PennState Extension

# AGRICULTURAL ALTERNATIVES

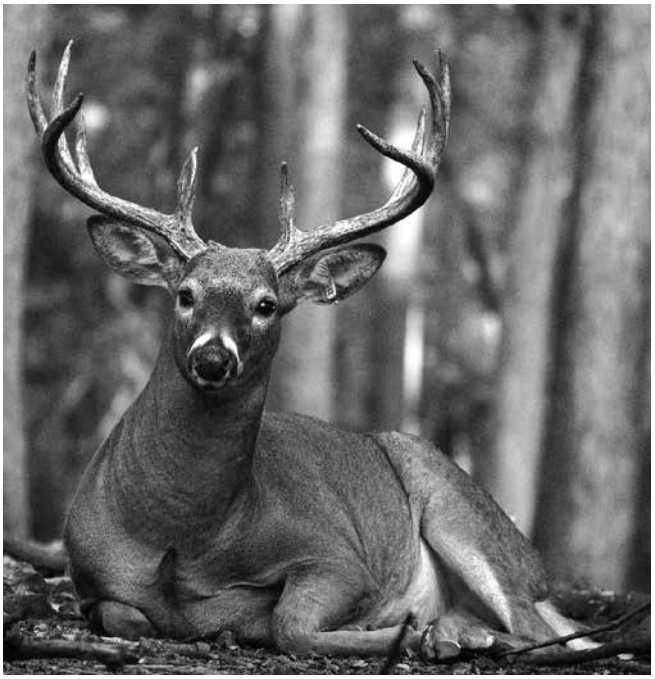
# White-tailed Deer Production

White-tailed deer farming has become an established and growing industry over the past two decades. White-tailed deer (*Odocoileus virginianus*) are a species of wild ruminant commonly found in much of North America and a member of the Cervidae family, which includes deer, caribou, elk, and moose. White-tailed deer have long been prized by hunters for their antlers, meat, and hides. There are 13 to 14 million hunting licenses sold annually in the United States, with between 900,000 and one million sold in Pennsylvania alone.

In recent years, the farming of white-tailed deer has become a successful commercial venture in the United States, with total of more than 4,000 operations generating sales of almost $44 million reported in the 2012 Census of Agriculture. These same statistics show that there were 3,205 white-tailed deer worth $5.7 million sold by Pennsylvania's 217 commercial deer farms in 2012. Although deer farms can be found across the entire United States, over 60 percent are located in Texas, Pennsylvania, Ohio, Michigan, and Minnesota.

The advantages of raising white-tailed deer include the following:

- White-tailed deer have a high fertility rate and long reproductive life.
- They deliver their fawns easily and wean their fawns early.
- They tolerate cold winters and hot summers.
- They can be housed on marginal land that is not well suited for other agriculture purposes.
- They serve as a strong draw for tourism and guided hunts.
- They yield numerous by-products, including high-quality venison, antlers, and hides.



## Marketing

It is essential that a prospective producer thoroughly investigate the markets for buying and selling deer and deer products prior to establishing a white-tailed deer farm. Although the commercial farming of other deer species is well established in New Zealand and the United Kingdom, the management of the animals and resulting products are significantly different from those of white-tailed deer farms. The North American white-tailed deer industry is largely divided into two sectors: breeding farms and hunting ranches. The breeding market is based on sales of animals and semen from established breeding farms to other breeding farms for the purpose of enhancing genetic traits in the offspring, with the ultimate goal of producing bucks with

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desirable traits based on preference and/or market demand. The hunting ranch market is based on a form of agricultural tourism centered on hunting for trophy bucks, which are housed in large tracts of fenced natural habitat within which individuals hunt deer with the assistance of hunting guides. Many of the deer that stock the hunting ranches originate at breeding farms, which serve as the supply chain to the hunting ranches. Additional products and services sold by deer farms include venison, antlers, hides, urine, and lodging and dining for hunters. Although a number of deer by-products may be sold for additional income, there are currently no reliable markets for most by-products.

# Facilities and Equipment

The farming of white-tailed deer requires land for paddocks, a fresh water supply, natural shelter such as trees or brush, and specialized animal handling facilities for animal sorting and treatment. The handling facility is typically composed of a series of pens, connected by chutes, gates, and possibly a floor scale and a squeeze chute or similar device. An animal treatment room equipped with a padded table and medical supplies may be incorporated into this facility. The handling facility may also be used to house bottle-raised fawns in multiple pens.

All deer farms in Pennsylvania are required to be surrounded by a minimum 8-foot fence, although 10-foot fencing is recommended. Fencing should be of woven-wire construction (sometimes referred to as "game fence") or similar design. Electrification is not required or generally recommended, although some producers may find it helpful to include a single strand of electrified wire just above ground level on the outside perimeter to deter predators. Paddock areas are generally composed of partially wooded lots that vary in size from less than one acre to 10 acres or more. These paddocks should contain abundant forage, which typically requires planting a mix of grasses, legumes, and other leafy forages. There should be adequate drainage to eliminate standing water and mud, and a constant source of clean, fresh water that is kept from freezing in winter. A variety of heated water troughs are commercially available. Feed troughs are also necessary in each paddock in order to deliver hay or grain to animals without requiring the feedstuffs to be eaten from the ground. Feed troughs should be covered to prevent feed spoilage during wet weather. Stocking rates should generally not exceed 10 deer per acre of paddock, although lower stocking rates are preferred.

## Animal Handling and Transporting

Proper training and equipment are required for the safe handling and transportation of white-tailed deer. The temperament of white-tailed deer is naturally wary and excitable with little to no tolerance for manual handling or restraint. This necessitates the construction of a well-designed animal-handling facility and the innovative use of chutes, gates, and pens. Most does, fawns, and bucks without antlers can be handled through the use of such a handling facility.

Animals that cannot be run through the handling facility (such as antlered bucks) may also require restraint and handling for a variety of procedures. This will necessitate the use of sedative drugs. Sedatives can be delivered to an animal either through a pneumatic or cartridge-fired dart gun or by syringe injection if possible. Consult your veterinarian for supervision of sedation protocols to ensure that you comply with all laws regarding the use of prescription medications and controlled substances. Additionally, drug withdrawal times must be carefully considered if venison is to be consumed from an animal that has been previously sedated or medicated. It is highly recommended that anyone who will be sedating and handling deer attend a training course in safe animal handling. Such courses are offered periodically by Penn State and other educational institutions.

Animals may be transported between facilities through the use of an animal crate or a modified livestock trailer. Highly fractious animals may require the use of sedative drugs for transport, but more docile animals can sometimes be transported without sedation. Animals may be placed into an animal crate to prevent them from harming themselves or escaping. If an animal crate is used, the animal should be frequently monitored to ensure that it is able to breathe appropriately. If a livestock trailer is used, the trailer must be modified to fully enclose the top and all sides to prevent excessive light from entering the trailer and to prevent escape.

# Breeding

White-tailed does generally reach sexual maturity and can become pregnant at 6 to 8 months of age, resulting in the birth of their first fawn when they are one year old. Does that have reached a body weight of approximately 80 pounds by 6 to 8 months of age have the best chance for a successful pregnancy. Bucks usually reach sexual maturity when they are 7 to 8 months old, but mature bucks between 2½ and 6½ years old are usually used as breeders.

Two types of breeding systems are commonly used in white-tailed deer farming operations: (1) natural cover, in which mature bucks are placed with fertile does to mate naturally and (2) artificial insemination, in which straws of semen frozen in liquid nitrogen are used to manually inseminate sedated does. With natural cover, it is generally estimated that one buck can successfully inseminate 10 to 15 does. A buck is typically placed in an enclosure with does intended to be bred between late October and November during the breeding season, or rut. The buck and does typically remain housed together for at least two months, after which time the buck may be removed to another enclosure.

Artificial breeding systems vary, but they typically use hormonal injections to synchronize estrus cycles for the entire herd to allow for timed insemination. Insemination may be performed either by direct deposition of collected

semen into the female reproductive tract through the cervix (transcervical insemination) or through a surgical procedure that deposits semen into the uterus itself through the abdominal wall (laparoscopic artificial insemination). Artificial insemination techniques are often favored because they allow for the use of purchased semen from a wide variety of bucks and do not require the presence and management of bucks in the breeding herd.

Natural cover may also be used as a supplement to artificial insemination methods. For example, following artificial insemination, does may be housed with a mature buck that would breed any does that did not become pregnant as a result of artificial insemination. In order to determine the sire of the pregnancy, or if otherwise desired, does can be checked for pregnancy by collection of a blood sample for "pregnancy specific protein" at a minimum of 40 days' gestation. Many breeding farms register their fawns in the North American Deer Registry pedigree database. The fee for registering DNA is $75 per animal; fawns would be registered each year. For more information on the DNA registry, see **https://www.dnasolutionsusa.com/animal/animal_nadr.asp.**

The breeding season lasts from late October through early December, and fawns are commonly born from May through July. Yearling does typically produce single births, while mature does 2 to 10 years old usually have twin fawns. It is not uncommon for mature does with optimum health and nutrition to produce triplet births.

# Nutrition

The diet of farmed white-tailed deer should be composed largely of forages, including leafy natural browse, legumes (including clover or alfalfa), and grass hay. The remainder of the diet may include grain or a grain-based pellet, preferably balanced with vitamins and minerals based on the life stage of the animals being fed. Clean, fresh water should be available at all times.

Ideally, deer should be grouped and fed according to life stage in order to best manage their physical and nutritional needs. Pregnant and lactating does will have higher nutrient requirements than animals that are not pregnant or lactating. Bucks tend to lose a significant amount of body weight during and after the breeding season, so they will have greater nutrient requirements during the recovery period in order to prepare them for the following year's antler growth and breeding season.

Many deer farms prefer to bottle feed doe fawns to acclimate them to human handling, resulting in a more docile temperament for greater ease of handling. This practice can be effective, but it is critical that the producer have a complete understanding of the nutritional needs of growing fawns in order to provide for their proper nourishment. Many commercial products are available as fawn milk replacers, but the general recommendation for a producer who wishes to bottle feed fawns is to use a milk replacer with nutrient values that closely resemble those of white-tailed doe milk. The practice of bottle feeding buck fawns is strongly discouraged due to the potential for aggressive behavior in bottle-fed bucks as they mature, particularly during the rut.

# Herd Health Program

White-tailed deer are susceptible to a number of parasitic, bacterial, viral, and fungal diseases. While some of these diseases can result in severe illness or death, they often result in subclinical levels of disease that can be overlooked by the producer. Subclinical disease can have profound effects on animal growth, productivity, and health as well as the profitability of the deer farm. Fortunately, several basic animal health practices are available to guide the producer in maintaining a healthy herd. These general practices are as follows:

1. Establish a professional relationship with a local herd veterinarian.
2. Implement sound biosecurity practices.
3. Maintain low stocking densities.
4. Effectively utilize preventive health products such as vaccines and deworming medications. The use of vaccines and deworming medications is a complex issue that must be customized to the specific needs of each individual farm. Consult your local veterinarian for professional guidance on developing your herd health program.

# Cervid Health and Transportation Regulations

As with all livestock species, captive white-tailed deer are subject to interstate movement regulations and intrastate disease surveillance and monitoring. The primary regulatory diseases of concern are bovine tuberculosis, bovine brucellosis, and chronic wasting disease (CWD). Because these diseases are known to exist in both captive and wild cervid populations (which include deer, elk, caribou, and moose) in several areas of the country, they are more highly regulated than traditional livestock species. This is a very important consideration for individuals interested in raising these types of animals.

Bovine tuberculosis is a chronic contagious respiratory disease, and brucellosis is a chronic contagious reproductive disease. They are zoonotic diseases, meaning they are transmissible to numerous animal species, including humans. White-tailed deer must test negative for bovine tuberculosis and brucellosis to be legally transported across state lines. A voluntary accreditation/certification program exists for white-tailed deer breeders who choose to participate. Testing for these diseases involves considerable cost, and it is not unusual for herds conducting disease testing to experience animal mortalities due to the stress of restraint and handling.

Chronic wasting disease is a contagious and fatal disease of white-tailed deer, elk, moose, mule deer, black-tailed deer, sika deer, red deer, and their hybrids. Unlike bacterial or viral pathogens, CWD is caused by an abnormal prion, or brain protein, that changes the structure of brain tissue and eventually leads to physical and neurological deterioration of the infected animal. CWD has been found in both captive and wild cervid populations in numerous states and has been designated a "Dangerous Transmissible Disease" in Pennsylvania. The Pennsylvania Department of Agriculture (PDA) has the responsibility to control the spread of CWD in the state's captive cervid population. A General Quarantine Order has been developed to control this disease and establishes the requirements for the voluntary Herd Certification Program and mandatory Herd Monitoring Program. A copy of the CWD General Quarantine Order and information related to the importation and movement requirements of white-tailed deer can be found on the PDA website. All cervid producers are required to participate in one of the CWD monitoring programs.

# Environmental Regulations

All agricultural operations in Pennsylvania, including small-scale and part-time farming enterprises, operate under the Pennsylvania Clean Streams Law. A specific part of this law is the Nutrient Management Act, which is of particular importance if you have livestock on your farm. However, all operations may be a source of surface water or groundwater pollution. Because of this possibility, you should contact your local Soil and Water Conservation District to determine what regulations may pertain to your operation.

# Risk Management

You should carefully consider how to manage risk on your farm. First, you should insure your facilities and equipment. This may be accomplished by consulting your insurance agent or broker. It is especially important to have adequate levels of property, vehicle, and liability insurance. You will also need workers' compensation insurance if you have any employees. You may also want to consider your needs for life and health insurance and if you need coverage for business interruption or employee dishonesty. For more on agricultural business insurance, see "Agricultural Alternatives: Agricultural Business Insurance." For more information on farm liability issues, see "Agricultural Alternatives: Understanding Agricultural Liability."

Second, check to see if there are multi-peril crop insurance programs available for your crop or livestock enterprises. There are crop insurance programs designed to help farmers manage both yield risk and revenue shortfalls. However, individual crop insurance coverage is not available for all crops or livestock enterprises. If individual coverage is not available for what you produce, you may be able to use the Whole-Farm Revenue Protection (WFRP) program to insure the revenue of your entire farm operation. To use WFRP you must have 5 years of Internal Revenue Service (IRS) Schedule F forms. For more information concerning crop insurance, contact a crop insurance agent or check the Pennsylvania crop insurance education website at **extension.psu.edu/crop-insurance**.

Finally, the USDA Farm Service Agency has a program called the Noninsured Assistance Program (NAP), which is designed to provide a minimal level of yield risk protection for producers of commercial agricultural products that don't have multi-peril crop insurance coverage. NAP is designed to reduce financial losses when natural disasters cause catastrophic reduction in production. NAP coverage is available through your local USDA Farm Service Agency office. The application fee for this program may be waived for eligible limited-resource farmers.

### Initial Resources for a Start-up Operation

- Land: 10 acres
- Labor: 400 hours
- Capital: up to $100,000

Start-up capital includes all facilities and purchasing 4 bucks, 5 bred does, and 9 fawns.

# Sample Budgets

Included in this publication are three sample budgets summarizing costs and returns for white-tailed deer production. The first is for a start-up operation, the second is for selling animals to hunting preserves, and the third is for selling semen and animals. These budgets should help ensure that you include all costs and receipts in your calculations. Costs and returns are often difficult to estimate in budget preparation because they are numerous and variable. Think of these budgets as an approximation and make appropriate adjustments using the "your estimate" column to reflect your specific production conditions. Additional livestock budgets can be found in the Agricultural Alternatives website, **extension.psu.edu/business/ag-alternatives**. More information on using livestock budgets can be found in "Agricultural Alternatives: Budgeting for Agricultural Decision Making."

## Sample Budget White-tailed Deer Production

Start-up budget for established enterprise selling live animals for breeding and stocking with a herd of 4 buck, 5 bred does, and 9 doe fawns (beginning with lower quality genetics) and building to a herd size of 30 adult bucks and does.

| Item | Head | Unit | Price | Total | Your Estimate |
|---|---|---|---|---|---|
| **Variable Costs** | | | | | |
| *Feed* | | | | | |
| Hay (alfalfa) | 110 | bales | $7.00 | $770.00 | |
| Pelleted feed (18% protein) | 30,000 | pounds | $0.30 | $9,000.00 | |
| Milk replacer (fawns) | 10 | fawns | $160.00 | $1,600.00 | |
| Pasture maintenance | 6 | acre | $67.00 | $402.00 | |
| **Total feed costs** | | | | **$11,772.00** | |
| *Health program* | | | | | |
| Vaccination bucks/does | 16 | head | $28.00 | $448.00 | |
| Vaccination fawns vitamin E | 16 | head | $1.00 | $16.00 | |
| Artificial insemination | 10 | does | $120.00 | $1,200.00 | |
| Semen | 10 | does | $100.00 | $1,000.00 | |
| Testing/sedation/antibiotics | 18 | animals | $30.00 | $540.00 | |
| Veterinarian expense | 3 | visits | $125.00 | $375.00 | |
| Transportation | 16 | head | $15.00 | $240.00 | |
| Advertising | 16 | head | $25.00 | $400.00 | |
| Hired labor | 400 | hours | $13.00 | $5,200.00 | |
| Supplies and miscellaneous | 16 | head | $5.00 | $80.00 | |
| Interest on operating capital | | | | $570.00 | |
| **Total variable costs** | | | | **$21,841.00** | |
| **Fixed Costs** | | | | | |
| Buck | 1 | head | $17,500.00 | $17,500.00 | |
| Bred doe | 7 | head | $3,600.00 | $25,200.00 | |
| Doe fawns | 4 | head | $2,000.00 | $8,000.00 | |
| Insurance | | | | $20.00 | |
| Depreciation (buildings and equipment) | | | | $1,650.00 | |
| Repairs | | | | $20.00 | |
| Interest on investment | | | | $290.00 | |
| **Total fixed costs** | | | | **$52,680.00** | |
| **Total Costs** | | | | **$74,521.00** | |

You should monitor local markets and contact suppliers to determine current prices for all items contained in this sample budget.

## Sample Budget White-tailed Deer Production

Budget for established enterprise selling live animals for breeding and stocking with a herd size of 10 adult bucks and 20 does after 5 years after start-up with lower quality genetics.

| Item | Head | Unit | Price | Total | Your Estimate |
|---|---|---|---|---|---|
| **Receipts** | | | | | |
| Bucks (200- to 250-inch class) | 2 | head | $3,427.00 | $6,854.00 | |
| Bucks (130- to 200-inch class) | 4 | head | $2,570.00 | $10,280.00 | |
| Does | 9 | head | $1,000.00 | $9,000.00 | |
| Doe fawns | 8 | head | $500.00 | $4,000.00 | |
| Buck fawns | 5 | head | $1,500.00 | $7,500.00 | |
| **Total receipts** | | | | **$37,634.00** | |
| **Variable Costs** | | | | | |
| *Feed* | | | | | |
| Hay (alfalfa) | 180 | bales | $7.00 | $1,260.00 | |
| Pelleted feed (18% protein) | 50,000 | pounds | $0.30 | $15,000.00 | |
| Pasture maintenance | 6 | acre | $70.00 | $420.00 | |
| **Total feed costs** | | | | **$16,680.00** | |
| *Health program* | | | | | |
| Vaccination bucks/does | 30 | head | $28.00 | $840.00 | |
| Vaccination fawns vitamin E | 27 | head | $1.00 | $27.00 | |
| Artificial insemination | 9 | does | $120.00 | $1,080.00 | |
| Semen | 9 | does | $100.00 | $900.00 | |
| Testing/sedation/antibiotics | 30 | animals | $30.00 | $900.00 | |
| Veterinarian expense | 3 | visits | $125.00 | $375.00 | |
| Transportation | 28 | head | $15.00 | $420.00 | |
| Advertising | 28 | head | $25.00 | $700.00 | |
| Hired labor | 500 | hours | $13.00 | $6,500.00 | |
| Supplies and miscellaneous | 30 | head | $5.00 | $150.00 | |
| Interest on operating capital | | | | $780.00 | |
| **Total variable costs** | | | | **$29,352.00** | |
| **Fixed Costs** | | | | | |
| Insurance | | | | $900.00 | |
| Depreciation (buildings and equipment) | | | | $7,400.00 | |
| Repairs | | | | $900.00 | |
| Interest on investment | | | | $2,700.00 | |
| **Total fixed costs** | | | | **$11,900.00** | |
| **Total Costs** | | | | **$41,252.00** | |
| **Returns Above Variable Costs** | | | | **$8,282.00** | |
| **Net Returns** | | | | **$(3,618.00)** | |

You should monitor local markets and contact suppliers to determine current prices for all items contained in this sample budget.

## Sample Budget White-tailed Deer Production

Budget for established enterprise selling live animals for breeding and stocking and semen collection with a herd size of 10 adult bucks and 20 does 5 years after start up with high-quality genetics.

| Item | Head | Unit | Price | Total | Your Estimate |
|---|---|---|---|---|---|
| **Receipts** | | | | | |
| Bucks (200- to 250-inch class) | 4 | head | $3,400.00 | $13,600.00 | |
| Bucks (130- to 200-inch class) | 2 | head | $2,500.00 | $5,000.00 | |
| Does | 9 | head | $2,800.00 | $25,200.00 | |
| Doe fawns | 8 | head | $1,500.00 | $12,000.00 | |
| Buck fawns | 5 | head | $2,400.00 | $12,000.00 | |
| Semen | 10 | straws | $2,000.00 | $20,000.00 | |
| **Total receipts** | | | | **$87,800.00** | |
| **Variable Costs** | | | | | |
| *Feed* | | | | | |
| Hay (alfalfa) | 180 | bales | $7.00 | $1,260.00 | |
| Pelleted feed (18% protein) | 50,000 | pounds | $0.30 | $15,000.00 | |
| Milk replacer (fawns) | 13 | fawns | $160.00 | $2,080.00 | |
| Pasture maintenance | 6 | acre | $70.00 | $420.00 | |
| **Total feed costs** | | | | **$18,760.00** | |
| *Health program* | | | | | |
| Vaccination bucks/does | 30 | head | $28.00 | $840.00 | |
| Vaccination fawns vitamin E | 27 | head | $1.00 | $27.00 | |
| DNA registration for fawns | 27 | head | $75.00 | $2,025.00 | |
| Artificial insemination | 18 | does | $350.00 | $6,300.00 | |
| Semen | 18 | does | $650.00 | $11,700.00 | |
| Testing/sedation/antibiotics | 30 | animals | $30.00 | $900.00 | |
| Veterinarian expense | 4 | visits | $125.00 | $500.00 | |
| Transportation | 28 | head | $15.00 | $420.00 | |
| Advertising | 28 | head | $25.00 | $700.00 | |
| Hired labor | 600 | hours | $13.00 | $7,800.00 | |
| Supplies and miscellaneous | 30 | head | $5.00 | $150.00 | |
| Interest on operating capital | | | | $1,030.00 | |
| **Total variable costs** | | | | **$51,152.00** | |
| **Fixed Costs** | | | | | |
| Insurance | | | | $900.00 | |
| Depreciation (buildings and equipment) | | | | $7,500.00 | |
| Repairs | | | | $900.00 | |
| Interest on investment | | | | $2,700.00 | |
| **Total fixed costs** | | | | **$12,000.00** | |
| **Total Costs** | | | | **$63,152.00** | |
| **Returns Above Variable Costs** | | | | **$36,648.00** | |
| **Net Returns** | | | | **$24,648.00** | |

You should monitor local markets and contact suppliers to determine current prices for all items contained in this sample budget.

# For More Information

## Publications


Becker, J. C., L. F. Kime, and J. K. Harper. "Agricultural Alternatives: Understanding Agricultural Liability." University Park: Penn State Extension, 2011.

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Kime, L. F., J. A. Adamik, E. E. Gantz, and J. K. Harper. "Agricultural Alternatives: Agricultural Business Insurance." University Park: Penn State Extension, 2004.


## Websites

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**www.nadefa.org/articles/general-information-about-deer-farming**

Penn State Deer Research Center
**animalscience.psu.edu/facilities/deer-pens**

Penn State Department of Veterinary and Biomedical Sciences
**vbs.psu.edu**

Pennsylvania Deer Farmers Association
**www.padfa.com**

Pennsylvania Department of Agriculture Chronic Wasting Disease Program
**www.portal.state.pa.us/portal/server.pt/gateway/PTARGS_0_2_24476_10297_0_43/AgWebsite/ProgramDetail.aspx?name=Chronic-Wasting-Disease-Program-&navid=12&parentnavid=0&palid=32&**

Texas A&M, "White-tailed Deer Biology"
**wildlife.tamu.edu/files/2010/05/White-tailed-Deer-Biology.pdf**


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