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USING MICROSATELLITE DNA TO UNDERSTAND BOBWHITE BEHAVIOR AND POPULATION STRUCTURE

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ABSTRACT

Northern bobwhite (*Colinus virginianus*) have a flexible mating system with varying degrees of parental investment in offspring. Questions of relatedness of mates and the dynamics of covey membership have not been answered. It is not known how different patterns of mating systems impact productivity of bobwhite populations. In addition to behaviors, the genetic structure of bobwhite populations likely varies across landscapes, and may depend on the distribution and abundance of habitat types. These issues have critical conservation and management implications, such as the impact of habitat fragmentation on gene flow. Recent advances in molecular techniques provide an opportunity to investigate these questions through examination of small, repetitive, highly variable regions of DNA known as microsatellites. Microsatellites provide the fine-scale resolution needed to objectively understand certain population structures and reproductive strategies. Microsatellite analysis techniques have been used successfully to research relatedness and extra-pair paternity of a number of species. Therefore, we have begun to investigate the genetic basis for many northern bobwhite behaviors related to reproduction. Our primary objectives are to determine: (1) relatedness of individuals within coveys and groups over time, (2) relatedness between reproductive pairs relative to random pairings, (3) relatedness of chicks in broods, (4) rates of extra-pair fertilization, (5) rates of intra-specific nest parasitism, and (6) the relatedness of incubating birds to their eggs. To do so, we have developed a series of microsatellite markers for northern bobwhites. We radiomarked approximately 75% of bobwhites on our study area at Tall Timbers Research Station. We collected body feathers from adults and 1.5 mm patagial micro-biopsies from each chick (4 days old) found brooding with radiomarked adults for microsatellite analysis. We are determining relatedness and parentage, based on these microsatellite data, using programs RELATEDNESS and CERVUS. Additionally, we are testing our tissue collection techniques on a pen-reared population of bobwhites to determine the efficiency of DNA amplification via the polymerase chain reaction for 4 tissue collection techniques: patagial micro-biopsy, down and feather shaft, egg tooth, and egg membrane. Additionally, we are pairing pen-reared adult hens and males for different periods of time to determine the presence of sperm storage and test for evidence of sperm competition. Further, we are crossing individuals of known relatedness over several generations to test the accuracy of paternity inferences calculated by CERVUS with respect to bobwhite microsatellite data. Finally, by collecting feathers from hunter-killed bobwhites throughout the Red Hills and the southeast, we will compare the genetic structure of the bobwhite population(s) of the Red Hills, likely the last panmictic population in the southeast, to more isolated, declining populations. In our poster we present a detailed description of this research along with first year results.

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