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SEASONAL CHANGES AND HABITAT INFLUENCING HELMINTHIASIS IN BOBWHITE QUAIL

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Abstract:

Two hundred forty-four bobwhite quail (Colinus virginianus) were collected in Kansas and examined for helminths during 1963-1966. Total incidence of helminthic infection was 23%; 24% in juveniles and 22% in adults. Total incidence of nematode infection was 13%, cestodes, 10% and no trematodes were recovered. Six species of nematodes, 1 species of cestode, and 1 species of acanthocephalan were found in the quail examined. Peak incidence of infection occurred from September to November during the 3-yr study.. Incidence of infection was greater during February-April 1965, than during similar periods of 1964 and 1966. Bobwhites collected within 0.5 mile of farms with poultry had a helminthic incidence of 38%, whereas, those collected 1.5 miles or more removed from farms with poultry had an incidence of only 8%, suggesting that poultry may be serving as a reservoir of helminthic infection for wild bobwhites.

Generally it has been found that game birds in the wild are not overtly affected by heminthiasis. However, among birds raised in captivity under certain management conditions, some helminths may be prevalent and cause extensive mortalities (1,3,4,6,9,15). The incidence and degree of infection reported for quail in the wild has been low with the exception of those studies encountering Aulonocephalus linquisti (9.15). In high-density areas, quail usually have greater individual burdens and a wider variety of parasites than quail in low density areas (7).

The study reported here (influence of seasons and habitats on the incidence and species of helminth in quail) was in conjunction with a study (R.J.R.) of quail food habitats, energetics, and population dynamics in Kansas. This paper is contribution No. 1150, Division of Biology, Agricultural Experiment Station, Kansas State University, Manhattan, Kansas 66502.

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Materials and Methods

All quail were collected on the Fort Riley Military Reservation, Riley County, Kansas, during September 1963 to February 1966 (Fig. 1).

Topography and vegetation of the study area as well as method of collection are described by Robel (13). The birds were eviscerated (esophagus, trachea, crop, proventriculus, gizzard, intestines, and ceca) and the viscera were refrigerated until examined for helminths within several days. Standard parasitological procedures were used for recovering, fixing, and staining helminths.

Results and Discussion

Of 244 bobwhite quail examined for helminths during this study, 194 (79.5%) were juveniles and 50(20.5%) were adults. Tip coloration of the greater upper primary feathers (10) and appearance of the 7th greater primary coverts (5) were used as age criteria. Juveniles exhibited a 23.7% incidence of infection while adults showed a 22.0% incidence, the incidence of infection in the 2 age classes was not significantly different ($p>0.05$). The overall helminthic incidence was 23.3%. The incidences of infection by classes of helminths were: cestodes (10%), reaching peaks in March and April, nematodes (13%), reaching peaks in November and February, and acanthocephala (1%). No trematodes were recovered.

Peak incidence of infection of quail during the 3 yr was in November, 1964, but highest incidence was in other months in 1965 and 1966 (Fig. 1). Temperatures were comparable during October-November of 1964 and 1965, but rainfall was much greater in this period of 1964 compared with 1965 (Fig. 2). The reduced rainfall in October-November of 1965 may have provided less favorable conditions for survival and/or development of helminthic life stages and/or intermediate hosts, thus reducing the helminthic incidence during this period. However, we can offer no explanation for the relatively high helminthic incidence in birds collected during February-April, 1965, compared with the absence of infection in birds collected February-March, 1964, and February, 1966.

Rhabdometra odiosa was the only cestode recovered and it occurred only in juvenile quail. Six species of nematodes were recovered: Heterakis gallinarum, H. bonasae (rare), Physaloptera sp. (rare), Subulara brumpti, Dispharynx spiralis and Seurocyrnea colini. Number of nematodes in the birds ranged from 1 to 21 with a median of 3. The acanthocephalan was a Mediorynchus sp. This acanthocephalan has been previously reported from quail (12,14).

Bobwhites collected within 0.5 mile of farms with poultry had a helminthic incidence of 38.0%, whereas those collected 1.5 miles or more from farms with poultry had an incidence of only 8.1% (Fig. 3). That suggests that poultry may be serving as a reservoir of infection (principally, cecal worms) for bobwhite quail. No difference in quail population densities were detected near farm buildings versus areas 1.5 miles or more removed from farm habitation. During the period of this study, poultry husbandry on the farms associated with our study area (Fig. 3) consisted of chickens roosting in coops at night, but being free to roam habitat adjacent to the farm during daytime. Therefore, it was possible for quail to ingest eggs of Heterakis gallinarum while feeding in habitat contaminated by unconfined chickens.

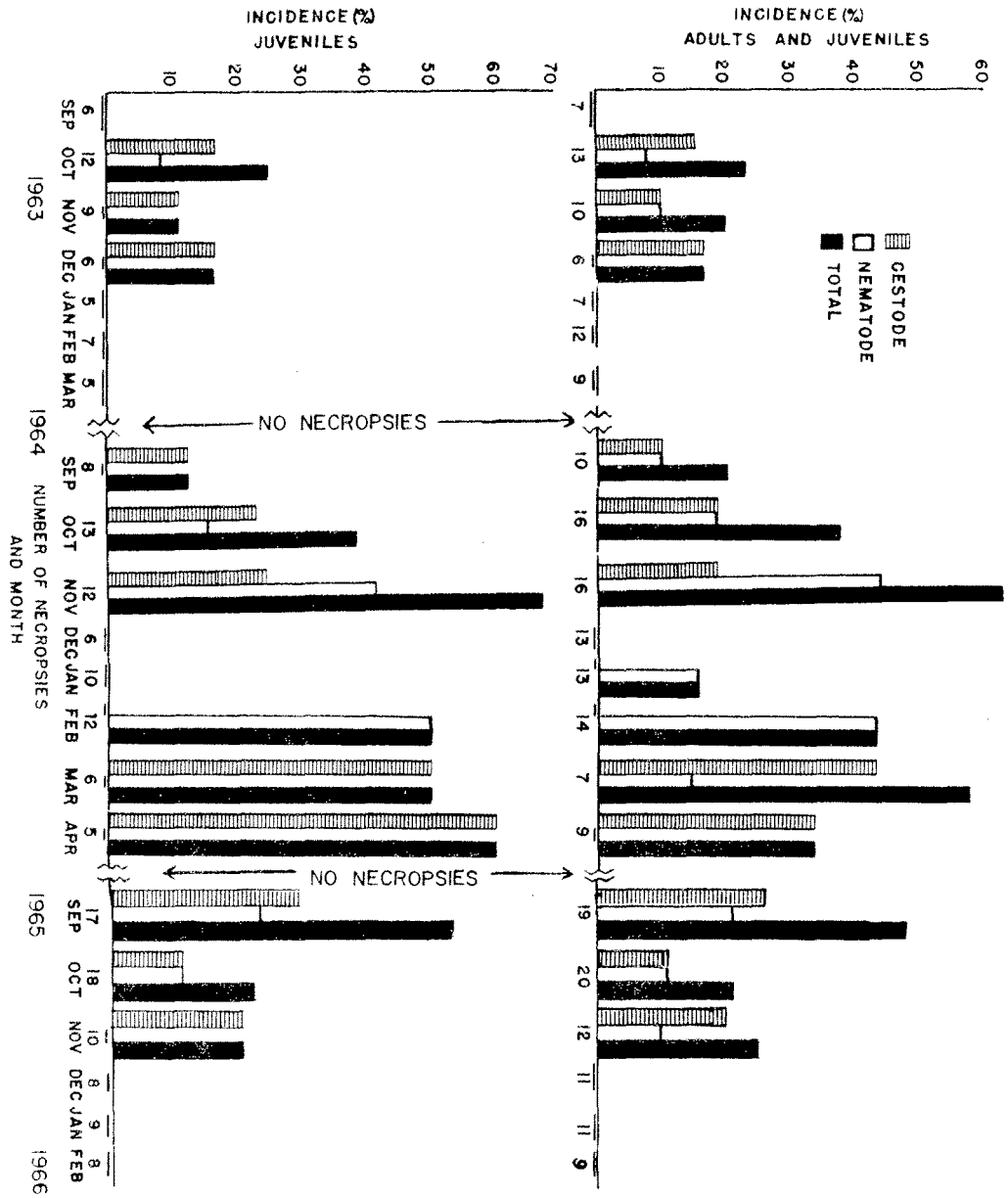

Figure 1. Incidence of infection with cestodes and nematodes in bobwhite quail according to age. Dash lines under the abscissa indicate no helminths recovered.

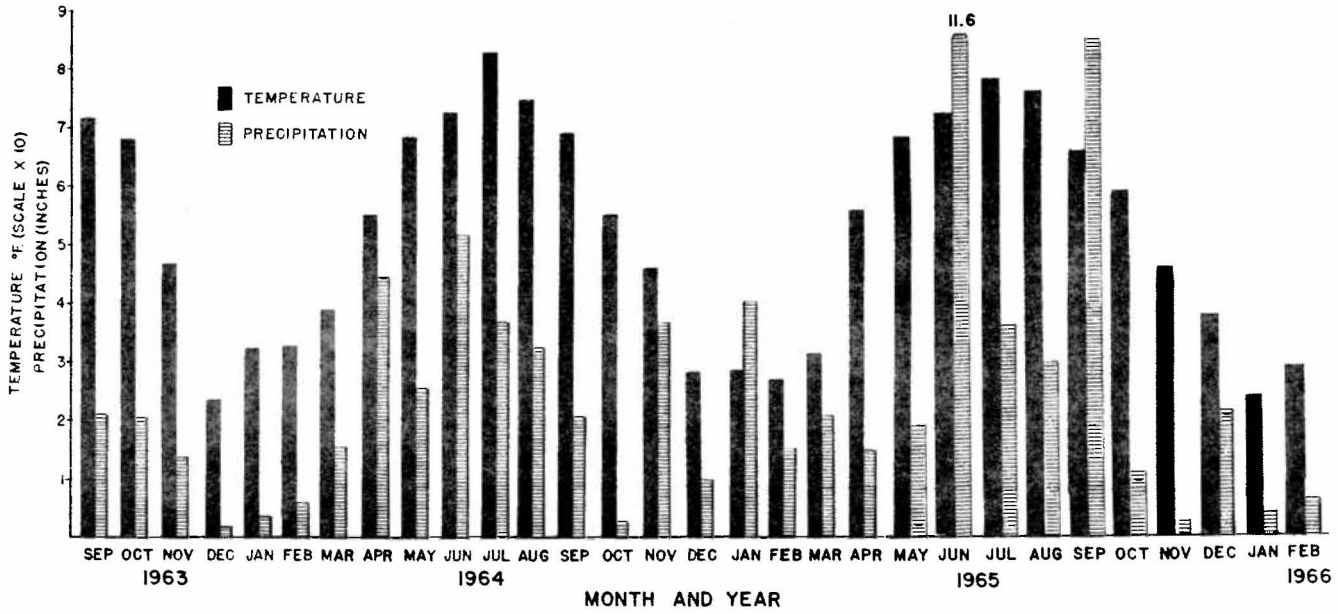

Figure 2. Temperature and precipitation corresponding with collection of bobwhite quail.

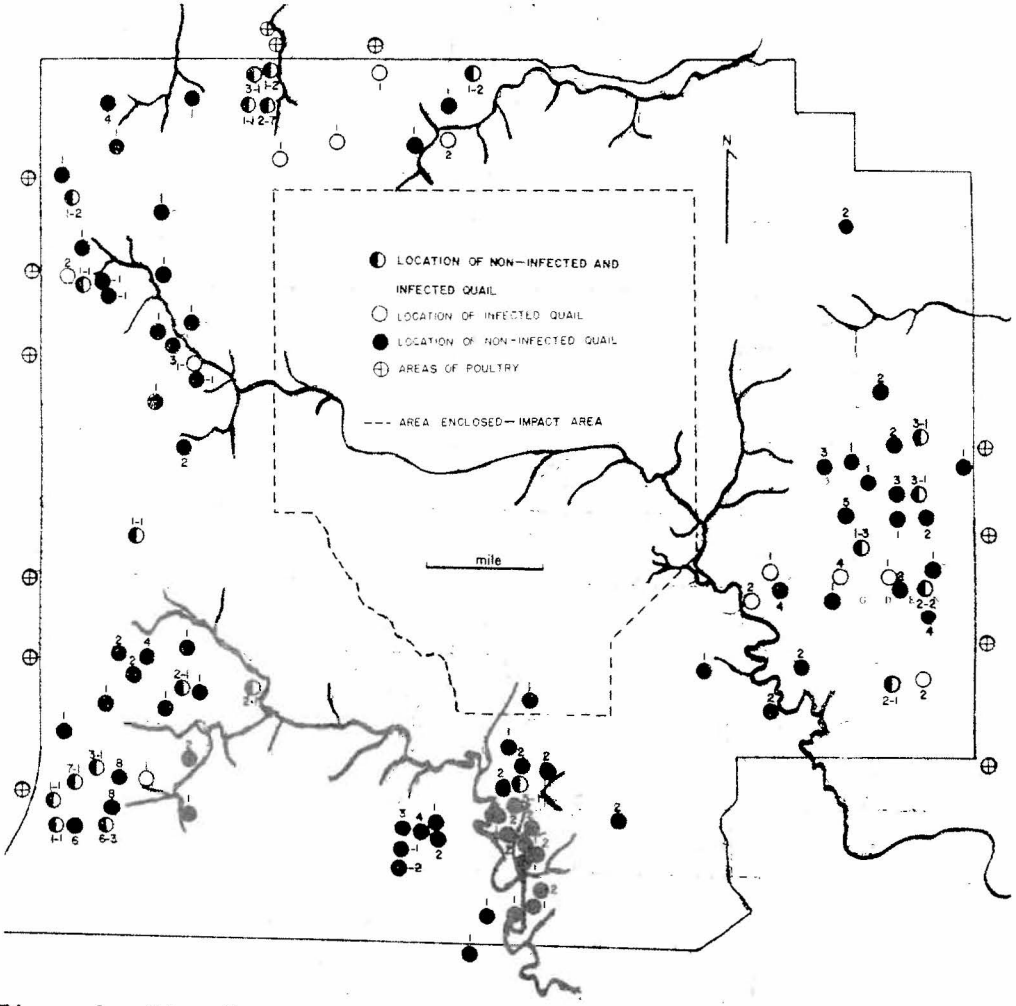

Figure 3. Distribution of non-infected and infected bobwhite quail in the Fort Riley Reservation study area. Numbers by each type of circle designate number of quail in the designated category.

The highest percentage incidence of helminthiasis was associated with the cecal worm, Heterakis gallinarum. Because this species of nematode can infect chickens, turkeys, and pheasants (11), it is not surprising that it was frequently found among quail collected near farms with poultry. This nematode is known to carry the protozoan Histomonas meleagridis, the organism causing blackhead disease of turkeys and pheasants. Research has demonstrated that the bobwhite is refractory to histomoniasis when given virulent strains of the organism cultured in vitro, but is susceptible to histomoniasis when fed embryonated heterakid eggs of worms from chickens (2,8). Laboratory experiments have demonstrated that bobwhites harbor the histomonad up to 6 months after initial infection (2). Bobwhites could be important in spreading the disease to pheasant populations via contamination of the habitat with eggs of Heterakis gallinarum which carry the protozoan.

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POPULATION DYNAMICS OF BOBWHITES ON AN INTENSIVELY MANAGED AREA IN SOUTHERN ILLINOIS

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Introduction

An intensive bobwhite quail management program was placed in operation on about 2,000 acres of The United Electric Coal Companies, Inc. properties near DuQuoin, Illinois in 1954 and was continued through 1959. Included were approximately 800 acres of strictly idle land, 600 acres of mixed idle and agriculture land, and 800 acres of intensive agricultural land. On idle lands, controlled burning, food strip plantings, fallow strips, and release cutting of trees in fencerows and field edges were carried out. Field size was reduced, fencerows widened, and food strips were established in the agricultural areas. In various years pen-reared quail were released, some in spring, some in summer, and some in fall in both areas. This paper describes the bobwhite population dynamics on these properties during 6 yr of management.

Methods

Population levels were determined by 3 censuses: 2 weeks before the hunting season (prehunting), immediately following the termination of hunting (posthunting, late December), and the third week in March (prenesting). Because of summer and early fall releases in 1954 and 1955, liberated quail were recorded as part of the fall population in those 2 yr. On the basis of percent return from harvesting it was estimated that these released birds represented 5 and 10% of the fall-censused populations for 1954 and 1955, respectively. Because of the apparent rate of mortality of liberated birds, it is estimated that they represented no more than 2 to 3% in any of the posthunting censuses and less than 1% in the prenesting censuses. Although some