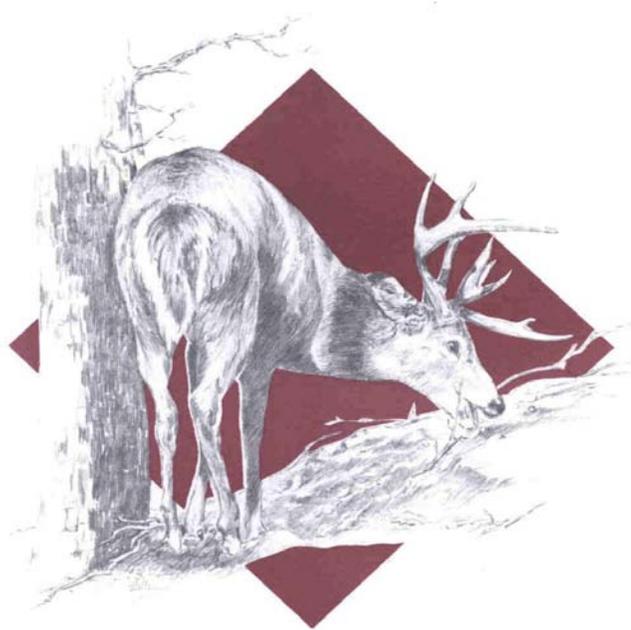


# Supplemental Feeding

by  
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## ***AUTHOR'S NOTE:***

In 1978 an article was published in the October issue of the Texas Parks and Wildlife magazine on supplemental feeding. Following public response to that article it was felt that a bulletin, made available to the public, on supplemental feeding would be beneficial. The first bulletin was printed in 1979.

Since that time the practice of supplemental feeding of wildlife, especially deer, has initiated research experiments resulting in new information, new formula, and some change in feeding programs.

The original intent then, as well as now, is for this bulletin to be a basic guide, informative in nature, and not address all of the technical aspects involved in a supplemental feeding program. Each individual should have specific goals in a wildlife management program that should be addressed on an individual basis with the assistance of professionals in the wildlife management field.

## ***ACKNOWLEDGEMENTS***

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### **Supplemental Feeding**

Many landowners and hunters consider supplemental feeding an important factor in deer management and a source of nutrition when native forage is inadequate either in quantity or quality. Under certain conditions a supplemental feeding program can help; however, most deer feeding programs which provide sufficient additional nutrients to be of value, are expensive.

There is a distinct difference between feeding and baiting deer. Maintaining deer feeders from October through December is a common practice on many ranches to attract deer to hunting blinds during the hunting season. Unfortunately most of these baiting efforts cease just before additional feed is really needed by the deer. Supplemental feeding should be done during stress periods and then only under specific conditions. Stress periods for deer are usually encountered when the protein content of the forage is at a low level during severe winters, dry springs and dry summers.

Supplemental feeding of deer is expensive, and unless properly done, it is of little or no benefit to the deer. The most efficient means of insuring adequate nutrition is through a good range management program that provides sufficient cover and a variety of browse plants as well as forbs. This is done by reducing deer numbers and domestic livestock numbers to levels that allow the range to recover and remain in good condition. A common mistake made by many landowners attempting to develop a range management plan is to disregard the number of animal units of deer present when calculating use of the range. If deer are present, they are utilizing available forage and must be considered as part of the stocking rate. If large numbers of deer are desired, domestic livestock must be reduced to prevent damage to the range. Under good range conditions, deer and cattle do not compete for food; however, deer, sheep and goats are in direct competition for the available food supply. When a range is in poor condition deer and cattle will compete for forb and browse plants.

Supplemental feeding of deer may be beneficial if the herd is harvested adequately each year and the range is in good condition. Only under closely controlled conditions will supplemental feeding benefit growth rate of body and antlers. The benefits of a supplemental feeding program may be more quickly realized when feeding is done within deer-proof fenced areas that permit the landowner to closely control deer numbers.

Dr. Larry Varner, Consulting Nutritionist on Wildlife and Livestock, New Braunfels, Texas, feels that there are certain advantages and disadvantages to any feeding program and offers the following for consideration:

#### **ADVANTAGES:**

1. Trophy class animals at an earlier age.
2. Lower post rut mortality in bucks.
3. Allow genetically superior animals to reach their potential.
4. Carry more quality animals in a given area.
5. Smooth out 'boom or bust' population cycles.
6. Expand range or hold animals in an area if other factors are not limiting.

#### **DISADVANTAGES:**

1. Long term commitment
  - a. Learned behavior
  - b. Three (3) year response time
2. More intensive management required

- a. Harvest management
  - b. Marketing
  - c. Feeding program management
3. Cost
    - a. Feed and equipment
    - b. Labor
  4. Feeding non-target animals

An important consideration in any feeding program is the type of feed to be used. Feed types vary from fertilized food plots to commercial cubes, pellets and blocks. In East Texas, the most popular method of supplementing the diet of deer is to plant food plots. Deer eat most agricultural crops but prefer those which are fertilized. Fertilization of native plant species will also increase usage of these plants by deer.

On the Kerr Wildlife Area in the Texas Hill Country, deer in research pens consume three to five pounds of 16 percent protein pellets per day per animal. The age of the deer as well as the season of the year affect the amounts of food taken by the animals. Bucks will increase food consumption during antler development and does will consume more feed during lactation. During the fall and winter seasons, following weaning, fawns will increase the food consumption. Doe deer also require nutrition during the fall and winter months for good reproductive success.

In the Texas Hill Country the most popular feed used to supplement the diet of deer is corn, although it is one of the poorest types of deer feed available. Corn is low in protein (approximately seven to ten percent) and high in carbohydrates. Corn does not provide adequate protein levels needed for development of bone and muscle; however, corn may be used as an energy supplement during very cold period of the winter.

A deer must obtain at least 6 to 7 percent crude protein diet just to maintain rumen function. A diet of less than 10 percent protein will result in inferior animals and poor antler development. Deer need a daily diet of 12 to 16 percent protein for optimum development of bone and muscle.

Dr. Varner feels that at times the protein content in supplemental feeds fed during antler growth and lactation should be 20 percent. He states "I agree that the total protein level in the diet does not need to be over 16 percent. A higher level will not hurt the deer, it is just more protein than they can effectively utilize. The 20 percent protein feed is not designed to be fed as the total diet. It is a supplement to the natural diet during periods of nutritional stress such as antler development or late stages of gestation and lactation. My research (Barnes and Varner, 1989) has shown that during certain times of the year or during drought, the forage that deer are consuming may be as low as 6 to 7 percent digestible protein. Unfortunately, many times there are periods when bucks are growing antlers and does are lactating. During this time a 20 percent protein supplement can be used effectively to raise the protein in the total diet to an acceptable level. It is much like feeding your cows 41 percent protein cottonseed cake during the winter to raise the protein level in the cow's diet to a level that will maintain acceptable production. In addition, when a buck is growing antlers, I would much rather feed him a little more than he needs rather than short him. Once antler development is complete then you can feed the 16 percent protein feed."

Minerals most important to a deer's body and antler growth are calcium and phosphorus. Most Texas range lands are adequate in calcium but deficient in phosphorus. If supplemental feed is made available to white-tailed deer it should have an adequate supply of calcium and particularly phosphorus. Many trace mineral are important to deer but natural forage usually contains sufficient amounts for body and antler growth.

In past studies, optimum antler and body growth were obtained when deer were fed a diet containing 0.64 percent calcium and 0.56 percent phosphorus. Calcium-phosphorus ratios ranging from one to one or two to one are sufficient. Greater amounts of one of these minerals may be detrimental even though the supply of the other is adequate.

**RECOMMENDED NUTRIENT LEVEL IN DEER DIETS** by: Larry W. Varner, Ph.D.

<b>Nutrients</b>	<b>Deer Needs</b>		<b>Content in Grains</b>		
	<b>Adults</b>	<b>Fawns</b>	<b>Corn</b>	<b>Milo</b>	<b>Wheat</b>
Crude Protein, %	13-14	16	9.90	10.10	13.10
TDN, %	60-68a	65	80.00	76.00	77.00
Calcium, %	0.4-0.75b	0.6	0.03	0.04	0.05
Phosphorus, %	0.3-0.45b	0.4	0.28	0.30	0.35
Magnesium, %	0.25	0.25	0.10	0.13	0.14
Potassium, %	0.6	0.75	0.33	0.31	0.41
Selenium, ppm	0.25	0.25	0.13	0.20	0.25
Cobalt, ppm	0.3	0.3	0.38	0.50	0.40
Copper, ppm	15	18	3.50	4.30	5.80
Iron, ppm	250	290	40.00	50.00	60.00
Manganese, ppm	100	110	5.70	15.80	41.50
Iodine, ppm	1	1	>0.01	>0.01	0.25
Zinc, ppm	75	100	20.00	17.00	31.00
Vitamin A, 1U/1b	2000	3000	4000.00	180.00	0.00
Vitamin D, 1U/1b	500	550	0.00	0.00	0.00
Vitamin E, 1U/1b	40	60	9.00	5.50	7.10

- (a) Feed higher energy levels during periods of climatic or physiological stress.
- (b) Feed higher mineral levels during lactation or active antler growth.

Studies conducted by Texas Parks and Wildlife biologists have indicated that vast acreages of Texas' deer range are overgrazed by domestic livestock and the levels of crude protein in available deer forage is below desired levels. The exception is in the South Texas Brush Country where protein content in forage varies from season to season but maintains a higher annual average than most other areas of the State. In the Edwards Plateau, or Hill Country, the average annual protein content in the vegetation utilized as deer food is below the desired level on the majority of the range. Add an over-populated deer herd, overgrazed and overbrowsed ranges and the result is relatively smaller deer and bucks with inferior antlers.

If deer have the genetic capability for quality antlers and body size, good quality bucks result from a combination of adequate nutrition, good calcium and phosphorus during early stages of body and antler development, and age. A buck will usually be at the peak of body and antler development at 5.5 to 6.5 years of age.

Before a supplemental feeding program is started, a landowner should examine his ranch and determine if (1) his deer herd is at or slightly below the carrying capacity of the range, (2) the range is in good condition, and (3) his annual deer harvest is adequate. Accurate field records need to be maintained to manage a deer herd. Records of annual harvest of bucks and

does, field dressed weights of animals harvested, antler measurements of bucks (inside spread, basal circumference of main beam, number of points) and, most important of all, the age of the animals harvested should be collected. The importance of recording the age of harvested animals can not be stressed enough. Other information that might be of importance to the rancher is a vegetation inventory of forage plants available and annual usage of forage plants. Parks and Wildlife Department biologists are available to assist landowners in establishing harvest quotas for their particular ranch. If the deer herd is on poor range and overpopulated due to inadequate harvest, then a supplemental feeding program would be a waste of money and effort.

When the decision is made to initiate a supplemental feeding program, the land manager must decide what type of program best suits his operation.

### **FOOD PLOTS**

Food plots can be planted where cultivation is possible and soil types and rainfall meet the requirements of the crop to be planted. Due to the diversity of the ecological regions of Texas, it is advisable to contact local Soil Conservation Service (SCS), Texas Agricultural Extension Service (TAEX), and / or Texas Parks and Wildlife Department (TPWD) personnel to see what is recommended for the area in question. A soil test may be necessary to determine soil deficiencies and types of fertilizer(s) needed.

Many species of wildlife, both game and non-game animals, may benefit from food plots as they will from various other types of supplemental feeding programs; however, the land manager must make the decision as to the cost effectiveness of this type of program as with any supplemental feeding program. Many factors must be considered such as: climate, soil type, slope and drainage of the land, labor, and equipment cost, and fencing from domestic livestock. Unfortunately, in many parts of Texas, summer rainfall may not be adequate for food plot production when a deer's need for good nutrition is high.

Food plots come in all shapes and sizes. They can range from 0.5 to 5 acres in size. Deer tend to feed more along the edge of plots than in the center, therefore, smaller plots that are long and narrow might prove more effective than one large plot. Dr. Dale Rollins, Extension Wildlife Specialist, TAEX, San Angelo, Texas, states "Ideally, food plots should comprise between 2 to 5 percent of the total land acreage. Using this total, divide the food plots proportionately into cool-season (small grains, etc.) and warm-season (millets, etc.) species. Plots should be strategically located across the ranch/farm. Keep in mind that plots should be adjacent to escape cover. Generally, long narrow plots are best, as they have the most edge."

According to data from Kansas quail researcher Robert Robel, food plots double the survival rate of bobwhite quail during harsh winters. Quail that had access to food plots (usually milo) enjoyed a survival rate of 40 percent as compared to only 21 percent for birds without access to plots. Much of the increase in survival results from greater fat reserves, which Robel translates into a measure of "starvation protection".

As previously mentioned, food plots are the primary method used in East Texas to supplement the diet of white-tailed deer. A very good source of information on planting food plots in East Texas is contained in *Supplemental Forage Management for East Texas White-tailed Deer* by Billy J. Higginbotham and James C. Kroll, Texas Agricultural Extension Service bulletin.

Dennis L. Brown, Technical Guidance Biologist, Texas Parks and Wildlife Department, Victoria, Texas, compiled the following list of some of the types of cultivated crops that may be considered.

*Deer and Exotics:*

Summer Grazing:

Alfalfa, clovers, soybeans, cowpeas, sweet potatoes (deer love sweet potato plants), and okra.

Fall and Winter Grazing:

Clovers, vetch and peas, wheat (excellent winter graze for deer), oats and rye.

*Game Birds – Quail, Pheasants, Mourning Doves and Turkey:*

Sesbania (plant June-July)

Millet (plant April-June)

Sunflowers (plant March-May)

Lespedeza (plant February-April)

Sesame (plant in spring after danger of frost)

Wild game sorghum (plant April-May)

Corn (plant February-June)

Winter Rye (planted by mid-September)

Wild japanese millet (early spring planting for high cover)  
excellent plant for ducks and geese as well as doves  
pheasant.

Before planting any crops the land manager should contact local experts for planting time, planting depth, fertilizers recommended, planting rate, etc. It should be noted that clovers are in some cases difficult to establish and according to Dr. Rollins “generally, clovers are not recommended west of Interstate Highway 35 in Texas because of sporadic rainfall.”

**DEER PELLETS OR SMALL CUBES**

Three methods are most commonly used when feeding pellets or cubes: by hand, automatic timer-controlled feeders or free choice, creep-type feeders. The free choice feeder is the most desirable but also the most expensive to maintain. This type of feeder provides supplemental feed at all time and if maintained will provide more feed per animal. Hand feeding or feeding with automatic feeders normally will not provide a sufficient amount of feed per animal.

If automatic feeders are used, a pellet 3/16 inch in size is normally necessary to eliminate the jamming of the feeder mechanism.

When feeding pellets, only commercial feeds containing natural protein and not urea should be used. Urea should not be used because it has been found to be very unpalatable to deer. Deer pellets are available from most dealers. The following feed formula was prepared for the Texas Parks and Wildlife Department and is used in one of the white-tailed deer research studies on the Kerr Wildlife Management Area near Kerrville. This feed is in the form of a 3/16 inch cube-size pellet and contains 16 percent natural protein; no urea is used.

20%	peanut hulls
20%	corn meal
5 %	dehydrated alfalfa meal
2%	ground milo
15 %	cottonseed meal
10%	soybean meal (44 percent)
5 %	masonex
0.5%	mineral mix **
0.5%	vitamin/trace mineral premix

\*\* Mineral mix should contain adequate calcium and phosphorus to supply the ration with 0.64 percent calcium and 0.56 percent phosphorus.

It should be noted that this feed is used for penned deer and is considered a total diet containing more bulk or fiber in the form of peanut hulls than would be necessary for deer on native range. The protein content of the feed could be increased by reducing the amount of peanut hulls and increasing the amount of cottonseed meal. This would, of course, increase the cost of the feed. The feed formula as given is considered a good supplemental feed for range fed deer. The following is an example of a high protein commercial formula pellet containing 20 percent protein and is considered a good supplement for range fed deer when a higher protein content is desired.

Crude Protein not less than.....	20.0%
Crude Fat not less than .....	1.5%
Crude Fiber not more than.....	12.5%
Calcium (Ca) not less than .....	0.7%
Calcium (Ca) not more than .....	1.7%
Phosphorus (P) not less than .....	1.0%
Salt (NaCl) not less than.....	0.1%
Salt (NaCl) not more than.....	1.1%

If the decision is made to use pellets, the land manager must then decide upon a planned feeding program. Dr. Varner developed the following program involving “concentrating the nutrients in the feed during the time of the year when the deer need them the most and the rest of the time feed them a less expensive feed. This generally costs little, if any, more than feeding the same feed all year round.”

**VARNER PLANNED FEEDING PROGRAM**

	3/1-7-31	8/1-10/31	11/1-2/28	ALL YEAR
% Protein	20	16	12	16
% Phosphorus	1.00	0.60	0.50	0.60
Cost/Ton	\$240	\$215	\$195	\$215
	[ _____ ]			
Annual Cost Per 100 Deer		\$ 1,998.00		\$ 1,962.00

**Note:** The above tables were developed using average prices of commercial feeds at the time of this writing. Price fluctuations will affect cost in the future! (Based on an average consumption of 0.5 lb./Deer/Day.)

Free choice feeders can be found in several configurations. Anyone with basic carpentry skills can build one. The Woods feeder, offered as a suggestion, is a large capacity feeder requiring less maintenance. A major disadvantage of this design is that it is large and difficult to move. This design can be reduced in length to allow for a more portable feeder. Some commercial feeder manufacturers are now offering several designs of free choice feeders.

Free choice feeders should be dispersed allowing for 1 feeder for each 300 acres. Large ranches may consider dispersing feeders at a rate of 1 feeder for each 500 to 600 acres. Feeders should be located adjacent to adequate escape cover and in an area where wildlife will not be

disturbed. Ideally this would be more to the center of the land tract, away from any major traveled pasture roads. No hunting should be allowed around or near the feeder. This area should be a “safe” area with little to no disturbance.

The land manager may discover that his deer will not immediately belly up to the feed trough and start feeding. Deer, in some cases, must learn to take supplemental feeds. Where deer have utilized corn in the past, it would be wise to mix corn with the cubes or pellets at the beginning of the feeding program. As the deer become accustomed to the commercial feeds, the amount of corn can be reduced gradually and finally eliminated.

### **GRANULAR MINERAL MIX**

Another source of wildlife diet supplement is through the use of granular mineral mixes. Again, these are available through commercial feed dealers and should be designed by a professional wildlife nutrition specialist.

The use of granular mineral mixes by deer may be very erratic, depending upon the quality of vegetation on the range, mineral content of the soils, etc. In some instances “mineral licks” have been established by pouring the mix into small depressions in the ground. Deer have been observed returning to lick the soil long after the mineral has disappeared. Suggested locations for trying this technique would be along game trails or near watering sources. If the deer in the area respond to corn, the area can be baited with corn in an attempt to initiate use of the mineral. If, after 4 or 5 months, there is no obvious use by the target species, discontinue this practice.

### **RANGE BLOCKS (DEER BLOCKS)**

The use of deer blocks to supplement the diet of deer is questionable. Blocks are probably best used as a bait where deer are lured to a hunting area and used in conjunction with feeders utilizing corn. Generally deer blocks are not considered to be cost effective by biologists and wildlife nutritionists. When a deer block is produced with the consistency to withstand weathering, generally a deer will not stand around long enough to lick a block and receive adequate nutrition. This action can probably be attributed to the natural behavior in deer.

### **CORN**

Deer hunters in the Texas Hill Country learned long ago that corn will attract deer to hunting areas during years when the natural forage is in short supply and during the winters with a poor acorn crop. On well managed ranges that provide good varieties of natural forage and in years of good acorn production, corn becomes less attractive to deer and hunting gets tougher to say the least.

Regardless of the relatively poor nutritional qualities of corn, it will continue to be used to feed (bait) deer and other wildlife species. The user then should be aware of the term AFLATOXIN, a fungi produced toxin. Aflatoxin is usually produced when corn or peanuts are grown under stress such as drought conditions (high temperatures and low soil moisture). Aflatoxin can pose a serious problem when wildlife species have access to contaminated fields (primarily waterfowl) or through supplemental feeding programs (deer, turkey, quail, doves and non-game birds and mammals). Deer are less susceptible to toxicosis than are birds such as turkeys, quail, doves and non-game birds; however most of these species, if present, will frequent any feeding site where corn is being fed to deer. Turkeys and quail are very susceptible aflatoxin levels higher than 20 parts per billion (ppb).

During 1990, half of the corn tested by the Texas Department of Agriculture contained aflatoxin. Eighteen percent of the samples contained 300 ppb or greater and 31 percent contained 20 to 300 ppb.

It is suspected that large portions of this corn is “dumped” on the market as “deer corn” and sold at reduced prices. It would be advisable for anyone using corn that is to be fed where wildlife species have access to it, to check with the feed dealer to determine the aflatoxin concentration. To be safe, only corn with a guaranteed analysis of 20 ppb or less of aflatoxin should be used in feeding programs where wildlife species will have access to the feed. Most reputable feed dealers can provide a guaranteed aflatoxin level for their corn. Commercial lab testing is available and usually requires a 5 to 6 pound sample of the corn in question.

### ***SUMMARY***

A supplemental feeding program may prove beneficial under certain conditions. In most cases, however, the best way to provide a proper nutritional diet for deer or any other wildlife species is through a good range and domestic livestock management program. When deer are the target species of a management program, an adequate, selective harvest is a must! Because of time, expense and extra management required, a supplemental feeding program should be considered only after other important aspects of the wildlife management plan have been implemented.

Assistance from professional wildlife manager and wildlife nutritionists is available through local Soil Conservation Service, Texas Agricultural Extension Service, and TPWD personnel. Commercial feed producers should be able to provide the names of wildlife nutritionists for consultation.

In addition to a staff of trained biologists and technicians, the Texas Parks and Wildlife Department employs Private Lands Enhancement Biologists to assist land managers in developing management plans on privately owned land. This service is strictly advisory and is provided without charge to cooperating landowners. For information, contact Private Lands Enhancement Program, 4200 Smith School Road, Austin, Texas 78744, (512) 389-4395.

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