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Poultry Diseases in Western Australia

by

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POULTRY diseases constitute a major factor in losses sustained by the industry. It is the aim of this article to provide a ready source of information to assist the poultry farmer in understanding the common disease conditions that he is likely to encounter and to suggest possible means of control and treatment.

This article is not intended to take the place of a reliable diagnosis, which whenever possible is most important. Under certain circumstances however, when advice is unavailable, a list of symptoms and their age incidence, such as presented in the following pages, can help narrow down the possibilities and assist the farmer to recognise his particular problem. In this way prompt action may restrict what otherwise could become heavy losses.

Wherever possible treatments are suggested, but it should be appreciated that drugs and medications suggested are often available under a variety of trade names.

DIFFERENTIAL DIAGNOSIS OF POULTRY DISEASES

Diseases Symptoms

(a) Chickens. RAPID DEATH
Aspergillosis Fungal infection of lungs. (Rare)
Chilling Usually found dead in morning, evidence of huddling under brooder.
Crazy Occurs mostly between 9-21 Chick days. Incoordination and unsteady gait with tendency to "back pedal."
Omphalitis Swollen abdomen, inflammation of navel. Dead chicks usually foul smelling.
Pullorum Heavy mortalities in first few days. Occurrence rare.
Coccidiosis Usually seen at later stage, but if chicks have access to damp, contaminated litter then rapid deaths from loss of blood, will occur.
Uraemia White, sticky diarrhoea, dehydration.

(b) Growing Stock and Adult Birds.
Peritonitis Odd deaths, due to infection of abdominal cavity, usually from oviduct.

Diseases Symptoms

Tick High temperature, greenish droppings, leg weakness, often high mortality. Birds die within 48 hours. Tick present.

LEG WEAKNESS AND PARALYSIS

(a) Chickens.
Perosis Also called slipped tendon. Birds walk on hocks which are usually swollen. Legs turned out at an angle.
Curl-Toe Riboflavin deficiency. Involuntary inward curling of the hocks—chicks move about on their hocks.
Paralysis Incoordination, staggering gait. Early stage of crazy chick disease.

Vitamin E deficiency Bones soft, rubbery, malformed.

(b) Growing Stock and Adult Birds.
Botulism Rapid death with peculiar kinking of the neck due to paralysis of neck muscles. Feathers easily removed.
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<td>Bumblefoot</td>
<td>Large abscess on base of foot.</td>
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<tr>
<td>Fowl Paralysis</td>
<td>Symptoms vary from stilted gait to complete paralysis. Leg held at awkward angle, either trailing or perpendicular to body. Sometimes accompanied by wing drop on affected side and kinking of neck. Progressive wasting, birds dying in 1-3 weeks.</td>
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<tr>
<td>Tick Fever</td>
<td>Leg weakness accompanied by green diarrhoea and fever.</td>
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<tr>
<td>Vitamin A deficiency</td>
<td>Leg weakness not uncommon. More characteristic in ducks.</td>
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**DIARRHOEA**

(a) Chickens.
- Coccidiosis: Blood stained dropping (Caecal).
- Pullorum: Whitish diarrhoea, rapid death.

(b) Growing Stock and Adult Birds.
- Vitamin A deficiency: Droppings often loose.
- Coccidiosis (Intestinal): Droppings loose. No blood.
- Visceral Leucosis: Result of a leucotic invasion of intestinal tract.
- Tick Fever: Greenish diarrhoea.
- Vent Gleet: Foul smelling diarrhoea. Vent inflamed.
- Worms: Diarrhoea can occur where infestation of roundworm or tapeworm is severe.

**WASTING, LOSS OF CONDITION**

(a) Chickens.
- Faulty Management: Incorrect brooding conditions, overcrowding, insufficient feeding facilities.

(b) Growing Stock and Adult Birds.
- Fowl Paralysis: See leg weakness.
- Visceral Leucosis: Mainly in birds 6-18 months of age. Gross enlargement of affected organs, i.e., liver, spleen, ovaries.
- Severe Round Worm Infestation: Birds show poor growth, loose droppings.

**EYE AND/OR NASAL DISCHARGE**

Growing Stock and Adult Birds.
- Coryza: Discharge only slight, coughing sounds heard at night.
- C.R.D.: Discharge more severe. Eye may be plugged with cheesy material.
- Fowl Pox: Oculo-nasal form. Eye usually is closed and protruding. Occurs only in unvaccinated birds.
- Vitamin A deficiency: In acute deficiencies the eye becomes swollen. Can be distinguished from above by white pustules in the throat and mouth.

**DISTRESSED BREATHING**

Growing Stock and Adult Birds.
- Aspergillosis: No gurgling or discharge (Rare) from eye.
- I.L.T.: No recent cases in W.A.
- Vitamin A deficiency: Severe cases. Pustules in mouth and throat.
- Fowl Pox: As above. Pox invasion of throat.

**LESIONS ON HEAD**

(a) Chickens.
- Pantothenic Acid deficiency: Rare. Lesions on corners of mouth and eyelids.

(b) Growing Stock and Adult Birds.
- Fowl Pox: Lesions may appear on any part of head but usually on comb. Wart like growths.

**BLINDNESS**

Growing Stock and Adult Birds.
- Fowl Pox: Acute Ocular-nasal form. Only in unvaccinated birds.
- C.R.D.: Coughing and gurgling present. Discharge from nostrils.
Diseases | Symptoms
---|---
Vitamin A deficiency | Swollen and discharging eyes. White pustules in throat and mouth.

INJURIES
Growing Stock and Adult Birds.
- Cannibalism | Bare patches on body, sores, evisceration, all caused by picking.
- Prolapse | Oviduct protruding. Usually results in picking.
- Bumblefoot | Abscess on ball of foot.

Vitamin A deficiency

ASPERGILLOSIS
This disease is due to a fungal infection of the lungs and air sacs, and when outbreaks occur they are often associated with straw litter. Conditions of moisture and humidity favour the fungal growth, but poor health and Vitamin A deficiency often predispose birds to infection.

The occurrence of Aspergillosis is rare in Western Australia, but outbreaks may be responsible for high mortalities. All age groups are susceptible, with affected birds showing symptoms of gasping and distressed breathing. The post-mortem picture reveals yellow-white nodules in the lungs, air sacs, and often the oesophagus and crop.

Treatment:
Two per cent. copper sulphate (bluestone) in non metal containers for 14 days.

BLACKHEAD
This is a contagious disease of fowls and turkeys, caused by a protozoan parasite transmitted by the caecal worm. The classical form of Blackhead is more frequently seen in turkeys, although outbreaks in chickens can be responsible for quite heavy losses. Pullets may carry the organism without contracting the disease, but predisposing factors such as Fowl Pox Vaccination may precipitate an active infection.

Birds of all ages are susceptible but the eight to 18 week old group is more often affected.

Infected birds show listlessness, ruffled feathers and a yellowish diarrhoea. While post-mortem lesions are often absent in chickens, the typical ulcerated caecum and large cylindrical liver abscesses are invariably present in turkeys.

Control:
Eradication of the caecal worms is a necessary step, as they carry the infectious agents. In addition young stock should be isolated from older birds and turkeys, if kept, run entirely separately.

As the spread of this disease is hastened by moist, unsanitary conditions it is essential to have dry litter and hygienic methods of husbandry.

For treatment of outbreaks the drug of choice is “Entramin” fed in the water for a period of 14 days. This may be continued for a further period if losses persist.

Arsenicals and Furizolodane have also been found effective.

BLUECOMB
This condition has been known by a variety of names throughout the world, none of which accurately describes the disease.
"Bluecomb" as it is commonly termed in Australia, is basically a disfunction of the kidneys, resulting in retention of the toxic products normally excreted. The cause has never been defined, but the nature of its spread suggests an infectious agent.

Outbreaks have been seen in birds from six to 20 weeks old, but the commonest incidence is in pullets of the 12 to 15 weeks age group. The onset of Bluecomb is usually rapid with very little indication as to the cause. It is thought that various forms of stress may predispose to this condition and pullets approaching the point of lay seem very susceptible.

Affected birds deteriorate rapidly, becoming mopey and disinterested in either food or water. The body tissues become very dehydrated and a whitish watery diarrhoea, heavily concentrated with urates, is common. Mortalities may not necessarily be high, but if 50 per cent. of the flock became affected losses from the setback can be extremely serious.

The predominant post-mortem finding is a markedly pale, enlarged kidney with distension of the tubules by urates giving it a typically mottled appearance. The muscles and flesh assume a dry but sticky feel due to dehydration.

Control and Treatment:

As it is difficult to anticipate an outbreak of Bluecomb, it is essential to recognise the condition immediately it arises, and aim at limiting the spread.

In general affected birds must be given every consideration and disturbed as little as possible. Various forms of treatment have been tried, but 5 per cent. molasses in the feed or water, or antibiotics such as Aureomycin or Terramycin seem to give the best results.

BOTULISM

Not common in domestic fowls. Occurs when birds gain access to mouldy and decaying feedstuffs or organic matter, i.e., dead carcasses, decaying algae, or stagnant pools which contain botulinas organisms. These organisms produce a powerful toxin, which when ingested results in progressive paralysis and is invariably fatal. The birds are usually found lying with body extended and the neck flexed at an acute angle. This paralysis of the neck is referred to as "limber neck." In addition there is usually a watery diarrhoea. Post-mortem examination shows no significant changes.

Control:

Remove all dead carcasses as quickly as possible and eliminate potential sources of the original infection, i.e., decaying vegetable or organic matters.

Treatment is of little value, although Epsom salts as a purge may aid the recovery of mild cases. Dose rate of 1 lb. of salts for 75-100 birds in the feed.

BUMBLEFOOT

The cause of bumblefoot has not definitely been established but is thought to be due to bacterial infection, probably following injury to the foot pad.
Treatment:
The only logical treatment is to lance the abscess and gently squeeze out the pussy contents. As this may have to be repeated it may be more convenient to market affected birds.

CAECAL WORMS
These are small, whitish roundworms from ¼ in. to ½ in. in length, found in the caecum. Infestations are quite common, and in the majority of cases show no obvious effects. Occasionally with extremely heavy burdens of caecal worm, they may cause inflammation and thickening of the caecal wall. Their importance however, lies in the fact that they may harbour the organisms of Blackhead, so their elimination is desirable.

Treatment:
Phenothiazine at the rate of ½ grammes a head given as a medicated mash, is an effective form of treatment.

CANNIBALISM
The vice developed by poultry whereby they peck at one another, often inflicting serious injury. Common sites affected are the vent, toes, comb and feathers. When the vent is attacked with subsequent penetration of the abdomen, the intestines may be pulled out, resulting in immediate death.

Many theories have been put forward as to the cause of cannibalism, all of which may play a part. The majority of outbreaks, however, are seen in intensively run birds, where faulty management and overcrowding predispose to the habit.

Control of cannibalism can be aided by providing a well balanced diet, adequate in roughage, by avoiding overcrowding and promptly removing birds which show a tendency towards cannibalism, eliminating shafts of light that may shine into the brooder house and by checking ventilation. Affected birds should be treated immediately to prevent further attack.

CANKER
This is the condition referred to when fowl pox gains entry into the mouth, throat or wind pipe.

The affected birds become dull and listless, lose appetite and later develop a rasping cough. Examination of the mouth will reveal yellow cheesy material in the corners of the mouth and often occluding the windpipe.

Treatment of these cases is of very little use, other than mechanical clearing of the opening to the windpipe. Increased Vitamin A in the water or mash may assist recovery from the fowl pox infections.

CHILLING
A condition brought about in chickens by faulty brooder management or incorrect temperature control. If the temperature in the brooder is too low chickens will usually be seen to crowd around the source of heat, whilst excess temperature will force them to migrate to the outer extremities of the brooder compartment.

Affected chickens are usually found dead with little or no indication of the cause.

Control:
Losses may be rectified by checking the brooder temperature regularly, ensuring that for the first three weeks the temperature is 95° F. allowing a 10° drop for each subsequent week of brooding. Also avoid draughts from faulty ventilation.

CHOLINE DEFICIENCY
Not recorded in this State, but sub-optimal levels may be responsible for growth reduction in broilers and production drop in layers. Choline deficiency has also been incriminated as a possible cause of Perosis in chickens.

CHRONIC RESPIRATORY DISEASE
(C.R.D.)
C.R.D. is a severe respiratory disease caused by virus-like organisms. Not common in this State, although possibly undetected in some cases.

Early infections are characterised by a watery discharge from the eyes and nostrils followed by coughing, gurgling and general respiratory embarrassment. These symptoms are usually accompanied by a rapid drop in feed consumption and fall off in egg production. The sinuses frequently become involved, resulting in a caseous plug inside the eye. Mortality is rarely high, but the effects may linger...
through the flock for a considerable period.

Control and Treatment:
Care must be taken to prevent the introduction of infected birds into clean flocks, and to maintain good husbandry. Treatment with antibiotics such as streptomycin, aureomycin and terramycin has been tried with varying success. Nitro-furanes are also said to be effective against the causitive organisms.

COCCIDIOSIS
This disease is still responsible for many losses in chickens throughout the poultry industry, although the advent of modern anti-coccidial drugs has done much to reduce its incidence.

Outbreaks of coccidiosis are frequently associated with wet conditions, moisture and heat being the principal predisposing factors. This may be from rainy or muggy weather, overcrowding and faulty drinking fountains.

The two main types of coccidial infections causing mortality are the caecal and intestinal worms, caused by different species of the same parasite. At each site these coccidia invade the delicate inside linings, where multiplication results in rupture of the cells and the clinical picture so common to poultry farmers.

Caecal Coccidiosis
Most commonly seen in chickens from three to eight weeks of age. Affected birds appear dejected, with huddled appearance, ruffled feathers and blood in the droppings.

Intestinal Coccidiosis
Usually occurring in older birds, but has been seen to affect chickens as young as three weeks. The symptoms are similar to the caecal form, but blood is rarely seen in the droppings. The extensive damage to the intestinal lining interferes with the absorption of nutrients and the birds show a rapid falling off in condition.

Prevention and Treatment:
There are many drugs available today which if fed at preventative levels, will control coccidiosis under sanitary conditions. It is when the condition of the litter becomes such that the build up of infection overwhelms this protective action that higher levels become necessary. The drugs found effective are principally Nitro-furazone, Zoalene, Nicarbazin and sulphamethoxypyridazine.

CORYZA
This disease is widespread in West Australian flocks and may be aptly described as the "common cold" of poultry.

The cause is bacterial in origin, but may be often associated with other forms of respiratory disease. The onset of outbreaks may often coincide with such predisposing factors as overcrowding, worm infestations, Vitamin A deficiencies, and variations in the external environment, such as humid, dusty or chilly conditions.

The symptoms vary in their severity, from a simple nasal discharge and cough, to heavy mucoid discharges, sneezing and pronounced loss of appetite. Early signs of coughing are easily picked up at night. In many outbreaks, losses are few, but the generalised "set back" experienced by affected flocks may have serious economic consequences.
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Control and Treatment:

Unfortunately control is extremely difficult, contact between susceptible birds and carriers being unavoidable. The rigid avoidance of predisposing factors as described above, will do much to prevent outbreaks occurring.

Treatment can be effective if used early in the outbreak. Such drugs as Sulphathiazole (45 per cent.) at the rate of 2 oz. per gal. of drinking water for four or five days, or injections of Streptomycin and the broad spectrum antibiotics (Aureomycin and Terramycin) at 2 to 3 oz. per 10 gal. of drinking water, have proved curative if used promptly.

**CRAZY CHICK DISEASE**  
*(Avian encephalomalacia.)*

This condition in chickens is due either directly or indirectly to a Vitamin E deficiency. Present day outbreaks are characterised not so much by an inadequacy of Vitamin E in the ration as by the presence of such factors as rancid fats or fish oils, which hinder the utilisation of Vitamin E in the chicken. With the apparent absence of such dietary factors, the possibility of increased requirements during periods of stress may be implicated.

Outbreaks commonly occur between the ages of nine and 21 days, after which the disease is generally self-limiting due to the reduced requirements of older birds. Affected chickens show a variety of symptoms ranging from dullness and lack of appetite to marked inco-ordination with "back pedalling," prostration and death.

In its simplest form this disease is prevented by adequate levels of Vitamin E in the diet and can be treated by the addition of synthetic Vitamin E or the inclusion of five per cent. fresh wheat germ. Crazy chick has been observed where the ration was well supplied with Vitamin E, and in this case the presence of varied fatty acids is thought to be responsible for the destruction of Vitamin E. It is possible that other factors are also involved.

**CROP BOUND**  
*(See impacted crop.)*

**CURL TOE PARALYSIS**  
*(See Riboflavin deficiency.)*

**DE-PLUMING MITE**

An external parasite which invades the feathered areas of birds, piercing the skin at the base of the quill. The resultant irritation causes the birds to denude large areas along the back and tail, frequently terminating in unthriftiness and non-productivity.

Control and Treatment:

Control can be extremely difficult and it may be advisable to cull affected birds. Treatment by dipping birds in a warm 0.1 per cent. solution of Lindane or spraying with a similar solution may be an aid to control.

**EGG BOUND**

This is the condition referred to when laying birds have difficulty in passing eggs in the normal manner. It is usually due to either oversized egg or a longitudinal rotation causing a blockage at the cloaca.

The hen usually appears restless or distressed, and the excessive straining may result in eventual prolapse of the cloaca. Birds on high energy rations seem prone to this condition.

**ENCEPHALOMALACIA**  
*(See Crazy chick Disease.)*

**ENCEPHALOMYELITIS**  
*Or Epidemic Tremor.*

This is a viral infection of the brain, primarily affecting young chickens. Although quite prevalent in the Eastern States, this disease is fortunately not common in Western Australia. Chickens of all ages are susceptible, but natural outbreaks are commonest in the rst two or four weeks of life. Mortalities from 10 to 50 per cent. have been reported, and recovered birds may continue to act as "carriers."

The predominant symptom of this disease is a fine vibrating tremor of the entire chicken, felt when held loosely in the cupped hand. Positive diagnosis can only be made on detailed laboratory examination.

There is no effective treatment for this disease.
EXUDATIVE DIATHESIS
This is another manifestation of Vitamin E deficiency, in which affected chickens show a characteristic accumulation of fluid in the subcutaneous, or under-skin tissues. In severe cases the swelling is obvious and the chickens stand with legs apart, reluctant to move.

Treatment:
As with Crazy Chick Disease, the diet must be examined for possible factors responsible for Vitamin E breakdown. In most cases the addition of wheat germ or synthetic Vitamin E to the diet will reduce the incidence.

FAVUS—OR WHITE COMB
Favus is a skin condition of fungal origin, the occurrence of which is rare in Western Australia. Although it is not of a particularly serious nature, the insidious spread through commercial flocks can be distressing.

The fungus firstly attacks the unfeathered areas of the head, especially combs and wattles and may spread down the neck to the body. The skin becomes scabby, and where the feathers are involved they pull out readily, leaving raised fungoid encrustations at the base.

Infection spreads rapidly by direct contact, so it is important to recognise the condition promptly and eliminate affected birds.

Treatment:
Isolate infected birds and treat lesions with tincture of iodine or one of the antifungal preparations.

FOWL PARALYSIS
This disease is one of the major poultry problems of the world and is responsible for heavy losses in West Australian flocks. Although undoubtedly related to the general leucosis complex there is some controversy as to whether the causative agent is a virus common to all the variant forms of leucosis, or an independent agent. However, for the purposes of diagnosis we shall deal with each form as an independent entity.

All breeds of poultry are susceptible to Fowl Paralysis. Infection is usually contracted in the first five or six weeks from contaminated pens or direct spread from adult carriers. The most susceptible period for outbreaks in this State appears to be from 10 to 16 weeks, although cases are recorded from as early as seven weeks, and up to 20 weeks. Evidence from local investigation suggests that concurrent infections such as severe coccidiosis, or periods of stress pre-dispose to outbreaks of fowl paralysis.

Although paralysis of the leg is the most common symptom, the nerve supply to the wings, neck and proventriculus are also frequently affected. The progress of paralysis follows no set course and may...
vary from a leg weakness and stilted gait in the early stages, up to complete paralysis with one or both legs stretched out at awkward angles from the body. The "splits" position, with one leg forward and the other trailing behind is commonly seen. Having once contracted the disease, affected birds fall away in condition and die in one or two weeks.

Prevention:
Due to the irreversible nature of this disease, treatment is out of the question. Therefore preventative measures such as strict isolation of chickens from adult birds, breeding from more resistant strains and the eventual development of a genetically resistant bird, are the only means by which the incidence of disease may be reduced.

FOWL POX
Fowl pox is another of the commonly occurring diseases of poultry. A virus has been incriminated as the causative agent, but the incidence of outbreaks has been markedly reduced since the inception of vaccination.
This disease may occur in birds of all ages, although young stock are most susceptible. This may be partly explained by the fact that older birds are usually resistant, having been subjected to attacks earlier in life. Poor management, overcrowding and Vitamin A deficiency appear to predispose to outbreaks. There are three main clinical forms seen in fowl pox infection, depending on the site and severity of infection.
(1) Cutaneous form—Where the small raised pox nodules are confined to the comb, wattles, around the beak and in the toes, affected birds usually recover after a short period of sickness accompanied by loss of appetite.
(2) Diphtheritic form—Occurs when the pox gains access to the mouth and throat. Upon examination the inside membranes will be found inflamed and coated with yellow-cheesy material or "canker." This form is much more serious, as the affected birds are in grave danger of suffocation with the resultant blocking of the windpipe, and is usually accompanied by gaping or gasping for breath. Birds lose appetite completely.
(3) Oculo-nasal form—May accompany the diphtheritic forms, with the eyes and nasal passages becoming swollen and blocked by cheesy plugs. Some confusion may exist between this form and other diseases such as Coryza, or Vitamin A deficiency.
Where chickens are infected before vaccination, mortalities may be over 50 per cent.

Prevention and Treatment:
Vaccination is the only effective method of preventing outbreaks of fowl pox. This is usually carried out at 12 to 14 weeks, as in young chickens the effects of vaccination are too severe. Even at that age some flocks experience a slight degree of reaction, which may be overcome by temporary treatment with antibiotics. In chickens under the age of six weeks temporary immunity may be obtained by vaccinating with the far less virulent pigeon pox vaccine.
Treatment in affected birds is of little value, although high doses of Vitamin A seem to increase the rate of recovery. The duration of infection rarely exceeds two or three weeks in any one bird, and recovered chickens remain immune to further outbreaks.

HEAT STROKE
This condition commonly accompanies summer heat waves, where no precautions are taken to reduce temperature. Affected
birds gasp and gape continuously, then die a convulsive death.

Prevention:
Adequate shade, or sprinkler systems on the shed roof.

IMPACTED CROP
This is due to the continuous ingestion of long, coarse indigestible grasses or weed. Pieces of hessian from brooder covers have also been incriminated.
The crop becomes distended and pendulous, preventing passage of the food to the gizzard. Death is usually due to starvation.

Treatment:
Emptying of the crop through a clean incision made in the wall is the only reliable method. Care in preventing access to fibrous materials will reduce incidence.

INFECTIOUS LARYNGOTRACHEITIS (I.L.T.)
I.L.T. is an acute, highly contagious respiratory disease of chickens. It is rare in Western Australia, but outbreaks were experienced in 1948 and 1954.
The actual cause of the disease is a virus spread directly in the fine vapour spray from the cough of infected birds. This accounts for its highly contagious nature. Outbreaks usually occur after the introduction of infected birds, or adult “carriers” into a susceptible flock. This is one of the reasons for the embargo on importation of birds from the Eastern States, where the disease is quite prevalent.

In the initial stages of an outbreak the disease runs a rapid course, with high mortality. This is especially evident in susceptible flocks, as would be the case in Western Australia.

Affected birds show a variety of symptoms depending upon the stage of infection. These are:

1. Acute Stage:—Infected birds gasp, extend the neck in an effort to breathe, and cough up blood stained mucous. In this stage birds die rapidly.

2. Chronic Stage:—Birds tend to linger, still experiencing difficulty in breathing and showing the characteristic blood stained mucous; but in addition develop a cheesy deposit in the eyes, nose and mouth. Coughing may still be severe.

A percentage of these birds may gradually recover, but remain “carriers” of the infection.

Control:
The only effective means of control is by vaccination, which due to the carrier state of recovered birds, must be continued until a clean flock is built up.

LEUCOSIS
(See Fowl paralysis and Visceral leucosis.)

LICE
One of the more serious external parasites, if allowed to live and multiply to any extent.

Numerous species of lice affect poultry, but due to the similarity of control they can be considered as a group for practical purposes.

Their general appearance may be described as flat, elongated parasites, grey to yellowish brown in colour, about 1/4 in. long and with biting mouthparts. The entire life history of lice is spent on the birds, the eggs being laid near the base of the feathers from where they hatch in clusters and after several molts emerge as adults.

The importance of infestations depends largely on the severity of the burden, but due to the irritation imposed by their biting habits, lousiness may cause poor condition and general unthriftiness. There is also some suspicion that they may be able to transmit tick fever organisms.

The spread is from bird to bird by direct contact.

Control:
Lice may be effectively controlled by the use of any of the recent insecticides. Of these DDT (5 per cent), B.H.C. (0.5 to 1 per cent.) and Lindane (1 per cent.) have all been found useful.

Older and less effective remedies include the use of Pyrethrum dust (10 per cent.), Sodium fluoride and the painting of perches prior to roosting with nicotine sulphate.
LIMBER NECK
(See botulism).

MANGANESE DEFICIENCY
Manganese is a trace element essential for the health, growth and production of poultry. Deficiencies of manganese result in poorly calcified egg shells and a marked fall in hatchability due to the death of chick embryos during the final stages of incubation.
In the chicken, deficiencies have been incriminated as the cause of Perosis or slipped tendon.

Prevention:
The deficiency disease may be avoided by including recommended levels of manganese sulphate in the ration.

MONILIASIS
This is another of the fungal group of diseases affecting chickens, under the general heading of thrush or mycosis. Infections of this type are rare in Western Australia.
Affected chickens show unsatisfactory growth, loss of appetite and weakness. Lesions are commonly found in the upper digestive tract—mouth, throat and crop, or greyish white thickening on the mucosal lining.

Treatment:
The use of copper sulphate (bluestone) in the water, at the rate of one teaspoonful to two gallons of water in non-metal containers, is generally recommended.
Overcrowding, together with unsanitary conditions, predispose to fungal infections, so should be strictly eliminated.

MYCOSIS
A general heading for fungal infections which include Aspergillosis, Favus or White Comb, Moniliasis and Thrush.

OMPHALITIS (NAVEL INFECTION)
This is a disease of chickens up to 10 or 12 days old, due to infection of the unabsorbed yolk sac or the tissues surrounding the navel.
The cause of infection is not clearly understood, but experimental work strongly suggests that the organisms gain access to the embryo whilst still in the egg, rather than the infection occurring after hatching.
The age incidence of outbreaks varies with the nature of the infection. Where the tissues surrounding the navel are involved, the mortality usually eases by the third or fourth day. However, if the yolk sac is the prime site of infection, losses may continue for seven to 10 days.
Symptoms show up soon after hatching, with numerous dead chickens and others dull, lethargic and weak. The foul smell of putrefaction is characteristic of omphalitis.

Treatment:
Due to the nature of outbreaks, treatment is rarely attempted. Where deaths continue for some days Sulphamezathine or antibiotics in the water may be beneficial. Prevention will be aided by thorough fumigation of the incubator between hatches, and disinfection of trays and so on. Fumigation may be carried out right up to the time when the eggs begin chipping.

PANTOTHENIC ACID DEFICIENCY
This is one of the less frequently occurring deficiency diseases, only one or two cases being encountered annually.
Outbreaks in young chickens are characterised by poor growth, rough
appearance and the presence of scabs at the corners of the mouth, on the eyelids and occasionally between the toes.

Deficiency in adult birds may cause a fall in hatchability.

Prevention:
Outbreaks should not occur if the diet contains such ingredients as bran, brewer's yeast, liver meal or lucerne meal, all of which are good sources of Pantothenic acid. The addition of calcium pantothenate to the ration will also overcome any chance of deficiency.

The requirements of Pantothenic acid are 2.5 milligrams per lb. for chickens, and 5 milligrams per lb. for growing birds and breeding stock.

PEARLY EYE
Another of the variant forms of leucosis, only odd cases of which are seen in local flocks.

The predominant symptom is a loss of pigment from the iris and distortion of the pupil. Blindness usually results.

PERITONITIS
This is the name given to infection of the lining to the abdominal cavity.
Losses from this condition are purely sporadic and occur either following penetration of the abdominal cavity, or secondary to some generalised infection.

PEROSIS (or Slipped Tendon)
This condition occurs in chickens either fed on a manganese deficient diet, or hatched from manganese deficient eggs. Outbreaks may also occur with the excessive feeding of bonemeal which interferes with the assimilation of manganese in the gut.

The early symptoms are retarded growth rates, with distorted development of the bones in the wings and legs. As this progresses the joints become swollen and flattened, resulting in the Achilles tendon slipping off to either side.

Affected chickens are unable to walk and may be seen to hop around on the hocks.

Prevention:
The requirement for manganese in chickens is about 50 parts per million, which may be adequately obtained by a level of four to seven ounces of manganese sulphate per ton of feed.

Strict attention should be given to breeders' rations, and to the level of bone-meal in chicken rations. Excessive amounts of calcium, phosphorus and iron raise the requirements of manganese. There is no treatment for chickens once the tendon is displaced.

POISONING
Under conditions of intensive or semi-intensive management, cases of poisoning are rare in poultry. Where birds are given freedom to roam aimlessly, however, access to rubbish heaps or toxic plants may occasionally lead to trouble. Of these, Mexican Poppy, Castor Oil plants and rhubarb have been known to cause death.

The only other possibilities of poisoning which come to mind are such things as overdoses of drugs (for example, Sulpha-quinoxaline poisoning), careless use of insecticides (for example, Dieldrin poisoning) and excessive salt in the ration.

Treatment is usually out of the question in such cases, so care must be observed to prevent such poisoning from occurring.

PROLAPSE
Although of a non-infectious origin, prolapse in laying birds may occur quite commonly. Such a condition is usually due to excessive straining, with a breakdown of the tissues supporting the cloaca and oviduct. As a result the cloaca is everted and the oviduct becomes exteriorised. The usual causes of prolapse are overlarge eggs, aggravated by constipation and evisceration following cannibalism.

Treatment:
If in the early stages, the prolapsed portions may be washed down with disinfectant and gently replaced.

PULLORUM
This disease in the past has been responsible for mortalities of 80 to 100 per cent. in hen hatched chickens. Since the advent of Pullorum testing, however, and the supply of hatching eggs coming from only Pullorum free stock, the incidence of losses has been virtually reduced to nil.
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If an outbreak does occur the course of the disease varies with the mode of infection. Where the eggs are infected very few embryos hatch out, but if the infection is contracted after hatching, mortalities may occur any time during the first 14 days, with a peak of losses at the third and fourth day.

The predominant symptom is rapid death, although sluggishness, huddling together and diarrhoea may be observed.

Treatment:
The causative organism has been found susceptible to sulphanomide treatment, but the disadvantage of this is that recovered birds may remain carriers and not be picked up until tested as adults.

Control of this disease has been achieved by rigorous blood testing programmes with the elimination of positive reactors.

RED MITE
Another of the external parasites which attack poultry, causing irritation and loss of condition.

The mites are extremely small but may be readily seen in heavy infestations. They usually attack the birds at night whilst on the perches and hide in the woodwork by day.

Red mite have been suspected of transmitting tick fever organisms.

Treatment:
Spraying with 3 per cent. Malathion has given good results in ridding sheds of Red Mite. An older remedy was the painting of the perches with Nicotine sulphate.

In adult hens there are no marked symptoms except a fall in egg production and an enlarged liver.

Treatment:
Deficient diets may be corrected by the addition of synthetic riboflavin, although liver meal, dried buttermilk powder, brewer’s yeast, lucerne meal and fresh greenfeed are sources of the vitamin. Requirements for breeding birds and growing stock are between 1.6 and 2 milligrams per lb. of feed and for laying hens about 1 milligram per lb.

RICKETS
This condition is brought about by faulty calcification of the bones, allowing unchecked growth to result in deformity.

It is impossible to separate the state of rickets from a Vitamin D deficiency, calcium or phosphorus deficiency, or an imbalance between all three.

RIBOFLAVIN DEFICIENCY
("Curl-toe Paralysis")
Riboflavin is one of the vitamins essential for growth and production, and although good quality greenfeed contains a moderate level, non-supplemented diets are in danger of being deficient.

The effects of Riboflavin deficiency are clearly displayed by poor hatchability, the embryos being dwarfed and deformed. In older chickens on a deficient diet the growth rate is impaired and a characteristic curling inwards of the toes occurs, forcing the chickens to walk on their hocks.

Riboflavin deficiency: Chicks in typical position. Note malformation of the feet which gives rise to the common name "curled-toe paralysis"
Affected chickens show symptoms of leg weakness, unsteady gait and poor growth. The beaks and bones are extremely soft, and may become grossly distorted.

With the amount of sunlight available in this State, rickets should be, and is, comparatively rare.

Treatment:

Rickets may be remedied by feeding high levels of Vitamin D for two to three days, together with at least 2 per cent. bonemeal in the ration.

As most Vitamin additives contain A and D3, and sunlight is plentiful, prevention of rickets should be no difficulty.

ROUND WORMS (Ascaridia Galli)

Round worms are the most prevalent form of internal parasitism in poultry. The worms themselves vary from one to two inches in length, are round, smooth and elongated. They inhabit the small intestine, but in heavy infestations may be found as far up as the gizzard. The economic importance of heavy round worm burdens is in the poor development of meat birds, delayed egg laying, loss of production in adult layers and the poor condition of birds generally.

Symptoms of severe infestations are loss of appetite, paleness of the comb, diarrhoea and occasional death due to mechanical obstruction of the bowel.

Treatment and Control:

Replacement flock should be routinely dewormed at 10 and 18 weeks. This may be done by the incorporation of Piperazine compounds in the mash, or in the water. In addition to this, care should be taken to avoid overcrowding, unhygienic conditions, feeding off the ground and so on—all factors which favour heavy infestation of round worms.

All birds should be de-wormed regularly where there is any suggestion of worms, or where the conditions favour their spread.

SCALY LEG

A condition of older birds, following infestations of leg mites. These minute external parasites burrow into the skin of the legs where they spend their entire life history, resulting in a proliferation and thickening of the leg scales.

Their spread from bird to bird is by direct contact, and is aided by dirty, unhygienic conditions.

Control and Treatment:

In commercial flocks it is best to cull affected birds, then spray and disinfect the houses to prevent recurrence. Treatment may be carried out by first scrubbing the scale and dirt off the legs with soap and water, then applying emulsions of either DDT (2 per cent.) or B.H.C. (0.1 to 0.5 per cent.).

SOUR CROP

This is a common term applied to the condition of the crop following fungal infections. Sour crop, however, can easily be provoked by the feeding of coarse, fibrous food quite apart from fungal infection.

Treatment:

Eliminate the cause and, if present, treat for fungal infection.

SPIROCHAETOSIS

See Tick fever.
STAPHYLOCOCCAL INFECTION

Although rarely diagnosed in this State, outbreaks may occur unrecognised.

As the name implies the cause of infection is a bacteria known as Staphylococcus, which is a common secondary invader in all animal species. Outbreaks may occur in chickens of all ages, resulting in septicaemia. The general symptoms are high temperature, scouring, dullness, loss of appetite and usually rapid death. There may also be some inflammatory swelling of the joints.

Treatment:

The use of broad spectrum antibiotics such as Terramycin and Aureomycin will generally be effective.

STICKFAST FLEA

One of the less prevalent external parasites since the advent of good housing and deep litter.

The flea attaches itself to the comb, wattles and around the eyes, causing intense irritation often resulting in ulceration.

Control and Treatment:

These must be carried out together if eradication is to be achieved.

The spraying of birds and sheds may be done with either 0.5 per cent. DDT or 0.25 per cent. B.H.C.

Provision of deep litter on cement floors, and careful scrutiny of introduced birds, should be aimed at in flea areas.

TAPEWORMS

These are flat, segmented worms found in the small intestine of poultry.

Heavy infestations cause loss of condition and a fall in egg production. The spread of tapeworm infestation involves secondary hosts such as snails and slugs, which eat the gravid segments passed out in the droppings.

Control:

This is difficult due to the presence of secondary hosts which are difficult to eliminate.

Treatment:

A recent compound has been found effective against the tapeworms, namely: Dibutyl tin di laurate, which is sold under the trade name of “Killworm.”

TICKS—FOUL

This is one of the most common and important of the external parasites in Western Australia. Ticks are oval in shape, reddish brown in colour, and easily visible to the naked eye.

Ticks are nocturnal in habit, emerging at intermittent periods to feed on fowls until engorged with blood. During the day they drop off and seek shelter in cracks, crevices, or under pieces of wood. However, the larval form, or “seed-tick” remains attached to the birds for about five days, so may be seen during the day.

Besides having harmful blood sucking habits, ticks are also the main vector for tick fever organisms. Heavy tick infestations cause ill thrift, poor growth and fall in egg production, due to the tick worry.

Control:

The location of ticks can only be done by painstaking searching, best carried out at night. One should concentrate on cracks, crevices, under perches, etc., with the aid of a strong light. Occasionally they may be seen on the bird itself.

Once having established their presence the shed should be thoroughly sprayed with either malathion (at 3 per cent.) or B.H.C. (0.5 to 1 per cent.) paying particular attention to where the perches join the wall, and so on.

Debris should also be removed from the ground.

TICK FEVER OR SPIROCHAETOSIS

Tick fever is an acute disease of poultry, caused by the inoculation of Spirochaetal organisms into the blood stream.

Outbreaks are associated with the presence of insect vectors such as fowl ticks, red mite, and possibly mosquitoes, which spread the disease by mechanical transmission of blood from an infected bird into the blood of a susceptible one.

Symptoms develop approximately 48 hours after inoculation, coinciding with the rapid multiplication of the infective organisms in the blood. In the acute form, affected birds show a high temperature (110-112°), greenish diarrhoea and a varying degree of leg paralysis. Death usually occurs in 12 to 24 hours. Mortalities at this stage can be extremely heavy. In the milder, more chronic form of the disease the birds are generally depressed,
extremely thirsty and may develop diarrhoea and paralysis 12 to 24 hours later. A percentage of these birds will recover.

The characteristic post-mortem picture shows a grossly enlarged, mottled spleen, and often a similar change in the liver.

Control and Treatment:
The main line of attack must be aimed at eliminating the insect vectors. This may be done by spraying with 3 per cent, Malathion or 0.5 to 1 per cent. B.H.C.

Affected birds will usually recover after treatment with antibiotics such as Penicillin, Streptomycin, Aureomycin or Terramycin. Arsenical preparations also have been used with varying success.

URAEMIA OR URICAEMIA
As the name implies (uric acid in the blood) this is a condition whereby the waste products normally excreted by the kidneys are forced back into the bloodstream.

The cause of this is still uncertain. Similarities between this disease and Bluecomb suggests the possibility of a virus; while stress factors such as overcrowding, dietary deficiency, and temperature variations cannot be discounted. Imbalance of sodium and potassium salts is another theory recently suggested. The incidence of uraemia in chickens up to the age of four to five weeks, is high in this State, although one to three weeks seems to be the most susceptible period.

Outbreaks usually commence with a number of chickens found dead and others showing symptoms of listlessness, loss of appetite, dehydration and sticky white diarrhoea. Mortalities in young chickens vary between 10 and 50 per cent., but seem generally lower in older birds.

The post mortem changes are mainly confined to the kidneys, which appear very pale and swollen due to the tubules being packed with urates; but the tissues also feel sticky due to dehydration.

Treatment:
In heavy mortalities good results have been obtained with water soluble antibiotics, while medication of the water with 5 per cent molasses has also proved extremely beneficial. Adjustment of the sodium potassium ratio by either cutting down on salt or adding potassium chloride to the water, is another treatment which has been successful in some outbreaks.

VENT GLEET
Vent gleet is an apparently infectious condition (although the cause has yet to be identified) in which the cloaca and surrounding feathers become soiled by a sticky white discharge.

This disease appears to be spread from bird to bird by the cock. Affected birds do poorly, lay very few eggs and bear a characteristically foul odour.

Vent infection may spread to the rectum, with the intense irritation leading to excessive straining, protusion and cannibalism.

Treatment:
Removal of infected birds is recommended. If treatment is to be attempted, repeated applications with a 3 per cent solution of chromic acid offers the best possibilities.

VISCERAL LEUCOSIS
This disease, like Fowl Paralysis, is an important member of the leucosis complex and is responsible for heavy losses in this State.

Leucotic lesions occur usually in birds from six to 12 months of age, although cases have often been recorded in younger birds.

The predominant symptoms seen in affected birds are loss of appetite, intermittent diarrhoea and progressive wasting, with birds dying in one to four weeks after the first signs being noticed.

The liver, kidney and spleen are the organs most commonly affected, but almost all portions of the body may become involved. Lesions vary from pale, greyish discolorations, to gross enlargement with the organs’ normal appearance being masked by infiltration of leucotic cells. Once the lesions commence to grow to a stage which is impossible to predict, the disease is irreversible.

Treatment:
There is absolutely no treatment of any value.

VITAMIN A DEFICIENCY
This is one of the more important deficiency diseases of poultry, due to the high requirements for egg laying, growth and resistance to disease.
Birds of all ages are susceptible to Vitamin A or green feed deficiency, especially young pullets on the point of lay. Adult hens take longer for a deficiency to become evident due to their ability to withstand a deficient state for longer periods.

The first symptoms of Vitamin A deficiency are a general falloff in condition and diminished egg production. As the condition progresses the mucous membranes of the throat and food pipe become involved, followed by nasal discharge and accumulation of white cheesy material in the eyes. Leg weakness and an incoordinated gait may be seen in the terminal stages. Severely affected birds may have difficulty in breathing and develop a harsh, rasping cough in an effort to clear the throat. A distinguishing feature of this disease from other forms of throat infection is the ease with which the cheesy material may be removed.

The characteristic post mortem changes, other than the appearance of the eyes, are the pustules which develop from the mouth right down the lining of the oesophagus to the crop.

**Treatment:**

Supplies of the Vitamin must immediately be boosted. Apart from the wide variety of synthetic preparations now available on the market containing Vitamins A and D₃, fish oils, carrots and green feed are all rich in Vitamin A.

**VITAMIN D DEFICIENCY**

This was outlined under the condition of Rickets.
VITAMIN E DEFICIENCY
See Crazy Chick Disease and Exudative Diathesis.

Vitamin K deficiency: A common position of young chick suffering from "crazy chick" disease

VITAMIN K DEFICIENCY
This Vitamin is abundant in normal commercial poultry feeds, so that deficient states are rarely seen. Several outbreaks were reported two or three years ago in chickens running on wire. This was explained by the inability of the affected chickens to eat their faeces, which are rich in Vitamin K.

Vitamin K is essential to the clotting process of blood, so symptoms of deficiency are clearly seen in haemorrhages of the muscles, on the breast and under the skin.

WATER BELLY
(Also known as Abdominal Dropsy)
This condition has only a sporadic occurrence in old birds, where the abdominal cavity becomes distended with fluid and forces the bird to adopt a "Penguin-like" position.

WHITE COMB
See Favus.

WORMS
See caecal worms, Roundworms and Tapeworms.

REFERENCES
We wish to acknowledge the information and in some cases photographs taken from the following texts:
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- Poultry Handbook.—Rudolph Seiden.
- Poultry Nutrition.—W. Ray Ewing.
- Poultry Diseases.—B. F. Kaupp.

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- Waroona office, Tuesdays, 9 a.m. to 4 p.m.
- Pinjarra Court House, Fridays 10 a.m. to 3.30 p.m.
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Registration cards are available from Road Board offices, Police Stations, Clerks of Court and most Post Offices.