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The Bobwhite Quail

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Among the native Nebraska wildlife to greet settlers when they first arrived in the territory was the bobwhite quail. Pioneers and homesteaders found quail along wooded waterways throughout the state, and as homesteaders introduced grain crops and fencerows to the quail, woody cover and annual weeds followed, all increasing the range of the bobwhite.

Records show that by 1901 the “bob” was distributed throughout the state; along river systems and wherever else suitable habitat occurred. By 1919, the bob was especially numerous along the upper Elkhorn River and streams emptying into the Missouri River west of Yankton, South Dakota. First settlers in Antelope County reported limited numbers of quail, but those soon increased with the agricultural development and quail were plentiful there by 1909.

Quail were harvested for eastern markets in the 1800s prior to protection by state regulations, but most of the birds taken were trapped and not shot, probably because of the time and expense required for hunting. One shipper in 1875, during a 6-week period, shipped 18,700 quail from Lincoln to eastern markets, primarily Boston and New York.

Even during the early 1900s the effect of winter weather on the quail population was documented. The 1908 annual report of the Nebraska Game and Fish Commission states: “In my last report I called attention to the almost complete extermination of the quail, caused by the severe winter of 1905, and predicted a speedy recovery to normal conditions, owing to their domestic habits, and prolificy. This seems to have been true, as during the past season the quail have been reported more plentiful than for years past.”

Again in the 1912 annual report: “The general condition of the game in this state is quite satisfactory, showing an increase in prairie chicken and grouse, and also in quail, during the years of 1910 and 1911, but owing to the severe winter of 1911 and 1912 the quail have decreased; the heavy snows and cold weather for weeks at a time prevented them from finding shelter and food.”

As we know today, the bobwhite is able to survive in Nebraska, however major population fluctuations have occurred due to severe winter conditions. Current fluctuations in population levels are probably not as drastic in the southeastern part of Nebraska due to better habitat conditions. We do, however, get major changes in the northern and western areas, especially in areas away from the wooded stream courses.

The bobwhite is normally considered more of a southeastern United States game bird. Many areas along its northern and westernmost range, however, do support high population levels. Nebraska lies on the northwesternmost portion of the bob’s range, with only marginal populations beyond this point.

In the state, bobwhite currently occur in greatest numbers in southeastern Nebraska, but there are densities outside that area that are equal to or better than those in the southeast. These areas are found in the riparian habitat along the Republican, Platte and Elkhorn rivers.

Before settlement of the state, quail were probably restricted to the woody stream courses, and it’s doubtful if they occurred in very large numbers. Settlers broke up the prairie into plots of ground and fencing followed. With the fences came woody cover for windbreaks to protect livestock and homesteads from the persistent prairie winds.

This interspersion of cropland, grassland and woody cover allowed the bob to move out of the river bottoms onto previously unsuitable range. This dispersion of range has undoubtedly increased the total quail population manyfold over historical levels.

Quail Range in Nebraska

During the early 1900s the bobwhite quail was largely restricted to Nebraska’s river systems. As the prairie was plowed, woody cover increased and so did the quail. This mixing of cropland with woody and grassy cover has undoubtedly increased the total quail population.

Abundant

Moderate

Scarce
EARLY SPRING finds bobwhites grouped in flocks of six or more. As the days lengthen, the closely knit groups associate less as groups and more as individuals. Confined to a small home range during winter months, the birds begin to spend their days roaming the countryside in search of a mate and a nesting site. As the hens leave the covey they are normally accompanied by a male. The number of males always exceeds the number of females,
leaving bachelor bobs. Excess males insure that every female has a mate, thus no production potential is lost within the covey framework.

Even though the sex ratio is nearly 1 to 1 when the chicks hatch, males are just a bit hardier than females. Nebraska's sex ratio of adult birds taken during the hunting season average 4 males for every 3 females, while young birds average 13 males per 12 females.

The covey breakup occurs around the first of April. Nearly a month goes by before nesting begins in earnest. Preferred nesting cover early in the season is grasses from the previous year with overhead canopy. Once a nest site is located the male scratches a bowl-like depression and weaves overhanging grasses into a canopy over it. The female supervises the operation. Once the nest meets the approval of the female, egg laying begins. Eggs are deposited at the rate of just under one egg per day, so to produce the average clutch of 14 eggs normally takes 16 days.

Incubation begins as soon as the last egg is deposited in the nest. If predators do not find the nest, and heavy rains do not wash it away and the cover is not destroyed, the eggs hatch after 23 days.

During courtship and early nesting, quail find their food supply on the increase. Bare ground in April makes the previous year's seed supply available but dwindling fast, so sprouting green vegetation is a preferred food at this time.

As the agricultural ground is worked, fewer seeds are available, but by mid May insects are beginning to emerge in sufficient numbers to provide a good food source for the nesting birds. As the season progresses, the quail's diet is primarily insects, greens and fresh berries.

Many of the nests start by quail never produce young. Many pitfalls occur that prevent eggs from hatching, but the persistence of the quail to successfully raise a brood of young perpetuates the species.

Climatic conditions are especially disastrous on quail production. Torrential rains flood out many nests, and cold, wet weather in May can set back the peak of hatch. Normal farming operations also take their toll each year, destroying nests located in fields that are worked late in the spring such as wheat, milo or corn stubble. Late spring burning will destroy both nesting cover and nests.

In cases where the nest is destroyed but the female survives, production is not necessarily lost because the hen will normally select a new nesting site and try again. If the hen dies and the nest is not destroyed, her mate will assume the incubation job and raise the young. If the male dies during this period, another is ready and willing to take his place. This is nature's way of insuring that every female has a mate, and unlike most species, once the clutch of eggs is complete, males will take full responsibility for incubating and raising the young.

Even though quail begin nesting in May, the production season will run into September. Maximum production occurs when the majority of the early nesting is successful as earlier clutches contain the most eggs. As renesting attempts occur, the number of eggs per nest decreases.

Until recently it was thought that a pair of quail would produce only one brood of chicks per year. However, biologists are now aware of some penned birds producing two broods. This only occurs under the most ideal conditions and the extent of this in the wild is unknown.

Current findings indicate that when second broods are produced by a pair, the second clutch of eggs is started soon after the first clutch hatches. The male then assumes full care of the first brood while the hen incubates the second clutch.

The frequency of this is not really known, but it does explain sudden eruptions of the quail population. There have been years in Nebraska, such as 1958, when the quail population almost doubled from the previous year.

Quail are about the size of a bumblebee when they hatch. The female broods them in the nest until they are completely dry, and as soon as they leave the nest the male joins his mate and the family moves into surround-

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**Sex Determination by Head Plumage**

In general appearance, the male and female bobwhite are very similar. The most conspicuous marking on the male is the white throat patch and a broad white stripe above the eye, running from the bill to the back of the neck. Both patches of white stand out because of dark brown borders. The female is almost identical except that these same patches are a buffy yellow.
The quail, like most birds, passes through various plumages during its life. By carefully studying the sequence of feather replacement and individual feather characters, biologists are now able to determine a bird’s age by examining only the wing. For example, the wing coverts, the row of feathers that lays over the top of the large flight feathers, are tipped in white on juvenile birds, top, but are a uniform gray on adult quail, bottom.

Age Determination by Wing Feathers

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The first several days of a chick’s life are spent searching for food when the weather is favorable, and when unfavorable, seeking protection from heat, cold and rain snuggled under the warm breast feathers of the adults.

Young quail grow rapidly. The soft yellow and black down they are born with is slowly replaced by juvenile feathers. Within two weeks the juvenile plumage begins to appear and by four weeks it covers all but the head. The bird is almost completely feathered by six weeks with only remnants of natal down still present on the head.

At eight weeks of age the first adult feathers begin to show on the breast. By 13 weeks adult plumage is dominant and at 15 weeks, adult plumage is reached.

A chick weighs 0.2-ounce when hatched and its weight about doubles every 10 days for the first 5 weeks. Between 8 and 10 weeks of age the chicks will have attained half of the adult weight.

For the first two weeks the young bobs spend most of their time under the protection of the adults, with only short periods of feeding. Immediately upon hatching, their feeding behavior is the same as adults. They scratch among the vegetation picking up insects and small seeds left from the previous fall. Within a week their wings are developed to a point where they are capable of flying short distances. They utilize their wings in short hops or flights upward to catch insects.

Young quail are dependent upon their parents for protection until they are five weeks old. From then on the young rely on the adult mainly for warnings of danger from predators and other natural enemies. They roost at night huddled together, yet function individually when danger arises, flushing singly and scattering in every direction.

As the young mature, they begin to function more as a unit, flushing together and taking the same flight path when danger is near. Their key to survival is this ability to act as a unit.

In September and October, most of
the young birds are no longer dependent upon their parents for survival. Food and cover are plentiful and the young birds begin to wander about. Many birds join other coveys. This movement is called the fall shuffle. Early beliefs were that coveys of quail in the fall were family units, but this is not entirely true. Some late broods may still be together in November, but most coveys at this time are composed of young from several different broods as well as numerous adults. By this time the bachelor males have joined up with other birds and are also scattered through various coveys.

This dispels the theory that quail should be hunted to break up family groups and thus reduce inbreeding—nature has taken care of breaking up family units before the hunting season even opens.

Mortality begins taking its toll on quail early. Young birds are especially susceptible to chilling and moisture. Rain will take its toll on young birds as well as nests. Predators will also take an occasional quail. Overall, 80 percent of the quail chicks that hatch in a given year will never see the following nesting season.

By November the birds are settled into coveys and their home range is fairly well established around cover that will satisfy their winter needs. This range is normally associated with woody or brushy cover for protection from predators and winter storms, a grassy area for roosting, and a corn or milo field for feed. The better the quality and the closer these cover types are to each other determines the number of birds an area can support.

Throughout the winter the birds are set in a way of life that changes very little from day to day. The covey spends the night in grassy habitat usually close to a patch of woody cover. The roosting formation is characteristic of the species and serves as protection from cold temperatures and predators: they form a circle with tails to the inside and heads facing out so that at any sign of danger the birds can take flight, and the circle is tight so that each bird has the benefit of body heat from each adjacent bird.

The covey leaves the roost shortly after sunrise and the first order of business is filling their crops. The covey moves off as a unit to its feeding area. In many cases the close proximity of the grain field to roosting cover allows the covey to walk instead of flying to breakfast. When food is in good supply, very little time is needed to satisfy the appetite of a bob, so they can soon move to a loafing area to spend the morning and afternoon.

Most of midday is spent loafing, preferably in an area that provides good overhead cover and allows the birds to dust themselves. Unless disturbed, the covey will spend the day in one location before moving off to feed again late in the afternoon. Upon completing their evening meal the birds move to their roosting area for the night.

This daily routine is repeated each day unless they are disturbed. Severe winter storms approaching will nor-

The first several days of a chick’s life are spent searching for food when the weather is favorable, and when unfavorable, seeking protection from the elements under the breast feathers of adults.
It is during periods of sub-zero temperatures and deep snow that mortality takes its heaviest toll on Nebraska’s bobwhites. Quail need to feed regularly to survive but can make it through cold winters as long as their food plants are not covered with snow.

Normally keep a covey of quail, as well as most species of wildlife, feeding all day. During severe storms, the birds may not be able to leave the roost for a day or two and the food supply may be covered by several inches of snow. It is during periods of sub-zero temperatures and deep snow that mortality takes its biggest toll on Nebraska’s bobwhites. Cold temperatures alone are not as harmful as when deep snow is also present. Quail require a lot of energy to survive sub-zero temperatures, but as long as their food source is not covered by snow they have little trouble withstanding the cold.

It is during the severest winter weather that habitat becomes most important to quail in Nebraska. Being on the extreme northwest edge of its U.S. range, the bobwhite population can be set back substantially during a severe winter; losses of 60 to 70 percent of the breeding population have been recorded. During periods of severe weather it is only the best habitat that will see a covey through.

During the fall and winter months, as normal mortality reduces the size of coveys, reshuffling will occur. A covey reduced to less than 10 birds during the hunting season will merge with another covey. Average covey size will change very little during this period even though the total population is drastically reduced. This allows the birds to select the best habitat.

Winter food of the bobwhite is composed primarily of annual seeds and grain. Whichever is most readily available will be used the most. Some berries are also utilized, such as sumac. Preferred grains are corn and grain sorghums, and while ragweeds and hemp are the most popular annual weeds, both are considered undesirable plants by farmers. Foxtail grasses are high on the preference list of quail, but the use of pre-emergents on cultivated lands has greatly reduced its availability.

As the first warm days of spring arrive, the once compatible males in a covey begin to square off in mock combat. It is at this time that most of the mate selection takes place. This will occur up to a month prior to the actual break-up of the winter coveys.

Provided normal conditions have existed during the year, the spring population of bobwhites is very close to that of the previous year. Very few old birds that nested the previous summer are left at this time, so most of the production rests on the hardy survivors produced the previous summer.
NEBRASKA'S regulation of upland bird harvest began in 1866. The earliest seasons, through 1929, were set by the legislature. Since that time, the seasons have been set by the Game Commission. During the early years of the 1900s there were one or two-month seasons with 50 birds-per-day limits.

The quail was completely protected from 1917 through 1943. In 1944, a 10-day season was allowed in Johnson, Nemaha, Pawnee and Richardson counties with a bag and possession limit of 5. The following year the season was extended to 15 days and another county (Gage) was added to the area. The area open to quail hunting progressively grew until the entire state was open in 1962.

Season length started at 10 days in 1944 and steadily increased to 90 days in 1973. For many years the quail season north of the Platte River was closed earlier than the area south of the river. January hunting was also prohibited for many years due to adverse weather conditions typical for that time of year.

Information gathered in recent years indicates that hunting pressure is related to the population density, and during periods of severe cold and deep snow cover, hunters are reluctant to spend time in the field hunting. These two factors allow quail hunting even in areas of low population densities, and for the season to extend into January when severe weather is most likely to occur.

Population surveys have been conducted in Nebraska since 1945, and data is available from the rural mail carrier survey from 1945 to the present. Although conducted three times a year (winter, spring and summer) only the summer survey is a reliable forecaster of the fall quail population. Questionnaires are sent to all rural mail carriers in the state and they record the number of game birds they observe during a four-day period, and the number of miles they drive.

The surveys are conducted at the same time each year and the variation in numbers of quail observed indicates the changes in population level. Year-to-year fluctuations show...
The harvest of quail in Nebraska by hunters has gradually increased since records have been kept. Many sportsmen and nature lovers feel that hunting reduces bobwhite populations. The real deterrent to increased quail numbers, though, is lack of habitat. Strictly regulated hunting as it now exists simply removes quail that would normally be lost due to inadequate habitat. The use of hunting dogs minimizes waste in the field.
the effect of weather on the populations. Long-term trends from 1945 to 1972 indicate a gradual increase in the bobwhite population. The peak occurred in 1958 and 1959, with the lowest population recorded in 1949.

A whistle-count survey is conducted each year by Commission personnel. This survey is based on the fact that bachelor males spend the summer in search of unmated females. In their quest for a mate, the males spend their time right after sunrise giving the familiar bobwhite call. Theoretically, the ratio of unmated males remains constant, and therefore an increase in unmated males indicates an increase in the overall quail population.

The whistle count survey is conducted each year over established routes 19 miles long. Starting at sunrise, the observer stops every mile along this route and records the number of quail giving the call. The number of males recorded is compared to previous years' records, thus establishing a population trend.

Information from the whistle-count survey since 1947 in the southeastern counties corresponds quite closely with information from the surveys conducted by rural mail carriers. The lowest population level occurred in 1949 and the highest in 1959. Again, the general population trend has been upward since 1947.

Violent fluctuations are caused by ideal nesting conditions producing birds in excess of the carrying capacity of range followed by severe winter storms that cause excessive winter mortality. As the population grows, quail disperse into areas that are simply not capable of supporting them. If a severe storm hits when the population is extremely high, their numbers can drop as much as 70 percent in one year.

When these sudden drops occur, sportsmen and landowners become very concerned and often request an immediate program to raise the population back up. Closing the season and stocking are the most common programs suggested. What is the best solution? Again, habitat is the key. If proper habitat is maintained, the fluctuation is much less pronounced. With normal nesting conditions and mild winters, a quail population will rapidly recover on its own. Such a loss occurred in northeast Nebraska in 1969. Due to a very severe winter the quail population dropped 58 percent. Within 4 years the population was back to the 1968 level and above it 5 years later (see graph) This recovery was made without change in management policy—no stocking or reduced seasons were involved.

What effect would stocking have on the recovery of a low quail population? Actually there is little or no benefit in stocking quail unless it is being done in an area where there are no wild birds and if the birds are released just ahead of the gun. The survival of pen-raised quail is normally less than 30 percent for birds released prior to the hunting season.

Studies have shown that the cost of putting a bird in the bag by stocking pen-raised birds ranged from $2.50 to $55.56 when young birds were released prior to the hunting season. Another technique used was releasing pen-raised young with wild-trapped adults. The adults normally adopted the young, but again, the cost of a bird was over $35.

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**Population Trends in Nebraska**

Since 1945, rural mail carriers across Nebraska have been conducting quail counts along their routes. When the results of these counts are tabulated and analyzed on a statewide basis, quail population trends can be determined. Based on information like this, the season length and bag limits are set so that only the surplus birds are skimmed off the population. Generally, “peak” years follow mild winters and “trough” years, seasons of severe cold weather.
Studies indicate that less than 4 percent of the pen-raised birds released in the fall survive until the next breeding season. Even with 100 percent nesting success, this would produce only 26 birds for every 100 birds released.

Late winter and early spring release of adult breeders is also a financial bust. Survival of native birds is only about 31 percent and pen-reared survival would be much less than that.

It simply boils down to the fact that any pen-raised birds released to replenish wild stock is impractical. In nearly all of Nebraska it is also impractical to attempt to introduce birds into an area void of native birds. If quail habitat is present, native birds will be there. If no native birds are present, there is no way pen-raised birds will survive for any length of time.

Only under the most unique circumstances is stocking of pen-raised quail financially feasible. The major drawback to game-farm quail in the wild is their tameness, which makes them very susceptible to predators; they have trouble finding food since they are conditioned to finding their food in a pre-arranged location, and they tend to remain separated and not form the covey unit that is so essential for survival of wild birds.

What effect does closing or reducing the season have on the quail population? Hunting mortality has little or no effect on the following year's population. Even though hunters remove a fair number of birds from the population each fall, these birds would normally be lost due to lack of suitable cover and other normal causes.

The most common winter loss in Nebraska is due to severe cold — below zero — for an extended period, and if their food source is buried beneath snow, quail will eventually starve. The means of combating this loss are to provide good protective cover from the cold and have the cover close to a food source that is not covered by snow. Birds that have to travel considerable distances from their roosting and loafing areas during severe weather to find food burn up much-needed energy and often perish.

Another threat to the quail population is a winter ice storm. Rain changing to snow with a rapid drop in temperature glazes the vegetation with ice and feeding can become difficult. There is also the threat of ice covering the birds, which normally results in suffocation.

When winter conditions become severe, the question of feeding game birds always arises. Done properly, winter feeding can bring a covey of quail through difficult times. However, there are definite ways to conduct a winter feeding program — the indiscriminate scattering of grain will not serve any benefit. The range of a covey must be known and the feed placed in good cover within that range. This means that instead of feeding birds in general, a specific covey is fed. Once a covey is fed, the food supply must be maintained throughout the bad weather.

Mixtures of the heading type of grains, like milo and the millets, offer the best quality food for winter feeding. Corn and wheat mixed with these grains will provide nourishing food. Various chicken feed mixtures, available at grain companies, are excellent too.

Feeding does have drawbacks if done improperly. If feeding is not continued throughout a period, birds may be held in an area short on food when they normally would move into another region where food is more readily available.

Feeding birds can also increase losses due to predation. Predators can become aware that the birds will be found at a certain site at a specific time each day. Feeding birds along roadsides will also increase road-kill losses. Indiscriminate scattering of grain is a waste of time and grain if it is expected to provide food for quail. It gets a lot of grain in the field, but it will help very few birds through a period of severe weather.

When a covey of quail is known to be present and the food supply is known to be eliminated, feeding can assure their survival at a relatively low cost. But, this can only be done effectively on a farm-by-farm basis.

Nebraska's bobwhite harvest has gradually increased since records have been kept. The increase is due mainly to an increase in number of hunters who harvest quail. Although quail hunting is attracting more hunters all the time, the vast majority of quail are taken incidental to pheasant hunting. There are fewer than 10,000 sportsmen who hunt primarily quail, and fewer than 20 percent of the hunters harvest just over 60 percent of the quail.

Although many sportsmen and nature lovers feel that hunting seasons reduce quail populations, the real deterrents to increased quail numbers are lack of habitat and the severity of Nebraska winters. The regulations as they now exist will simply remove quail from the population that would normally be lost due to inadequate habitat.

The gradual settlement of the state developed habitat more to the quail's liking. The plowing of prairie, the subsequent planting of small grain, the increase of weedy growth, and planting of trees all enhanced the cover and vegetation necessary for quail survival and increase.

While settlement increased the quail population, many modern farming practices are detrimental to quail production. The advent of herbicide use and increased mechanization have encouraged the trend toward "clean" farming. Much of the quail habitat is now restricted to inaccessible, un tillable areas such as drainage ditches, fencerows and pastures.

The trend toward monoculture or one-crop farming is also detrimental to wildlife. For instance, a portion of land in com year after year provides little variable cover that would benefit quail. All modern farming practices aren't bad, however. Conservation practices such as grassed waterways, terracing, strip farming, pasture improvement and shelterbelt plantings all may benefit quail.

Unlike so many native game birds, the bobwhite has adapted well to living with man. To sustain their populations, all we need do is meet their basic life requirements.
The key to all successful wildlife management is habitat. Various types of cover are needed at different seasons to serve the needs of bobwhites. Usually one or two types of habitat are available, but possibly an additional one needs to be increased. The main method of improving quail habitat is to increase “edge.” Edges are those areas where two different types of habitat, that serve different functions for the quail, come together. Examples would be pasture land adjacent to a

The Way to Quail Abundance
Four types of cover are usually associated with bobwhites—grassland, crop, brush and woodlands. An ideal quail area would have a mixture of these four; however, all are not necessarily needed in order to have a suitable quail population.

Grass serves its best purpose as nesting cover; at least two out of three quail nests are found in grass communities. Some hayfields are used, but usually the grass is associated with brushy cover on unused areas such as along a hedgerow. Many times, grass clumps that are inaccessible to cattle furnish the needed protection for a quail nest. Roadsides also receive high use due to non-use by livestock and haying. Also, a fencerow may provide additional protection and make a ditch bank a preferred nesting area. Overgrazed pastures and harvested hayfields offer little for quail. Quail usually do not prefer heavy stands of alfalfa for nesting as pheasants do, but seek out areas that are more open, with less canopy effect, which are easily traveled.

The increase in cropland has been the primary factor in increasing quail range. Before the land was homesteaded, range fires disturbed the soil and allowed weed growth to occur, but grass succession eventually overcame the weed and forb growth. Early sod breaking and farming practices created disturbed areas and edges for the growth of ideal quail habitat.

While the old, inefficient type of farming was beneficial, modern farming techniques are working against the quail. The use of herbicides and insecticides remove the necessary cover and food that they need. Land leveling has removed many woody or brushy draws that formed necessary edges. Fencerows and hedges are removed to enable the use of larger equipment. Because of the increased demand for food for the increasing human population, the farmer cannot be faulted for trying to improve his land for increased production. Many farmers, however, see the need for and benefits of conservation practices to prevent soil erosion and conserve moisture and water on the land.

Most of these practices benefit both the farmer and wildlife.

Brush is probably a broad term that would include an osage orange "hedge" row, plum thicket or sunflower patch. Normally any low woody plants or woody type herbs provide a necessary part of the quail "home". The availability of this type of cover adjacent to cropland or other food source usually determines bobwhite home range. One reason why southeast Nebraska and the Platte and Republican rivers and tributaries are blessed with quail populations is because of these brushy areas.

While multiflora rose has been a beneficial addition in many eastern and southern states, the introduction into Nebraska has not been successful due in part to lack of moisture, and disease.

Osage orange was planted as living fences, and as a brushy field boundary has well served the quail. However, many of these hedges are going before the bulldozer, and the quail vanish with them. Plume thicket spring up and spread without help from man and are very important. Redcedar, commonly used for windbreaks, also provides important winter cover. Snow tends to bridge over the branches, leaving a canopy and protection for the bobwhite.

Blackberries, raspberries, plums, currants and elderberries provide food in addition to shelter.

Woodlands serve best use when associated with brushy undergrowth or brushy cover adjacent to the woodland edge. Most woodlands are associated with rivers and tributaries and are not as intensively managed for timber or quail as in the southeastern states. Their value in Nebraska is limited to an association with brush and cropland. Some winter cover is provided, along with limited food. A woodlot that is heavily grazed to remove ground cover is practically worthless to quail.
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