

# SOME PARASITIC AND INFECTIOUS DISEASES OF BOBWHITE QUAIL FROM OKLAHOMA\*

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The prevalence of intestinal parasites, selected bacterial organisms, and serologic activity to some infectious diseases of bobwhite quail from Oklahoma was studied over a 1-year period. The nematodes *Subulara brumpti* and *Heterakis gallinarum* were recovered from 27% and 4% of the birds examined respectively. Unidentified cestodes were recovered from 6% of the birds examined. Four genera and five species of protozoa were identified; *Trichomonas* sp. (45%), *Chilomastix* sp. (30%), *Eimeria* sp. (27%), *Trichomonas gallinarum* (25%), and *Histomonas meleagridis* (7%). All birds tested were negative for *Salmonella* sp., haemosporidia and serologic activity to Newcastle's disease, ornithosis, eastern and western equine encephalitis, and type-A influenza. Pathogenesis and seasonal and geographic occurrence are discussed.

## INTRODUCTION

The prevalence and importance of parasitic and infectious diseases of the bobwhite quail (*Colinus virginianus*) have been reported by numerous authors (1, 2, 3, 4, 5). Most of this information has, however, been gathered in the southeastern and northeastern areas of the United States and much of it has been based on experimental studies and/or pen-reared birds.

The present study was designed to survey wild bobwhite quail from Oklahoma populations to identify *Salmonella* sp., blood parasites, intestinal protozoans, intestinal helminths, and serologic activity to Newcastle's disease, ornithosis, eastern and western equine encephalitis, and type-A influenza. Interpretations of data should prove valuable in quail management efforts as well as in subsequent management efforts for related fowl.

## MATERIALS AND METHODS

One hundred and six bobwhite quail were collected by the Oklahoma Department of Wildlife Conservation from 4 geographic areas represented by a total of 16 different collection sites across the state. The areas (and counties of origin) are: northwest (Texas, Ellis, Roger Mills, Blaine, Major); central (Oklahoma, Cleveland, Carter, Love); northeast (Osage, Delaware); and southeast (Pushmataha, McCurtain, Atoka, Johnson). Twenty-four birds were collected in July, 49 in October and 27 in March. The last 23 quail collected in March were shot at their respective locations and shipped to the laboratory. These last 23 birds were examined for adult worms only. All other birds were live-trapped and delivered alive.

After arrival at the laboratory, live birds were killed by decapitation. Blood films were made immediately, and stained with Giemsa stain. Blood was collected and the sera separated for serologic analysis. The birds were then necropsied and the large and small intestine opened. Slide smears for protozoan parasites were made from rectal and cecal samples obtained with sterile cotton swabs. These smears were fixed in Schaudin's fixative and stained with trichrome stain. Swab samples of rectal and cecal contents were also placed in tubes of selenite broth and processed for routine *Salmonella* sp. isolation.

The entire intestinal tracts were opened and helminth parasites were individually recovered, fixed and stored for later identification. Sera were screened for the presence of antibody to Newcastle's disease virus (NDV) and eastern and western equine encephalitis (EEE and WEE) by micro-hemagglutination-inhibition (HI)

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tests. All HI reactors (titers of 1:2 or higher) were retested before being considered positive. Serum samples were tested through the courtesy of Dr. B. H. Espe, USDA-APHIS.

## RESULTS

### Helminth Infections

Thirty-seven percent of the quail examined harbored one or more species of helminths. Table 1 shows prevalence, worm burdens, and range per infection by geographic region. Two nematodes, *Heterakis gallinarum* and *Subulura brumpti*, were recovered from the ceca while cestodes were found in the small intestine. The *Heterakis* sp. recovered was determined to be *H. gallinarum*, although spicule morphology was intermediate between it and *H. isolonche*. Additionally, cecal nodules which are typical of *H. isolonche* were not observed. No attempts were made to identify the specific cestodes recovered.

The differences in seasonal occurrence of the helminths recovered in this study suggest quail have the highest infestation during summer (43%) and fall (39%) and the lowest during the spring (30%), although sample size precluded statistical analysis.

### Protozoan Infections

Fifty-seven of 83 bobwhite quail harbored intestinal protozoa representing four genera and five species. More birds (45%) were infected with *Trichomonas* sp. than any other protozoan, with the least number of birds (7%) harboring *Histomonas meleagridis*. There was little difference in the prevalence of *Chilomastix* sp. (30%), *Eimeria* sp. (28%), and *Trichomonas gallinarum* (25%) (Table 1). Seasonal differences were observed with regard to the number of quail infected during summer (29%), fall (87%), and spring (100%).

Several additional unidentified protozoans resembling *Hexamita* sp. and unidentified amoebae were also observed but not included in the results because of their uncertain taxonomic position. No haemosporidia were observed in the 83 samples examined.

### Bacterial Cultures

A total of 100 quail were cultured for *Salmonella* spp. All birds examined were found to be free of those organisms.

### Serologic Findings

All 83 birds tested were negative for serologic activity when tested for NDV, encephalitis (EEE,WEE), chlamydiosis, and type-A influenza.

## DISCUSSION

The findings of this study suggest that intestinal helminths and protozoan parasites are common in Oklahoma quail. Al-

TABLE 1. Prevalence and/or worm burdens of some parasites of bobwhite quail (*Colinus virginianus*) from 4 geographic regions of Oklahoma.

Parasites identified	Geographic Regions				Total Statewide
	Northwest	Central	Northeast	Southeast	
<b>Nematodes</b>					
<i>Subulura brumpti</i>					
Prevalence (% infected)	40%	14%	15%	25%	27%
Av. worm burden*	15	55	6	2	20
Range of infection*	1-70	1-153	2-10	1-5	1-153
<i>Heterakis gallinarum</i>					
Prevalence	0	0	5%	25%	4%
Av. worm burden*	0	0	9	13	12
Range of infection*	0	0	9	6-26	6-26
Cestodes (prevalence)	0	11%	5%	0	6%
<b>Protozoa (prevalence)</b>					
<i>Trichomonas</i> sp.	35%	40%	15%	41%	45%
<i>Chilomastix</i> sp.	23%	33%	26%	16%	30%
<i>Eimeria</i> sp.	28%	18%	31%	16%	28%
<i>Trichomonas gallinarum</i>	16%	18%	21%	25%	25%
<i>Histomonas meleagridis</i>	4%	0	0	8%	7%

\*Average worm burden and range of infection determined from number of birds infected per area.

though the percentage of free-ranging quail infected with the organisms identified was low, several of the genera identified are known to be capable of producing disease and/or death in quail and other wild and domestic gallinaceous birds (3, 4, 6, 7, 8). The presence and importance of *Heterakis gallinarum* and *Histomonas meleagridis* is well documented in relation to blackhead in quail and/or other gallinaceous birds (3). The pathogenicity of *S. brumpti* is not, however, well established (3). The similar morphology and site location of *S. brumpti* and *H. gallinarum* raise the question of potential pathogenicity. This is supported by the fact that *H. meleagridis* was found in the northwest area where the only nematode recovered was *S. brumpti*. It should be noted, however, that *H. gallinarum* could be present, but not observed due to sample size. Periodic evaluation of birds from areas throughout the state are thus warranted, especially where future introductions of native or exotic gallinaceous birds are contemplated.

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