Bobwhites (Colinus virginianus) Failure as Vectors of Fowl Cholera in Turkeys 1

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Bobwhites *(Colinus virginianus)* Failure as Vectors of Fowl Cholera in Turkeys [1]

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Abstract

Bobwhite quail *(Colinus virginianus)* were exposed to infection of fowl cholera by housing them in a pen where experimental epornitics of fowl cholera were in progress. These bobwhites subsequently were allowed to cohabit with susceptible turkeys. None of the turkeys developed fowl cholera thereby suggesting that the bobwhite is not a vector of fowl cholera.

Introduction

Outbreaks of pasteurellosis are reported frequently in waterfowl populations.[3,8] This disease, while rarer in upland game birds, has been reported in a large number of these species including bobwhites.[10] Several species of free flying wild birds have been infected experimentally with *Pasteurella* strains originally isolated from other sources.[5,7,8] *Pasteurella multocida* (P-1059) could be reisolated from the mouths of bobwhites one week after an experimental oral infection.[7] It therefore has been suggested that wild birds are sources of *Pasteurella* infections for domestic poultry.[2,4] "Wild" pigeons *(Columba sp.)*, however, did not act either as mechanical or biological vectors of fowl cholera following prolonged exposure to an epornitic of fowl cholera in domestic turkeys.[1]

Bobwhites *(Colinus virginianus)* were used in this study since they are a common wild gallinaceous bird in the Southeast. This report deals with an experiment designed to test the hypothesis that bobwhites are either vectors or reservoirs of pasteurellosis.

Methods

Bobwhites

The 18 week old pen raised bobwhites used in this study were obtained from a flock isolated from domestic poultry.* There is no correlation between tests for anti-Pasteurella antibodies (agar-gel diffusion and agglutination) and the immune status of birds, therefore, no survey for these antibodies was conducted.[6]

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Four groups of ten bobwhite quail were confined in pens 6' x 30" x 30" constructed of lumber and ½" hardware cloth. Each pen was placed within a field where experimental epornitics of fowl cholera were induced in domestic turkeys. The quail were exposed directly to infection by placing a sick turkey in their pens daily while the epornitic in turkeys was in progress.

Each field contained 120 turkeys which were exposed to various strains of *Pasteurella multocida* by contact challenge with other turkeys infected by intramuscular injection of these organisms.

Field 1:	Contact challenge with *P. multocida* (P-1059).	Turkey mortality 83%
Field 2:	Contact challenge with *P. multocida* (X-73).	Turkey mortality 43%
Field 3:	Contact challenge with *P. multocida* (Field isolate-Serotype 3**, Georgia 1 and characterized as virulent).	Turkey mortality 19%
Field 4:	Contact challenge with *P. multocida* (Field isolate-Serotype 3, Georgia 3 and characterized as mildly virulent)	No turkey mortality or apparent morbidity.

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Each turkey epornitic was considered to start when the first turkey died in a field, and the experiment terminated 30 days later.

Test of Transmission

During the epornitic of fowl cholera in the turkeys, bobwhites in all pens died of ulcerative enteritis. The diagnosis of ulcerative enteritis was based upon gross lesions. Livers from a sample of the dead birds were cultured on blood agar plates and no *Pasteurella* organisms could be demonstrated.

The bobwhites died of ulcerative enteritis to the extent that only sufficient numbers were alive from the pens confined in Field 1 and 3 to conduct transmission studies. At the termination of the 30 days exposure period the nine surviving bobwhites from Field 1 (*P. multocida* P-1059) and the six surviving bobwhites from Field 3 (Serotype 3, Georgia 1) were transferred immediately to a new location and new pens. Each group of bobwhites was cohabited with ten 10-week-old fowl cholera susceptible turkeys. In this manner each group of turkeys was indirectly exposed either to *P. multocida* P-1059 or to Serotype 3, Georgia-1.

Infection and Susceptibility

Turkeys: Following the 60-day cohabitation period with the bobwhites, the turkeys were challenged to determine their susceptibility to fowl cholera. Challenge was performed by placing the test turkeys in contact with other turkeys which had been infected with *P. multocida*. Those turkeys exposed to bobwhites from Pen 1 were challenged with *P. multocida* P-1059), and those turkeys exposed to bobwhites from Pen 3 were challenged with *P. multocida* Serotype 3, Georgia 1. In each group, eight test turkeys died within one week.

Bobwhites: Immediately following the cohabitation period the bobwhites were killed, necropsied, and examined for lesions suggestive of pasteurellosis. Bacterial cultures were made from the turbinates, liver, spleen, and heart blood of each bird.

Results

None of the bobwhites or turkeys confined together for 60 days following the exposure of the bobwhite to fowl cholera developed symptoms of the disease. When the turkeys were challenged with the same strain of *P. multocida* to which their pen mate bobwhites had been exposed to previously (P-1059 or Serotype 3, Georgia 1, 80% of each group of turkeys died within one week.

At necropsy none of the bobwhites had lesions suggestive of pasteurellosis, and all cultures obtained from these birds were negative for *P. multocida.*

Discussion

It would appear that under the conditions of this experiment that bobwhites are neither mechanical nor biological vectors of *P. multocida* (P-1059) or *P. multocida* (Serotype 3, Georgia 1). The intimate contact between the bobwhites and moribund turkeys is not a natural condition. It did, however, provide ample opportunity for the bobwhites to develop an infection if they were naturally susceptible. In addition to biological transmission, no attempt was made to prevent mechanical transmission when the bobwhites were moved to new pens. The failure of the bobwhites to act as either a mechanical or a biological vector under these conditions strongly suggests that they are not natural vectors of pasteurellosis in turkeys. Because of the very small numbers of bobwhites surviving in other pens, no attempt could be made to test their ability to transmit other strains of *P. multocida.*

Traditionally, wild birds have been considered infection sources of fowl cholera for domestic fowl.[3,4] More recently, it has been suggested that *Pasteurella* infections in domestic fowl may be the source of pasteurellosis in wild waterfowl.[3,8] Generally, the experimental evidence for these statements is indirect. The logic, however, is impeccable. First, *P. multocida* has been incriminated in epornitics in wild waterfowl.[5,8] Secondly, inoculations of wild birds with *P. multocida* generally result in mortality. Therefore, it appears that a wild bird/turkey infectious cycle may exist. The report of Rosen and Morse[9] supports the idea of an interspecies cycle of *Pasteurella* infection. In an investigation of an epornitic in coots they found strong evidence of a spread to ducks and finally to gulls and mice.

There is little direct experimental evidence, however, to indicate that *Pasteurella* infections pass from one species of bird to another. Brown *et al.*[1] could not demonstrate transmission, either biological or mechanical, of *P. multocida* (P-1059) infection from turkeys to pigeons or from pigeons to turkeys. In this trial, bobwhites failed to become infected from turkeys or to transmit fowl cholera infections from infected to susceptible turkeys. Thus, the cycle of infection, wild bird/turkey inferred is not supported by the direct evidence so far accumulated. Further work is necessary to clearly delineate the role of wild birds in *Pasteurella* infections in domestic fowl.

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