A Facilitated Method for Collection of Fecal Samples from Mist-netted Birds

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ABSTRACT

Herein we describe a new method which allows safe non-invasive collection of fecal samples from mist-netted birds and rapid storage of the samples for later analysis. The technique involves holding and transporting birds in specially adapted socks to which plastic collection and storage bags are attached. Feces samples fall into plastic bags for later removal, labeling, storage, and analysis. The technique proves especially feasible for assimilating diet data from constant-effort banding stations during migration. We applied the technique to allow assessment of the diet of transient passerines during stopover on Block Island, Rhode Island. During a portion of the 1993 autumnal migration season, 347 of 482 birds banded (71.99%) produced fecal samples with little time or effort required on the part of the researchers to collect them. Use of this technique is encouraged among researchers and banders to determine the diets of birds, especially during migration.

INTRODUCTION

For many questions in avian ecology and behavior, diet analyses are essential for complete understanding of the constraints and opportunities faced by foraging birds (Rosenberg and Cooper 1990). In birds, several different methods are used to determine the diet of individuals, populations, or species; and each has its advantages and disadvantages. Behavioral observations are often used to determine prey taken by a particular bird, but these can be difficult to obtain in densely vegetated habitats, are often biased by the most active and visible behaviors, and often render prey taxon classification difficult. Stomach contents can be obtained from birds which are collected or found dead, but the destruction of individuals is often not desirable in studies where particular populations or individuals are followed over time or in threatened populations, and large numbers of individuals must be collected to overcome high individual variation in diet. Some studies (e.g. Zach and Falls 1976) have used tartar emetics to force regurgitation of ingested food, but this technique often results in high mortality, especially in birds also subjected to stress at capture. Moveover, in many ecological and behavioral studies, diet analyses are often ancillary to principal questions, although essential for the interpretation of results; thus great time and effort may not be able to be allocated toward accurate determination of diet preference.

Fecal analyses can be a viable alternative to other techniques of diet determination (Wheelwright et al. 1984; Blake et al. 1990; Rosenberg and Cooper 1990; Blake and Loiselle 1992). Large sample sizes can be obtained quickly and easily without harming most individuals; and with some training, prey can be identified to order or family if not species (e.g. Ralph et al. 1985). Moreover, fecal analyses for information on frugivores are not based on observations at conspicuous plants bearing large fruit crops and are more likely to include most fruits eaten by the focal species (Blake et al. 1990; Blake and Loiselle 1992). Many studies (e.g. Moody 1970; Major 1990) have attempted stomach flushing to collect the entire gut contents, but this technique is time consuming and difficult to accomplish under such time-limited conditions as banding autumn-passage migrating passerines. Others (e.g. Blake et al. 1990) have placed birds in holding cages prior to processing to collect naturally

excreted feces. Birds frequently defecate prior to placement in holding cages, however; and this technique is time-consuming which is undesirable in situations when large numbers of birds must be processed. While a great deal of time and effort is required for analysis of samples collected by any method, reduction in collection time is one means to ease collection of diet data. Herein, we present a facilitated technique to collect fecal samples from large proportions of birds removed from mist nets, one which provides easy storage and requires little time. The technique functions through the transport and holding of birds prior to their processing and banding and can quickly provide large sample sizes for any species which is regularly caught in mist nets.

METHODS

With this technique, birds were transported from mist nets to banding station in specially designed bags that allowed collection of fecal samples into the same container in which they would be stored. The transport and holding bags were easily and rapidly constructed of large socks from which the toes (lower 2-5 cm) had been removed, creating a cloth tube for placement and removal of a bird from the sock. Polypropylene sock liners functioned well, as they were easily rinsed, dried quickly, and allowed good air circulation for the captive bird inside. A square piece (8 cm x 8 cm) of hardware cloth of approximately one-cm mesh was attached to the bottom of the sock. We taped and/or bent the cut-off ends of the wire square to prevent accidental injury of the captured individual. This wired square was fixed to the sock by means of wire or safety pins, but many socks are resilient enough to retain the mesh with their own elastic. The mesh served as the substrate on the bottom of the sock on which the bird perched, and allowed passage of the fecal sample into a collection bag below. The fecal collection bags were plastic zipper-lock sandwich bags which were attached to the bottom of the sock with safety pins. The bags were attached with the pins through the top flaps of the bag above the zipper-sealed compartment to prevent holes from forming and becoming enlarged, risking the loss of samples. While these materials were used to create socks of appropriate size to hold a wide range of passerines from the smallest Parids to large thrushes, larger fecal collection bags could easily be constructed.

Once a bird was removed from the net it was placed in the bottom of the sock so that it would sit upright on the mesh screen. The remaining length of the sock was then tied in a simple knot to prevent the escape of the bird and to keep it placed on the bottom of the sock closer to the fecal collection bag. Because several birds were often removed from a net at once during migration, we developed a system of identifying the sock with a numbered binder clip, approximately 2.5 cm in width, used to keep the sock closed to prevent the bird's escape. The clip number was then transcribed in a field notebook with the date, time, species, and other information such as habitat or net number in which the bird was captured. Clips also enabled us to suspend birds in socks on nearby branches while other birds were removed from the net. Socks containing birds were suspended by these clips from wall-mounted nails inside the banding station while one individual was being processed for appropriate banding data. Usually before several birds had been removed from a net and before the first bird was processed (banded, weighed, etc., usually in less than ten minutes), a fecal sample had been produced by several of the individuals captured. Typically, little time was necessary to wait for an individual to defecate, and fecal samples could be collected from the overwhelming majority of birds netted by first processing those birds that had already produced a sample. Careful placement of the bird into the sock was necessary to prevent catching of the bill or toes on the sock material, and we made certain to locate "socked" birds out of sunlight and under proper temperature regimes to prevent overheating. With such care, we experienced no injuries from this technique while using it on several thousand migrant passerines.

Samples should be labeled with pertinent bird species and capture information and stored in refrigeration for later analysis of prey taxon and abundance (e.g. Sherry 1990; Rosenberg and Cooper 1990) and for such factors as the proportion of fruit or insect matter (e.g. Herrera 1981a,b; 1984a,b; Jordano 1986, 1988). After each day

we quickly washed socks and mesh with warm water and biodegradable soap to insure removal of any contagion or feces from previously captured birds.

RESULTS AND DISCUSSION

Using this technique in a study of dietary plasticity of passage Neotropical migrants during two weeks of the 1993 fall migration season at Block Island, Rhode Island, 347 of 482 birds banded (71.99%) produced fecal samples. This technique was later used to collect samples from individuals of the genera *Catharus, Vireo,* and *Dendroica* to estimate proportions of fruit in their diets during migration. This technique provided a relatively effortless method for collection of fecal samples in an effort to determine diets of passage songbirds during stopover and should be helpful in similar studies which seek to gather dietary data from large numbers of processed birds. We encourage the use of this simple method among professional and amateur banders alike so that more can be learned of the diets and foraging ecology of passerines, especially during stopover periods during migration.

ACKNOWLEDGMENTS

JDP would like to thank Mrs. F. David Lapham for the generous use of her land, and the Block Island biosphere reserve field office of The Nature Conservancy for their generous support. D.I. McCracken and an anonymous reviewer made helpful comments to the manuscript. S. Oppenheimer assisted in the implementation of the technique in the field. Research on Block Island was conducted with support from the American Ornithologists' Union, The American Museum of Natural History, and a pre-doctoral fellowship from the National Science Foundation to JDP.

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