

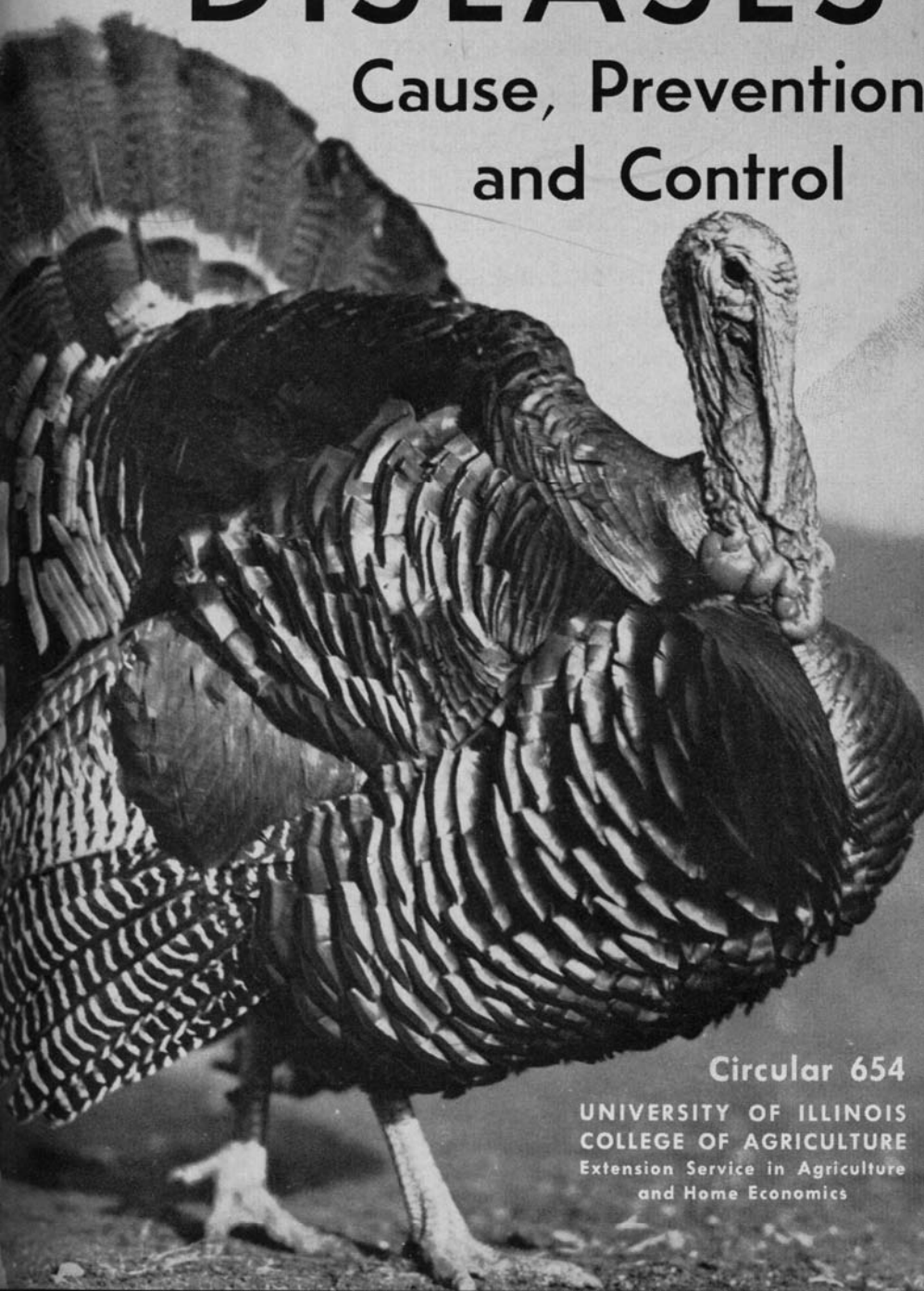
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# TURKEY

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# DISEASES

Cause, Prevention  
and Control



Circular 654

UNIVERSITY OF ILLINOIS  
COLLEGE OF AGRICULTURE  
Extension Service in Agriculture  
and Home Economics

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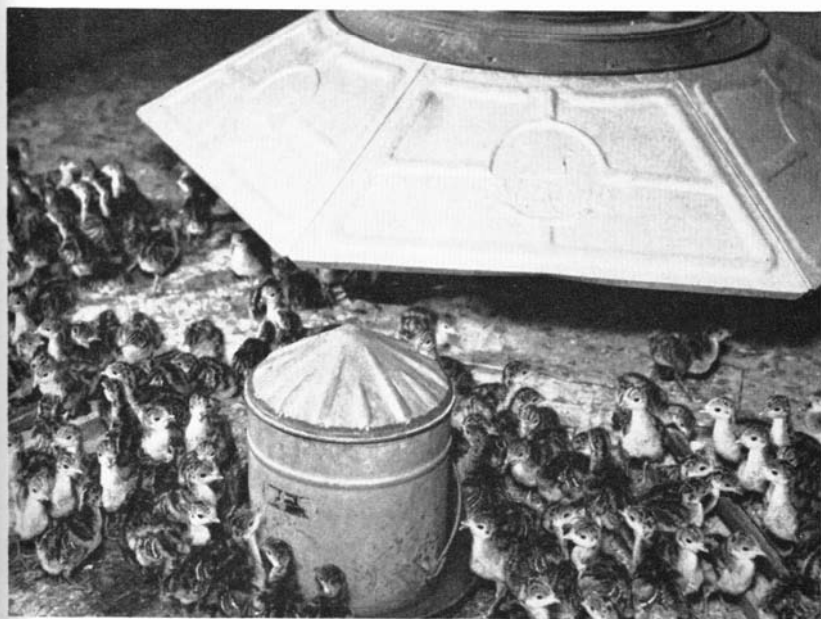
# TURKEY DISEASES

## Cause, Prevention, and Control

**T**URKEY DISEASES are a constant threat to the turkey grower. A great deal of financial loss could be avoided by a better knowledge of disease prevention and by more rapid diagnosis and treatment. Good management is the basis for all disease prevention.

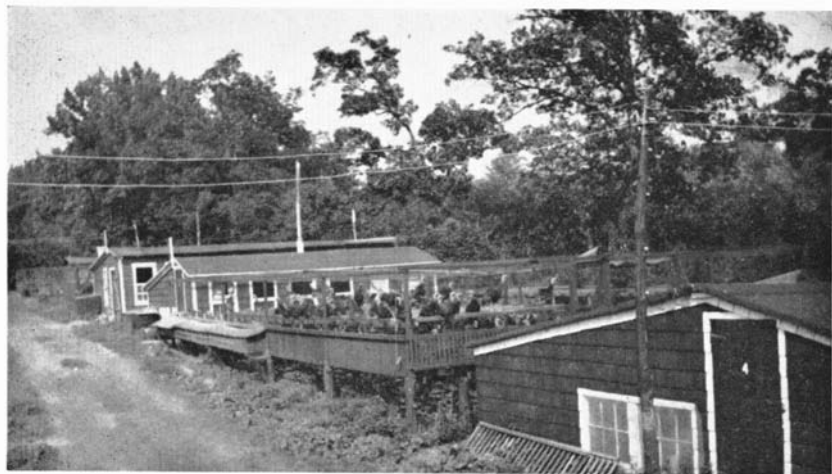
### KEEP YOUR BIRDS HEALTHY

The first two or three weeks after the poults have hatched usually make the difference between profit and loss to turkey growers. A grower who can keep a high percentage of poults alive during these



Efficient brooder stove, feeders, and waterers help to keep poults alive and healthy. Waterers are placed between the feeders, which radiate out from the brooder stove.

(Fig. 1)



These single-unit brooder houses have porches which provide extra room for turkeys when weather permits their being outside. Disease is less likely to spread in small houses than in larger houses, but the multiple-unit houses are more convenient and require less work. (Fig. 2)

weeks is likely to have a profitable business. Much of the so-called normal loss during this early period, as well as later losses, can be prevented by good, careful management.

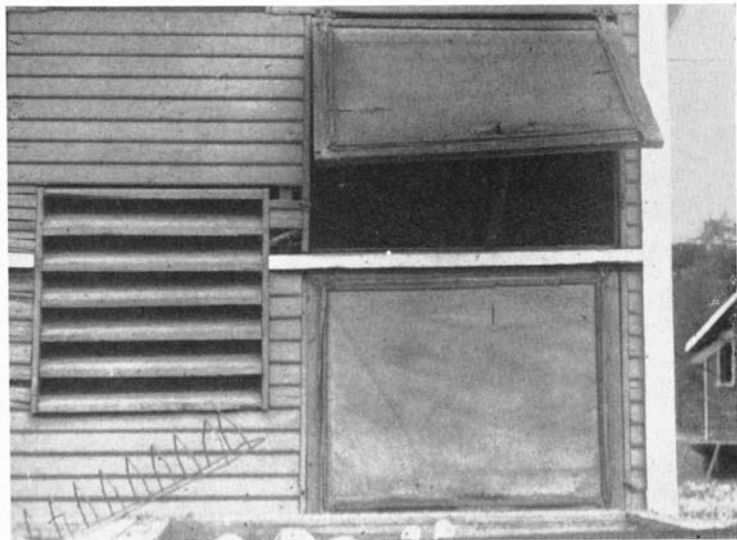
**Housing.** Choosing the best type of brooding equipment (Fig. 1) and brooder house is the first step in preventing losses among turkeys. Single-unit houses (Fig. 2) have the advantage that infected birds can be isolated, and thus there is less chance than in multiple-unit houses for disease to spread. However, it takes more work to service the single-unit houses. The larger houses are more efficiently operated, but they permit the rapid spread of disease.

In the multiple-unit house, pens are often arranged in one row, with doors opening onto a common alleyway. Units can be serviced from this alleyway. Each pen has a porch that is separated from the next porch by wire netting. Use of a central heating system in addition to brooder stoves helps safeguard the health of the poults.

*Avoid overcrowding* if you want to save poults. Overcrowding keeps the weaker birds away from the feed and water and also tends to promote cannibalism (Fig. 3). Often in attempting to operate efficiently, a grower crowds too many birds into too small a space. Some growers provide about 1 square foot of space for every seven



Picking the cloaca, a common form of cannibalism, often results from overcrowding. The cloaca becomes irritated and is sometimes everted, providing an increased attraction for the picking poults. (Fig. 3)



Ventilating system in small brooder house. Note that air intake is slanted upward to prevent direct drafts on the poults. An outlet is at the peak of the house. Windows may be left open on warm days. (Fig. 4)

or eight poults, but putting only three or four birds into this amount of space may cut losses by 3 or 4 percent.

*Ventilation* in the brooder house is another "must" if poult losses are to be kept at a minimum. Accumulations of water and droppings on the floor make the house damp. Poults need a warm, dry atmosphere if they are to grow well and stay healthy. For this reason it will pay to put a good ventilating system in your brooder house.

If you use a forced-air system, be sure that it is carefully installed. Alternating cold and hot air blowing on the poults is dangerous, especially during the first week after hatching. Even natural ventilation may be harmful if there is a draft on the birds.

Fig. 4 shows a simple type of ventilation. The air is directed upward as it enters the house, and thus no drafts blow on the birds. A ventilator at the top of the house helps to get rid of hot, stale air. A screen over the ventilator will keep insects out.

**Sanitation.** The importance of sanitation in managing turkey flocks cannot be overemphasized. Keep the litter in the house clean and dry at all times. Coarse materials like chopped corncobs or shavings are better than fine materials like straw or sawdust. If coarse litter is used, raking it every few days will cause the moisture, droppings, and old feed to settle to the bottom and leave the top layer relatively dry. Fine litter forms a thick, wet mass that is hard to break up and remove. Either kind, however, needs to be replaced fairly often with clean litter.

Empty and clean the feeders at least twice a week — both those on the range and those in the house. Wash the drinking fountains thoroughly every day. A contaminated water supply may cause disease to spread quickly through a flock. Turkeys need to have plenty of water, too, whether they are on the range or in the house.

To prevent disease it is advisable to rotate the land on which turkeys are kept. The old ground quickly becomes contaminated with droppings. Try to move all birds to new land at least every three weeks, and do not use the same range again for two or even three years. When selecting a range, be sure the drainage is good. Wet ground increases the possibility of disease. A gentle slope often helps to keep the land dry.

**Protect birds on the range.** Turkeys must have adequate shelter on the range (Fig. 5). They need to be protected from rain, wind, and extremely hot or cold weather. Birds may be smothered if they have to huddle into too few shelters on a sudden cold night in early



Turkeys on the range need enough shelters to protect them from the sun in summer and from sudden cold in the spring. Many feeders should be scattered around, and there should be a good distance between feeders and waterers to keep feed and water from caking on the litter. (Fig. 5)

spring. And during the hot days of July and August sunstroke sometimes occurs. Good lighting is needed on the range to lessen the danger from dogs or wild animals. It is advisable to keep a hospital pen on the range at some distance from the flock so that sick birds can be culled and isolated.

## WHAT TO DO WHEN DISEASES STRIKE

Turkey diseases are hard to diagnose accurately, for the symptoms of various diseases are often alike. A lymphocytic tumor of the liver, for example, may be mistaken for blackhead, or the lesions of fowl cholera may resemble those of fowl typhoid or erysipelas. Lack of information about the cause and history of the outbreak may further complicate diagnosis.

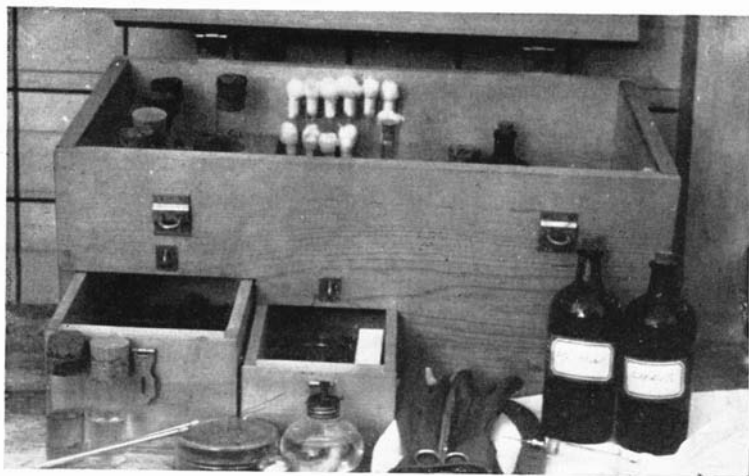
When signs of disease appear among your birds, call a veterinarian at once. Do not put off calling him in the hope that the symptoms will disappear—a delay may complicate the treatment and increase the loss. Often a quick, accurate diagnosis and early treatment will prevent large losses.

The veterinarian may be able to diagnose the disease in the field with portable laboratory equipment (Fig. 6). This type of diagnosis



is satisfactory for some diseases, but others require a more detailed examination which can be made only in a laboratory.

If you need more help than the veterinarian can give, take a typically affected live bird to the nearest competent diagnostic laboratory. Dead birds are usually not so satisfactory as live ones, be-



Equipment used by veterinarians in field work includes media and instruments for making autopsies and for finding and identifying bacteria and parasites, as well as specimen bottles and disinfectants. (Fig. 6)

cause the diagnostician needs to correlate the symptoms in the live bird with the autopsy and laboratory findings. Also, because some of the agents that cause disease die quickly and deteriorate in the carcass, it may not be possible to find and identify them.

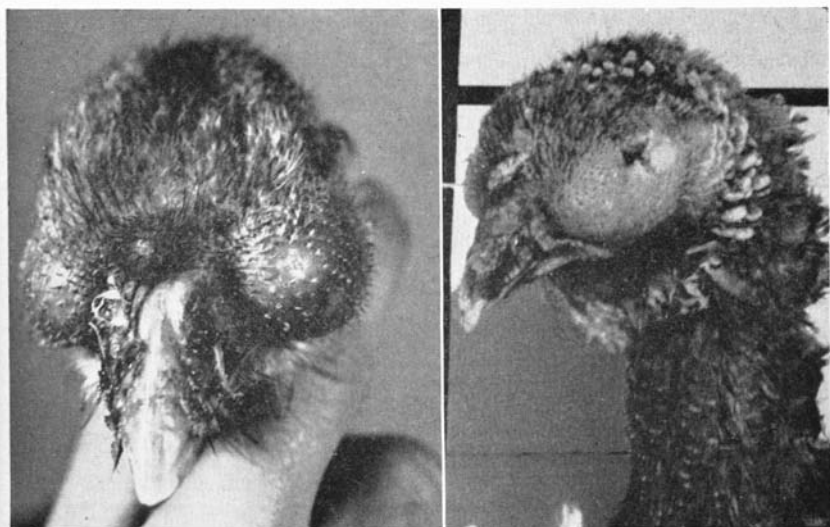
## DISEASES OF THE RESPIRATORY SYSTEM

### Infectious Sinusitis

Infectious sinusitis is usually not acute—that is, large numbers of birds do not die in a short time—but the infection often continues over a period of months. The birds do not grow and develop normally, and as a result growers often experience large financial losses.

**Cause.** As the name suggests, infectious sinusitis is contagious. Discharge from the sinuses of infected birds may infect normal





Bird on left shows the marked swelling on both sides of the face and the nasal discharge characteristic of bilateral sinusitis. Swelling has become so intense on bird pictured at right that it has caused the eye to shut. (Fig. 7)

turkeys. Although the exact causative agent is not known, it is probably a virus or rickettsia.<sup>1</sup> Bacteria have also been found to cause a sinus infection which may be confused with infectious sinusitis but is not the same thing.

**Symptoms.** The main symptom of this disease is a swelling of the sinuses on one or both sides of the face. When it occurs on both sides of the face the disease is known as bilateral sinusitis (Fig. 7). A nasal discharge often accompanies the swelling.

Sometimes the swelling is so severe that it closes the eyes. It may also close the nasal passages, thus making breathing difficult. The disease may confine itself to the upper respiratory tract, or it may also affect the bronchi, lower trachea, lungs, and air sacs.

**Treatment.** The most effective treatment is to remove the fluid from the swollen sinuses and apply medicine (Fig. 8). Use a 5-cc. sterile syringe attached to a 1½-inch 18- or 19-gauge needle. Then,

<sup>1</sup> A *virus* is an ultramicroscopic organism that cannot be seen under an ordinary microscope. A *rickettsia* has many of the characteristics of a virus, but can be seen under a microscope. Viruses and rickettsiae are both difficult to grow artificially. A *bacterium* is a rod-shaped organism that can be seen with the aid of a microscope and can be grown on laboratory media.

leaving the needle in place, inject about 4 cc. of a 1-percent solution of silver nitrate into the sinus. It may be necessary to repeat the treatment if the swelling comes back.

Sometimes in a long-standing infection the fluid is thick and yellow and cannot be removed with a syringe and needle. Then it is necessary to cut out a small triangle of skin overlying the sinus and force the thickened material out through this opening.

**Prevention.** Following the general sanitary measures outlined on page 6 will help to prevent sinusitis. Water and feeding systems are a source of contagion; clean and disinfect them every day during an outbreak. Keep pens and ranges as dry as possible. Remove all



Discharge resulting from bilateral sinusitis is removed with a syringe and needle. Treatment is then given through the same needle. (Fig. 8)

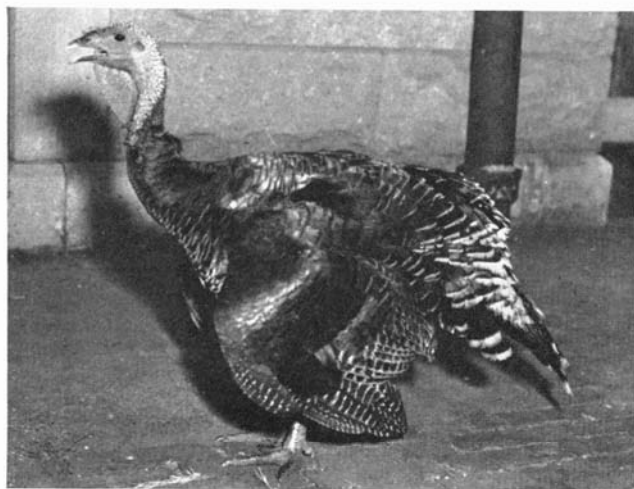
affected birds from the flock and isolate them. *Do not return them to the main flock* even though they have been treated and apparently have recovered.

### Air Sac Infection

A disease which seems to affect only the lower respiratory tract has appeared recently in Illinois turkey flocks. It is referred to as "air sac infection." Breeding flocks are mainly affected. Usually no other respiratory troubles show up in the poults. Although large numbers of birds may be affected in a single flock, there are few deaths unless the birds get too much exercise.

**Cause.** A virus is probably the cause of air sac infection. It may be similar to or the same as that causing infectious sinusitis. In laboratory experiments the disease has been reproduced in both turkeys and chickens.

**Symptoms.** The commonest symptom is gasping (Fig. 9), and there is often a mucous discharge from the trachea. There is no evidence that other parts of the body are affected. The disease causes little loss of flesh. If the bird is exercised or hung by the legs, the respiratory difficulties increase and it may die from asphyxiation.



Gasping is typical of air sac infection. Accumulations of mucus in the lower part of the windpipe make breathing difficult. (Fig. 9)

In one flock it was noted that when the birds were driven to a new range several of them would gasp violently, run a few steps, and then die, apparently from suffocation. Each day when the flock was culled, examination showed that a few more birds were affected.

**Autopsy.** Autopsy examination of birds with air sac infection shows a marked thickening of the air sac membrane and sometimes congestion of the lungs. There is always a moderate amount of thick mucus in the trachea, or windpipe.

**Treatment and control.** Since the source and the exact cause of the infection are not known, it is difficult to make recommendations for control and treatment. Daily culling will, however, help to prevent contagion. Equipment should be cleaned and disinfected frequently. The death rate can be kept low by following good management practices.

## Newcastle Disease

This is a highly contagious disease. Turkeys, chickens, pheasants, and other species of birds are susceptible to the infection. Although the disease has not been prevalent in Illinois turkey flocks, it has caused a great deal of loss in some other areas of the country.

**Cause.** Newcastle disease is caused by a virus. Discharges from the nose contain the virus and probably cause the disease to spread from one bird to another. Liver, spleen, brain, and lungs of infected birds also contain a large amount of virus.

**Symptoms.** The disease affects mainly the respiratory and nervous systems. The first symptoms are gasping, nasal discharge, and sometimes rattling in the throat. Several days after these respiratory symptoms appear, nervous reactions may occur. They include twisting of the neck, paralysis of the wings and limbs, and sometimes tetanic (jerking) spasms of the body. Some of the affected birds may walk backwards. Mature birds may not develop nervous symptoms. Occasionally the respiratory symptoms may be mild enough to be mistaken for a cold. In laying birds there is an abrupt drop in egg production.

**Treatment and prevention.** There is no satisfactory treatment for birds actively infected with the disease. Birds that recover from an attack of Newcastle disease will be immune to further infection.

Strict sanitary management is of prime importance in preventing Newcastle disease. Fumigate incubators regularly with formaldehyde. Before new birds are brought in, scrub houses, brooders, and other equipment with lye solution, and then fumigate them if practicable. If the disease should occur in one or several pens, keep the birds in strict isolation. Different people should care for infected and for clean pens. After the disease has been eradicated, fumigate the pens which contained sick birds and leave them empty for two weeks.

Since the disease spreads rapidly through a flock, early diagnosis is essential. If laboratory examination shows that the disease is in a flock, healthy birds should be immunized. Birds over six weeks of age may be actively immunized with live Newcastle disease vaccine. The vaccine should be administered by a veterinarian or other experienced person. *Vaccination has no value for infected birds.* Poults hatched from eggs of immune hens will be immune to Newcastle disease virus for about four to six weeks.

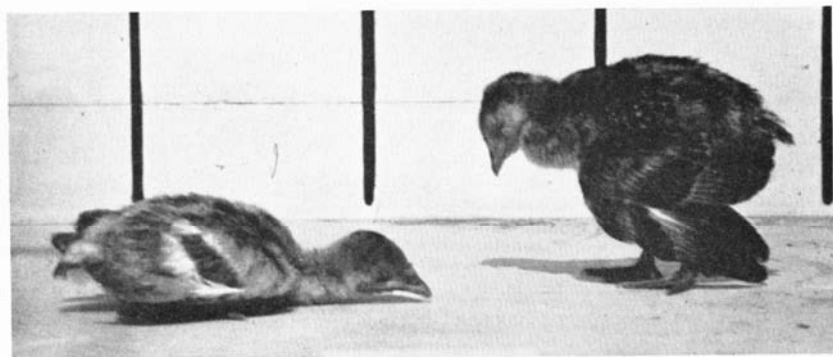
For further information see Illinois Circular 651, "Protect Your Poultry Against Newcastle Disease."

## DISEASES OF THE DIGESTIVE TRACT

### Trichomoniasis

Trichomoniasis is a disease that affects the upper part of the digestive system, especially the crop. It is associated with unsanitary management practices. Although most cases occur in poults, older birds are also susceptible.

**Cause.** The cause of trichomoniasis is a flagellate protozoan,<sup>1</sup> *Trichomonas gallinae*. There are other harmless species of *Trichomonas* in the lower digestive tract, so the location of the parasites must be taken into account in making a diagnosis. Microscopic examination is needed to detect the protozoa.

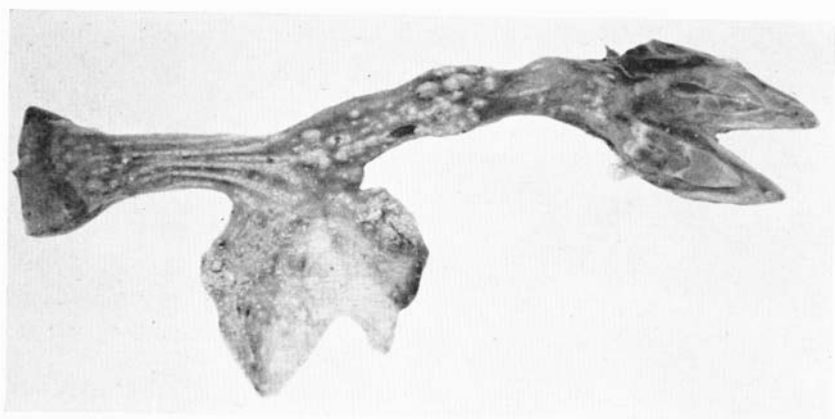


A "tucked-in" appearance around the crop is a frequent symptom of trichomoniasis. Birds also lose weight and become depressed. (Fig. 10)

**Symptoms.** The disease usually presents a picture of progressive wasting. Affected birds gradually lose weight, become depressed, and often have a "tucked-in" appearance around the crop (Fig. 10). If the birds are young, large numbers may develop the disease, but only a few older birds are usually affected at one time. The death rate is high among affected birds.

**Autopsy.** The most common finding at autopsy is severe ulceration of the crop and esophagus or gullet (Fig. 11). Adhering closely to the linings are many cone-shaped projections of yellowish necrotic (dead) tissue. When these projections are removed, they leave a de-

<sup>1</sup>A flagellate protozoan is a one-celled organism with fiber-like processes, or projections, which enable it to move rapidly.



Crop and esophagus (gullet) of birds suffering from trichomoniasis usually have raised areas over the surface. (Fig. 11)

pression of raw tissue. In advanced cases the ulcerations may fuse, giving the appearance of large masses of dead tissue.

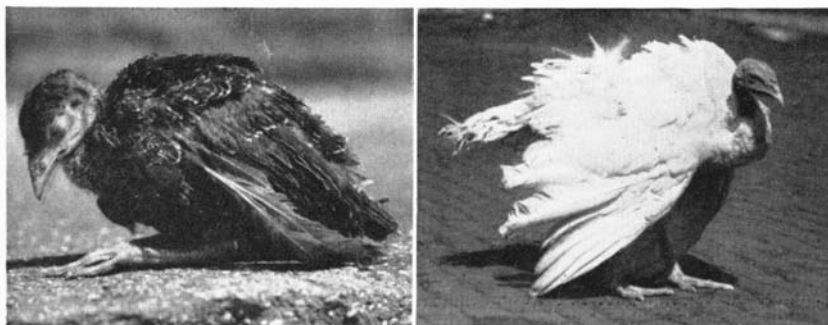
**Treatment and control.** The control of trichomoniasis is a sanitary problem. Follow the general rules for sanitation; isolate all affected birds; *keep drinking water clean*. So far, medicinal treatment has not been found of value.

### Hexamitiasis

Hexamitiasis, or infectious catarrhal enteritis, is an intestinal disease of young turkeys which usually occurs during the first few months of life (Fig. 12). Outbreaks are usually acute, death losses subsiding after one or two weeks. The death rate depends to a large extent on management practices and on the age of the birds—the older the birds, the lower the death rate. The disease is apparently not common in Illinois.

**Cause.** A flagellate protozoan, *Hexamita meleagridis*, is the cause of this disease. This same organism, however, may be found in the intestinal tract of older turkeys, where it apparently causes no ill effects. Organisms similar to *Hexamita meleagridis* may also be found in the intestinal tract. Microscopic examination by an expert is necessary for accurate diagnosis.

**Symptoms.** Affected poults tend to huddle near brooder stoves and are listless and reluctant to feed. Sometimes there is a watery diarrhea



Poult (left) and young turkey affected with hexamitiasis. The disease is most likely to affect turkeys during the first few months of life. Severe depression and a "foamy" diarrhea are characteristic symptoms. (Fig. 12)

and the droppings have a foamy consistency. The feathers are usually ruffled. The birds tend to stand with a marked "tucking-in" of the crop region, similar to that noted in trichomoniasis.

**Autopsy.** Post-mortem examination shows an enteritis (inflammation of the intestines) and a peculiar foamy appearance of the intestinal contents. Often the cecal "tonsils" located at the junction of the intestine and ceca are inflamed and enlarged. Scrapings of the intestine examined microscopically show *Hexamita meleagridis*. The scrapings should be taken from the upper part of the intestinal tract.

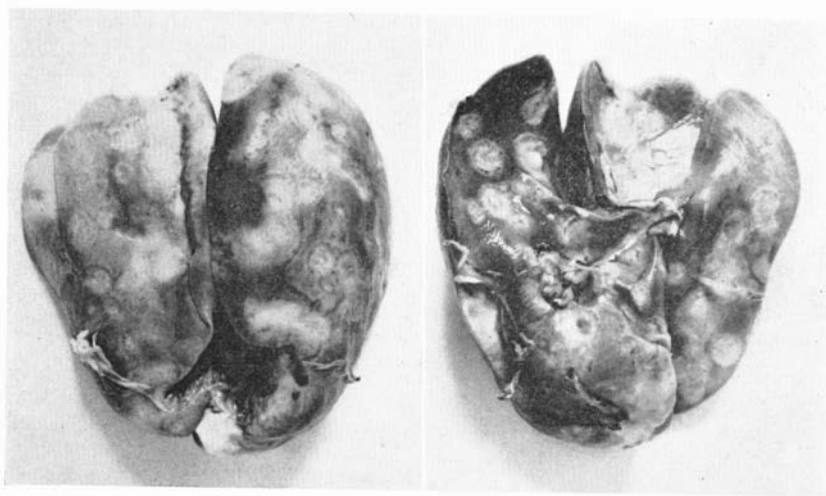
**Treatment and control.** Since droppings are the chief source of the infection, sanitary measures should be strictly followed. Because adult turkeys may be carriers of the disease, remove all breeding stock from the premises before poults are brooded. Keep birds that have recovered from the disease away from the younger birds. No medicinal treatment has been found effective either in curing or preventing the disease.

### Histomoniasis

Histomoniasis (enterohepatitis, blackhead) has probably had more harmful effect on the turkey industry than any other single disease. In fact, it is the reason that many flock owners have abandoned the turkey-growing business.

**Cause.** Histomoniasis, or blackhead, as it is more commonly called, is caused by a flagellate protozoan, *Histomonas meleagridis*. This organism, which produces lesions (injuries) in the cecum and





These livers show the well-defined, depressed areas of infection which result from histomoniasis, or blackhead. (Fig. 13)

liver, is transmitted by the cecal worm of chickens and turkeys, *Heterakis gallinae*. The cecal worm, however, may not always be essential in transmitting the disease.

**Symptoms.** Yellowish or sulfur-colored droppings are one of the most constant symptoms of histomoniasis. This yellowish diarrhea is accompanied by listlessness, ruffled feathers, and rapid loss of flesh and condition. In uncontrolled outbreaks the death rate is usually above 50 percent. Few if any birds recover from a well-established case of the disease. Losses may extend over several weeks, since infected birds will transmit the disease to healthy birds in the flock.

The common name *blackhead* is a misnomer. Although darkening or discoloration of the head may occur this is not a constant or characteristic symptom of histomoniasis.

**Autopsy.** At autopsy lesions are usually found to be confined to the ceca and liver. The ceca are enlarged and contain a thick yellow-brown core of dead tissue. Often the lumen (the cavity in the center of the cecum) is completely closed. The liver contains many areas of dead tissue, each with a depressed center (Fig. 13). These areas extend deeply into the liver.

**Treatment and control.** Because no medicinal treatment is known, control measures are entirely preventive. Rotation of range lands is important. Turkeys should be kept on one plot of range land for

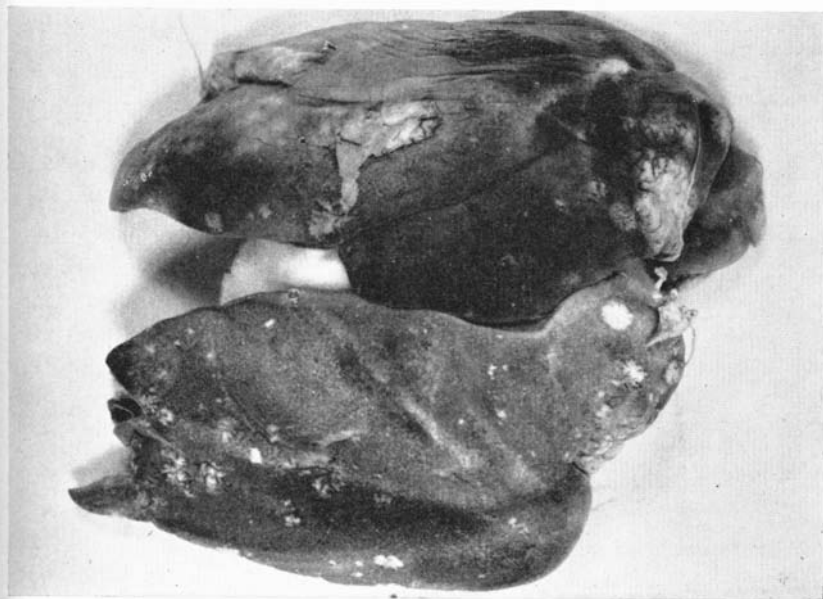
no longer than three weeks, and then moved to new ground. The old ground should not be used again for two or three years. The flock should be moved as soon as evidence of disease appears. Since chickens carry the disease, though they are not usually affected themselves, they should be kept away from the turkey flock.

### Lymphomatosis

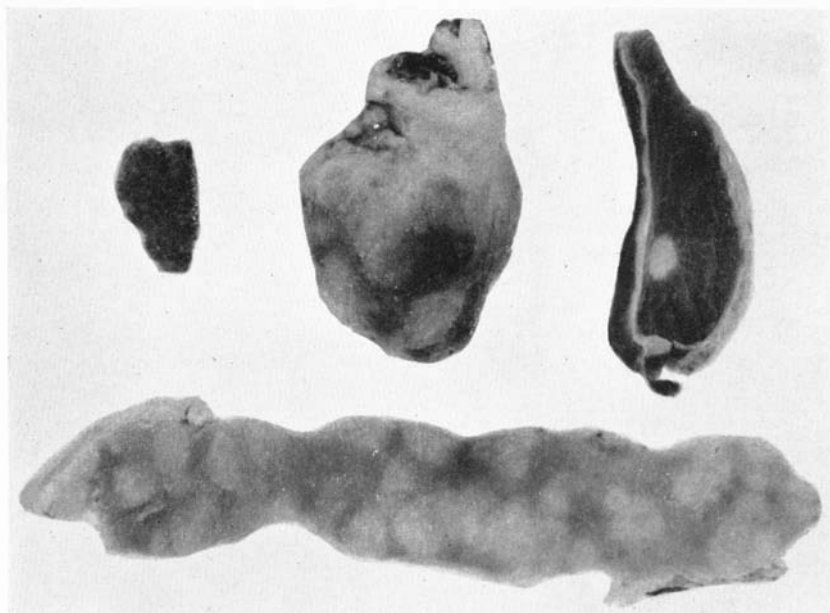
Lymphomatosis is not a serious affliction of turkeys in Illinois. Usually only a few birds are affected in a single flock.

**Symptoms.** Affected birds gradually lose condition, although their appetites are not noticeably impaired until the disease is well advanced. There may be partial paralysis—one wing may droop, or the bird may lose the use of one leg, usually dragging it and finally being unable to stand.

**Autopsy.** When the carcass is opened, the most common finding is an enlarged liver with white areas on the surface that are irregular both in shape and size (Fig. 14). These areas are raised above the



The enlarged liver that usually results from lymphomatosis has given the disease its popular name of "big-liver disease." The many small white areas on the surface of the liver are also typical. (Fig. 14)



Spleen, heart, gizzard, and intestine with the pale, raised lesions of lymphomatosis. The ovary and testes, as well as the liver, may also be affected. Sometimes tumors are attached to the wall (mesentery) of the abdominal cavity, rather than to the organs. (Fig. 15)

surface of the liver, thus differing from those of blackhead, which are sunken. The liver may be unusually firm.

Other organs may also be affected (Fig. 15). Often the spleen is enlarged and covered with small white areas as if it had been sprinkled with sawdust. The muscle of the gizzard, as well as the lungs, heart, and kidneys, may also have small white areas. The intestine may have a nodular appearance. When paralysis occurs, the nerves of the legs or the wing are usually affected, becoming enlarged and dull white in color.

**Cause.** Although many workers believe an infectious agent is involved, the exact cause of the disease is not yet known.

**Treatment and prevention.** There is no known medicinal treatment for lymphomatosis. Inheritance may play some part in susceptibility of birds to the disease. For this reason it is wise to choose breeding stock from flocks which have not had the disease or in which only a few birds have had it.

## Coccidiosis

Coccidiosis is not a common turkey disease in Illinois. It is found mainly in poults, although in rare cases older birds may be affected.

**Cause.** The organisms causing coccidiosis in turkeys, *Eimeria meleagridis* and *Eimeria meleagrimitis*, are different from those found in chickens and do not infect other species of fowl. Since the lesions of coccidiosis are similar to those of other intestinal diseases, a careful examination is required to diagnose the disease.

**Symptoms.** Birds tend to huddle around brooders or in corners, refusing to eat or drink. A white diarrhea is sometimes noticeable. Death is rapid in infected birds.

**Autopsy.** The disease affects the lower part of the digestive tract. There is a catarrhal enteritis (mild inflammation of long standing in the intestine) with a varying amount of thick, white material in the lumen (passageway) of the intestine. There may also be a small amount of hemorrhage in the mucous membrane of the intestine.

**Treatment and control.** Sulfonamides applied in the same way as in controlling chicken coccidiosis will often cut down the number of deaths. Sulfamerazine, sulfamethazine, or sulfaquinoxalene in the feed or drinking water has been found to be effective.

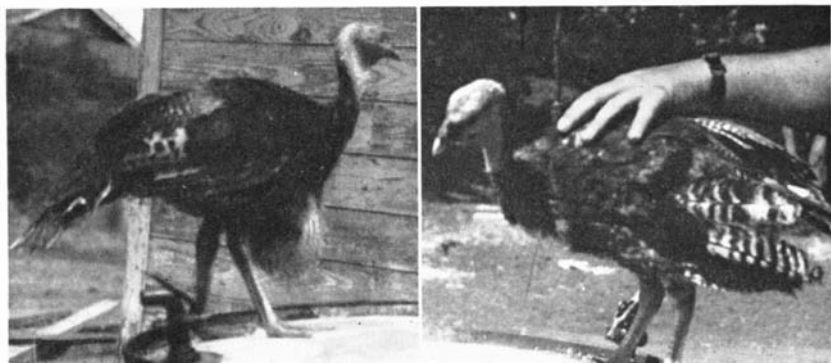
## Pendulous Crop

Both growing and adult turkeys sometimes have dilated or enlarged crops (Fig. 16). This condition is called pendulous crop. The crop and its covering skin hang so much lower than normal that there is danger of the bird's stepping on it or injuring it in other ways.

**Symptoms.** The crop region becomes increasingly larger. There are no apparent signs of general illness. The birds usually continue to eat and drink until prevented by the swelling or injury.

**Cause.** The exact cause of pendulous crop is not known. Some workers think it may be inherited or caused by nerve injury. Others think it results from eating long blades of fresh grass or hay that cannot be moved through the digestive tract. There are indications, also, that drinking unusual amounts of water may contribute to the condition. Air temperature may be involved, as apparently more cases develop in warm weather.

**Treatment.** It is necessary to empty the crop in order to relieve undue pressure. This may be done by flushing out the feed and other



The same turkey before and after operation for pendulous crop. After part of the crop was removed by surgery, the bird gained weight rapidly and was marketed as a healthy, normal turkey. (Fig. 16)

contents. Using a veterinary stomach pump, fill the crop with warm water. Then empty the crop by inverting the bird and massaging the crop to force out the semi-fluid material.

Surgery is probably the most effective way to correct pendulous crop (Fig. 16). With a little practice and guidance, growers can learn to perform the following simple operation: Pluck out the feathers over the pendulous part, and make a cut 5 or 6 inches long in the skin. Then separate the skin from the crop so that half or more of the crop is free. Holding the crop over a pan or pail, cut into it and drain out the contents. Then draw out the crop and remove a large portion of it, taking care not to cut the esophagus that leads from the mouth to the crop.

Sew the two raw edges together with gut suture or strong sewing thread that has been boiled in water for 10 minutes. Close the skin in the same way. Give the bird only water for 48 hours, and then feed it mash for two weeks. At the end of that time it may be returned to the flock and fed the normal ration.

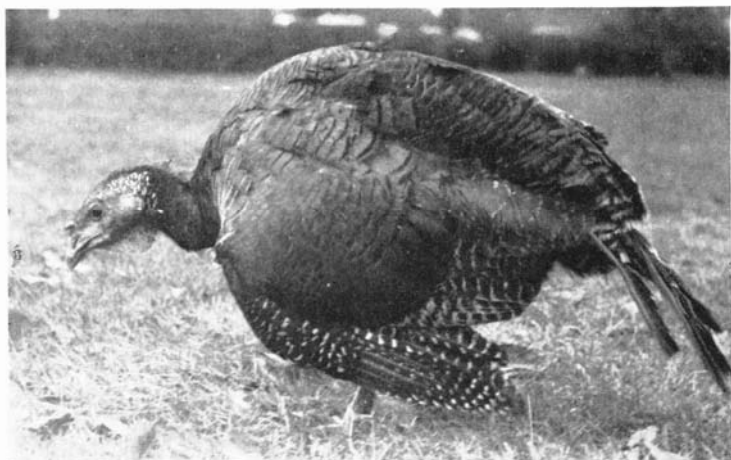
## GENERALIZED (SEPTICEMIC) DISEASES

### Fowl Cholera

Fowl cholera is a highly infectious disease affecting turkeys, chickens, and other species of fowl. It is caused by the bacterial agent *Pasteurella multocida*. The disease is apparently particularly virulent in turkeys, and in an outbreak losses are often heavy.

**Symptoms.** The disease strikes quite suddenly; a flock owner may not know that anything is wrong until he finds several dead birds one morning. Losses increase rapidly until a high percentage of the flock is either ill or dead. After the first outbreak, losses may extend over a period of some weeks, or a second acute outbreak may occur.

Affected birds are depressed (Fig. 17). They tend to huddle into a corner or stand off by themselves. There may be a dark discoloration about the head and a fetid diarrhea. Birds are extremely warm to the touch, as the body temperature may go well above 108° F. before death. They may be very thirsty in the early stages of the disease, but they will soon refuse both food and water and be content to lie on the ground with eyes closed and heads and necks "drawn-in."



Symptoms of depression shown by this turkey are typical of fowl cholera. *Pasteurella multocida* was isolated from the liver at autopsy. (Fig. 17)

**Autopsy.** The high fever causes the muscles to redden, and the blood vessels and small capillaries throughout the body are congested. Hemorrhages in the base of the heart appear as small red dots against the fatty tissue. There may also be hemorrhages in the heart muscle, or myocardium. The liver either has a dark-red congested appearance or is a light bronze with small hemorrhages throughout. It may or may not be enlarged (Fig. 18).

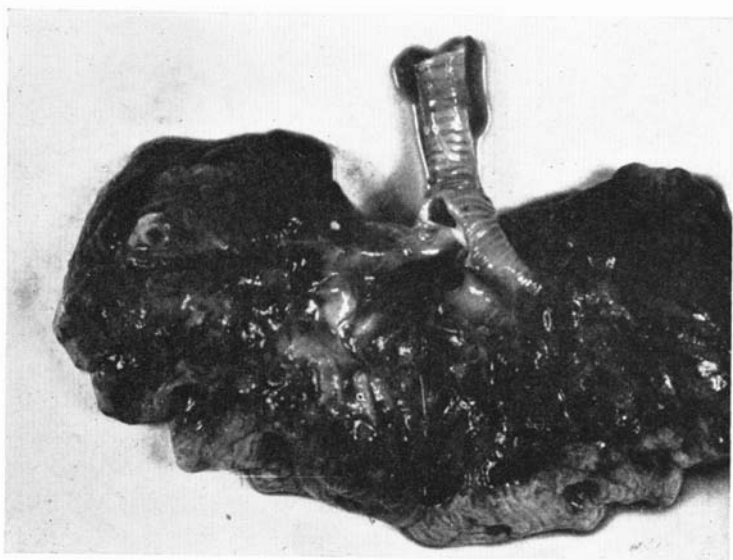
The ovaries are dark and hemorrhagic (congested with blood). Kidneys, lungs, and other internal organs may also appear hemorrhagic

(Fig. 19). The spleen may show small hemorrhages. The intestine is often severely inflamed, and the contents are rather thick and viscid.

**Diagnosis and treatment.** Although symptoms, history, and lesions may strongly suggest fowl cholera, a laboratory examination is necessary to confirm the diagnosis. If the agent *Pasteurella multocida* is



Enlarged livers and hearts from birds having fowl cholera. Note the dark color resulting from hemorrhage in these organs. (Fig. 18)



Severe hemorrhages on the lung are often found when autopsies are performed on birds with fowl cholera. (Fig. 19)



isolated upon bacteriological examination of the internal organs, the diagnosis is positive. It is extremely important that this examination be made in the early stages so that treatment may be started promptly.

Sometimes an outbreak may take a chronic form. In these cases the losses extend over a long period and are not especially severe at any one time. This situation may follow an acute outbreak or may precede a sudden acute flare-up.

There is no complete cure for fowl cholera. To date no satisfactory bacterin or vaccine has been produced, and until recently no drug or medicine has been very effective. The newer sulfonamides, however, appear to do some good. Experimental evidence shows that the group of drugs which includes sulfamerazine and sulfamethazine temporarily hold down the death rate if treatment is started early. After sulfa treatment is stopped, the disease may reappear and losses continue.

### Fowl Typhoid

Fowl typhoid is a contagious disease caused by a bacterium, *Salmonella gallinarum*. Losses in acute outbreaks may be 25 percent or higher. There is evidence that the disease can be transmitted through the egg. It usually occurs, however, in growing or mature turkeys.

**Symptoms.** Though some birds may die suddenly without having shown noticeable symptoms, affected birds usually are sick for several days before death. They lose appetite and have a tendency to huddle in corners. Fever is high, causing increased thirst. A greenish diarrhea is also present.

**Autopsy.** The heart, spleen, and liver may be enlarged. Small white spots are present in infected organs. The liver may be friable (easily crumbled) and have a bronze color. Heart and liver may show small pin-point hemorrhages. The ovaries are sometimes shrunken and hemorrhagic.

Since the lesions of fowl typhoid closely resemble those of fowl cholera, accurate laboratory diagnosis is essential in differentiating the two diseases.

**Prevention, control, and treatment.** Birds surviving an outbreak of fowl typhoid should not be kept for breeders. The organism can pass into the egg and thus infect the next generation. Also, birds that have recovered from the disease may become carriers. The blood test for pullorum disease will detect some of the carriers of fowl typhoid, but it cannot be relied on a hundred percent.

There is no "sure cure" for this disease. As in pullorum and cholera, the newer sulfonamides have some value as flock treatments. Sulfamerazine and sulfamethazine given in the water will control losses but will not prevent them completely.

### Pullorum Disease

Pullorum disease is still the No. 1 killer of turkey poults in Illinois. Though many flocks are blood-tested annually, control is still far from satisfactory. Since older birds are usually resistant to the disease, few acute outbreaks occur among adult turkeys.

**Cause.** The cause of the disease is a bacterium, *Salmonella pullo-  
rum*. The organism apparently has a particular affinity for the reproductive system of the hen and is found in the ovaries of mature hens. For this reason the disease is transmitted in the egg to the next generation. Although there is no apparent illness in adult birds carrying the organisms, antibodies or agglutinins circulate in the blood stream and can be detected by an agglutination test.

In poults acutely ill with pullorum disease, the organism is found throughout the body tissues and organs and can be isolated by bacteriological examination.

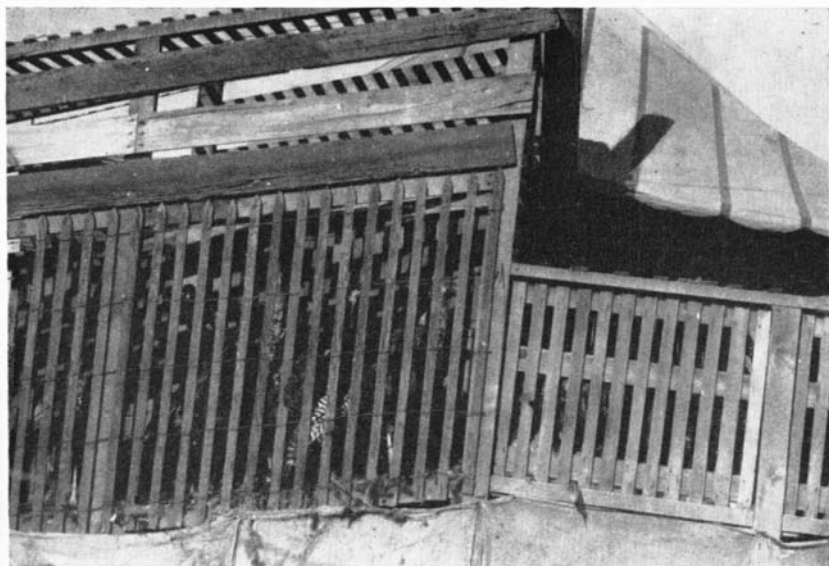
**Symptoms.** Young turkeys are usually affected when 7 to 14 days old. The poults tend to huddle around the brooder, and a white diarrhea may appear. Occasionally the organism affects the central nervous system, causing lack of muscular coordination and staggering.

Sometimes the birds die rapidly without showing any noticeable symptoms. Some poults may develop chronic cases of the disease and die four or five weeks after the peak of the outbreak. The death rate may vary from as low as 2 or 3 percent to nearly 100 percent of the flock.



Drawing blood sample for pullo-  
rum agglutination test. Each  
sample is numbered with the leg  
band number of the bird. All re-  
actors are removed from the  
flock. (Fig. 20)

**Treatment and control.** The key to pullorum control is an efficient program of testing and culling. Breeding flocks should be tested before eggs are produced for hatching purposes (Figs. 20, 21, and 22). All reactors should be removed after the blood test, and subsequent tests should be made until the flock is free from pullorum reactors on two successive tests.



Turkeys are kept in a chute like this or in a pen before they are bled for the pullorum agglutination test. They are run in at one end of the chute and are taken out at the other end. (Fig. 21)

To keep the work of bleeding the flock moving, have a chute or pen nearby and have enough help. It is important that the crew bleeding the flock be efficient. Besides those who do the actual bleeding, there should be others to keep records, band the birds, and keep a supply of clean syringes and needles. With such a system it is possible to bleed the greatest number of birds in the shortest time.

Many drugs have been used in the past for treating acute outbreaks of pullorum disease in poults, but most of them have been of little value. The new sulfonamides, particularly sulfamerazine and sulfamethazine, now appear to be effective in cutting down the number of deaths from pullorum. This treatment is not a substitution for preventive measures, however, and if poults recover from an acute case, they may still become adult carriers.



An efficient crew is needed for bleeding turkeys for the pullorum test. There should be enough people to keep records, band the birds, and keep clean syringes and needles on hand, as well as to do the actual bleeding. (Fig. 22)

### Erysipelas

The organism of swine erysipelas also infects turkeys, usually producing an acute generalized (septicemic) type of disease. In some ways the disease resembles fowl cholera. Usually turkeys of market or breeding age are stricken, toms being affected more often than hens.

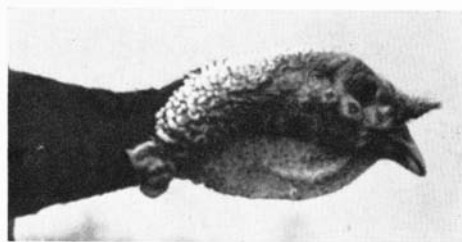
**Cause.** Erysipelas is caused by a bacterium, *Erysipelothrix rhusiopathiae*. It is the same agent that produces erysipelas in swine and polyarthritis in sheep. The organism is also responsible for a skin infection of man known as erysipeloid, and consequently there is some danger in dressing an infected carcass.

**Symptoms.** The first symptoms shown by an affected bird may be depression or drowsiness, with an inclination to stand away from the rest of the flock. When aroused in this early stage, however, the bird may appear normal and run with the others. Diarrhea soon develops, and the head appears dark and discolored. The snood, or caruncle, is gorged with blood, and appears stiff and swollen. Some affected birds have sores and ulcers about the head (Fig. 23), although this may not be characteristic of erysipelas infection in turkeys. Birds quickly lose condition, refuse to eat, and die within 3 to 6 days.

**Diagnosis.** Diagnosis cannot be based exclusively on observation of the affected flock. Several other diseases may show similar symptoms. For accurate diagnosis, the causative organism must be isolated in the laboratory.

**Treatment and prevention.** As in all contagious diseases, strict sanitary measures must be employed. Keep all feed and water utensils clean. Keep the premises as dry as possible. Remove all visibly affected birds immediately and place them in isolation.

The common poultry remedies and specific anti-erysipelas serum do not seem to be effective in controlling this disease. Recent experi-



Sores or ulcers may develop on the head at spots where the bacteria causing turkey erysipelas gained entrance through the skin. Injuries resulting from fighting toms are the most frequent cause for spread of the disease.

(Fig. 23)

mental evidence, however, shows that penicillin may have value in the treatment of erysipelas of turkeys. All toms in the flocks should be treated when penicillin is used.

## DISEASES OF THE SKIN, JOINTS, AND BURSAS

### Fowl Pox

Fowl pox affects the mucous membranes and the skin, especially on the unfeathered parts of the head. It is caused by a virus which infects chickens and other fowl.

**Symptoms.** The first symptom is a small, yellowish, rather firm blister. When it is removed, the surface underneath is raw and red. Next, large warty scabs appear which may cover almost the entire head (Fig. 24). Sometimes extensive soft yellow masses form in the mouth and throat. These may seriously affect breathing and interfere with eating. If the bird is able to take food and water, it may recover in three to eight weeks, although its growth and development are seriously retarded.

Death losses from fowl pox are usually not heavy and are caused mainly by a bird's inability to eat or by choking. Because of the

lowered growth rate and loss of condition, more time is required for birds to reach market age.

**Treatment.** Medicines have little or no effect on the course of fowl pox. A satisfactory vaccine is, however, being widely used to prevent the disease.

If there has been any fowl pox in the flock or if vaccination has been practiced in the past, it is advisable to use fowl pox vaccine. Vaccination is not necessary, however, if there is no record of the disease either on the premises or in the neighborhood and if there has been no vaccination previously.

The vaccine should be obtained from a reliable source. Follow the manufacturer's directions carefully, and *do not use out-dated vaccine.*

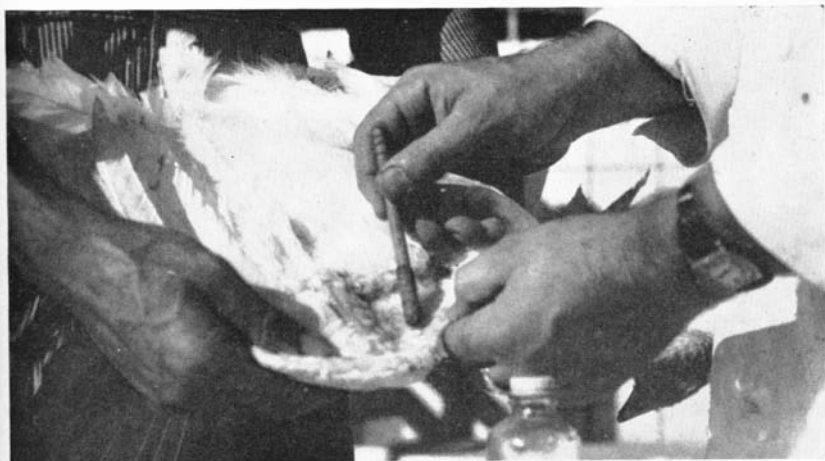
Vaccination may be done by one of three methods: the feather-follicle, the stab, or the scarification method. There are several possible sites for vaccination, but usually either the wing web or the thigh is used (Figs. 25 and 26). Some persons consider the wing an undesirable place because there is danger of live virus spreading to the head. *The feather-follicle method in the thigh is recommended.*

To vaccinate by the feather-follicle method, follow these steps: (1) remove the feathers on the thigh over a space about 2 inches square; (2) dip a small hard-bristled brush into the vaccine and brush vigorously over the defeathered area; (3) after 8 to 10 days examine about 10 percent of the birds for "takes," which appear as wart-like raised areas. "Takes" indicate satisfactory vaccination.

For the stab method (Figs. 25 and 26) a stick about 6 or 8 inches



Typical case of fowl pox. Sores on the eyelids may keep birds from seeing feeders and waterers (Fig. 24)



Vaccination against fowl pox may be made in the web of the wing, but this is a less desirable place than the thigh, as there is danger that the live virus may spread from the wing to the head. (Fig. 25)

long is used. The stick has two needles, or prongs, extending out about  $\frac{1}{4}$  inch at one end. Dip the stick into the vaccine and stab it through a featherless part of the skin. *Be sure to dip into the vaccine before vaccinating each bird.* Examine birds for "takes" as described above.

If upon examination you do not observe "takes," vaccinate again with freshly bought vaccine. Do not assume that your birds are already resistant to the disease.



The thigh is the best place for vaccination, but the feather-follicle method is preferable to the stab method being used here. (Fig. 26)



**Outbreaks.** Outbreaks of fowl pox may occur in vaccinated birds if: (1) the vaccine was old or improperly stored; (2) vaccination wasn't done right; (3) too long a period has elapsed since previous vaccination (in breeding flocks). Birds kept for breeding should be vaccinated about every seven months.

If an outbreak of fowl pox occurs, follow these three steps:

1. Vaccinate all birds not showing symptoms.
2. Put all affected birds in a clean, warm hospital pen away from the well birds.
3. Give affected birds individual care. Iodine or other local disinfectants may help to clean up the skin sores. Destroy birds that are unable to eat because of internal lesions.

### Bursitis

Growing turkeys often develop a pronounced swelling at the hock region, resulting in severe lameness (Fig. 27). This condition is often diagnosed clinically as arthritis. Usually, however, the joint itself is not affected, the swelling being due to the formation of pus in the bursas (cushions between tendons and bones) of the hock region.



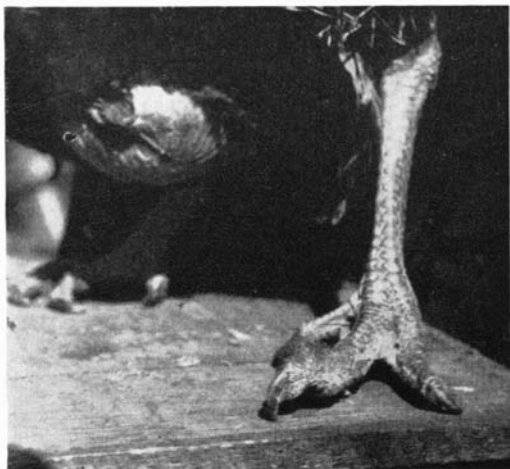
Enlarged joints of bird affected with bursitis. Lameness keeps birds from reaching feed and water. Cuts and bruises may help to spread this infection. (Fig. 27)

Large chronic abscesses usually appear over the tendons and between the tendons and bones, and frequently the condition extends up the tendon coverings (sheaths).

**Symptoms.** Before the swellings over the hock become pronounced, affected birds may appear reluctant to move from a resting position. When they do walk, their gait is painful and stilted. They are not generally depressed, however, but usually appear bright and alert.

When the swellings first appear, they may be soft and puffy, but gradually they develop into hard abscesses. Usually it is impossible to draw any fluid from the swellings, as the contents are thick and cheesy. Swellings may appear in other parts of the body besides the

Enlarged toes due to bursitis. The feet are extremely painful. Affected birds tend to rest on their hocks and move only when aroused. The large swelling, or keel blister, on this bird is also a symptom of bursitis. (Fig. 28)



hock. Often there is a marked enlargement of the toes (Fig. 28), and sometimes a swelling, commonly called a keel blister, occurs at the point of the breast.

**Cause.** The bacterium *Staphylococcus aureus* is the organism most often recovered from affected tissues. *Salmonella pullorum* has also been found. Some injury, such as a bruise, a cut, or severe irritation, usually precedes bursitis. It is frequently seen in flocks raised for long periods on wire.

Leg weakness and joint involvement similar to that observed in bursitis may result from nutritional deficiencies. Lack of manganese, choline, or calcium, for example, may contribute to leg weakness. Rickets and, consequently, weakness in the legs may result from a Vitamin D deficiency.

**Treatment.** Put the birds on a smooth floor as soon as you notice the condition, and give them plenty of food and water. They should not be moved or excited. In the early stages sulfa drugs may be effective, but there is no experimental evidence to show the actual value of this treatment.

## *For a healthy, profitable flock of turkeys . . .*

- Carefully follow good sanitation and management practices.
- Safeguard your poults. A successful turkey enterprise often depends on getting the birds safely through their first two or three weeks.
- Protect birds against extremes in temperature and other dangers on the range.
- If disease appears, get an accurate diagnosis and start proper treatment without delay.