

# Feeding behavior

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The doe stands at the edge of the alder swamp in the midday sun and surveys the ridge above. After remaining motionless for almost ten minutes, she moves rapidly up the ridge. Two fawns suddenly emerge from the swamp behind her and follow their mother to the base of a large white oak. They go directly, almost as if drawn by a magnet. After again surveying her surroundings, the doe begins a methodical search. With her head near the ground, she walks around the base of the tree, moving her head from side to side in a sweeping motion. Every minute or so she stops and looks up while she chews on the acorns she has found. Her fawns follow her example.

Times are good and the mast crop is abundant. In less than fifteen minutes the deer have eaten their fill and moved farther down the ridge, where they bed in the security of a thicket of aspens. For the next three hours, the deer remain in their beds, chewing their cud.

This typical whitetail feeding behavior—locating preferred foods quickly, consuming them rapidly, and processing the food later—contributes to the success of the species. Unquestionably, the deer's senses of smell and taste aid in finding food, but those senses are likely to operate differently from those of human beings. A deer foraging for acorns, grapes, or persimmons in the forest depends on its keen sense of smell to distinguish good fruits from bad—and to avoid poisonous plants. Our tongues are sensitive

to sweet and sour tastes; deer are thought to be able to detect certain oils, sugars, and amino acids. Moreover, the deer's tongue and lips have great dexterity and can pick up items as small as a kernel of corn. Since deer have no upper incisors, they do not clip their food items, but instead tear or pull herbaceous material from the stems of the plant they are feeding on. When feeding on larger stems and woody vegetation, deer chew the stems with their molars.

As ruminants, deer can ingest their feed without having to thoroughly chew it, thereby limiting the time they spend feeding and being exposed to predators. Only when bedded in a safe place do they regurgitate the cud and chew it into small particles.

Deer are opportunistic in their feeding habits. Although they have definite preferences, the choice of plants they feed on depends largely on what is available. The diet thus changes greatly through the year and around the country. While deer are feeding on acorns in Michigan, deer farther south in Alabama and Mississippi are switching from summer forbs, muscadine grapes, and legumes to leafy vines, greenbrier, and persimmon fruit. At the southern extreme of their range in southern Texas and Mexico, white-tails have subsisted on prickly pear cactus through the summer months and now add winter forbs, mesquite seeds, and browse species. In Montana, deer resort to woody browse species, such as snowberry and cottonwood, with alfalfa fields providing high-



*Acer rubrum*  
red maple

*Vaccinium corymbosum*  
high mountain blueberry

*Fagus grandifolia*  
American beech



*Pseudotsuga menziesii*  
Douglas-fir

*Hamamelis virginiana*  
witch hazel



quality forage to bolster fat stores for the coming winter.

To describe the diet of the white-tailed deer, it is almost easier to say what the white-tail *won't* eat. The wide range and adaptability of the species invite all kinds of qualifications, but a few generalities are possible. Throughout their range, deer prefer fleshy fruits, such as blueberries and huckleberries, persimmons, apples, blackberries, and wild grapes.



Whitetails also relish the leaves and new growth on a variety of woody vines, shrubs, and trees, such as poison ivy, honeysuckle, greenbrier, dewberry, cinquefoil, trumpet creeper, rose, red-osier dogwood, aspen, and oak. Clover, vetch, tick trefoil, and other legumes are important sources of high-quality protein, as are many small leafy annual and perennial plants, such as aster and goldenrod. The legumes also are particularly rich in calcium. Nontoxic fungi and lichens make up a substantial part of the diet and are rich sources of energy and phosphorus.

The appeal of agricultural crops like alfalfa, peas, soybeans, sugar beets, sweet potatoes, corn, wheat, rye, and oats often leads people to consider deer a major economic pest species. Some crops, such as the winter small grains, soybeans, and beans, are eaten both as seed and in the tender growing stages.

Water, like protein, carbohydrates, fats, and minerals, is an important nutrient. Watering generally depends on the moisture content of the feed deer eat. During the spring, for example, deer rarely if ever need free water because their diet consists of succulent plants of high moisture content. In the late summer and early fall, when plants become highly fibrous and less succulent, the whitetail is likely to drink water occasionally to several times a day. In the desert, the need for water is so great that deer may even metabolize body fats to meet their water requirements.

★ The whitetail is a concentrate feeder. Unlike cattle and sheep, it has a small stomach relative to body size and requires, as a result,



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REZENDES

Once deer have consumed forage at ground level, they must strain to reach overhanging branches—resulting in a browse line—or go without food altogether.

a very high-quality diet. Deer prefer high-protein and energy-rich plants that are highly digestible, like browse, leafy plants, and acorns, over more fibrous grasses.

The whitetail changes its diet seasonally to meet the physiologic requirements of the rut, antler growth, pregnancy, nursing, and climatic stress in different periods of the year. Bucks have different nutritional needs at different times of the year from does, and fawns have different nutritional requirements than adults. In general, does experience their greatest nutritional demand just before weaning their fawns in the fall. Bucks are in the best nutritional condition at this time and begin voluntary food restriction until after the rut is through. It is tempting

*Below: A study of deer in Mississippi from fall into early winter revealed that the animals' most intense activity was at dusk; feeding continued through the night. The deer were least active at midday. Source: Jacobson.*

*Bottom: In Mississippi, where seasonal variations in food are less extreme than in more northerly parts of whitetail range, acorns and fruits are preferred when they are available. In winter, browse and grasses assume more importance. Source: Mitchell.*

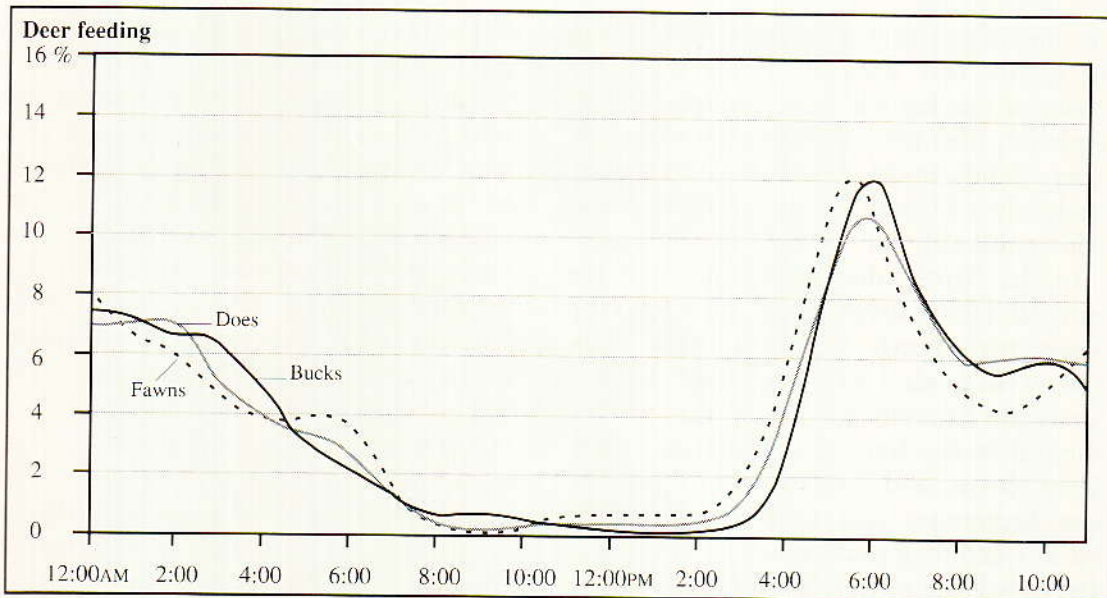
Gaultheria procumbens  
wintergreen

Betula alleghaniensis  
yellow birch

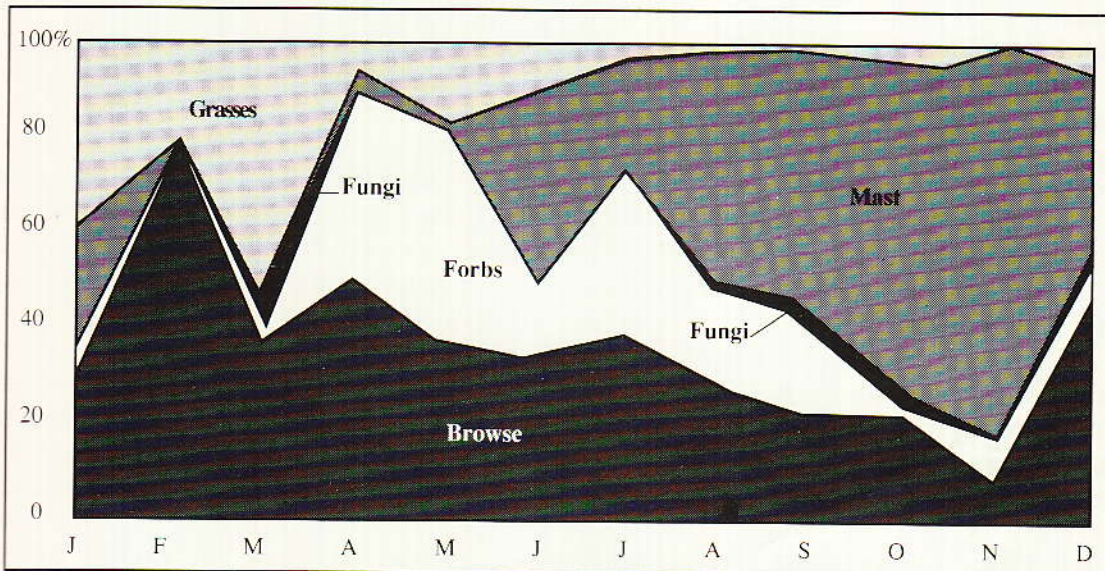
Diospyros virginiana  
common persimmon

Gleditsia triacanthos  
honey locust

Lonicera periclymenum  
honeysuckle



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*Quercus alba*  
white oak



*Sorbus americana*  
mountain ash



*Prunus americana*  
American plum



*Magnolia acuminata*  
cucumber tree



*Juniperus communis*  
juniper



to think that this is an adaptive mechanism to ensure that does recovering from the strain of nursing will have enough food to replenish their body stores before winter arrives. Adult bucks and fawns are usually under their highest nutritional stress in late winter and early spring.

In the North, deer spend much of the early fall taking advantage of the acorn crop along with beech nuts and other high-energy fall foods. Obtaining a heavy store of lipids and fat reserves will be critical to their survival in the lean winter months ahead. Does, fawns, and bucks eat heavily during late September and early October. The bucks reach their peak condition in October and early November, just prior to the start of the rut. Once the rut starts, feeding activity takes second place to the urge to reproduce: body condition declines rapidly.

Other factors that affect what the whitetail eats are geographic location, soil types, and possibly even genetics. Geography determines what climatic stress a deer will have to endure: Stockpiling energy in the form of fat is critical for deer at the northern extremes of the whitetail's range but not so important for southern deer. Conversely, the drought and oppressive heat of a southern summer mean that whitetails in the South must be nutritionally prepared for heat dissipation and water conservation; northern herds have no such need.

There are other geographic differences as well. Plants that are favorite foods of deer in

one location may be low choice or even starvation foods someplace else. Red cedar is one such plant. *Juniperus virginiana* is a preferred food in the Missouri Ozarks and in lower Michigan, but in most of the Southeast, it would be considered a low-quality starvation food. Sumac and red maple are two other browse species that are listed as highly preferred by deer in much of the Northern and Western ranges of white-tailed deer but are consumed in only low to moderate quantities in the Southeast.

The reason for such differences may be in the ground: soil types are known to affect the palatability of some forage species. But perhaps genetics offers another explanation. It is reasonable that evolutionary pressures on deer in different areas would foster different enzyme systems, allowing a race of deer in one location to digest foods with tannins or toxins that deer of another race would be unable to process. Indeed, deer have evolved different enzymes than domestic livestock: they readily consume such "toxic" plants as poison ivy, inedible mushrooms, locoweed, bracken fern, elks clover, rhododendron, mountain laurel, and tansy ragwort.

The microorganisms present in the stomach also affect what deer can and cannot eat. Deer have been known to starve to death with their stomachs full of what normally would be highly nutritious forage because, through disuse and subsistence on starvation foods, they have lost the normal rumen

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*Sambucus nigra*  
elderberry

*Magnolia virginiana*  
sweetbay

*Tilia heterophylla*  
white basswood

*Malus angustifolia*  
crabapple

*Amelanchier*  
downy serviceberry



organisms necessary to digest that kind of good forage.

In general, the whitetail is said to be a crepuscular animal, actively feeding at dawn and dusk. A radio telemetry study conducted by Kammermeyer and Marchinton in Georgia documented crepuscular activity of movements by deer, but recent studies by Jacobson and Darrow using remote sensing devices at feeding stations have failed to confirm that deer are crepuscular in their feeding activity. Wild deer provided shelled corn at feeding stations during the hunting season on a wildlife management area in Mississippi were primarily nocturnal in their feeding. They fed from one-half hour before dusk until about 4 in the morning.

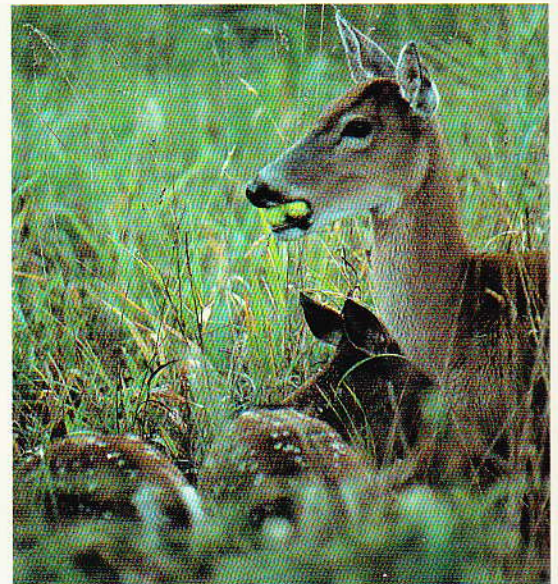
*Fleshy fruits supplement the summer and fall diets. This Columbia whitetail doe takes advantage of the plentiful cultivated apple crops of Washington.*

Personal observation over a fifteen-year period of many deer in captivity has led me to conclude that even in an undisturbed situation, deer are not particularly crepuscular in their feeding habits. I have rarely observed captive deer feeding prior to midmorning, and most daytime feeding activity does not begin until midday or later. Captive deer definitely demonstrate a feeding peak in the late afternoon and early evening hours, but also feed throughout the night.

My current study of wild deer suggests that feeding may begin in late afternoon and last throughout the night. I have conducted observations with a remote camera and timing device at feeding stations for deer accustomed to using a supplemental ration. That nocturnal feeding is an adaptation to human disturbances seems unlikely; the deer maintained this feeding schedule both during and outside of hunting season. Such feeding activity may explain the species' crepuscular movements: animals observed moving in late afternoon are going to feeding areas and those seen moving during early morning are returning from those areas.

Ultimately, perhaps, all the different research results come down to agreement: that the whitetail is a generalist feeder, that it is anything but predictable, and above all, that it is a survivor. Even in the complex man-dominated world of today, the whitetail has managed not only to exist but even to flourish.

—Harry A. Jacobson



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