

Avian Necropsy Techniques ¹

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A necropsy (postmortem examination) is performed to determine the cause of disease by gross and microscopic examination of tissues and by conducting appropriate serologic and microbiologic examinations. A postmortem examination is indicated whenever there is a decrease in production, there are overt signs of illness, or there is an increase in mortality.

Necropsy will not reveal all causes of disease because a high percentage of disease problems are related to management, including poor nutrition, feed and/or water deprivation, improper ventilation, poor sanitation, chilling or overheating of birds, and overcrowding. Such conditions often require an on-site investigation to determine the cause of the problem. Necropsy is most likely to identify infectious disease processes, nutritional deficiencies, toxicities, parasitic disease, and tumors.

Equipment

Necropsies can be performed with a limited amount of equipment. Required are a knife (4- to 6-inch), bone shears, tissue scissors (preferably with sharp/blunt blades), forceps with teeth, disposable gloves, disposable syringes (3 cc and 5 cc), needles (20 gauge, 1 inch for wing vein blood collection, and 1 1/2 inch for heart blood collection), sanitizer for cleaning instruments and table, tissue bottles with 10 percent neutral buffered formalin, black marker,

and labeling tape. If serum samples are collected, blood collection tubes and serum vial are also needed.

History of the Problem

Prior to examining the birds, a thorough history of the problem must be evaluated. The more information provided about aviary conditions, environment, management practices, and flock history, the more likely the pathologist will be able to derive a diagnosis. The flock history should include: primary clinical signs, age, strain (or species), number affected, vaccinations, medications, recurrent aviary diseases, feeding problems, feed consumption, production, body weights, and mortality pattern. If the disease problem is in chicks, include the history on hatching and brooding procedures. In most cases, a list of possible causes of the problem (differential diagnosis) can be developed following study of the complete history.

Examination of Live Birds

If the disease is a flock problem, closely examine the live birds in the aviary prior to necropsy. This examination should include assessment of general appearance, feathering, weight, pigmentation of skin and shanks, physical injuries, facial tissues, eyes, feces (droppings), nasal and respiratory discharges, respiration, gait, leg/joint deformities, and external parasites.

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Necropsy Techniques

1. Moisten the feathers with water containing detergent. If psittacosis (or other human pathogen) is suspected, the bird should be soaked in a 5 percent Lysol solution, and a laminar flow hood should be used while performing the necropsy.
2. With scissors, cut through one lateral commissure of the mouth and examine the oral cavity.
3. Continue at the cut commissure and make a longitudinal incision through the skin of the neck to the thoracic inlet. Reflect the skin laterally.
4. Make a longitudinal incision in the esophagus and crop. Note the content and odor.
5. Make a longitudinal incision in the larynx and trachea and examine.
6. With bone shears, remove the upper beak with a transverse cut near the eyes. This will allow inspection of the nasal cavity and will expose the open anterior end of the infraorbital sinuses.
7. Insert one blade of a pair of sterile scissors into the infraorbital sinus. Make a longitudinal lateral incision through the wall of each sinus and examine them. Culture the sinuses if indicated.
8. Incise the loose skin between the medial surface of each thigh and the abdomen. Reflect the legs laterally, and disarticulate the hip joints. Incise the skin on the medial aspect of each leg, and reflect it to expose the muscles and stifle joint.
9. Connect the lateral skin incisions with a transverse skin incision across the middle of the abdomen. Reflect the skin of the breast anteriorly, and of the abdomen, posteriorly.
10. Make a longitudinal incision through the pectoral muscles on each side of the keel and over the costochondral junctions. The anterior end of each incision should intersect the thoracic inlet and the dorso-ventral midpoint. With bone shears or scissors, cut through the coracoid and clavicle bones.
11. With sterile scissors, make a transverse incision through the posterior part of the abdominal muscles. On each side continue the incision anteriorly through the costochondral junctions. Remove the ventral abdominal wall and breast as one piece, observing the air sacs as they are torn during removal.
12. Without touching them, examine the viscera and air sacs *in situ*.
13. Using sterile instruments, remove any organs and take any swabs needed for culturing. The spleen can be exposed aseptically by freeing the left margin of the gizzard and reflecting that organ to the bird's right side. All unnecessary manipulations and delays prior to culture increase the probability of contamination.
14. Examine the pancreas. Transect the esophagus at the anterior border of the proventriculus. Reflect the entire gastrointestinal tract posteriorly by cutting the mesenteric attachments and then remove it after transecting the rectum.
15. Remove and examine the liver and spleen.
16. Examine the genitalia. In the female remove the ovary and oviduct, and open the oviduct longitudinally.
17. Examine the ureters and kidneys *in situ*. If indicated, you may remove them for closer examination.
18. Remove and examine the heart.
19. Examine the lungs by reflecting them medially from between the ribs.
20. With scissors, make a longitudinal incision through the proventriculus, ventriculus, small intestine, ceca, colon, and cloaca. Examine for lesions and parasites.
21. Both brachial plexuses and sciatic nerves should be examined. The brachial plexus is most easily observed anterior to the first rib. The extrapelvic sciatic nerve is exposed by careful separation of the adductor muscles. The intrapelvic portion of the sciatic nerve is exposed by blunt dissection of the middle lobe of the kidney.
22. With bone shears or scissors, split one femur longitudinally and examine the bone marrow.
23. To examine the brain, disarticulate the head and skin it. Remove the calvarium with strong scissors, using the same technique as for mammals.

Histopathology

When performing the necropsy, remember two things: the quality of the specimen submitted for histopathology (microscopic study) will be no better than the care taken to preserve the specimen; and if in doubt, cut it out and preserve it. The following should be done to guarantee the quality of the specimens.

- Submit formalin-fixed tissues only from freshly killed (or deceased) birds.
- Use at least 10 times the volume of 10 percent neutral buffered formalin to the volume of tissue taken for histopathology.
- Only use containers with wide openings. It is safest to place the formalin container in a sturdy sealable bag when shipping.
- Do not freeze tissues prior to or after fixation in formalin.
- Tissues should be only a 1/4 inch (0.5 cm) thick.
- Trim excess extraneous tissue from the specimen.
- Open all hollow organs (including trachea, GI tract, bursa of Fabricius, cloaca and uterus) prior to fixation. Segments are best if a 1/2 to 1 inch long.
- Be careful not to touch inside surface of hollow organs if submitting the tissue. Excess ingesta or blood can be rinsed in another container of formalin (or saline).
- Avoid squeezing tissues or distorting tissues with forceps.
- Cut spleen, heart, and brain in half to allow contact with fixative.
- Bone needs to be stripped of skin and muscle and incised in order for fixative to enter the core.
- If tissue floats, it can be covered by gauze or a paper towel.
- Tissue cassettes are helpful when submitting small pieces of tissue, such as air sac or peripheral nerve.
- Make sure containers and/or tissues are labeled and properly sealed to prevent leakage during transport.