders for white-tailed deer had any effect on turkey nest predation[20]. They concluded that nest predation was significantly higher near feeder locations. This study and others have led many to believe feeding deer can have negative effects on nontarget wildlife species.

Habitat degradation

Large deer populations can severely degrade an area's vegetation. When supplementing white-tailed deer nutritional requirements, a conscientious manager will manipulate vegetation and soils to increase growth, or remove herbivorous animals—otherwise the area's vegetation will be devastated. One researcher described this type of devastation saying, "I have seen every edible bush and seedling browsed, first to anemic desuetude, and then to death. I have seen every edible tree defoliated to the height of a saddlehorn[21]." Aside from being unsightly, habitat degradation can reduce revenues and lead to soil erosion. Population control and habitat management are both critical components of any wildlife management program.

The positive effects of good range management on the nutritive value of deer diets in Texas are proven. Researchers noted in a rangeland study, that as range condition declined due to overstocking, and plant diversity subsequently decreased, the nutritive value of wild ungulate diets declined[22]. Conversely, the crude protein in the diets of white-tailed deer increased notably on rangeland pastures that were well managed. This work supports other studies that show well-managed habitats, with appropriate stocking rates, can provide excellent nutrition for white-tailed deer[23]. This is especially critical in captive deer herds, where high fences keep white-tailed deer from dispersing to find other forage.

Some research cautions against long-term supplemental feeding in fixed locations because the local range may become degraded[24]. However, a South Texas study noted increased weight gain of fawns receiving supplemental feed at low, moderate, and high deer densities and did not noticed any adverse effect on native deer browse or forbs associated with supplemental feeding[25].

Habitat management

To keep an area suitable for white-tailed deer, the wildlife manager must also be a habitat manager—this usually involves brush management. Woody browse that is more than about 5 feet tall is out of a deer's feeding zone. Taller woody plants may serve as a bedding area and provide screening or

thermal cover, but aside from mast items such as acorns, they offer little in the way of nutrition. In cases where deer can no longer browse effectively, fire, herbicide, or mechanical means are typically used to set back the brush so resprouting may again make browse available. Again, habitat management is an on-going, critical component of any white-tailed deer management plan.

Because no feeding program alone will substitute for good wildlife management, you should adopt the following deer management positions before starting a supplemental feeding program:

a) Improvements to the natural habitat should be part of an ongoing management strategy.
b) Deer populations should be kept below the carrying capacity of the habitat.
c) Harvest strategies should allow bucks to reach maturity.

Although the value of feeding deer remains an open question, the following suggestions will help you establish forages for deer where appropriate. When browse and/or forbs are limited due to drought or heavy snow, introduced forages will likely still be limited. In arid environments, if irrigation is not available, supplemental feeds are likely to be more beneficial to white-tailed deer.

Supplementation strategies: Planted forages and feed

Several forage species are suitable for white-tailed deer. These forages are either warm-season or cool-season and both of these can be either annuals or perennials. Most white-tail forages are annuals.

In Texas, warm-season forages include cowpeas, lablab, soybeans, and chicory. In this group, only chicory requires N fertilizer. Chicory is also the only perennial species in the group.

Cool-season forages include oats, wheat, rye, triticale, the various clovers, medics, and alfalfa. The clovers, medics, and alfalfa do not require N fertilizer. Alfalfa, chicory, and white clover are perennial forages.

Establishment guidelines

Planting forages takes time and can be expensive, so you will need to pay careful attention to details to establish a successful stand. You must also understand the seasonal nutritive requirements of white-tailed deer in order to provide cost-efficient and biologically effective supplementation. To determine if a forage species is economically viable and adapted to your area, consider the following.

Soil type and fertility: Site selection is critical to successful forage establishment and production. Determine if there is an acceptable site capable of supporting plant growth. Consider the site's soil type carefully and determine whether the site is subject to drought, flood, or erosion. Obtain soil analyses from the site(s).

Moisture availability during establishment and growing seasons: A distinct moisture gradient transects Texas from east to west. Check long-term precipitation records, periods of drought, etc., to increase the potential for successfully establishing forage. Timely planting and good seedbed preparation are the best ways to avoid crop failure due to deficient moisture.

Temperature extremes: Many forage plants are cold sensitive. Plants that persist for years in South Texas may not survive the first freeze in North Texas. As well, heat sensitive plants may perform poorly in South Texas and the Edwards Plateau. Ensure that the forages you choose will persist in your region.

Forage palatability and acceptance: If a plant is adapted to your area and produces great quantities of dry matter, it will not be useful if the deer will not eat it. White-tailed deer are very selective in what they eat—make sure the forage you select is palatable to white-tailed deer.

Forage availability for deer: White-tailed deer generally need supplemental nutrition during late summer and late winter because that is when native forages may lack quantity or nutritive value. The growth cycle of forages you choose is very important. Spring-planted, warm-season forages generally provide nutrition June through September. Fall-planted, cool-season forages usually make forage available from November through April. If environmental conditions allow, forage species that are suited to your location can provide valuable nutrition in a timely manner. If a forage does not offer nutrition when it is needed, it is pointless to establish and maintain that species.

Establishment checklist

Select sites based on forage species requirements: Avoid sites that are excessively wet or dry. The size of the forage area will depend on whether you intend it as an attractant, supplement, etc. How much you plant is also a factor of the overall size of the property. Some recommend planting 2 percent or more of the total acreage when supplementing deer. Plant to maximize the "edge" effect—long narrow forage areas will increase the available edge compared to square areas. This will allow for maximum use by white-tailed deer. Do not forget to obtain a soil sample from the site.

Check seed availability and cost: Seed is a relatively inexpensive part of establishing a stand of forage. Purchase seed with guaranteed analysis for pure live seed, weed seed, hard seed, etc. These specifications can often be found on the tag.

In addition to excellent nutritional value, legumes provide their own nitrogen fertilizer. For nitrogen fixation to occur, legumes must be inoculated with specific *Rhizobia* bacteria. If you are going to plant a legume, make sure the inoculant is available. If the legume seed is not pre-inoculated, follow the inoculation procedure to optimize legume production. Contact your county Extension agent or an Extension specialist if you need guidance.

Seed into sod or a clean tilled bed: In east Texas, cool-season forages can be successfully established into warm-season perennial grass sods if you follow procedures outlined below. In other cases, clean-tilled seedbeds usually provide more forage, but may not be an option due to equipment requirements, slope, stumps, rocks, etc.

Prepare the seedbed before planting: Finishing the clean-tilled seedbed may require several trips across the field. Allow time for delays due to weather, equipment failure, etc. Keep the seedbed free of plants to conserve moisture at the site. If sod-seeding, make sure the warm-season grass is grazed or mowed very short before planting.

Locate the equipment you will need: Locate equipment or a custom operator well in advance of the planting date. If someone else establishes the forage, make sure they understand the species, timing, seeding rate, etc. Write it all down—documenting the scope of work and materials will minimize misunderstandings.

Apply limestone based on soil test recommendations: Apply limestone with an effective calcium carbonate equivalent (ECCE) of 100, if available, to achieve the most rapid soil pH change. Phosphorus and K should be incorporated into the clean-tilled seedbed. If sod-seeding, apply limestone to the surface well in advance of planting.

Regardless of location, you should plant quality seed at the proper rate, depth, and time into a moist seedbed. You should also apply fertilizer based on soil test recommendation. Finally, you should be alert for insects or weeds that may require pesticide application. Familiarity with pests and their appropriate treatments can mean the difference between success and failure. If you follow these recommendations and those listed above, you can avoid crop failure or less than satisfactory establishment and production.

Feed rations for white-tailed deer

Wildlife managers have several feeds to choose from. The feed you choose will depend on your goal, but the following will focus on the supplementing nutrition for free-ranging deer. These options are representative, not an exhaustive.

Shelled corn: It has been speculated that Texans feed more corn to deer than any other State. As a source of nutrition, however, corn provides carbohydrates, but lacks many nutritive qualities, and its crude protein content insufficient for growth, reproduction, lactation, and optimal antler production. The main value of corn as a feed is during winter months, when nutrition is limited. As mentioned earlier, it is important to feed a low-aflatoxin (less than 50 ppb) corn, and to store it in a cool, dry environment.

Pelleted feed: Pelleted feeds have long been popular in the livestock industry to provide a near-total nutrient supplement that replaces the complex crude protein, minerals, and vitamins found in forages. In recent years, the feed industry introduced pelleted feeds for deer. Some of these are intended as supplementation in the pasture, others are intended to meet the complete nutritional needs for captive deer production in pen facilities. In the pasture, these can provide supplemental protein to aid in antler growth, reproduction, and lactation. When purchasing a pelleted feed, it is critical to read and understand the content of the feed. You must carefully match the product you use to the target animal's nutritional needs. Remember, white-tailed deer are not cattle and total digestible nutrients (TDN) of the feed for deer should be above that of feed for cattle.

Cottonseed: Cottonseed (in cakes or as a meal) has been used for livestock supplementation for many years. Cottonseed is inexpensive and readily available many areas. It provides ample energy with some protein and vitamins; however, there is concern over potential negative effects on white-tailed deer. In a study on exotic deer species, a compound in cotton plants (gossypol) lead to reduced sperm density and antler mass[26]. Another study, however, suggested the effect was not as detrimental in white-tailed deer, but still urged caution in adopting large-scale cottonseed supplementation. Cottonseed typically does not attract as many nontarget species as corn. Although the benefits of feeding cottonseed supplements are well known in cattle and sheep production, the same results may not apply to deer.

Legumes: Legumes such as black-eyed peas, purple-hull peas, and soybeans, are excellent feed rations for deer. They do not develop aflatoxin, as corn does, and are highly digestible. Many report that deer prefer and adopt legumes as a food item more quickly than they do corn or pelletized feeds. Legumes as feed rations may cost more than similar options, but should be considered as a white-tailed deer supplement.

Deployment methods

Most supplemental feeds can be manually broadcast on the ground. While this is the lowest-cost option in many cases, the labor required may not fit with the manager's schedule. The next lowest-cost option is a traditional livestock feed trough or crib. These structures are designed to contain an amount of feed, and may or may not include a rain cover. While the manager must still monitor these, they do not require daily attention. The last method consists of dedicated feeding devices. Whether the feed is dispersed by gravity or by mechanical device, such as a spin-cast feeder, these are the costliest option. However, they can often be left unattended for extended periods. For nutritional supplementation, a spin-cast feeder is usually not a viable because even when set to maximum spin time, they will not dispense an adequate level of feed.

As you choose a deployment method, also consider disease risks, discussed above, as well as the compatibility of you feed rations with the deployment method. For example, not all mechanical feeders can accept cottonseed, and some corn rations contain bits of corncob that can jam mechanical feed casters.

Feed timing

You need to decide what time of day to feed, and when to feed during the year.

If you are baiting deer for hunting, you should feed shortly before the hunting is to occur. It may be easiest to do this with automated, mechanical feeders, or manual or mechanical broadcasting, such as vehicle-based broadcast feeders.

As to the time of year, feed rations should correspond with the deer's nutritive requirements. For example, protein supplementation is not particularly useful when antlers are not growing or does are not lactating. As well, feed rations may be unnecessary when native forages are adequate, and hunting is not allowed.

Summary

Feeding white-tailed deer will remain a controversial management strategy for the foreseeable future. Proponents have not proven the value of plantings, nor have skeptics proven them worthless. One clear benefit of supplemental feeding is in its educational value to the public[27]. In an increasingly urbanized environment, supplemental feeding can serve to increase the public's awareness and appreciation of wildlife and wildlife management. This is especially important for the general public and elected representatives who may not have a close connection with nature.

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