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More Food for Upland Game

Fig. 1. WILD TURKEY

ar since the days of the red man, this handsome, keen-witted creature to hold its own in Pennsylvania. It needs our help during the winter, however, when snow covers its food.

Bulletin No. 11

ISSUED BY THE BOARD OF GAME COMMISSIONERS
COMMONWEALTH OF PENNSYLVANIA

BOARD OF GAME COMMISSIONERS

Photograph by Department of Forests and Waters.

WOODED HILLS AND COZY VALLEYS DON THE WHITE COAT OF WINTER: A PENNSYLVANIA STREAM, LINED WITH EXCELLENT GAME COVER

MORE FOOD FOR UPLAND GAME

BY

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AND

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INTRODUCTION

This bulletin has been prepared largely from data and suggestions submitted by Game Refuge Keepers and other field officers of the Pennsylvania Board of Game Commissioners, who have had considerable experience in feeding upland game. It is hoped that through its publication Pennsylvania sportsmen and all other wild-life enthusiasts will have a better understanding of practical and inexpensive methods of feeding game, particularly in winter. An ample supply of food is essential to the conservation and increase of our valuable wild-life, and the cooperation of all interested forces is necessary if this food supply is to be properly maintained.

No attempt is made in this bulletin to discuss feeding of wild-water fowl, as this subject was fairly well covered in a bulletin prepared several years ago which is now available upon application. The title of that bulletin is "Wild Water Fowl Foods and How to Grow Them."

Since feeding upland game during severe cold spells is one of the most important phases of conservation work, this bulletin treats of winter feeding fully, but the planting of trees and shrubs which produce game food should not be overlooked and this permanent phase of the game feeding program is briefly discussed.

A great variety of feeding shelters have been experimented with on game refuges and elsewhere, but in this bulletin only the more practical types are described, and most of these lend themselves to innumerable variations suitable to different conditions and depending on materials available for construction. Sketches were made by L. A. Mackey, Draftsman in the Bureau of Refuges and Lands.

WHY MORE FOOD FOR GAME?

If wild birds and animals are to live and propagate normally they must have an abundance of natural food. When there is a scarcity of natural food, due either to failure in fruit or nut crops, or to deep snows which cover nuts, seeds, and grit, it becomes necessary to supply food by artificial means. In Pennsylvania it is particularly important that game birds and animals be cared for in these days of strenuous hunting, when 600,000 sportsmen range the woods and fields in the fall. To meet the ever increasing demands of the hunter, game animals and birds must propagate to the limit of their natural ability; and to do this they must be healthy and well nourished. The importance of keeping game in sound condition cannot be too strongly impressed on the minds of sportsmen throughout the country, and particularly is this true within a thickly settled and industrial State such as Pennsylvania. The Pennsylvania Board of Game Commissioners fully realize this and, through their Game Protectors and Refuge Keepers constantly endeavor to supplement the natural supply of food with grains placed in shelters. Sportsmen, too, throughout the State are becoming more and more interested in this vital phase of game conservation work. The natural food supply can be augmented by two principal methods: first, the planting of various kinds of shrubs, trees, vines and grasses which will eventually produce nuts, berries, and seeds desirable as food for game; and second, the distribution of grains, nuts and dried plants, usually in winter when deep snows make this method expedient. The latter method is herein termed *emergency winter feeding.*

When the early settlers came to America they found a balanced, though varied, assemblage of wild-life. There was sufficient food for all. Predatory species killed weaker animals, but these weaker animals were always so abundant that they were not exterminated. The coming of civilization upset the balance which so nicely existed in primeval Pennsylvania. The white man killed game, while the beasts of prey evaded him, and continued their killing. Game animals disappeared as their enemies became too abundant. The white man converted the primeval woodland into farms and towns. Vast areas, after the timber was cut, became waste land as the result of repeated forest fires. These fires destroyed much game, game food and cover. In more recent years the chestnut blight has practically eliminated the chestnut, Pennsylvania's best native game-food producing tree. The loss of this tree has taken away much of the food for wild turkeys, grouse, squirrels, and deer, causing the latter to invade the farms in search of food. It has become increasingly important to supply additional winter food for turkeys since these birds depended so extensively upon chestnuts.

Photograph by Game Commissioner Francis H. Coffin, Scranton.

Fig. 3. BOY SCOUTS SCATTERING GRAIN FOR GAME BIRDS

EMERGENCY WINTER FEEDING

Many thousands of game animals and game birds are fed each winter in Pennsylvania with various kinds of grains, scratch feed, and occasionally with hay and alfalfa distributed especially for that purpose. During the past few years this feeding program has been stressed continuously by the Game Commission and splendid assistance has been given by organized and individual sportsmen, farmers, rural mail carriers and Boy Scouts. In many sections of the Commonwealth, Boy Scouts have organized successful feeding campaigns, and they, as well as farmers, are entitled to special commendation for their good work. For the welfare of our game, particularly game birds, everyone interested must do his bit in placing suitable food where it will do the most good.

We have much to learn concerning the most desirable game foods and the best methods of feeding game in an economical way. It is difficult to determine how to feed the maximum amount of game with a minimum amount of food and effort, for animals other than game, rodents particularly, are likely to get more of it than the game for which it is intended. Definite knowledge of the kinds of food that are most tempting and beneficial to game is of great importance and in this field there is much opportunity for investigation and experiment.

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stance; numerous types of artificial shelters have been built; natural shelters such as thickets, hollow logs and sheltered rock ledges have been used; and grain has been scattered in the open and ears of corn have been placed on twigs or stubs two feet above the ground so that they would protrude above the snow.

ORGANIZE FEEDING CAMPAIGNS

Each Sportsmen's Association should work out a plan by which its members, preferably through the appointment of a good live committee, will systematically and regularly feed the game during the winter in their vicinity. District Game Protectors will gladly cooperate with sportsmen in planning feeding campaigns, and can usually arrange to furnish some of the feed needed.

It is quite easy to feed small game in agricultural territory. In fact many farmers either provide feed themselves or can be induced to do so if properly approached. Many of them will gladly put out feed without compensation while others, who cannot afford to donate the feed, will put it out if they are paid for the feed or if it is furnished them.

Feeding game in the forest areas becomes a somewhat more difficult problem in winter, but is no less essential. However, volunteers who are willing to devote some of their time to taking out grain can invariably be found in any good Sportsmen's Association. Snow-shoes or skiis may occasionally be needed in the southern part of the State and frequently required in the north, but the more difficult the objective, the greater the satisfaction in having attained it. Many State Game Refuge Keepers and Game Protectors who devote their entire time to maintaining the supply of game for sport use snow-shoes or skiis in carrying feed into the woods and find pleasure in doing so.

The unique method of distributing grain from an aeroplane was tried in January, 1926, by the Blair County Game, Fish and Forestry Association (the State Game Commission cooperating), in an effort to feed turkeys and grouse in the remote, inaccessible mountains of Central Pennsylvania. The ground was covered by deep snow with a frozen crust. Paper bags filled with corn on the ear or shelled corn were dropped from an elevation of a few hundred feet. The bags broke open either on trees or on the hard crust of the snow, and the grain scattered. This method cannot be considered practical because of the excessive cost and because too small a proportion of the grain falls in the particular spots where it is most needed. However, the publicity given to this particular experiment brought home to many people the vital necessity of feeding game, and stimulated activity in this field throughout the State.

Photograph by Division Supervisor Frank A. Myers, Lewistown.

Fig. 4. ONE OF THE DUTIES OF THE GAME PROTECTORS IS TO FEED GAME IN WINTER

Here corn on the cob is being placed so that it will not be covered by snow.

FOOD MUST BE TAKEN TO THE GAME

In distributing food in winter it is very important that it be placed at or near the particular spots where the game for which it is intended is living. Food for grouse, for instance, should be placed usually under cover formed by clumps of evergreen trees, thickets of laurel, rhododendron or weeds, dense patches of scrub oak, or grape vines; bob-whites are usually fed in the open, along fence rows; wild turkeys in the deep woods along spring runs and so on.

It should be borne in mind that emergency feeding is most essential when the ground is covered with deep snow and when, in consequence, game is unable to find the existing natural food. It is important that the food be placed under some form of shelter so that it will not be covered by snow. Where suitable natural shelters are available they should be used, but they are not always to be found in the localities where it is most desirable that feeding be carried on. Therefore it is usually necessary to provide artificially constructed shelters.

One disadvantage in the use of natural shelters is that food can seldom be put out in sufficient quantities to last during the part of the season when it is most needed, and consequently, it must be taken

out to such shelters at a time when deep snow makes travel in the woods exceedingly difficult. On the other hand, artificial shelters can be arranged so that a considerable quantity of food may be stored in them when travel is easy, protected from the elements, and thus be available when it is most needed by game. Game will at first be more or less suspicious of an artificial shelter and to be effective such a shelter should be built prior to the time winter feeding is necessary. If this policy is followed, game will have become accustomed to seeing the shelters by the time deep snows arrive. Shelters of one or more years' standing have proven more satisfactory than those newly established. It is also essential that the shelter be given a natural appearance. Feeding should be started before heavy snows so that game will have learned where to obtain food.

Where it is expected that considerable quantities of food will be required during the winter at a feeding shelter or station, it is advisable to store an extra supply in some way, either in cans or metal lined boxes, near the shelter. This stored food will then be conveniently available for placing in the shelter when bad roads and deep snows make its transportation difficult.

Many types of artificial shelter or feeder may readily be devised, and it is hoped that suggestions made herein will incite the ingenuity of all who are interested in constructing more efficient types. Practical lean-to shelters under which food may be placed can be made quickly from a few old boards or poles and quite a satisfactory shelter can be made with corn fodder.

VERMIN A MENACE

The habits of predatory birds and animals should by all means be borne in mind when food for game is being placed, particularly when artificial shelters are used. Provision should always be made for the easy escape of game animals or birds so that they will not be cornered and caught within the shelter. Never less than two entrances or exits should be provided.

Various species of predatory animals—foxes, wild cats, weasels and the more valuable fur bearer, mink—are quite apt to find a feeding station where game is feeding and in turn feed on the grain fed game. If this occurs, either the vermin should be trapped or the placing of grain at the station be discontinued.

Care should be exercised not to attempt to draw too much game in a section to one feeding place, for vermin will profit by it at the expense of game. Numerous small feeding shelters, artificial or natural, are far better than a few large ones.

The abundance of deer in many sections of the State makes the winter feeding of small game a difficult problem, for a very few deer

Photograph by Assistant Game Protector W. F. Hamilton, Galeton.

Fig. 5. A LEAN-TO FEEDING SHELTER FOR RUFFED GROUSE

Notice that this shelter is open at three sides to permit the easy escape of the birds in the event they are pursued by enemies

may eat quickly the grain intended for turkeys, grouse, and squirrels, although buds and twigs on which deer should browse may be fairly abundant. To overcome this difficulty some of the feeders herein described were designed primarily to keep the grain beyond the reach of deer.

All species of upland game, with the exception of ruffed grouse, can readily be fed if the right kind of food is provided at suitable places. The most difficult problem to solve is that of feeding grouse, and this problem merits most exhaustive study and experimentation. Success in feeding this most valuable of native game birds has been

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very poor, although several officers of the Game Commission report success. One reports having fed grouse under pines along streams and in thick laurel patches around springs, in other words under natural cover where there is nothing to excite their suspicion. It appears logical that best results should be attained near springs and streams, for grouse will go there for water and grit.

A Refuge Keeper reported having successfully fed grouse somewhat as follows: A shock of unhusked corn was placed against a tree close to an old woods road and wired to the tree. Then the shock was opened on the side opposite from the prevailing winds and scratch feed was placed on the ground under the shock. All ears on the outside were husked but left on the stalk. Later grouse were found feeding on the husked corn as well as on the scratch feed.

It is not always necessary to make use of shelters in placing food, and in certain instances it may even be inadvisable to do so. Experi-

Photograph by Game Protector W. L. Wright, Trauger.

Fig. 6. THE WILD TURKEY RESPONDS READILY TO WINTER FEEDING

ence has demonstrated that a very satisfactory method of feeding wild turkeys and other woodland game is by placing ear corn on the stub end of a small sapling cut off about two feet above the ground, or on a stick forced into the ground upon which the ear of corn is fastened. The intention is to keep the corn above the snow. Squirrels may be successfully fed by placing ears of corn in cavities or crotches of trees. Shocks of unhusked corn may be placed conveniently for use of squirrels and other game. Squirrels eat out the "eye" of the kernel, leaving the rest as food for other game.

ARTIFICIAL FEEDING SHELTERS AND STATIONS

Hopper Shelter and Feeder (Fig. 7): One of the most successful artificial feeding shelters thus far used is the so-called "Hopper Shelter and Feeder." It is a combination shelter and feeder with a fairly large chamber capacity for storage of grain. The shelter, about 14 feet square, is supported on posts or trees 24 to 30 inches above the surface of the ground, the hopper being placed about in the center. The lower or chute end of the hopper should rest on a stone or in a shallow box to prevent its sinking into the ground. The frame of the shelter is constructed of four poles 4 to 6 inches in diameter securely nailed to trees or posts. It should be substantially constructed so that it will carry a heavy weight of snow. Should it sag under the snow, additional supporting posts can be placed underneath the shelter. Saplings 2 to 4 inches in diameter are nailed about one foot apart, checker-board fashion, and a covering of pine or hemlock boughs, or of brush and weeds, is then placed on top, allowing the covering to hang down over the sides a short distance, forming a fringe or curtain. It is open on four sides, enabling game to leave quickly if molested.

The food, either grain or scratch feed, which is placed in the hopper at convenient times, filters out of the four inverted cone shaped openings at the bottom of the hopper as it is eaten.

Several Game Refuge Keepers have used this shelter successfully in feeding small game, some reporting that even grouse, the most timid of game birds, have fed at them. This type is designed with the large low shelter so placed as to keep the grain beyond the reach of deer. The hopper, with suitable modifications, is adaptable for use in many other types of shelters.

Wire Basket Feeder (Fig. 8): A very satisfactory method of feeding turkeys and other birds, as well as squirrels, is the use of a basket of 1¼ inch mesh poultry wire, made in cylindrical form, and wired or hung onto a tree. This basket, made in any convenient size, and filled with ear corn, has proved worthwhile as a feeding station, particularly in the central and southern parts of the Commonwealth where snows seldom become so deep as to prevent refilling the basket with corn. Turkeys readily peck corn from the cobs through the wire mesh, and squirrels can enter the basket. They work the cobs around while gnawing at the corn, thus shelling much which falls to the ground where it is accessible for grouse, turkeys or other birds.

Suspended Tray Feeder (Fig. 9): In squirrel, turkey, and grouse territory a tray, with mesh wire bottom, suspended well above the reach of deer, has been used as a feeding station with fair suc-

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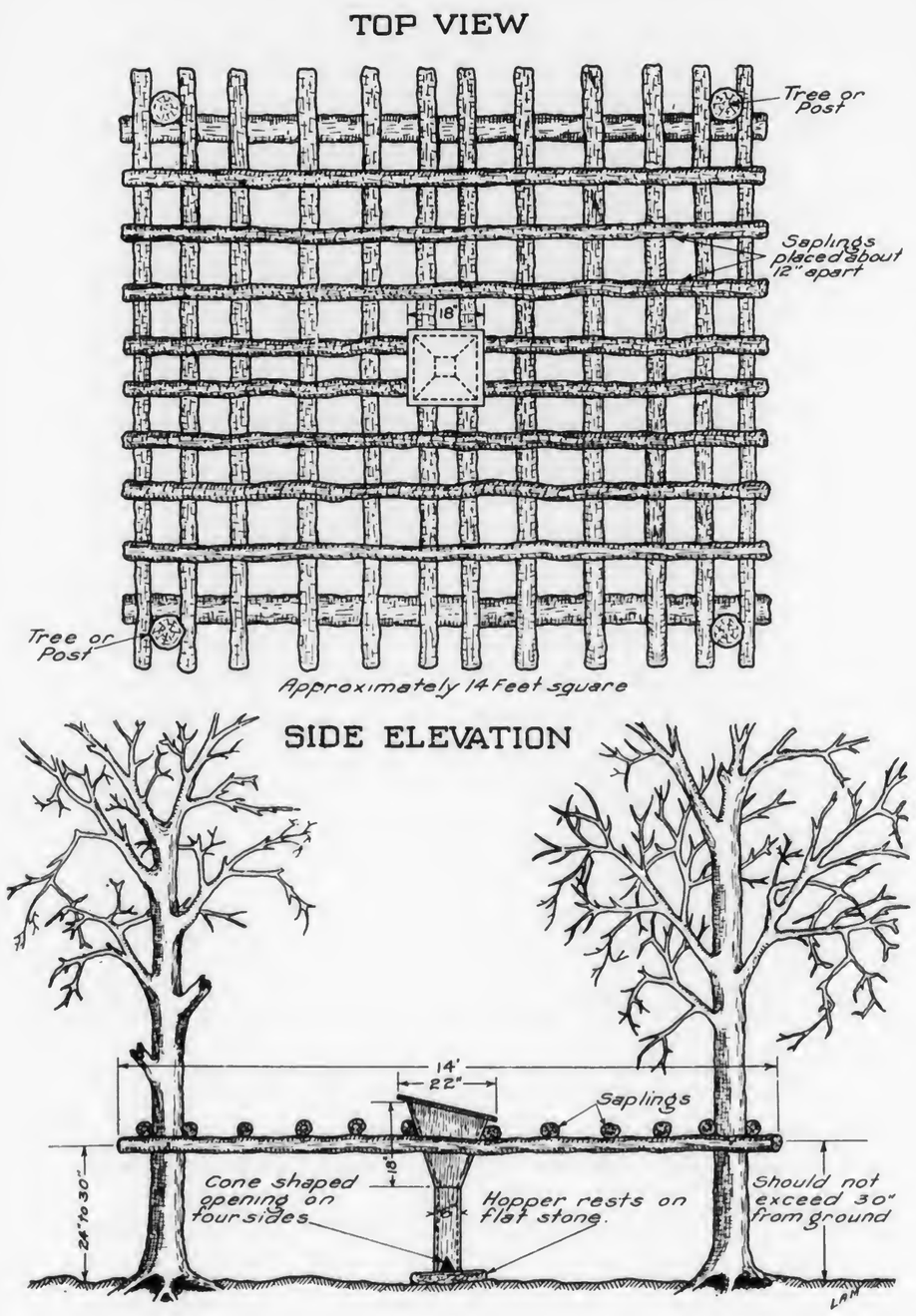


Fig. 7. DIAGRAM OF THE HOPPER SHELTER AND FEEDER

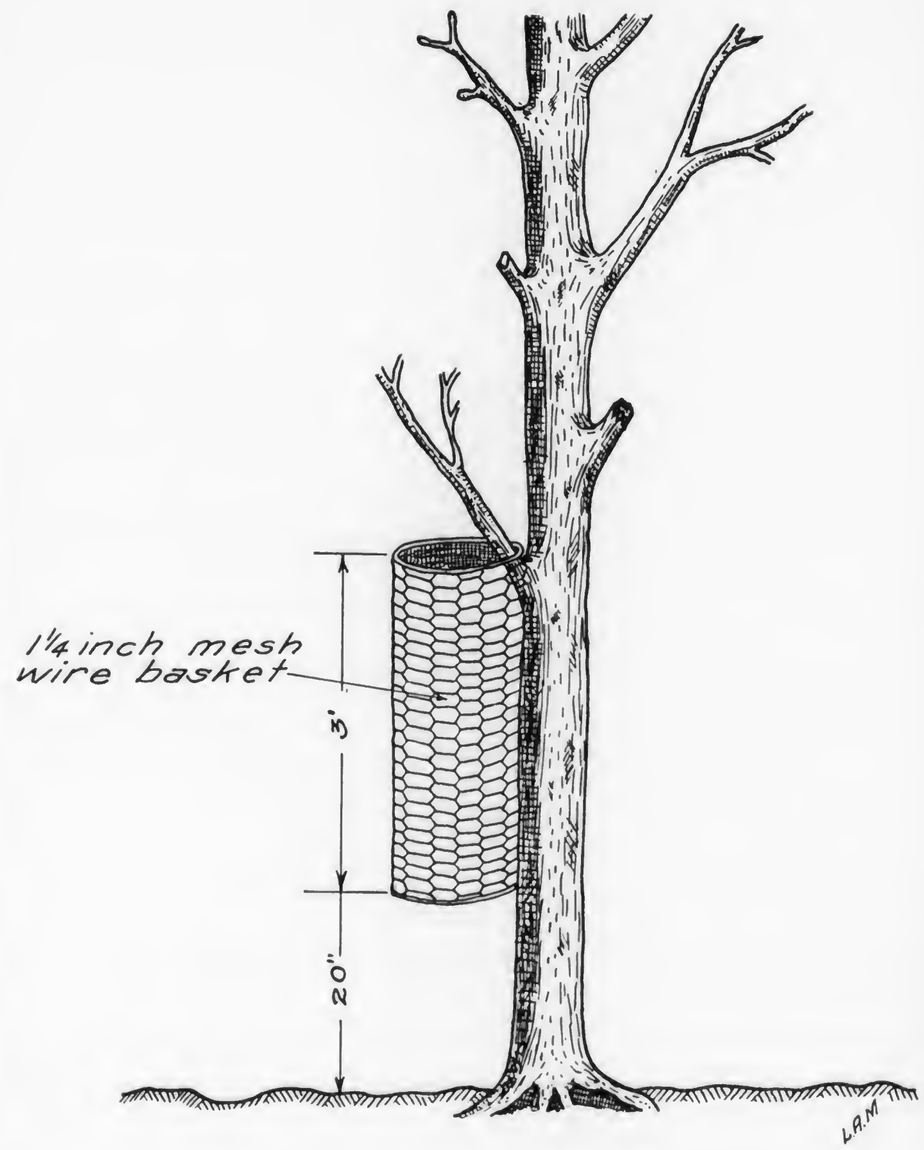


Fig. 8. DIAGRAM OF THE WIRE BASKET FEEDER

cess. These trays may be of any convenient size, but those which have proved most practical are from four to five feet in length, from one to two feet wide, and six inches deep. They may be suspended from trees by wire or iron rods, or supported on the top of posts set in the ground. Corn on the ear is placed in the trays. Squirrels which gnaw at the ears naturally shell a considerable amount which falls to the ground where it becomes accessible to grouse and turkeys.

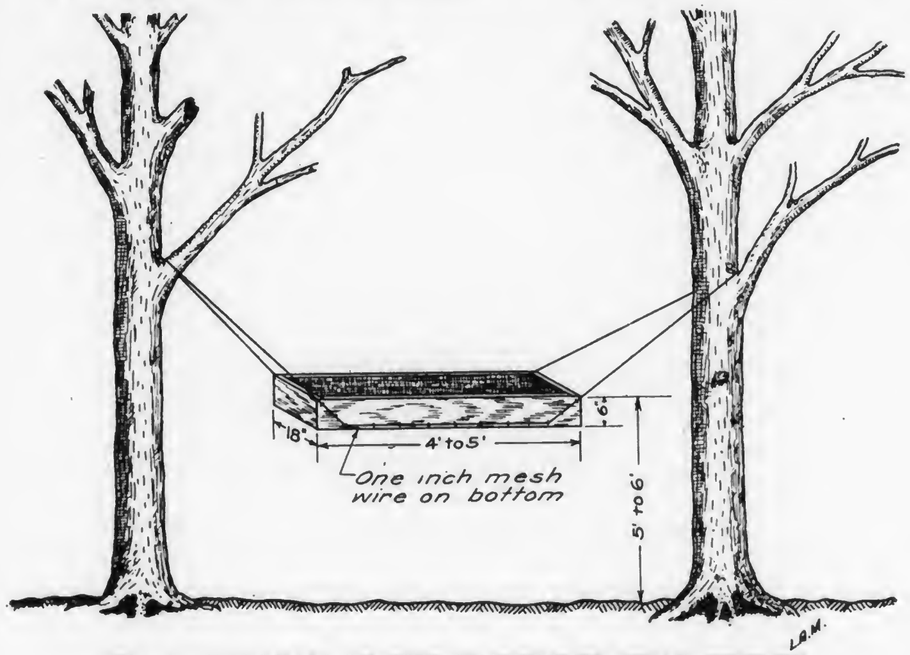
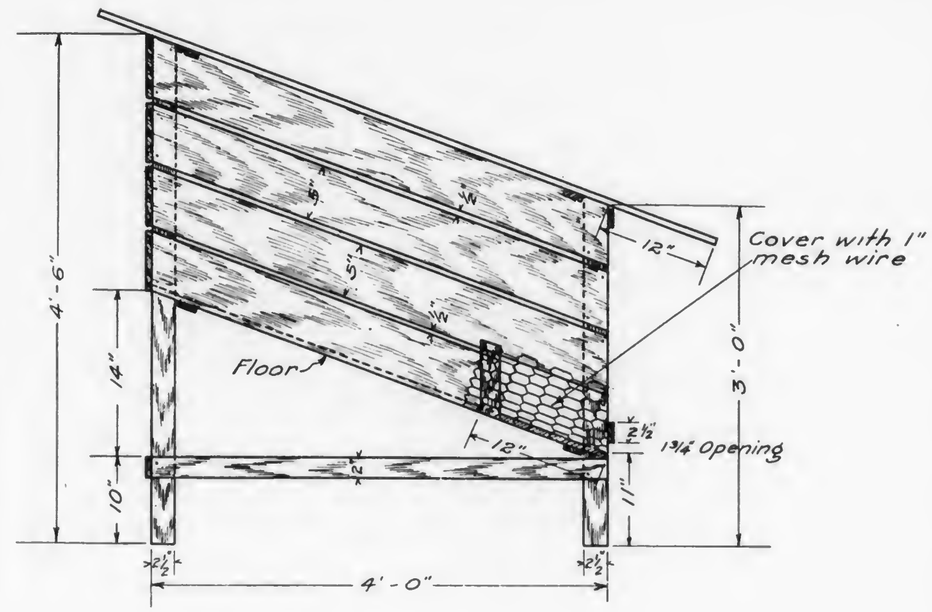


Fig. 9. DIAGRAM OF THE SUSPENDED TRAY FEEDER

Crib-Hopper Feeder (Fig. 10): This type of feeder was designed to permit storage of four or five bushels of ear corn when roads are passable. It is intended primarily for wild turkeys, although other birds and game animals may take advantage of the kernels of corn which drop to the ground. It is a crib or box of any convenient size, made of boards and with sloping floor. The lower end is covered with 1 inch woven mesh poultry wire to within 2 inches of the floor, a strip of wood being nailed across the box just above the floor leaving an opening about 1¾ inches wide through which the shelled ears can drop from the bin after the turkeys have pecked off the kernels. It is desirable to provide wire covered side openings at the lower end which will facilitate working out the shelled cobs. Turkeys, and perhaps grouse, will feed at these cribs by pecking the corn from the ears through the wire. Some kernels will naturally drop to the ground and be available for grouse and other birds.

The roof is removable to facilitate refilling. This feeder should be placed under natural cover wherever possible.

SIDE ELEVATION



FRONT ELEVATION

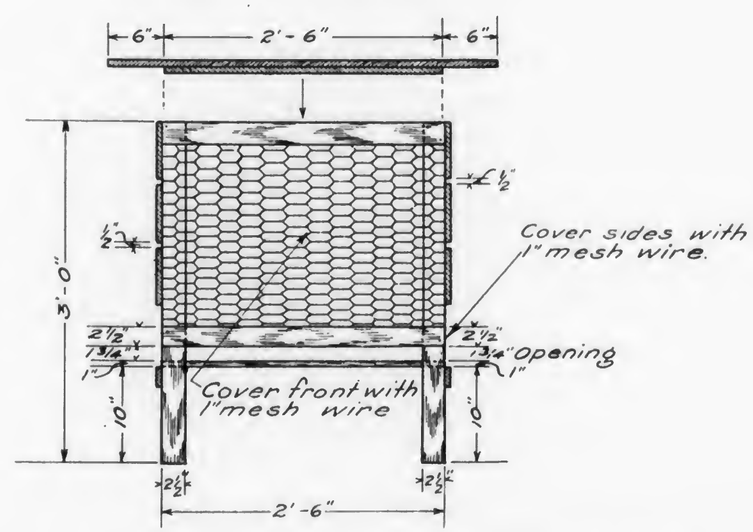
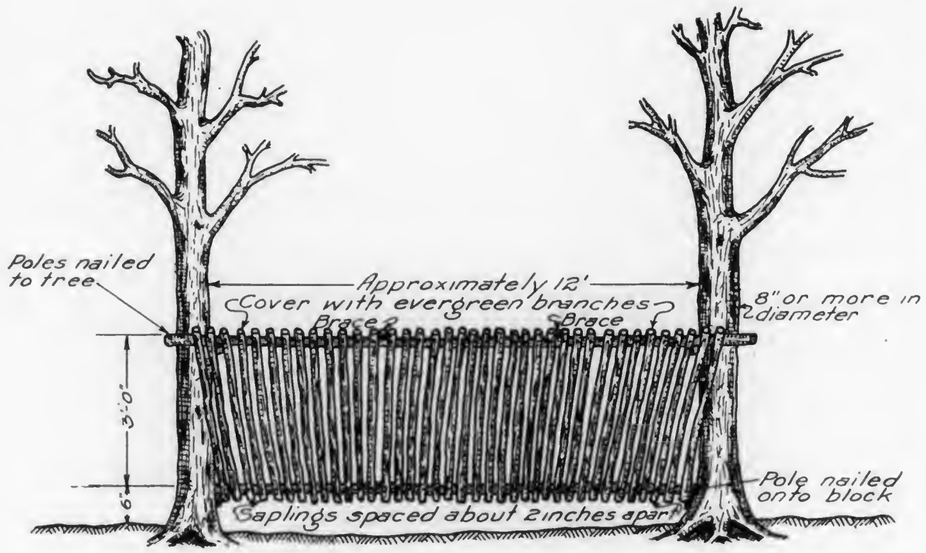


Fig. 10. DIAGRAM OF THE CRIB-HOPPER FEEDER

SIDE ELEVATION



END ELEVATION

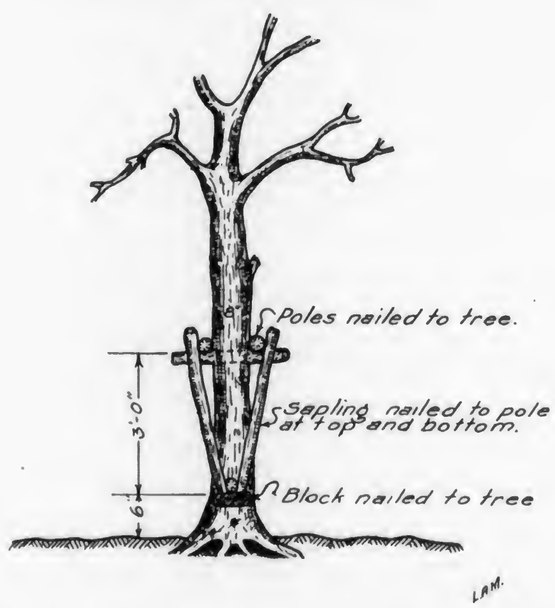


Fig. 11. DIAGRAM OF THE RACK FEEDER

Rack Feeder (Fig. 11): The rack feeder is very easily constructed and is an economical and practical method of feeding corn on the ear to turkeys as well as other game. It is constructed of poles and saplings and covered with hemlock or pine branches which extend outward a foot or two, thus furnishing some shelter to the feeding game. Two parallel poles are nailed on opposite sides of two trees 3½ feet to 4 feet above the ground. A third pole is fastened to blocks nailed to the butts of the two trees and saplings or slats are then nailed to the poles forming a V-shaped crib. The slats or palings are spaced about 2 inches apart and the openings thus formed allow the cobs to fall out of the crib.

A feeder similar to this type, placed about two feet above the ground, of larger capacity and with slats spaced about four inches apart, can be used in connection with feeding hay or alfalfa to deer or elk.

Stove-Pipe Squirrel Feeder (Fig. 12): A unique and economical squirrel feeder has been experimented with, using shelled corn or other grain, but its success has not yet been well demonstrated. A piece of stove-pipe, about three feet in length, is slipped over the snag of a tree approximately 2½ feet above ground. A post of the proper size may well be used for this purpose. A two inch square opening is made in the pipe, near the level of the top of the snag. This is done by cutting three sides of a square in the metal and pushing it back. The inside flap thus formed prevents the grain from flowing out faster than it is used. A top for the container is made by nailing a block the size of the pipe onto a square piece of board several inches larger than the pipe, the block fitting into the pipe. This pipe arrangement may well be used in connection with various other kinds of artificial shelters in the same manner as the hopper described in Fig. 7 may be used. The plan lends itself to many adaptations for use under different conditions.

Spike Pole Feeder (Fig. 13): A feeder for turkeys and squirrels which has been tried with fair success is made of poles and spikes upon which ears of corn are placed. Spikes are driven into a pole and the heads then cut off, or spikes may be driven through the pole from the bottom up and thus save the labor of cutting off the heads. Two such poles are fastened to opposite sides of two trees from five to seven feet above the ground, the poles being parallel and on the same level, the spikes pointing upward.

Side Hill Shelter (Fig. 14): A simple type of shelter under which small game can be fed may readily be constructed on a hillside. Fasten a good sized pole horizontally between two trees three to four feet above the ground, then lay a series of parallel smaller poles from the horizontal pole to the higher ground in rear of the

two trees. By covering these poles with hemlock or pine branches, or with brush and weeds, a practical and effective shelter is provided, three sides of which are open.

The frame of a shelter such as this may be covered with building or roofing paper, then hemlock or pine branches placed over the paper. The paper will last throughout the winter and will help to protect the grain from water and snow. Under this shelter corn or other grain, or scratch feed, may be placed as required. This type should prove very satisfactory for feeding grouse or quail at accessible places where storage of grain is unnecessary.

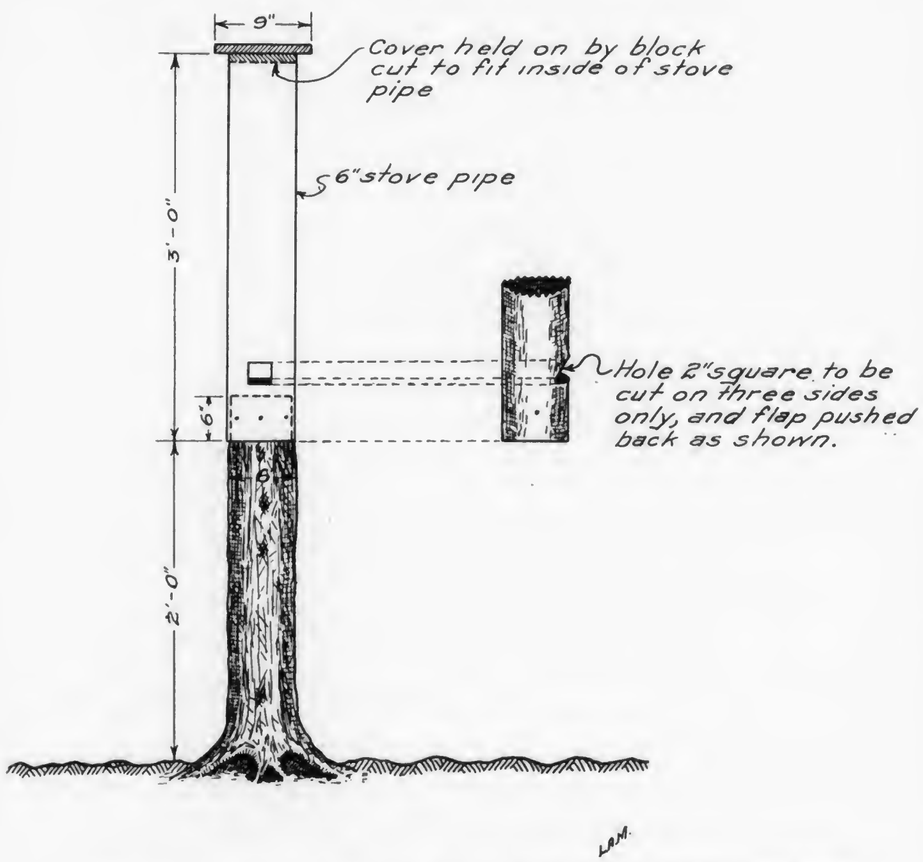


Fig. 12. DIAGRAM OF THE STOVE-PIPE SQUIRREL FEEDER

Tent Shelter (Fig. 15): A shelter on level ground under which small game can be fed may be constructed of small poles and shaped like a soldier's "pup" tent. A fairly heavy pole is fastened horizontally between two trees three to five feet above the ground. Smaller poles are then laid parallel to one another from the ground to the horizontal pole, on both sides of the tree, the horizontal pole forming the ridge of the "tent." The frame thus made is then covered with evergreen branches, brush, or weeds, or any other available material suitable for the purpose. Corn fodder can be used to form the "tent" if readily available. Under a shelter such as this corn or other grain, or scratch feed, may be scattered as needed. Ring-necked pheasants and quail, and in some localities grouse, will find this shelter acceptable.

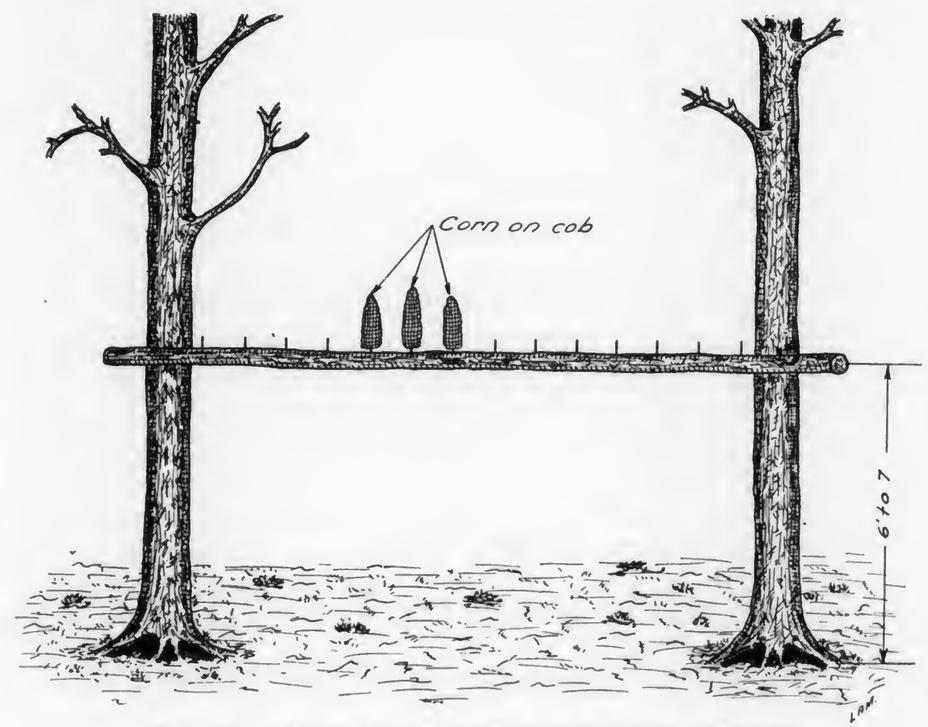


Fig. 13. DIAGRAM OF THE SPIKE POLE FEEDER

WHAT TO USE FOR WINTER FEEDING

Game animals and birds require, or at least appear to need, different types of food. Some are exceedingly particular as to their food, while others eat a great variety. Before supplying winter rations the food habits of game should be carefully studied so that the particular food which they desire may be furnished. Experience has demonstrated, in most instances, the kinds of food our game will eat. For all game birds *grit should be included with the feed* since it is a necessary aid to digestion. Birds usually take it in the form of sand or gravel, but when the ground is covered by snow it may be difficult to obtain, and consequently should be included as a part of the ration. Grit may be purchased separately and put out along with grain.

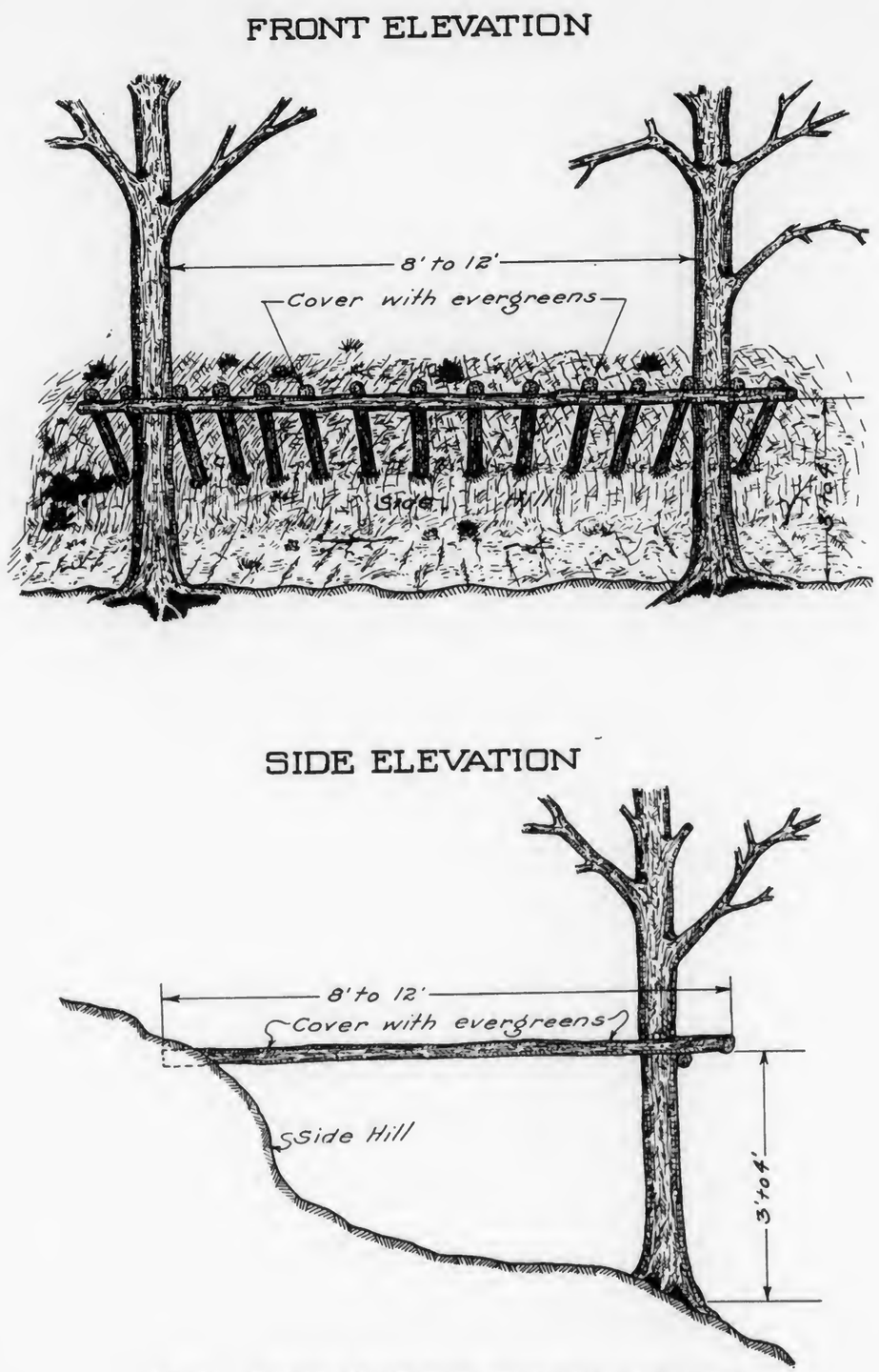


Fig. 14. DIAGRAM OF THE SIDE HILL SHELTER

Shocks of unthreshed buckwheat placed where small game winters, provides an easy method of feeding ring-necked pheasants and bob-white quail and one which has given success in all respects. Besides ring-necks it has been reported that gray squirrels and even raccoon were found feeding from the buckwheat. Corn in the shock may be used in the same way, but as it is less easily transported to the most favorable spots, it becomes less practical to use. In many instances uncut corn left in the fields has furnished food for ring-necks and

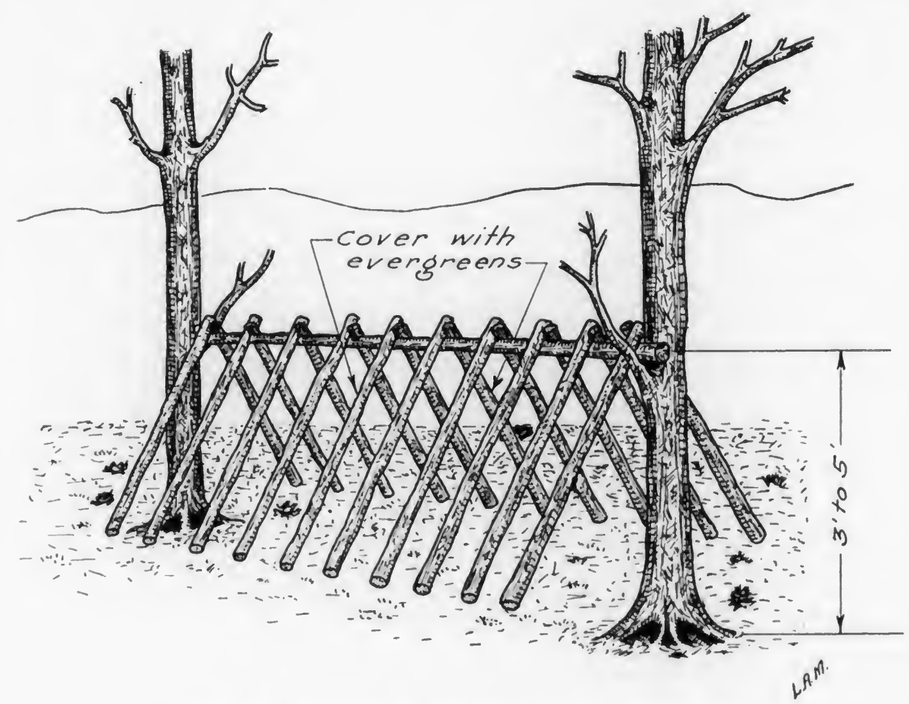


Fig. 15. DIAGRAM OF THE TENT SHELTER

squirrels, but it is inadvisable to leave buckwheat uncut, since buckwheat, unless cut and shocked, will be bent to the ground and covered by winter snows.

Shocks of corn not only provide food, but if the lower part of the shock is parted a very practical feeding shelter can be arranged.

Following is a list of our upland game. Under each species is given a statement of the normal winter food, according to the reports of the field force and the investigations of stomach contents made by the Bureau of Research and Information. A list of the suitable winter foods for game which can be procured locally without much difficulty is also given.

BOB-WHITE OR QUAIL

Normal Food: The bob-white in winter lives almost altogether upon weed seeds, grass seed, dried berries such as can be found in the open or along fence rows, and upon waste grain. Very little insect food is consumed during winter. Stomachs of winter specimens taken in Pennsylvania contained over 75% of weed seeds. Prominent among the species represented was the wild lupine.

Food at Shelters: Commercial scratch feed, good screenings, commercial chick feed, wheat, oats, rye, barley, broom corn, millet and sunflower seed.

Photograph by Game Commissioner Ross L. Leffler, McKeesport.

Fig. 16. A FEEDING-SHELTER FOR BOB-WHITES BUILT BY BOY SCOUTS

HUNGARIAN PARTRIDGE

Normal Food: This bird of the open field lives upon weed and grass seed almost exclusively during the winter. Since the birds inhabit only the wide treeless fields, they exist chiefly upon the seeds of plants which grow strictly in the open.

Food at Shelters: Commercial scratch feed, good screenings, commercial chick feed, wheat, oats, rye, barley, broom corn, millet and sunflower seed.

RUFFED GROUSE

Normal Food: The grouse eats many different forms of winter food. It eats the buds and terminal twigs of birch, aspen, poplar, fire cherry, apple, hawthorn, and wild rose; occasionally it eats the buds and leaves of the hemlock. It is very fond of berries and pulpy fruits which can be found above the snow. Among them are huckleberries, winter-green berries, fruit of the jack-in-the-pulpit, redhaws, rose hips, black haws, and apples. They often eat leaves of the winter-green berry and laurel during winter. On the ground they occasionally find weed seeds, small acorns and beech nuts and at the edge of the woodland the fruit of bitter-sweet, wild grapes and Virginia creeper. Grouse do not often feed upon waste grain because they do not come into the open as a rule.

Photograph by George Miksch, Sutton.

Fig. 17. THE TOES OF THE RUFFED GROUSE HAVE LATERAL SCALES IN WINTER WHICH SERVE AS SNOWSHOES

Grouse vary their diet considerably from day to day. On one day an individual may consume little aside from buds; on another day it will subsist chiefly on wild grapes. While this rather unique custom may be the result of availability of food, it suggests the possibility either that food at a shelter should be considerably varied, or that we need not expect grouse to come regularly to the shelter to feed upon the same grain daily.

Food at Shelters: Commercial scratch feed, wheat, rye, buck-

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INTENTIONAL SECOND EXPOSURE

wheat and whole or cracked corn. Only a few authentic reports on winter feeding of grouse are on file. Apparently grouse eat from shelters only when they desperately need food.

WILD TURKEY

Normal Food: The winter food of this species consists of such fruits, nuts, berries and seeds as can be found above or under the snow. Turkeys are exceedingly fond of chestnuts and acorns. They consume regularly the fruit of the jack-in-the-pulpit, and do not hesitate to eat such leaves, berries and weed seeds as can be found. Being large of size, the wild turkey requires a good deal of food and much grit. Pebbles the size of an acorn are not unusual in this bird's gizzard.

When turkeys live near grain fields they often wander about feeding upon such corn, buckwheat, wheat, barley, rye or oats as they can find. A limited amount of insect food is consumed during winter. Much grass is eaten.

Food at Shelters: Shelled corn or corn on the ear, commercial scratch feed, buckwheat, barley, wheat and rye.

RING-NECKED PHEASANT

Normal Food: One of the principal winter foods of the ring-neck is the seed of the skunk cabbage. Weed seeds, waste grains,

Photograph by Refuge Keeper J. B. Rearick, Halifton.

Fig. 18. A RING-NECKED PHEASANT IN THE SNOW

berries and small fruits, and grass and leaves, as well as a limited amount of insect food are consumed. Since ring-necks live in open country, and are partial to agricultural regions, much of their food in some sections is doubtless waste grain.

Food at Shelters: Commercial scratch feed, wheat, corn and buckwheat.

WAPITI OR ELK

Normal Food: The fondness of this big game for twigs of sumac and hercules club has led to the virtual disappearance of these plants locally, where elk have been in the habit of feeding. They eat much grass, of course, and vary their diet with moss and lichens, leaves, twigs of various trees, and such small fruits as they can find.

Food at Shelters: Clover, timothy and alfalfa hay, branches from fruit and other trees, and occasionally corn and other grains.

Photograph by Assistant Game Protector, Rollin Heffelfinger, Cresco.

Fig. 19. A BROWSING WHITE-TAILED DEER
It is difficult to feed deer artificially in winter

WHITE-TAILED DEER

Normal Food: Deer secure most of their winter food through browsing and through pawing in the snow for acorns, leaves, and such bits of green vegetation as they can find. As a rule they eat the twigs of most of our well known trees and shrubs, including the orchard

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INTENTIONAL SECOND EXPOSURE

varieties. Where their usual food supply is low they may eat the twigs or leaves of pine and hemlock, and of laurel or rhododendron —plants which they do not ordinarily touch. Deer will virtually live upon acorns if they can find a sufficiently large supply.

Food at Shelters: It has been difficult to get deer in a wild state in Pennsylvania to take advantage of hay and fodder put out for them. It is a well known fact that they eat corn put out for turkeys, but to feed corn to the hundreds of thousands of deer in Pennsylvania would be excessively expensive and laborious. Authentic reports are available of deer eating timothy (particularly when it is sprinkled with salt water), clover and alfalfa hay, unthreshed grains, cull apples, oats and corn, and it seems logical that they will feed on branches cut from fruit and other trees.

BLACK BEAR

The black bear has no winter food problem for he goes into deep sleep in the autumn and does not awaken until the warmth of spring is assured. When he emerges from his winter sleep he may be ravenous, and little can be done it appears, to keep him from attacking livestock or bee hives when he cannot find such food as he needs, in the wilds.

COTTONTAIL RABBITS

These, the most popular of game animals in Pennsylvania, consume much bark during winter. They eat also such small fruits, grasses, and leaves as they can find. At shelters they will feed on a great variety of vegetables and fruits, corn, oats, clover hay and even branches pruned from fruit trees. The latter have been used successfully where rabbits are damaging an orchard. The pruned branches are piled in or near thickets just outside of the orchards, or left lying as they fall around the tree, the rabbits eating the bark from the prunings. Grain also may be placed under the piles of branches as an added attraction to keep them from damaging the orchard trees.

SNOWSHOE RABBITS

The snowshoe rabbit's chief winter food is the bark of small trees. It is particularly fond of willow. Many varieties of vegetables and fruits, corn, oats, and clover hay furnish desirable winter food for them at shelters.

SQUIRRELS

It is seldom necessary to feed squirrels in winter for they are usually able to store nuts and other foods in hollow trees and shallow holes in the ground. They also eat many seeds, and small fruits, in-

cluding the rather bulky fruit of the cucumber tree. However, when the nut crop is scant, squirrels may lack an adequate winter supply, or if the forest floor is covered with deep snow for a long period of time, feeding is desirable. Almost any kind of nuts, as well as grains, may be used.

Photograph by Division Supervisor Frank A. Myers, Lewistown.

Fig. 20. THE SNOWSHOE RABBIT IS WHITE IN WINTER, BUT GRAY IN SUMMER

TREES AND SHRUBS WHICH PRODUCE GAME FOOD

Assisting nature in producing suitable foods for game and birds by planting trees, shrubs, and so forth, is desirable where practicable. Many varieties of shrubs and trees produce berries, fruits and nuts which persist well into and often through the winter, and furnish excellent food. Such species of shrubs and trees may be planted on favorable locations, but it is a waste of time and money to plant unless the planted stock will receive sunlight necessary for it to become established and to grow. Most of these species will not grow satisfactorily in dense shade; in fact they almost invariably demand an abundance of sunlight, which means they can be expected to grow only on open areas within the woods, or on abandoned agricultural lands.

A great many of the trees and shrubs, as well as vines, including the valuable wild grape, which produce desirable foods for upland game are more or less objectionable to the forester whose aim it is to produce the greatest volume of wood on a given area. Unfortunately, most of the food-producing species have little or no lumber value and are considered undesirable by the forester and are termed "forest weeds." The ultra-scientific forester, failing to realize

their inestimable value to wild life, looks with disdain upon these "forest weeds" and desires above all else to replace them with lumber trees. Fortunately, most foresters in this country, not being of the ultra-scientific type appreciate the fact that wild life in our wooded areas has a great economic value and realize that the so-called "forest weeds" are essential to its existence. Pennsylvania's State Game Lands and State Forests, more than one million acres of good hunting territory, and owned by the Commonwealth, are managed in a practical way under the direction of trained foresters. There is little likelihood that these men will ever sacrifice too large a proportion of game-food producing "forest weeds" to make way for comparatively few additional lumber trees.

Planting of shrubs, trees and vines which will produce food for game and small birds should be carried on extensively by sportsmen

Photograph by Game Commissioner Ross L. Leffler, McKeesport.

Fig. 21. AN EASILY CONSTRUCTED BOB-WHITE FOOD-SHELTER

and lovers of wild life. The Board of Game Commissioners have been setting an example for a number of years through their Game Protectors and Game Refuge Keepers, and now have planted most of the available areas under their control. They have no authority to plant on privately owned or controlled lands, and, consequently, such planting as may be carried on in the future must be done by sportsmen and other individuals.

COVER FOR GAME

While considering the planting of food-bearing species, it is well also to give thought to the furnishing of more and better cover for game. The importance of cover must not be underestimated by foresters, sportsmen, officers of the Game Commission or others. Coniferous or evergreen plantations made for reforestation purposes are wonderful havens of safety for pursued game, especially ruffed grouse. Under the thick canopy formed by the crowns of the planted trees grouse and other small game may obtain protection from hawks. It requires but a very few years for the small seedling trees ordinarily planted to reach a size sufficient to provide adequate and desirable cover for game. Also many birds and animals relish as food the seeds from cones of evergreen trees. A plantation of such species will furnish both cover and food for game as well as timber in later years.

SUITABLE PLANTING STOCK

Far better results will be obtained by planting nursery grown seedlings in preference to nuts or seeds. If nuts or seeds are planted or sown a large percentage of them will be eaten by rodents. Experience has proved that the percentage of those which germinate is very low. Nuts and seeds of most species sown in a nursery may be expected to result in a good percentage of germination and to produce good healthy seedlings. These seedlings, after one or two years in the nursery, should be planted in their permanent location. Many commercial nurseries are now raising for sale at reasonable prices, quite a variety of trees and shrubs which are desirable as producers of food for game and birds.

Trees, shrubs, and other perennial plants, which produce nuts, fruits or seeds desirable as food for game and birds, are listed below. No effort is made to list them in the order of their importance since the value of each species is variable with locality and with different kinds of game. The common name of the species is given as well as the scientific name of the group to which it belongs, but no attempt is made to list all of the desirable species of each group, since such a list would be voluminous and unnecessary. The seeds or fruits of almost all species of one group are similarly edible.

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TREES

Common Name	*Genus*
American Beech	*Fagus*
Oak	*Quercus*
Hazelnut	*Corylus*
Walnut	*Juglans*
Hickory	*Carya*
Chestnut	*Castanea*
Blue Beech	*Carpinus*
Pine	*Pinus*
Hemlock	*Tsuga*
Larch	*Larix*
Cedar	*Juniperus*
Hackberry	*Celtis*
Aspen	*Populus*
Cucumber	*Magnolia*
Maple	*Acer*
Poplar	*Populus*
Ash	*Fraxinus*
Birch	*Betula*
Sassafras	*Sassafras*
Basswood	*Tilia*
Crabapple	*Pyrus*
Common Apple	*Pyrus*
Persimmon	*Diospyros*
Black Gum	*Nyssa*
Cherry	*Prunus*
Mulberry	*Morus*
Pawpaw	*Asimina*
Hornbeam	*Ostrya*

SHRUBS AND MISCELLANEOUS PLANTS

Common Name	*Genus*
Mountain Ash	*Pyrus*
June Berry or Shad Bush	*Amelanchier*
Dogwood	*Cornus*
Buckthorn	*Rhamnus*
Holly	*Ilex*
Elder	*Sambucus*
Chokeberry	*Pyrus*
Hawthorn	*Crataegus*
Rose	*Rosa*
Witch Hazel	*Hamamelis*
Spice Bush	*Benzoin*
Hercules Club	*Aralia*
Haw	*Viburnum*
Viburnum	*Viburnum*
Red Bud or Judas Tree	*Cercis*
Alder	*Alnus*
Leatherwood	*Dirca*
Partridge Berry	*Mitchella*
Maleberry	*Lyonia*
Sourwood	*Oxydendrum*
Privet	*Ligustrum*
Sumac	*Rhus*
Snowberry	*Symphoricarpos*
Laurel	*Kalmia*
Rhododendron	*Rhododendron*
Bayberry	*Myrica*
Red Root	*Ceanothus*
Bittersweet	*Celastrus*
Honeysuckle	*Lonicera*
Grape	*Vitis*
Greenbrier	*Smilax*
Raspberry	*Rubus*
Blackberry	*Rubus*
Strawberry	*Fragaria*
Huckleberry	*Gaylussacia*
Blueberry	*Vaccinium*
Pokeberry	*Phytolacca*
Teaberry	*Gaultheria*

END OF NUMBER

no. 11, 1935

MORE FOOD FOR UPLAND GAME

Photograph by Dr. C. S. Apgar.

Bulletin No. 11

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ISSUED BY THE BOARD OF GAME COMMISSIONERS
COMMONWEALTH OF PENNSYLVANIA

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Revised and enlarged

1935

SAVE GAME FOOD AND COVER

PREVENT FOREST FIRES

MORE FOOD FOR UPLAND GAME

By

W. Gard. Conklin,
DIRECTOR OF THE BUREAU OF REFUGES AND LANDS

and

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Bulletin No. 11
(Fourth Edition)
Revised and enlarged

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Photograph by Dr. C. S. Apgar.

A Pennsylvania Game Refuge Keeper looks over his territory as the wooded hills and cozy valleys don the white coat of winter.

INTRODUCTION

This bulletin is prepared largely from information collected over a period of years, and from suggestions submitted by Game Refuge Keepers and other field officers of the Pennsylvania Board of Game Commissioners. It is hoped that through its publication Pennsylvania sportsmen and all other wild-life enthusiasts will have a better understanding of practical and inexpensive methods of feeding game in winter, as well as methods of improving the environment for game by planting material which provides natural food and cover.

The first requisite is food which creates body heat and enables birds to survive intense cold. Food also provides the strength necessary to assist game and birds to escape predatory enemies. It brings birds to the spring nesting season in a healthy and vigorous condition. Artificial feeding of game in winter is therefore extremely important. It is much better, however, to produce a supply of natural foods through the planting of shrubs, trees, grains, grasses, vines etc. A natural food supply is in the long run much cheaper and more effective.

In these days of intensive development, clean farming practices, good roads, automobiles, more leisure time, and an ever increasing number of hunters, game must have some attention during the entire year. We cannot let it shift for itself. This is particularly true with respect to food and cover, which in many sections is a serious problem.

The farmer knows that to raise crops he must save some seed for planting the next year and that he must carefully care for the young plants that the seeds produce. In this way only can he hope to harvest crops each year. The forester or timberland manager knows that to harvest a crop of trees he must carefully protect the young shoots that spring up when the older trees are cut, that he must leave seed trees of certain species or he must supplement the natural growth which springs up, with seedlings artificially raised and transplanted. The same technique applies to game crops.

It is certainly not possible to harvest the game crop each year and forget about the seed stock and the young produced by it until the time for the next harvest. It is obviously impossible for the Game Commission to adequately care for the crop. This means that all sportsmen must assist in raising their crop if they hope for a bountiful harvest. Boy Scouts, bird and nature lovers also have a particular interest in this connection and can render valuable

assistance. Improvement in conditions for wildlife in most cases improves the environment for song and insectiverous birds. We all know of their value to the orchardist and farmer as insect destroyers. Naturally all sportsmen are interested in them. If each one interested and concerned in this important problem helps just a little bit it will go a long way toward helping Pennsylvania to retain its enviable position as a great game State.

No attempt is made in this bulletin to discuss feeding of wild-water fowl, as this subject was fairly well covered in a bulletin prepared several years ago which is now available upon application. The title of that bulletin is *Wild Water Fowl Foods and How to Grow Them.*

WHY MORE FOOD FOR GAME?

If wild birds and animals are to live and propagate normally they must have an abundance of natural food. When there is a scarcity of natural food, due either to failure in fruit or nut crops, or to deep snows which cover nuts, seeds, and grit, it becomes necessary to supply food by artificial means. To meet the ever-increasing demands of the 600,000 hunters who range the woods and fields in the fall, game animals and birds must propagate to the limit of their natural ability and to do this they must be healthy and well nourished. The importance of keeping game in sound condition cannot be too strongly impressed on the minds of sportsmen throughout the country, and particularly is this true within a thickly settled and industrial State such as Pennsylvania. The Pennsylvania Board of Game Commissioners fully realize this and, through their Game Protectors and Refuge Keepers, constantly endeavor to supplement the natural supply of food with grains placed in shelters. Sportsmen, too, throughout the State are becoming more and more interested in this vital phase of game conservation work. The natural food supply can be augmented by two principal methods: first, the planting of various kinds of shrubs, trees, vines, grains and grasses which will eventually produce nuts, berries, and seeds desirable as food for game; and second, the distribution of grains, nuts and dried plants, usually in winter when deep snows make emergency winter feeding necessary.

TREES AND SHRUBS WHICH PRODUCE GAME FOOD AND COVER

Assisting nature in producing suitable foods for game and birds by planting trees, shrubs, and so forth, is desirable where practiable. Many varieties of shrubs and trees produce berries, fruits and nuts which persist well into and often through the winter, and furnish excellent food. Such species of shrubs and trees may be planted on favorable locations, but it is a waste of time and money to plant unless the planted stock will receive sunlight necessary for it to become established and to grow. Most of these species will not grow satisfactorily in dense shade; in fact, they almost invariably demand an abundance of sunlight, which means they can be expected to grow only on open areas within the woods, or on abandoned agricultural lands.

Photograph by Dr. C. S. Apgar.

Game Protector J. M. Haverstick in charge of planting program on state game lands No. 52.

Among the trees the most important are the nut bearers such as walnut, hickory nut, butternut, hazelnut, oak and beech. The mulberry, either common or Russian, is very valuable for summer food for game birds as well as song and insectivorous birds. Black gum produces berries relished by wild turkeys. Fruit bearing trees such as apple, crabapple, wild cherry, pawpaw, hackberry, etc., are very valuable. Other trees such as sassafras, cucumber, hornbeam and birch furnish food. For cover the trees most useful are the various conifers such as spruce, pine and hemlock. Among the shrubs and vines producing food are the dogwood, holly, barberry, snowberry, witch hazel, sumac, hawthorn, wild rose, mountain ash, viburnum, wild grape, greenbrier, osage orange, buffaloberry, bush honeysuckle, Russian olive, Siberian pea tree, bittersweet, blackberry, huckleberry, elder, raspberry, dewberry, Japanese barberry, etc.

If each sportsmen's organization would put on a campaign calling for the planting of food producing species in sections where deer will not destroy all of them much good will result. The fall or spring is the best time for planting. The planting could be done either in October and November or from about March 15th to

May 15th. Practically all the shrubs, as well as the trees, require sunlight. Consequently the planting must be made where they receive light. Food producing plants should be set close to cover or some cover plants set out in connection with the food producers. A very good plan is to plant a clump of 25 or 50 evergreens and nearby a clump of mixed shrubs. If these in turn are located near a food patch of grain, game is almost certain to be found there. The planting can be made on State owned land or lands upon which permission to hunt can be obtained. Farmers, no doubt, in many instances will readily give permission to hunt in return for the planting of trees and shrubs on their land. These trees increase the value of the land and most of the shrubs are very ornamental and attract song and insectivorous birds as well as game. The value of insectivorous birds to the farmer cannot very well be

Photograph by Walter A. Gresh.

Wild grapes provide excellent game food and cover.

estimated in dollars and cents, but undoubtedly it is enormous. Some briars, grape vines, bittersweet, etc., should be encouraged along fence rows, old dumps, stone quarries, gullied areas and other unused corners of the farm.

A great many of the trees and shrubs, as well as vines, including the valuable wild grape, which produce desirable foods for upland game, are more or less objectionable to the forester whose aim it is to produce the greatest volume of wood on a given area. Unfortunately, most of the food-producing species have little or no

lumber value and are considered undesirable by the forester and are termed "forest weeds." The ultra-scientific forester, failing to realize their inestimable value to wild life, looks with disdain upon these "forest weeds" and desires above all else to replace them with lumber trees. Fortunately, most foresters in this country, not being of the ultra-scientific type, appreciate the fact that wild life in our wooded areas has a great economic value and realize that the so-called "forest weeds" are essential to its existence. Pennsylvania's State Game Lands and State Forests, almost two million acres of good hunting territory, and owned by the Commonwealth, are managed in a practical way under the direction of trained foresters. There is little likelihood that these men will ever sacrifice too large a proportion of game-food producing "forest weeds" to make way for comparatively few additional lumber trees.

Planting of shrubs, trees and vines which will produce food for game and small birds should be carried on extensively by sportsmen and lovers of wild life. The Board of Game Commissioners

Photograph by Dr. C. S. Apgar.

Planting of clumps of evergreens will make more cover for game on this area.

have been setting an example for a number of years through their Game Protectors and Game Refuge Keepers, and have planted much of the available areas under their control. They have no authority to plant on privately owned or controlled lands. Such planting should be carried on by sportsmen and other individuals.

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INTENTIONAL SECOND EXPOSURE

and other shrubs which produce game food. Bittersweet suffers particularly due to the fact that it is sought for decorative purposes by many people. The bittersweet forms much of the normal diet of birds in sections where it is abundant. Both game and song birds feed on the berries and they should be permitted to remain in the woods for game food.

Coniferous or evergreen plantations made for reforestation purposes are wonderful havens of safety for pursued game, especially ruffed grouse. Under the thick canopy formed by the crowns of the planted trees grouse and other small game may obtain protection from hawks. It requires but a very few years for the small seedling trees ordinarily planted to reach a size sufficient to provide adequate and desirable cover for game. Also many birds and animals relish as food seeds from cones of evergreen trees. A plantation of such species will furnish both cover and food for game, as well as timber in later years.

For maximum utility for game, plantations of evergreens must not be large in size. They should not be more than 500 or 600 feet in diameter. All old fields or clearings should not be planted as they are essential to the well-being of many small game species. It is better to have clumps or small patches planted here and there with evergreens and some clearings left to grow up to the miscellaneous assortment of weeds and briars which provide game food.

SUITABLE PLANTING STOCK

Far better results will be obtained by planting nursery grown seedlings in preference to nuts or seeds. If nuts or seeds are planted or sown a large percentage of them will be eaten by rodents. Experience has proved that the percentage of those which germinate is very low. Nuts and seeds of most species sown in a nursery may be expected to result in a good percentage of germination and to produce good healthy seedlings. These seedlings, after one or two years in the nursery, should be planted in their permanent location. Many commercial nurseries are now raising for sale at reasonable prices, quite a variety of trees and shrubs which are desirable as producers of food for game and birds.

Trees, shrubs, and other perennial plants, which produce nuts, fruits or seeds desirable as food for game and birds, are listed below. No effort is made to list them in the order of their importance since the value of each species is variable with locality and with different kinds of game. The common name of the species is given as well as the scientific name of the group to which it belongs, but no attempt is made to list all of the desirable species of each group, since such a list would be voluminous and unnecessary. The seeds or fruits of almost all species of one group are similarly edible.

TREES

Common Name	*Genus*	*Common Name*	*Genus*
American Beech	*Fagus*	Maple	*Acer*
Oak	*Quercus*	Poplar	*Populus*
Hazelnut	*Corylus*	Ash	*Fraxinus*
Walnut	*Juglans*	Birch	*Betula*
Hickory	*Carya*	Sassafras	*Sassafras*
Chestnut	*Castanea*	Basswood	*Tilia*
Blue Beech	*Carpinus*	Crabapple	*Pyrus*
Pine	*Pinus*	Common Apple	*Pyrus*
Hemlock	*Tsuga*	Persimmon	*Diospyros*
Larch	*Larix*	Black Gum	*Nyssa*
Cedar	*Juniperus*	Cherry	*Prunus*
Hackberry	*Celtis*	Mulberry	*Morus*
Aspen	*Populus*	Pawpaw	*Asimina*
Cucumber	*Magnolia*	Hornbeam	*Ostrya*
Locust	*Robinia*	Willow	*Salix*

SHRUBS AND MISCELLANEOUS PLANTS

Common Name	*Genus*	*Common Name*	*Genus*
Mountain Ash	*Pyrus*	Maleberry	*Lyonia*
June Berry or Shad Bush	*Amelanchier*	Sourwood	*Oxydendrum*
Dogwood	*Cornus*	Privet	*Ligustrum*
Buckthorn	*Rhamnus*	Sumac	*Rhus*
Holly	*Ilex*	Snowberry	*Symphoricarpos*
Elder	*Sambucus*	Laurel	*Kalmia*
Chokeberry	*Pyrus*	Rhododendron	*Rhododendron*
Hawthorn	*Crataegus*	Bayberry	*Myrica*
Rose	*Rosa*	Red Root	*Ceanothus*
Witch Hazel	*Hamamelis*	Bittersweet	*Celastrus*
Spice Bush	*Benzoin*	Honeysuckle	*Lonicera*
Hercules Club	*Aralia*	Grape	*Vitis*
Haw	*Viburnum*	Greenbrier	*Smilax*
Viburnum	*Viburnum*	Raspberry	*Rubus*
Red Bud or Judas Tree	*Cercis*	Blackberry	*Rubus*
Alder	*Alnus*	Strawberry	*Fragaria*
Leatherwood	*Dirca*	Huckleberry	*Gaylussacia*
Partridge Berry	*Mitchella*	Blueberry	*Vaccinium*
Russian Olive	*Elaeagnus*	Pokeberry	*Phytolacca*
Buffaloberry	*Shepherda*	Teaberry	*Gaultheria*
Virginia Creeper	*Psedera*	Siberian Pea Tree	*Caragana*
		Japanese Barberry	*Berberis*
		Osage Orange	*Maclura*

GRAIN CROPS—ESSENTIAL

The planting of food patches and strips is another very essential program for providing wildlife with food during the summer and fall. Several sportsmen's organizations have recently taken up this matter. It is sincerely hoped that more will make arrangements now for an extensive program to be carried out as soon as possible.

There are a great many grains, grasses, weeds, etc., which furnish food for game. Nearly everyone is familiar with many of the kinds found quite commonly growing on farms. In addition to the commoner plants there are other ones which produce particularly desirable seed for game, game birds, and song and insectivorous birds.

The Department of Conservation in Michigan, as a result of experiments, found a wildlife mixture which has proven very satis-

Photograph by Dr. C. S. Apgar.

Sportsmen broadcasting grains on prepared areas. Game food conditions can be greatly improved if sportsmen's groups take up this work.

factory for southern Michigan. This consists of a mixture of 15 grains, including Sudan grass, buckwheat, sorghum, cowpeas, flax, millets, hemp, corn, proso, soy beans, feterita and sunflowers. This is planted in May or early June, at the rate of about 20 lbs. to the acre. It may be broadcast on the previously prepared seed bed and harrowed in. This should be planted in long narrow strips close to cover. It appears to be an excellent combination for planting in Pennsylvania. The cost of seed is very reasonable. This should be particularly good in ringnecked pheasant or quail territory. A cooperative arrangement between sportsmen and farmers could be worked out in many sections whereby patches can be

planted with this material. Information as to where seed may be obtained will be furnished upon request.

The Department of Conservation in Minnesota has put on campaigns of planting of Black Amber Cane or Minnesota Sorghum, which is a native plant of the State. It is of the same family as Kaffir corn but more hardy. This material is drilled in with a corn planter, planted about the same time and cultivated in the same manner as corn. It is planted 20 lbs. to the acre and under normal crop conditions will produce sixty bushels of seed. It grows from seven to nine feet tall and has a high fodder value for livestock. In Minnesota the farmers are furnished the seed and they arrange to raise the material as their own. All that is requested is that they leave the shocks in the fields until the snow leaves the ground, when they can use it up as fodder. All during the winter, therefore, this valuable food is available for game birds. Sportsmen in Pennsylvania could no doubt make similar arrangements with farmers in this State.

Willie Craig of Trevilians, Virginia, the well known dog trainer, purchased 3,000 acres of land in Virginia a few years ago for the purpose of training his dogs. At that time the quail was practically gone on this area, due to lack of food and cover and because of predators. By intelligent attention to the requirements of the quail, Mr. Craig has been able to bring them back. He encourages cover such as thickets of briars and vine tangles. Adjacent to these areas and wooded sections, strips are plowed and planted to various grains. For fall, winter and spring food a mixture of cowpeas and beans is used. Other patches are planted to Octotan beans, Kaffir corn, maize, millet, buckwheat and sorghum, with a sprinkling of field corn. This material is planted by hand, about 2 pecks to the acre. Planting by hand distributes the seed more evenly than by using a drill or seeder, as the small seeds, when mixed with the larger ones, have a tendancy to work to the bottom of the drill and sow them too thick. These seeds are planted about the middle of May. From the middle of May to the middle of June should be satisfactory for Pennsylvania climate. Mr. Craig finds that by sowing the seed thinly it matures good strong plants and makes more seed than if planted thickly.

The common lespedezia or Japan clover is one of the important quail foods of the south. The Korean lespedezia, a variety of this, is more hardy and should do well in Pennsylvania. This is an excellent quail food. It is a very good forage crop; it is a legume and therefore builds up poor soils by returning nitrogen to the soil and it is valuable in preventing soil erosion. This will grow on almost any kind of soil with very little preparation. Disking the

ground prior to sowing the seed broadcast is satisfactory. It does excellently by sowing broadcast on top of winter wheat during the later part of March or the first of April. Unlike that of most legumes the seed loses its viability in a relatively short time, consequently seed of the previous year's crop should be sown to secure best results.

Buckwheat is a very good wild turkey food. Either the common or Tartary may be used. The latter is probably better for game food. It is sown from the middle of June to the middle of July. Sweet clover planted around gravel pits, stone quarries, along roadsides, eroded gullies, and other unused corners, furnishes very good cover for game and benefits the farmer by building up the soil and preventing erosion. This can be planted in the spring with oats or barley as a nurse crop. It can also be sown in June or July without a nurse crop or in corn at the last cultivation.

Photograph by Dr. C. S. Apgar.

Clean farming does not provide good game conditions. This area could be made better by permitting a few rows of grain along the edge to remain standing.

Other plants suitable for food strips include cowpeas, millet, sorghum, and laredo soy beans. Cowpeas may be sown broadcast at the rate of 1¼ to 2 bushels per acre or planted in rows ½ to ¼ bushels in May or June. Millet is planted broadcast at the rate of 20 or 35 pounds per acre in June. Sorghum is planted in rows at the rate of 8 to 10 pounds per acre or broadcast in June using about 1 peck per acre. Soy beans are broadcast at the rate of 3 pecks per acre from the middle of May to the first of July. In mixture, of course, the amount per acre of each of the four plants should be only ¼ of that given for planting per acre. The patches

planted to the above can also include buckwheat broadcast at the rate of ¼ to 1¼ bushels per acre from May to August 15th; corn planted in rows at the rate of 1 to 1½ gallons per acre from May 1 to May 31st; Kaffir corn planted in rows, 6 to 10 lbs., or broadcast 1 peck per acre in June; and Sudan grass broadcast 20 to 35 pounds per acre, May 15th to May 31st. Provided all 8 of the plants listed are used for a mixture the amount per acre of each would be ⅛ the amount given for planting per acre.

Food patches of wheat, rye, vetch, Austrian winter pea and German or crimson clover have been found good for quail. Wheat

Photograph by Dr. C. S. Apgar.

Fence rows permitted to grow up furnish excellent game food and cover.

is planted 4 to 6 pecks per acre, planted about the time of the first killing frost. Rye planted 4 to 6 pecks per acre at about the same time as wheat or a little later. Vetch 20 to 30 pounds per acre from August 1st to November 1st. Austrian winter pea at the rate of 1½ to 2 bushels per acre in February or March. German or crimson clover is planted broadcast 15 pounds to the acre about August.

Volunteer foods, consisting of various weed seeds, can often be

secured by having parts of abandoned fields plowed. Soils very often contain thousands of seeds of many kinds dropped years ago. They germinate only when influenced by the sun and other conditions. Plowing brings about favorable conditions for part of these weed seeds.

Sportsmen quite frequently secure the cooperation of farmers by purchasing a few shocks of buckwheat or unhusked corn or a patch of uncut corn which is allowed to remain in the fields. It should be kept in mind that to be most useful the corn or buckwheat should be left near good cover. Perhaps arrangements could also be made to permit a strip of uncut grain or hay to remain along the edges of some fields. A strip four feet wide will do much good. If wheat stubble is cut high it provides some cover to birds seeking the waste grains in the stubble field during the fall of the year.

Photograph by Game Commissioner Ross L. Leffler, McKeesport.

An easily constructed Bob-white food shelter, built by Boy Scouts.

Boy Scouts could help immensely in providing food for game and song birds if each troop would arrange for a patch of sun flowers. These provide excellent food for song birds and for game birds. A small patch near good cover would not require much work for the returns which would be secured for the birds. It is planted any time up to the middle of July in rows far enough apart to permit cultivation. Eight or ten pounds per acre should be sown and cultivated the same as corn. A small patch of broom corn could also be planted near good game cover. This is very good quail food. It is planted about one to two weeks after the first corn is planted, that is May 1st to June 15th. It is planted at the rate of about 4 pounds per acre. The seed is placed in rows

3½ feet apart and covered about 1 inch deep. It must be cultivated by harrowing or hoeing frequently. After the seed ripens in the fall the tops of the stalks should be bent down so that the seed hangs about 18 inches above the ground. In many sections it will also be possible for the Scouts to secure berry bushes or other game foodplants for planting in clumps around stone piles or other places where permission can be obtained to plant.

The Scouts should also start now the building of feeding shelters under which game can be fed this winter. If shelters are built now game will have become accustomed to them before next winter's snow makes artificial feeding essential. Plans for shelters are shown under Emergency Winter Feeding in this Bulletin.

EMERGENCY WINTER FEEDING

Many thousands of game animals and game birds are fed each winter in Pennsylvania with various kinds of grains, scratch feed, and occasionally with hay and alfalfa distributed especially for that purpose. During the past few years this feeding program has been stressed continuously by the Game Commission and splendid assistance has been given by organized and individual sportsmen, farmers, rural mail carriers, Boy Scouts and others. In many sections of the Commonwealth, Boy Scouts have organized successful feeding campaigns, and they, as well as farmers, are entitled to special commendation for their good work. For the welfare of our game, particularly game birds, everyone interested must do his bit in placing suitable food where it will do the most good.

We have much to learn concerning the most desirable game foods and the best methods of feeding game in an economical way. It is difficult to determine how to feed the maximum amount of game with a minimum amount of food and effort, for animals other than game, rodents particularly, are likely to get more of it than the game for which it is intended. Definite knowledge of the kinds of food that are most tempting and beneficial to game is of great importance and in this field there is much opportunity for investigation and experiment.

Many methods in the proper distribution and placing of winter feed have been employed in this Commonwealth with varying degrees of success. Throwing grain from an airplane has been tried; numerous types of artificial shelters have been built; natural shelters such as thickets, hollow logs and sheltered rock ledges have been used and grain has been scattered in the open and ears of corn have been placed on twigs or stubs two feet above the ground so that they would protrude above the snow.

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ORGANIZE FEEDING CAMPAIGNS

Each Sportsmen's Association should work out a plan by which its members, preferably through the appointment of a good live committee, will systematically and regularly feed the game during the winter in their vicinity. District Game Protectors will gladly cooperate with sportsmen in planning feeding campaigns, and can usually arrange to furnish some of the feed needed.

It is quite easy to feed small game in agricultural territory. In fact, many farmers either provide feed themselves or can be induced to do so if properly approached. Many of them will gladly put out feed without compensation while others, who cannot afford to donate the feed, will put it out if they are paid for the feed or if it is furnished them.

Photograph by Brandau Studio, Hazleton, Pa.

A group of sportsmen preparing for winter feeding of game.

Feeding game in the forest areas becomes a somewhat more difficult problem in winter, but is no less essential. However, volunteers who are willing to devote some of their time to taking out grain can invariably be found in any good Sportsmen's Association. Snow-shoes or skiis may occasionally be needed in the southern part of the State and frequently required in the north, but the more difficult the objective, the greater the satisfaction in having attained it. Many State Game Refuge Keepers and Game Protectors who devote their entire time to maintaining the supply of game for sport, use snow-shoes or skiis in carrying feed into the woods and find pleasure in doing so.

The unique method of distributing grain from an airplane was first tried in January, 1926, by the Blair County Game, Fish and Forestry Association, (the State Game Commission cooperating), in an effort to feed turkeys and grouse in the remote, inaccessible mountains of Central Pennsylvania. The ground was covered by deep snow with a frozen crust. Paper bags filled with corn on the ear or shelled corn were dropped from an elevation of a few hundred feet. The bags broke open either on trees or on the hard

crust of the snow, and the grain scattered. This method cannot be considered practical because of the excessive cost and because too small a proportion of the grain falls in the particular spots where it is most needed. However, the publicity given to this particular experiment brought home to many people the vital necessity of feeding game, and stimulated activity in this field throughout the State.

FOOD MUST BE TAKEN TO THE GAME

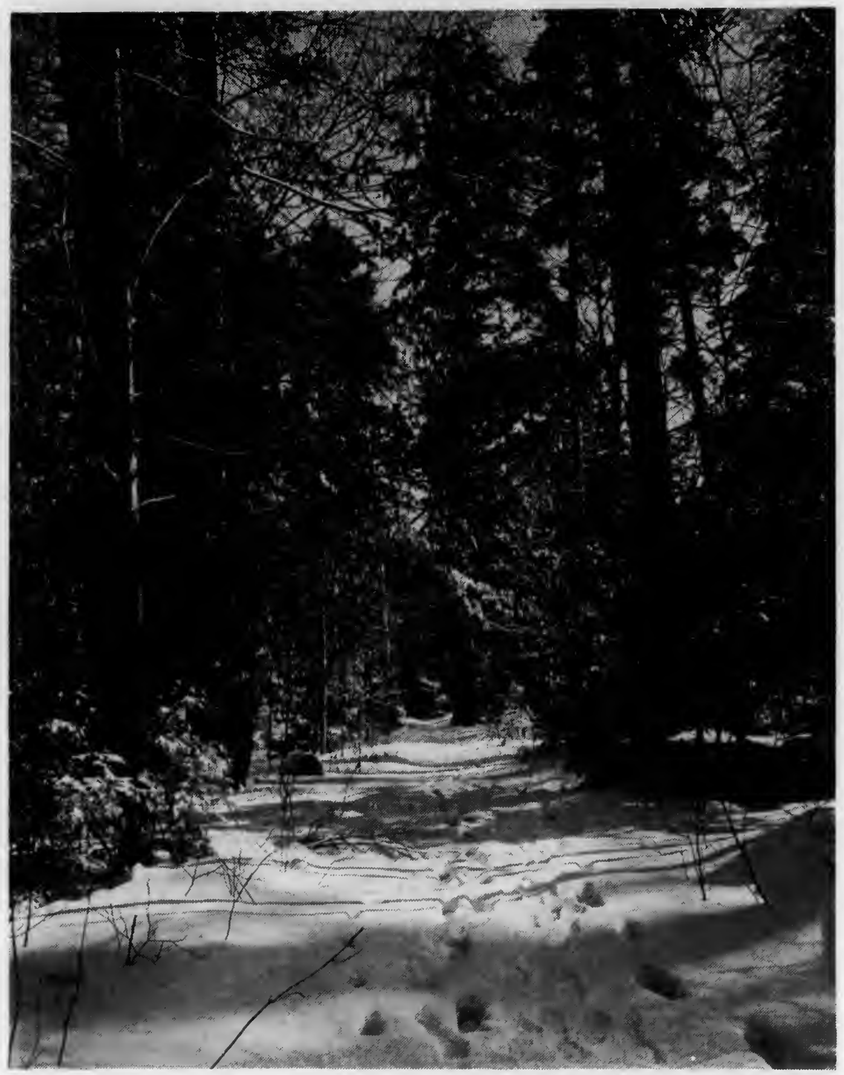
In distributing food in winter it is very important that it be placed at or near the particular spots where the game for which it is intended is living. Food for grouse, for instance, should be placed usually under cover formed by clumps of evergreen trees, thickets of laurel, rhododendron or weeds, dense patches of scrub oak, or grape vines; bob-whites are usually fed in the open, along fence rows; wild turkeys in the deep woods along spring runs and so on.

It should be borne in mind that emergency feeding is most essential when the ground is covered with deep snow and when, in consequence, game is unable to find the existing natural food. It is important that the food be placed under some form of shelter so that it will not be covered by snow. Where suitable natural shelters are available they should be used, but they are not always to be found in the localities where it is most desirable that feeding be carried on. Therefore it is usually necessary to provide artificially constructed shelters.

One disadvantage in the use of natural shelters is that food can seldom be put out in sufficient quantities to last during the part of the season when it is most needed, and consequently, it must be taken out to such shelters at a time when deep snow makes travel in the woods exceedingly difficult. On the other hand, artificial shelters can be arranged so that a considerable quantity of food may be stored in them when travel is easy, protected from the elements, and thus be available when it is most needed by game. Game will at first be more or less suspicious of an artificial shelter and to be effective such a shelter should be built prior to the time winter feeding is necessary. If this policy is followed, game will have become accustomed to seeing the shelters by the time deep snows arrive. Shelters of one or more years' standing have proven more satisfactory than those newly established. It is also essential that the shelter be given a natural appearance. Feeding should be started before heavy snows so that game will have learned where to obtain food.

Where it is expected that considerable quantities of food will be required during the winter at a feeding shelter or station, it is advisable to store an extra supply in some way, either in cans or

metal lined boxes, near the shelter. This stored food will then be conveniently available for placing in the shelter when bad roads and deep snows make its transportation difficult.



Photograph by Dr. C. S. Apgar.

Artificial feeding of game can be done under thickets of evergreens.

Many types of artificial shelter or feeder may readily be devised, and it is hoped that suggestions made herein will incite the ingenuity of all who are interested in constructing more efficient types. Practical lean-to shelters under which food may be placed can be made quickly from a few old boards or poles and quite a satisfactory shelter can be made with corn fodder.

VERMIN A MENACE

The habits of predatory birds and animals should by all means be borne in mind when food for game is being placed, particularly when artificial shelters are used. Provision should always be made for the easy escape of game animals or birds so that they will not be cornered and caught within the shelter. Never less than two entrances or exits should be provided.

Various species of predatory animals—foxes, wild cats, weasels and the more valuable fur bearer, mink—are quite apt to find a feeding station where game is feeding and in turn feed on the grain-fed game. If this occurs, either the vermin should be trapped or the placing of grain at the station be discontinued.

Photograph by Dr. C. S. Apgar.

Typical large game territory in Pennsylvania.

Care should be exercised not to attempt to draw too much game in a section to one feeding place, for vermin will profit by it at the expense of game. Numerous small feeding shelters, artificial or natural, are far better than a few large ones.

The abundance of deer in many sections of the State makes the winter feeding of small game a difficult problem, for a very few deer may eat quickly the grain intended for turkeys, grouse, and squirrels, although buds and twigs on which deer should browse may be fairly abundant. To overcome this difficulty some of the

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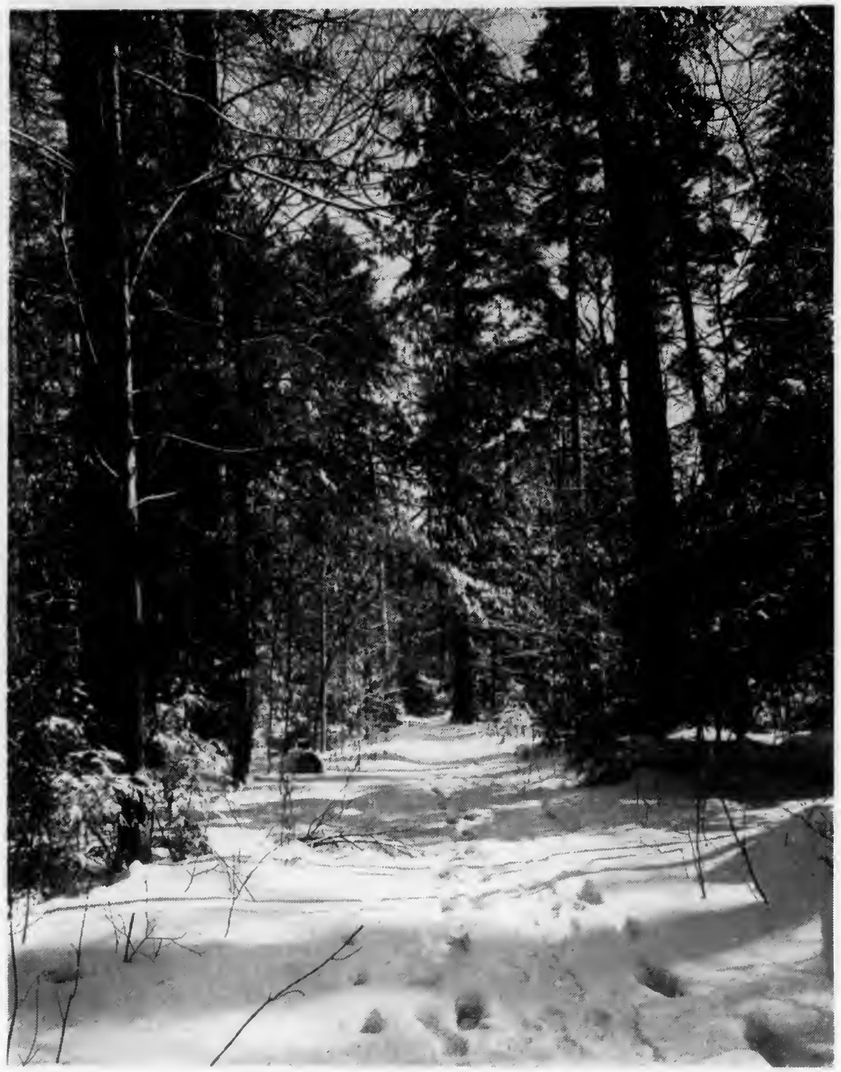

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feeders herein described were designed primarily to keep the grain beyond the reach of deer.

All species of upland game, with the exception of ruffed grouse, can readily be fed if the right kind of food is provided at suitable places. The most difficult problem to solve is that of feeding grouse, and this problem merits most exhaustive study and experimentation. Success in feeding this most valuable of native game birds has been very poor, although several officers of the Game Commission report success. One reports having fed grouse under pines along streams and in thick laurel patches around springs, in other words, under natural cover where there is nothing to excite their suspicion. It appears logical that best results should be attained near springs and streams, for grouse will go there for water and grit.

Photograph by Division Game Protector W. L. Wright, Trauger.

The Wild Turkey responds readily to winter feeding.

A Refuge Keeper reported having successfully fed grouse somewhat as follows: A shock of unhusked corn was placed against a tree close to an old woods road and wired to the tree. Then the shock was opened on the side opposite from the prevailing winds and scratch feed was placed on the ground under the shock. All ears on the outside were husked but left on the stalk. Later grouse were found feeding on the husked corn as well as on the scratch feed.

It is not always necessary to make use of shelters in placing food, and in certain instances it may even be inadvisable to do so. Experience has demonstrated that a very satisfactory method of

feeding wild turkeys and other woodland game is by placing ear corn on the stub end of a small sapling cut off about two feet above the ground, or on a stick forced into the ground upon which the ear of corn is fastened. The intention is to keep the corn above the snow. Squirrels may be successfully fed by placing ears of corn in cavities or crotches of trees. Shocks of unhusked corn may be placed conveniently for use of squirrels and other game. Squirrels eat out the "eye" of the kernel, leaving the rest as food for other game.

A desirable arrangement for placing ear corn can be made by driving nails or spikes through a board in several places and tacking the board to a tree or to a fence. A number of ears can thus be placed in one location.

A great variety of feeding shelters have been experimented with on game refuges and elsewhere, but in this bulletin only the more practical types are described, and most of these lend themselves to innumerable variations suitable to different conditions and depending on materials available for construction. Sketches were made by L. A. Mackey, Draftsman in the Bureau of Refuges and Lands.

ARTIFICIAL FFEDING SHELTERS AND STATIONS

Hopper Shelter and Feeder (Fig. 13): One of the successful artificial feeding shelters which has been used is the so-called "Hopper Shelter and Feeder." It is a combination shelter and feeder with a fairly large chamber capacity for storage of grain. The shelter, about 14 feet square, is supported on posts or trees 24 to 30 inches above the surface of the ground, the hopper being placed about in the center. The lower or chute end of the hopper should rest on a stone or in a shallow box to prevent its sinking into the ground. The frame of the shelter is constructed of four poles 4 to 6 inches in diameter securely nailed to trees or posts. It should be substantially constructed so that it will carry a heavy weight of snow. Should it sag under the snow, additional supporting posts can be placed underneath the shelter. Saplings 2 to 4 inches in diameter are nailed about one foot apart, checker-board fashion, and a covering of pine or hemlock boughs, or of brush and weeds, is then placed on top, allowing the covering to hang down over the sides a short distance, forming a fringe or curtain. It is open on four sides, enabling game to leave quickly if molested.

The food, either grain or scratch feed, which is placed in the hopper at convenient times, filters out of the four inverted cone-shaped openings at the bottom of the hopper as it is eaten.

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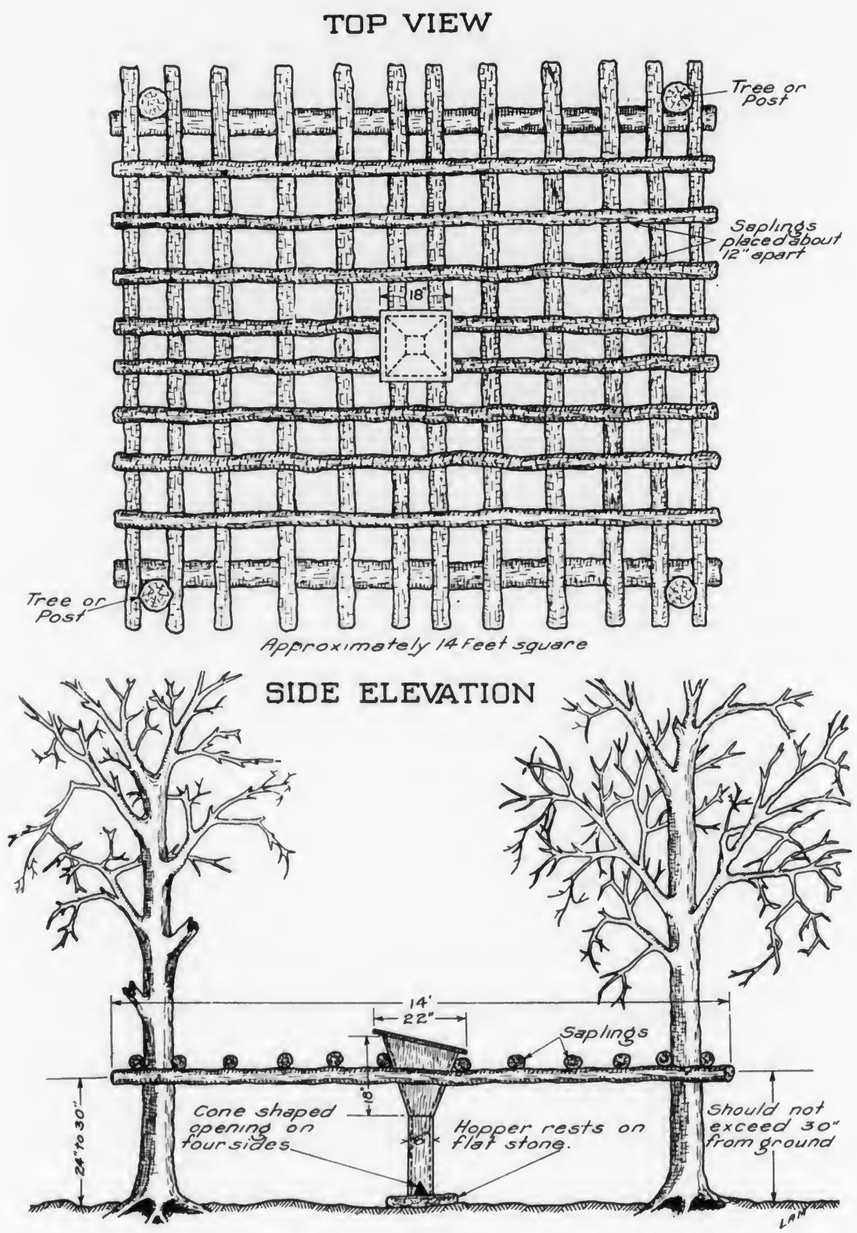

Fig. 13. Diagram of the Hopper Shelter and Feeder.

fully in feeding small game, some reporting that even grouse, the most timid of game birds, have fed at them. This type is designed with the large low shelter so placed as to keep the grain beyond the reach of deer. The hopper, with suitable modifications, is adaptable for use in many other types of shelters.

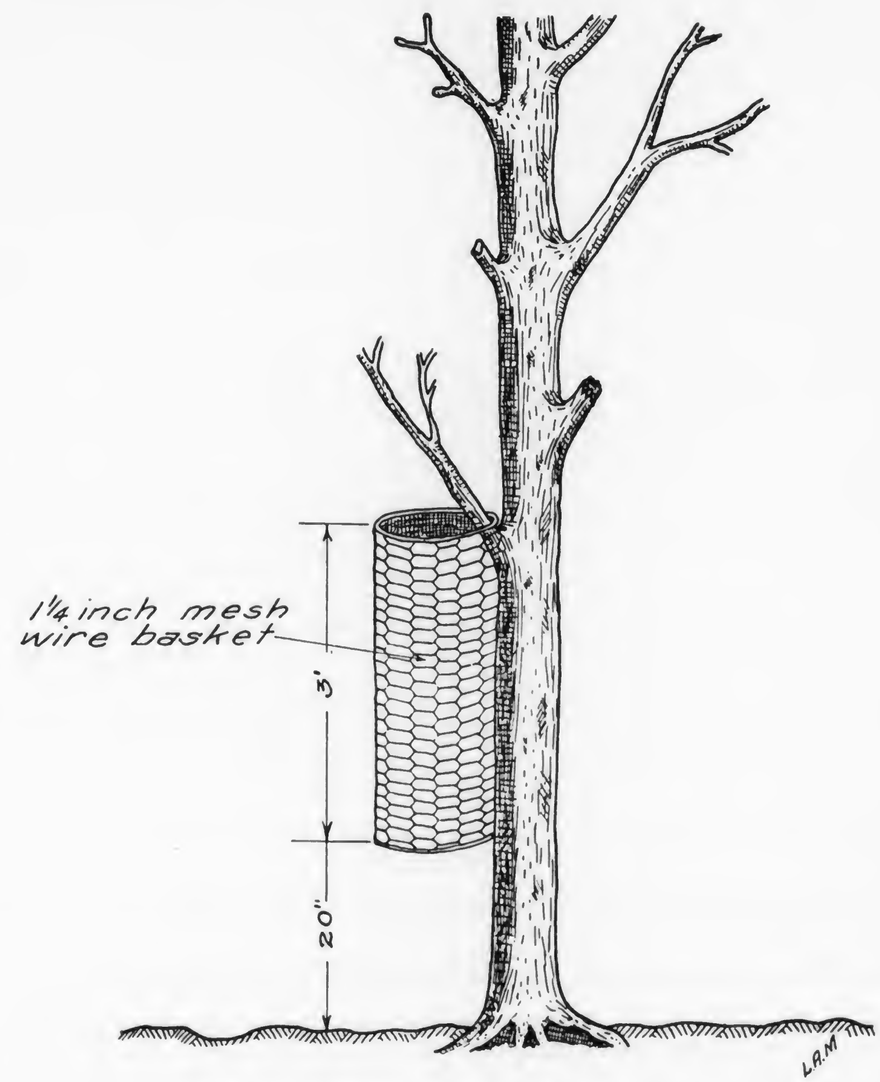

Fig. 14. Diagram of the Wire Basket Feeder.

Wire Basket Feeder (Fig. 14): A very satisfactory method of feeding turkeys and other birds, as well as squirrels, is the use of a basket of 1½-inch mesh poultry wire, made in cylindrical form,

and wired or hung onto a tree. This basket, made in any convenient size, and filled with ear corn, has proved worthwhile as a feeding station, particularly in the central and southern parts of the Commonwealth where snows seldom become so deep as to prevent refilling the basket with corn. Turkeys readily peck corn from the cobs through the wire mesh, and squirrels can enter the basket. They work the cobs around while gnawing at the corn, thus shelling much which falls to the ground where it is accessible for grouse, turkeys or other birds.

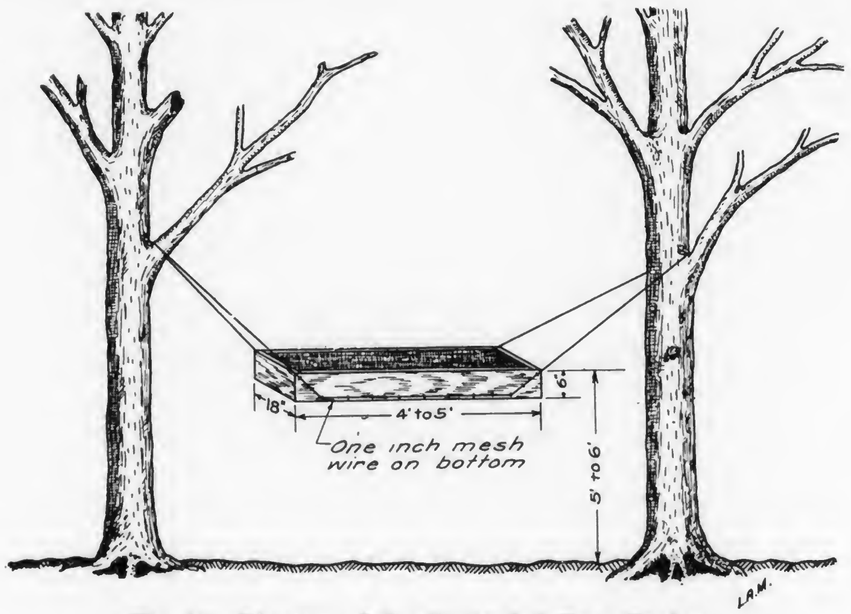

Fig. 15. Diagram of the Suspended Tray Feeder.

Suspended Tray Feeder (Fig. 15): In squirrel, turkey, and grouse territory a tray, with mesh wire bottom, suspended well above the reach of deer, has been used as a feeding station with fair success. These trays may be of any convenient size, but those which have proved most practical are from four to five feet in length, from one to two feet wide, and six inches deep. They may be suspended from trees by wire or iron rods, or supported on the top of posts set in the ground. Corn on the ear is placed in the trays. Squirrels which gnaw at the ears naturally shell a considerable amount which falls to the ground where it becomes accessible to grouse and turkeys.

Crib-Hopper Feeder (Fig. 16): This type of feeder was designed to permit storage of four or five bushels of ear corn when roads are passable. It is intended primarily for wild turkeys, although other

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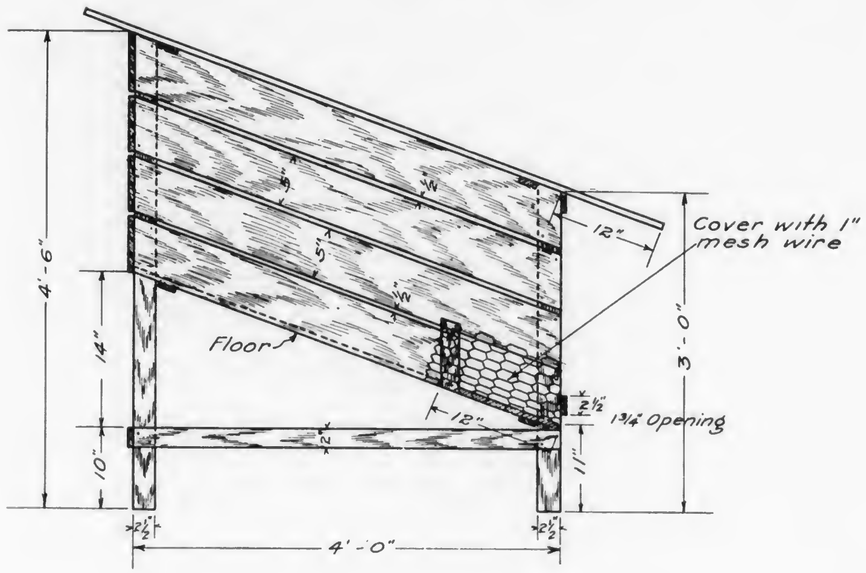


FRONT ELEVATION

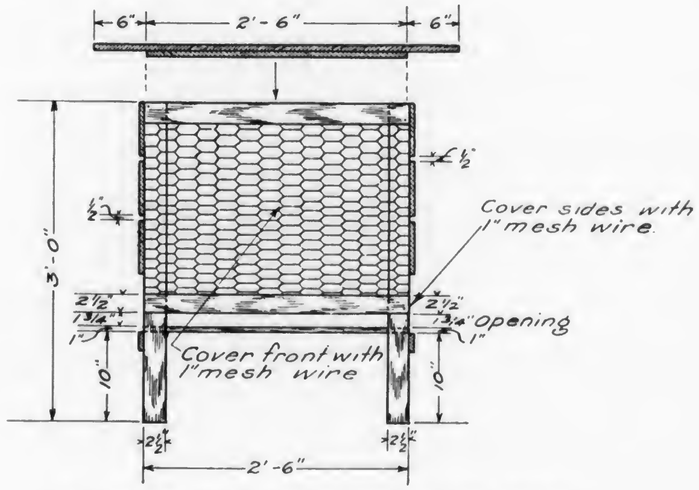


Fig. 16. Diagram of the Crib-Hopper Feeder.

birds and game animals may take advantage of the kernels of corn which drop to the ground. It is a crib or box of any convenient size, made of boards and with sloping floor. The lower end is covered with 1-inch woven mesh poultry wire to within 2 inches of the floor, a strip of wood being nailed across the box just above the floor leaving an opening about 1¾ inches wide through which the shelled ears can drop from the bin after the turkeys have pecked off the kernels. It is desirable to provide wire covered side openings at the lower end which will facilitate working out the shelled cobs. Turkeys, and perhaps grouse, will feed at these cribs by pecking the corn from the ears through the wire. Some kernels will naturally drop to the ground and be available for grouse and other birds.

The roof is removable to facilitate refilling. This feeder should be placed under natural cover wherever possible.

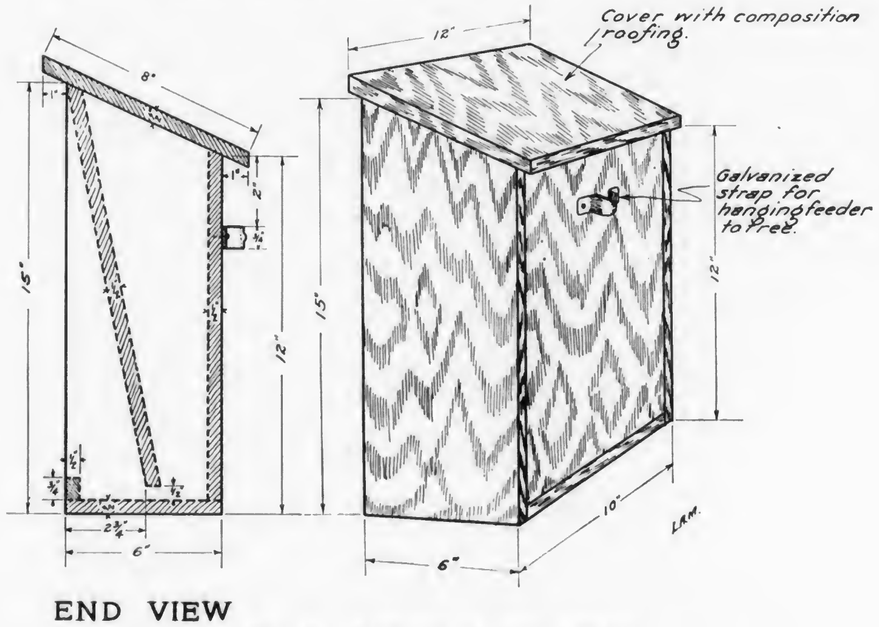


Fig. 17. Diagram of Box Feeder.

Box Feeder (Fig. 17): This feeder, designed by Refuge Keeper Orrie Smith for squirrels, should likewise be valuable for feeding wild turkeys.

The feeder can be made any size, but a convenient one holds about one peck of shelled corn. The board in front is sloped to provide a tray at the bottom from which squirrels or turkeys can feed. An opening, approximately one-half inch, is provided between the front board and the bottom board so that grain will flow onto

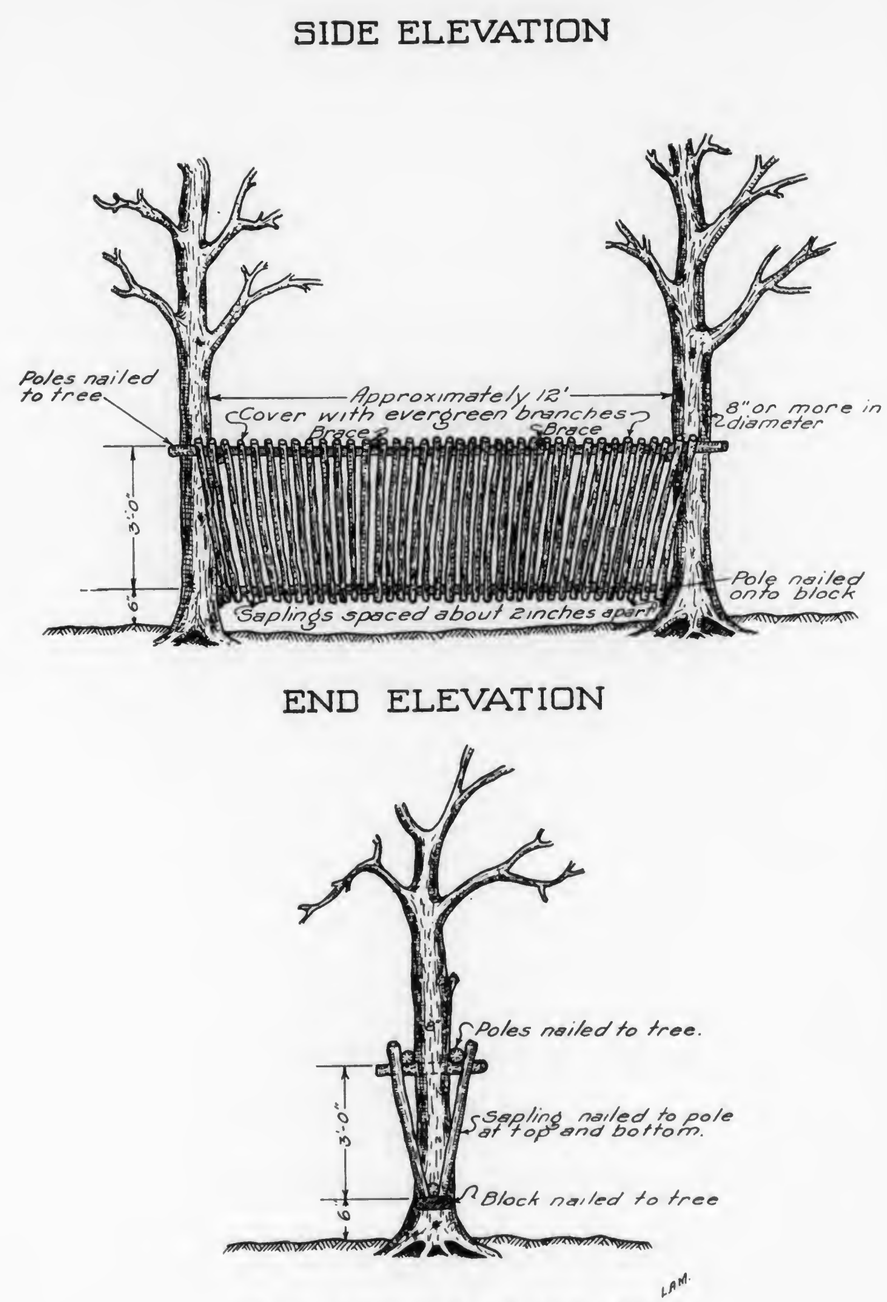


Fig. 18. Diagram of the Rack Feeder.

the tray as it is eaten. A strip in front of the tray prevents the grain from being brushed off before eaten. A hinged lid is provided on top. This should overhang slightly and should be covered with tar paper or some other roofing to keep the grain dry.

A clip is fastened to the back of the box and this, in turn, is hooked on a nail driven into a tree. For squirrels the box can be placed any height on a tree. For anyone carrying corn on horseback, a convenient height is one which will permit the refilling of the box from the horse. For feeding turkeys the box should be placed so that it can be easily reached by turkeys on the ground. This box is particularly well suited for feeding squirrels where deer are plentiful as it can be placed above their reach.

Rack Feeder (Fig. 18): The rack feeder is very easily constructed and is an economical and practical method of feeding corn on the ear to turkeys as well as other game. It is constructed of poles and saplings and covered with hemlock or pine branches which extend outward a foot or two, thus furnishing some shelter to the feeding game. Two parallel poles are nailed on opposite sides of two trees 3½ feet to 4 feet above the ground. A third pole is fastened to blocks nailed to the butts of the two trees and saplings or slats are then nailed to the poles forming a V-shaped crib. The slats or palings are spaced about 2 inches apart and the openings thus formed allow the cobs to fall out of the crib.

A feeder similar to this type, placed about two feet above the ground, of larger capacity and with slats spaced about four inches apart, can be used in connection with feeding hay or alfalfa to deer or elk.

Stove-Pipe Squirrel Feeder (Fig. 19): A unique and economical squirrel feeder has been experimented with, using shelled corn or other grain, but its success has not yet been well demonstrated. A piece of stove-pipe, about three feet in length, is slipped over the snag of a tree approximately 2½ feet above ground. A post of the proper size may well be used for this purpose. A two inch square opening is made in the pipe, near the level of the top of the snag. This is done by cutting three sides of a square in the metal and pushing it back. The inside flap thus formed prevents the grain from flowing out faster than it is used. A top for the container is made by nailing a block the size of the pipe onto a square piece of board several inches larger than the pipe, the block fitting into the pipe. This pipe arrangement may well be used in connection with various other kinds of artificial shelters in the same manner as the hopper described in Fig. 7 may be used. The plan lends itself to many adaptations for use under different conditions.

Spike Pole Feeder (Fig. 20): A feeder for turkeys and squirrels which has been tried with fair success is made of poles and spikes upon which ears of corn are placed. Spikes are driven into a pole and the heads then cut off, or spikes may be driven through the pole from the bottom up and thus save the labor of cutting off the heads. Two such poles are fastened to opposite sides of two trees from five to seven feet above the ground, the poles being parallel and on the same level, the spikes pointing upward.

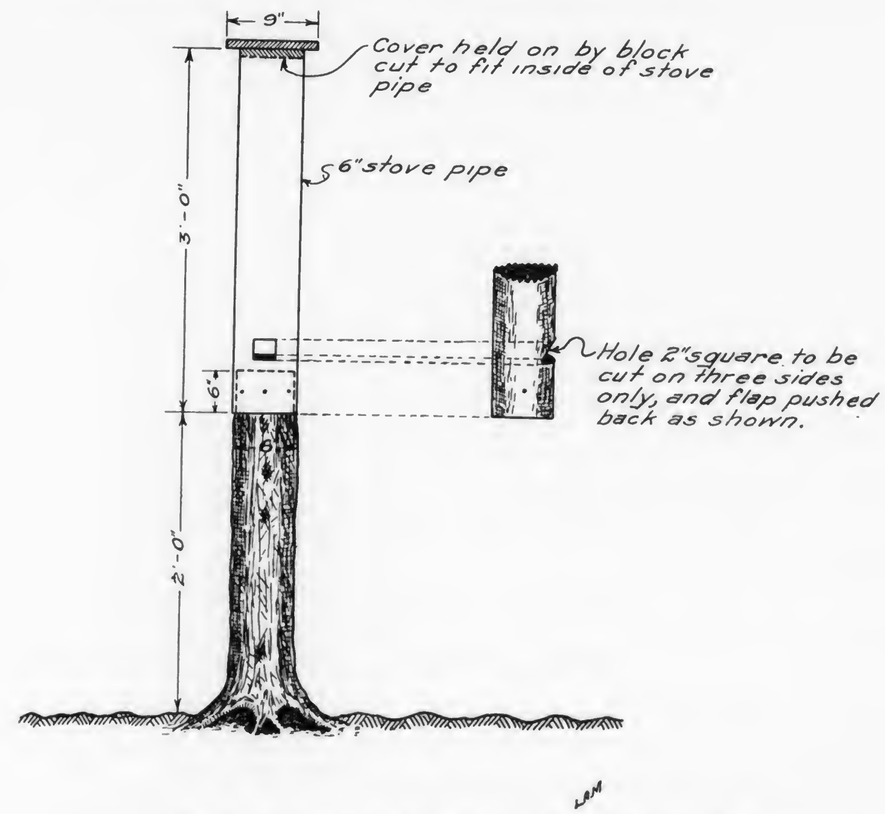


Fig. 19. Diagram of the Stove-Pipe Squirrel Feeder.

Side Hill Shelter (Fig. 21): A similar type of shelter under which small game can be fed may readily be constructed on a hillside. Fasten a good sized pole horizontally between two trees three to four feet above the ground, then lay a series of parallel smaller poles from the horizontal pole to the higher ground in rear of the two trees. By covering these poles with hemlock or pine branches, or with brush and weeds, a practical and effective shelter is provided, three sides of which are open.

The frame of a shelter such as this may be covered with building

or roofing paper, then hemlock or pine branches placed over the paper. The paper will last throughout the winter and will help to protect the grain from water and snow. Under this shelter corn or other grain, or scratch feed, may be placed as required. This type should prove very satisfactory for feeding grouse or quail at accessible places where storage of grain is unnecessary.

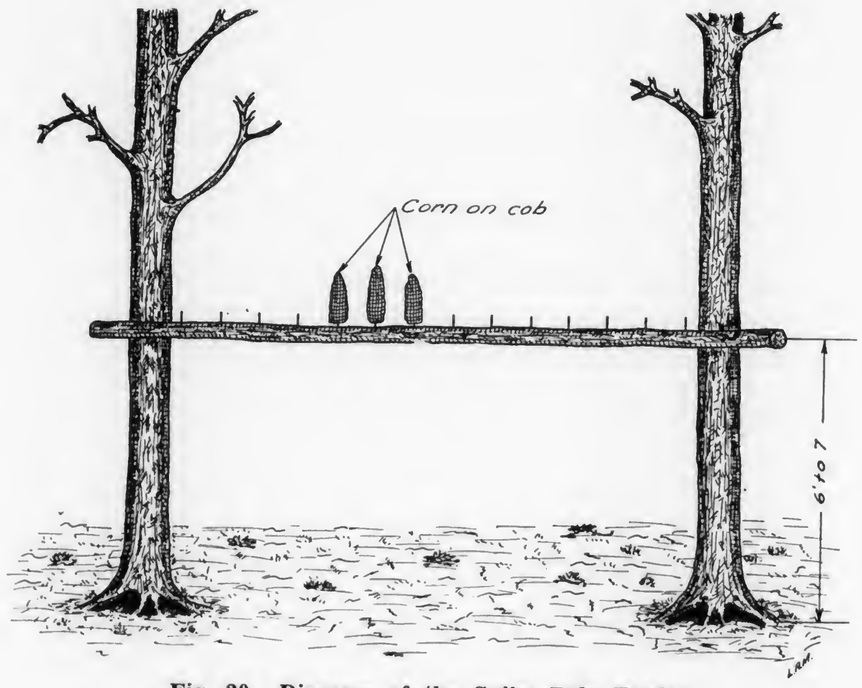
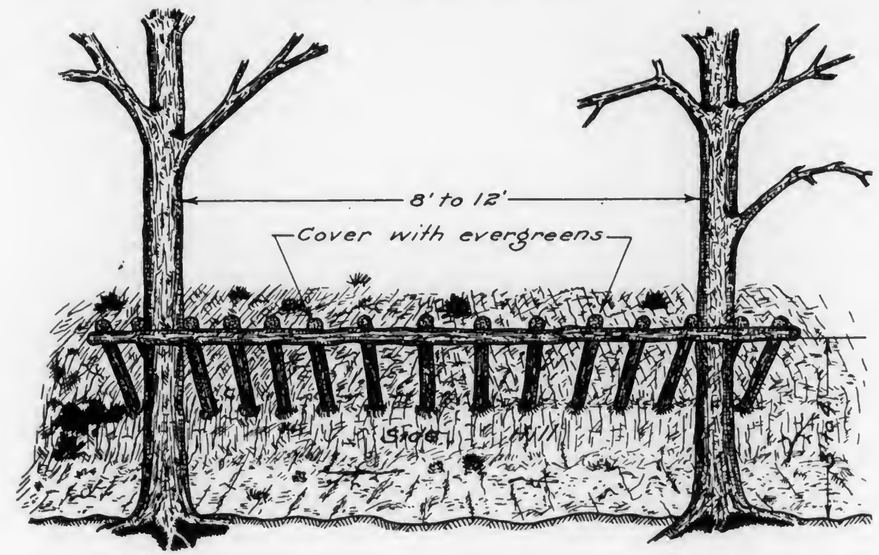


Fig. 20. Diagram of the Spike Pole Feeder.

Tent Shelter (Fig. 22): A shelter on level ground under which small game can be fed may be constructed of small poles and shaped like a soldier's "pup" tent. A fairly heavy pole is fastened horizontally between two trees three to five feet above the ground. Smaller poles are then laid parallel to one another from the ground to the horizontal pole on both sides of the tree, the horizontal pole forming the ridge of the "tent." The frame thus made is then covered with evergreen branches, brush, or weeds, or any other available material suitable for the purpose. Corn fodder can be used to form the "tent" if readily available. Under a shelter such as this corn or other grain, or scratch feed, may be scattered as needed. Ring-necked pheasants and quail, and in some localities grouse, will find this shelter acceptable.

FRONT ELEVATION



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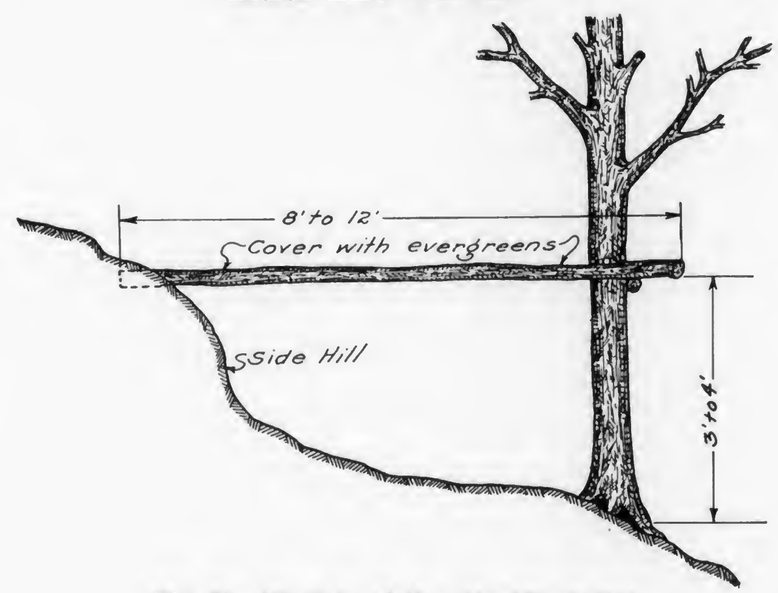


Fig. 21. Diagram of the side hill shelter.

WHAT TO USE FOR WINTER FEEDING

Game animals and birds require, or at least appear to need, different types of food. Some are exceedingly particular as to their food, while others eat a great variety. Before supplying winter rations the food habits of game should be carefully studied so that the particular food which they desire may be furnished. Experience has demonstrated, in most instances, the kinds of food our game will eat. For all game birds *grit should be included with the feed* since it is a necessary aid to digestion. Birds usually take it in the form of sand or gravel, but when the ground is covered by snow it may be difficult to obtain, and consequently should be included as a part of the ration. Grit may be purchased separately and put out along with grain.

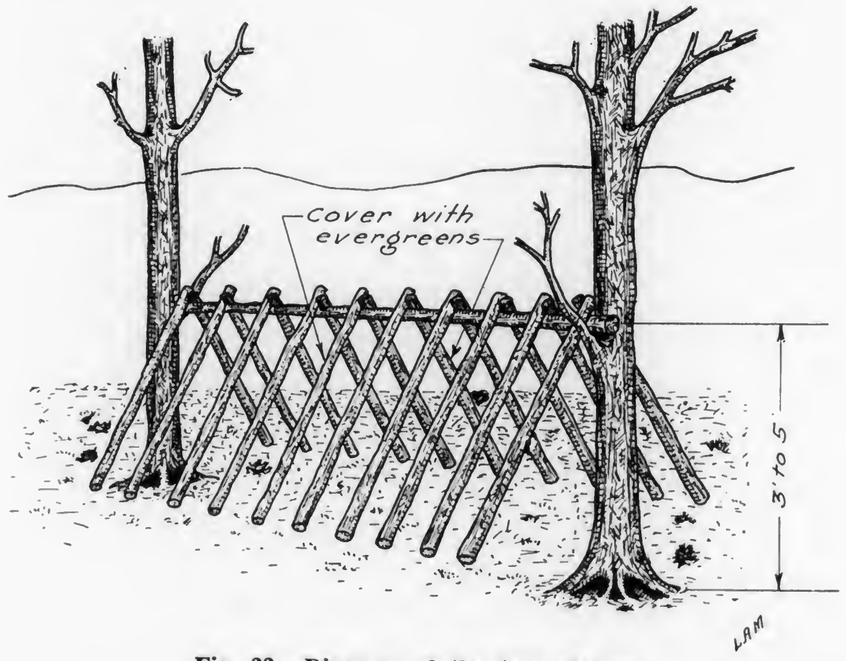


Fig. 22. Diagram of the tent shelter.

Shocks of unthreshed buckwheat placed where small game winters, provides an easy method of feeding ring-necked pheasants and bob-white quail and one which has given success in all respects. Besides ring-necks it has been reported that gray squirrels and even raccoon were found feeding from the buckwheat. Corn in the shock may be used in the same way, but as it is less easily transported to the most favorable spots, it becomes less practical to use. In many instances uncut corn left in the fields has furnished

food for ring-necks and squirrels, but it is inadvisable to leave buckwheat uncut, since buckwheat, unless cut and shocked, will be bent to the ground and covered by winter snows.

Shocks of corn not only provide food, but if the lower part of the shock is parted a very practical feeding shelter can be arranged. Frequently farmers can be persuaded to leave food patches for

Photograph by Seth E. Gordon.

Shocks of corn not only provide food but can be made into a practical shelter under which to place other feed.

game here and there on their farm. A small patch of grain or a fence row left without cutting will be particularly beneficial to ring-necked pheasants and quail.

Following is a list of our upland game. Under each species is given a statement of the normal winter food, according to the reports of the field force and the investigations of stomach contents made by the Bureau of Research and Information. A list of the suitable winter foods for game which can be procured locally without much difficulty is also given.

WHAT TO USE FOR WINTER FEEDING

Game animals and birds require, or at least appear to need, different types of food. Some are exceedingly particular as to their food, while others eat a great variety. Before supplying winter rations the food habits of game should be carefully studied so that the particular food which they desire may be furnished. Experience has demonstrated, in most instances, the kinds of food our game will eat. For all game birds *grit should be included with the feed* since it is a necessary aid to digestion. Birds usually take it in the form of sand or gravel, but when the ground is covered by snow it may be difficult to obtain, and consequently should be included as a part of the ration. Grit may be purchased separately and put out along with grain.

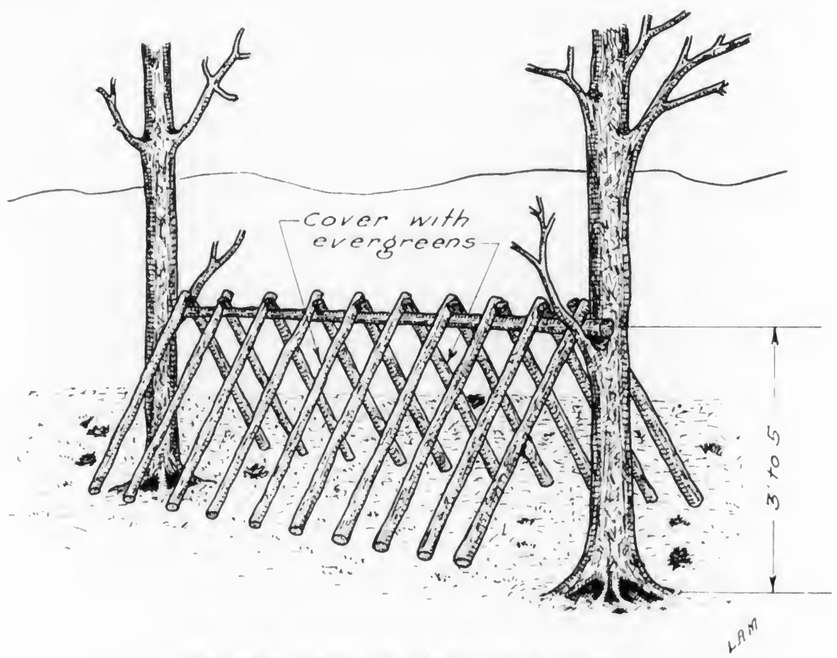


Fig. 22. Diagram of the tent shelter.

Shocks of unthreshed buckwheat placed where small game winters, provides an easy method of feeding ring-necked pheasants and bob-white quail and one which has given success in all respects. Besides ring-necks it has been reported that gray squirrels and even raccoon were found feeding from the buckwheat. Corn in the shock may be used in the same way, but as it is less easily transported to the most favorable spots, it becomes less practical to use. In many instances uncut corn left in the fields has furnished

food for ring-necks and squirrels, but it is inadvisable to leave buckwheat uncut, since buckwheat, unless cut and shocked, will be bent to the ground and covered by winter snows.

Shocks of corn not only provide food, but if the lower part of the shock is parted a very practical feeding shelter can be arranged. Frequently farmers can be persuaded to leave food patches for

Photograph by Seth E. Gordon.

Shocks of corn not only provide food but can be made into a practical shelter under which to place other feed.

game here and there on their farm. A small patch of grain or a fence row left without cutting will be particularly beneficial to ring-necked pheasants and quail.

Following is a list of our upland game. Under each species is given a statement of the normal winter food, according to the reports of the field force and the investigations of stomach contents made by the Bureau of Research and Information. A list of the suitable winter foods for game which can be procured locally without much difficulty is also given.

BOB-WHITE OR QUAIL

Normal Food: The bob-white in winter lives almost altogether upon weed seeds, grass seed, dried berries such as can be found in the open or along fence rows, and upon waste grain. Very little insect food is consumed during the winter. Stomachs of winter specimens taken in Pennsylvania contained over 75% of weed seeds. Prominent among the species represented was the wild lupine.

Food at Shelters: Commercial scratch feed, good screenings, commercial chick feed, wheat, oats, rye, barley, broom corn, millet and sunflower seed.

Photograph by J. N. Morton.

Where Wild Turkeys are plentiful frequent refills of the wire basket feeder are necessary.

Refuge Keeper Ross Metz refilling wire basket in Diamond Valley, Huntingdon County.

HUNGARIAN PARTRIDGE

Normal Food: This bird of the open field lives upon weed and grass seed almost exclusively during the winter. Since the birds inhabit only the wide treeless fields, they exist chiefly upon the seeds of plants which grow strictly in the open.

Food at Shelters: Commercial scratch feed, good screenings, commercial chick feed, wheat, oats, rye, barley, broom corn, millet and sunflower seed.

RUFFED GROUSE

Normal Food: The grouse eats many different forms of winter food. It eats the buds and terminal twigs of birch, aspen, poplar, fire cherry, apple, hawthorn, and wild rose; occasionally it eats the buds and leaves of the hemlock. It is very fond of berries and

pulpy fruits which can be found above the snow. Among them are huckleberries, wintergreen berries, fruit of the jack-in-the-pulpit, redhaws, rose hips, black haws, and apples. They often eat, during winter, leaves of the winter-green berry, laurel and the fruiting bodies of sweet fern. On the ground they occasionally find weed seeds, small acorns and beech nuts and at the edge of the woodland the fruit of bitter-sweet, wild grapes and Virginia creeper. Grouse do not often feed upon waste grain because they do not come into the open as a rule.

Grouse vary their diet considerably from day to day. On one day an individual may consume little aside from buds; on another day it will subsist chiefly on wild grapes. While this rather unique custom may be the result of availability of food, it suggests the possibility either that food at a shelter should be considerably varied, or that we need not expect grouse to come regularly to the shelter to feed upon the same grain daily.

Food at Shelters: Commercial scratch feed, wheat, rye, buckwheat and whole or cracked corn. Only a few authentic reports on winter feeding of grouse are on file. Apparently grouse eat from shelters only when they desperately need food.

WILD TURKEY

Normal Food: The winter food of this species consists of such fruits, nuts, berries and seeds as can be found above or under the snow. Turkeys are exceedingly fond of chestnuts and acorns. They consume regularly the fruit of the jack-in-the-pulpit, and do not hesitate to eat such leaves, berries and weed seeds as can be found. Being large of size, the wild turkey requires a good deal of food and much grit. Pebbles the size of an acorn are not unusual in this bird's gizzard.

When turkeys live near grain fields they often wander about feeding upon such corn, buckwheat, wheat, barley, rye or oats as they can find. A limited amount of insect food is consumed during winter. Much grass is eaten.

Food at Shelters: Shelled corn or corn on the ear, commercial scratch feed, buckwheat, barley, wheat and rye.

RING-NECKED PHEASANT

Normal Food: One of the principal winter foods of the ring-neck is the seed of the skunk cabbage. Weed seeds, waste grains, berries and small fruits, and grass and leaves, as well as a limited amount of insect food are consumed. Since ring-necks live in open

country, and are partial to agricultural regions, much of their food in some sections is doubtless waste grain.

Food at Shelters: Commercial scratch feed, wheat, corn and buckwheat.

WAPITI OR ELK

Normal Food: The fondness of this big game for twigs of sumac and hercules club has led to the virtual disappearance of these plants locally, where elk have been in the habit of feeding. They eat much grass, of course, and vary their diet with moss and lichens, leaves, twigs of various trees, and such small fruits as they can find.

Food at Shelters: Clover, timothy and alfalfa hay, branches from fruit and other trees, and occasionally corn and other grains.

Photograph by V. T. Warfel.

Robert Warfel, son of a Refuge Keeper, placing feed for Ringnecked Pheasants.

WHITE-TAILED DEER

Normal Food: Deer secure most of their winter food through browsing and through pawing in the snow for acorns, leaves, and such bits of green vegetation as they can find. As a rule they eat the twigs of most of our well known trees and shrubs, including the orchard varieties. Where their usual food supply is low they may eat the twigs or leaves of pine and hemlock, and of laurel or rhododendron—plants which they do not ordinarily touch. Deer will virtually live upon acorns if they can find a sufficiently large supply.

Food at Shelters: It has been difficult to get deer in a wild state in Pennsylvania to take advantage of hay and fodder put out for them. It is a well known fact that they eat corn put out for turkeys,

but to feed corn to the hundreds of thousands of deer in Pensylvania would be excessively expensive and laborious. Authentic reports are available of deer eating timothy (particularly when it is sprinkled with salt water), clover and alfalfa hay, unthreshed grains, cull apples, oats and corn, and it seems logical that they will feed on branches cut from fruit and other trees.

BLACK BEAR

The black bear has no winter food problem for he goes into deep sleep in the autumn and does not awaken until the warmth of spring is assured. When he emerges from his winter sleep he may be ravenous, and little can be done, it appears, to keep him from attacking livestock or bee hives when he cannot find such food as he needs, in the wilds.

COTTONTAIL RABBITS

These, the most popular of game animals in Pennsylvania, consume much bark during winter. They eat also such small fruits, grasses, and leaves as they can find. At shelters they will feed on a great variety of vegetables and fruits, corn, oats, clover hay and even branches pruned from fruit trees. The latter have been used successfully where rabbits are damaging an orchard. The pruned branches are piled in or near thickets just outside of the orchards, or left lying as they fall around the trees, the rabbits eating the bark from the prunings. Grain also may be placed under the piles of branches as an added attraction to keep them from damaging the orchard trees.

SNOWSHOE RABBITS

The snowshoe rabbit's chief winter food is the bark of small trees. It is particularly fond of willow. Many varieties of vegetables and fruits, corn, oats, and clover hay furnish desirable winter food for them at shelters.

SQUIRRELS

Squirrels usually store some food for winter needs. They do not store quantities of food in any one place; instead they bury nuts singly, scattering them promiscuously over rather sizeable areas. In addition to nuts, they also eat many seeds and small fruits, including the rather bulky fruit of the cucumber tree. When the nut crop is scant, squirrels lack an adequate winter supply. If the forest floor is covered with deep snow for a long period of time, feeding is desirable. Almost any kind of nuts, as well as grains, may be used.

AVAILABLE PUBLICATIONS

The following publications are for free distribution and can be obtained, in single copies, or (for special needs) in reasonable numbers, direct from the Game Commission headquarters in Harrisburg:

Educational Leaflet No. 1 (Descriptive Stories of Pennsylvania's Game and Fur-bearing Animals)

Bulletin No. 11 (More Food for Upland Game)

Bulletin No. 12 (The Pennsylvania Deer Problem)

Game Law Pamphlets

Biennial Reports

Trapping Methods

Summary of Game Laws

By a recent ruling of the Attorney General the following Game Commission publications can be secured only *directly* from the Bureau of Publications, Division of Documents, Harrisburg, Pa., and not from the Board of Game Commissioners. (Stamps will not be received in payment):

Bulletin No. 10 (Game Administration in Pennsylvania) ...$.10

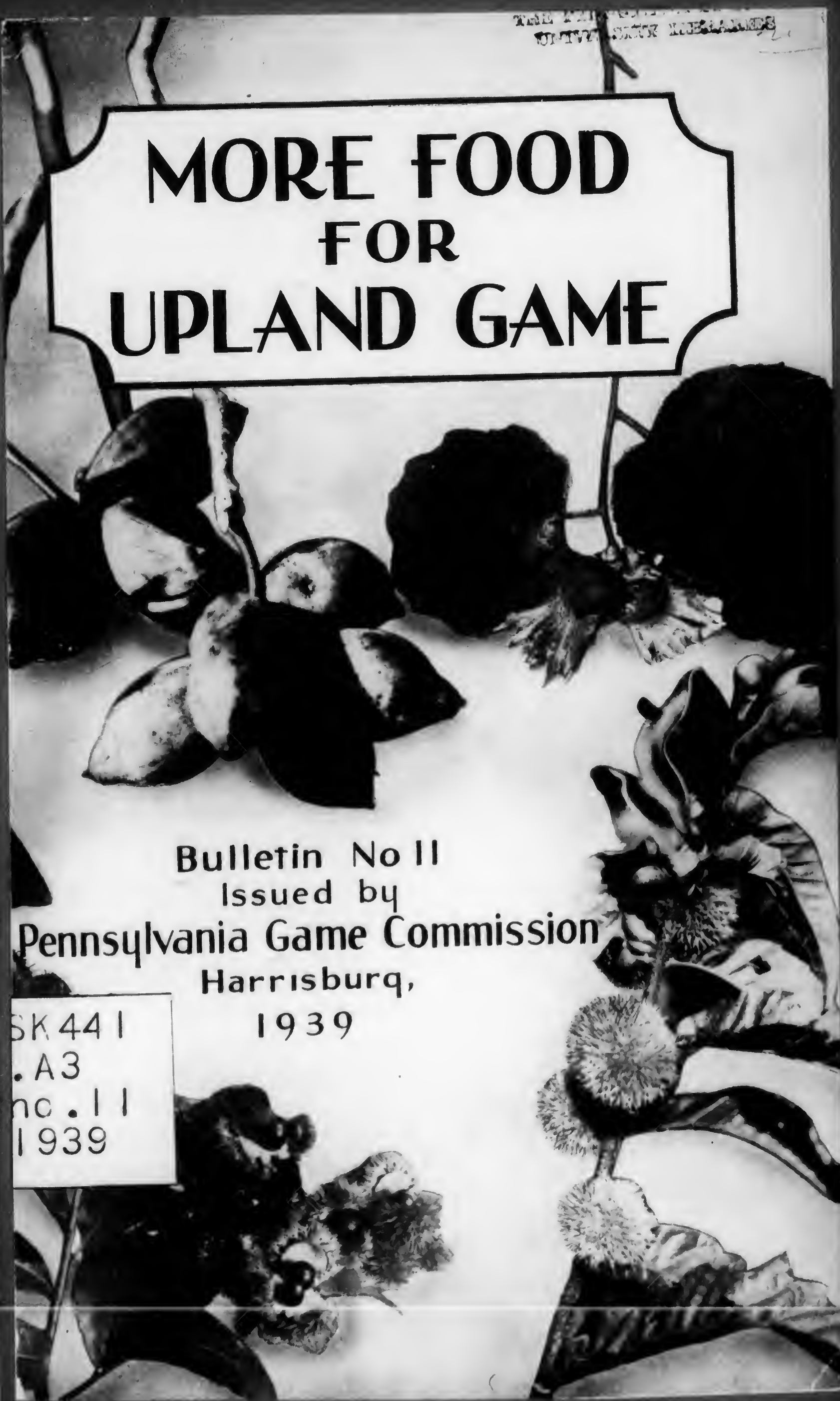
Bulletin No. 14 (Pennsylvania's State Game Refuges and Public Hunting Grounds) ..... .10

Bulletin No. 15 (An Introduction to the Mammals of Pennsylvania) ..... .10

END OF NUMBER

no. 11, 1939

MORE FOOD FOR UPLAND GAME



Bulletin No 11
Issued by
Pennsylvania Game Commission
Harrisburg,
1939

MORE FOOD FOR UPLAND GAME

By

W. GARD. CONKLIN
Chief of the Division of Lands

and

JAMES N. MORTON,
Chief of the Division of Game Land Management

Bulletin No. 11
(Sixth Edition)
1939

Cover Photos and Design by W. L. R Drake

Photograph by Henry E. Metzgar

WILD TURKEYS

Popular since the days of the red man, these handsome, keen-witted creatures continue to hold their own in Pennsylvania. They need our help during the winter, however, when snow covers their food.

INTRODUCTION

This bulletin is prepared largely from information collected over a period of years, and from suggestions submitted by Game Refuge Keepers and other field officers of the Pennsylvania Game Commission. It is hoped that through its publication Pennsylvania sportsmen and all other wild-life enthusiasts will have a better understanding of practical and inexpensive methods of feeding game in winter, as well as methods of improving the environment for game by planting material which provides natural food and cover.

The first requisite is food which creates body heat and enables birds to survive intense cold. Food also provides the strength necessary to assist game and birds to escape predatory enemies. It brings birds to the spring nesting season in a healthy and vigorous condition. Artificial feeding of game in winter is therefore extremely important. It is much better, however, to produce a supply of natural foods through the planting of shrubs, trees, grains, grasses, vines, etc. A natural food supply is in the long run much cheaper and more effective.

In these days of intensive development, clean farming practices, good roads, automobiles, more leisure time, and an ever increasing number of hunters, game must have some attention during the entire year. We cannot let it shift for itself. This is particularly true with respect to food and cover, which in many sections is a serious problem.

It is obviously impossible for the Pennsylvania Game Commission to carry on all of the improvement work necessary to adequately care for the game supply. This means that all sportsmen must assist in raising their game crop if a sufficient supply is to be produced. Boy Scouts, bird and nature lovers also have a particular interest in this connection and can render valuable assistance. Improvements in conditions for wild-life in most cases improves the environment for song and insectivorous birds. Everyone knows of their value to the orchardist and farmer as insect destroyers. If each one interested and concerned in this important problem helps just a little bit, it will go a long way toward helping Pennsylvania to retain its enviable position as a great game State.

No attempt is made in this bulletin to discuss feeding of wild waterfowl, as this subject was fairly well covered in a mimeographed pamphlet prepared several years ago and which is available upon application. The title of that pamphlet is "Wild Waterfowl Foods and How to Grow Them."

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WHY MORE FOOD FOR GAME?

If wild birds and animals are to live and propagate normally they must have an abundance of natural food. When there is a scarcity of natural food, due either to failure in fruit or nut crops, or to deep snows which cover nuts, seeds, and grit, it becomes necessary to supply food by artificial means. To meet the ever-increasing demands of the 600,000 hunters who range the woods and fields in the fall, game animals and birds must propagate to the limit of their natural ability and to do this they must be healthy and well nourished. The importance of keeping game in sound condition cannot be too strongly impressed on the minds of sportsmen throughout the country, and particularly is this true within a thickly settled and industrial State such as Pennsylvania. The Pennsylvania Game Commission fully realize this and, through their Game

Photograph by John B. Sedam

Game management students, Pennsylvania State College, examining food development work on State Game Lands.

Protectors and Refuge Keepers, constantly endeavor to supplement the natural supply of food with grains placed in shelters. Sportsmen, too, throughout the State are becoming more and more interested in this vital phase of game conservation work. The natural food supply can be augmented by two principal methods: first, the planting of various kinds of shrubs, trees, vines, grains and grasses which will eventually produce nuts, berries, and seeds desirable as food for game; and second, the distribution of grains, nuts and dried plants, usually in winter when deep snows make emergency winter feeding necessary.

TREES AND SHRUBS WHICH PRODUCE GAME FOOD AND COVER

Assisting nature in producing suitable foods for game and birds by planting trees, shrubs, and so forth, is desirable where practicable. Many varieties of shrubs and trees produce berries, fruits and nuts which persist well into and often through the winter, and furnish excellent

food. Such species of shrubs and trees may be planted on favorable locations, but it is a waste of time and money to plant unless the planted stock will receive sunlight necessary for it to become established and to grow. Most of these species will not grow satisfactorily in dense shade; in fact, they almost invariably demand an abundance of sunlight, which means they can be expected to grow only on open areas within the woods, or on abandoned agricultural lands.

Photograph by Dr. C. S. Apgar

Game Protector J. M. Haverstick in charge of planting program on state game lands No. 52.

Among the trees the most important are the nut bearers such as walnut, hickory nut, butternut, hazlenut, oak and beech. The mulberry, either common or Russian, is very valuable for summer food for game birds as well as song and insectivorous birds. Black gum produces berries relished by wild turkeys. Fruit bearing trees such as apple, crabapple, wild cherry, pawpaw, hackberry, etc., are very valuable. Other trees such as sassafras, cucumber, hornbeam and birch furnish food. For cover the trees most useful are the various conifers such as spruce, pine and hemlock. Among the shrubs and vines producing food are the dogwood, holly, barberry, snowberry, witch hazel, sumac, hawthorn, wild rose, mountain ash, viburnum, wild grape, greenbrier, osage orange, buffaloberry, bush honeysuckle, Russian olive, Siberian pea tree, bittersweet, blackberry, huckleberry, elder, raspberry, dewberry, Japanese barberry, etc.

If each sportsmen's organization would put on a campaign calling for the planting of food producing species in sections where deer will not destroy all of them much good will result. The fall or spring is the best time for planting. The planting could be done either in October and November or from about March 15th to May 15th. Practically all

the shrubs, as well as the trees, require sunlight. Consequently the planting must be made where they receive light. Food producing plants should be set close to cover or some cover plants set out in connection with the food producers. A very good plan is to plant a clump of 25 or 50 evergreens and nearby a clump of mixed shrubs. If these in turn are located near a food patch of grain, game is almost certain to be found there. The planting can be made on State owned land or lands upon which permission to hunt can be obtained. Farmers, no doubt, in many instances will readily give permission to hunt in return for the planting of trees and shrubs on their land. These trees increase the value of the land and most of the shrubs are very ornamental and attract song and insectivorous birds as well as game. The value of insectivorous birds to the farmer cannot very well be estimated in dollars and cents, but undoubtedly it is enormous. Some briars, grape vines, bittersweet, etc.,

Photograph by J. N. Morton

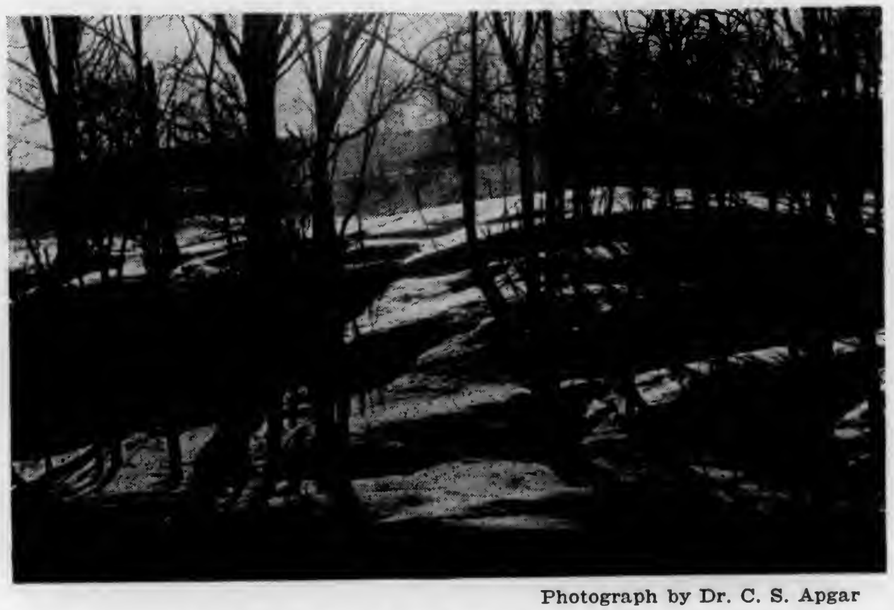
Wild grapes provide excellent game food and cover.

should be encouraged along fence rows, old dumps, stone quarries, gullied areas and other unused corners of the farm.

A great many of the trees and shrubs, as well as vines, including the valuable wild grape, which produce desirable foods for upland game, are more or less objectionable to the forester whose aim it is to produce the greatest volume of wood on a given area. Unfortunately, most of the food-producing species have little or no lumber value and are considered undesirable by the forester and are termed "forest weeds." The ultra-scientific forester, failing to realize their inestimable value to wild

life, looks with disdain upon these "forest weeds" and desires above all else to replace them with lumber trees. Fortunately, most foresters in this country, not being of the ultra-scientific type, appreciate the fact that wild life in our wooded areas has a great economic value and realize that the so-called "forest weeds" are essential to its existence. Pennsylvania's State Game Lands and State Forests, almost 2,000,000 acres of good hunting territory, and owned by the Commonwealth, are managed in a practical way under the direction of trained foresters. There is little likelihood that these men will ever sacrifice too large a proportion of game-food producing "forest weeds" to make way for comparatively few additional lumber trees.

Planting of shrubs, trees and vines which will produce food for game and small birds should be carried on extensively by sportsmen and lovers of wild life. The Pennsylvania Game Commission have been setting an example for a number of years through their Game Protectors and Game Refuge Keepers, and have planted much of the available areas under



Photograph by Dr. C. S. Apgar

Planting of clumps of evergreens will make more cover for game on this area.

their control. They have no authority to plant on privately owned or controlled lands. Such planting should be carried on by sportsmen and other individuals.

Sportsmen and others can render a distinct service to game conservation by discouraging the cutting and removal of bittersweet and other shrubs which produce game food. Bittersweet suffers particularly due to the fact that it is sought for decorative purposes by many people. The

the shrubs, as well as the trees, require sunlight. Consequently the planting must be made where they receive light. Food producing plants should be set close to cover or some cover plants set out in connection with the food producers. A very good plan is to plant a clump of 25 or 50 evergreens and nearby a clump of mixed shrubs. If these in turn are located near a food patch of grain, game is almost certain to be found there. The planting can be made on State owned land or lands upon which permission to hunt can be obtained. Farmers, no doubt, in many instances will readily give permission to hunt in return for the planting of trees and shrubs on their land. These trees increase the value of the land and most of the shrubs are very ornamental and attract song and insectivorous birds as well as game. The value of insectivorous birds to the farmer cannot very well be estimated in dollars and cents, but undoubtedly it is enormous. Some briars, grape vines, bittersweet, etc.,

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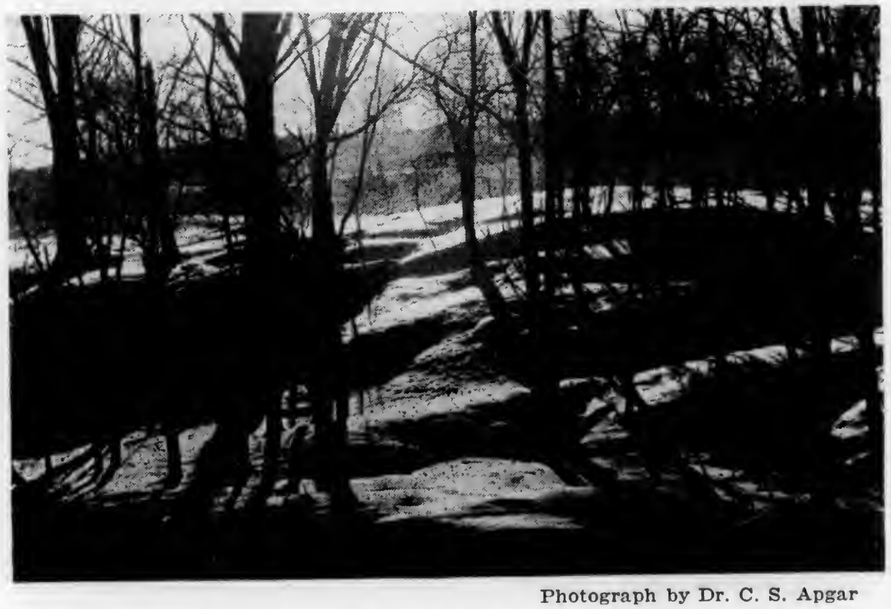

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INTENTIONAL SECOND EXPOSURE

bittersweet forms much of the normal diet of birds in sections where it is abundant. Both game and song birds feed on the berries and they should be permitted to remain in the woods for game food.

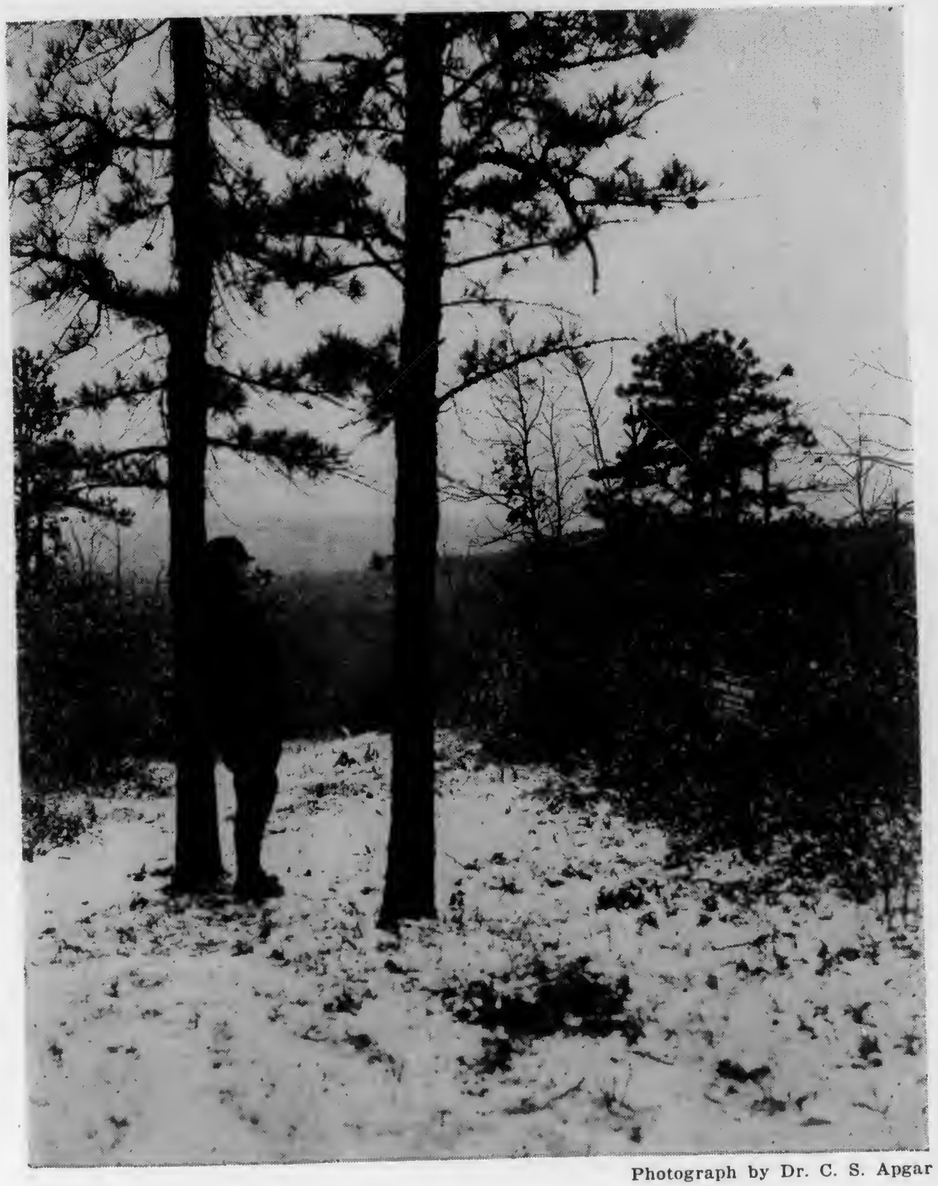
Coniferous or evergreen plantations made for reforestation purposes are wonderful havens of safety for pursued game, especially ruffed grouse. Under the thick canopy formed by the crowns of the planted trees grouse and other small game may obtain protection from hawks. It requires but a very few years for the small seedling trees ordinarily planted to reach a size sufficient to provide adequate and desirable cover for game. Also many birds and animals relish as food seeds from cones of evergreen trees. A plantation of such species will furnish both cover and food for game, as well as timber in later years.

For maximum utility for game, plantations of evergreens must not be large in size. They should not be more than 500 or 600 feet in diameter. All old fields or clearings should not be planted as they are essential to the well being of many small game species. It is better to have clumps or small patches planted here and there with evergreens and some clearings left to grow up to the miscellaneous assortment of weeds and briars which provide game food.

SUITABLE PLANTING STOCK

Far better results will be obtained by planting nursery grown seedlings in preference to nuts or seeds. If nuts or seeds are planted or sown a large percentage of them will be eaten by rodents. Experience has proved that the percentage of those which germinate is very low. Nuts and seeds of most species sown in a nursery may be expected to result in a good percentage of germination and to produce good healthy seedlings. These seedlings, after one or two years in the nursery, should be planted in their permanent location. Many commercial nurseries are now raising for sale at reasonable prices, quite a variety of trees and shrubs which are desirable as producers of food for game and birds.

Trees, shrubs, and other perennial plants, which produce nuts, fruits or seeds desirable as food for game and birds, are listed on the following page. No effort is made to list them in the order of their importance since the value of each species is variable with locality and with different kinds of game. The common name of the species is given as well as the scientific name of the group to which it belongs, but no attempt is made to list all of the desirable species of each group, since such a list would be



Photograph by Dr. C. S. Apgar

A Pennsylvania Game Refuge Keeper looks over his territory as the wooded hills and cozy valleys don the white coat of winter.

voluminous and unnecessary. The seeds or fruits of almost all species of one group are similarly edible.

TREES

Common Name	*Genus*	*Common Name*	*Genus*
American Beech	*Fagus*	Maple	*Acer*
Oak	*Quercus*	Poplar	*Populus*
Hazelnut	*Corylus*	Ash	*Fraxinus*
Walnut	*Juglans*	Birch	*Betula*
Hickory	*Carya*	Sassafras	*Sassafras*
Chestnut	*Castanea*	Basswood	*Tilia*
Blue Beech	*Carpinus*	Crabapple	*Pyrus*
Pine	*Pinus*	Common Apple	*Pyrus*
Hemlock	*Tsuga*	Persimmon	*Diospyros*
Larch	*Larix*	Black Gum	*Nyssa*
Cedar	*Juniperus*	Cherry	*Prunus*
Hackberry	*Celtis*	Mulberry	*Morus*
Aspen	*Populus*	Pawpaw	*Asimina*
Cucumber	*Magnolia*	Hop Hornbeam	*Ostrya*
Locust	*Robinia*	Willow	*Salix*

SHRUBS AND MISCELLANEOUS PLANTS

Common Name	*Genus*	*Common Name*	*Genus*
Mountain Ash	*Pyrus*	Maleberry	*Lyonia*
June Berry or Shad Bush	*Amelanchier*	Sourwood	*Oxydendrum*
Dogwood	*Cornus*	Privet	*Ligustrum*
Buckthorn	*Rhamnus*	Sumac	*Rhus*
Holly	*Ilex*	Snowberry	*Symphoricarpos*
Elder	*Sambucus*	Laurel	*Kalmia*
Chokeberry	*Pyrus*	Rhododendron	*Rhododendron*
Hawthorn	*Crataegus*	Bayberry	*Myrica*
Rose	*Rosa*	Red Root	*Ceanothus*
Witch Hazel	*Hamamelis*	Bittersweet	*Celastrus*
Spice Bush	*Benzoin*	Honeysuckle	*Lonicera*
Hercules Club	*Aralia*	Grape	*Vitis*
Haw	*Viburnum*	Greenbrier	*Smilax*
Viburnum	*Viburnum*	Raspberry	*Rubus*
Red Bud or Judas Tree	*Cercis*	Blackberry	*Rubus*
Alder	*Alnus*	Strawberry	*Fragaria*
Leatherwood	*Dirca*	Huckleberry	*Gaylussacia*
Partridge Berry	*Mitchella*	Blueberry	*Vaccinium*
Russian Olive	*Elaeagnus*	Pokeberry	*Phytolacca*
Buffaloberry	*Shepherda*	Teaberry	*Gaultheria*
Virginia Creeper	*Psedera*	Siberian Pea Tree	*Caragana*
		Japanese Barberry	*Berberis*
		Osage Orange	*Maclura*

GRAIN CROPS—ESSENTIAL

The planting of food patches and strips is another very essential program for providing wildlife with food during the summer and fall. Several sportsmen's organizations have recently taken up this matter. It is sincerely hoped that more will make arrangements now for an extensive program to be carried out as soon as possible.

There are a great many grains, grasses, weeds, etc., which furnish food for game. Nearly everyone is familiar with many of the kinds found quite commonly growing on farms. In addition to the commoner plants there are other ones which produce particularly desirable seed for game, game birds, and song and insectivorous birds.

The Pennsylvania Game Commission, after carrying on some experiments, developed a mixture of seeds which is recommended for planting for game food. The mixture contains buckwheat, Kaffir corn, Sudan grass, sorghum, dwarf broom corn, German millet, Japanese millet, hog

Photograph by Dr. C. S. Apgar

Sportsmen broadcasting grains on prepared areas. Game food conditions can be greatly improved if sportsmen's groups take up this work.

millet, flax and sunflower. The seed is planted at the rate of about fifteen pounds per acre in May or early June. This seed should be planted in long narrow strips close to cover. Seed costs are very reasonable. A cooperative arrangement between sportsmen and farmers could be worked out in many sections, whereby patches of this material to supply game food are made available. Information relative to the source of supply of seeds and any other information will be supplied upon request to the Game Commission, Harrisburg, Pa.

The common lespedezia or Japan clover is one of the important quail foods of the south. The serecia lespedezia, a variety of this, is more hardy and should do well in Pennsylvania. This is an excellent quail

food. It is a very good forage crop; it is a legume and therefore builds up poor soils by returning nitrogen to the soil and it is valuable in preventing soil erosion. This will grow on almost any kind of soil with very little preparation. Disking the ground prior to sowing the seed broadcast is satisfactory. It does excellently by sowing broadcast on top of winter wheat during the later part of March or the first of April. Unlike that of most legumes the seed loses its viability in a relatively short time, consequently seed of the previous year's crop should be sown to secure best results.

Buckwheat is a very good wild turkey food. Either the common or Tartary may be used. The latter is probably better for game food. It is sown from the middle of June to the middle of July. Sweet clover

Photograph by John B. Sedam

Plot showing Pennsylvania game food plot mixture.

planted around gravel pits, stone quarries, along roadsides, eroded gullies, and other unused corners, furnishes very good cover for game and benefits the farmer by building up the soil and preventing erosion. This can be planted in the spring with oats or barley as a nurse crop. It can also be sown in June or July without a nurse crop or in corn at the last cultivation.

Other plants suitable for food strips include cowpeas, millet, sorghum, and laredo soy beans. Cowpeas may be sown broadcast at the rate of one and one-quarter to two bushels per acre or planted in rows one-half to one-quarter bushels in May or June. Millet is planted broadcast at the rate of twenty to thirty-five pounds per acre in June. Sorghum is planted

in rows at the rate of eight to ten pounds per acre or broadcast in June using about one peck per acre. Soy beans are broadcast at the rate of three pecks per acre from the middle of May to the first of July. In mixture, of course, the amount per acre of each of the four plants should be only one-quarter of that given for planting per acre. The patches planted to the above can also include buckwheat broadcast at the rate of one-quarter to one and one-quarter bushels per acre from May to August 15th; corn planted in rows at the rate of one to one and one-half gallons per acre from May 1 to May 31st; Kaffir corn planted in rows, six to ten pounds, or broadcast one peck per acre in June; and Sudan grass broadcast twenty to thirty-five pounds per acre, May 15th to May 31st. Provided all eight of the plants listed are used for a mixture the amount per acre of each would be one-eighth the amount given for planting per acre.

Photograph by Seth Gordon

Clean farming does not provide good game conditions. This area could be made better by allowing cover to grow along the fence rows and permitting a few rows of grain along the edge to remain standing.

Food patches of wheat, rye, vetch, Austrian winter pea and German or crimson clover have been found good for quail. Wheat is planted four to six pecks per acre, planted about the time of the first killing frost. Rye planted four to six pecks per acre at about the same time as wheat or a little later. Vetch twenty to thirty pounds per acre from August 1st to November 1st. Austrian winter pea at the rate of one and one-half to two bushels per acre in February or March. German or crimson clover is planted broadcast fifteen pounds to the acre about August.

Volunteer foods, consisting of various weed seeds, can often be secured by having parts of abandoned fields plowed. Soils very often contain thousands of seeds of many kinds dropped years ago. They germinate

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only when influenced by the sun and other conditions. Plowing brings about favorable conditions for part of these weed seeds.

Sportsmen quite frequently secure the cooperation of farmers by purchasing a few shocks of buckwheat or unhusked corn or a patch of uncut corn which is allowed to remain in the fields. It should be kept in mind that to be most useful the corn or buckwheat should be left near good cover. Perhaps arrangements could also be made to permit a strip of uncut grain or hay to remain along the edges of some fields. A strip four feet wide will do much good. If wheat stubble is cut high it provides some cover to birds seeking the waste grains in the stubble field during the fall of the year.

Photograph by Dr. C. S. Apgar

Fence rows permitted to grow up furnish excellent game food and cover.

Boy Scouts could help immensely in providing food for game and song birds if each troop would arrange for a patch of sun flowers. These provide excellent food for song birds and for game birds. A small patch near good cover would not require much work for the returns which would be secured for the birds. It is planted any time up to the middle of July in rows far enough apart to permit cultivation. Eight or ten pounds per acre should be sown and cultivated the same as corn. A small patch of broom corn could also be planted near good game cover.

This is very good quail food. It is planted about one to two weeks after the first corn is planted, that is May 1 to June 15. It is planted at the rate of about four pounds per acre. The seed is placed in rows three and one-half feet apart and covered about one inch deep. It must be cultivated by harrowing or hoeing frequently. After the seed ripens in the fall the tops of the stalks should be bent down so that the seed hangs about eighteen inches above the ground. In many sections it will also be possible for the Scouts to secure berry bushes or other game foodplants for planting in clumps around stone piles or other places where permission can be obtained to plant.

The Scouts should also assist in the building of feeding shelters under which game can be fed during the winter. Wherever possible these shelters should be built before the time for feeding in order that game will have become accustomed to them before the winter's snow makes artificial feeding essential. Plans for shelters are shown under Emergency Winter Feeding in this bulletin.

Photograph by Game Commissioner Ross L. Leffler, McKeesport

An easily constructed Bobwhite food shelter, built by Boy Scouts.

EMERGENCY WINTER FEEDING

Many thousands of game animals and game birds are fed each winter in Pennsylvania with various kinds of grains, scratch feed, and occasionally with hay and alfalfa distributed especially for that purpose. During the past few years this feeding program has been stressed continuously by the Game Commission and splendid assistance has been given by organized and individual sportsmen, farmers, rural mail carriers, Boy Scouts and others. In many sections of the Commonwealth, Boy Scouts have organized successful feeding campaigns, and they, as well as farmers, are entitled to special commendation for their good work. For the welfare of our game, particularly game birds, everyone

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interested must do his bit in placing suitable food where it will do the most good.

We have much to learn concerning the most desirable game foods and the best methods of feeding game in an economical way. It is difficult to determine how to feed the maximum amount of game with a minimum amount of food and effort, for animals other than game, rodents particularly, are likely to get more of it than the game for which it is intended. Definite knowledge of the kinds of food that are most tempting and beneficial to game is of great importance and in this field there is much opportunity for investigation and experiment.

Many methods in the proper distribution and placing of winter feed have been employed in this Commonwealth with varying degrees of

Photograph by C. C. Freeburn

Feeding station constructed by C. C. C. camp.

success. Throwing grain from an airplane has been tried; numerous types of artificial shelters have been built; natural shelters such as thickets, hollow logs and sheltered rock ledges have been used and grain has been scattered in the open and ears of corn have been placed on twigs or stubs two feet above the ground so that they would protrude above the snow.

ORGANIZE FEEDING CAMPAIGNS

Each sportsmen's association should work out a plan by which its members, preferably through the appointment of a good live committee, will systematically and regularly feed the game during the winter in their vicinity. District Game Protectors will gladly cooperate with sportsmen in planning feeding campaigns, and can usually arrange to furnish some of the feed needed.

It is quite easy to feed small game in agricultural territory. In fact, many farmers either provide feed themselves or can be induced to do so if properly approached. Many of them will gladly put out feed without compensation while others, who cannot afford to donate the feed, will put it out if they are paid for the feed or if it is furnished them.

Feeding game in the forest areas becomes a somewhat more difficult problem in winter, but is no less essential. However, volunteers who are willing to devote some of their time to taking out grain can invariably be found in any good sportsmen's association. Snow shoes or skis may occasionally be needed in the southern part of the State and frequently required in the north, but the more difficult the objective, the greater the satisfaction in having attained it. Many State Game Refuge Keepers and Game Protectors who devote their entire time to maintaining the supply of game for sport, use snowshoes or skis in carrying feed into the woods and find pleasure in doing so.

Photograph by Brandau Studio, Hazleton, Pa.

A group of sportsmen preparing for winter feeding of game.

The unique method of distributing grain from an airplane was first tried in January, 1926, by the Blair County Game, Fish and Forestry Association (the Pennsylvania Game Commission cooperating), in an effort to feed turkeys and grouse in the remote, inaccessible mountains of Central Pennsylvania. The ground was covered by deep snow with a frozen crust. Paper bags filled with corn on the ear or shelled corn were dropped from an elevation of a few hundred feet. The bags broke open either on trees or on the hard crust of the snow, and the grain scattered. In more recent years other organizations and individuals have used this method of winter feeding with varying degrees of success. However, the publicity given to this particular experiment brought home to many people the vital necessity of feeding game, and stimulated activity in this field throughout the State.

FOOD MUST BE TAKEN TO THE GAME

In distributing food in winter it is very important that it be placed at or near the particular spots where the game for which it is intended is living. Food for grouse, for instance, should be placed usually under cover formed by clumps of evergreen trees, thickets of laurel, rhododendron or weeds, dense patches of scrub oak, or grape vines; bobwhites are usually fed in the open, along fence rows; wild turkeys in the deep woods along spring runs and so on.

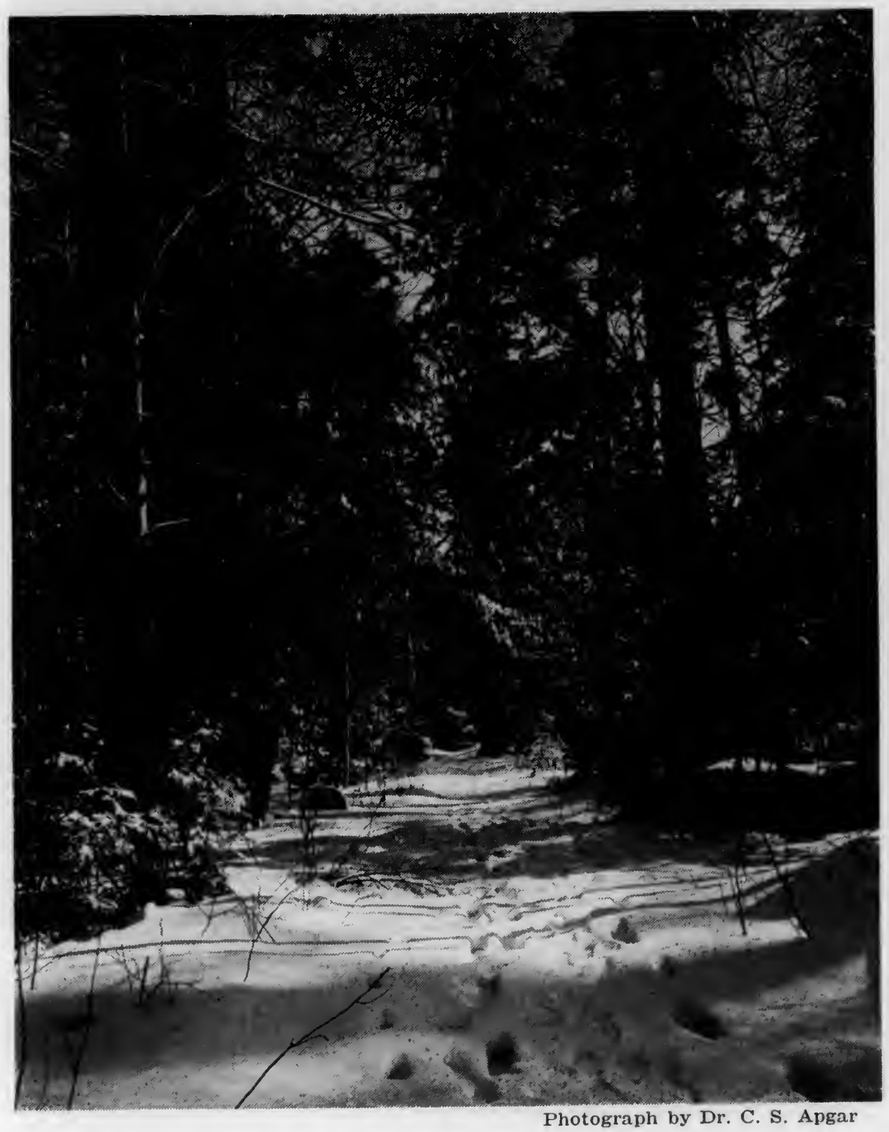
It should be borne in mind that emergency feeding is most essential when the ground is covered with deep snow and when, in consequence, game is unable to find the existing natural food. It is important that the

Game protectors taking game feed into mountainous sections during deep snow.

food be placed under some form of shelter so that it will not be covered by snow. Where suitable natural shelters are available they should be used, but they are not always to be found in the localities where it is most desirable that feeding be carried on. Therefore it is usually necessary to provide artificially constructed shelters.

In placing shelters in mountainous areas, southern exposures of course offer the most attractive places for the snow melts quicker and subsequent bare spots provide ideal feeding areas. Mountain streamsides also furnish ideal places to erect feeders. Grouse particularly frequent such spots to feed on succulent growth which is usually available.

Around springs and near the heads of streams moss and other vegetation is usually present no matter how severe the weather; therefore these locations are desirable.



Photograph by Dr. C. S. Apgar

Artificial feeding of game can be done under thickets of evergreens.

One disadvantage in the use of natural shelters is that food can seldom be put out in sufficient quantities to last during the part of the season when it is most needed, and consequently, it must be taken out to such shelters at a time when deep snow makes travel in the woods exceedingly difficult. On the other hand, artificial shelters can be arranged so that a

considerable quantity of food may be stored in them when travel is easy, protected from the elements, and thus be available when it is most needed by game. Game will at first be more or less suspicious of an artificial shelter and to be effective such a shelter should be built prior to the time winter feeding is necessary. If this policy is followed, game will have become accustomed to seeing the shelters by the time deep snows arrive. Shelters of one or more years' standing have proven more satisfactory than those newly established. It is also essential that the shelter be given a natural appearance. Feeding should be started before heavy snows so that game will have learned where to obtain food.

Photograph by Dr. C. S. Apgar

Typical large game territory in Pennsylvania.

Where it is expected that considerable quantities of food will be required during the winter at a feeding shelter or station, it is advisable to store an extra supply in some way, either in cans or metal-lined boxes, near the shelter. This stored food will then be conveniently available for placing in the shelter when bad roads and deep snows make its transportation difficult.

Many types of artificial shelter or feeder may readily be devised, and it is hoped that suggestions made herein will incite the ingenuity of all who are interested in constructing more efficient types. Practical lean-to shelters under which food may be placed can be made quickly from a few old boards or poles and quite a satisfactory shelter can be made with corn fodder.

VERMIN A MENACE

The habits of predatory birds and animals should by all means be borne in mind when food for game is being placed, particularly when artificial shelters are used. Provision should always be made for the easy escape of game animals or birds so that they will not be cornered and caught within the shelter. Never less than two entrances or exits should be provided.

Various species of predatory animals—foxes, wild cats, weasels and the more valuable fur bearer, mink—are quite apt to find a feeding station where game is feeding and in turn feed on the grain-fed game. If this occurs, either the vermin should be trapped or the placing of grain at the station be discontinued.

Photograph by J. N. Morton

Wild turkeys at feeding shelter on game refuge in Bedford County.

Care should be exercised not to attempt to draw too much game in a section to one feeding place, for vermin will profit by it at the expense of game. Numerous small feeding shelters, artificial or natural, are far better than a few large ones.

The abundance of deer in many sections of the State makes the winter feeding of small game a difficult problem, for a very few deer may eat quickly the grain intended for turkeys, grouse, and squirrels, although buds and twigs on which deer should browse may be fairly abundant.

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To overcome this difficulty some of the feeders herein described were designed primarily to keep the grain beyond the reach of deer.

All species of upland game, with the exception of ruffed grouse, can readily be fed if the right kind of food is provided at suitable places. The most difficult problem to solve is that of feeding grouse, and this problem merits most exhaustive study and experimentation. Success in feeding this most valuable of native game birds has been very poor, although several officers of the Game Commission report success. One reports having fed grouse under pines along streams and in thick laurel patches around springs, in other words, under natural cover where there is nothing to excite their suspicion. It appears logical that best results should be attained near springs and streams, for grouse will go there for water and grit.

A refuge keeper reported having successfully fed grouse somewhat as follows: A shock of unhusked corn was placed against a tree close to an old woods road and wired to the tree. Then the shock was opened on the side opposite from the prevailing winds and scratch feed was placed on the ground under the shock. All ears on the outside were husked but left on the stalk. Later grouse were found feeding on the husked corn as well as on the scratch feed.

It is not always necessary to make use of shelters in placing food, and in certain instances it may even be inadvisable to do so. Experience has demonstrated that a very satisfactory method of feeding wild turkeys and other woodland game is by placing ear corn on the stub end of a small sapling cut off about two feet above the ground, or on a stick forced into the ground upon which the ear of corn is fastened. The intention is to keep the corn above the snow. Squirrels may be successfully fed by placing ears of corn in cavities or crotches of trees. Shocks of unhusked corn may be placed conveniently for use of squirrels and other game. Squirrels eat out the "eye" of the kernel, leaving the rest as food for other game.

A desirable arrangement for placing ear corn can be made by driving nails or spikes through a board in several places and tacking the board to a tree or to a fence. A number of ears can thus be placed in one location.

A great variety of feeding shelters have been experimented with on game refuges and elsewhere, but in this bulletin only the more practical

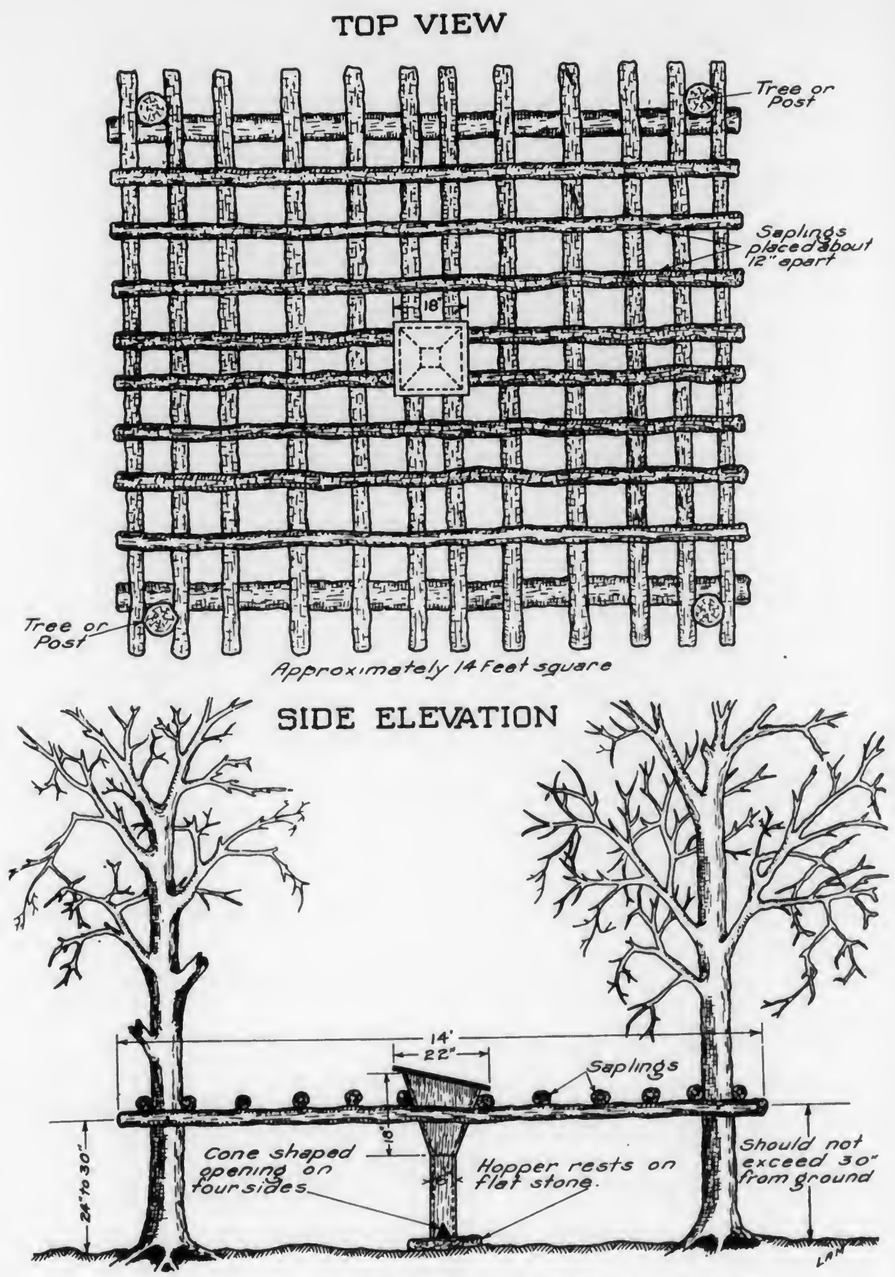


Fig. 13. Diagram of the Hopper Shelter and Feeder.

types are described, and most of these lend themselves to innumerable variations suitable to different conditions and depending on materials available for construction. Sketches were made by L. A. Mackey, Draftsman in the Division of Lands.

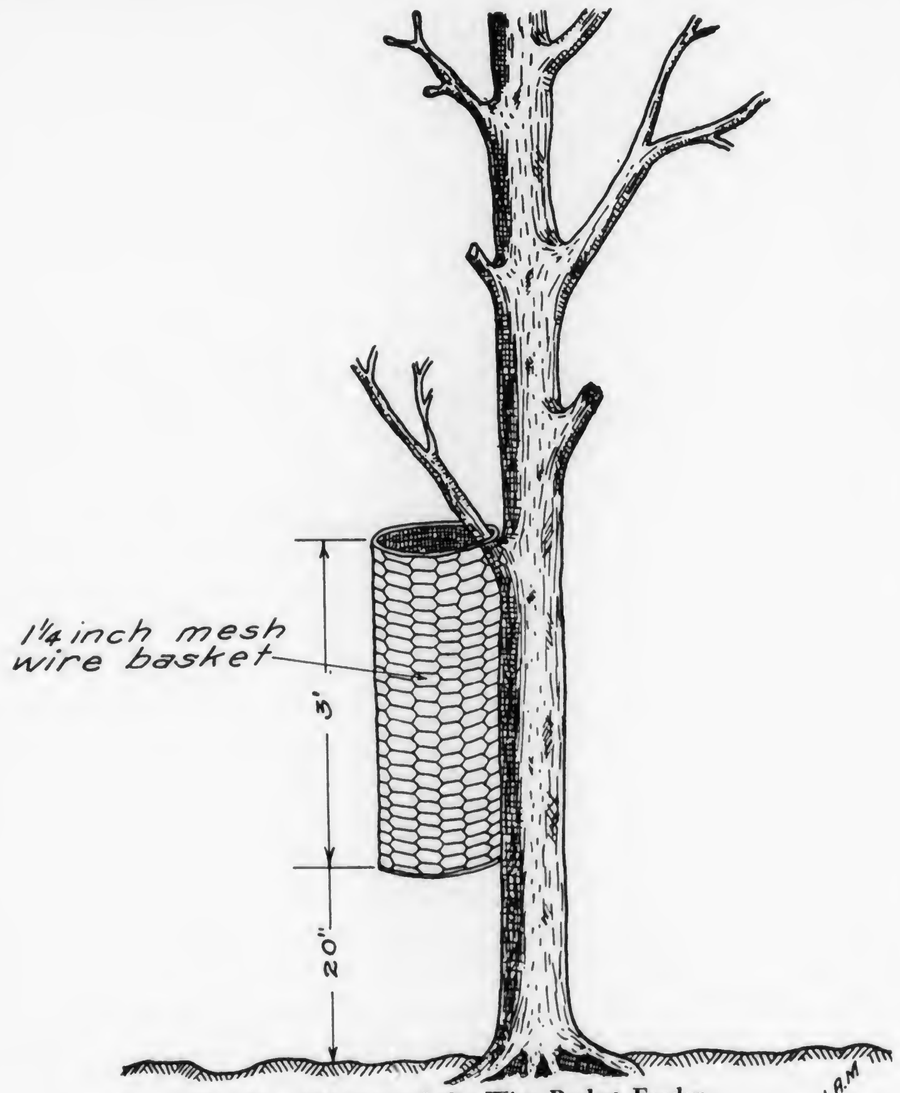


Fig. 14. Diagram of the Wire Basket Feeder.

ARTIFICIAL FEEDING SHELTERS AND STATIONS

Hopper Shelter and Feeder (Fig. 13): One of the successful artificial feeding shelters which has been used is the so-called "Hopper Shelter and Feeder." It is a combination shelter and feeder with a fairly large chamber capacity for storage of grain. The shelter, about fourteen feet

square, is supported on posts or trees twenty-four to thirty inches above the surface of the ground, the hopper being placed about in the center. The lower or chute end of the hopper should rest on a stone or in a shallow box to prevent its sinking into the ground. The frame of the shelter is constructed of four poles four to six inches in diameter securely nailed to trees or posts. It should be substantially constructed so that it will carry a heavy weight of snow. Should it sag under the snow, additional supporting posts can be placed underneath the shelter. Saplings two to four inches in diameter are nailed about one foot apart, checker-board fashion, and a covering of pine or hemlock boughs, or of brush and weeds, is then placed on top, allowing the covering to hang

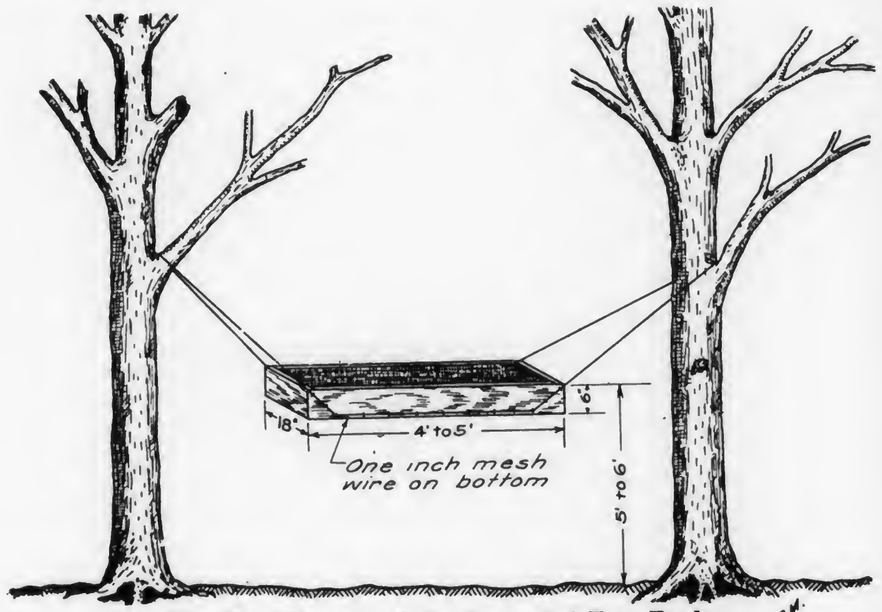


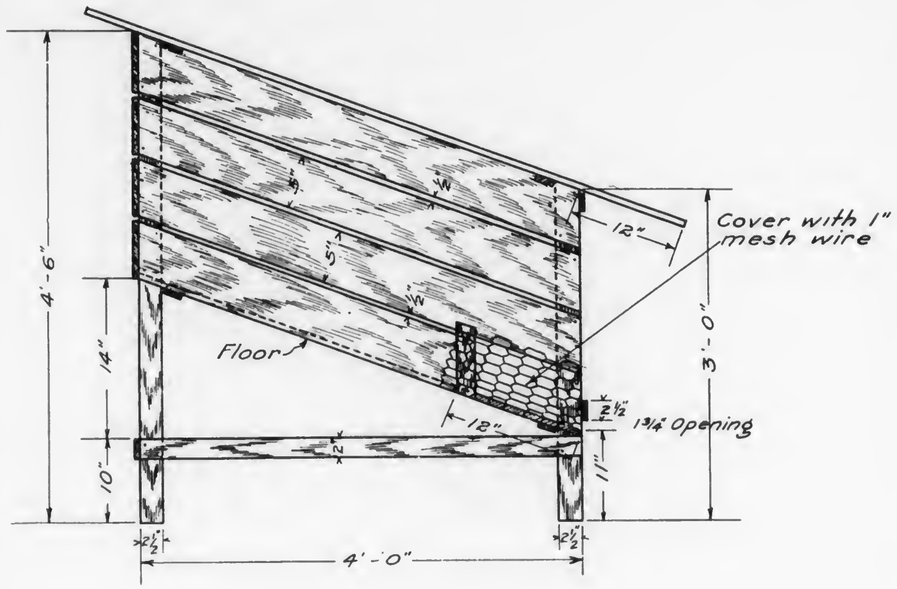
Fig. 15. Diagram of the Suspended Tray Feeder.

down over the sides a short distance, forming a fringe or curtain. It is open on four sides, enabling game to leave quickly if molested.

The food, either grain or scratch feed, which is placed in the hopper at convenient times, filters out of the four inverted cone-shaped openings at the bottom of the hopper as it is eaten.

Several Game Refuge Keepers have used this shelter successfully in feeding small game, some reporting that even grouse, the most timid of game birds, have fed at them. This type is designed with the large low shelter so placed as to keep the grain beyond the reach of deer. The hopper, with suitable modifications, is adaptable for use in many other types of shelters.

SIDE ELEVATION



FRONT ELEVATION

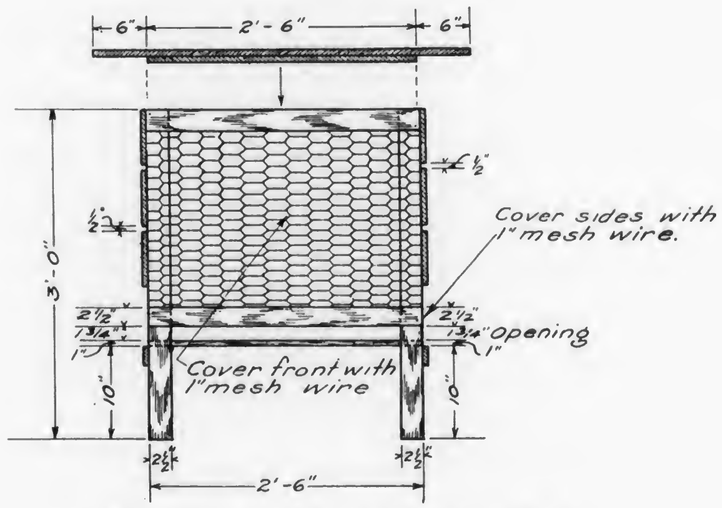
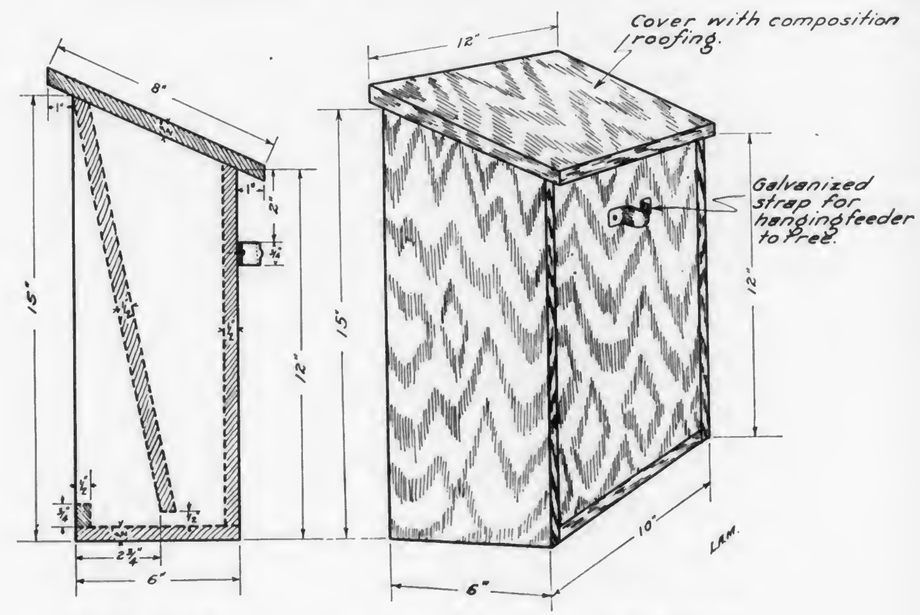


Fig. 16. Diagram of the Crib-Hopper Feeder.

Wire Basket Feeder (Fig. 14): A very satisfactory method of feeding turkeys and other birds, as well as squirrels, is the use of a basket of one and one-half inch mesh poultry wire, made in cylindrical form, and wired or hung onto a tree. This basket, made in any convenient size, and filled with ear corn, has proved worthwhile as a feeding station, particularly in the central and southern parts of the Commonwealth where snows seldom become so deep as to prevent refilling the basket with corn. Turkeys readily peck corn from the cobs through the wire mesh, and squirrels can enter the basket. They work the cobs around while gnawing at the corn, thus shelling much which falls to the ground where it is accessible for grouse, turkeys or other birds.



END VIEW

Fig. 17. Diagram of Box Feeder.

Suspended Tray Feeder (Fig. 15): In squirrel, turkey, and grouse territory a tray, with mesh wire bottom, suspended well above the reach of deer, has been used as a feeding station with fair success. These trays may be of any convenient size, but those which have proved most practical are from four to five feet in length, from one to two feet wide, and six inches deep. They may be suspended from trees by wire or iron rods, or supported on the top of posts set in the ground. Corn on the ear is placed in the trays. Squirrels which gnaw at the ears naturally shell a considerable amount which falls to the ground where it becomes accessible to grouse and turkeys.

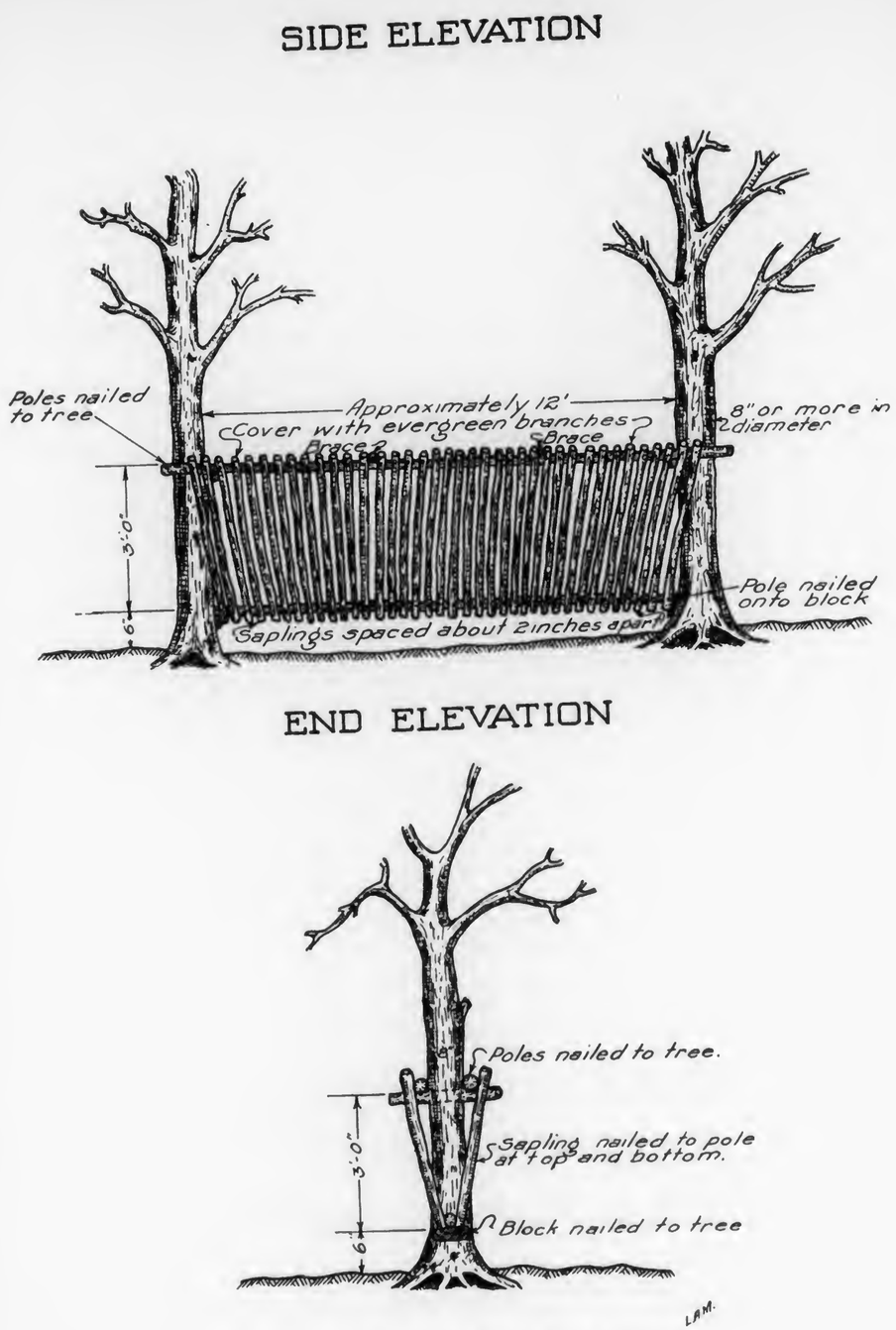


Fig. 18. Diagram of the Rack Feeder.

Crib-Hopper Feeder (Fig. 16): This type of feeder was designed to permit storage of four or five bushels of ear corn when roads are passable. It is intended primarily for wild turkeys, although other birds and game animals may take advantage of the kernels of corn which drop to the ground. It is a crib or box of any convenient size, made of boards and with sloping floor. The lower end is covered with one-inch woven mesh poultry wire to within two inches of the floor, a strip of wood being nailed across the box just above the floor leaving an opening about one and three-fourths inches wide through which the shelled ears can drop from the bin after the turkeys have pecked off the kernels. It is desirable to provide wire covered side openings at the lower end which will facilitate working out the shelled cobs. Turkeys, and perhaps grouse, will feed at these cribs by pecking the corn from the ears through the wire. Some kernels will naturally drop to the ground and be available for grouse and other birds.

The roof is removable to facilitate refilling. This feeder should be placed under natural cover wherever possible.

Box Feeder (Fig. 17): This feeder, designed by Refuge Keeper Orrie Smith for squirrels, should likewise be valuable for feeding wild turkeys.

The feeder can be made any size, but a convenient one holds about one peck of shelled corn. The board in front is sloped to provide a tray at the bottom from which squirrels or turkeys can feed. An opening, approximately one-half inch, is provided between the front board and the bottom board so that grain will flow onto the tray as it is eaten. A strip in front of the tray prevents the grain from being brushed off before eaten. A hinged lid is provided on top. This should overhang slightly and should be covered with tarpaper or some other roofing to keep the grain dry.

A clip is fastened to the back of the box and this, in turn, is hooked on a nail driven into a tree. For squirrels the box can be placed any height on a tree. For anyone carrying corn on horseback, a convenient height is one which will permit the refilling of the box from the horse. For feeding turkeys the box should be placed so that it can be easily reached by turkeys on the ground. This box is particularly well suited for feeding squirrels where deer are plentiful as it can be placed above their reach.

Rack Feeder (Fig. 18): The rack feeder is very easily constructed and is an economical and practical method of feeding corn on the ear to turkeys as well as other game. It is constructed of poles and saplings and covered with hemlock or pine branches which extend outward a foot or two, thus furnishing some shelter to the feeding game. Two

parallel poles are nailed on opposite sides of two trees three and one-half feet to four feet above the ground. A third pole is fastened to blocks nailed to the butts of the two trees and saplings or slats are then nailed to the poles forming a V-shaped crib. The slats or palings are spaced about two inches apart and the openings thus formed allow the cobs to fall out of the crib.

A feeder similar to this type, placed about two feet above the ground, of larger capacity and with slats spaced about four inches apart, can be used in connection with feeding hay or alfalfa to deer or elk.

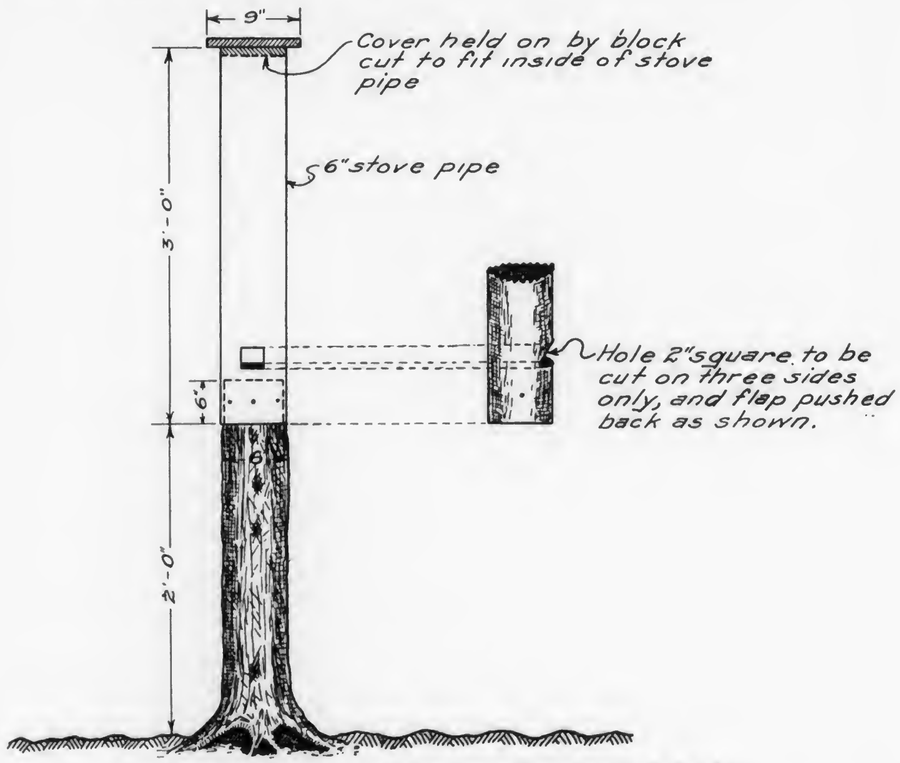


Fig. 19. Diagram of the Stove-Pipe Squirrel Feeder.

Stove-Pipe Squirrel Feeder (Fig. 19): A unique and economical squirrel feeder has been experimented with, using shelled corn or other grain, but its success has not yet been well demonstrated. A piece of stove pipe, about three feet in length, is slipped over the snag of a tree approximately two and one-half feet above ground. A post of the proper size may well be used for this purpose. A two inch square opening is made in the pipe, near the level of the top of the snag. This is done by cutting three sides of a square in the metal and pushing it back. The inside flap thus formed prevents the grain from flowing out faster than it is used. A top for the container is made by nailing a block the size of the pipe onto a

square piece of board several inches larger than the pipe, the block fitting into the pipe. This pipe arrangement may well be used in connection with various other kinds of artificial shelters in the same manner as the hopper described in Fig. 7 may be used. The plan lends itself to many adaptations for use under different conditions.

Spike Pole Feeder (Fig. 20): A feeder for turkeys and squirrels which has been tried with fair success is made of poles and spikes upon which ears of corn are placed. Spikes are driven into a pole and the heads then cut off, or spikes may be driven through the pole from the bottom up and thus save the labor of cutting off the heads. Two such poles are

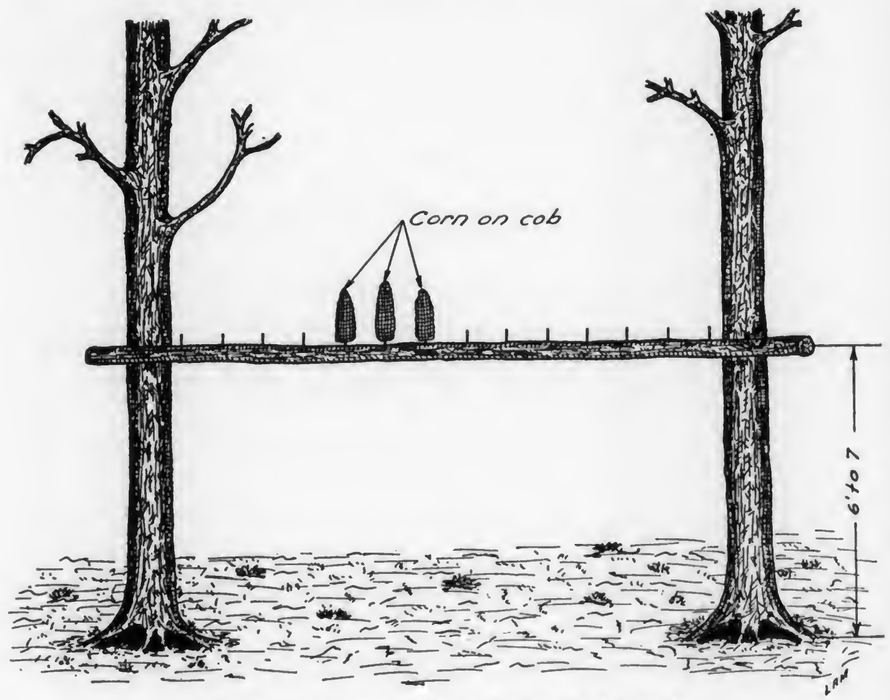
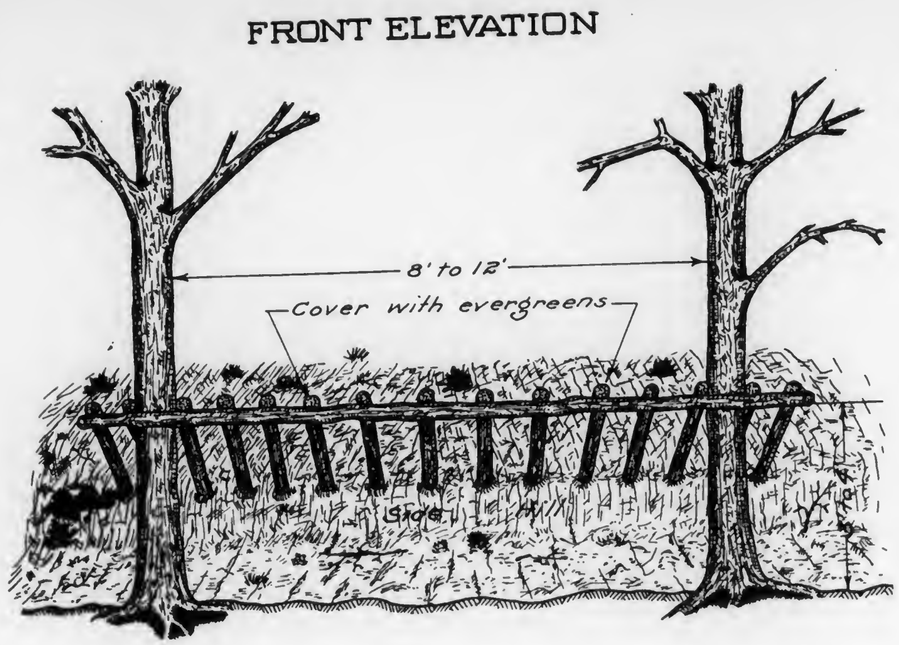


Fig. 20. Diagram of the Spike Pole Feeder.

fastened to opposite sides of two trees from five to seven feet above the ground, the poles being parallel and on the same level, the spikes pointing upward.

Side Hill Shelter (Fig. 21): A type of shelter under which small game can be fed may readily be constructed on a hillside. Fasten a good-sized pole horizontally between two trees three to four feet above the ground, then lay a series of parallel smaller poles from the horizontal pole to the higher ground in rear of the two trees. By covering these poles with hemlock or pine branches, or with brush and weeds, a practical and effective shelter is provided, three sides of which are open.



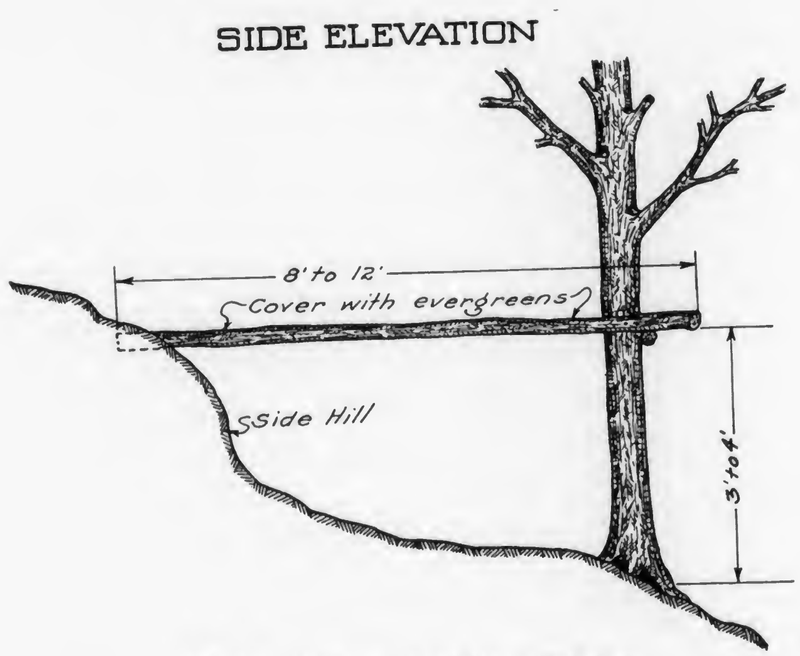


Fig. 21. Diagram of the side hill shelter.

The frame of a shelter such as this may be covered with building or roofing paper, then hemlock or pine branches placed over the paper. The paper will last throughout the winter and will help to protect the grain from water and snow. Under this shelter corn or other grain, or scratch feed, may be placed as required. This type should prove very satisfactory for feeding grouse or quail at accessible places where storage of grain is unnecessary.

Tent Shelter (Fig. 22): A shelter on level ground under which small game can be fed may be constructed of small poles and shaped like a soldier's "pup" tent. A fairly heavy pole is fastened horizontally between two trees three to five feet above the ground. Smaller poles are

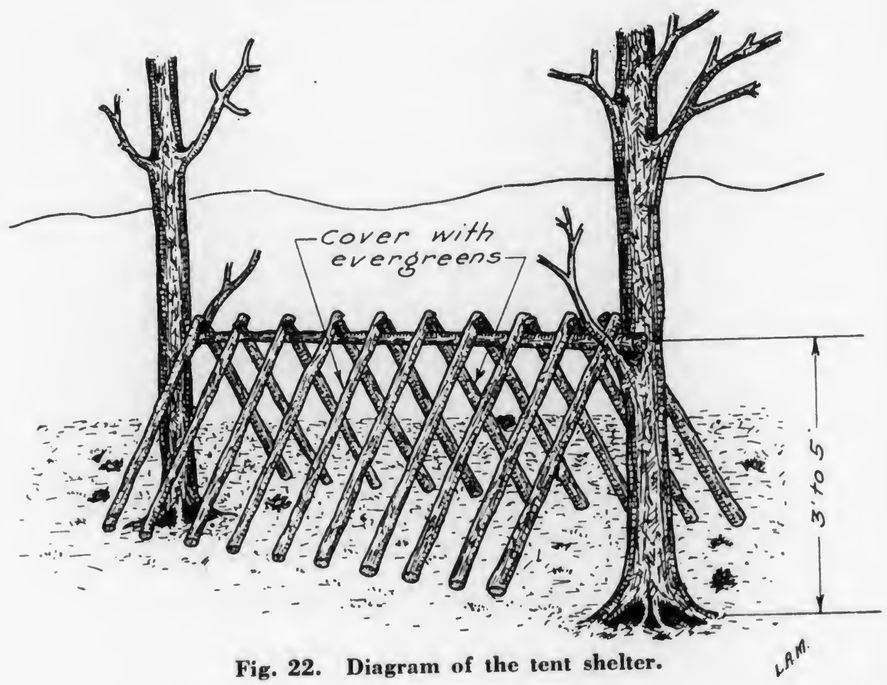


Fig. 22. Diagram of the tent shelter.

then laid parallel to one another from the ground to the horizontal pole on both sides of the tree, the horizontal pole forming the ridge of the "tent." The frame thus made is then covered with evergeen branches, brush, or weeds, or any other available material suitable for the purpose. Corn fodder can be used to form the "tent" if readily available. Under a shelter such as this corn or other grain, or scratch feed, may be scattered as needed. Ring necked pheasants and quail, and in some localities grouse, will find this shelter acceptable.

Spring Drain Feeder (Fig. 23): Refuge Keeper Ross Metz has had excellent results with a modification of the Spike Pole Feeder which he uses at spring drains for feeding wild turkeys and squirrels.

Spikes are driven in a pole similar to those described in Fig. 20. The pole is then fastened to trees on opposite sides of the spring drain and ears of corn placed on spikes. A second pole without spikes on which the turkeys stand while eating the corn is placed parallel with the first pole but about twelve inches lower.

Where trees are not available stakes may be driven in the ground and cross poles attached to these.

Some of the advantages of the spring drain feeder are that wild turkeys usually follow along spring drains during the severest weather for the purpose of securing grit, drinking water and natural feed. Spring drains are usually open all winter, even during the coldest weather, consequently food placed near such locations is always available for use. Grains of corn dropped from the pole by turkeys or squirrels are readily picked up by grouse, turkeys, and other birds.

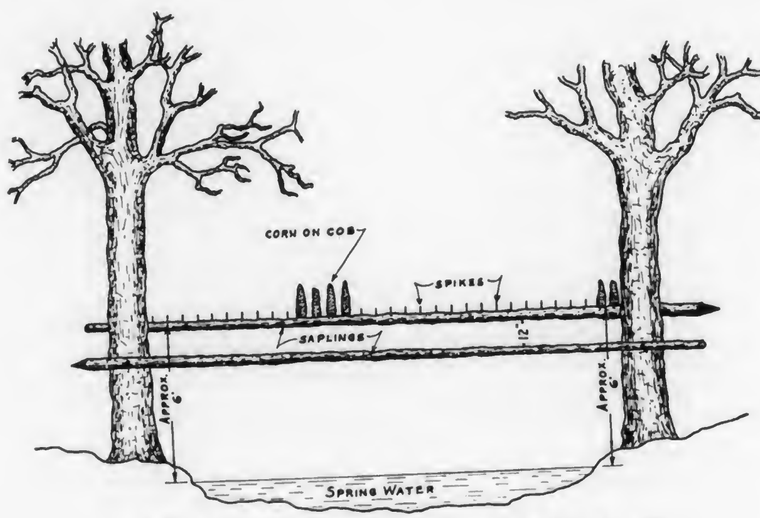


Fig. 23. Diagram of the spring drain feeder.

Barrel Feeder (Fig. 24): The Barrel Feeder can be made from a barrel with four poles cut in the woods. The poles act as legs on which the barrel is placed. A platform is built under the barrel inside the legs, and a two inch section of pipe inserted in the bottom of the barrel in order that it extends to within about three inches of the platform. Corn or other grain placed in the barrel runs down the pipe and is deposited on the platform until the pile of feed shuts off any further flow. As the feed is eaten more runs out.

A roof can be added to assist in keeping the feed dry. This may be either boards, brush or old sheet iron. The roof should extend over the edges far enough to prevent snow from falling on the platform.

If no barrel is available, use an old packing case, keg, discarded hot water tank or any weatherproof container to which a two inch pipe can be attached.

WHAT TO USE FOR WINTER FEEDING

Game animals and birds require, or at least appear to need, different types of food. Some are exceedingly particular as to their food, while others eat a great variety. Before supplying winter rations the food habits of game should be carefully studied so that the particular food which they desire may be furnished. Experience has demonstrated, in most instances, the kinds of food our game will eat. For all game birds

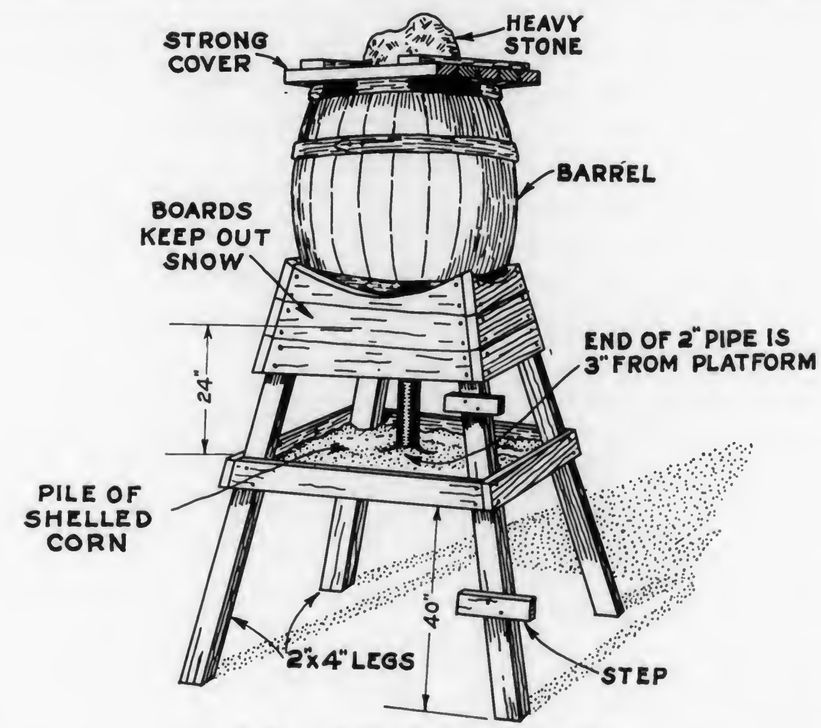


Fig. 24. Diagram of Barrel Feeder.

grit should be included with the feed since it is a necessary aid to digestion. Birds usually take it in the form of sand or gravel, but when the ground is covered by snow it may be difficult to obtain, and consequently should be included as a part of the ration. Grit may be purchased separately and put out along with grain.

Shocks of unthreshed buckwheat placed where small game winters, provides an easy method of feeding ring necked pheasants and bobwhite quail and one which has given success in all respects. Besides ring necks it has been reported that gray squirrels and even raccoon were found feeding from the buckwheat. Corn in the shock may be used in the same way,

but as it is less easily transported to the most favorable spots, it becomes less practical to use. In many instances uncut corn left in the fields has furnished food for ring-necks and squirrels, but it is inadvisable to leave buckwheat uncut, since buckwheat, unless cut and shocked, will be bent to the ground and covered by winter snows.

Shocks of corn not only provide food, but if the lower part of the shock is parted a very practical feeding shelter can be arranged. Frequently farmers can be persuaded to leave food patches for game here

Photograph by Seth Gordon

Shocks of corn not only provide food but can be made into a practical shelter under which to place other feed and grit.

and there on their farm. A small patch of grain or a fence row left without cutting will be particularly beneficial to ring-necked pheasants and quail.

Following is a list of our upland game. Under each species is given a statement of the normal winter food, according to the reports of the field force and the investigations of stomach contents made by the Bureau of Research and Information. A list of the suitable winter foods for game which can be procured locally without much difficulty is also given.

BOBWHITE OR QUAIL

Normal Food: The bobwhite in winter lives almost altogether upon weed seeds, grass seed, dried berries such as can be found in the open or along fence rows, and upon waste grain. Very little insect food is consumed during the winter. Stomachs of winter specimens taken in Pennsylvania contained over seventy-five per cent of weed seeds. Prominent among the species represented was the wild lupine.

Food at Shelters: Commercial scratch feed, good screenings, commercial chick feed, wheat, oats, rye, barley, broom corn, millet and sunflower seed.

Photograph by J. N. Morton

Where Wild Turkeys are plentiful frequent refills of the wire basket feeder are necessary.

Refuge Keeper Ross Metz refilling wire basket in Diamond Valley, Huntingdon County

HUNGARIAN PARTRIDGE

Normal Food: This bird of the open field lives upon weed and grass seed almost exclusively during the winter. Since the birds inhabit only the wide treeless fields, they exist chiefly upon the seeds of plants which grow strictly in the open.

Food at Shelters: Commercial scratch feed, good screenings, commercial chick feed, wheat, oats, rye, barley, broom corn, millet and sunflower seed.

RUFFED GROUSE

Normal Food: The grouse eats many different forms of winter food. It eats the buds and terminal twigs of birch, aspen, poplar, fire cherry, apple, hawthorn, and wild rose; occasionally it eats the buds and leaves of the hemlock. It is very fond of berries and pulpy fruits which can

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be found above the snow. Among them are huckleberries, wintergreen berries, fruit of the jack-in-the-pulpit, redhaws, rose hips, black haws, and apples. They often eat, during winter, leaves of the wintergreen berry, laurel and the fruiting bodies of sweet fern. On the ground they occasionally find weed seeds, small acorns and beechnuts and at the edge of the woodland the fruit of bittersweet, wild grapes and Virginia creeper. Grouse do not often feed upon waste grain because they do not come into the open as a rule.

Grouse vary their diet considerably from day to day. On one day an individual may consume little aside from buds; on another day it will subsist chiefly on wild grapes. While this rather unique custom may be the result of availability of food, it suggests the possibility either that food at a shelter should be considerably varied, or that we need not expect grouse to come regularly to the shelter to feed upon the same grain daily.

Food at Shelters: Commercial scratch feed, wheat, rye, buckwheat and whole or cracked corn.

WILD TURKEY

Normal Food: The winter food of this species consists of such fruits, nuts, berries and seeds as can be found above or under the snow. Turkeys are exceedingly fond of chestnuts and acorns. They consume regularly the fruit of the jack-in-the-pulpit, and do not hesitate to eat such leaves, berries and weed seeds as can be found. Being large of size, the wild turkey requires a good deal of food and much grit. Pebbles the size of an acorn are not unusual in this bird's gizzard.

When turkeys live near grain fields they often wander about feeding upon such corn, buckwheat, wheat, barley, rye or oats as they can find. A limited amount of insect food is consumed during winter. Much grass is eaten.

Food at Shelters: Shelled corn or corn on the ear, commercial scratch feed, buckwheat, barley, wheat and rye.

RING NECK PHEASANT

Normal Food: One of the principal winter foods of the ring-neck is the seed of the skunk cabbage. Weed seeds, waste grains, berries and small fruits, and grass and leaves, as well as a limited amount of insect food are consumed. Since ring necks live in open country, and are partial to agricultural regions, much of their food in some sections is doubtless waste grain.

Food at Shelters: Commercial scratch feed, wheat, corn and buckwheat.

WAPITI OR ELK

Normal Food: The fondness of this big game for twigs of sumac and hercules club has led to the virtual disappearance of these plants locally, where elk have been in the habit of feeding. They eat much grass, of course, and vary their diet with moss and lichens, leaves, twigs of various trees, and such small fruits as they can find.

Food at Shelters: Clover, timothy and alfalfa hay, branches from fruit and other trees, and occasionally corn and other grains.

Photograph by John B. Sedam

Feeding shelter built by WPA on State Game Lands.

WHITE-TAILED DEER

Normal Food: Deer secure most of their winter food through browsing and through pawing in the snow for acorns, leaves, and such bits of green vegetation as they can find. As a rule they eat the twigs of most of our well-known trees and shrubs, including the orchard varieties. Where their usual food supply is low they may eat the twigs or leaves of pine and hemlock, and of laurel or rhododendron—plants which they do not ordinarily touch. Deer will virtually live upon acorns if they can find a sufficiently large supply.

Food at Shelters: It has been difficult to get deer in a wild state in Pennsylvania to take advantage of hay and fodder put out for them. It is a well known fact that they eat corn put out for turkeys, but to feed corn to the hundreds of thousands of deer in Pennsylvania would be

excessively expensive and laborious. Authentic reports are available of deer eating timothy (particularly when it is sprinkled with salt water), clover and alfalfa hay, unthreshed grains, cull apples, oats and corn, and it seems logical that they will feed on branches cut from fruit and other trees.

BLACK BEAR

The black bear has no winter food problem for he goes into deep sleep in the autumn and does not awaken until the warmth of spring is assured. When he emerges from his winter sleep he may be ravenous, and little can be done, it appears, to keep him from attacking livestock or beehives when he cannot find such food as he needs, in the wilds.

COTTONTAIL RABBITS

These, the most popular of game animals in Pennsylvania, consume much bark during winter. They eat also such small fruits, grasses, and leaves as they can find. At shelters they will feed on a great variety of vegetables and fruits, corn, oats, clover hay and even branches pruned from fruit trees. The latter have been used successfully where rabbits are damaging an orchard. The pruned branches are piled in or near thickets just outside of the orchards, or left lying as they fall around the trees, the rabbits eating the bark from the prunings. Grain also may be placed under the piles of branches as an added attraction to keep them from damaging the orchard trees.

SNOWSHOE RABBITS

The snowshoe rabbit's chief winter food is the bark of small trees. It is particularly fond of willow. Many varieties of vegetables and fruits, corn, oats, and clover hay furnish desirable winter food for them at shelters.

SQUIRRELS

Squirrels usually store some food for winter needs. They do not store quantities of food in any one place; instead they bury nuts singly, scattering them promiscuously over rather sizeable areas. In addition to nuts, they also eat many seeds and small fruits, including the rather bulky fruit of the cucumber tree. When the nut crop is scant, squirrels lack an adequate winter supply. If the forest floor is covered with deep snow for a long period of time, feeding is desirable. Almost any kind of nuts, as well as grains, may be used.

END OF NUMBER

Numbers
12 - 13
Missing