



# Poultry Inspection

*2nd Edition*

Anatomy, physiology and disease conditions

*A Grist*

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**CONTEXT**

## **INTRODUCTION**

This book is designed to provide notes for students undertaking the Royal Society for the Promotion of Health (RSPH) examination in Poultry Meat Inspection, and as a revision guide for students undertaking other courses in which knowledge of poultry anatomy, diseases and conditions is required such as Veterinary Courses, Environmental Health and Poultry Science.

It is hoped that this may also provide source material for the theoretical training of abattoir staff to undertake post-mortem inspection of poultry in licensed premises under the supervision of the Official Veterinarian as is currently allowed under European law.

Following the success of the first edition of Poultry Inspection, this second edition, updated and augmented was produced. Poultry Inspection was the first book I wrote in the meat inspection series and as such I was unsure what others would require of it, or indeed how much information I should give. Since its publication in 2004 I feel that I have a better idea of what I, and others, expect of the book. To that end I have replaced a large number of the diagrams with labelled photographs and expanded the Anatomy section to give what I hope will be a clearer and better understanding of the subject. The general layout of the book has been further altered to follow the other books in the series including Bovine Meat Inspection, Ovine Meat Inspection and Porcine Meat Inspection due to the positive feedback received.

The Diseases of Poultry section has been updated and now includes photographs of some of the conditions and begins with a basic explanation of the disease process and the body's response. The diseases and conditions are listed in alphabetical order rather than in any order of incidence or priority as these factors can be subject to annual and seasonal variation. The parasites section has been improved by the addition of photographs, most of these kindly supplied by Daniel Parker BVMS Cert PMP MRCVS of the Slate Hall Veterinary Practice, Cambridge.

Having tutored on the subject of poultry inspection and been asked to explain to various students a method for performing post mortems on suspect birds, this has been included as a separate section with explanation and photographs. This section is only intended for guidance, as each person finds their own methods of examination which they are comfortable performing.

I hope that I have recorded all the professionals that provided advice and encouragement in the acknowledgments section, and sincerely hope that this edition fulfils expectations.

## **AUTHOR DISCLAIMER**

I must add that the judgments are my own views. They are based on experience of Poultry Inspection, both broiler and organic/free range systems, and through consultation with others.

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## EXTERNAL ANATOMY

The modern fowl is a result of selective breeding over hundreds of years. Broiler chickens are designed to grow as fast as possible, they eat to capacity, not to need, and reach slaughter age at about 37-40 days. The internal and external anatomy has obviously evolved for flight, they have a short, rigid body with a centralized centre of gravity, relatively light heads, flexible necks and their forelimbs have been modified to become wings.

In terms of colour, broilers have white feathers and layer hens have brown, the latter having been based on the Rhode Island Red.

### THE HEAD

In the mature bird, the sexual characteristics are pronounced, these being a fleshy **comb** across the top of the head, **wattles** from the base of the beak and prominent **earlobes**. These characteristics are more marked in males than in females. Broiler chickens are immature, but will possess the rudimentary features of the adult.

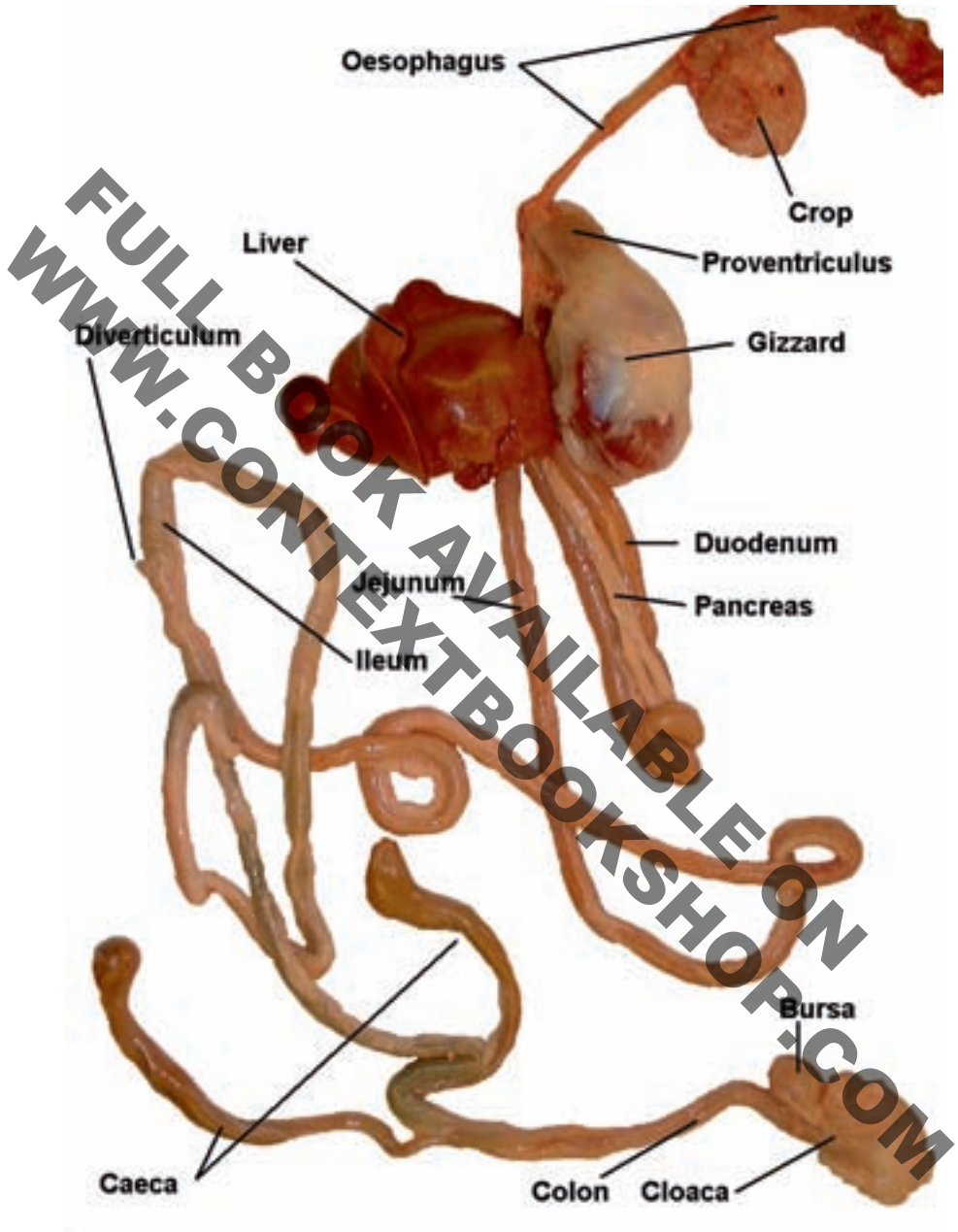
The eyes are large in comparison with mammals, in the live bird the size is obscured by the upper and lower eyelids. A third eyelid, the nictitating membrane, moves across the eye from front to back during blinking, sweeping horizontally across the eye. The loss of the nictitating blink reflex is commonly used as an indication of the successful application of an electroplectic stun.



External features of the head



The nictitating membrane



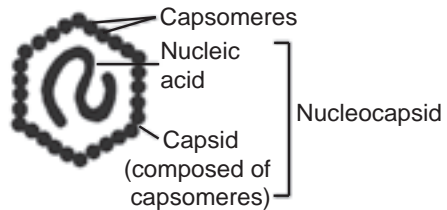
Avian Digestive System



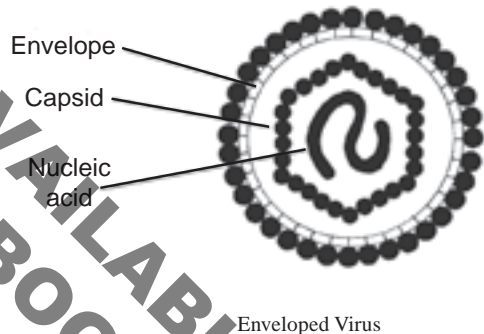
## VIRUSES

Viruses are obligate parasites, they do not contain the biochemical mechanisms for their own replication and are unable to replicate outside of a living cell.

The basic viral particle (nucleocapsid) consists of linear genetic material (DNA or RNA) surrounded by a protein coat (capsid) composed of capsomeres. Some viruses are also enclosed in a membranous envelope of lipoprotein; in the case of the influenza virus this coat is formed from the host's cellular tissue and inhibits the body's auto immune response.



A virion is the complete viral particle, found extracellularly and capable of surviving in a metabolically inert form and possessing the ability to infect living cells. Virion range in size from 0.003 to 0.05  $\mu\text{m}$ .



Viruses replicate by using the biochemical mechanisms of a host cell to synthesize and assemble their separate components. When attached to a host cell, only the viral nucleic acid and in some cases a few enzymes, are injected into the cell. The nucleic acid is then replicated within the cell, followed by the synthesis of the capsid.

After infection by a virus, there are four possible effects on the host cell.

- Transformation of normal cells to tumour cells. Followed by division and the production of a tumour.
- Lytic infection. After viral multiplication the cell dies releasing the virus.
- Persistent Infection. After viral multiplication there is a slow release of the virus without cell death.

This normally occurs in the aorta in the region of the testes.  
 The carcase is anaemic.  
 Judgement Carcase and offal are unfit for human consumption.

**ASPERGILLOSIS**

Synonyms	Brooder pneumonia, mycotic pneumonia, pneumomycosis
Type	Fungal
Aetiology	Fungal infection. <i>Aspergillus flavus</i> and <i>A. fumigatus</i>
Pathogenesis	Inhalation of spores. <b>Zoonotic.</b> Farmer's Lung
Clinical signs	Loss of appetite, gasping, increased respiratory rate, increased thirst, emaciation.
Gross lesions	Greyish-white caseous nodules in lungs and thickened air sac membranes. Greenish moulds in airsacs in chronic form as the conidiophores develop.
Judgement	Total rejection if associated with emaciation or septicaemia. Carcase meat may be salvaged if localised, reject affected parts.
Differential diagnosis	Pulmonary Granulomas associated with <i>M.gallisepticum</i> infection, tuberculosis, salmonellosis, and coryza.



Aspergillosis lesions



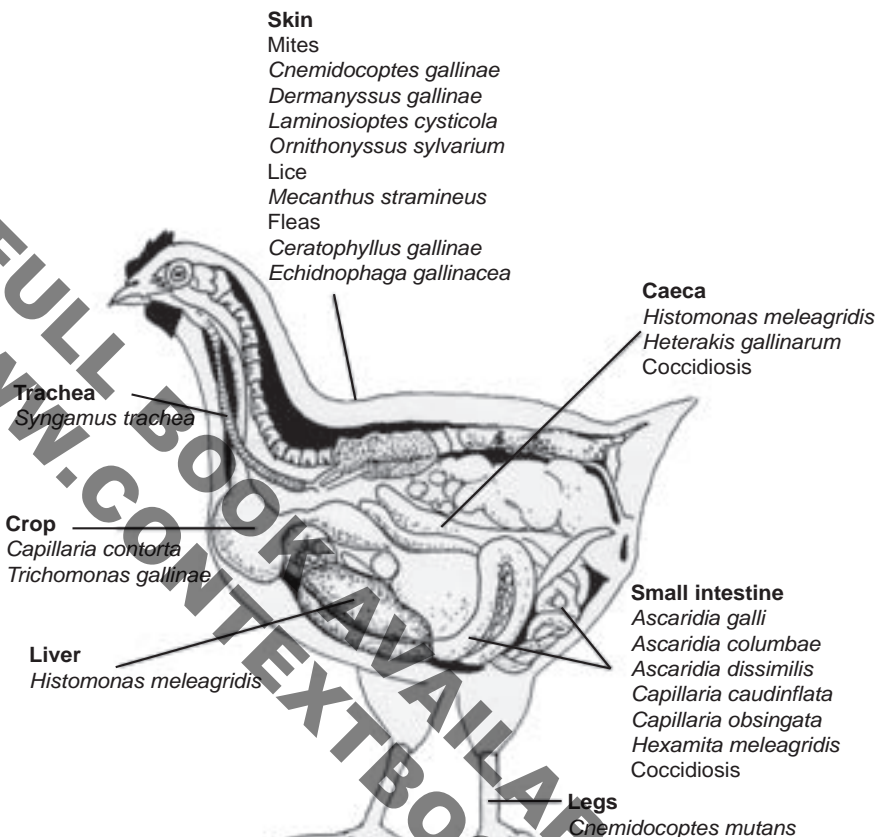
Broiler feet – the lower from a carcass affected with Melanosis

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### MYCOTOXICOSIS

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Synonyms	Aflatoxicosis, Turkey X disease.
Type	Fungal
Aetiology	<b>Fungal toxin</b> poisoning. Aflatoxicosis due to the <i>Aspergillus flavus</i> mycotoxin.
Pathogenesis	Fungal mycotoxin produced on feedstuffs is ingested. Food left on the ground in close proximity to water feeders can promote fungal growth and possible toxin formation. The level of toxin ingested, combined with the period of consumption of the toxin determines the detrimental effects encountered.
Clinical signs	Lethargy, loss of appetite, death. Spasm of neck muscles, legs fully extended.
Gross lesions	Turkey – congestion and oedema of carcass, liver most affected. Chronic lesions include cirrhosis, the liver becoming yellowish-brown or mottled, hydropericardium, swollen kidneys. Ducks – Acute – liver and kidneys enlarged and pale. Chronic – cirrhosis, ascites and tumours in the liver.
Judgement	Carcass and offal are unfit for human consumption.



Common parasites of poultry

## PROTOZOA

Protozoa are single-celled organisms that, unlike bacteria, possess a nucleus and other organelles that enable them to lead an independent existence. Protozoa are mobile organisms, using methods of propulsion such as flagella, cilia and undulating membranes. They feed by enveloping particles and digesting them, followed by the extrusion of waste material from the cell. In poultry the forms encountered include *Eimeria species*, *Trichomonas species*, *Histomonas meleagridis* and *Hexamita meleagridis*.

## AFFECTIONS OF SPECIFIC PARTS

### AIRSACS

LESIONS	POSSIBLE DIAGNOSIS
Inflammation of	Airsacculitis
Cloudy	Airsacculitis, infectious coryza, laryngotracheitis, influenza, Newcastle disease.
Foam, frothy	Infectious bronchitis
Mouldy, nodules	Aspergillosis
Foam, pus, thickened	Airsacculitis, colibacillosis, fowl cholera, Newcastle disease, chronic respiratory disease (CRD)

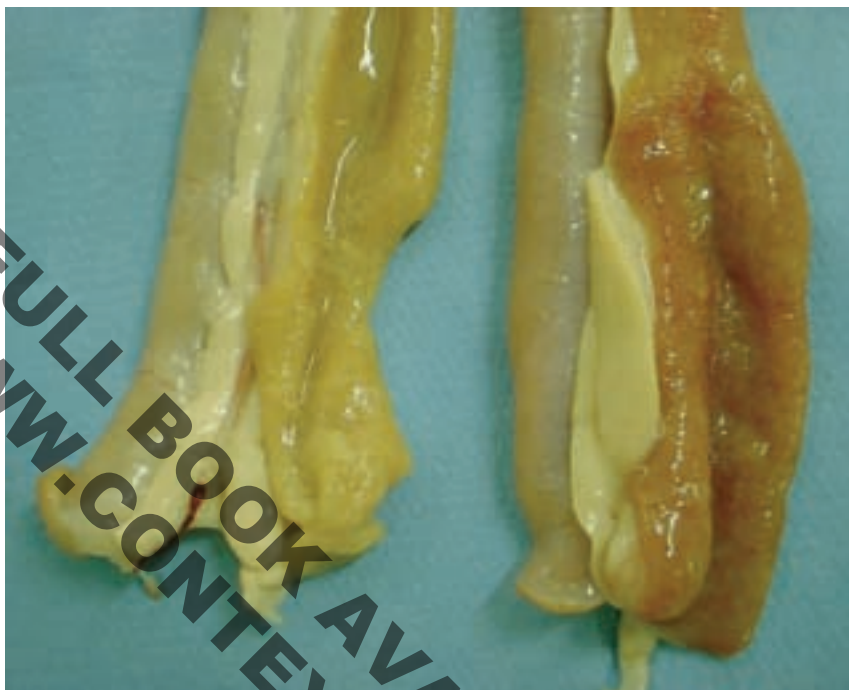
### BODY CAVITY

LESIONS	POSSIBLE DIAGNOSIS
Straw coloured fluid	Ascites
Milky fluid	Peritonitis
Blood clot	Aortic rupture, Hepatic rupture
Petechial haemorrhages in abdominal fat	Avian influenza, toxæmia
Chalky deposits on serosal surfaces	Visceral gout
'Cooked' egg yolk	Egg peritonitis
Black, foul smelling pus	Traumatic peritonitis



Petechial haemorrhages in abdominal cavity, on proventriculus and gizzard

DISEASE	CAUSE	TYPE
Anatipestifer (New Duck Disease, Infectious serositis)	<i>Pasteurella anatipestifer</i>	Bacterial
Ascariasis	<i>Ascaridia galli</i> (poultry) <i>A.dissimilis</i> (turkeys) <i>A.columbae</i> (pigeons)	Parasitic
Aspergillosis (Brooder Pneumonia, Mycotic pneumonia, Pneumomycosis)	<i>Aspergillus flavus</i> <i>Aspergillus fumigatus</i>	Fungal
Avian Chlamydiosis (Ornithosis, Psitticosis)	<i>Chlamydia psittaci</i>	Rickettsiae
Avian Influenza (Fowl Plague)	Orthomyxovirus	Viral
Avian Leukosis (Big Liver Disease)	Oncornovirus	Viral
Avian Mycoplasmosis (Chronic Respiratory Disease) (Infectious Synovitis)	<i>Mycoplasma gallisepticum</i> <i>Mycoplasma meleagridis</i> <i>Mycoplasma synoviae</i>	Bacterial
Avian Salmonellosis (Paratyphoid)	<i>Salmonella spp</i> especially <i>Salmonella typhimurium</i>	Bacterial
Avian Tuberculosis	<i>Mycobacterium avium</i>	Bacterial
Blackhead	<i>Histomonas meleagridis</i>	Protozoal
Botulism (Limberneck, Western Duck Sickness)	<i>Clostridium botulinum</i>	Bacterial toxins
Caecal worm	<i>Heterakis gallinarum</i>	Parasitic
Candidiasis (Thrush, Moniliasis, Sour crop, Crop mycosis)	<i>Candida albicans</i>	Fungal
<i>Capillaria</i>	<i>Capillaria contorta</i> <i>Capillaria caudinflata</i> <i>Capillaria obsingata</i>	Parasitic
Chicken Anaemia Virus (Infectious Anaemia)	Circovirus	Viral
Coccidiosis	<i>Eimeria species</i>	Protozoal parasite



A section of duodenum with enteritis on the right, compared with a normal specimen on the left. Both samples have been partially incised to show lining. Note the hypertrophic pancreas of the affected sample.

Other characteristic forms of enteritis include:

Intestines distended, contents watery and foamy (gas) – acute bluecomb of turkeys.

Blood in intestines – haemorrhagic enteritis of turkeys, coccidiosis.

Button like ulcers -Quail's disease

Petechial haemorrhages-Fowl Cholera

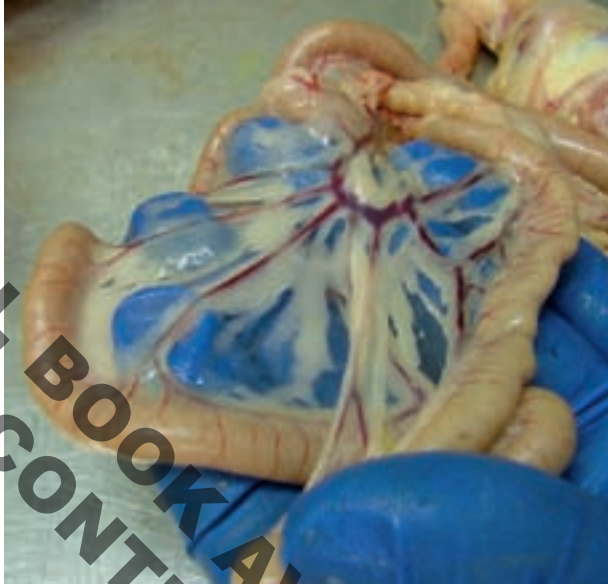
Vegetative growths and foul smell associated with necrotic enteritis infections

Slimy enteritis due to Fowl typhoid

It must be remembered that these conditions above are worst case scenarios, and should be considered in conjunction with other lesions before a decision is taken.

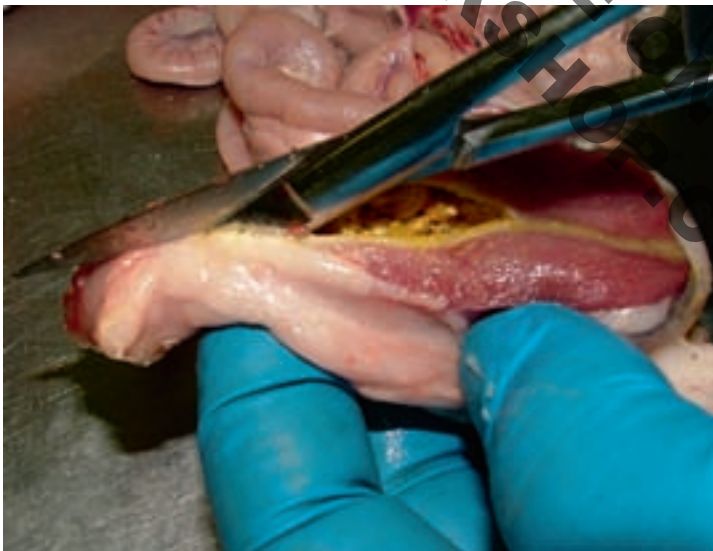
If the enteritis is associated with emaciation the carcass and offal should be considered unfit for human consumption.

After checking the mesentery gently pull apart the digestive system.



Using scissors cut the oesophagus down to the crop and examine the contents. Wash the crop and examine the lining.

Incise the proventriculus and gizzard. Remove contents and examine the lining of the proventriculus and the junction to the gizzard. Examine in detail the cutica gastrica of the gizzard for signs of erosion; check whether this lining can be peeled from the muscle. Examine the muscle.





**Axial Skeleton**

Skull

Cervical  
vertebrae

Thoraic  
vertebrae

Pelvis

Synsacral  
vertebrae

Coccygeal  
vertebrae



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# Poultry Inspection

2nd Edition

## Anatomy, physiology and disease conditions

A Grist

Aimed primarily at students undertaking examinations in poultry meat inspection, this fully illustrated book guides the reader through poultry anatomy and physiology; explaining the diseased state (including how disease can be recognised at the inspection stage and what action should be taken), parasites and neoplasia (tumours). Conditions encountered at post mortem inspection are graphically illustrated and explained; with a further three sections covering revision of anatomy, disease and a guide to possible diagnosis of specific lesions, listed by anatomical parts. A further addition since the first edition is a guide to performing a necropsy.

The full colour photographs make this an invaluable tool for all those for whom a knowledge of poultry anatomy, diseases and other conditions is required, including veterinary surgeons and meat inspectors within the abattoir, and also poultry producers who will be receiving condemnation data from these establishments.

### Contents

Anatomy/physiology • Diseases of poultry • Parasites • Neoplasia • Affections of specific parts • Disease and cause • Conditions encountered at post mortem inspection in abattoirs • Processing conditions • An autotomy procedure • Anatomy aide memoire • Index

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