

# NECROPSY MANUAL

## ZOETIS INTERNAL TRAINING MANUAL



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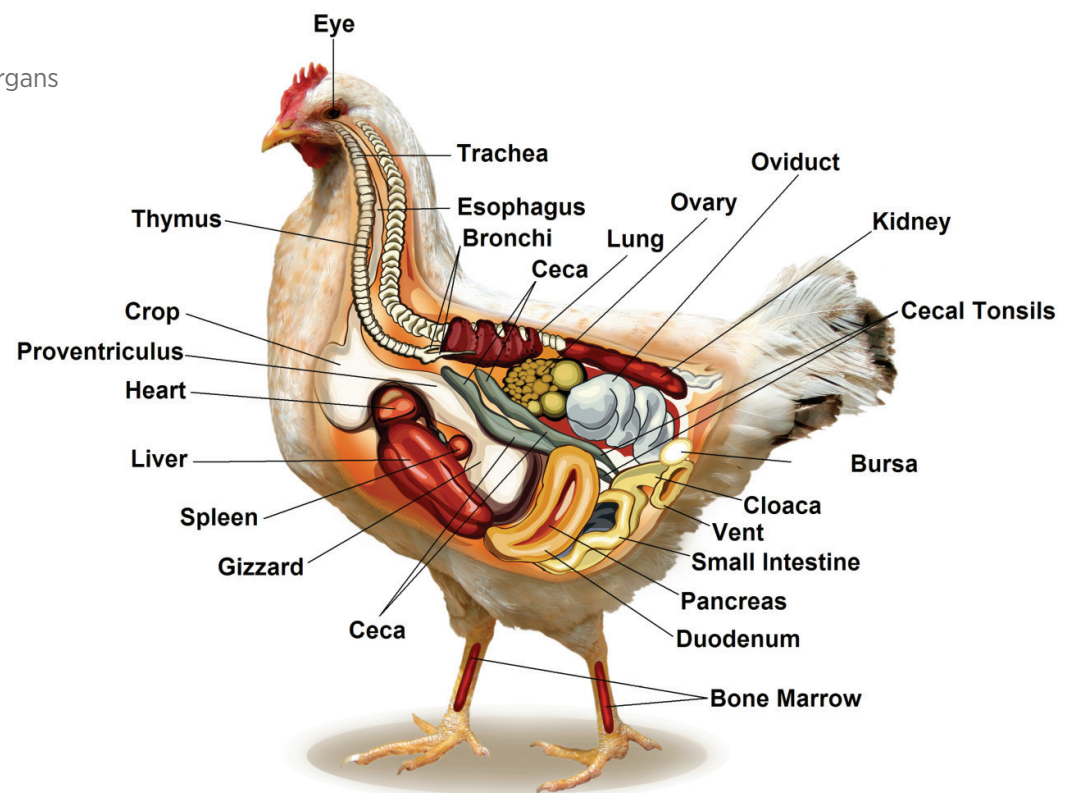
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## NECROPSY MANUAL

Recognizing poultry abnormalities is enhanced by developing a consistent necropsy routine. There is often a tendency to move quickly to the suspected lesion or body system, which risks missing important information. A good necropsy involves paying attention to ALL the clues that can be provided, so the routine has to be followed, with attention to detail at every step.

### SIX KEY STEPS TO A CONSISTENT ROUTINE

1. Obtain the history
2. Examine the animal externally
3. Open the body
4. Remove the organs — set aside for detailed examination and sampling
5. Examine and sample the organs
6. Write your findings



# 1. OBTAIN THE HISTORY

**A GOOD INDIVIDUAL ANIMAL AND FLOCK HISTORY SHOULD BE OBTAINED. THIS HISTORY SHOULD INCLUDE:**

1. Bird's age
2. Sex
3. Breed
4. Clinical signs
5. History of trauma or disease
6. History of any treatments administered
7. Any other information that may be relevant to the case such as type of feed and water
8. If the bird is a member of a flock, the following is also required:
  - Number of birds in the flock
  - Number of birds in the affected group
  - Number of affected birds
  - Clinical signs of the flock should also be noted

**A proper history can help in determining what samples should be taken and what tests are necessary for making the correct diagnosis.**

## 2. EXAMINE THE BIRD EXTERNALLY

### EXAMINE THE BIRD FOR ANY SIGNS OF TRAUMA AND EVALUATE THE BIRD'S GENERAL BODY CONDITION.

- If possible, the bird should be weighed.
- The area of the keel bone (sternum) should be felt to determine if there is any pectoral muscle atrophy.
- The skin, feathers, eyes, ears and beak should be examined for any abnormalities. Take a close look at the comb and wattles — any swelling or discoloration?
- Look at the back of the bird for evidence of feather picking.



Figure 1

- If any skin lesions are noted, they should be sampled.
- Examine all mucous membranes (mouth, nares, and conjunctiva) for any discoloration or other abnormalities. How about the cloaca? Any diarrheal staining? Urates present? Trauma?
- Look at the joints — any swelling?



Figure 2

Prior to opening the body, you might want to swab the oropharynx, trachea or cloaca. When swabbing the oropharynx, insert the swab up in the choanal cleft, as depicted in Figure 3.

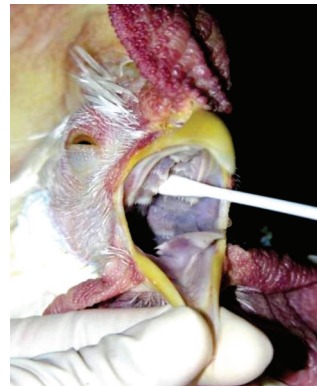


Figure 3



Figure 4

Figure 4 depicts swabbing the cloaca.



Figure 5

Dip the whole carcass into a bucket of soapy water to thoroughly wet all the feathers — this will decrease the dander that might aerosolize from the skin and will also keep your instruments free of small feathers as you do the dissection.

### 3. OPEN THE BODY

- The body should be placed on its back with its feet facing you.
- Reflect the wings back.
- Cut through the skin between the legs and the breast so the legs can be fully abducted and lie flat against the table.



Figure 6

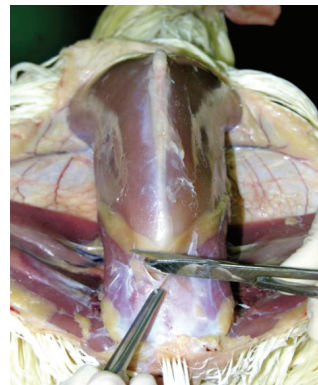


Figure 7

- Extend the cut up through the cervical area and cut open the beak at the angle of the jaw. Now oral cavity, esophagus, trachea and crop are all visible.
- The keel bone and breast muscles are then removed by incising the pectoral muscles on each side of the keel and cutting through the ribs. Use the heavy poultry shears.

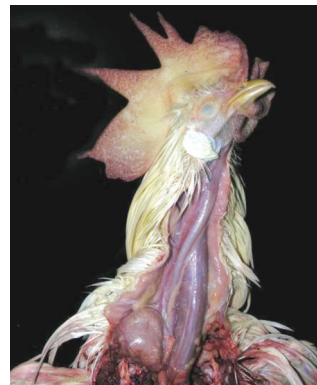


Figure 8

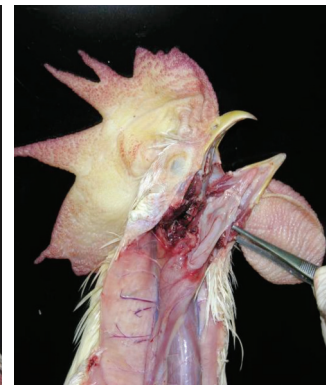


Figure 9

- Remove the skin from the ventral surface of the bird by cutting across at the caudal edge of the keel and then pulling skin cranially and caudally — peel away from the muscle to expose the muscular body wall.
- Make a small cut into the body cavity using scissors or a scalpel blade — just behind the breastbone — and then pull the abdominal muscle caudally to expose some abdominal viscera.

- Remove the keel and breast muscles entirely — you should now be able to see the internal organs from oral cavity to rectum.
- At this point, all internal viscera should be examined *in situ* for any abnormalities before removing any organs. Note the color, position and size of all organs and look for any adhesions (Figure 10).

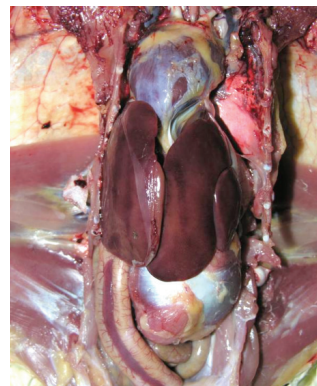


Figure 10

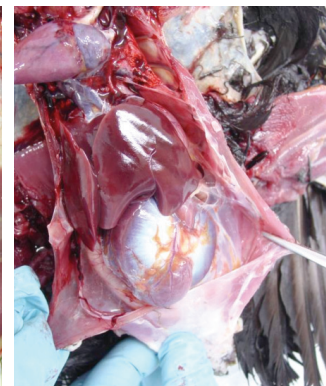


Figure 11

- Examine the air sacs for increased thickness or cloudiness (caudal thoracic air sac is at the end of the forceps) (Figure 11).

## 4. REMOVE THE ORGANS AND SET ASIDE FOR EXAMINATION

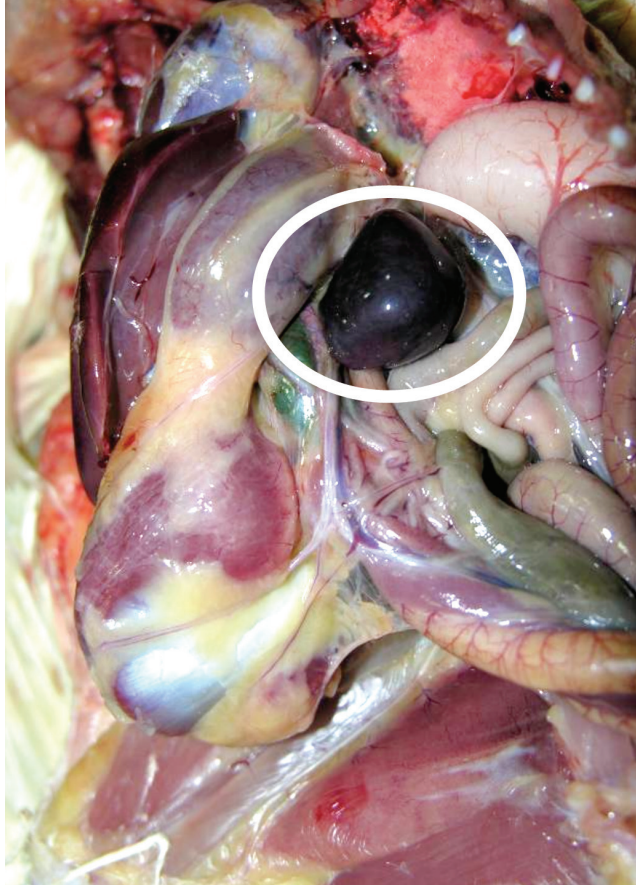


Figure 12

It is probably easiest to remove the abdominal viscera first and then go back and remove the thoracic organs. Remove the liver — in birds, the liver takes up a big portion of the abdomen.

The **spleen** (Figure 12) can be a difficult organ to find once everything is removed, so it is a good idea to locate it now and set it aside. It is spherical in shape and located on the right side at the junction of the proventriculus and ventriculus. Pull the proventriculus aside, and it should pop into view. Take it out now and set it in a clean dry spot.

Find the junction of the esophagus and stomach, cut here and pull the digestive tract out, all the way to the cloaca. The **digestive, urinary** and **reproductive tracts** come together at the cloaca.

Located in the cloaca is the light cream-colored saccular organ, the **bursa of Fabricius**. The bursa of Fabricius contains lymphoid follicles and can be easily found in young birds. Once the bird reaches sexual maturity, it undergoes involution and therefore becomes smaller as the bird ages.

Cut at the end of the large intestine, but leave the bursa in the bird.

Here are two views of the bursa — undisturbed (Figure 13) and incised (Figure 14).

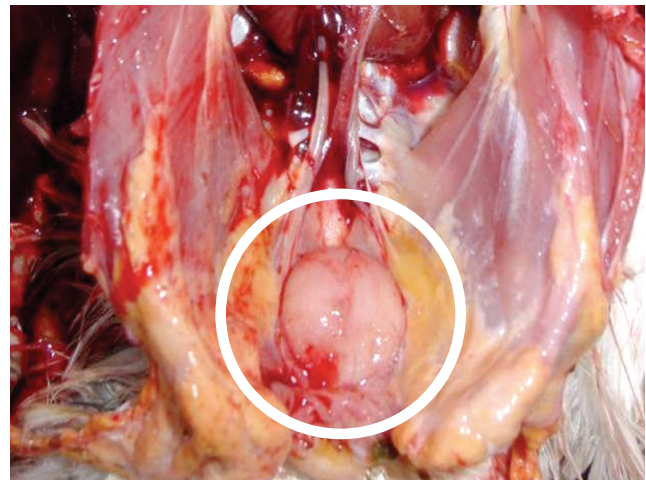


Figure 13

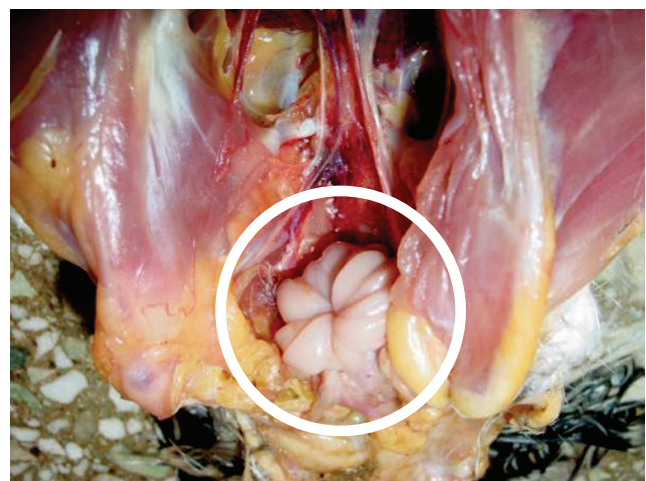


Figure 14

## 4. REMOVE THE ORGANS AND SET ASIDE FOR EXAMINATION

The kidneys (Figures 15-18) are nestled up against the body wall. There are three portions: cranial, middle and caudal poles. The **reproductive tract** lies on top of and at the cranial end of the **kidneys**.

Figure 15 is an immature male.

Figure 16 is a mature male.

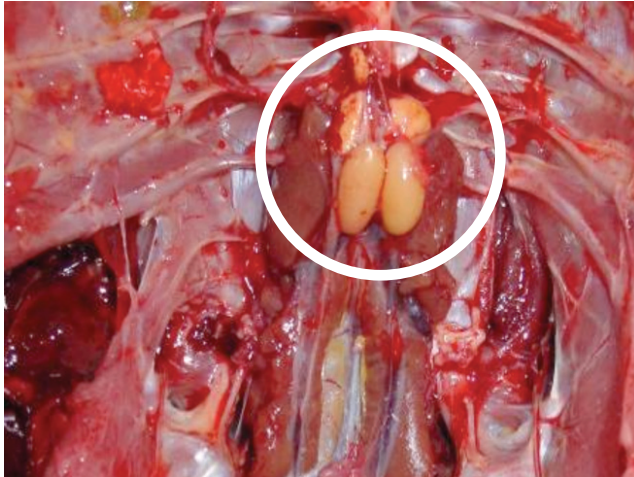


Figure 15

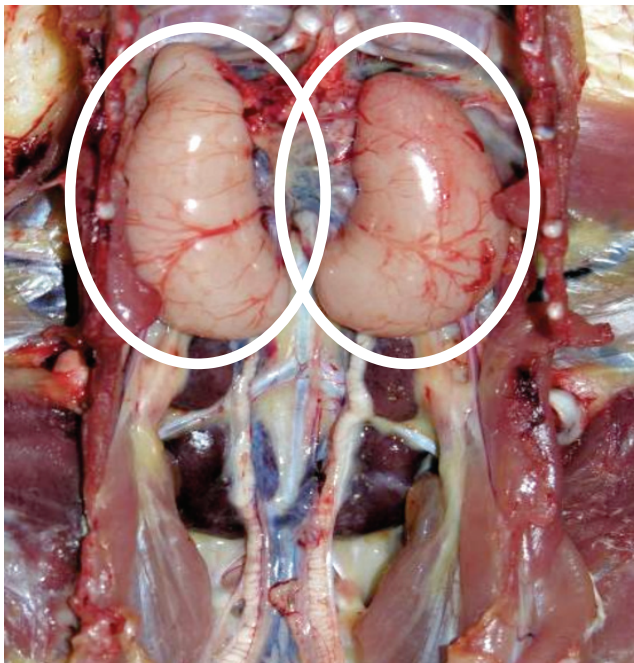


Figure 16

Figure 17 is an immature female. In females, only the left side of the tract persists; the right is vestigial and too small to be identifiable.

Figure 18 is a mature female.

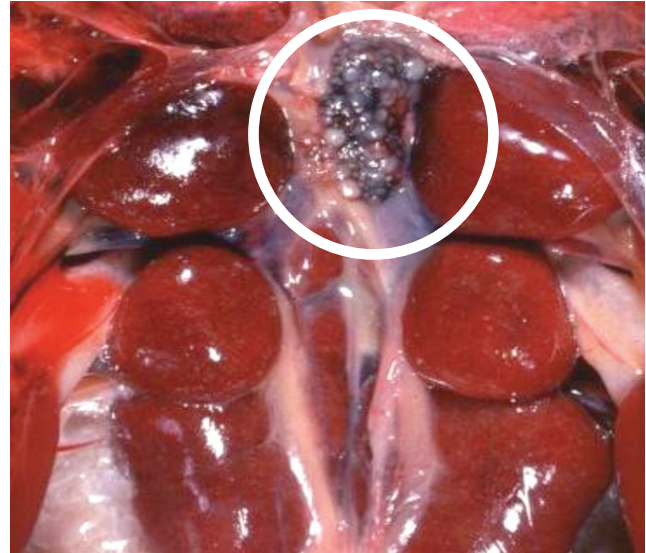


Figure 17



Figure 18



## 4. REMOVE THE ORGANS AND SET ASIDE FOR EXAMINATION

Pull the heart and lungs away. The lungs are closely adhered to the dorsal body wall and, therefore, careful teasing of the lungs away from the ribs may be necessary to remove them.

Open up the nasal cavity to take a close look at the **sinuses** (Figure 19).

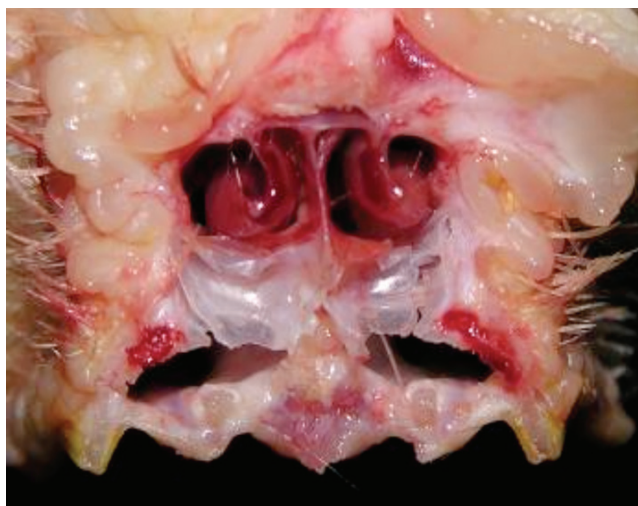


Figure 19

Observe the sciatic nerve, which is an important location where Marek's disease can be seen (Figure 20).



Figure 20

Open some joints to observe the fluid and synovial membranes (Figure 21).



Figure 21

The brain can now be removed. Using the smaller scissors (not poultry shears), chip away at the skull, beginning from the foramen magnum, and remove the calvarium covering the cerebral hemispheres and the cerebellum. Take the brain out — use care, this organ is quite soft (Figure 22).

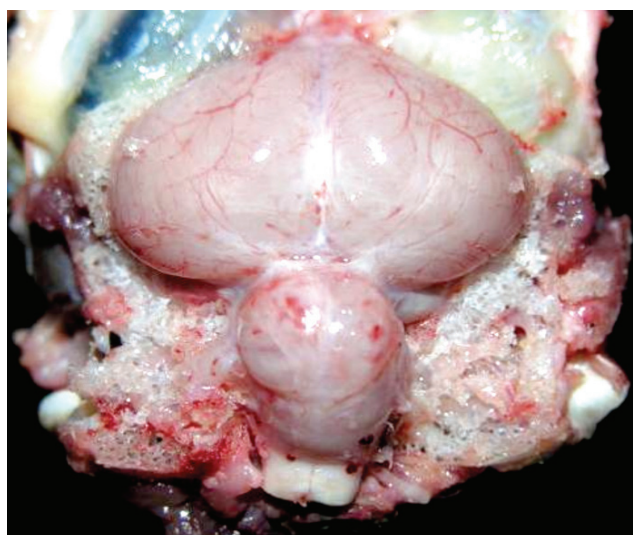


Figure 22

## 5. EXAMINE AND SAMPLE THE ORGANS

It is a good idea to go from the “cleanest” organs to the “dirtiest.” Usually this order is: lymphoid tissue, brain, lungs, heart, kidneys, reproductive tract, liver, intestinal tract.

Note any abnormalities for each (color, consistency, distribution and size). Be sure to examine both capsular and cut surface. Make several cuts in each organ. Collect specimens for further diagnostic work.



Figure 23

### LYMPHOID SYSTEM

The spleen in birds is a small, round organ that should be a uniform mahogany color on capsular and cut surfaces (Figures 24 and 25).



Figure 24



Figure 25

The bursa changes dramatically with age. Birds older than 10 weeks will have a bursa that may even be difficult to locate. A normal bursa in a young bird has an accordion-like structure and is a homogeneous tan color (refer to Figures 13 and 14).

## 5. EXAMINE AND SAMPLE THE ORGANS

### BRAIN

Often the brain is sliced down the middle to create symmetrical halves for frozen and formalin specimens.



Figure 26

### HEART

The heart can now be examined. Make one incision into each ventricle; examine muscles and valves.



Figure 27



Figure 28

### RESPIRATORY SYSTEM

Begin by cutting through the larynx, trachea and syrinx, making note of any mucus, froth or petechia (Figure 29). Lungs should be pink, “spongy” and free of any fluid (Figure 30).



Figure 29

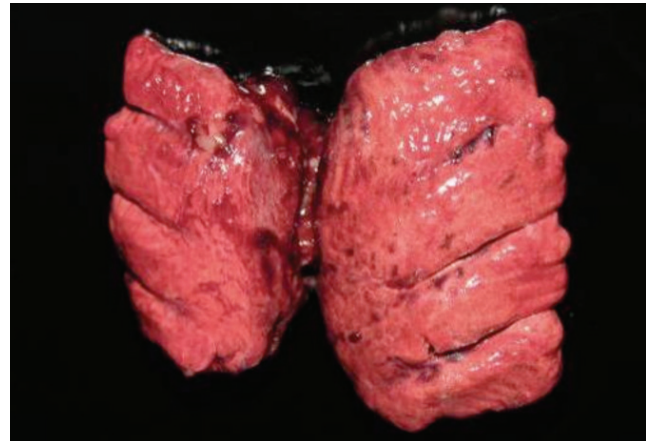


Figure 30

### KIDNEYS

These should be smooth and homogeneous. A reticular pattern is an indication of dehydration (Figure 31).



Figure 31

## 5. EXAMINE AND SAMPLE THE ORGANS

### REPRODUCTIVE TRACT

Testes are homogeneous on capsular and cut surface (Figure 32 and 33). Ovaries should be free of inflammation. Sterile egg yolk peritonitis is a common finding in “spent” layers.



Figure 32

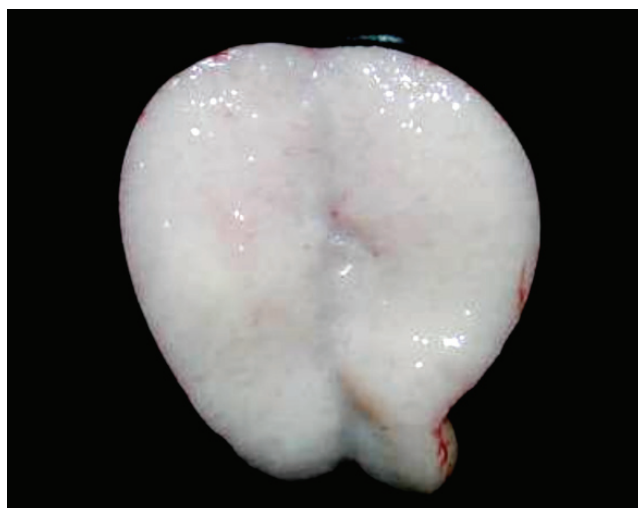


Figure 33

### LIVER

The liver's surface should be examined for any abnormalities. It should be palpated for any nodules, friable areas or other abnormal changes. Several slices are made into the liver in order to examine the deeper structure of the liver (Figure 34).

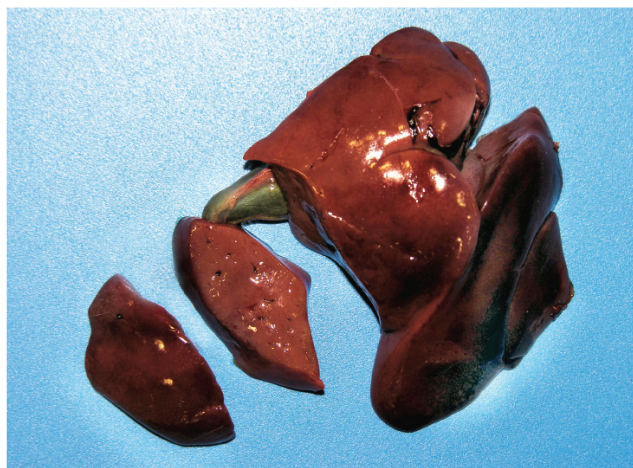


Figure 34

## 5. EXAMINE AND SAMPLE THE ORGANS

### INTESTINAL TRACT

Look in the mouth for any abnormalities. Cut down the esophagus and see how much food is in the crop (Figure 35).

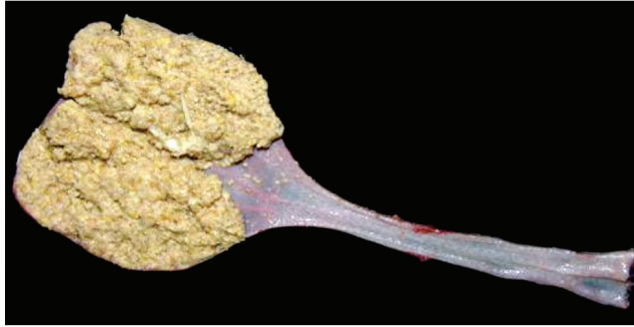


Figure 35

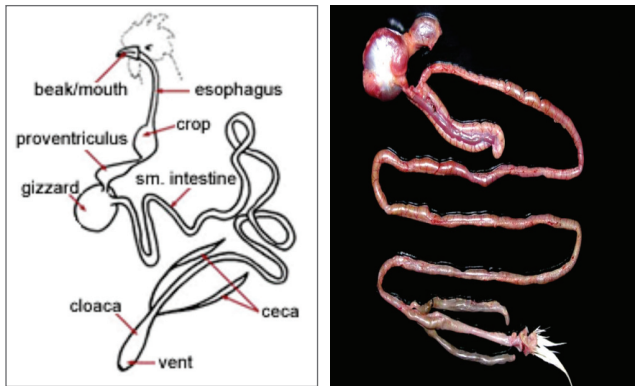


Figure 36



Figure 37

Open the proventriculus and make note of the lining, which is normally bumpy due to the presence of digestive glands. Note any abnormalities. The proventriculus-ventriculus junction (white arrow) is an area with abundant lymphoid tissue and should be examined carefully for lesions (Figure 38).

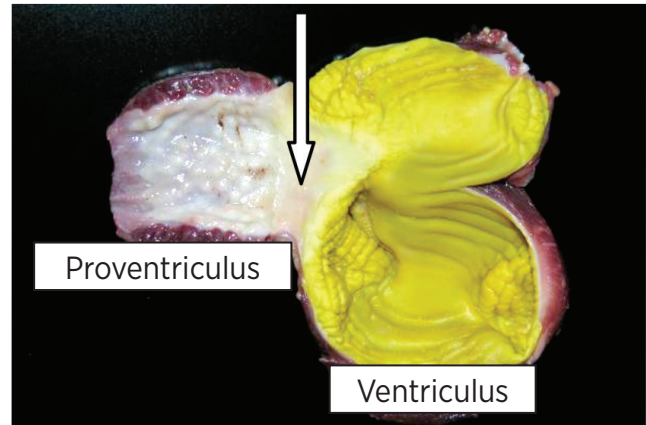


Figure 38

The ventriculus, or gizzard, should be examined next. Because the gizzard is responsible for grinding ingested material, it has a thick external muscularis layer and contains small stones or grit. The ventricular glands secrete a thick protective gel, known as koilin, which has a yellowish color. The gizzard thickness should be examined and the surface examined for erosions, ulcerations, discoloration or other abnormalities. Peel the koilin back to look at the mucosa (Figure 39).



Figure 39

## 5. EXAMINE AND SAMPLE THE ORGANS

The small intestine of birds is typically arranged into several loops before entering the colon. The first loop is the duodenum. It is easily identified by the location of the pancreas within the duodenal loop mesentery (Figure 40).



Figure 40

The remaining loops make up the jejunum and ileum. The colon is relatively short with two long ceca and connects to the cloaca via the colorectum. In the picture below, you see the two ceca and the large colon in between. There are large lymphoid patches in the proximal portions of the ceca; these are often called “cecal tonsils” (Figure 41).



Figure 41

### SAMPLING OF ORGANS

- Tissues could be collected in duplicate, with half going into 10% formalin for histopathology and half as unfixed tissues that will be used for bacterial culture, virus isolation, fluorescent antibody testing, toxicology, etc.

- Tissue collection should be based on necropsy findings and differential diagnoses.

- Label the tissues that are collected fresh so that the laboratory performing the tests can determine what each tissue is.

Crushing should be avoided when taking samples since this may cause histological artifacts. This can be avoided by using a sharp blade and a hard surface.

- When examining any organ with a mucosal surface (trachea, esophagus, intestine, etc.), care should be taken not to damage or destroy the mucosal surface by rubbing the surface with fingers or instruments.

In order to improve fixation of tissues, samples should not exceed 5 mm in thickness, and volume of fixative should be at least 10 times the volume of tissue.

Fresh samples should be packaged so that they remain cool and to minimize possibilities of leaking. Be sure to submit the proper paperwork to accompany the samples.



Figure 42

## 6. WRITE YOUR FINDINGS

No necropsy is complete until all findings have been recorded in written form for your records. Note that some customers may request a necropsy report. The report should include at least the following information:

- Species, breed, age, sex
- History
- Died or euthanized?
- Nutritional, hydration status
- Findings from external examination
- Findings by organ system: lymphoid (spleen, bursa), respiratory, digestive, urogenital, musculoskeletal, nervous
- Differential diagnosis based on necropsy examination

## ADDITIONAL RESOURCES

### **FOR MORE INFORMATION ON THIS NECROPSY MANUAL, PLEASE CONTACT:**

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Technical Director, Global Marketing,  
Zoetis  
jose.a.linares@zoetis.com

### **SUGGESTED READING:**

Diseases of Poultry, 12th Edition. Chapter 1, Principles of Disease Prevention: Diagnosis and Control. pp. 33-40. Blackwell Publishing. 2008.

A Practical Guide for Managing Risk in Poultry Production. Published by the American Association of Avian Pathologists, Inc. 2011.

