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Aggressive Response Of Adult Bobolinks To Neck Ligatures On Nestlings

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Aggressive Response of Adult Bobolinks to Neck Ligatures on Nestlings

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ABSTRACT.—We monitored provisioning behavior at 18 Bobolink (*Dolichonyx oryzivorus*) nests during 240.5 min of videotape data from June to July 2006, and observed 64 nest visits by adults while nestlings were fitted with neck ligatures. Adults pecked or pulled at the ligatures, often aggressively, at 72% of nests (n = 18) and 52% of visits (n = 64). These behavioral responses by adults indicate the neck ligature technique is more invasive than previously believed. We documented no mortality as a result of ligature placement, but researchers should minimize the time that ligatures are in place to reduce stress to both parents and nestlings. *Received 8 September 2008. Accepted 30 January 2009.*

Quantitative assessments of avian diets may be critical for evaluating habitat quality. However, methods used to quantify avian diets have associated biases and/or shortcomings as most studies require techniques tailored to specific studies and hypotheses (Rosenberg and Cooper 1990). Neck ligatures have been used to quantify diets of nestling birds as this technique allows collection of prey items prior to onset of digestion. Modifications have been suggested to improve ligature function and minimize negative effects on nestlings. For example, Johnson et al. (1980) described abnormal behavior of nestlings after leaving ligatures in place for 1 hr and suggested that collection of prey immediately after each parental visit would minimize biases. Further, Mellott and Woods (1993) found that cable ties simplified ligature placement compared to coated wire, especially when used by untrained personnel.

Neck ligatures are considered an invasive technique (Rosenberg and Cooper 1990, Poulsen and Aebischer 1995), but most studies addressing their effects have focused on the be-

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havioral responses of nestlings. We used video cameras and neck ligatures simultaneously in a study of nestling Bobolink (*Dolichonyx oryzivorus*) diets. We report on the response of adult Bobolinks to placement of neck ligatures on nestlings.

METHODS

Study Site.—Our study was conducted during June–July 2006 in three hayfields in Hinesburg, Shelburne, and Charlotte, Chittenden County, Vermont, USA. Bobolinks breed in hayfields and pastures throughout this agricultural region (Shustack 2004, Perlut et al. 2006) and their ground nests are relatively easy to locate.

Video and Ligature Data Collection.—Nest observations, video monitoring, and ligature sampling occurred between 0400 and 1300 hrs EST during precipitation-free periods. A small, wide-angle ''lipstick'' lens (www.helmetcamera.com) was mounted 10 cm from the nest when nestlings reached 6 days of age. The lens was attached by cable to an 8-mm camcorder (Sony DCR-TRV460 Digital8 Handycam) placed 2 m from the nest and concealed by vegetation. Recording sessions commenced with an initial 45-min acclimation period during which nestlings were left undisturbed. Recording was paused while neck ligatures were placed on nestlings following Johnson et al. (1980) and subsequent modifications (Mellott and Woods 1993). We placed ligatures on a maximum of three nestlings per nest using plastic cable ties (10 cm length before cutting off excess, 2.5 mm width), temporarily removing any additional nestlings for the remainder of the videotaping period (generally 45 min). Removal of some of the nestlings reduced the number of nestlings that were not fed by parents during a feeding session (adults were not observed feeding all nestlings in a single feeding trip when a nest contained five or six nestlings; N. G. Perlut, unpubl. data) and reduced the number of nestlings that would be exposed to any potential stress during the ligature process. We attempted to remove ligatures and collect diet samples from the nestlings as soon as we observed the adults return to the nest with food. Prolonged use of ligatures can induce abnormal swallowing and gaping behavior in nestlings, which leads to the redistribution of prey items among nestlings by adults (Johnson et al. 1980).

RESULTS

We monitored 18 Bobolink nests during 240.5 min of videotape data. We applied neck ligatures to 50 nestlings, and successfully collected 99 prey items from 28 of those nestlings. No nestling mortality occurred while nests were videotaped. Leaf hoppers (27.3% based on numerical abundance), holometabolous larvae (24.2%), grasshoppers (16.2%), mayflies (8.1%), spiders (7.1%), and moths (5.1%) were the most common prey types fed to nestlings. Mean ± SD prey length was 14.5 ± 10.2 mm with 17% of prey items delivered >25 mm. Sixteen of the 18 nests were successful with 56 nestlings fledged.

We observed 64 nest visits by adults while nestlings were fitted with ligatures. Seventy-two percent of visits were by females and 28% by males. On average, females and males visited nests 2.6 and 1.0 times, respectively while ligatures were in place (~45 min). Adults pecked at ligatures of nestlings in 13 of 18 nests (72%) and in 33 of 64 (52%) visits. They directed pecks at more than one nestling in 70% of the visits during which adults pecked at the ligatures. Females had a greater propensity to peck at ligatures with 59% of all female visits eliciting pecks to ligatures compared to 33% of all male visits. The first adult to return to the nest pecked at the ligatures in 12 of 13 nests in which adults pecked at ligatures. There was no indication that probability of pecking changed across the time period ligatures were in place (logisitic regression, $\chi^2 = 1.68$, df = 1, $P = 0.20$).

Adults generally pecked at the thin band of the cable tie. In these cases, the adults appeared to be assessing whether or not the ligature could be easily removed from the chicks. Adults also grasped and pulled at the bulkier locking mechanism of the cable tie with the appearance that removal was the goal. Parents were notably aggressive in about half of the nests in their attempts to remove the ligatures, grasping the ligature and forcibly pulling the nestlings' heads upwards or sideways. In one instance, a female inspected, grasped, and pulled at a nestling's ligature for 30 sec. No aggressive actions toward nestlings were noted when ligatures were not present

on nestlings based on video data prior to ligature placement and a few tapes which we left running after the ligature sessions. One female visually inspected her nestling's throats upon her first visit to the nest ~20 min after removal of the ligatures.

DISCUSSION

Use of neck ligatures has been shown to provide quality dietary data for nestling birds (Orians 1966, Martin et al. 2000, Clotfelter et al. 2007). Our data support these results as we were able to collect a relatively large sample of prey items over a short period of time. Prey length data suggest that adults did not adjust the size of prey items brought to nestlings with ligatures. However, we do not have adequate control data (nestlings without ligatures) for a quantitative comparison.

Our data show that undesirable behavioral responses to ligatures are not restricted to nestlings. The strong and consistent response of adults to ligatures suggests this technique elicits stress that was not previously documented. Attempts by female Red-winged Blackbirds (*Agelaius phoeniceus*) to remove pipe cleaner ligatures have been documented, but no behavioral data were provided (Robertson 1966). Our results indicate that Bobolinks are strongly attuned to the appearance of their nestlings and, in most cases, neck ligatures trigger a response upon the first visit to the nest. Females in our sample were more likely to attempt to remove ligatures than males (but also made more nest visits). Approximately half of the attempts to remove the ligatures were aggressive with parents lifting and/or dragging nestlings by the ligature. These responses indicate the neck ligature technique is more invasive than previously believed. Comparable data from other species would be useful to better address the generality of our findings.

Gaunt and Oring (1999) noted the potential for changes in blood circulation, tracheal function, and food delivery rates with use of neck ligatures. Our data suggest there may be additional stress to nestlings beyond physical placement of the ligatures. The majority of nest visits by adults included pecking or pulling at neck ligatures and there was no indication that adults became habituated to the presence of ligatures. Neck ligatures remain a relatively safe, inexpensive, and informative method, but do present welfare concerns. Investigation into the efficacy of less-invasive alternatives such as videography should be conducted, especially when working with rare and declining species. We documented no mortality as a result of ligature placement, but researchers should minimize the time that ligatures are in place to reduce stress to both parents and nestlings.

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