Diseases of Adult Poultry and Control by Plant Sanitation
Michigan State University Extension Service
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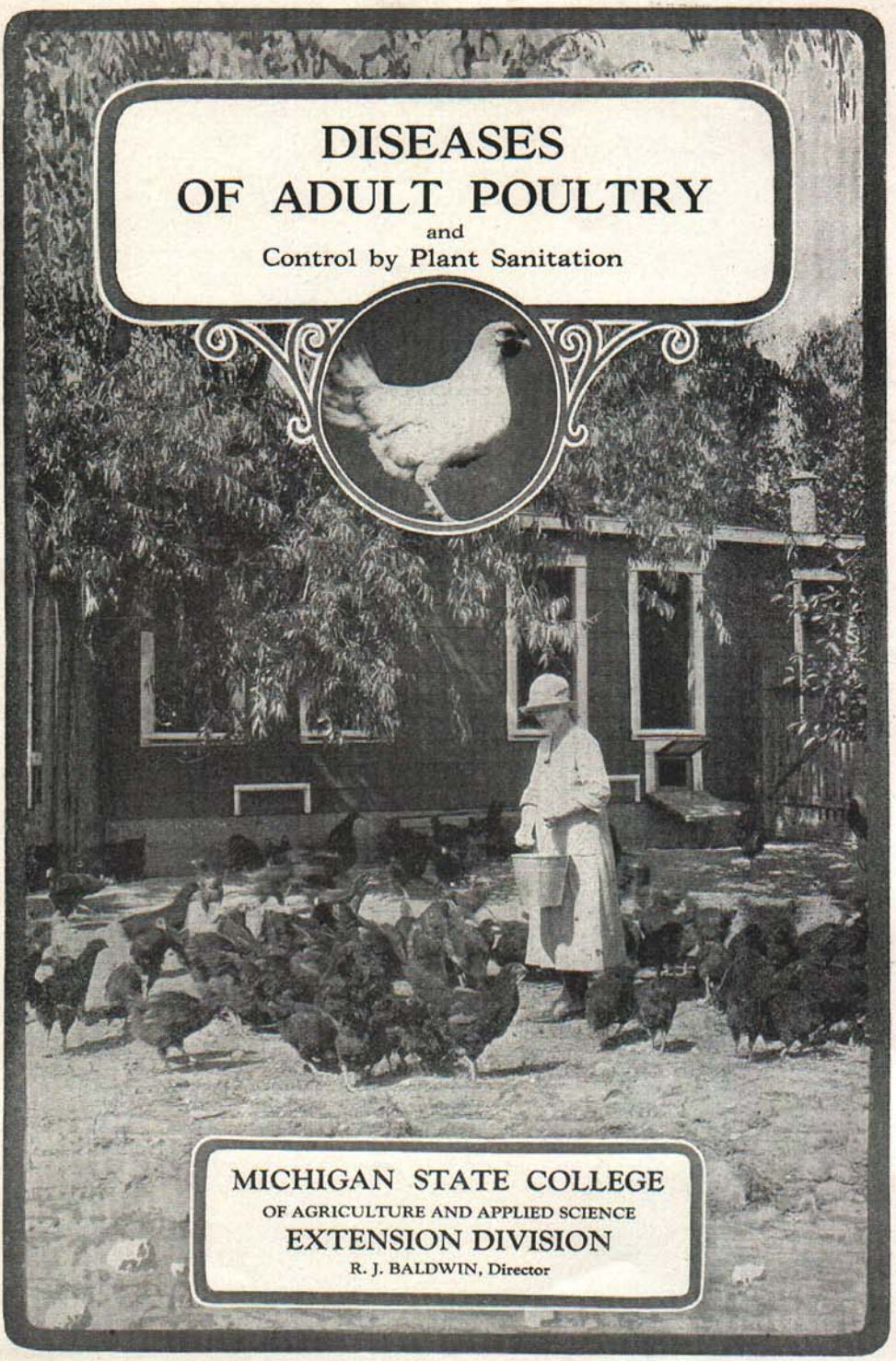
DISEASES OF ADULT POULTRY

and

Control by Plant Sanitation



MICHIGAN STATE COLLEGE
OF AGRICULTURE AND APPLIED SCIENCE
EXTENSION DIVISION
R. J. BALDWIN, Director

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Successful disease control is one of the fundamentals of profitable poultry raising.

To find the cause must be the first step in all attempts at disease control.

Disease cannot be prevented, controlled or eradicated without an adequate knowledge of the nature of the cause.

Whenever disease is encountered, try to obtain an accurate diagnosis and base all control measures on the facts known about the cause of the malady concerned.

DISEASES OF ADULT POULTRY

and Control by Plant Sanitation

H. J. STAFSETH

POULTRY HYGIENE

Plant sanitation as a means of control of infectious and parasitic diseases of adult poultry is not only necessary but the most logical and least expensive method. The following remarks will be limited to sanitary measures inasmuch as bulletins on housing and feeding deal quite adequately with such hygienic considerations as lighting, ventilation, heat and cold.

Selecting Stock—As far as we know, only bacillary white diarrhea and fowl typhoid are transmitted from the ovary of the hen through the egg to the chick. The germs that cause these two diseases belong to the same group and are closely related in many respects. For this reason, the agglutination test for bacillary white diarrhea germ carriers will detect carriers of fowl typhoid germs and vice versa. Hence, as far as the baby chick industry is concerned, these two diseases may be considered as one problem. It is, therefore, evident that if the bacillary white diarrhea-fowl typhoid problem is properly taken care of, eggs and baby chicks should be fairly safe sources of new stock.

When it becomes desirable to bring in adult birds as a source of new stock, the problem is not so simple because adult birds may carry the germs of tuberculosis, chicken pox, blackhead, coccidiosis, roup, cholera, bacillary white diarrhea, fowl typhoid, fowl plague, as well as worms and other parasites without showing any noticeable evidence thereof. For the detection of carriers of tuberculosis germs, one may employ the tuberculin test, but for diseases other than tuberculosis, bacillary white diarrhea and fowl typhoid no test exists. In order to prevent the bringing in of communicable diseases with adult birds one should inquire closely into the history of the flock, from which the new stock is to be obtained, as to conditions of health. It is also advisable to keep new stock or birds, brought home from fairs, shows, or egg contests, in quarantine, preferably with a few less valuable members of the home flock, for two or three weeks in order to see if an infectious disease should develop before placing them with the flock as a whole.

Visitors—Any person coming from poultry establishments where communicable diseases prevail may carry the infection to clean flocks. For this reason visitors should not be allowed to go through poultry houses or yards, and extension poultry men and inspectors should inform themselves as to proper precautions against this method of spreading disease.

Feed and Water—Most poultry diseases are spread partly or entirely through the droppings of infected birds. For this reason the feeding and drinking utensils should be constructed and placed so that contamination of feed and water by droppings is prevented as far as possible. Scratch feed should also be fed in sanitary hoppers.

THE POULTRY PLANT

Soil and Drainage—As droppings of infected birds contain disease producing germs or eggs of parasites, it is impossible to prevent entirely soil contamination. It is also impossible to disinfect soil by chemical or other artificial means in a practical way. Sunlight and good drainage do much toward the purification of soil. For this reason poultry plants should be located on light, well drained soil whenever possible. Yards should be laid out, and shade trees placed so as to permit a liberal amount of sunlight. Rolling ground aids drainage. Artificial drainge must be resorted to when the plant must be placed on heavy soil and level ground.

The Poultry House—Effective practice of sanitation is impossible unless the poultry house is equipped with a floor that can be cleaned and disinfected in a few hours, should occasion require it. A properly constructed concrete floor meets this requirement far better than any other type of floor. Dirt floors are very insanitary. Wooden floors are unsatisfactory because it is difficult to clean them thoroughly and sooner or later they warp and crack, thus providing hiding places for all sorts of contamination.

The walls should be free from cracks in order to prevent external parasites from finding hiding places. Various preparations, that can be used effectively for painting the walls in order to do away with hiding places for body parasites, are now on the market.

In constructing the perches and dropping boards one must also keep the external parasite problem in mind, since cracks and crevices there form the most ideal retreat for mites. If the cracks permit the successful application of an insecticide, they are less objectionable than if they are inaccessible for spraying. Thus small cracks are worse than large ones as far as the parasite problem is concerned.

By means of a woven wire (about 2 inch mesh) fastened to the under surface of the perches, with an apron dropping down in front, the chickens can be prevented from walking and picking in the droppings.

A dust bath or dust wallow, consisting of a large shallow box containing dry, light sand to which has been added some snuff or tobacco dust will help chickens to keep themselves free from external parasites. This dust wallow also helps in removing loose feathers and scales of skin.

GENERAL DIRECTIONS FOR CONTROLLING OUTBREAKS OF COMMUNICABLE DISEASES

1. Move healthy birds to clean quarters, or remove and completely isolate affected birds as soon as they are discovered. Birds that are too sick to warrant treatment should be killed and burned.
2. Remove contaminated litter and burn it or take it to a place where chickens cannot come in contact with it for at least three years. Clean and disinfect the house. See paragraph on disinfection, Extension Bul. No. 53.
3. Do not walk back and forth between isolation pen and pens where healthy chickens are kept unless the shoes are disinfected when leaving the isolation pen or a special pair of rubbers or boots is put on while in this pen.
4. After handling diseased birds, carefully wash the hands before feeding or handling healthy ones. As a routine one should take care of the healthy birds before looking after the diseased ones.

Note: Infection may be carried on clothing as well as on the shoes and hands. For this reason it may be well to use a long, light coat of some kind while taking care of the birds in the isolation pen. The best results could be obtained by having a special caretaker for the diseased birds.

VICIOUS HABITS—CANNIBALISM

1. Feather Pulling

Monotonous diets and itching due to external parasites are given as causes of this trouble. Feather pulling may also become a habit with some birds.

Control—Remove offenders as soon as they are discovered, supply birds with an adequate diet and enough hoppers so that all the birds can eat at the same time, and rid them of external parasites.

2. Egg Eating

This is usually a habit starting with the eating of an accidentally broken egg. Lack of lime in the ration has also been thought to cause egg eating.

Control—Watch for floor eggs and remove them without delay. Keep an adequate amount of straw in nests to prevent breaking of eggs and also keep the nests dark so that broken eggs are not so easily discovered. Supply the necessary amount of lime in the ration if calcium deficiency is thought to be the cause.

3. Pecking at Diseased or Injured Parts of the Body

Bleeding wattles and combs or prolapsed oviducts and similar conspicuous objects invariably start a "pecking contest" among chickens. Injured or diseased chickens sooner or later become the prey of the more vigorous ones so that the failure to remove crippled chickens from the pen is apt to lead to cannibalism. The importance of this trouble is increased by the fact that infectious diseases, such as chicken pox, bacillary white diarrhea, and tuberculosis may spread the more readily in the flock as the result of healthy chickens pecking at diseased ones.

Prevention and Control—Prompt removal of injured, weak, diseased or dead chickens from the house or yards. Chickens that have become habitual cannibals should also be removed. It is less difficult to prevent this habit from being formed than to stop it, once it has gotten a good start.

CHICKEN POX (AVIAN DIPHTHERIA)

Chicken pox is an infectious disease of poultry caused by a filterable virus (a germ so small that it cannot be seen by a microscope and capable of passing through an unglazed porcelain filter). This disease is very contagious, perhaps the most contagious known disease of poultry.

Chicken pox appears in two forms. The external form, characterized by scab formations on comb, wattles and other parts of the skin, is the form most commonly called chicken pox. The other form, internal pox, is characterized by the formation of cankers or diphtheritic membranes in the mouth, eyes, and larynx and is, for this reason, generally known as avian diphtheria.

Some birds may have both forms and occasionally chicken pox may be complicated with roup, in which case there will be a discharge from the nostrils.

Prevention and Control—As there is no treatment available, one must rely entirely upon prevention and control measures. Vaccination is employed in certain sections of the country, it is said, with good results Commercial vaccines can be obtained through the local veterinarian. Because of the fact that the virus of this disease is spread through the secretions of the mouth, it may be well to keep potassium permanganate in the drinking water. See paragraph on antiseptics in the drinking water. Extension Bul. No. 53. For directions relative to other preventative measures, see paragraph on hygiene in this bulletin.

COLDS (ROUP)

Colds are characterized by a discharge from the nostrils and eyes. There is also swelling of the nasal sinuses. Fig. I. When the sinuses swell up, there may be partial or complete closing of one or both eyes. In uncomplicated colds there is no canker in the eyes. A very disagreeable odor is always associated with colds. Roup is merely another name for colds. This disease seems to be contagious and is

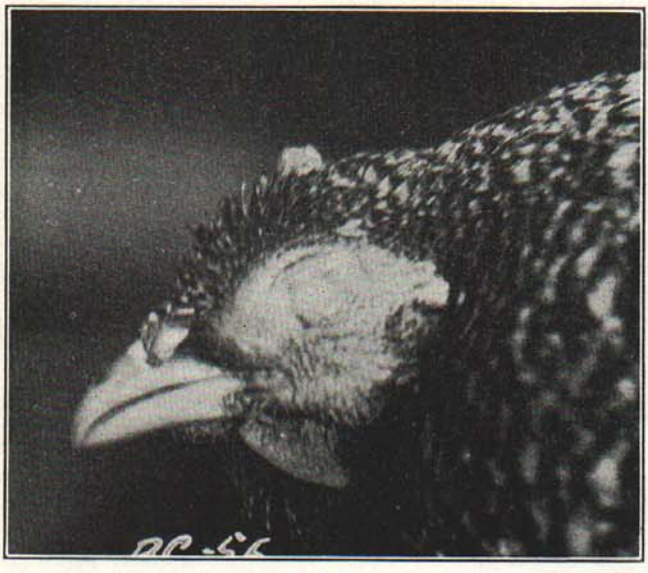

Fig. I.

generally considered to be caused by a filterable virus although some investigators do not agree with this point of view. It is true that other microorganisms may have something to do with the production of colds.

Infestation with worms, malnutrition, exposure, coccidiosis, tuberculosis, and perhaps other diseases may be predisposing causes.

Prevention and Control—Feed and house the chickens well and keep them free from internal and external parasites. Keep potassium permanganate in the drinking water during the outbreak. (See page 20, Extension Bul. No. 53.) and otherwise follow the directions given under *Poultry Hygiene.*

BACILLARY WHITE DIARRHEA

Bacillary white diarrhea is an infectious disease of chickens caused by a germ called *Salmonella* (or *Bacterium*) *pullorum*. This germ usually localizes in the ovary of the hen producing a chronic disease. Fig. II. Sometimes the heart, liver, and oviduct are involved. Fig. III. Intestinal inflammations may also be due to an infection with this microbe. In males, the heart, liver, intestines, and occasionally the testes may be the seat of infection. Droppings and eggs of infected individuals may contain the germs. For additional information on the mode of spread of bacillary white diarrhea, see Extension Bul. No. 53, pages 6 and 7.

Symptoms—In the average chronic case there are no symptoms of disease whatever. Some hens with infected ovaries may lay normally for a while and then start to lay irregularly. When the ovarian infection has advanced to the extent that all the ovules are infected, the productive ability of the ovary is destroyed and the hen will quit laying. Such a hen may look perfectly normal and may persist in going on the nest, sometimes several times a day. Acute infections in adults occur but rarely. In such cases the birds may die suddenly or remain sick for only a short time. At times one may observe droopiness, emaciation, and weakness. The presence or absence of "White Diarrhea" means very little.

Prevention and Control—Since it is impossible to detect individuals by symptoms or physical examination, one must resort to the agglutination test. By applying this test, one can pick out the majority of the infected birds and thus check the spread of the disease or even eradicate it. Birds found to be infected should be completely isolated, or better, disposed of immediately. A thorough cleaning and disinfection should follow immediately upon the removal of the infected bird. See chapter on hygiene in this bulletin and chapter on disinfection and disinfectants in Extension Bul. No. 53.

BOTULISM (LIMBERNECK)

This is a disease caused by the toxin (poison) of the botulinus bacillus. The toxin is developed when the germ grows in alkaline media such as for example canned corn, meat, and ensilage under anaerobic (absence of air) conditions. Then chickens eat food in which the botulinus bacillus has grown, they become sick if a sufficient amount of the poison has been ingested.

Symptoms—Weakness or complete paralysis of the neck, limberneck, weakness in the legs, trembling, and drowsiness are outstanding symp-

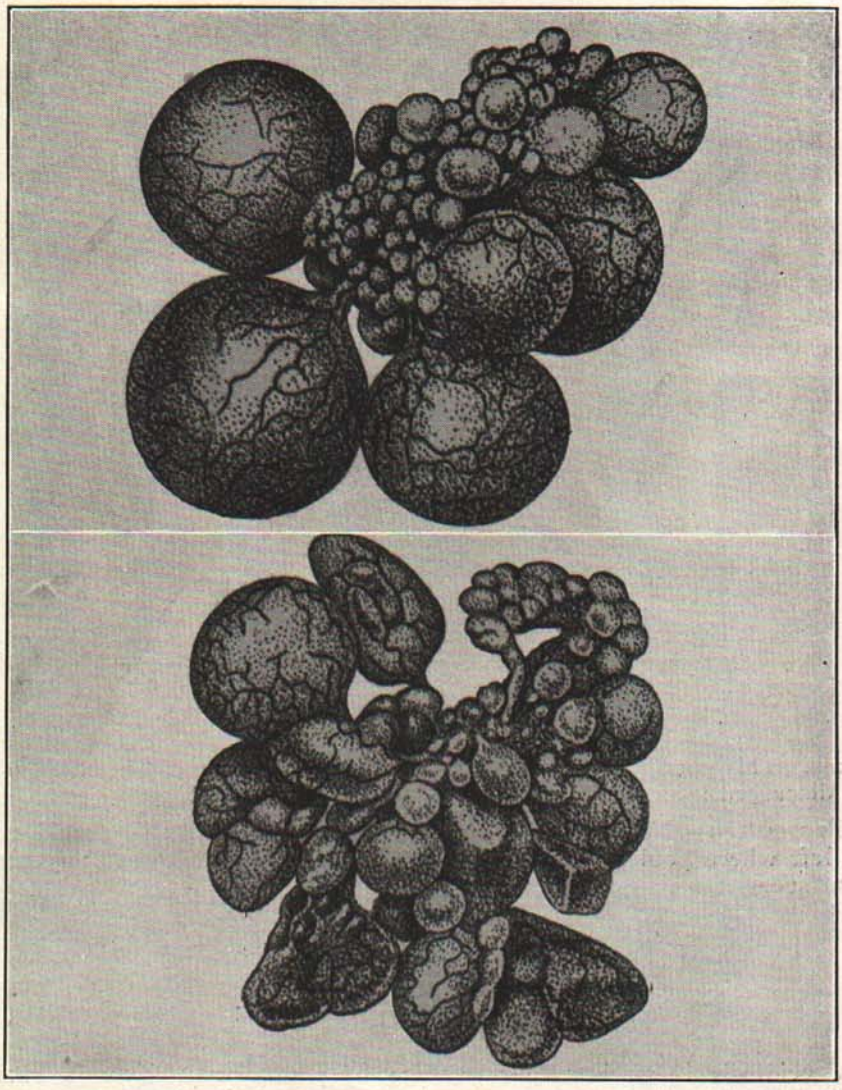

Fig. II.—Above, normal ovary; Below, diseased ovary.

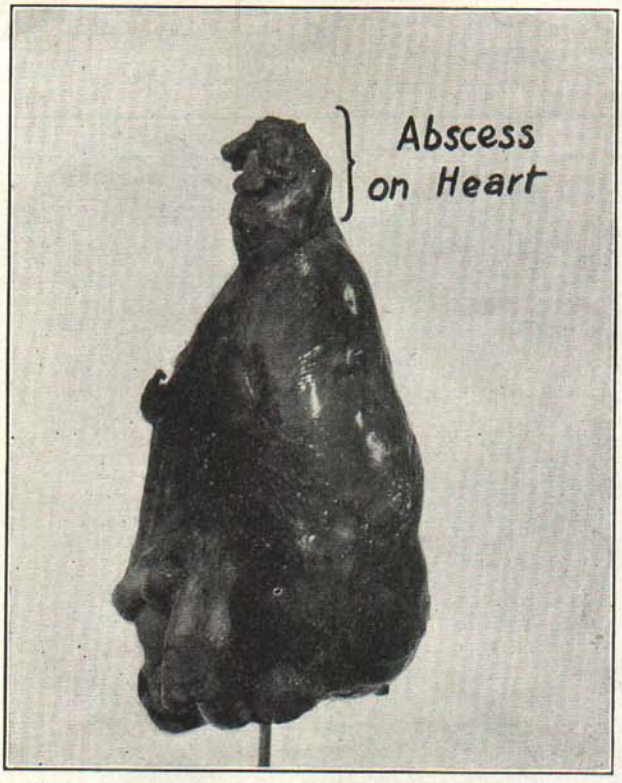

Fig. III.

toms. This condition must not be confused with wry neck which will be discussed later.

Prevention—Dead, decomposing birds or other animals should not be left where poultry can have access to them. Do not feed anything that seems even slightly spoiled.

COCCIDIOSIS

Coccidiosis is an infectious disease of poultry caused by a small animal or protozoan parasite called *Eimeria* (or *Coccidium*) *avium.*

Birds of all ages are susceptible. For information on coccidiosis in chicks, see Extension Bul. No. 53. In adults coccidiosis is generally a chronic disease manifesting itself by such symptoms as emaciation, paleness of mucous membranes, comb, and wattle, leg weakness or paralysis, incoordination of movement, excitability, droopiness, ruffled feathers and drooping wings. In flocks where coccidiosis prevails blindness is often observed, but whether this is due to coccidiosis is not

known. Chickens affected with coccidiosis also seem to be quite susceptible to roup. Bloody droppings are rarely seen in adults, but there may be diarrhea in some cases.

The most common seat of coccidiosis infection in adults is the duodenum (the upper part of the small intestines). Sometimes the ceca may show lesions also. It is not easy to diagnose coccidiosis in adults. Neither symptoms nor lesions will show the true nature of the disease. Hemorrhages and small grayish white areas in the mucous membranes are signs of coccidiosis, but very similar lesions occur in other diseases. A typical case may be diagnosed on the basis of lesions and symptoms by a well trained veterinarian if he can make a post mortem examination of a bird that is in the early stages of the disease. Usually, however, it is necessary to make use of a microscope in order to establish an accurate diagnosis.

Prevention and Control—No effective cure, in the form of drugs, is known. The addition of as much as 40 per cent of dried milk to a mash containing no meat is reported as a practical and quite effective means of control. In attempting to stop the spread of coccidiosis one should remember that the infection is spread through the droppings of infected birds and that the coccidia must remain on the ground, floors, dropping boards, or other places, exposed to air and moisture for about four days before they can infect other birds. In other words, they are harmless at the time they are discharged with the droppings. It is, therefore, a good plan to arrange for a thorough cleaning and disinfection of the houses every fourth day or at least once a week. For information on disinfection for coccidiosis see Extension Bul. No. 53.

Coccidia remain alive in the soil for a long time. Rotation of yards and ranges is, therefore, necessary. If the soil has become badly contaminated, one may obtain better results by keeping the chickens in the house all the time because a properly constructed floor in a poultry house can be disinfected, but the ground cannot.

Under no circumstances should diseased birds be allowed to remain with healthy ones longer than absolutely necessary.

FOWL CHOLERA

Fowl cholera is an infectious disease of poultry caused by a germ called *Pasteurella avicida* or *Bacterium avisepticum.* This germ is found in the tissues of affected birds as well as in the intestinal contents and the secretions of the trachea. Droppings, blood, and mouth and nasal discharges are, therefore, apt to convey the infection to other birds.

This disease manifests itself in several ways. In acute cases birds die on the roosts, on the nests, or in other places without having shown any symptoms of disease. Less acute cases may show droopiness, somnolence, darkening of the skin of the head, weakness, and yellowish or greenish droppings. Chronic infections are quite common in Michigan. In such cases one may find yellowish or greenish diarrhea, lameness, and swollen wattles. Often birds show swollen wattles with no other symptoms except, of course, more or less lassitude.

Tissue changes are often lacking in acute cases. Less acute cases may show fine white spots in the liver and hemmorrhages on the heart and in the intestines, especially the upper part. In this laboratory we have found it impossible to rely on symptoms and lesions for a diagnosis. A bacteriological examination for the purpose of isolating and identifying the causative organism is necessary.

Prevention and Control—No cure is known. As it is possible for the germ to be discharged from the mouth or nostrils, it may be well to use potassium permanganate in the drinking water. See paragraph on antiseptics in drinking water, Extension Bul. No. 53. A reduction in the amount of meat in the ration has been recommended as an aid in the control of this disease. This may not be necessary unless a mash very rich in meat scraps is used (say 20 to 30 per cent). For further information on prevention and control, see the paragraph on hygiene.

FOWL PLAGUE

Fowl plague is an infectious disease of poultry caused by a filterable virus (a germ too small to be seen under the microscope, capable of passing through a porcelain filter).

This disease does not exist in the United States now, but was introduced from Europe a few years ago at which time it was found for a short period in a number of states.

One cannot diagnose this disease positively without injecting filtered tissue extracts or blood from affected birds into a rabbit and a chicken. If the chicken dies and the rabbit lives, one may conclude that the material injected contained plague virus. Affected birds do not die without showing symptoms as is often the case in cholera. As a rule they sit around with drooping head and wings for a few days. Somnolence is a marked symptom. The tissue changes are limited to hemorrhages found in the intestines, and the serous membranes.

Prevention and Control—No cure is known. The system of prevention is the same as that suggested for fowl cholera.

FOWL TYPHOID

Fowl typhoid is an infectious disease of poultry caused by a germ *Salmonella* (or *Bacterium*) *gallinarum* (or *sanguinarium*). This disease spreads in the same way as bacillary white diarrhea although ovarian infection is less common in the case of fowl typhoid, hence, chick infection is also less frequent. The symptoms of fowl typhoid resemble those of cholera very closely. Tissue changes occur in varying degrees in the liver, spleen, heart, and intestines. The liver may be enlarged and mahogany colored. Enlargement of the spleen is common. On the heart one may find white spots or areas. Unfortunately these

changes are subject to so many variations that it is impossible to attempt to diagnose the disease by merely observing lesions. A well trained veterinarian might be able to diagnose fowl typhoid by considering the history of the outbreak symptoms and lesions. An accurate diagnosis will depend on a careful bacteriological examination; in other words, the isolation and identification of the *Salmonella gallinarum.*

Prevention and Control—There is no known medicinal treatment. In some sections of the country vaccination has been employed, it is said, with good results. Since this disease spreads in the same way as bacillary white diarrhea, and since the two diseases can be detected by the same test, the preventive measures recommended for bacillary white diarrhea will be effective against fowl typhoid as well.

INFECTIOUS ENTHERO-HEPATITIS (BLACKHEAD)

Infectious entero-hepatitis is an infectious disease of poultry caused by a microscopic animal parasite, the *Trichomonas* (or *Histomonas*) *meleagridis.* Formerly the parasite was also called the *Ameba meleagridis.*

The parasite is spread with the droppings of infected birds and is capable of remaining alive in soil for many years. Adult chickens are quite resistant to this disease. However, as chickens carry the parasite without showing any symptoms of disease, they constitute a great menace to turkeys, which are highly susceptible even after they are fully grown. For this reason one should never raise turkeys and chickens together.

Turkeys affected with blackhead become listless and segregate themselves. They may stand around with drooping wings and ruffled feathers often sleeping with the head under the wing. There may be more or less marked emaciation. Yellow droppings are rather common. The skin of the head may become dark.

The seat of the disease is the liver or the ceca or both, sometimes also other parts of the intestines. In the intestines and ceca ulcerations with cheesy masses occur, and in the liver circular, often depressed, many-colored spots appear in well marked cases.

Prevention and Control—No absolutely effective treatment is known. For information on preventive measures and other phases of infectious entero-hepatitis see paragraph on hygiene in this bulletin and also chapter on infectious entero-hepatitis in Extension Bul. No. 53.

LEG WEAKNESS AND PARALYSIS

Leg weakness is not a disease in itself but a symptom occurring in a number of diseases such as rickets, tuberculosis, coccidiosis, leukemia, worm-infestation, and others. The same is also largely true of paralysis. So called range paralysis is being studied by a number of investigators, and opinions differ as to the exact cause and nature of

this trouble. One investigator claims that paralysis is transmitted through the egg (inheritance) and another believes to have brought forth evidence to show that a filterable virus causes this disease. In Michigan we have found that coccidiosis and range paralysis are so commonly associated that we believe that coccidia are at least in part responsible for this ailment. Chickens affected with leukemia often show symptoms like those observed in range paralysis.

Prevention and Control—No effective treatment is known. Since leg weakness may occur in several diseases, one should first of all try to obtain a reliable diagnosis, and, having found the cause, a system of prevention can usually be worked out.

LEUKEMIA

Leukemia is a very common disease of chickens in Michigan. It has all the characteristics of an infectious, communicable disease, but its cause is not definitely known. Some investigators claim that a filterable virus is the cause, and others think that several diseases producing organisms may be responsible.

The symptoms of this disease vary greatly. Some birds die without having shown marked symptoms; others may show lameness, paralysis, droopiness, and paleness. Some birds remain in good flesh and may even become heavier than normal; others become emaciated.

The tissue changes are also subject to marked variations. In some cases the lesions are so much like those of tuberculosis that only an expert can tell them apart. One may even have to resort to microscopic and bacteriological examination in order to make a differential diagnosis since the early stages of leukemia may resemble two or three diseases other than tuberculosis.

Prevention and Control—There is no known cure for this disease, and since so little is known about the cause and its mode of spread, all one can do is to practice sanitation as carefully as possible. (See paragraph on hygiene.)

LICE AND MITES

These external parasites are very undesirable because they lower the productive ability of their hosts. The belief that lice kill poultry is unfounded. Mites produce more serious effects than lice, but it is questionable whether they actually kill their hosts except rarely.

Since most external parasites alternately live on the bodies of their hosts and in cracks or other hiding places in the poultry houses, one must combat these parasites not only by treating the birds but the house as well. Various materials are available for spraying the poultry house. Kerosene emulsion is useful for this purpose and is made as follows: boil one half pound of laundry soap in one gallon of soft water, remove from flame, and, while hot, add two gallons of kero-

sene, stirring well to effect thorough mixing. For spraying, dilute eight to ten times with soft water. Another preparation that may be used for painting the walls and perches is a mixture consisting of equal parts of kerosene and crank case oil.

One should have no difficulty in detecting lice on poultry, and when these parasites are found, an effort should be made to get rid of them. Louse infestation causes more or less annoyance which decreases productivity appreciably. Commercial sodium fluoride is an effective remedy against lice. It may be applied by dusting it in among the feathers around the vent, on the back, on the breast, and under the wings by means of a salt shaker. When working indoors, it may be better to apply it by taking a little of the powder between the tips of the fingers and putting it among the feathers in the places already indicated. This is done to prevent too much inhalation of the drug which is quite irritating to the mucous membranes of the respiratory tract.

Several kinds of mites are encountered in this state. The red mite is quite common and spends a good share of its time in cracks and crevices, especially in and about the perches. At night when the chickens roost, the mites come out of their hiding places and infest the birds. While on the chickens, they suck blood and cause considerable irritation. When they have filled up on blood, they return to their hiding places. This mite is grayish in color, very small, and, therefore, difficult to see except when engorged with blood at which time it is red and quite easily seen, especially so because the mites have the habit of collecting in masses. To combat this parasite, one should eliminate cracks as far as possible and then paint or spray the roosts, dropping boards, and walls with one of the preparations mentioned above or any other reliable insecticide. No treatment of the birds is necessary.

The scaly leg mite or foot mange burrows in the skin of the leg below the tarsal joint and causes irritation and exudation of grayish white material. An accumulation of this exudate causes the scales of the legs and toes to protrude. In some cases accumulation of mere dirt will effect a similar appearance of the feet and legs. An examination of the material found beneath the scale should reveal the mites if they are present. The legs of affected birds should be soaked in warm soap solution and the cheesy mass removed by scrubbing with a brush. Following this cleaning process one should apply either caraway oil or sulphur ointment (caraway oil one part, white vaseline four parts or sulphur one part and nine parts of lard). Affected birds should also be separated from the rest of the flock, and the house should be sprayed as for red mites.

Depluming mites infest the quills under the surface of the skin causing the feathers to break off or shed. The back and neck are affected most commonly. The application of sulphur or caraway oil ointment to the affected areas will usually effect a cure.

Another mite frequently encountered is the subcutaneous tissue mite. This parasite is found between the skin and the muscles particularly of the breast, abdomen, and sides. In these regions one will find these mites encapsulated in a calcareous white or yellowish white substance. These little bodies are usually a little over one sixteenth of an inch in length and may be oval in shape. They are often numerous. It seems

that this mite has no disease producing power. No means for ridding infected birds of these parasites is known.

The air sack mite infests the airsacks, trachea, lungs, hollow bones, and the peritoneum. Occasionally they may also appear in other parts of the body. The mites are so small that they are barely visible to the naked eye. This mite does not seem to have a marked disease producing power as heavily infested hens may appear to be in perfect health. The mode of transmission is unknown. No specific cures or preventive measures are known so that all one can do is to practice the general measures for mite prevention outlined above.

OVIDUCT TROUBLES

Inflammations of the oviduct occur now and then. *Salmonella pullorum,* the cause of bacillary white diarrhea, has been found to be a common cause of this trouble. Severe inflammatory processes in the oviduct may lead to retention of eggs (egg bound), soft shelled eggs, rupture and eversion or prolapse of the oviduct. Soft shelled eggs and prolapse of the oviduct are also supposed to be due to nutritional deficiency and over production. It is also possible that infections caused by germs other than *Salmonella pullorum* may be responsible. Whenever a number of birds show prolapse of the oviduct or other oviduct troubles, one should always make an attempt to obtain an accurate diagnosis. If bacillary white diarrhea infection is found to be the cause, the system of prevention outlined for bacillary white diarrhea should be followed. Should nutritional deficiency or over-production be the cause, one can usually check these ailments by correcting errors in feeding.

Rupture of the oviduct will lead to accumulation of egg material in the abdominal cavity which in turn may produce peritonitis (inflammation of the lining of the abdominal cavity). Birds affected in this way may die suddenly. At times yolks may be discharged into the abdominal cavity without entering the oviduct. When egg material accumulates in the abdominal cavity, the birds so affected are often spoken of as internal layers.

TUBERCULOSIS

Tuberculosis of poultry is an infectious disease caused by a germ called *Mycobacterium tuberculosis.* This disease seldom affects birds less than one year of age. The symptoms and tissue changes accompanying tuberculosis are seldom sufficiently distinctive to enable the layman to make a correct diagnosis. It is commonly thought that fat and apparently healthy chickens cannot have tuberculosis, but that all tuberculous chickens must be lame and emaciated. Another mistaken idea is that "white spots" in the liver are always signs of tuberculosis. At least three common poultry diseases besides tuberculosis may show

white spots on the liver, and at times it is difficult even for a well trained man to tell the nature of these spots without making use of special laboratory technic and apparatus. All preventative or curative measures must be based upon a correct diagnosis in order to be effective. Therefore, a mistake in diagnosing a disease may lead to loss of time, effort and money especially if the disease concerned requires the application of specific preventative procedures.

Mode of Spread—The droppings of infected birds and tuberculous carcasses are the principal sources of infection. Tuberculosis germs may be introduced with newly purchased stock carrying the infection me-

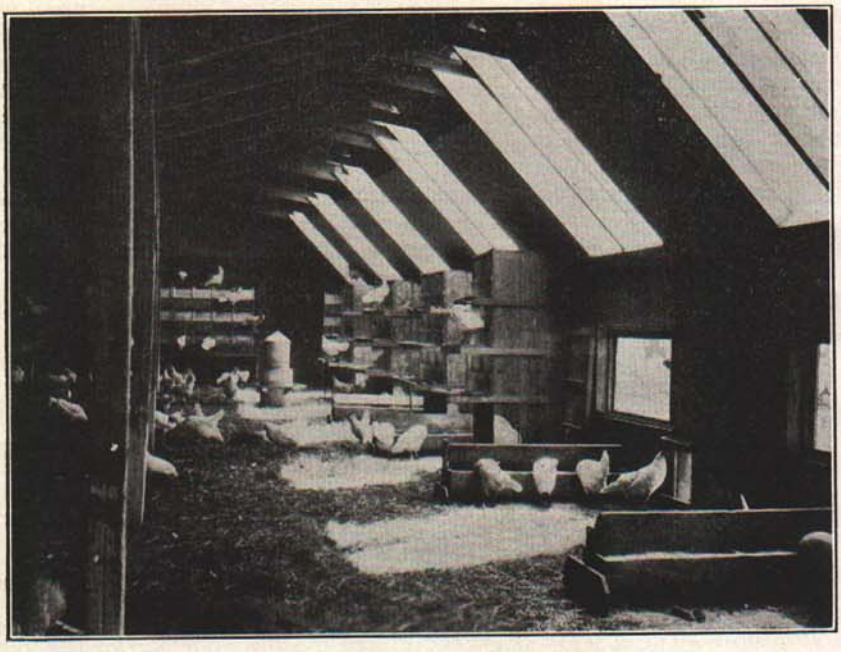

Fig. IV.—The interior of a sanitary poultry house.

chanically or otherwise, baby chicks excepted. There is no experimental evidence to show that tuberculosis is transmitted from the hen to the chick through the egg or that baby chicks carry the infection from one place to the other. Hence, from the point of view of avian tuberculosis prevention, baby chicks may be considered as a safe source of new stock. Persons, animals, and birds other than chickens may carry infection from one place to another mechanically.

While humans are not frequently affected with avian tuberculosis a few cases have been found. Swine are frequently affected, and in a few instances this type of tuberculosis has been found in cattle. Just how humans contract the disease is not known, but it seems safe to say that eggs and meat are not the source of infection. Swine and cattle undoubtedly pick up the germs from feed, water, or ground contam-

inated with droppings of infected birds. The practice of throwing dead birds into the pig pen is quite surely responsible for a number of cases of avian tuberculosis in swine.

Prevention and Control—New stock in the form of adult birds should never be introduced from infected flocks. It may be a good plan to buy stock only from tuberculosis free flocks although there is very little chance of introducing tuberculosis with eggs or baby chicks.

In order to eradicate the disease from a flock one may choose one of three different ways:

1. Dispose of the entire flock, clean and disinfect, and then discontinue poultry raising for at least one year. Old insanitary buildings used for poultry should be destroyed. This method should be employed in cases where the stock is of little value and the buildings are so constructed that effective disinfection is impossible.
2. Cull the flock down so that only the best birds are left. Keep them in isolation, and use their eggs as a source of new stock which must be raised on clean ground and in infection free houses. Dispose of the old birds as soon as possible.
3. Cull the flock carefully in order to remove birds that show visible signs of disease. Have a competent veterinarian test the rest of the chickens to remove apparently healthy carriers and consult with him as to other sanitary and preventive measures.

Otherwise practice general plant sanitation as outlined under the paragraph on poultry hygiene.

VENT GLEET

Vent gleet appears to be a communicable disease affecting the vent and cloaca of fowls. The cause is not known.

Mode of Spread—This disease seems to be spread entirely by coitus, in other words, the male bird acts as the vehicle of transmission.

Symptoms—The disease is characterized by inflammation of the vent, cloaca, and sometimes the rectum and oviduct. As the inflammation proceeds, there will be an increased amount of irritation causing the birds to peck at the affected part. The inflamed area will swell and become covered over with a purulent, membranous discharge. A very disagreeable odor is always associated with vent gleet.

Prevention and Treatment—Since vent gleet does not yield readily to treatment, one should dispose of affected birds if they are not too numerous. Should the disease have gotten too much of a start, the affected birds may be isolated and an attempt made to treat them. Male birds should be segregated if the outbreak affects a number of hens. Cleaning and disinfecting the houses is advisable as an additional precaution against spread of infection.

As treatment one might clean the affected parts with warm water, mop them dry with absorbent cotton, and then apply some mild antiseptic. Equal parts of tincture of iodine and glycerine may be used for swabbing the diseased areas.

WORM INFESTATION

Worm infestation in poultry is of rather common occurrence throughout Michigan. The most common worm found in poultry is the cecum worm. This worm is about one-half to three-fourths of an inch in length, quite thin, and whitish in color. It is found in the ceca (blind pouches) and is so widespread that it is extremely rare to find a chicken that does not have a few of these worms. If this worm has any disease producing power, it is certainly very difficult to recognize. It is quite useless to try to give any treatment for this worm as the agents given will not enter the blind end of the ceca where most of these worms are. One is, therefore, not justified in attempting to administer any remedies against this parasite. General sanitary measures tending towards the control of the spread of worms are, however, not to be neglected. In the case of turkeys it has been suggested that cecum worm infestation aids the development of blackhead.

Round worms, whitish in color and about one inch or more long, are quite frequently found in the small intestines of fowls. When these worms become numerous, they may cause disease.

Tapeworms of different kinds may also be found rather frequently in poultry. Some of these worms are so small that they are very difficult to see, and others may be several inches long. The disease producing power of tapeworms has no relation to the size of the worm. These worms are segmented and ribbon like.

Both round worms and tapeworms reproduce by the giving off of eggs which are discharged with the droppings of the infested birds. In the case of the roundworm the eggs require an incubation period outside of the body of the bird before it can reach a stage that will infest another bird. In the case of tapeworms the eggs must be picked up by slugs or flies which in turn must be eaten by chickens before reinfestation can take place.

Prevention and Control—It will be evident from what has just been stated that worm control depends primarily on house, yard, and range sanitation. Frequent cleaning of houses and rotation of yards and ranges will aid materially in keeping down worm infestation. In some sections of the United States it has become necessary to screen houses in order to keep out flies for the purpose of preventing tapeworm infestation.

There seems to be a tendency on the part of many poultrymen to think of worms as the cause whenever something goes wrong with their chickens. For this reason worm remedies, good, bad, and indifferent, are used quite promiscuously. If the worm remedies so employed are good, little or no damage may result therefrom. However, some worm remedies are apt to be harmful in themselves. There is also another side to this question. Let us say that a flock has tuberculosis or some other infectious disease, and the owner decides for himself that worms are causing the disease and that a worm remedy must be administered. What will this person gain by the administration of the worm remedy? He will do no good but will rest easy for a few days

thinking that he has done away with the cause of his poultry troubles, only to discover later that he has made a mistake and has lost some time and money. In the meantime the infectious disease has been spreading and the problem has become more costly and difficult to handle. It is for such reasons that poultry owners are urged to consult well qualified veterinarians as to diagnosis and treatment of all poultry ailments.

WRY NECK

By wry neck is meant a twisting of the neck either upward, downward, or sideways. This condition must not be confused with limberneck (paralysis of the neck). In the case of wry neck the neck is stiff. Limberneck has a specific cause and wry neck apparently has not.

While the cause of wry neck is not known, it seems that this condition may be associated with parasitism, certain infectious diseases, and perhaps other disturbances of health. The writer has seen recovery take place in twenty-four hours from the administration of a tablespoonful of castor oil in a few cases. When wry neck is encountered in a number of birds in the same flock, a careful examination should be made by a qualified veterinarian for the purpose of finding the cause if possible.