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## Blood Parasites in Relation to Pheasants and Quail in Iowa<sup>1</sup>

DAVID J. ROSLIEN<sup>2</sup>, PAUL L. FORE<sup>3</sup>, and ARNOLD O. HAUGEN<sup>4</sup>

*Abstract.* Blood parasite investigations of ring-necked pheasants (*Phasianus colchicus*) and bobwhite (*Colinus virginianus*) were conducted in Iowa during 1957-59 and 1959-61. Wild pheasants from Winnebago, Union, Ringgold, and Adair counties, and wild quail from Ringgold and Wapello counties were checked for blood parasites. Pen-reared pheasants and quail checked for blood parasites were supplied by the State Wildlife Research and Exhibit Station at Boone and by private game clubs. Examination of blood smears from 364 pheasants and 673 bobwhite indicated no positive cases of *Haemoproteus*, *Leucocytozoon*, or *Plasmodium*. Experiments aimed at inducing infections of *Plasmodium* in pheasants and *Leucocytozoon* in bobwhite were unsuccessful.

Blood parasite investigations of ring-necked pheasants (*Phasianus colchicus*) and bobwhite (*Colinus virginianus*) were carried on in Iowa during 1957-59 and 1959-61. These studies attempted to evaluate the relationship of some common avian blood parasites to the two most important species of upland game birds in the state.

During past decades, local population fluctuations have occurred when ample supplies of food and adequate cover seemed to be available. Weather conditions seemed optimum during periods of variation, and no explanation was available for the fluctuations.

Little was known about possible decimating effects of blood parasites on Iowa game birds; however, many reports from the literature indicate blood parasites were capable of causing fluctuations in bird populations. Since dense cover hides and scavengers obscure evidence of mortality in wild birds, disease may be overlooked in evaluating causes of population variations.

The principal objective of the studies here reported was to determine the incidence of *Plasmodium*, *Haemoproteus*, and *Leucocytozoon* in pheasants and bobwhites.

Past publications indicate blood parasites are common in birds of the order Galliformes; however, few specific records for the

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ring-necked pheasant and the bobwhite are reported (Herman, 1944). Sambon (1908) observed *Leucocytozoon* from a ring-necked pheasant in Europe. Böing (1925) reported a decrease in pheasants throughout Germany in the late 1920's and suggested that blood parasitism was partly responsible. He collected 120 wild pheasants and found 50 per cent with *Plasmodium*, 40 per cent with *Haemoproteus*, and 15 per cent with *Leucocytozoon*. *Plasmodium lophurae* was originally isolated from a pheasant and Jeffrey (1944) succeeded in experimentally transmitting it to the pheasant. Wetmore (1941) reported *Haemoproteus* in the bobwhite from the District of Columbia. *Plasmodium* was reported from the bobwhite by Wetmore (1941) and Allen (1931).

Studies on *Haemoproteus* infections in California quail (*Lophortyx* sp.) were connected by O'Roke (1930, 1932, 1955), Herman and Glading (1942), and Herman and Bischoff (1949). Malaria infections in Gambels quail (*Lophortyx gambelii*) and scaled quail (*Callipepla squamata*) were studied by Hungerford (1955.)

Other gallinaceous birds reported to harbor blood parasites include: Chucker partridge (*Alectoris graeca*), scaled quail (*Callipepla* sp.), Gambel's quail (*Lophortyx* sp.), wild turkey (*Meleagris gallopavo*), ruffed grouse (*Bonasa umbellus*), and spruce grouse (*Canachites canadensis*).

LOCATION OF STUDIES

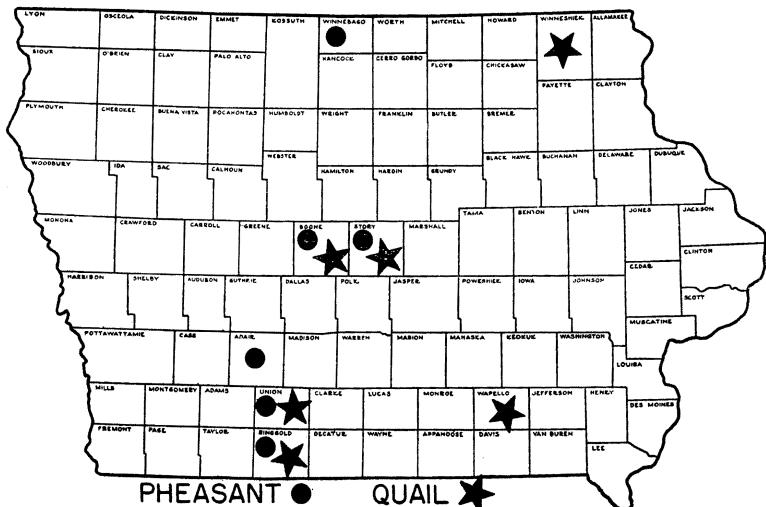


Figure 1. Source of pheasants and quail checked for blood parasitism.

Principle areas in which wild pheasants were checked for blood parasites, as reported in this paper, include Winnebago, Union, Ringgold, and Adair Counties, Iowa (Fig. 1). Additional samples were obtained from pen-reared birds at the Iowa State Wildlife Research and Exhibit Station (Formerly Iowa State Game Farm) at Boone, Iowa.

Quail blood smears were obtained from wild birds in Ringgold and Wapello counties. Additional blood smears were prepared from pen-reared quail in Union, Ringgold, Story, and Winneshiek counties. Quail from the Iowa Wildlife Research and Exhibit Station were also checked for blood parasitism.

#### TECHNIQUES

Wild pheasants and quail were obtained by live-trapping and/or shooting. A roadside throw-net technique described by Harris (1952) was used during summers on pheasants. Quail were live-trapped with heart-shaped and standard quail traps described by Stoddard (1941). Birds shot in the hunting season were utilized for blood studies when possible; however, satisfactory smears could not be prepared from birds after they had been field dressed.

Blood for making smears was obtained from birds by various methods. Adult pheasants were bled from the brachial vein which was exposed by plucking feathers from the underside of the proximal wing segment. The exposed area was swabbed with 70 per cent ethyl alcohol before pricking the vein with a hemolet. A standard-sized microscope slide was touched to the wound, and a thin blood smear was streaked. Blood from quail and juvenile pheasants was obtained by snipping the end of a toenail with a nailclipper (McClure and Cedeno, 1955).

Blood smears were air-dried, then fixed for 1 minute in absolute alcohol. The smears were stained in Giemsa (1:40 dilution) for 30 minutes. Each preparation was examined for 5 minutes at 430x and for 10 minutes under oil immersion (970x).

#### RESULTS

Blood smears were prepared from 248 wild and 116 game-farm pheasants during the period 1957-59 (Table 1). The sample included 262 adult and 102 juvenile birds. Smears were collected throughout the year including 65 per cent in winter and 30 per cent in summer (Fore, 1959).

Quail blood smears were prepared from 85 wild, 286 private game club and 302 state game farm birds (Table 2). The sample included 327 adult and 346 juvenile birds. Summer collections accounted for 87 per cent of the sample.

Examination of blood smears from 364 pheasants (Fore, 1959)

Table 1. Monthly distribution and source of pheasant blood smears

Month	Adults			Juveniles		Total	Per cent of total
	Winnebago	Union-Adair	Game Farm	Winnebago	Union-Adair		
January		125				125	34.3
February							
March			114			114	31.3
April							
May							
June	3	6			15	24	6.6
July	4			21	13	38	10.5
August	3			36		39	10.7
September				6		6	1.7
October			2			2	0.5
November	5			11		16	4.4
December							
Total	15	131	116	74	28	364	
Per cent of total	4.1	36.0	31.9	20.3	7.7		100.0

and 673 quail (Roslien, 1962) indicated all were negative for the avian blood parasites *Haemoproteus*, *Plasmodium*, and *Leucocytozoon*. These results indicate blood parasites were of little or no significance in the areas in which birds were checked between 1957 and 1961. Pheasants from the Winnebago study area and quail from the Mt. Ayr Game Area represented a relatively large percentage of birds present. The absence of blood parasites in the large sample of birds (418) from the Iowa Wildlife Research and Exhibit Station at Boone was both surprising and heartening.

Lack of positive evidence of blood parasitism in wild and game farm birds prompted two experiments aimed at inducing infections in game birds.

Table 2. Monthly distribution and source of quail blood smears

Month	Adults		Juveniles		Total	Per cent of total
	Wild birds	Pen reared	Wild birds	Pen reared		
January						
February		6			6	0.9
March						
April		32			32	4.8
May						
June		220		27	247	36.8
July	24		2	22	48	6.9
August	14		4	273	291	43.3
September	9		8	10	27	4.0
October						
November	22				22	3.3
December						
Total	69	258	14	332	673	
Per cent of total	10.2	38.3	2.1	49.4		100.0

In 1958 four pheasants were inoculated with pigeon strain 1B *Plasmodium relictum* isolated by Becker *et al.* (1957). A daily

series of blood smears was made during a period extending from 3 days post-inoculation through the following 19 days; however, no infection was induced. Plimmer (1914) reported finding *Plasmodium relictum* (= *P. praecox*) in the Mongolian pheasant.

In 1959, an experiment was carried on with quail in Winneshiek County, Iowa. Downy young birds were penned along a small trout stream near Decorah, Iowa, in an attempt to induce natural infections of *Leucocytozoon*. Black flies (*Simulium* sp.), which are known vectors of *Leucocytozoon*, were present as larvae in the stream and as adults in the vicinity. *Culex* sp. and *Aedes* sp. of mosquitoes, which are known vectors of bird malaria, were present in the Decorah area. The 11 sample birds were bled 4 times during the period June 15-July 10. No evidence of blood parasitism was found in these birds.

It is possible that changing conditions might result in future infections since potential insect vectors are present throughout the state. Blood parasite infections have been reported in Iowa turkeys, in mourning doves, and in passerine birds; therefore, Iowa does have reservoirs for parasitism. It seems advisable that periodic surveys to check for blood parasites should be made both at the State Wildlife Research and Exhibit Station and at other areas in the state where pheasants and quail are of importance.

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## Vernal Breeding of Cottontails in Iowa

PAUL D. KLINE<sup>1</sup>

**Abstract.** Studies of 399 cottontails (*Sylvilagus floridanus mearnsii*) taken during late winter and spring of 1958 through 1961 have established the early portion of the breeding season for the species in Iowa. Males attained breeding condition starting in February. Pregnant females occurred late in February. Most females became pregnant for the first time in March. All females examined after April 1 were pregnant. Differences in commencement of the breeding season from year to another were noted. A statistically significant difference in average size of first and second embryonic litters was noted. Litters from northern Iowa averaged larger than those from southern Iowa. This difference was statistically significant at the 0.20 level of confidence.

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