Evaluating Mourning Dove Crop Gland Activity Associated with Crop Milk Production

BULLETIN 545
DECEMBER 1982

ALABAMA AGRICULTURAL EXPERIMENT STATION
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AUBURN UNIVERSITY, ALABAMA

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The research on which this report is based was sponsored in part by each of the following:

Accelerated Research Program for Webless Migratory Shore and Upland Game Birds, U. S. Fish and Wildlife Service

Alabama Agricultural Experiment Station, Auburn University

Department of Fisheries and Wildlife Sciences, Virginia Polytechnic Institute and State University

Virginia Commission of Game and Inland Fisheries

PHOTO CREDITS: Cover picture of parent feeding fledglings, R. R. Hitchcock; all others, R. E. Mirarchi.

FIRST PRINTING 3M, DECEMBER 1982

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INTRODUCTION

MOURNING DOVES *(Zenaida macroura)* are America's most abundant game birds. With their swift and erratic flight, they provide hunters with many hours of outdoor recreation. Their popularity as game birds causes millions of dollars of Pittman-Robertson (Federal Aid in Wildlife Restoration) tax revenues to be generated. These funds can be used for management of doves and other wildlife species. Mourning doves are popular with nonhunters as well, because of their attractive appearance and plaintive vocalizations, and because they frequently nest in suburban and urban areas.

Mourning doves lay two eggs per nesting attempt, incubate the eggs for 14 days, brood the young for approximately 15 days, and feed the fledglings 10-12 days after they leave the nest *(1)*. Mourning doves nourish their young with a curdlike substance regurgitated from the crop. This crop "milk" is formed by desquamation of the proliferating epithelium of the crop wall *(2)*. Formation of crop milk is confined to the two lateral lobes in the crop of both parents and is accompanied by changes in the crop wall that are readily observable in dissected specimens. Nestlings are fed crop milk almost entirely for 5-6 days posthatching *(3)*. Seeds become more prevalent in the

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[2]Gratitude is extended J. T. Jones and C. F. Mirarchi for help in caring for the captive dove colony. W. Morehead aided in collecting samples.

diet up until the time of fledging, when there is little difference between the diets of fledglings and adult doves *(4)*. Although crop milk production decreases greatly during the early stages of brooding, crop gland activity persists to some degree for longer periods. This activity persists longer in males than in females *(5)* during a "typical" nesting cycle (i.e. one followed by a renesting attempt) because males have greater feeding responsibilities after the young doves fledge *(1)*.

A variable percentage of hunter-harvested mourning doves in the United States each year shows indications of crop gland activity *(6)*. The controversy between humane organizations and governmental agencies surrounding crop gland activity of mourning doves harvested early in the hunting season has continued for more than 30 years. Recent research funded by state and federal agencies has concentrated on resolving these conflicts. Development of techniques useful for detection and evaluation of crop gland activity has become necessary, and new field *(7,8)* and statistical *(9)* techniques already have been developed. However, personnel who have had little experience with crop gland activity have difficulty accurately classifying the various phases by gross morphological traits. This bulletin was developed to serve as a guide for such personnel.

MATERIALS AND METHODS

Paired mourning doves of a captive breeding colony were allowed to court, mate, and nest. Paired birds were selected and sacrificed simultaneously at 9:00 a.m. e.d.t. on specific day intervals postlaying and posthatching. Postlaying and posthatching day intervals were determined using the first egg laid and the first egg hatched, respectively, as the first day of the interval. Crop development was classified as active, developing, regressing, or inactive based on criteria outlined previously for other columbids *(10,11)*. Crops were weighed after removal of contents and extraneous materials. To ensure representation of normal color patterns, crop glands were photographed immediately after dissection. Photographs included full frontal views of the entire crop with one lobe exposed and a close-up of the exposed crop lobe. Descriptions of each important stage of crop gland development and regression were made and crop gland weights were recorded.

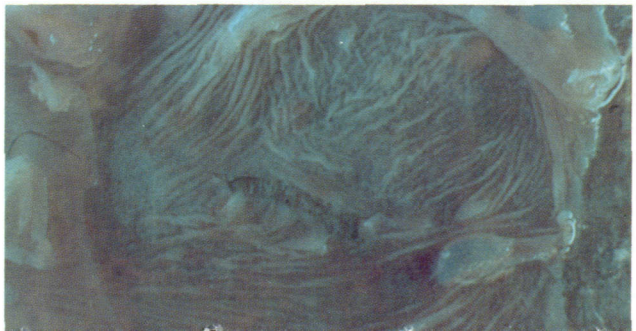
GENERAL PATTERN OF CROP GLAND DEVELOPMENT AND REGRESSION

The duration and characteristics of mourning dove crop gland activity during the nesting cycle have been described in detail (5). Crop gland activity is absent in nonbreeding adults and during the first 9 days postlaying. Crop glands develop rapidly in both sexes from the 10th to the 14th day of incubation. Both parents have active crop glands during the first 5 days posthatching. Crop glands of adult males and females begin to regress at different rates at 9 days posthatching and some females already have inactive crop glands by that time. Crop glands of males regress slower than those of females and may lag behind by approximately 4-6 days. The majority of both sexes have inactive crop glands by 18-20 days posthatching. *Note:* The gross morphology of developing and regressing crop glands differs little, and the two cannot be separated accurately by gross visual examination. These crop glands would have to be classified using histological examination if the stage of incubation or brooding is unknown.

External (top): Lobes are translucent with no thickening or hyperemia. No heavy pigmentation, other than a light cream cast.

Internal (bottom): Lobes may or may not have slight stippling (folds). Folds have minimal height and width when present. No fusion of folds or crop milk present. Weight range (fresh)-male, 0.9-2.2 grams; female, 0.7-2.0 grams.

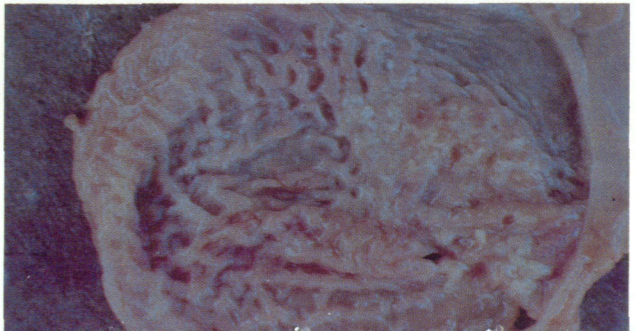
Stage of nesting cycle (days)	*Sex*	*Crop phase*
Nonbreeding and 1-9 postlaying	M&F	Inactive



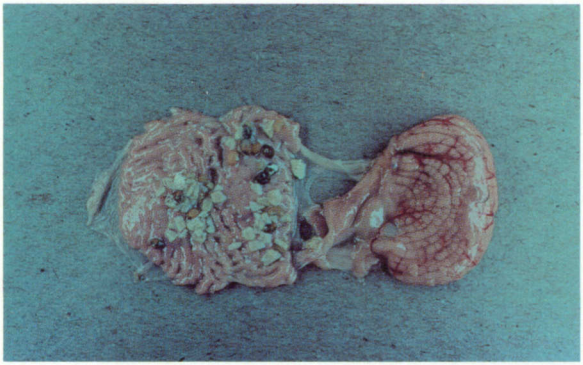
External (top): Lobes opaque, slightly thickened. Blood vessels begin to become prominent. Crop may attain yellow-rose hue.

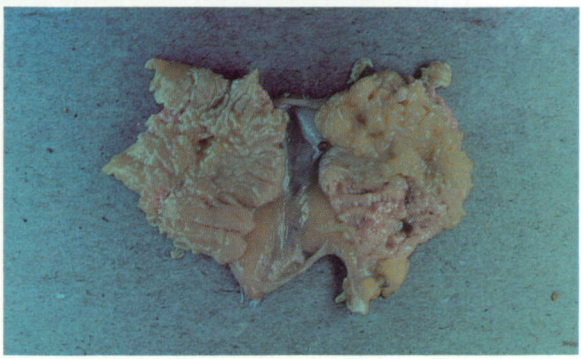
Internal (bottom): Lobes have folds of medium height and width. Some fusion of folds and small amounts of crop milk may be present. Weight range (fresh)-male, 1.3-3.4 grams; female, 1.2-3.1 grams.

Stage of nesting cycle (days)	*Sex*	*Crop phase*
10-13 postlaying	M&F	Developing



Stage of nesting cycle (days)	*Sex*	*Crop phase*
14 postlaying-5 posthatching	M&F	Active





External (top): Lobes are opaque and very thick with numerous blood vessels present. Crop has rose-red color cast.

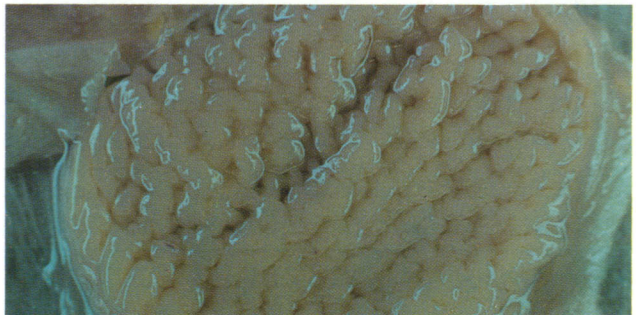
Internal (middle): Lobes have definite folds of great height and width. Folds may be fused and crop milk often present in copious quantities. All particles present are food items.

Internal (bottom): Crop gland with both lobes exposed to show crop milk. Weight range (fresh)-male, 2.9-5.5 grams; female, 3.5-6.7 grams.

External (top): Lobes are still opaque and thickened, but characteristics are not as pronounced as in active crops. Fewer blood vessels present. Crop has lost rosy-red hue but still may have pink-cream coloration.

Internal (bottom): Lobes have folds of medium-great height and width. Some fusion of folds and particles of crop milk usually present, not in large quantities. Weight range (fresh)-2.4-4.1 grams.

Stage of nesting cycle (days)	*Sex*	*Crop phase*
9-15 posthatching	M	Regressing

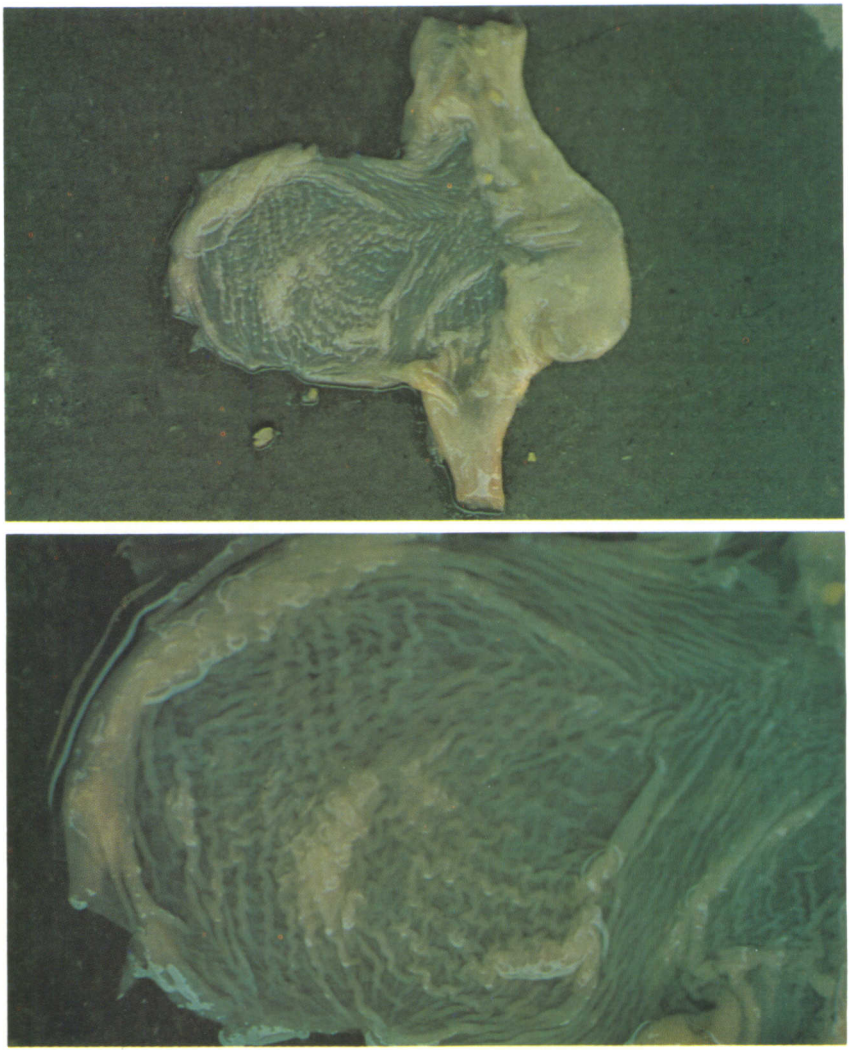


External (top): Lobes are still opaque but not as thick as male at 9-15 posthatching. Little hyperemia, cream in color. Some crops may appear to be inactive.

Internal (bottom): Lobes have folds of little height and width. Occasional fusion of folds and particles of crop milk present. Some lobes inactive. Weight range (fresh)-1.6-3.0 grams.

Stage of nesting cycle (days)	*Sex*	*Crop phase*
9-13 posthatching	F	Regressing
16-18 posthatching	M	Inactive

Stage of nesting cycle (days)	*Sex*	*Crop phase*
15-25 posthatching	F	Inactive
24-25 posthatching	M	Inactive



External (top): Same basic description as crop glands of nonbreeding doves and crop glands 1-9 postlaying. Some characteristics (amount of opacity, folds or stippling, thickness) may be slightly more exaggerated.

Internal (bottom): Same comments as external. Weight range (fresh)-0.7-1.7 grams.

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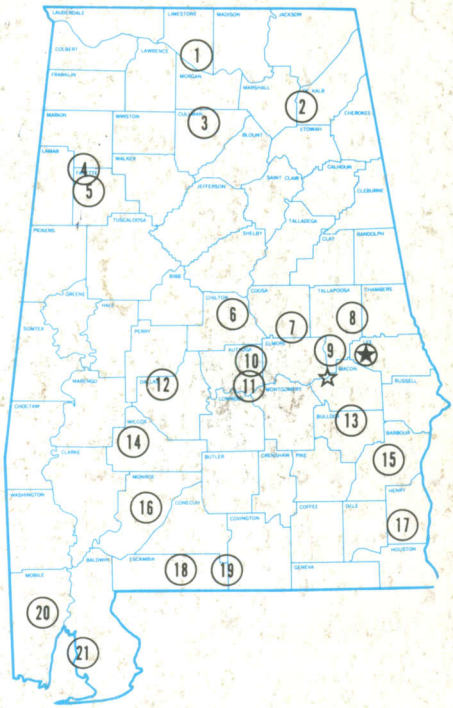

Research Unit Identification

★ Main Agricultural Experiment Station, Auburn.
☆ E. V. Smith Research Center, Shorter.

1. Tennessee Valley Substation, Belle Mina.
2. Sand Mountain Substation, Crossville.
3. North Alabama Horticulture Substation, Cullman.
4. Upper Coastal Plain Substation, Winfield.
5. Forestry Unit, Fayette County.
6. Chilton Area Horticulture Substation, Clanton.
7. Forestry Unit, Coosa County.
8. Piedmont Substation, Camp Hill.
9. Plant Breeding Unit, Tallassee.
10. Forestry Unit, Autauga County.
11. Prattville Experiment Field, Prattville.
12. Black Belt Substation, Marion Junction.
13. The Turnipseed-Ikenberry Place, Union Springs.
14. Lower Coastal Plain Substation, Camden.
15. Forestry Unit, Barbour County.
16. Monroeville Experiment Field, Monroeville.
17. Wiregrass Substation, Headland.
18. Brewton Experiment Field, Brewton.
19. Solon Dixon Forestry Education Center, Covington and Escambia counties.
20. Ornamental Horticulture Field Station, Spring Hill.
21. Gulf Coast Substation, Fairhope.