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.

A Grist
CONTENTS

Foreword to first edition by Malcolm Morris BVSc MRCVS xx

Introduction v

SECTION ONE

Anatomy/Physiology

External 3
Skeletal Structure 7
Musculature 19
Digestive System 27
Respiratory System 36
Cardiovascular System 41
Urogenital System 46
Immune System 51
Nervous System 54
Endocrine System 58

SECTION TWO

Diseases of Poultry

Routes of infection 65
Immunity 66
Bacteria 68
Viruses 72
Fungi 74
Amyloidosis 76
Anatipestifer 76
Aortic rupture 76
Aspergillosis 77
Avian Chlamydiosis 78
Avian Influenza 78
Avian Salmonellosis 79
Avian Mycoplasmosis 79
Avian Tuberculosis 80
Botulism 80
Breast Blisters 81
Cage Layer Fatigue 81
Candidiasis 82
Chicken Anaemia Virus 82
Curled Toe Paralysis 82
Duck Virus Enteritis 83
Duck Virus Hepatitis 84
Egg Peritonitis 84
Erysipelas 85
Exudative Diathesis 85
Favus 86
Femoral Head Necrosis 86
Fowl Pox 86
Fowl Typhoid 87
Gangrenous Dermatitis 87
Goose Viral Hepatitis 88
Gout 88
Haemorrhagic Enteritis of Turkeys 90
Icterus 90
Impaction of the Oviduct 90
Inclusion Body Hepatitis 91
Infectious Bronchitis 91
Infectious Bursal Disease 92
Infectious Laryngotracheitis 92
Infectious Coryza 94
Infectious Stunting 94
Infectious Synovitis 96
Marble Spleen Disease of Pheasants 96
Melanosis 96
Mycotoxicosis 97
Necrotic Enteritis 98
Newcastle Disease 98
Oregon Disease 99
Paracolon Infection 100
Pasteurellosis 101
Perosis 101
Pseudotuberculosis 102
Pullorum 102
Rickets 103
Spondylolisthesis 103
Swollen Head Syndrome 103
Tibial Dyschondroplasia 104
Transmissible Enteritis of Turkeys 105
Ulcerative Enteritis 106
Viral Enteritis 107

SECTION THREE
Parasites

Parasitism 111
Parasite list 113
Protozoa 114
Coccidiosis 115
Histomonas meleagridis 122
Hexamita meleagridis 123
Trichomonas gallinarum 124
Heterakis gallinarum 125
Syngamus trachea 126
Ascarids 127
Capillaria 128
Fleas 129
Lice 129
Mites 130

SECTION FOUR 133
Neoplasia
Avian Leukosis 138
Lymphoproliferative Disease of Turkeys 138
Marek’s Disease 139
Squamous Cell Carcinoma 141

SECTION FIVE 143
Affections of Specific Parts
Airsacs 146
Body Cavity 146
Caeca 147
Cloacal Bursa 147
Crop 147
Droppings 148
Feet 148
Gizzard 148
Head 149
Heart 149
Intestines 149
Kidneys 150
Legs 150
Liver 151
Lungs 152
Ovaries 153
Proventriculus 153
Skin 153
Spleen 153
Trachea 154

SECTION SIX 155
Disease and Cause

xi
SECTION SEVEN
Conditions Encountered At Post Mortem Inspection In Abattoirs

Airsacculitis 163
Arthritis/Tenosynovitis 165
Ascites/Oedema 168
Bumblefoot 176
Deep Pectoral Myopathy 177
EmaCiation/Cachexia 178
Enteritis 182
Fatty Liver 185
Femoral Head Necrosis 185
Focal Hepatic Necrosis 186
Hepatitis 186
Haematopoietic foci 187
Jaundice 189
Pendulous Crop 192
Pericarditis 193
Peritonitis/Perihepatitis 194
Pododermatitis 199
Ruptured Gastrocnemius Tendon 200
Salpingitis 201
Septicaemia/Toxaemia 202
Skin Lesions 208
Congenital Deformities 222

SECTION EIGHT
Processing Conditions

Contamination 231
Death Other Than Slaughter 232
Dead On Arrival 233
Machine Damage 235
Overscald 236
Thermal Distress 237
Trauma 238

SECTION NINE
An Autopsy Procedure

SECTION 10
Anatomy Aide Memoire
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.
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 autoimmune 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 µm.

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**

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

Mycotoxicosis

<table>
<thead>
<tr>
<th>Synonyms</th>
<th>Aflatoxicosis, Turkey X disease.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Fungal</td>
</tr>
<tr>
<td>Aetiology</td>
<td>Fungal toxin poisoning. Aflatoxicosis due to the Aspergillus flavus mycotoxin.</td>
</tr>
<tr>
<td>Pathogenesis</td>
<td>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.</td>
</tr>
<tr>
<td>Clinical signs</td>
<td>Lethargy, loss of appetite, death. Spasm of neck muscles, legs fully extended.</td>
</tr>
<tr>
<td>Gross lesions</td>
<td>Turkey – congestion and oedema of carcase, 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.</td>
</tr>
<tr>
<td>Judgement</td>
<td>Carcase and offal are unfit for human consumption.</td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>Lesions</th>
<th>Possible Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inflammation of Airsacculitis</td>
<td>Airsacculitis, infectious coryza, laryngotracheitis, influenza, Newcastle disease.</td>
</tr>
<tr>
<td>Cloudy</td>
<td></td>
</tr>
<tr>
<td>Foam, frothy</td>
<td>Infectious bronchitis</td>
</tr>
<tr>
<td>Mouldy, nodules</td>
<td>Aspergillosis</td>
</tr>
<tr>
<td>Foam, pus, thickened</td>
<td>Airsacculitis, colibacillosis, fowl cholera, Newcastle disease, chronic respiratory disease (CRD)</td>
</tr>
</tbody>
</table>

## Body Cavity

<table>
<thead>
<tr>
<th>Lesions</th>
<th>Possible Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Straw coloured fluid</td>
<td>Ascites</td>
</tr>
<tr>
<td>Milky fluid</td>
<td>Peritonitis</td>
</tr>
<tr>
<td>Blood clot</td>
<td>Aortic rupture, Hepatic rupture</td>
</tr>
<tr>
<td>Petechial haemorrhages in</td>
<td>Avian influenza, toxaemia</td>
</tr>
<tr>
<td>abdominal fat</td>
<td></td>
</tr>
<tr>
<td>Chalky deposits on serosal surfaces</td>
<td></td>
</tr>
<tr>
<td>‘Cooked’ egg yolk</td>
<td>Visceral gout</td>
</tr>
<tr>
<td>Black, foul smelling pus</td>
<td>Egg peritonitis</td>
</tr>
<tr>
<td></td>
<td>Traumatic peritonitis</td>
</tr>
</tbody>
</table>

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Petechial haemorrhages in abdominal cavity, on proventriculus and gizzard
<table>
<thead>
<tr>
<th><strong>DISEASE</strong></th>
<th><strong>CAUSE</strong></th>
<th><strong>TYPE</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Anatipestifer (New Duck Disease, Infectious serositis)</td>
<td><em>Pasteurella anatipestifer</em></td>
<td>Bacterial</td>
</tr>
</tbody>
</table>
| Ascaridiasis | *Ascaridia galli* (poultry)  
*A.dissimilis* (turkeys)  
*A.columbae* (pigeons) | Parasitic |
| Aspergillosis (Brooder Pneumonia, Mycotic pneumonia, Pneumomycosis) | *Aspergillus flavus*  
*Aspergillus fumigatus* | Fungal |
| Avian Chlamydiosis (Ornithosis, Psitticosis) | *Chlamydia psittaci* | Rickettsiae |
| Avian Influenza (Fowl Plague) | Orthomyxovirus | Viral |
| Avian Leukosis (Big Liver Disease) | Oncornovirus | Viral |
| Avian Mycoplasmosis (Chronic Respiratory Disease) (Infectious Synovitis) | *Mycoplasma gallisepticum*  
*Mycoplasma meleagridis*  
*Mycoplasma synoviae* | Bacterial |
| Avian Salmonellosis (Paratyphoid) | *Salmonella spp* especially  
*Salmonella typhimurium* | Bacterial |
| Avian Tuberculosis | *Mycobacterium avium* | Bacterial |
| Blackhead | *Histomonas meleagridis* | Protozoal |
| Botulism (Limberneck, Western Duck Sickness) | *Clostridium botulinum* | Bacterial toxins |
| Caecal worm | *Heterakis gallinarum* | Parasitic |
| Candidiasis (Thrush, Moniliasis, Sour crop, Crop mycosis) | *Candida albicans* | Fungal |
| Capillaria | *Capillaria contorta*  
*Capillaria caudinflata*  
*Capillaria obsingata* | Parasitic |
| Chicken Anaemia Virus (Infectious Anaemia) | Circovirus | Viral |
| Coccidiosis | *Eimeria species* | 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 carcase and offal should be considered unfit for human consumption.
Section 9

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
Thoracic vertebrae
Pelvis
Synsacral vertebrae
Coccygeal vertebrae
INDEX

A

A-band 20
Acetabulum 17
Acquired immune response 67
Actin 20
Adenosine triphosphate 20
Adenovirus 74
Adrenal gland 60
Adrenals 58
Affector cells 67
Aflatoxicosis. See Mycotoxicosis
Airsacculitis 163
Airsacs 36
Amyloidosis 76
Anasarca 168
Anatipestifer 76
Antibodies 67
Aortic rupture 76
Appendicular skeleton 16
Apteria 5
Arthritis 165
Ascaridia columbae 127
Ascaridia dissimilis 127
Ascaridia galli 127
Ascites 168
Aspergillosis 77
ATP. See Adenosine triphosphate
Atrium 41
Autotrophs 69
Avian chlamydiosis 78
Avian diphtheria. See Fowl pox
Avian influenza 78
Avian keratoacanthoma 141
Avian leukosis 138
Avian malignant oedema. See Gangrenous dermatitis
Avian mMycoplasmosis 79. See also Infectious synovitis
Avian pneumoencephalitis. See Newcastle disease
Avian rhinotraceitis. See Swollen head syndrome
Avian salmonellosis 79
Avian tuberculosis 80
Axial skeleton 8
Axon 55

B

B-cells 67
Benign tumours 135
Big liver disease. See Avian leukosis
Bile staining 231
Binary fission 69
Biotin deficiency 180
Birnavirus 74
Blood vessels 42, 43
Bluecomb. See Transmissible enteritis of turkeys
Body lice 129
Botulism 80
Brachial cysts 226
Brain 55
Breast blister 81
Breast blisters 208
Breast burn 212
Bronchi 23
Brooder pneumonia. See Aspergillosis
Bruising 238
Bumblefoot 176
Burrowing flea. See Echidnophaga gallinacea
Bursa of Fabricius 51
Index

C

CAA. See Chicken anaemia virus
Cachexia 178
Caeca 33, 54, 147
Caecal coccidiosis 121
Caecal tonsils 54
Cage layer fatigue 81
Cage layer paralysis. See Cage layer fatigue
Calamus 4
Candidiasis 82
Canker 124
Capillaria caudinflata 128
Capillaria contorta 128
Capillaria obsingata 128
Cardiac muscle 23
Caudal vertebrae 10
Cauliflower gut. See Necrotic enteritis
Cellulitis 209
Central nervous system 54
Ceratophyllus gallinae 129
Cervical vertebrae 10
Chemotaxis 67
Chemotrophy 69
Chicken anaemia virus 82
Cholangiohepatitis 188
Chordae tendineae 41
Chronic bacterial dermatitis 218
Chronic respiratory disease. See Avian mycoplasmosis
Clavicle 14
Cloaca 33, 52, 147
Clotting 45
Cnemidocoptes gallinae 130
Cnemidocoptes mutans 130
Coccidiosis 115
Coccygeal vertebrae 10
Colibacillosis 206
Coligranuloma 207
Comb 3, 78, 86, 149
Compound fracture 239
Congenital deformities 222
Contagious epithelioma. See Fowl pox
Coracoid 14
Coronavirus 74
Crop 29, 82
Crop mycosis. See Candidiasis
Cuprodeum 33
Curled toe paralysis 82
Cutica gastrica 30
Cystic duct 35
Cytotoxic T-cells 68

D

Dead on arrival 233
Death other than slaughter 232
Deep pectoral myopathy. See Oregon disease
Depluming itch mite. See Cnemidocoptes gallinae
Dermatites 212
Derszys disease. See Goose viral hepatitis
Dimorphic fungi 75
Dislocation 241
Dissecting aneurysm. See Aortic rupture
Dorsobronchi 38
Duck virus enteritis 83
Duck virus hepatitis 84
Ductless glands 58
Duodenum 31
DVH. See Duck viral hepatitis

E

Earlobes 3
Echidnophaga gallinacea 129
Efferent nerves 55
Egg bound. See Impaction of the oviduct
Egg impaction. See Impaction of the oviduct
Egg Peritonitis 84, 194
Emaciation 178
Endocrine system 58
Endomysium 19
Endotoxins 71
Enteritis 182
Epimysium 19
Epiphyseal cartilage  7
Erysipelas  85
Erythrocytes  43
Erythroid leukemia  138
Exotoxins  71
Extramedullary haematopoesis  187
Exudative diathesis  85

F
Fatty liver syndrome  185
Favus  86
Feathers  4
Femoral head necrosis  185
Fibre types  21
Fibrin  45
Fibrinogen  45
Floppy broiler syndrome. See Marek’s disease
Focal hepatic necrosis  186
Focal osteodystrophy. See Tibial dyschondroplasia
Folliculitis  219
Found dead  233
Fowl paralysis. See Marek’s disease
Fowl pest. See Newcastle disease
Fowl plague. See Avian influenza
Fowl pox  86
Fowl typhoid  87
Fractures  240
Frounce  124
Fungi  74
Furcula  14

G
Gametogony  115
Gangrenous cellulitis. See Gangrenous dermatitis
Gangrenous dermatitis  87, 215
Gapes  126
Gizzard  30
Gonads  58
Goose viral hepatitis  88
Gout  88
Grams staining  71
Green leg disease  200
Green muscle disease. See Oregon disease
Gumboro disease. See Infectious bursal disease
GVH. See Goose viral hepatitis

H
H-zone  20
Haematopoetic foci  187
Haemorrhagic anaemia syndrome. See Inclusion body hepatitis
Haemorrhagic enteritis of turkeys  90
Head  3
Heart  41, 149
Helper/inducer T-cells  68
Hepatic duct  35
Hepatitis  188
Herpesvirus  74
Heterakis gallinarum  125
Heterakis isolonche  125
Heterotrophs  69
Hexamita columbae  123
Hexamita meleagridis  123
Hindlimb  17
Histomonas meleagridis  122
Hjärre’s disease  207
Hockburn  220
Humerus  16
Hydropericardium  168
Hyperthermia  237
Hyphae  74
Hypophysis  59
Hypothermia  237

I
I-band  20
Icterus  90, 189
Ileum  32
ILT. See Infectious laryngotracheitis
Immunity  66
Impaction of the oviduct  90
Inclusion body hepatitis  91
Infectious anaemia. See Chicken anaemia virus
Infectious bronchitis  91
Index

Infectious bursal disease 92
Infectious bursitis. See Infectious bursal disease
Infectious coryza 94
Infectious laryngotracheitis 92
Infectious serositis. See Anatipestifer
Infectious stunting 94
Infectious synovitis 96
Inflammation 68
Infundibulum 48
Intermediate nerves 55
Intestinal contamination 231
ISS. See Infectious stunting
Isthmus 48

J
Jaundice 189
Jejunum 32
Joints 18

K
Kidneys 46
Kinky back. See Spondylolisthesis

L
Laminosioptes cysticola 131
Large intestine 33
Leatherhead. See Erysipelas
Leucocytes 43
Limberneck. See Botulism
Liver 35, 151
Lumbar vertebrae 10
Lung oedema. See Marble spleen disease
Lungs 36
Lymphoid leukemia 138
Lymphoid tissue 53
Lymphoproliferative disease of turkeys 138
Lytic infection 72

M
Machine damage 235
Magnum 48
Malabsorption syndrome. See Infectious stunting
Malignant tumours 136
Marble spleen disease 96
Marek’s disease 139
Melanosis 96
Memory cells 68
Menacanthus stramineus 129
Mesentery 34
Mesobronchi 38
Mesophiles 70
Metastasis 137
Metatarsal pad 18
Moniliasis. See Candidiasis
MS. See Infectious synovitis
Muscle 19, 24
Mycotic pneumonia. See Aspergillosis
Mycotoxicosis 97, 107
Myeloid leukemia 138
Myoblasts 19
Myosin 20

N
Necrotic dermatitis. See Gangrenous dermatitis
Necrotic enteritis 98
Neoplasia 135, 137
Nephritis 204
Nerves 55
Neurolymphomatosis gallinarum. See Marek’s disease
New duck disease. See Anatipestifer
Newcastle disease 98
Nictitating membrane 3
Northern fowl mite 131
Notarium 10

O
Oedema 168
Oesophagus 29
Oregon disease 99, 177
Ornithonyssus sylvarium 131, 159
Ornithosis. See Avian chlamydiosis
Orthomyxovirus 74
Osteoblast 7
Index

Osteoblasts 7
Osteoclast 7
Overscalding 236

P
Pancreas 58, 60
Parabronchii 38
Paracolon Infection 100
Paramyxovirus 74
Parasite list 113
Parathyroid 7, 58, 61
Parathyroid hormone 7
Paratrophy 69
Paratyphoid. See Avian salmonellosis
Parrot beak 180
Parvovirus 74
Pasteurellosis 101
Patella 17
Pectoral girdle 14
Pendulous crop 192
Pericarditis 193
Pericardium 41
Pericloacal cellulitis 209
Perihepatitis 196
Perimysium 19
Periosteum 7
Peripheral nervous system 54
Peritonitis 194
Perosis 101
Persistent right oviduct 223
Phagocytosis 66
Phalanges 17
Phototrophy 69
Picornavirus 74
Pituitary 58
Pituitary 61
Plantar necrosis 199
Plasma 42
Platelets 43
Pneumomycosis. See Aspergillosis
Pododermatitis 199
Polydactyly 222
Polyneuritis. See Marek’s disease
Portal circulation 44
Portal circulation 43
Pox virus 74
Preen gland 5
Proctodeum 33
Prokaryotic organisms 69
Prothrombin 45
Proventriculus 30
Pseudotuberculosis 102
Psitticosis. See Avian chlamydiosis
Psychrophiles 70
Psychrotrophs 70
Ptyrylae 5
PTH. See Parathyroid hormone
Pullorum disease 102
Pulmonary hypertension 170
Pulmonary system 44
Pygostyle 10
Pyrexia 206

Q
Quail disease. See Ulcerative enteritis

R
Rachis 4
Range paralysis. See Marek’s disease
Red marrow 7
Red mite 131
Red muscle fibres 22
Ribs 10
Ricketts 103
Right ventricular dilation 173
Rigor mortis 22
Rot gut. See Necrotic enteritis
Routes of infection 65
Runt 181

S
Sacral Vertebrae 10
Salpingitis 201
Scabby hip dermatitis 213
Scaly leg mite. See Cnemidocoptes mutans
Scapula 14
Schwann cells 55
Sensory nerves 55
Septicaemia 202
Serum 45
Index

Shizogony 115
Skin 5, 87
Skull 8, 10, 55
Smooth muscle 23
Sour crop. See Candidiasis
Spinal cord 56
Spine 10
Spleen 52
Spondylolisthesis 103
Squamous cell carcinoma 141
Sternal abnormalities 224
Sternal bursitis. See Breast blister
Sternum 14
Stratum corneum 5
Stratum germinativum 5
Suppressor T-cells 68
Swell head. See Swollen head syndrome
Swollen Head Syndrome 103
Syngamus trachea 126
Synsacrum 10
Systemic Circulation 44
Systole 43

T

T-cells 67
Tachycardia 205
Tenosynovitis 165
Testes 50
Thermal distress 237
Thermophiles 70
Thoracic vertebrae 10
Thrombokinase 45
Thrush. See Candidiasis
Thymus 58, 67
Thyroid 58
Tibia 17
Tibial Dyschondroplasia 104
Tibiotarsus 17
Tissue mite 131
Toxaemia 205
Trabeculae 7
Transmissible enteritis of turkeys 105
Trauma 238

Traumatic peritonitis 197
Trichomonas columbae 124
Trichomonas gallinarum 124
Trissoeal canal 14
Tuberculosis 65
Tunica adventitia 43
Tunica interna 43
Tunica media 43
Turkey X disease. See Mycotoxicosis

U

Ulcerative enteritis 106
Uncinate process 10
Urodeum 33
Uropygial gland 5
Uterus 48

V

Vagina 48
Ventricle 41
Ventriculus. See Gizzard
Ventrobronchi 38
Vertebral column 10
Viral Arthritis 107
Virion 72
Viruses 72
Vitelline diverticulum 32

W

Wattles 3
Western duck sickness. See Botulism
White comb. See Favus
White muscle fibres 22
Wing 16
Wishbone 14

Y

Yolk peritonitis. See Egg peritonitis

Z

Z-disc 20
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 autotopsy procedure • Anatomy aide memoire • Index