
Notes on The Ecology of Nestling Eastern Bluebirds Occupying Nest Boxes in Pontotoc County, Oklahoma

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Eastern Bluebird (*Sialia sialis*) nestlings were monitored from nest boxes during the 1996-97 breeding season in Pontotoc County, Oklahoma. Growth was calculated to have an asymptotic weight of 26.0 grams and the mean fledgling age was 17.8 days. Primary food materials delivered to nestlings were grasshoppers (Order Orthoptera), moths and butterflies (Order Lepidoptera), and spiders (Class Arachnida). © 2000 Oklahoma Academy of Science

INTRODUCTION

The Eastern Bluebird (*Sialia sialis*) is one of several cavity nesting species in Oklahoma that readily use man-made nest boxes. Current interest in this species is widespread due not only to its aesthetic beauty but also to concerns about population stability resulting from competition with other species for cavity sites (1). Perhaps because of its willingness to accept man-made nest cavities, knowledge about the natural history and ecology of the Eastern Bluebird and other *Sialia* species has been enhanced (2-5). However, little has been published from the east-central part of its breeding range. Because the nestling period is usually the most crucial time in a bird's life, new information relative to growth, development and food preferences in different parts of the breeding range is important to a further understanding of its ecology.

METHODS

During the 1996-97 breeding season, we monitored bluebird nest boxes mounted on posts distributed on approximately 190 ha of partially grazed pasture land in Pontotoc County, Oklahoma, approximately 8 miles northeast of the city of Ada. Nestboxes were placed at the edge of a pasture, 2.5 m from the edge of a woodland consisting of various species of oak (*Quercus*) and hickory (*Carya*). Nestboxes were checked daily for

the duration of the breeding season (May-July) in 1996-97. Nestling weights and measurements were recorded daily at approximately the same time in order to ensure a 24-h time lapse between measurements. After weighing nestlings, a wire ligature was tied around the throat to prevent swallowing. These were removed after food items had been collected for 1-1.5 h (3, 6). We also observed the boxes from a distance using a spotting scope to determine materials brought to the nest. This allowed us to determine the food material of older nestlings because nest disturbance at that time might lead to premature fledging. We also were able to collect remains of some items that were not swallowed and had fallen into the nest. A water displacement method was used to determine the comparative volumes of various types of food.

RESULTS and DISCUSSION

Nestling Growth: Table 1 shows the growth pattern from hatch day (Day 0) through Day 12 of the nestling period. The overall growth rate or rate index (K) was calculated using the logistic pattern as described by Ricklefs (7). For bluebird nestlings in this study, the asymptotic weight was 26.0 g and the growth rate index or weight gain of 65 nestlings (16 broods) was 0.513. Pinkowski (2) calculated the growth rate for bluebird nest-

lings in Michigan at 0.488 which was 1.05 times slower than that of Oklahoma nestlings. The time interval for growth from 10% to 90% of the asymptotic weight was 8.2 d compared to 9.0 d for Michigan nestlings studied by Pinkowski (2). The mean fledging age in Pontotoc County was 17.8 d (SD=0.75 days; n=31) for late spring and summer broods, whereas Pinkowski (2) reported 18.63 d. Pinkowski (2) noted that in Michigan, the fledging period was longer in spring than in summer possibly due to cooler conditions and reduced food sources. In our study, no significant difference in growth rate occurred between the two periods ($t=1.33$, $df=22$, $P>0.05$). The faster growth rate and shorter fledging period for Oklahoma nestlings may be related to warmer climatic conditions at a lower latitude and perhaps a more favorable food supply.

Food Habits: Orthopteran insects composed the greatest percentage (41.7%) of nestling food, which included the families Acrididae (18.6%), Tettigoniidae (16.6%) and Gryllidae (8.2%; mostly *Gryllus pennsylvanicus*). A variety of spiders (Class Arachnida; especially Family Lycosidae) were the second most common prey item (24.7%), with lepidopterans (primarily larvae) third (17.5%). Less frequent prey included homopterans (4.9%, primarily cicada nymphs), isopods (4.9%), coleopterans (2.1%), dipterans (2.1%), hymenopterans (1.0%), and diplopoda (0.5%). Similar types of prey have been reported from other regions with some variation in frequency. For instance, Pinkowski (3) found that lepidopterans were taken in greatest quantity in Michigan, with orthopterans second and arachnids third in importance.

TABLE 1. Weight and tarsal length of nestling Eastern Bluebirds in Pontotoc County, Oklahoma, 1996-97.

age= days after hatching	sample size	weight (g)			tarsal length (mm)		
		M	SD	R	M	SD	R
0 (hatch day)	31	2.5	0.2	2.0-3.0	0.49	0.02	0.4-0.5
1	47	3.8	0.6	3.1-4.8	0.58	0.06	0.5-0.7
2	43	5.3	0.9	2.9-7.1	0.70	0.08	0.5-0.8
3	53	8.0	1.2	3.4-10.7	0.88	0.09	0.7-1.1
4	48	11.0	1.5	7.0-13.5	1.1	0.12	0.7-1.5
5	46	13.9	2.0	8.9-18.5	1.3	0.19	0.8-1.8
6	35	6.8	1.8	12.1-20.5	1.5	0.12	1.3-1.8
7	41	20.0	2.0	17.3-23.7	1.8	0.13	1.6-2.1
8	23	21.3	1.7	16.1-22.5	1.9	0.12	1.7-2.2
9	38	24.0	1.9	19.4-28.0	2.0	0.12	1.8-2.2
10	52	25.2	1.7	21.4-28.5	2.1	0.12	1.9-2.3
11	44	25.3	1.4	22.3-27.9	2.1	0.11	1.9-2.3
12	35	25.6	1.3	22.9-28.1	2.1	0.06	1.9-2.2

M=mean, SD=standard deviation, R=range

TABLE 2. Frequency of prey items fed to Eastern Bluebird nestlings in Pontotoc County, Oklahoma, 1996-97.

Prey	Nestling Age (days)					
	0-5		6-10		>10	
	No.	%	No.	%	No.	%
Lepidoptera:						
larvae	24	20.8	24	13.6	7	18.9
adult	3	2.6	0	—	0	—
Arachnida	33	28.6	29	16.4	6	16.2
Orthoptera:						
Arididae	13	11.3	37	21.0	11	36.6
Tettigonidae	20	17.3	36	20.4	7	18.9
Gryllidae	7	6.0	13	7.3	3	8.1
Homoptera	4	3.4	21	11.9	1	2.7
Isopoda	5	4.3	5	2.8	1	2.7
Coleoptera	4	3.4	2	1.1	1	2.7
Hymenoptera	1	0.8	2	1.1	0	—
Blattaria	0	—	1	0.5	0	—
Reptilia	0	—	3	1.7	0	—
Diptera	1	0.8	3	1.7	0	—

n=115 for 0-5 days, n=176 for 6-10 days, n=37 for >10 days

Unusual vertebrate prey items have been reported in the literature, e.g., snakes (8), tree frogs (9) and shrews (10). In this study, we had one instance of a ground skink (*Scincella lateralis*) tail delivered to nestlings; however, it was not swallowed. Bay and Carter (11) reported that during several breeding seasons in the same study area skink tails and entire bodies were delivered to bluebird nestlings, but most were unswallowed and were recovered at the bottom of the nest boxes. Lizard prey has been reported by others (12, 13), but with the exception of shrikes, Family Laniidae (14) this must be a rare food item for passeriform species.

Spiders and lepidopteran larvae were the most frequent prey delivered to nestlings 0-5 days old in Michigan with orthopteran insects being the primary food of older nestlings (3). Results from our study were similar (Table 2), except that we found little difference in prey diversity delivered to recent

hatchlings (0-5 days old) compared to older nestlings ($H=2.2$ in both cases) (Shannon Diversity Index) however, our sample size was considerably smaller than Pinkowski's (3).

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