

Avian postmortem: a how-to guide

By Catherine Harvey

Backyard chickens are becoming common in urban as well as rural areas of New Zealand, so it's useful for veterinarians to know how to perform postmortem examinations of these animals. Here's a brief guide.

While postmortem examinations are usually performed by anatomical pathologists at veterinary pathology laboratories, they can also be undertaken by clinical veterinarians, who can submit samples to the laboratories for additional diagnostic testing if required.

These additional diagnostic tests can include: histopathology for Marek's disease (on fixed enlarged sciatic nerves, brain, liver, spleen and bursa); chlamydia antigen ELISA for chlamydiosis (on fresh liver, cloacal or coanal dry swabs); microbiology culture for salmonellosis (on fresh intestinal contents); and PCR for mycobacteriosis (on freshly frozen liver, spleen or intestines). Lead toxicity testing can be performed on an ethylene diaminetetracetic (EDTA) blood sample (at least 0.2mL is required), liver, kidney and eggs.

No matter what type of animal you have to necropsy, the basic technique and principles are the same. However, as always in veterinary medicine, it is important to know specific differences in anatomy and physiology and species-specific diseases. For those unfamiliar or out of practice with avian anatomy and postmortem, here's a brief guide.

A reminder about health and safety: A number of zoonotic diseases can be transmitted by cuts or through inhalation (eg, chlamydiosis, mycobacteriosis and aspergillosis). Always cover cuts, wear gloves and a protective mask, and if possible use a well-ventilated room, downdraft table or hood. Disinfect equipment and cutting surfaces afterwards with a suitable disinfectant such as TriGene. You'll also need to dispose of the remaining tissues properly using cremation or incineration.

General notes

Ideally, necropsies should be performed as soon as possible after death. Autolysis degrades tissues, and the overgrowth of bacteria and fungi from the gastrointestinal tract and environment will be more pronounced if postmortem examination is delayed.

If a necropsy cannot be performed immediately, the body should be refrigerated as soon as possible. Bodies can be refrigerated for 24–48 hours without significant autolysis. Smaller-sized animals fare better than large and fat ones. Freezing creates artefacts for histopathology and reduces the viability of microorganisms present.

Ideally take multiple samples – fixed, fresh and frozen. Sample any lesions for microbiology and histopathology testing. Cytology may also be useful. Take samples of all organs for histopathology and, as required, samples for parasitology (blood, faeces and scrapes) and toxicology. For toxicology, liver, kidney, stomach contents, whole blood (EDTA), serum and fat are commonly tested, while muscle, brain, urine, feed and water are less so.





Notes on avian anatomy

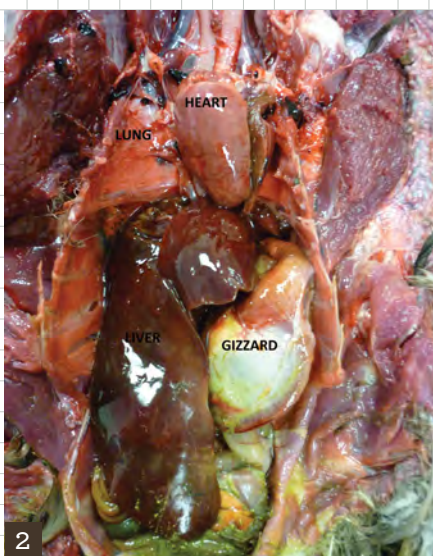
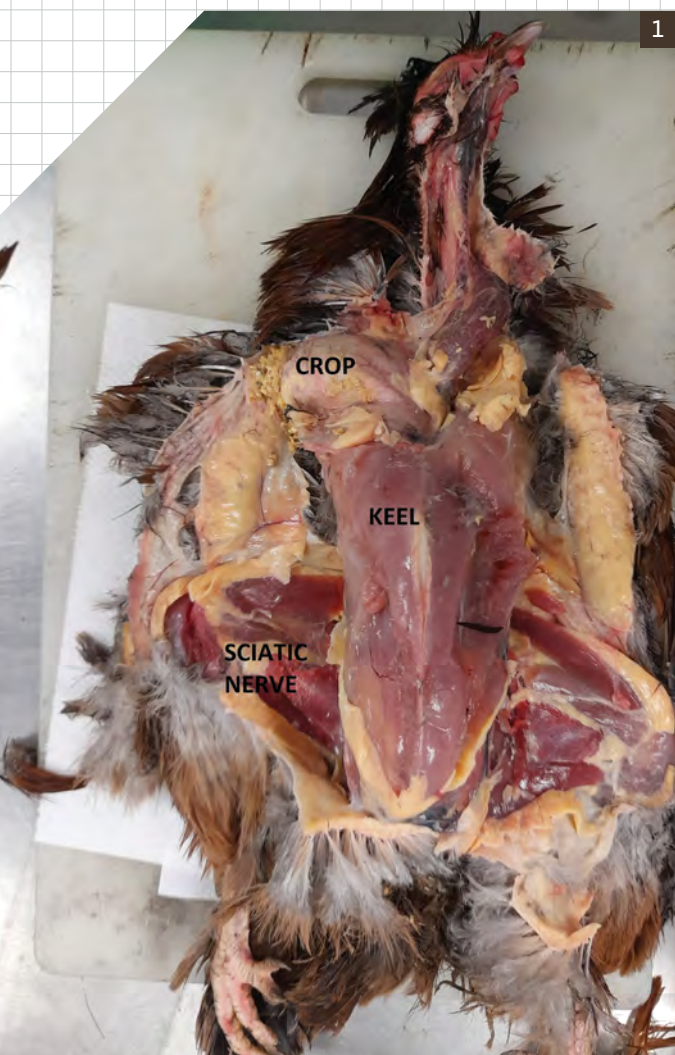
- The internal organs are in one coelomic cavity; there is no diaphragm.
- The lungs have multiple transparent air sacs that extend into the neck, clavicular area, thorax, abdominal area and some bones.
- Birds have no teeth; their beaks break food. The gastrointestinal tract contains an outpouching of the oesophagus called the crop (ingluvies), which stores food. Instead of a stomach there is a proventriculus, which is glandular, an intermediate zone and a gizzard (ventriculus), which is muscular for grinding.
- Birds usually have no lymph nodes (the exception being small numbers in ducks and geese), but variable amounts of lymphoid tissue occur in all organs. The primary lymphoid tissues are the thymus, the spleen and the bursa of Fabricius (cloacal bursa). The bursa enlarges after hatching and involutes by the time of sexual maturity.
- Kidneys produce uric acid and urates. There is no urinary bladder.
- The cloaca is the end of the urinary and gastrointestinal tracts.
- Birds have paired testes, or a left ovary and oviduct.
- Their hearts have four chambers.
- The brain is lissencephalic (it has a smooth surface with no sulci and gyri).

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External examination: **how-to**

- Note the bird's identification, weight and body condition (pectoral muscles in birds of flight, leg muscles and fat).
- Check the skin, feathers and scales for damage or external parasites.
- Check the oral cavity, eyes, ears and cloaca for anything unusual.
- Palpate the musculoskeletal system and observe any trauma or swelling.
- Lie the bird on their back and wet the feathers down with detergent and/or ethanol or methanol.



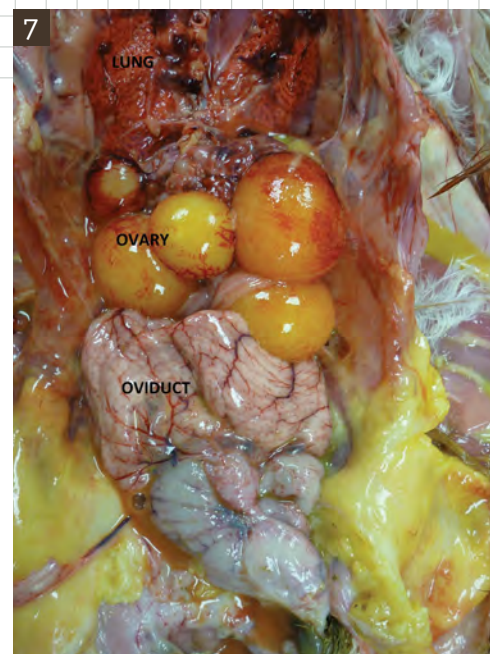
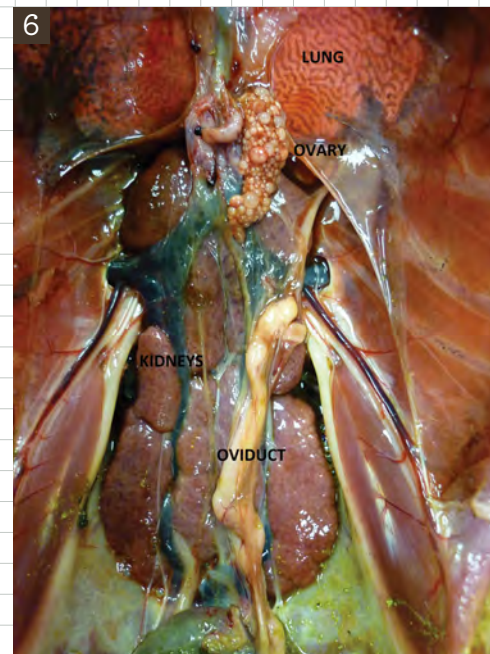
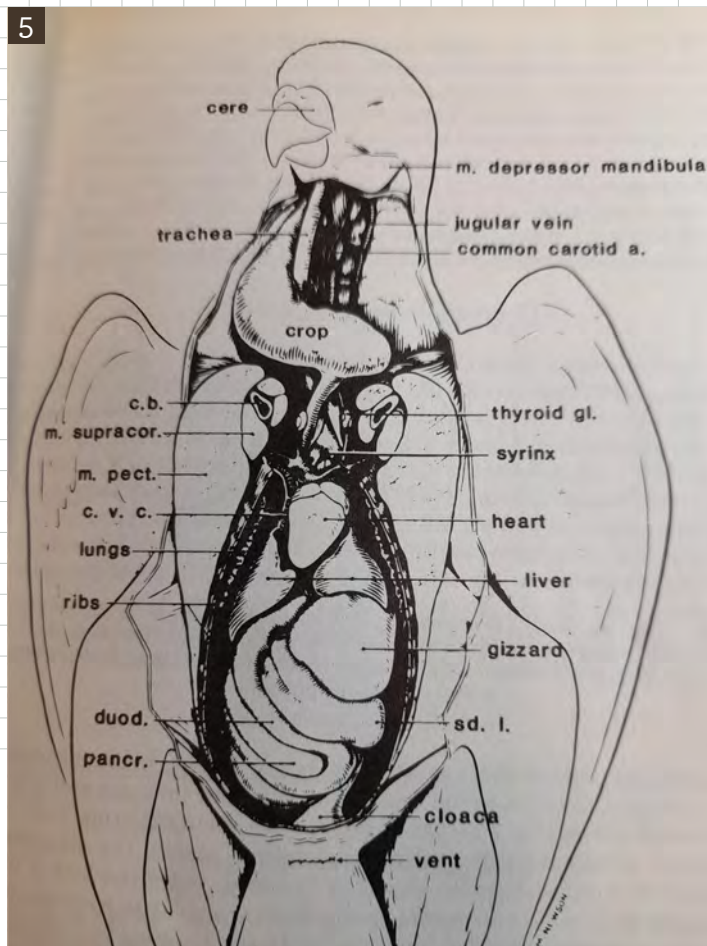


7. Using strong scissors or shears, cut along the ribs on both sides from the caudal to cranial aspect and through the coracoid bones.
8. Reflect the ribs and keel and pectoral muscles.
9. Extend a ventral midline incision cranial from the ventral neck adjacent to the tongue and then reflect tongue caudally.
10. Examine the oral cavity, nasal cavity and infraorbital sinuses. Cut open the trachea to the syrinx.

Internal examination: how-to

1. Using a scalpel and forceps, make a ventral midline incision from the beak to the cloaca and reflect skin laterally (Figure 1).
2. Check the body condition, including the presence of subcutaneous fat.
3. Open the scapular and hip joints – is there any arthritis or articular gout?
4. Bone marrow can be taken from the proximal tibiotarsal bone as the femur contains an air sac.
5. If Marek's disease is suspected, examine the sciatic nerves for enlargement. Disease may not be visible grossly and may require histopathology for a diagnosis.
6. Open the abdominal coelomic wall ventral midline, from just caudal to the keel to the cloaca. Make transverse incisions parallel to the caudal aspect of the keel and reflect abdominal wall laterally.





Then visualise and examine the:

- ➔ trachea, syrinx and thyroid glands
- ➔ coelomic cavity with heart, lungs, liver, gizzard and amount of adipose tissue (Figure 2)
- ➔ coelomic air sacs (Figure 3). Note these should be clear and transparent
- ➔ heart. Take it out and cut open the chambers to examine the endocardium and valves
- ➔ spleen on the left side of the gizzard (Figure 3) and liver. The gastrointestinal tract can be removed intact and opened to examine and sample. Examine the oesophagus, crop, proventriculus, gizzard, duodenum, pancreas, jejunum, ceca, colon, cloaca and bursa (Figures 4 and 5)
- ➔ dorsal abdominal coelom – kidneys, ureters, adrenal glands and testes or left ovary and oviduct (Figures 6 and 7)

- ➔ brain, by removing the skin and muscles from the head and neck. The dorsal calvarium can be cut open with scissors, scalpel or saw to expose and remove the brain. Make a transverse cut caudal to the eyes and two lateral cuts from the foramen magnum to the transverse incision. Peel off the calvarium and then use scissors to remove the brain from the skull (Figure 8).

A thorough and step-by-step postmortem can be a valuable diagnostic tool for your avian patients. For more information, consult the book *Birds: Their Structure and Function*, listed below. ^{vs}

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FURTHER READING:

King AS, McLelland J. *Birds: Their Structure and Function*. 2nd Edtn. Balliere Tindall, London, Philadelphia, 1984