

SOME OBSERVATIONS ON THE ECOLOGY OF THE RING-NECKED
PHEASANT IN HAMILTON COUNTY, KANSAS

by

ISREAL HARRY TRIGG

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INTRODUCTION

Pheasants were first introduced into the United States in 1790 (Wetmore, 1930) by Governor Wentworth of New Hampshire. According to the Kansas Fish and Game Commission (Cammack, 1932) they were first introduced into Kansas in 1905 following which there were intermittent plantings until 1921. Considerable difficulty was experienced in getting the birds to propagate, hence it was not until 1932 that the first open season was declared.

The importance of the ring-necked pheasant, (Phasianus colchicus torquatus), as a game bird in Kansas is well known by sportsmen and farmers. It is also well known that population densities of pheasants fluctuate from year to year, some years being characterized by dense populations while in other years there is a scarcity of birds. Since Hamilton County, Kansas lies well within the known range of pheasants it was believed that an ecologic study of the pheasants in this area might produce some data bearing on population densities. Hence the objective of this work was to collect available data relative to the food habits, cover, nesting habits, mortality, and management of pheasants in Hamilton County.

This area, one of the western most counties of the state, is in the high plains regions and has a light average yearly rainfall. The county is bisected from east to west by the Arkansas River. A strip of sand hills borders the southern bank of the river through the county, the strip being from one to two

miles wide. The rest of the county is a comparatively level plain except for the extreme southwest where there is a network of large gullies, many of which contain small natural lakes. These lakes, filled with water in the fall and winter are usually dry early in May or June.

Pheasants in Hamilton County, therefore, have an environment which differs considerably from that of Minnesota and Iowa where much research has been conducted with pheasants. In Minnesota Fried (1940) found the main food of pheasants to be corn while in this county very little corn is raised. In Iowa Baskett (1947) found that most nests were in uncut clover and hay fields. In Hamilton County, however, there is very little hay grown and no timothy or redbud. While some few fields of alfalfa do occur along the river, they cover only a small part of the county.

Minnesota and Iowa, in general, are well supplied with lakes, ponds, rivers, creeks, and springs whereas in Hamilton County, water sources are scarce. Another point of difference in environment is the density of human population, Hamilton County being sparsely populated in comparison with most counties in Minnesota and Iowa, where pheasant research has been conducted.

According to the older residents of Hamilton County, the pheasant made its appearance about 1910, but did not gain much in number until after the dust bowl days when the human population of the county increased and maize became a main crop of the county.

METHODS

The information, on which this paper is based, was obtained by direct observations, talks with landowners, and by reports from many farmers in the county. A census of pheasants was taken during the falls of 1949 and 1950. In the determination of food habits and cover, observations were made of selected areas known to be inhabited by pheasants, and in addition, analyses were made of the contents of pheasant crops taken at various times during the year.

Nesting habits were studied by observing harems in the spring, and by correlating this information with reports made by farmers relative to the number of nests found and to the character of the nesting area.

Information concerning the mortality of pheasants was acquired by observing the bodies of dead birds in the field. In many cases the immediate cause of death was difficult or impossible to determine. Additional information was obtained from reports by landowners throughout the County. The number of dead pheasants observed and the number of nests destroyed were listed in these reports.

Land use practices were observed in the county to determine if such practices might affect pheasant population densities. Observations were made and recorded relative to the practices that the writer believes might aid in increasing pheasant population density in Hamilton County.

REVIEW OF LITERATURE

In Minnesota Fried (1940) made an analysis of 515 crops and gizzards and found that cultivated grains made up 81.3 per cent of the food eaten by Minnesota pheasants. He also found that grasshoppers were the most preferred of animal food, making up most of the 3.9 per cent of the animal matter found in the crops and gizzards, while corn made up the largest percentage of grains eaten. Fried's work was corroborated by Nelson (1950) who determined that corn was the main food of the pheasants he studied in Minnesota.

In Michigan Dalke (1937) found that 83 per cent of the pheasants' food was cultivated grains and that corn comprised the largest percentage. According to Dalke insects formed only a minor percentage of the total food of Michigan pheasants.

Grit is also an important part of the pheasant food intake and Dalke (1938) found that in Michigan most of it consisted of quartz and other odd objects. He also found that young birds begin to take grit almost as soon as they start to eat.

Nelson (1950), in studying the cover used by pheasant in Minnesota, found that sloughs, marshes and uncut meadows were used most frequently. Brush, shrubs, and timber served for cover much less frequently.

Studies made by Leedy (1949), in Ohio, to determine the areas used by pheasants for their nests, showed that most nests were in hay fields if such fields were close to areas serving for winter refuge. He further found that the cutting of hay

destroyed many nests and that there was less destruction of nests in wheat fields than in hay fields.

In Iowa, Baskett (1947) found in his study of nesting habits that courtship at nesting time followed a certain pattern which consisted first of crowing by the male, then display of plumage, after which, copulation occurred. Subsequently the cocks established territories and the hens selected the nesting site. This was all accomplished by the first week of March. The egg laying period continued from March to July. When the nest site was selected, the pheasant scratched out a small circular depression in the soil and then lined it with down and debris. The eggs were laid between feeding times which were about two hours after sunrise and two hours before sunset. In certain cases, some pheasants began to "set" before laying had ceased. After the chicks hatch the female cares for the young. Most of the nests observed by Baskett were in hay or grain fields, or along fence rows.

Another important aspect of the ecology of the pheasant is predation and disease. In a study of predation Hedgepath (1943) found that skunks prey on pheasant eggs but that they ate more rodents and insects than pheasant eggs.

Tegetmeier (1904) in his book, (Tegetmeier on Pheasants), found that important diseases of pen-raised pheasants were catarrh, roup, tuberculosis, gapes, cramps, and fowl enteritis. Cook (1897) in his book, (Pheasants, Turkeys, and Geese), says that wild birds are not subject to many diseases but that the main ones are gapes, congested lungs, and roup. He found a few

cases of scurvy legs caused by a parasite under the leg scales, and a few cases of lead poisoning caused by the pheasants' eating of shot.

Several methods of taking a pheasant census have been described. One of the most popular is the crowing count. Kimball (1949) found that the crowing count, and the roadside count, yielded the same results and that the crowing count was satisfactory for both small and large areas. He also found that the crowing count was good for showing population trends. Fisher, Hiatt, and Bergeson (1947) found that the roadside count made in the morning while motoring at a rate of 20 miles per hour yielded a large variability in results. In Nebraska, McClure (1945) made a comparison of several different census methods and concluded: (1) that the roadside count was quite variable; (2) that the one minute count is good only in the spring; (3) that the denotations count could be used all year long; (4) that the horseback count is good to determine the yearly trend; and (5) that the scat count is good for determining winter concentrations.

FOOD HABITS

The food habits of the ring-necked pheasant in Hamilton County, Kansas were studied by taking observations of the type of food present when pheasants were observed. A number of crops were also taken and analyzed in order to determine the type of food that the pheasant was eating at the time the crops were taken.

The first group of 14 crops were taken during the months of August, September, October, and November of 1949. These crops were brought in by farmers living in various parts of the county or were taken by the author from pheasants killed by automobiles. Analyses of these crops indicated, in general, the nature of the fall food being utilized by pheasants.

The next group of 6 crops was collected during the winter months of December, January and February of 1949 and 1950. They were collected from birds frequenting the river banks, the sloughs, and the gullies in the southwest part of the county.

Another group of 5 crops was collected in the months of March, April, and May of 1950. The northeast, southeast, northwest, and southwest parts of the county were represented by one crop each while the fifth came from along the river about the center of the county.

Tables 1 to 6 show that maize, (Sorghum vulgare), constituted by volume the largest percentage of the food eaten by pheasants during all three periods. The second most important food, by volume, in the crops taken during the fall was composed largely of grasshoppers, (Melanoplus spretus), which were found in 10 crops while maize was found in only 8. By volume, grasshoppers were followed by wheat, (Triticum vulgare), which made up 16.3 per cent of the total food. Sunflower seeds, the army worm, the stink bug, pigweed seeds, and the cricket were also found in lesser amounts.

In the crops taken during the fall, grasshoppers ranked first by occurrence and were followed in order by sunflower seeds,

Table 1. Analysis of 14 crops collected in the fall of
1949---per cent by volume.

Food	: Grams	: Per cent by volume
Maize (<i>Sorghum vulgare</i>)	48.9	50.1
Grasshopper (<i>Melanoplus spretus</i>)	26.8	27.4
Wheat (<i>Triticum vulgare</i>)	15.9	16.3
Sunflower (<i>Helianthus petiolaris</i>)	03.8	03.9
Stink bug (<i>Nezara viridula</i>)	00.7	00.7
Army worm (<i>Prodenia ornithogalli</i>)	00.6	00.6
Clover root beetle (<i>Sitona hispidulus</i>)	00.3	00.3
Pigweed (<i>Amaranthus graecizans</i>)	00.2	00.2
Wheat straw	00.2	00.2
Grit	00.2	00.2
Cricket (<i>Gryllus assimilis</i>)	00.1	00.1
Total	97.7	100.0

Table 2. Analysis of 14 crops collected in the fall of
1949---per cent by occurrence.

Food	:No. of crops	:Per cent
Grit	14	100
Grasshopper (<i>Melanoplus spretus</i>)	10	71
Sunflower (<i>Helianthus petiolaris</i>)	9	64
Maize (<i>Sorghum vulgare</i>)	8	57
Wheat (<i>Triticum vulgare</i>)	6	43
Army worm (<i>Prodenia ornithogalli</i>)	5	36
Clover root beetle (<i>Sitona hispidulus</i>)	3	21
Pigweed (<i>Amaranthus graecizans</i>)	3	21
Stink bug (<i>Nezara viridula</i>)	3	21
Cricket (<i>Gryllus assimilis</i>)	1	7
Wheat straw	1	7

Table 3. Analysis of 6 crops collected in the winter of 1949-50--per cent by volume.

Food	: Grams	: Per cent : by volume
Maize (<i>Sorghum vulgare</i>)	37.0	84.0
Grit	2.4	5.0
Manure	1.7	4.3
Pigweed seed (<i>Amaranthus graecizans</i>)	1.5	3.7
Sunflower seed (<i>Helianthus petiolaris</i>)	0.6	1.0
Grasshopper (<i>Melanoplus spretus</i>)	0.3	0.6
Gourd seed (<i>Cucurbita foetidissima</i>)	0.2	0.5
Straw	0.2	0.5
Weedseed (unidentified)	0.1	0.2
Wheat (<i>Triticum vulgare</i>)	0.1	0.2
Total	44.1	100.0

Table 4. Analysis of 6 crops collected in the winter of 1949-50--per cent by occurrence.

Food	: No. : of crops	: Per cent : by occurrence
Grit	6	100
Maize (<i>Sorghum vulgare</i>)	6	100
Sunflower (<i>Helianthus petiolaris</i>)	3	50
Pigweed (<i>Amaranthus graecizans</i>)	3	50
Straw	3	50
Wheat (<i>Triticum vulgare</i>)	2	33 1/3
Grasshopper (<i>Melanoplus spretus</i>)	2	33 1/3
Manure	1	16
Gourd seed (<i>Cucurbita foetidissima</i>)	1	16
Weedseed (unidentified)	1	16

Table 5. Analysis of 5 crops collected in the spring of 1950--per cent by volume.

Food	: Grams :	Per cent : by volume :
Maize (<i>Sorghum vulgare</i>)	23.0	60
Wheat (<i>Triticum vulgare</i>)	6.0	16
Grit	4.5	12
Pigweed (<i>Amaranthus graecizans</i>)	3.0	8
Chinch bug (<i>Blissus leucopterus</i>)	1.0	4
Total	38.5	100

Table 6. Analysis of 5 crops collected in the spring of 1950--per cent by occurrence.

Food	: NO. : of crops :	: Per cent : by occurrence :
Grit	5	100
Maize (<i>Sorghum vulgare</i>)	4	80
Pigweed seed (<i>Amaranthus graecizans</i>)	2	40
Wheat (<i>Triticum vulgare</i>)	1	20
Chinch bug (<i>Blissus leucopterus</i>)	1	20

maize, wheat, the army worm, the stink bug, the clover-root beetle, the cricket, and finally wheat straw.

In crops taken during the winter, maize was the most important food, being 84 per cent by volume and 100 per cent by occurrence. In these crops grasshoppers decreased in importance, making up only .7 per cent by volume and 33 1/3 per cent by occurrence. By volume, pigweed seeds, manure, straw, and sunflower seed were other important foods. Wheat, gourd seed, and an unidentified seed were also found in lesser amounts. Sunflower seed, pigweed seed, and straw were found in three of the crops; wheat was found in two, and manure and gourd seed were present in one.

Maize, also an important food in spring, was present in 4 crops taken during this season, and comprised 60 per cent of the total crop volume. Pigweed seed, second in importance to maize, was followed by wheat. The chinch bug was found in one crop. As is to be expected grit was present in all crops observed.

Tables 7, 8, and 9, summarize the data relating to food types present where pheasants were observed from August, 1949 to February, 1951. Insects are not included in this summary because it was impossible to obtain sufficient crops to make adequate examinations.

Apparently maize was the most important source of food for pheasants as indicated by this study. It comprised more than 50 per cent of the food present in both fall and winter seasons. The second most important food in the fall and winter

Table 7. Food present where pheasants were observed in the falls of 1949 and 1950.

Food	: No. of pheasants	: Per cent
Maize	152	69
Weed and grass seed	33	15
Green wheat	17	8
Wheat	15	7
Corn	3	1
Total	220	100

Table 8. Food present where pheasants were observed in the winters of 1949-50 and 1950-51.

Food	: No. of pheasants	: Per cent
Maize	40	51
Weed and grass seed	30	38
Green wheat	8	11
Total	78	100

Table 9. Food present where pheasants were observed in the spring of 1950.

Food	: No. of pheasants	: Per cent
Weed and grass seed	8	50
Green wheat	6	37
Green alfalfa	2	13
Total	16	100

seasons was grass and weed seeds. In the fall, wheat was third in importance followed in order by green wheat and corn. In the winter, green wheat was third in importance and made up 11 per cent of the total food available. In the spring, weed seeds and grass seeds were the foods most available with green wheat and green alfalfa ranking next in order.

There are only a few, small corn fields in the county, and corn was never found in any of the crops observed.

COVER

The study of cover types in Hamilton County was made by observing the kinds of vegetation where the pheasants were seen.

It was found, Table 10, that weeds and grass made up the greatest percentage of the cover used by pheasants in the fall months. Apparently this relationship was due to the fact that most of the fence rows, around the maize fields where pheasants obtained their food, were overgrown with grass and weeds, as were also a considerable number of maize fields. Many of the maize fields had a fairly dense growth of grass in and between the maize rows, which probably accounts for the fact that most of the pheasants used the maize field itself for cover. In addition, many wheat fields, adjacent to maize fields, supported a good growth of grass and weeds.

Next in importance came pasture land which made up 17 per cent of the cover used. Following pastures in importance for cover were brush and timber which made up about 15 per cent of

Table 10. Types of cover in area where pheasants were observed in the falls of 1949 and 1950.

Cover	No. of pheasants	Per cent
Weeds and grass	84	34
Maize fields	59	24
Pastures	42	17
Brush and timber	37	15
Slough grass	14	6
Barnyards	10	4
Total	246	100

the total cover used in the fall. This is probably because there is not much brush and timber except along the river and consequently there is little maize land in these areas to supply food for the pheasants. Least in importance are slough grass, and barnyards which comprise 6 and 4 per cent of the total cover, respectively.

In winter cover, Table 11, weeds and grass remain the most important type of cover with brush and timber taking second place. This probably is because most of the pheasant population moves toward the river and gullies when cold weather occurs and when most of the maize is harvested. Third in importance is the tall slough grass which makes good cover during cold weather. Maize fields, also important in providing winter cover make up 10 per cent of the total. The method of harvesting maize leaves numerous seeds in the field where they are available to the pheasant throughout the winter and early spring. Last in importance for cover are pastures and barnyards.

Barnyards were also the least important in the fall, but pasture land dropped from third place in the fall to fifth place in winter. The pheasant seems to prefer the taller growth of the sloughs and the adjacent brush and trees during the cold weather.

Table 11. Types of cover in area where pheasants were observed in the winters of 1949-50 and 1950-51.

Cover	No. of pheasants	Per cent
Weeds and grass	31	40
Brush and timber	22	28
Slough grass	10	13
Maize fields	8	10
Pastures	4	5
Barnyards	3	4
Total	78	100

In the spring the pheasant moves to the rankest growth of grass available for nesting. Such grasses usually are found bordering sloughs and gullies, Table 12, and constitute 56 per cent of the cover used by pheasants during this time of the year. Other important types of cover are composed of weeds and grass found along fence rows, and on land which is to be summer fallowed. Least in importance are barnyards which make up only 7 per cent of the cover used by pheasants in the spring.

Table 12. Types of cover in area where pheasants were observed in the spring of 1950.

Cover	No. of pheasants	Per cent
Slough grass	9	56
Weeds and grass	6	37
Barnyards	1	7
Total	16	100

NESTING HABITS

The study of nesting habits was limited mostly to observation of the type of cover that the pheasant used for nesting, and by recording reports, from farmers throughout the county, on the type of cover pheasants used for their nests. In addition, the writer observed different harems of pheasants several times in order to determine their territory and also observed the type of cover available for nests in the area which they frequented.

A total of 12 nests were reported in May of 1950. Nine of these nests were destroyed in some unknown manner. Very few farmers have ever seen a pheasant nest unless it was destroyed and thus came to their attention. Four of the nests were found on summer fallowed land which was overgrown with grass and weeds; four in tall slough grass; two in a fairly heavy growth of vegetation along fence rows; one in a windbreak; and another was found in a pasture characterized by good nesting cover. The data

in Table 13 indicate that the preferred cover for nesting is composed of rank growths of grass and weeds.

Ten harems were located in the county, Table 14. Four of these were along sloughs; three were in pastures; two were located in weeds and grass on land which was to be summer fallowed; and one was along a fence row close to timber land.

The harems apparently were established by the 15th of April. This time of establishment of the harem was indicated by the fact that after April 15th only one cock was observed in the area of the harem. The harems were not observed enough times or long enough at any one time to get an accurate count of the number in each harem, however, from limited observation it is believed that the harems ranged in size from 5 to 12 hens. Two of the harems were observed from 6 to 10 times each with the count remaining fairly constant at all times. All of the harems observed were in fairly isolated areas and were the only harems in that area. Some farmers reported that in particular areas there appeared to be several harems fairly close together but the writer never observed these.

Of the 9 destroyed nests, Table 17, 5 were destroyed by plowing up the nests; 3 by unknown animals; and 1 by a horse stepping in it. In two of the nests destroyed by animals the eggs were eaten, while in the remaining one the eggs were just broken. In the area occupied by the harems no nests were found although much time was spent trying to locate them. The writer observed only three nests each of which had been previously destroyed.

Table 13. Types of cover in which nests reported were found in the spring of 1950.

Type of Cover	:No. of nests	:Per cent
Grass and weeds on summer fallowed land	4	33.0
Slough grass	4	33.0
Fence row	2	17.0
Windbreak	1	8.5
Pasture	1	8.5
Total	12	100.0

Table 14. Type of cover in area where harems were observed in the spring of 1950.

Type of cover	:No. of harems	:Per cent
Slough grass	4	40
Pasture	3	30
Grass and weeds on summer fallowed land	2	20
Fence row and timber	1	10
Total	10	100

Table 15. Pheasant nests destroyed which were reported to me and were observed by me.

Method of destruction	:No. of nests	:Per cent
By animals	2	66 $\frac{2}{3}$
By farming methods	1	33 $\frac{1}{3}$
Total	3	100

Table 16. Pheasant nests destroyed which were reported to me but were not observed by me.

Method of destruction	No. of nests	Per cent
By farming methods	4	67.0
By animals	1	16.5
By man	1	16.5
Total	6	100.0

Table 17. Total number of pheasant nests destroyed.

Method of destruction	No. of nests	Per cent
By farming methods	6	56
By animals	3	33
By man	1	11
Total	9	100

MORTALITY

Mortality of pheasants is always an interesting study in any work on pheasant ecology. The study of mortality in Hamilton County was made by observing dead pheasants and determining the cause of death, and by recording reports of the presence of dead pheasants and destroyed nests.

By far the most destructive force to pheasants in Hamilton County was the automobile. In the period from August, 1949 to February, 1951, 40 dead pheasants were observed and 8 more were reported by other people making a total of 48 killed in the county, Table 18.

About the only predators of any consequence to the adult pheasant in this county are the coyote and the hawk. These two predators kill a few pheasants but according to the results of the study not enough to influence the population density. During the entire period of the study only 14 pheasants apparently were killed by coyotes or hawks. Neither coyotes nor hawks were actually observed in the act of killing a pheasant. When the remains of a pheasant were found, it was concluded to have been killed by a coyote if the bones had been eaten or partially eaten. If, however, the bones were intact and the flesh had been torn and pulled, it was recorded as having been killed by a hawk. The skunk destroys some nests and could kill a mature pheasant but it is believed that most nests are destroyed by coyotes.

During the period of August, 1949 to February, 1951, Table 19, 2 pheasants were observed and 3 were reported as having been killed by coyotes. In the same period 4 were observed and 5 were reported as having been killed by hawks.

During the two winters this study was in progress there never was enough snow on the ground for a long enough period to keep the pheasant from getting food and cold weather was of insufficient duration to kill pheasants. Therefore, winter kill, during this study, had no effect on the pheasant population.

Table 18. Number of pheasants killed by automobiles, both observed and reported from August 1949 to February 1951.

Killed by automobile	No. of pheasants
Observed	40
Reported	8
Total	48

Table 19. Number of pheasants killed by predators, both observed and reported from August 1949 to February 1951.

Killed by predators	No. of pheasants
Coyote	
Observed	2
Reported	3
Total	5
Hawk	
Observed	4
Reported	5
Total	9

Diseases and parasites are not important factors in limiting pheasant population in this county. During the time this study was in progress the writer did not see a sick pheasant, or one that had died of disease. None of the farmers or hunters interviewed in the county had ever seen a diseased pheasant or heard of one. One pheasant shot during the hunting season of 1949 was thought to have a disease of the eye, but with further study it was concluded that the eye was injured by a stick or branch while

the pheasant was running or flying through timber or brush.

MANAGEMENT

In this phase of the study, agricultural practices in this county affected the pheasant population. One of the common agricultural practices here is the summer fallowing of land. This practice is favored because of the slight rainfall and the need for conserving moisture for future wheat crops. When one wheat crop is harvested some of the land is not plowed but allowed to grow up in weeds and is plowed the following spring.

The plowing of this land does not start until late April or early May, by which time many pheasants have made nests and laid eggs on this land. These nests, destroyed by plowing, tend to prevent increases in population density.

Another practice which affects the pheasant population is the burning of pastures and sloughs in the spring. Burning of pastures in March destroys much cover and food and increases pressure for nesting and food in the remaining available areas.

Burning of pastures and sloughs in late April, especially the sloughs with their rank growth of grass and weeds, results in the loss of many pheasant nests. Increased numbers of wind-breaks in this county provide much good cover and will aid in increasing the pheasant population, due to survival of breeding stock. In the counties to the north and east of Hamilton, wind-break plantings are numerous and provide good cover and food for numerous pheasants which utilize them during the winter.

Another agricultural practice which is beneficial to the pheasant population is the method of maize harvest in this area. The large fields of maize are harvested by combines, and as the growth is not always even, much seed is left in the field during the winter, where it is available to pheasants until the field is plowed the next spring.

One beneficial practice in this and neighboring counties is the reseeded of grassland as the region becomes more and more a cattle raising area. The resulting pastures will provide nesting areas where nest loss will be less than on land to be summer fallowed. Furthermore, as more pastures are started there will be more fence rows in which the pheasant can nest and find cover. Few fence rows are now present in most parts of the county. Burning the fence rows, as is now the practice, destroys food and cover for pheasants as well as nesting places and does not materially help the agricultural picture.

The practice of building farm ponds with wooded areas around them will aid in increasing the pheasant population. Such a practice, just getting started in this county, will aid in providing food, cover, and water.

Many farmers in Hamilton County are becoming aware of the fact that conservation of wildlife is closely related to all conservation and the indications are that within the next few years a considerable improvement in the amount of wildlife management will occur in this county as well as other neighboring counties.

CENSUS

As part of this study a census was taken each year, before the hunting season, to determine the number of pheasants in the county. No other census was taken in the county; therefore, the results must of necessity be of an arbitrary nature. Since this census was taken by the writer alone it is slightly different from any census described in the literature on pheasants.

Six sections were picked in the county, three north of the river and three south of the river. The census of 1949 indicates that two of the sections picked were poor places for pheasants, two were fair, and two were excellent. The number of pheasants in each of these sections was determined largely by walking over the areas. On a few occasions a car was driven over the land.

The results of the census of 1949 show that there were approximately 8,958 pheasants in the county, or an average of 9.16 birds per section. This may seem pretty low but one must remember that many sections in the county could not support even one pheasant.

The census of 1950 was taken in much the same way as the census of 1949 except that six different sections were chosen. The results of the census of 1950 show that there are slightly fewer pheasants than in 1949. There was a total of 7,667 pheasants in 1950 or about 7.83 per section. This agrees with the belief of the State Fish and Game Commission in October that there would be fewer pheasants in the state in 1950 than in 1949.

Results of pheasant census taken in Hamilton County,
Kansas on Saturday, October 15, 1949:

Time 7:00 A.M.
Weather Cool and sunny no overcast
Place Wheatfield bordered by weedpatch, a place for water. Not the best place for pheasants, but about average. Section No. 25 S.E.
Method Walked over quarter section, flushed 7 pheasants

Time 9:00 A.M.
Weather Cool and sunny no overcast
Place Wheat stubble and volunteer wheat. Poor section for pheasants. Section No. 6 S.E.
Method Drove car over section, flushed 1 pheasant.

Time 10:30 A.M.
Weather Cool and sunny
Place Section of wheat and maize. Section 34 S.W.
Method Walked over $\frac{1}{2}$ section, flushed no birds.

Time 1:00 P.M.
Weather Clear, warm and windy
Place Wheat stubble, section 22 N.E. Poor place.
Method Drove car over entire section, flushed 2 pheasants.

Time 2:00 P.M.
Weather Clear, warm and some wind
Place Maize and wheatfield combined. Section 4 N. E.
Method Walked strip about $\frac{1}{8}$ of a section, flushed 3 birds. Excellent place for pheasants.

Time 5:00 P.M.
Weather Clear, warm and windy
Place Wheat stubble bordered by maize. Excellent place with green wheat close. Section No. 4 N.E.
Method Walked over $\frac{1}{5}$ section, flushed no birds.

Computations

Section 35 S.E.	7 birds per 1/4 section	28 per section
Section 6 S.E.	1 bird per section	1 per section
Section 34 S.W.	0 birds per 1/4 section	0 per section
Section 22 N.W.	2 birds per section	2 per section
Section 4 N.W.	3 birds per 1/8 section	24 per section
Section 1 N.E.	0 birds per 1/4 section	0 per section
Total		55 in 6 sections

978 sections in county	
9.16 average birds in section	
<u>5888</u>	6/ 55.00
978	9.16 birds per
<u>8893</u>	section
8958.48 No. of birds in county.	

Results of pheasant census taken in Hamilton County, Kansas
on Saturday, November 4, 1950:

Time 7:00 A.M.
Weather Warm with light wind
Place Wheat stubble, bordered by weeds, maize
and water not far away. About average
place in section No. 25.
Method Walked over 1/4 section, flushed 2 pheasants.

Time 8:30 A.M.
Weather Warm and light wind
Place Pasture with maize and small cornfield
joining, also place for water at abandoned
farmstead. Section No. 31 S.W. fair
place for pheasants.
Method Walked over 1/4 section, flushed 4 birds.

Time 11:00 A.M.
Weather Warm and almost no wind.
Place Along slough with maize field on each side.
Small lakes all around, excellent place for
pheasants, section No. 28 S.W.
Method Walked along slough and over maize field
about 1/4 section, flushed 4 pheasants.

Time 1:30 P.M.
 Weather Warm and still.
 Place Wheat stubble bordered on west with small strip of maize. Poor place for pheasant, section No. 18.
 Method Drove car over stubble and along close to strip of maize, flushed 1 pheasant, in 1/2 section.

Time 3:00 P.M.
 Weather Warm and slightly cloudy, light breeze
 Place Half wheat stubble, half green wheat. Fence rows full of weeds. Poor place for pheasants. Section 29.
 Method Drove car over entire section, flushed only one pheasant.

Time 5:00 P.M.
 Weather Cold, slightly cloudy and windy
 Place Small maize field surrounded by pasture and wheat stubble overgrown with weeds, water supply from slough. Good place for birds, section 13 N.W.
 Method Walked over 1/4 section, flushed 1 pheasant.

Computation

Section 25 S.E.	2 per 1/4 section	8 per section
Section 31 S.W.	4 per 1/4 section	16 per section
Section 28 S.W.	4 per 1/4 section	16 per section
Section 18 N.E.	1 per 1/2 section	2 per section
Section 28 N.W.	1 per 1 section	1 per section
Section 13 N.W.	1 per 1/4 section	4 per section
Total		47 in 6 sections

978 sections in county
 7.83 average birds per section
2934
 7824
6846
 7,657.74

6/ 47.00
7.83 birds per section

DISCUSSION

This study shows that maize is the most important food of the pheasant in this county. This agrees with the studies of Fried (1940) and Nelson (1950) in Minnesota and Drake (1937) in Michigan. They found the largest per cent of food for pheasants in their states was cultivated grains. The chief difference is that the main grain in those states was corn while here it is maize. This shows that the pheasant will use whichever grain is grown extensively in the area.

Grasshoppers make up the greatest percentage of the animal matter eaten by the pheasant in this county. This agrees with the findings of Fried (1940) in Minnesota. Also the largest intake of grasshoppers was in the fall when they were abundant. Fried (1940) also found that many grasshoppers were eaten during the summer months, but as the writer was attending school during the summer no crops were taken, hence, the summer food preferences were not checked. In general, the writer believes that the pheasant does not exhibit a high degree of food preference, but will take what is available in quantity at the time of feeding.

The writer's findings are in agreement with Nelson (1950) as to kind of cover pheasants use. In this county sloughs, weeds and grass seem to be the cover most used by pheasants. In Minnesota the pheasants seem to prefer sloughs, marshes and uncut meadows. In this county there are a number of sloughs, but very few marshes, and almost no meadows. The pheasant would probably use timothy and redtop for cover here if they were available.

Pheasants in this county seem to use about the same type of cover for nests as they do in Iowa (Baskett, 1947), and in Ohio (Leedy, 1949). Few hayfields are present in Hamilton County but fence rows, grass, and sloughs are used extensively by the pheasants.

It is believed that the writer's observations were too limited to produce worthwhile conclusions relative to nests and nesting activities. However, no facts were brought out which would tend to show that the nesting habits are any different in this county than any other place where pheasants have been studied. Instead, the results of most of this study, as one might surmise, corroborates studies made by Baskett (1949) in Iowa and Leedy (1949) in Ohio. During the writer's limited observations, all factual evidence relative to nesting habits agree with the findings of Taber (1949) in his study of the nesting behavior of pheasants in Wisconsin.

No diseases were diagnosed nor were any external parasites found during the study. These findings agree with those of Cook that wild pheasants are not subject to many of the diseases that affect pen-raised pheasants.

CONCLUSIONS

This study, made only during the fall, winter, and spring months, forms the basis for the following conclusions:

1. In Hamilton County, Kansas the ring-necked pheasant is chiefly a granivorous bird, preferring cultivated grains at all times.

2. Maize is the most preferred of all the cultivated grains.

3. Grasshoppers constitute the highest percentage of animal matter.

4. Sloughs, grass, and weed patches are used most by pheasants for cover.

5. The pheasants prefer slough grass and weeds and grass on land to be summer fallowed as cover for their nests.

6. The automobile is the greatest killer of pheasants in Hamilton County.

7. The hawk and coyote do not kill enough pheasants to affect the total population.

8. More pheasant nests are destroyed by farming than by any other method.

9. Farmers are becoming more and more aware that wildlife conservation ties right in with land conservation.

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SOME OBSERVATIONS ON THE ECOLOGY OF THE RING-NECKED
PHEASANT IN HAMILTON COUNTY, KANSAS

by

ISREAL HARRY TRIGG

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The objective of this work was to determine the extent to which the ring-necked pheasant has become adopted in Hamilton County, Kansas to important factors in its habitat. Its relation to food, cover, nesting behavior, mortality, and management was studied. Considerable research has been accomplished on pheasant ecology in other areas of the United States, but very little has been carried on in western Kansas.

The types of food utilized by the pheasant in this area, was determined by two methods. A record was kept of the types of food present where the pheasants were observed to be feeding, and crops of pheasants were collected and the contents analyzed in the fall, winter and spring of 1949-1950.

The cover habits were studied by keeping a record of the types of cover present where the pheasants were observed.

The nesting habits were studied by recording reports made by farmers relative to the number of nests observed and the type of cover in which these nests were found. A number of harems were also observed and the type of cover available to them for nests was recorded.

Mortality was studied by keeping a record of the number of dead pheasants found in the county and in determining the causes of death. The number of nests destroyed and the method of their destruction was also recorded.

Agricultural procedures affecting wildlife were studied throughout the county by observing certain farming practices and determining the effect of such practices on the pheasant population. A comparison was made between wildlife management practices in

Hamilton County and management practices that led to an increase of the pheasant population in other areas. A study of the area in relation to agricultural practices was made to determine whether new methods that would be conducive to an increased pheasant population could be employed.

During this study, a census was taken each year before the hunting season, to determine the number of pheasants in the county.

The ring-necked pheasant in Hamilton County, Kansas is chiefly a granivorous bird. Maize and wheat made up the greatest percentage of the grains eaten. In addition to maize and wheat, practically the only grains raised in the county, the pheasant eats weed seed consisting mainly of pigweed seed and sunflower seed. Little corn is raised in this county, hence the pheasants cannot make it a main food as they do in corn-growing areas. Grasshoppers comprised the chief animal matter eaten, however, small numbers of the clover-root beetles and the chinch bug were noted in the crop contents.

Important cover for pheasants consists largely of weeds and grass in fence rows, and on summer-fallowed land. Brush and timber may be utilized where available. Maize fields, pasture, and windbreaks are used as cover to some extent.

The chief kinds of nesting cover are slough grasses, weeds and grass on summer-fallowed land, and weeds and grass along fence rows. Evidence was obtained which indicated that the harems ranged in size from five to twelve birds. Most harems were established by the middle of April. Egg laying is well started by May.

The greatest destroyer of the adult pheasant in Hamilton County, Kansas, is the automobile. The coyote and hawk kill some birds but not enough to affect the total population. There is no evidence to indicate that disease or parasites affect the pheasant population in Hamilton County.

The destruction of nests by farming practices has a very detrimental effect on the density of the pheasant population. Some of these practices are summer-fallowing, which is necessary, and spring-burning of pastures and fence rows, which is unnecessary.

There are, however, good practices becoming established that will aid in increasing the pheasant population. Some of these are the reseeding of grassland, the planting of windbreaks, and the building of farm ponds.

According to the censuses taken in 1949 and in 1950 there were more pheasants in 1949 than in 1950.