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**TIMELY
TRUTHS
ABOUT
POULTRY
TROUBLES**

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Timely Truths About Poultry Troubles

A GREAT MANY people who raise chickens have more or less trouble with some of the common poultry ailments. However, these are not numerous—all told a half dozen will usually account for 90 per cent of the losses.

This little booklet will not attempt to cover the whole field of chicken diseases. Only those of considerable importance will be discussed. Neither is it a "doctor book," and prescriptions will be few and far between. We will try to help you cut down losses from certain diseases and give you information which should help you to prevent trouble in your flock.

In short, this will not be a lecture on how to cure one sick hen. It is never advisable to maintain chicken hospitals. As a rule, it does not pay to fuss with one or two ailing birds. A sharp hatchet is often the best cure. Some women, and men, too, like to smear vaseline or olive oil on birds' heads and gargle their throats and give castor oil or Epsom salts. The sick birds are frequently kept in a wooden box back of the kitchen stove and even though a few finally recover, it takes a lot of time and is hardly worth the effort. The individual treatment of sick birds is very unsatisfactory, and most flock treatments are notoriously unsuccessful.

The writer does not know of any chicken disease that can be cured or even relieved by "putting stuff in the drinking water." In fact, many times

a great deal of harm is done. The owner is usually worse off because instead of adopting drastic clean-up methods, he is inclined to depend on the colored drinking water for help and the trouble continues until the entire flock is riddled.

Many are the records of entire flocks actually killed by using certain harmful drugs in the guise of cure-alls. Most quack remedies are worthless and rely chiefly upon the gullibility of the buyer and our national optimism for success. The author has never known of one that really cured anything from that ancient disease "pip" on down the list. Try to be reasonable about these things. It is far better to consult your local veterinarian than to take patent medicine peddlers into your confidence. Very likely you know more about the trouble than they do—only you don't know it.

Such diseases as tuberculosis, cholera, coccidiosis, and pullorum are absolutely incurable with any known medicine. Yet there are hundreds that subtly guarantee to cure them. Why not forget them—save the money—find out what the disease is and then learn the best way to stop further losses. This is hard enough as it is, without expecting a modern miracle. Unfortunately, it is a fact that we have few medical aids to combat common poultry diseases. As a result of this, the farmer often buys fake cures as a last resort.

Open the Dead Ones

If you are having trouble with birds getting sick or dying, don't immediately consign them to the manure pile or don't let them rot in the chicken yard. There are very few diseases that can be recognized by merely glancing at a sick bird. Many peddlers claim to do this, but their guess is always questionable. If you do not have the help of someone skilled in this, it is usually best to open a bird yourself and try to discover the cause of the trouble. You won't be able to identify all of them, of course, but you should be able to recognize such diseases as tuberculosis and worms.

Many farmers and their wives do not hesitate to clean a bird for the dinner table, but detest opening one that has died from disease. Booklets such as this usually have pictures of diseased insides of chickens and you won't be able to compare unless the bird is opened.

Lay the bird on a box or table and proceed to remove the entrails, trying all the time not to make a mess of it. After you have turned back the breast and exposed the internal organs, the liver greets you first. It is reddish in color—some say mahogany. Examine it carefully for signs of tuberculosis or blackhead. The spleen may escape you. It is located directly under the liver and is of the same color. It is round and varies in size up to that of a small pullet egg. Tuberculosis may be noted here, also.

Then remove the liver and intestines. With a sharp pair of scissors, open the intestines from end to end. Worms may be found here—both roundworms and tapeworms. Remove and open the crop and gizzard. Open the mouth—examine it carefully and then cut right down through the windpipe, keeping a weather eye out for yellow patches of canker.

Each year we receive hundreds of letters from folks asking what to do for their sick chickens. In their letters they simply say their hens are dying and ask for some medicine to cure them. This is nothing more or less than a guessing contest and advice given under such circumstances is not very valuable. So be sure to look the sick birds over carefully—inside and out—then consult pictures in this or other poultry-disease bulletins and try to piece the puzzle together. If you are unable to help yourself and can not secure the advice of a competent veterinarian, write us a letter describing everything you have observed.

Nearly every other letter received asking for advice about diseases in poultry usually begins by stating that the birds have bowel trouble. There's a question for you. Bowel trouble is not a disease in itself. The term is generally used to describe a bird having diarrhea.

Diarrhea is merely a symptom of several of the common diseases of chickens. It will not tell anyone what the disease actually is. Chickens may have a diarrhea when affected with tuberculosis, cholera, coccidiosis, or worms. Even chilling, overheating, and overcrowding of chicks may bring on a diarrhea. Faulty feeding will, too.

Another thing to bear in mind is not to put too much stress on the color of the droppings. This color means little or nothing and may be changed at will by varying the diet of the birds. In chicks especially, many try to identify a disease by the color of the droppings—if it's red, it's coccidiosis—if it's white, it's white diarrhea—if it's yellow, it's tuberculosis and so on. While it is true that colored droppings are frequently associated with certain diseases, one can not depend on this.

Then too, we have the hen's appendix to examine. You often hear it spoken of as the "blind gut" or caecum. It is a two-pouched blind sac in the lower part of the intestines and only a few inches from the rectum or cloaca. These two pouches are the home for the "pin" or caecal worm of poultry. The effects of coccidiosis and black-head are also seen here.

I hope by these brief suggestions that you will be encouraged to open dead birds as a safe and sane means of recognizing at least a few of the common poultry diseases. All the talk in the world will not help you unless the bird is opened by someone. If you are too fastidious or think the job is too messy, take one to your veterinarian or send one to the Veterinary Division at University Farm, St. Paul, Minnesota.

Tuberculosis

Poultry tuberculosis is one of the most widespread of all diseases in Minnesota. It is also one of the easiest to recognize, and there is no excuse for

anyone to pass it by. Other names such as spotted liver, consumption, going light, and bowel trouble are often applied to it. It is also frequently referred to as "avian t. b."

Tuberculosis in chickens is not a lung disease as so often seen in man and some other animals, but rather a disease of the digestive organs involving the liver, the spleen, and the intestines. As you would suppose from this location, the germs that cause it pass out through the droppings by the millions. Tuberculosis germs can be seen only with a microscope. The germ-filled droppings pass out on the ground, the floors, and even in the feed hoppers and watering vessels. Healthy birds then swallow these deadly microbes when they eat or drink. Early hatched birds seldom show evidence of the disease before late fall or winter.

It is generally believed that chickens do not become infected from tuberculous cattle or hogs, but may transmit their type of the disease to them. There has been some talk that tuberculosis may be carried through the eggs and thus infect both man and baby chicks. Recent experiments at the University of Minnesota and other places would indicate that eggs even from known tuberculous hens are not a serious source of infection. Avian t. b., therefore, is not inherited, as many think. Practically all birds become infected by eating the germs with their food and water.

In these days of canned chicken, tuberculosis is coming more and more into the limelight. Packers who make a specialty of canning chicken are finding that Minnesota flocks are badly infected and unless something is done to combat the disease we may find our-

selves discriminated against in favor of other sections of the country where the disease is not so widespread. Modern methods of canning chicken call for inspection just like other livestock products, and diseased birds must go into

fore the grower will be forced to clean up his flock.

Tuberculosis is an underhanded disease in that it proceeds slowly and the losses do not become severe until practically the entire flock is affected. If the disease were a bit more showy and killed birds rapidly, perhaps we would be inclined to get more excited about it.

Do not try to recognize tuberculosis just by looking at sick birds. Yes, they do have a few characteristic actions, but these are not sufficient to do more than guess. Quite a while after the flock becomes infected, some of the birds are noticed to be falling off in their appetites and a few of them may appear listless. Their movements are slow, and they are easily caught.

As the disease progresses, the comb and wattles become pale. Diarrhea may be seen and the feathers about the vent may be matted. The bird now becomes very thin. The breast bone is easily felt, owing to the wasting away of the muscle covering. The average handler frequently calls this condition "going light."

If a bird showing these symptoms dies or is killed, the liver is found to be much enlarged and dotted with yellowish-white spots of varying size and number. These spots may also be found on the intestines as yellowish lumps or warts. They appear as growths on the outside of the bowel. The spleen, that small, round, marble-shaped organ located underneath the liver, may be enlarged and contain the same yellow spots. If these growths, or lumps, are cut with a knife you may sense a gritty feeling as the knife passes through them.

There is no cure for birds affected with tuberculosis. Preparations guar-



FIG. 1. PHOTOGRAPH OF A TUBERCULOUS FOWL

The liver is enlarged and spotted. This illustration also shows the proper way to open a dead bird.

the "tank." This means a loss, and it behooves the grower to get busy and get this disease under control. Considerable numbers of chickens are now dressed, drawn, and frozen. The buying public likes the idea of the fresh, clean package and are gradually becoming accustomed to asking for it. Since this method of selling requires federal inspection, it won't be long be-

anted to bring about a cure should be branded as frauds. All efforts should be directed to weeding out the sick birds and stop the further spread of the disease.

There are three ways to control and perhaps eventually to eradicate tuberculosis:

First, if the flock is small and not of great value from a breeding standpoint, it will likely be best to destroy the entire flock and start over the following spring with healthy baby chicks. In the meantime the henhouse should be carefully cleaned and disinfected. Buy a reputable disinfectant and follow the directions on the can. Do not try to clean up the soil about the chicken house by spreading lime on it. This is little short of useless. Deep plowing and the action of sunshine will accomplish a lot.

Second, if the flock is standard bred and valuable from that standpoint, the tuberculin test may be applied in much the same way as for cattle. The test is best applied by a veterinarian and works splendidly. It is, however, foolish to test a flock and then expect no more birds to die. The test merely picks out the spreaders. Regular clean-up methods must be used along with the test or no good will come of it. See that the house is well scrubbed and disinfected. If the floor is dirt, the surface to a depth of several inches should be removed and then replaced with clean fresh dirt. It is quite easy to clean a cement or tight wooden floor. Plow up the soil about the henhouse, if it is found impossible to move the building. Disinfect frequently all drinking and feeding utensils. You have no doubt decided by now that all this is too hard to do, so why not just pull up

stakes and have a general shake-up. The writer knows very well that many objections will be made to this second plan on the ground that such a program is entirely out of the question for the busy farmer and his wife.

Very well—why not try this last and best of plans. Here it is. This calls for a lot of courage and you will have to burn all your bridges behind you. If it should be fall or winter as you read this and you are having considerable losses from tuberculosis, you may clean house as outlined in Plan 1 and make a resolution to dodge the trouble next year. You can prevent worms and coccidiosis at the same time, too. This plan is not a half-baked idea, but one that has actually been carried out on hundreds of Minnesota farms.

To begin with, you should use movable brooder houses for the artificial rearing of the baby chicks. Haul the brooder house way out from the farm buildings—on alfalfa, if possible. Fence in this young and growing flock of healthy birds to keep the old hens away from them and to keep them from wandering back to the farmhouse and old chicken ground. This is done to avoid worm infestation as well as tuberculosis. It will also aid in preventing the dreaded coccidiosis.

Keep this young flock in their yard away from the farm buildings until October 1. This yard should of course be changed whenever it becomes dirty. In the meantime you will have adopted mash feeding as well as scratch feeding for the birds in order to develop them for early fall egg production.

Many farm wives object to the walk out to the brooder house in the alfalfa field. Well, the only alternative is to provide a modern wire front porch for

your brooder house. This will allow the house to be close in and still keep the chicks' feet off the ground. Ask us for a plan of this porch. The birds may be kept on the sunporch for six or eight weeks and then moved out on to clean alfalfa range for the summer. Try the sunporch. You will wonder how you got along without it.

When October rolls around, if you have any of last year's birds left, they may be disposed of. The henhouse should now get a thorough cleaning and disinfecting. Spray the inside with carbolineum to prevent mites, while you are at it. The young clean flock is then moved into this spick and span house all ready to start in the fall laying season. If this plan is carried out, the losses from tuberculosis will be little or nothing. We heartily recommend that you try it. Others have, and have liked it. Folder No. 21 has been prepared describing this plan more in detail. It will be sent to you on request.

Fowl or Range Paralysis

The above title may not be entirely correct, but it will serve to identify the diseases under consideration. The term "range" paralysis might give one the impression this disease is always associated with range conditions, whereas it merely means birds usually show first visible evidence of being affected when they reach range age. Birds that have never been on a range may suffer. It may begin when the

birds are on range or when they reach the laying house in the fall.

There are a number of other names given the group of symptoms describing this disease. Some investigators consider range paralysis symptoms as part of a disease called leukemia or leukosis. There is still another ailment called "big liver disease," which some writers consider the same as leukemia, while others class it under the general head of fowl paralysis. The whole situation is very confusing.

To avoid muddling the reader still further and for purposes of this discussion, we will use the name "fowl paralysis," admitting the possibility of its not being altogether suitable. At any rate, this is the name most often used by poultry people. Leukemia or leukosis or big liver disease will be bundled together and discussed in another section.

Fowl paralysis may attack all breeds of chickens. It has been reported in turkeys but as yet is not a serious problem with turkey growers. Chickens from two to three months of age on up to about a year are most often affected. The disease has been observed in this country for many years but until recently it did not give much cause for worry. Nowadays it is considered one of the most serious menaces that confront the poultryman. This attitude may in part be attributed to the fact that so little is actually known about it. When further studies are completed, the situation may not be so hopeless as we now think.

Much has been written about the cause of fowl paralysis. We now believe it is caused by a filtrable virus and certain transmission experiments indicate the disease may be passed from

bird to bird in several ways. How it spreads under natural conditions, we do not know. There is some reason for believing it may sometimes be carried through hatching eggs or through the purchase of breeding stock from another flock where paralysis has occurred. Much research is being undertaken in an attempt to learn more about the cause and how it is spread, but so far the results have been discouraging.

There have been reports and statements made that paralysis is carried by flies, insects, etc., but these have not been verified. Others have maintained that worms and coccidiosis weaken birds and pave the way for fowl paralysis. This, too, may be overlooked at least for the present. It is a fact that wormy birds and birds affected with coccidiosis may at times become lame, but that does not prove any connection. All wormy birds are not lame. As a matter of common observation, most of them are not.

As the name "fowl paralysis" would indicate, the outstanding symptom is one of paralysis. One should keep in mind that this is a disease of the nervous system and that various parts of the bird may be affected. For example, should the nerves controlling the movements of the legs become diseased, the bird would gradually lose its ability to stand. Similarly, the wings might droop or drag and the head turn or twist this way or that. Some nerves of the eye often become affected, causing blindness. Paralysis of the legs and wings and loss of eyesight are the symptoms most often reported by flock owners.

These things in themselves as a rule would not cause death immediately. Most of the birds would live quite

a while if they could get to and see their feed. As it is, many lie around until they die slowly of starvation. Fowl paralysis being a disease of the nervous system, we may assume, too, that vital organs such as the heart, liver, and kidneys may also be affected. Some birds may not show the paralysis symptoms at first. They may merely become unthrifty, lose weight, and later develop paralysis and blindness. Many owners say that birds lie sprawled out with one leg forward and the other backward. However, they do not have to assume that special position. To sum up, then, a poultryman who finds birds from three to twelve months of age becoming paralyzed, some of them showing blindness, may well be suspicious of fowl paralysis.

To make sure of the presence of this disease, one should have expert help from someone who will understand what to look for when the sick or dead bird is examined. The leg paralysis is best demonstrated by an examination of the nerve passing down the inside of the leg. Very often it is greatly enlarged. This, when observed in a paralyzed bird, is thought to be quite conclusive. Other affected nerves may show the same evidence. An examination of the eye may show definite changes. The colored portion of the eye may be a dirty discolored white. This eye change has been called pearly eye, white eye, glass eye, and fish eye.

Now for treatment. This should not take a great deal of space, because there is no treatment. This may sound very unsatisfactory, but at any rate there is no reputable vaccine or drug treatment. Most of the sick birds will die in spite of anything we can do. We recommend that all affected birds be killed as fast

as they show up. This may sound like pretty heroic treatment, but it will serve to shorten the attack. Do not permit paralyzed birds to lie about the yards in contact with well birds. This is good advice in any disease-control program. If the flock is small, it might be excellent advice to dispose of the entire flock before they die off by that aggravating one-by-one method.

Prevention suggestions are rather unsatisfactory, too. It has been recommended that one try to secure hatching eggs from flocks that have not had this disease. Also, one should not buy breeding stock from flocks where the disease has occurred during the last three or four years. We know very well the above advice is not very helpful, and being human you will grasp at any thing that offers the least possibility of help. However, the time may soon come when we will know more about the disease and how it spreads. Then we will be in a position to outline a workable plan of control. Until then we must content ourselves with general good management and try to buy eggs and breeding stock from clean flocks.

Leukemia

This is the disease we mentioned when discussing fowl paralysis. As stated in that section, some observers believe they are one and the same. Leukemia goes by many other names such as leukosis, lymphocytoma, big liver disease, etc. To the average person who meets this disease on his own farm, it is likely the name big liver

disease will appear to be the most appropriate. Leukemia has been seen in this country for many years. It has been the subject of a great deal of investigation, and these same investigations have led to much disagreement. Leukemia is most often seen in birds under one year of age.

The cause of leukemia is unknown. There has, however, been no scarcity of theories. Some theories favor a germ or virus as the cause. At various times faulty nutrition has been blamed. This latter supposition may be discounted at this time. Various sorts of transmission experiments have been tried, but none so far have been uniformly successful.

The symptoms shown by leukemia-affected birds are in no way startling. Sick birds eat sparingly and may therefore soon lose condition. As a rule, birds do not drop dead without previous warning. This disease develops slowly, with the individual sick bird taking a long time to reach a point which might alarm the owner. Often it might become established in a flock before the caretaker is fully aware of it. A few of the sick birds may have a rather dumpy appearance and the droppings may be a greenish yellow. The feathers about the vent may be matted and smelly. Since leukemia usually affects the liver, one might notice a yellow, jaundiced look to the head generally and the whites of the eyes in particular. Some birds refuse food and become very thin. You are no doubt aware by now that these symptoms are somewhat vague and will not help you to recognize the trouble by merely looking at a sick bird. It will be necessary to kill and

open one before drawing definite conclusions.

The after-death examination of the bird usually tells the tale. The liver change is the most striking. Sometimes it is so greatly enlarged as almost to fill the abdominal cavity. You may observe creamy white areas all over the surface of the liver. You must not confuse this with tuberculosis. They do not have the typical gritty yellow centers which are characteristic of tuberculosis. The spleen, that marble-shaped organ located just underneath the liver and alongside the gall bladder, may also be greatly enlarged and show the same changes as found in the liver. The kidneys, located up and down the back and on either side of the backbone, may be enlarged and exhibit the same whitish areas. Frequently there are grayish-white tumor-like formations in the liver. These appear as firm white growths. When cut into with a sharp knife they do not have the yellow gritty centers as in tuberculosis, but are rather solid and grayish white. In some cases the liver or spleen may be so enlarged and spongy as to be found ruptured and bleeding when the bird is opened. This rupture and bleeding would, of course, be the immediate cause of death.

The ovaries or egg sac are commonly affected. Most of you would not even recognize it as an ovary. It often resembles a dull grayish-white cancerous mass. The typical grape-like formation with the clusters of yellow ova of various sizes are entirely absent. The folds that support the intestines are also greatly thickened and have that identical grayish appearance. Sometimes the farm wife or other members of the family may notice after picking a wing

or drumstick at the dinner table that the bone itself is much larger and thicker than usual. The bone is roughened and just looks "wrong." This is considered another sign of leukemia. No cause for personal alarm though, so far as we know now.

There is no definite recommended treatment for leukemia. Nor is there any clear-cut method of prevention. There can not be until the cause and method of transmission becomes known. The advice given in fowl paralysis will serve here as well, unsatisfactory as it may be. Since there is some reason for believing leukemia may be transmitted through hatching eggs, one might attempt to secure eggs from flocks known to be free from this disease. Cull the flock often, and be sure to remove any bird not in tiptop condition. Try to purchase breeders from clean flocks.

Roup

The term "roup" is much overworked. Some writers use the name "coryza" to describe about the same group of symptoms. Farmers often speak of it as a "cold in the head." Others call it plain "sniffles." We won't try to determine who is right. We will consider roup as that common disease which affects the eyes especially but may extend down into the upper air passages of birds of practically all ages.

In some flocks only a few birds may be affected and cause no great concern; in others the entire flock may be involved. Roup usually shows itself first

as a slight cold in the head. A few birds may be seen to sneeze and there may be a sticky discharge from the nose. This frequently gums the nostrils shut. On entering the henhouse in the morning when the sun shines on the birds, the caretaker may notice a



FIG. 2. ROUP IN FOWL

Note swollen eye and lid gummed shut.

glistening bead of moisture in the eyes of some of the birds. This is often the first symptom and may pass unseen.

After the sneezing stage, the eyes may become swollen and the eyelids glued together. When the lids close, the whole side of the face, including the eye, often bulges. One might imagine the bird had been clubbed.

Upon examination, the upper part of the mouth and throat may be filled with a "gooey" mucus. This causes the birds to make a rattling sound at nearly every breath. Birds may stand around shaking their heads in a futile attempt

to dislodge the accumulations in the nose or eyes. When the disease proceeds this far, many sick birds are blind and may either suffocate or starve to death. Roup has a characteristic odor—it lingers, and once smelled, the tang is seldom forgotten. In this highly specialized age, we hear it frequently referred to as halitosis in man.

After some years observing housing conditions on the farm, the writer has come to the conclusion that overcrowding and no ventilation are the leading causes of most outbreaks of roup—especially in the fall and winter. We have summer roup, too—like summer colds in man. Of course the "out and out" cause of roup is germs. These germs are present a good deal of the time and when for some reason the pep or vitality of the flock is lowered by overcrowding, lack of ventilation, improper feeding, chilling, or overheating, trouble begins. The birds then may show all or any of the symptoms mentioned in the previous paragraph.

Get this straight—chickens breathe germs with every breath just as man does. Some are harmless and others—normally harmless when the birds are up and coming—can set up this roup disease when the vitality of the flock is lowered. I mention this because some folks think it is possible to disinfect the air of a chicken house during an outbreak of roup. We couldn't sterilize the air even though we wanted to.

It is generally assumed that the type of roup we are discussing can be caused by a variety of germs and those causing trouble in one chicken house may not necessarily be responsible for the disease in another. In winter some henhouses frost badly on the inside. During the day when the sun shines

brightly, the frost melts and soaks the litter. Pretty soon the house warms up, the litter steams, and we have a modified Turkish bath. As the evening approaches, the birds, now in almost a sweat, cool off and the "cold" begins.

Most of us have heard the old adage that an ounce of prevention is worth a pound of cure. We believe it, too, but don't work very hard at it most of the time. Prevention really means something in roup.

There are innumerable so-called roup cures—some you are advised to squirt about in the air, some you put in the drinking water, and still others you rub on. Fumigating a henhouse, already damp and moist as it is, is death for the flock. There isn't anything you can put in the drinking water that will relieve one of these gorgeous swelled heads, and most certainly rubbing salve on a pus-filled eye is useless. Every year or so we have a brand new crop of roup cures. Some of them are even imported from China. You may not care for the treatment we have to offer, but at least it's rational. If you had a cold yourself with one eye filled with pus and swollen as big as a hen's egg, I'll guarantee you wouldn't expect a gargle to help the eye.

Now then, you must first relieve the overcrowded condition in the house. Figure three square feet for leghorns and four square feet for the heavy breeds, and you are not far off. Do this arithmetic problem and determine how many hens should be in the house. Destroy all birds whose heads are swollen badly. Have someone who knows ventilation look over the poultry house and suggest ways and means to improve the intake and outlet of air. A straw loft with cross-ventilation above

is hard to beat. When the air is moving properly and the house is free of drafts, noticeable improvement should be seen.

Some birds with runny eyes may be helped by bathing the eyes frequently with a mild boric acid solution. Better



FIG. 3. YOUNG BIRD AFFECTED WITH ROUP
The eye is glued shut and covered with a large scab.

still, secure from your drug store a few ounces of a 10 per cent solution of argyrol and a medicine dropper. Place a drop or two of this directly on the eyeball and wiggle the lids over it. Repeat as often as necessary. If you attempt treatment of birds with eyes glued shut, first pry the lids apart, squeeze out the pus, and then apply the argyrol. Treatment of badly affected birds is very discouraging and takes a lot of time. It is not advised.

From time immemorial it has been customary to recommend putting various antiseptics in the drinking water. It is hard to imagine how a bit of potassium permanganate dissolved in a

pan of water will relieve a bird with a swollen eye. Most of the roup "cures" depend on this principle for their success—if any. We will offer none here because little good will come of it except to make the owner feel that he or she is doing something. How much better it would be if the owner cleaned out the very sick birds, reduced the numbers in the house, improved ventilation, and disinfected sensibly by a careful cleaning of the drinking and feeding utensils. Even with this method, it takes time for recovery—it won't take place over night. Roup sometimes hangs on for several weeks in spite of the best of management. Vaccination is often practiced but is not recommended.

Chicken Pox and Canker

For a long time pox and canker were thought to be different diseases. We now believe they are one and the same. Chicken pox appears in two common forms. First there is the bird that develops scabby growths about the head. These may also be observed on other parts of the body. The scabs start out as watery blisters which break and form a dirty scab over the affected area. There may be several blisters close together, which when broken merge together and form a good-sized crust.

Until recent years this type of pox was seldom seen in Minnesota, but it has been on the increase, perhaps because of the more general use of the live pox vaccine. What is often called

"canker" is nothing more than a variation of this same disease. This canker form of pox used to be called avian diphtheria. Some people call it the diphtheritic form of pox. Still others call it diphtheritic roup. From now on in this discussion let's understand that pox and canker are the same disease.

Chicken pox is a contagious disease. It may spread rapidly at times and then again it may occur in a mild form, spread very slowly, and cause little or no serious losses. Pox is a so-called virus disease. By this we mean no one ever saw the germ under a microscope, but we can produce the disease in a healthy bird by smearing on its face some of the material taken from a blister of a pox-infected bird.

In some flocks the affected birds show only the scabs, while in others we may find the canker form only. It is quite possible, however, to have both forms showing up at the same time in the same flock. The scabby type of pox needs little description. You simply find birds showing up with scabby, crusty formations, most often about the head parts. These may pile up about the eye and blind the bird. The wattles frequently become affected, as is the comb.

It is well to remember when handling a flock that the owner may easily carry the disease from one bird to another on his own hands. The watery discharge oozing from the scabs contains the live germs of pox, so if the bird doesn't already have it the owner in examining a flock may make the situation much worse. So much for the scabby form. We haven't had much experience with the canker form of pox.

Canker shows itself by the formation of cheesy yellow patches found in the

corners of the jaws, roof of the mouth, and extending down into the windpipe. Upon opening the mouth the odor is often foul. Some folks mistake these yellow patches for particles of yellow corn and frequently write describing it as such. If the owner is not a careful observer, he may say the birds suffocate or drop dead. As a rule, he has not made a careful examination of the mouth and throat. A mass of this dried yellow material might easily choke the bird if it was located in the windpipe. Very often the eyes are affected. The eyelids become glued together, and soon there is an accumulation of this same yellow material under the eyelid and upon the eyeball itself. This increases in size until the closed eye bulges, and since the bulging of the eye is all the owner notices, he immediately calls the disease "roup." Let us repeat again that this bulged eye symptom may occur during the course of a severe attack of coryza or a cold. Usually if one is persistent he will locate the yellow patches in the mouth and throat along with the eye disturbance. Those birds with cankerous patches in the mouth and throat may wheeze and stand around gasping for breath. If the sores are numerous in the mouth parts, the bird's appetite may be impaired because it probably hurts the bird when it tries to eat or swallow.

To sum up, chicken pox may appear with the formation of scabs about the head or it may show the yellow cankerous patches in the mouth parts. Some birds may also have bulging eyes, which when pried apart will show cheesy material underneath. The scabby form may appear alone, or we may have the canker form without seeing the brown scabs. On the other hand, we may

find both types appearing simultaneously.

The treatment of chicken pox is highly unsatisfactory. It does very little good to pry off these brownish-black scabs and apply some "dope" or other, and besides that you will soil your fingers with the juice from beneath the scabs or blisters and carry the disease to other birds. If you must apply something, merely smear the scabby parts with carbolated vaseline and let it go at that. If only a few birds are affected, it will be better to destroy them.

For birds with cankers in the mouth and throat, the situation is nearly hopeless. I suppose one might scrape off the yellow growths in the corners of the mouth, on the roof of the mouth, etc., but the treatment isn't especially recommended. If something must be done to a bird or two which may be valuable perhaps from a breeding standpoint, scrape the surface of the sore and sear the underlying raw spot with a stick of lunar caustic. Be sure to wrap the stick of caustic with a piece of paper so as not to burn yourself. You may need to treat the affected parts several times.

Birds with the stuck-together eyelids may be relieved by prying the lids open and lifting out the yellow mass of dried pus. Place a few drops of a 20 per cent solution of argyrol directly on the eyeball. This may help an individual bird or two but would be a terrific chore if one had to treat very many birds. It is useless to put antiseptics in the drinking water.

Vaccination as a preventive for chicken pox is successful. Don't forget that it will not cure sick birds and should not be administered to pox-in-

fectured flocks. Do not use the so-called mixed infection vaccines or bacteria for pox prevention or treatment.

It will be a good thing to remember that pox vaccine contains the live germs of chicken pox and should be handled with great care. If, for example, a flock has a slight attack of this disease, it might be well to avoid any vaccination whatsoever. If you should use a vaccine, it is possible that you may introduce a much more severe form of the disease. Best advice would be to consider vaccination only as a preventive. If the attack in your flock has been mild with few losses, don't vaccinate at all. If, however, there have been more or less severe losses for one or more years, one may decide to vaccinate before the birds become affected, in which case this would probably be early in the summer when the birds are from two to four months old.

Should a laying flock become infected with pox and vaccination be contemplated, one should do it with his fingers crossed, because, as mentioned before, vaccination is a preventive and not a cure. It is never good advice to vaccinate a healthy flock in the midst of the laying season.

There are two common types of chicken pox vaccines: the regular fowl pox vaccine, which is made from chickens, and the pigeon pox vaccine produced from infected pigeons. The first-mentioned pox vaccine is the best to use as a preventive. The pigeon type of vaccine has been used on sick birds because it's so much shorter-lived. If I were a farmer in Minnesota, I should avoid pox vaccination as long as possible, because once begun it should be a regular routine each year. Do not forget the vaccine is the live

virus or germ of the disease and not to be taken lightly or handled carelessly. One should not be too anxious to embark on an annual vaccinating routine unless he has to.

A last word — the vaccination works nicely as a preventive applied early in the summer. It is not worth much as a cure. Never vaccinate a healthy laying flock. If you have to vaccinate an infected laying flock, the pigeon type of vaccine would be best, but do not expect marvelous results. When vaccination is attempted, all the birds on the place should be immunized. Best advice of all, don't start vaccination unless you must.

Laryngotracheitis

This disease may be a bit difficult to pronounce, but it is merely another name for what we used to call infectious bronchitis. Inasmuch as it affects the larynx and windpipe, it has been renamed. This disease has come to the front during the last few years. It very likely existed for a long time, but was either unrecognized or the losses were not severe enough to cause great concern. It would be quite easy to confuse some of the phases of this disease with others such as coryza, pox, or possibly cholera, especially when the attack is sudden and the losses very heavy.

This disease affects chickens almost exclusively. The turkey, for example, appears to be immune—at least so far. Chicks may at times suffer, but older birds from three or four to eighteen months apparently are most suscepti-

ble. Laryngotracheitis is especially dangerous where birds are raised in large numbers or concentrated in close quarters such as feeding stations, produce plants, and the like. A few years ago, many feeding stations where birds were battery-fed were hard hit. Some called it "flu" at that time, but it was doubtless laryngotracheitis.

This is a specific infectious disease and is not caused by the birds' sitting in a draft. It is caused by a germ or what scientists in this particular case would term a "virus." This germ or virus is found in the nose and throat of sick birds; therefore healthy birds usually get the disease by direct contact with sick birds, or the discharge may be carried to them through infected feeding and drinking dishes.

The disease might be carried from one flock to another on the caretaker's clothing or through the purchase of a "carrier" from a flock that has passed through an attack of the disease. A bird may have laryngotracheitis, make a good recovery, and still carry the germs in its system. Should this bird go to another flock, it might easily start the disease among the birds in the second flock. This carrier bird is one of the serious aspects in the control of tracheitis. You can now readily understand why the disease carries over from year to year in the same flock. This does not mean that all recovered birds remain carriers, but a certain percentage of them doubtless harbor the germs of laryngotracheitis in their systems and are able to transmit the disease to the young growing flock the following season.

Laryngotracheitis may be acute or quick-acting, or it may be chronic and long drawn out. The losses in either

type may at times be extremely heavy, often running 50 per cent or more. As a rule, the disease starts without much warning and spreads rapidly. Some owners report that birds are well today and dead tomorrow.

The outstanding symptom of laryngotracheitis is the difficulty in breathing. Many of the birds sit on their haunches, so to speak, and simply gasp for breath. They often exhibit a type of breathing commonly referred to as pump handle breathing. That is, the bird stretches its neck out and up and down in an attempt to draw in air. It may emit a rattling sound as it struggles for breath. This is due to an accumulation of bloody phlegm in the windpipe. The birds may shake their heads and wheeze in an effort to dislodge the plug in the throat. The eyes may water and there may be a swelling in front of the face. The sick birds don't like to move, preferring to assume this sitting-down position.

This disease is no respecter of condition, because flocks in tiptop condition often suffer as much as poorly managed flocks. Late summer, fall, and winter are the seasons when tracheitis is most often seen, although of course it may appear at other times. You will readily see why this disease may be confusing, and many owners doubtless call it "roup" because of the runny nose, puffed cheeks, hard breathing, etc. Adult birds usually are hit the hardest. Generally speaking, the attack in chicks is not so severe.

Expert advice is frequently necessary to make sure the trouble is laryngotracheitis. Off-hand, one might pass snap judgment and say it was tracheitis when the disease hits hard in the fall or winter, the attack severe, the birds

showing the characteristic sitting-down - gasping - for - breath attitude. When the bird dies and is examined, it is necessary to examine the air passages. The nose may be sealed over while the back part of the mouth cavity is highly inflamed and the windpipe is usually filled with blood-stained mucus or phlegm. There may even be a cheesy mass that blocks the passage of air. Experimentally, birds of all ages may have tracheitis.

It is well to keep in mind that one attack of the disease either kills a bird or makes it immune for life. Don't forget, however, that the bird that recovers may be a carrier all its life. This explains why tracheitis often affects the same flock year after year. It is the held-over "recovered carriers" that have the germs in their throats and pass them on to next year's birds. While caretakers, infected feed sacks, and infected crates may serve as carriers of the disease from farm to farm, it is quite likely the recovered bird is the greatest menace. If one should buy a rooster, say in midwinter, from a flock that had recently passed through the disease on another farm, he might easily introduce the disease into his flock if this rooster happened to have had the disease and retained the germs in his throat. It might be well to investigate a bit.

Treatment is very unsatisfactory. Sometimes heat in the house will relieve the breathing. Local treatment of a sick bird takes patience. One might open the mouth and try to remove some of the material in the throat, but this is discouraging. Putting things in the drinking water is practiced. It may comfort the owner, but probably won't help the birds' breathing. Smudges of

various sorts have been used with questionable results. Some owners try to make the birds sneeze out the obstructions in the throat. Chances are it would only fill up again. From this, do not get the idea that good nursing doesn't help a lot. It does. Remove the sick ones as fast as they show up. This isn't easy on most farms. You might treat the noses of these birds with a 10 per cent argyrol solution and a medicine dropper. If very ambitious, take a pair of tweezers and try to remove the plug in the throat. A mild antiseptic in the drinking water may help to keep the water safer to drink. Set up a stove in the house. Watch it carefully so you don't burn up the house. This has been done. The dry heat often helps to reduce the severity of the attack. We have our doubts about fumes of various sorts.

So much for treatment, if we can really call it that. Let us say a word about preventive vaccination. There is a highly successful vaccination against tracheitis. Remember, however, it is not to be applied to sick birds. Vaccination is not recommended for flocks that have never experienced an attack of the disease, because the vaccine contains the live germs of the disease and should be handled with care. On the average farm, vaccination for tracheitis should be avoided unless the premises are known to be infected. An exception to this general rule might be made in the case of flocks engaged in big-time commercial egg production. Remember, too, this vaccine is specifically for tracheitis and that alone. It won't prevent any other disease. If you have had trouble with the disease, say one or more years, and have had a sure identification made,

you might resort to vaccination for relief from further attacks.

The young flock should be vaccinated when they are six to eight weeks of age. All the birds on the place should be vaccinated—not just this group or that. Should you have birds of varying ages, wait until the youngest group is about six weeks old. The method of vaccination is usually supplied with the vaccine and will not be described here. Simply follow the directions that come with the vaccine, or better still, your local veterinarian can probably do a better job and save you the worry. A final word—make sure your flock has the disease before you embark on a yearly vaccinating program. Another point to remember—while birds that recover from a natural attack of the disease often remain carriers, birds recovering from vaccinating do not carry the infection, say longer than two weeks after they have been vaccinated.

Cholera

Fowl cholera is the most fatal of all poultry diseases. It is not related in any way to hog cholera. Cholera may attack geese, ducks, chickens, or turkeys. Outbreaks may occur at any time and are often observed in flocks that are apparently in tiptop condition. This is especially true of geese and ducks being fattened for market. The birds die in great numbers and more often than not the disease starts without any warning other than finding several birds dead under the roosts in the morning. Many people blame the loss to poisoning of some sort.

As a general rule, cholera appears in the form of a storm—it may appear suddenly, run its course, and gradually disappear, leaving behind numerous dead birds. In the acute, or rapid, type many birds die and the disease passes on. In the chronic, or slow-acting, type the course of the outbreak is delayed, the deaths are not so sudden, but the disease hangs on much longer, sometimes lasting several weeks.

Cholera is caused by a germ that is widely distributed in nature and may often be found in the air passages of perfectly healthy birds. It appears that at times when, for some reason, the resistance of the flock is reduced, these germs, being present, suddenly become active and attack the birds. Various causes may reduce the vitality of a flock. The birds may be too fat, overcrowded, starved, or subjected to exposure. In this weakened condition, the birds fall easy prey to the ravages of this germ, which is more or less harmless when the birds are in good trim.

The symptoms of cholera are often very puzzling, even to the expert. This makes the disease difficult to recognize. Many poultrymen report finding a few dead hens under the roosts. The flock may have appeared perfectly healthy the evening before. This is the acute kind.

Chronic cholera requires more time to develop and some birds may be sick for several days. They appear in sleepy hunched-up attitudes and may exhibit a foul-smelling diarrhea. Examination after death does not always furnish conclusive evidence. First, peel the skin back from the breast. You may notice the “white meat” to be highly colored, sometimes even a

light reddish shade. Upon opening the carcass, the liver may be greatly enlarged and engorged with blood, causing it to break or crumble easily. The surface of the heart may show pinpoint hemorrhages, while the intestines appear inflamed or congested with the blood vessels standing out prominently.

With this brief description, we might sum up by saying that a diagnosis of cholera may be guessed when birds die suddenly without seeming cause, together with reddened breast muscles, *enlarged liver, and inflamed heart and intestines.* This is a pure guess, however, and a laboratory test is necessary to clinch the diagnosis.

There are no medicines of any value for the treatment of cholera. Many are sold, but they have not justified themselves. Vaccination is often advocated although the writer does not recommend it. Fowl cholera is one of the most unsatisfactory diseases to combat. As a rule, all one can do is employ common-sense sanitation. Destroy the sick birds and, if possible, seek new quarters. It is best to reduce the quantity of feed and correct anything in the way of overcrowding and poor ventilation. Fortunately, cholera is not common and an outbreak is often over before the owner gets organized to fight it.

Pullorum Disease or Bacillary White Diarrhea

First, try to understand just what this disease is. Some call it bacillary white diarrhea, while others speak of

it as B.W.D., which is nothing more than an abbreviation of the first name.

Poultry raisers are apt to think all birds with loose bowels are affected with this disease. Nothing could be further from the truth. As a matter of fact, it is probably true that much of the so-called "white diarrhea" is not the infectious type, but rather a bowel disturbance set up by any one of several kinds of mismanagement. To avoid confusion, there has been a movement to change its name to pullorum disease after the name of the germ causing it. Hatchery men have so popularized the term B.W.D. that it will be hard to make the change. Just remember that all these names refer to the same disease.

The word "diarrhea" is much overworked—it is but a symptom and only means the bowels move too freely. Let's understand this clearly—because chicks have a diarrhea and are more or less pasted up behind does not mean they are affected with this disease, whatever name you choose to call it. Many chicks die of pullorum disease without having any diarrhea whatever. Such a condition may be brought on by dirty surroundings, overcrowding, or faulty feeding. Many chick growers do not seem to realize that baby chicks are infants and must be handled with extreme care as to cleanliness.

Pullorum disease affects the digestive tract of chicks, and droppings from a sick bird contain countless germs. Baby chicks recovering from the disease are frequent carriers. The pullorum germs stay in their egg-laying organs and when the birds are big enough to lay, many produce eggs with live germs in them. When such an egg hatches, the chick is already infected

and may infect other birds through its germ-laden droppings which quickly soil the feed and water dishes.

The actions of chicks affected with pullorum disease mean nothing. All sick chicks look pretty much alike. Many traveling "experts" claim to be able to recognize the disease by the color of the droppings. This is sheer buncombe. Birds usually begin to die within 72 hours after they leave the shell. If all goes well for 10 or more days, the danger period is largely past and when the birds reach three or four weeks of age, they are relatively safe. Many chicks may be loose while others may show no diarrhea. The death rate runs from 30 to 90 per cent. An important thing to remember is—if you are losing a large number of chicks under two weeks of age, there is a chance it is pullorum disease.

No one can positively identify the disease by hand examination of a dead bird. A few of the sick or dead chicks should be sent to the Veterinary Division, University Farm, for further investigation. The service is free.

Unfortunately, there is no drug treatment for pullorum disease. Every effort should be made to prevent its spread. All visibly sick birds should be destroyed. It is small loss, for should a few recover, they may develop into carriers and start the disease again the next spring.

Scald all drinking and feeding utensils daily. Clean the brooder house carefully, disinfect, and change litter frequently. Nearly everyone likes to put something in the drinking water. Potassium permanganate is the old stand-by for this purpose. Add enough of this to turn the water a deep purple. Put it out fresh twice daily. It is very

doubtful whether this does much good, but at least it keeps the owner busy. Since the disease spreads through the droppings, removal of the sick birds and constant cleanliness should be the watchword.

Prevention of pullorum disease is far more effective than cure. It is now possible to give a laying flock a blood test. If the test is interpreted properly and the reacting hens are removed, little, if any, trouble should be experienced when using hatching eggs from such a flock. The test, honestly carried out, is quite accurate and is being widely used.

If you are in the habit of buying baby chicks, good judgment would point to the selection of a hatchery actually putting out chicks from pullorum-tested flocks. Even though you buy tested chicks, that does not mean they will not develop a bowel disturbance if they are not well cared for.

Blackhead

Blackhead is a very common and destructive disease of turkeys. It may affect chickens when they are raised in close contact with a flock of diseased turkeys. The name blackhead means little or nothing and is misleading besides. The heads of the affected birds do not turn black. Scientists call it by its right name—entero-hepatitis, which means "entero" for intestines and "hepatitis" for the liver. It is, therefore, a disease of the liver and intestines of turkeys and is no way associated with the head.

For some years it has been known

that chickens may act as transmitters of blackhead, but only recently were attempts made to control it—since there is no cure.

Investigations show clearly that if turkeys are raised away from the farmyard and without any contact with

work for the caretaker, but the losses are reduced to a minimum and the birds grow faster and bigger with fewer No. 2's.

If you are willing to throw away all your former ideas concerning turkeys and try something new—not untried, mind you—we will be glad to send you a copy of *Talking Turkey*. Your request on a post card will bring it to you. All you need to know to follow this plan is contained in this free bulletin. Ask for Extension Bulletin 104.



FIG. 4. BLACKHEAD LIVER, SHOWING GREENISH YELLOW ULCERS ON SURFACE

chickens, blackhead can largely be avoided. The only way this can be accomplished is to grow the birds by artificial methods, using brooder houses to start them and then graduate them to enclosures at a considerable distance from the buildings. In other words, by yarding one is able to control the flock and keep them away from infection they would otherwise be sure to pick up.

Minnesota took the lead in advocating growing turkeys in confinement on the farm. The plan is highly successful and is now practiced by all successful turkey growers. Of course, growing turkeys in yards means more

Coccidiosis

After chicks have successfully weathered the first three or four weeks of life, the next obstacle to a ripe old age is coccidiosis, a disease with a long name and a very high death rate. It is not caused by insanitary surroundings, although such conditions will reduce vitality and birds fall prey easier. The cause is a tiny parasite which lives in the soil about the farm buildings.

In large commercial flocks, where the same ground is used over and over, it is practically impossible to avoid the disease. In the older poultry-raising states coccidiosis is very common. Birds from three or four weeks old up to about eight weeks are most susceptible.

The germ enters the bird with contaminated food and water and is carried into the intestines and the two-pouched blind gut, where it thrives and multiplies. This soon causes a severe inflammation which may produce a bloody diarrhea. Old birds are not often sick to death, but may act as



FIG. 5. BIRDS SUFFERING FROM COCCIDIOSIS

The trouble starts at about this age and continues to six or eight weeks of age.

carriers and transmit the germs to younger and more delicate birds from three to eight weeks old. The droppings of sick chicks are especially dangerous, as they carry millions of parasites which pollute the feed and water, thus endangering other healthy birds. The age of the affected birds is important. There may or may not be bloody droppings. Some birds drink a lot and appear drowsy. Death may follow in a few hours after the disease develops; some birds may be sick several days. A few may recover and act as carriers for other generations of chicks to come.

Many of the birds have a frowsy appearance, with unkempt feathers and dragging wings. When birds of the above age die in fairly large numbers, some showing evidence of blood-stained droppings, there is an even chance of its being coccidiosis.

When examining a dead bird, be sure to observe the intestines carefully. They may be found very much reddened and the caecum, or blind gut, is likely to be enlarged or swollen and filled with bloody material. White specks of pin-

head size are frequently noted on the intestines. These are tiny ulcers. These few symptoms, together with the age, are helpful in making a reasonable guess that the trouble is coccidiosis. However, a positive diagnosis can be made only in a laboratory such as is maintained at University Farm.

The treatment of coccidiosis is not satisfactory. Innumerable drugs have been advocated, but the facts say they are not effective. As in most chicken diseases, the best way to handle an outbreak is to endeavor to prevent further losses—not worry about curing the sick ones. It can't be done, anyway. You should not lose sight of the fact that the parasites pass out through the droppings—therefore, the floor of the brooder house should be cleaned daily. It requires a few days for the newly passed germs to develop to the harmful stage, so if the owner cleans and re-cleans persistently, much good will be accomplished. Scald the drinking and feeding dishes every day. The sick birds may just as well be decapitated first as last, for they will die anyway.

It has been suggested to use a mash composed of 40 per cent dried milk as a means of control and treatment. The best that can be said for this is that it is a very nutritious and easily digested mash and should reduce the strain on the bird's digestive organs. To say that it will cure birds and stop an outbreak is rather far-fetched. Such a mash, together with good sanitation and destruction of the sick birds, should be helpful. Antiseptics in the drinking water will not stop the disease.

This will help as much as anything—first, kill the sick birds and, if possible, move the rest of the flock to another brooder house. If this can not be done, remove the birds, scald the floor, and resurface with clean sand for litter. Replace with fresh sand daily. Haul the brooder house to a new and clean patch of ground at some distance from the farmhouse. If you would like to dodge coccidiosis next year, send for Healthy Chicks Make Hearty Hens, Folder 21. It is free.

Worms

This section will deal with the three common intestinal worms of poultry. In discussing them, certain drugs will be recommended for their removal. The reader should know that many times the flock is ruined before worms are even suspected and the best of treatments, while they may expel the worms from the remaining birds in the flock, will not restore to health the countless runts. It is far better to prevent your young flock from becoming wormy than to allow the birds to

become infested and then seek a cure. It is so easy to prevent worms, one wonders why more people do not make the attempt.

In the old days farmers did not have a great deal of trouble with worms. The soil was new. It was clean and chickens had not been raised long. In recent years, worm trouble has become much more prevalent because of the continuous use of the same soil year after year. Some folks have come to believe that worms are part of the chicken business. This is far from the truth. Worms are a nuisance and, while it may be impossible to eradicate them entirely, they can be controlled to such a degree as to cause the owner little or no concern.

For many years growers have been putting their faith in worm expellers, but experience has shown this will not control worms. They will not prevent birds from becoming infested, but will expel the worms later on, after the bird has become stunted and often worthless with or without the worms.

Scientific investigations have shown that worms in practically all forms of livestock attack the young chiefly. This is true of chickens. It has been demonstrated that if growing chicks are raised on clean ground a couple of hundred yards from the farm buildings and kept entirely apart from the older worm-carrying hens until they are 16 weeks old, it is next to impossible to have them become wormy enough to injure their health after that time. Chicks are in reality infants. When small they are not able to fight off the worms, but when they get out of the short-pants stage, they acquire strength enough to battle worms if they should meet them later on.

Now, leave it to your own sober judgment—knowing these facts, why not give the birds a chance? Of course it means more work. It requires a brooder house. The caretaker will have to do a bit of walking out to the brooder house, too. The results, however, more than repay the work involved. If you are interested, send for Folder 21. All the steps are given briefly and to the point—feeding directions, also.

Roundworms

In this section we are referring to the common roundworm so often seen in chickens and less frequently in ducks, geese, and turkeys. It is widely distributed throughout Minnesota. The worms are white, sharp pointed on both ends, and vary from one to five inches in length. They may be found in birds of all ages, but appear to do most damage in young birds by stunting their growth and otherwise ruining their chances of ever being productive. Large numbers of the worms sometimes block the passage of food through the intestines.

Birds may be infested as early as two weeks of age, but if kept free for 12 to 16 weeks, they are not usually seriously affected after that time. The worm eggs pass out with the droppings and, if weather conditions are favorable, hatch and become dangerous in from two to three weeks. The young worm is then swallowed by a healthy bird and passes into the intestines, where it completes its development, growing to its full size in about two months.

Worm eggs withstand much cold, but little heat. In unshaded soil, hot summer sun doubtless destroys many eggs.

In dark places, such as a grove or windbreak, eggs will remain alive for a long time. In this connection, it is well to remember to keep young birds away from such places.

Birds affected with worms are unthrifty. Some claim to be able to recognize wormy birds by merely looking at them. Don't depend on this. When chicks or older birds fail to grow normally and become weak, one should open a few and with a pair of sharp-pointed scissors go through the intestines carefully. The worms are big enough to be seen easily. You do not need to use your imagination.

When worms in sufficient numbers to cause trouble are discovered, the next step is to remove them as quickly as possible. This is accomplished in several ways. Perhaps the best treatment is to dose each bird with nicotine sulphate capsules. These are sold under various trade names. Your druggist can supply them. This treatment is not so popular as it should be because each bird must be handled individually. It is, however, very effective. Always follow the directions found on the package. The tobacco dust treatment has been used for years. It seems designed for folks who want a workless wormer.

Generally speaking, most flock owners prefer a treatment that may be administered without the need for catching each bird. This, they say, is too much work. Therefore, anything that can be fed to the flock in mash form is bound to be favored. One difficulty with tobacco dust fed in the mash is that the mill run of available tobacco dust may be old and extremely variable in the nicotine content. This would be an easy way to administer a worm ex-

pellor, if it always worked. At various times, it has been suggested that chicks be fed tobacco dust in their starting mash from the very beginning. Experiments indicate that the continuous feeding of mash containing the usual 2 per cent tobacco dust is not effective in preventing the birds from becoming worm infested. Apparently the little growing worms are not hindered in their development by the presence of the tobacco in the mash. Even in adult birds the continuous feeding of a mash carrying 2 per cent tobacco dust of good grade was not so effective as the one-shot treatment.

The writer suggests the flock owner either use the individual pill method or nicotine-sulphate worm powder. This latter method is not a continuous feeding program but rather a "one shot" dose of the powder mixed with the regular mash. For those who object to handling the birds, this should answer very well. This powder can be bought at most drug stores; be sure to follow directions. It is not recommended for chicks or baby turkeys.

Various so-called double treatments designed to remove both roundworms and tapeworms with one pill are on the market. These have not been successful with us. As a rule, a flock is harboring in large numbers one worm or the other.

Do not treat a laying flock for worms unless you are sure they are heavily infested with worms. Great reduction in eggs usually follows. Prevention is the order of the day. During August and September of each year, hundreds of flocks are found to be worthless as layers the following winter. They are undersized weaklings and, even after

worming and the best of care from then on, most likely won't lay an egg until the next Fourth of July. Dodging worms beats pilling them any day.

Tapeworms

Tapeworms are flat, white, linked or segmented worms varying in length from less than an inch to nearly a foot. Some are very hard to see with the naked eye; others are readily recognized. Tapeworms do all their growing from the head end and as the segments or joints are added just back of the neck, the older ones are gradually pushed along and sloughed off near the "tail." Therefore, to rid a bird of tapeworms completely, the heads must be dislodged where they are attached to the wall of the intestines.

There are several varieties of tapeworm. The life history of all of them is not known, but some of them do pass through such intermediate hosts as house flies, beetles, snails, slugs, and earthworms before they are taken up by chickens. One might refer to these insects as tapeworm incubators. The insect eats the eggs—hatches them—and the chicken in turn eats the insect and gets the tapeworm along with it for good measure. When present in large numbers, tapeworms may be found in the lower part of the intestines matted together like so much snarled white thread.

Birds carrying many tapeworms are unthrifty. There is loss of appetite, and a chronic diarrhea often stains the feathers about the vent. The physical appearance of the birds is no different from those having roundworms. Lameness or total paralysis may be seen. Examination of a few sick birds should

lead to the discovery of tapeworms. One or two worms probably do little damage, but large numbers cause considerable losses.

Some farmers report seeing "small white maggots" in fresh droppings. These are not maggots, but segments of tapeworms broken off from the mother tapeworm and passed out with the droppings. It is these very segments or the eggs they contain which pass their next stage in the insects mentioned above.

According to the best information we can secure, there is no successful treatment for tapeworms. For a long time kamala was thought to be of value, but recent work indicates that its worth is questionable. Following a dose of kamala, many portions of worms were found in the droppings. What really happened was the worms were broken off back of the necks leaving the heads still imbedded in the lining wall of the intestine. The worm derives its nourishment by burying its head deep into the intestinal wall and it is very difficult to make it let go. In fact, that seems to be the trouble. No drug is available that will cause the worms to loosen their hold so they might be passed out all in one. As it is, all we do now is break them off, and since they develop from the head end, we soon have another crop of worms.

Discouraging as it may be, the truth is there is no successful tapeworm expeller. Kamala at best is a little risky to use because it often appears to act as a poison. It is likely that a big dose of Epsom salts will dislodge a large number of tapeworms and probably do as much good as any available treatment. A pound of Epsom salts

dissolved in sufficient water should be enough for about a hundred birds. The birds won't like the taste of the salts and water and usually must be forced to it by removing all water for a few hours before.

Since treatment is not recommended, one should try to avoid flock infection as much as possible. Rearing chicks on clean ground far removed from the farm buildings will help to dodge tapeworm infestation. If the walk is objected to, try a wire front porch in front of your brooder house. A plan for such a porch is available if you will ask for it.

Caecal Worms

These worms are often called poultry pinworms. They are threadlike white worms and are seldom more than half an inch long. They inhabit the caecum, or what many term the "blind gut," an appendix-like two-pouched sac near the end of the intestines. Most birds harbor a few of these little worms and unless they are found in great numbers, it is likely they do scant harm. At least, few heavy losses have been definitely traced to them. Pinworms are, however, involved in the transmission of blackhead in turkeys.

The sanitation plan devised for the control of roundworms and tapeworms will prevent heavy infestations of caecal worms. Until our knowledge of the ill effects of this worm is greater than it is now, poultrymen need not be greatly concerned over finding a few.

Few farmers will have occasion to treat their flock for these worms, as the damage done by them is not definitely known. When some unusual disturbance occurs in a flock, many of

the traveling salesmen experts open a bird or two and, as it is easy to find a few pinworms, point to these as the cause of the trouble. Such a diagnosis is always questionable unless the worms are present in enormous numbers.

Lice

A farmer once said that folks who raise chickens must put up with lice. This is the attitude of a great many people—in fact, some look upon them as a necessary evil. Perhaps they are thinking of what David Harum said about dog fleas: “A reasonable amount of fleas is good for a dog for it keeps him from brooding over being a dog.”

Lice cause a much greater annoyance to chickens than is generally supposed. Even small chicks suffer a great deal. The constant irritation from biting and feeding on the skin makes the bird's life miserable, and its growth is impaired. There is absolutely no reason why a flock of hens can not be freed from these pests and kept free. Lice cause discomfort by the continual gnawing and chewing at the skin of the birds. They usually work during the day.

A reasonably careful examination of infested birds quickly brings them to light for they can be seen with the unaided eye. The area about the vent is a favorite place for them to congregate.

There have been innumerable silly methods offered to a gullible public for the eradication of lice. These have proved worthless, much to the satisfac-

tion of the lice population which thrived thereby. One of the best and by far the cheapest way to rid a flock of lice is to use sodium fluoride. This is a white powder costing about 50 cents a pound. This amount is sufficient for 100 birds. The powder may irritate if the operator breathes much of it, but is otherwise harmless unless actually eaten. The pinch method is generally the best means of administration—this means the bird is held on a box or barrel and several pinches rubbed on the bird's body, about the vent, under each wing, on the breast, back and thighs. If applied properly, one application is enough to kill all the lice and also their eggs. This treatment, if applied in the fall before the birds are shut in for the winter, should keep them clean all season.

Twice a year is a fine prevention program. In warm, summer weather, the flock may be dipped in a solution in which sodium fluoride has been dissolved at the rate of one ounce of the powder to a gallon of water. The bird is dipped, the feathers ruffled to permit penetration, and head then ducked for an instant. Do not hold them under too long. Dipping should be done only in the middle of a nice, warm, summer day.

Forty per cent nicotine sulphate solutions have been widely used of late. One paints the roosts with the black liquid a short time before the birds go to roost. The vapors rise up through the feathers of the roosting fowls and kill many of the lice. It is usually necessary to repeat the treatment at frequent intervals because all the lice and their eggs are not destroyed. This method is popular be-

cause the owner does not need to work hard. It is not so effective as the sodium fluoride method.

Mites

Mites are fully as obnoxious as lice. There are many kinds of mites. The one described here is the common red mite. In its habits, it closely resembles the bedbug. It works only at night and leaves the body of the bird during daylight hours to hide in cracks and crevices of the henhouse.

The mite is gray, but when it sucks blood from the hen it becomes red. When filled with blood it retires from the hen, lays a batch of eggs and goes back to the bird for another meal. All it does is eat and lay eggs.

If the roosts are carefully examined, one usually finds the characteristic salt and pepper marks. These are comparable to fly "specks." In large numbers, mites will ruin egg production in a heavily laying flock. Sometimes setting hens are killed on the nests. Mites are hardy, too. They often live in empty henhouses for months without starving.

There are many ways to rid a building of mites. Perhaps the best thing to use is an oily spray such as anthracene oil or carbolineum. The house should be cleaned first. Then spray the roosts, supports, dropping boards, nests, and all other likely places where the mites may be hiding. To make sure of killing all of them, spray the entire inner surface of the building. The flock should be kept from the

house until the fumes have disappeared and the oil has soaked into the wood. Common dips, carbolic acid, or even kerosene are not nearly so effective. They are too light in body and evaporate too quickly.

If the oils mentioned can not be obtained from your drug store or lumber yard, waste crankcase oil from a car

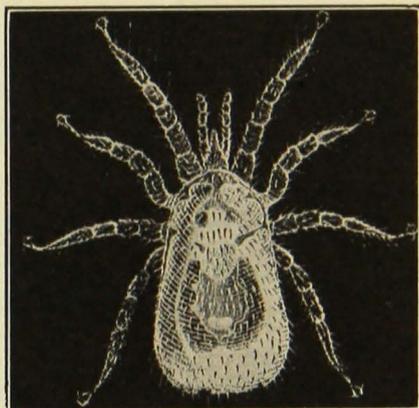


FIG. 6. WICKED LOOKING ANIMAL, THE CHICKEN MITE, OR POULTRY BEDBUG

They work while the hen tries to sleep. Don't feed mites.

or tractor not burning ethyl gasoline makes a fair substitute. Apply this in the same way. One treatment each fall should keep the house free of mites.

Scaly Leg

The name "scaly leg" describes this disease to a "T." It is caused by one of the itch mites belonging to the same general family that produces mange in other farm animals. The mites first attach themselves to the feet of the

birds and dig under the scales between the toes. They burrow to form tunnels under the scales until the scaly portion of the feet and legs is affected. Soon the scales begin to buckle outward to make room for the rapidly increasing mite population underneath. Before long the leg becomes roughened and encrusted with grayish-white material pushed out from under the scales by the mining operations below.

The disease spreads slowly, being so gradual as not to be noted until many birds are affected. Treatment is simple. If only one or two birds are diseased, it might be wise to use them on the table, as they are fit for food.

Dipping the feet and legs in crude petroleum has given the best results. Pour the oil into a bucket and immerse the legs of the birds up to the top of the scaly part of the legs. Avoid having the oil touch the feathers and upper portions of the legs. Soak until the oil penetrates thoroughly. One treatment is usually sufficient. Kerosene works fairly well, but is not so good as crude oil. If the infection is very bad, the henhouse should be cleaned and sprayed as described for red mites.

Flesh Mites

These are white or yellowish-white cucumber-seed-like bodies found under the skin of most farm poultry. They are the remains of connective tissue mites. They rarely cause the death of a bird, and most farm folks are not aware of their presence until they happen to see them when preparing a bird



FIG. 7. WHITE SEED-LIKE BODIES UNDER THE SKIN

This is not tuberculosis. It is the remains of the connective tissue mite. They are usually considered harmless.

for table use. Then, they are often mistaken for tuberculosis, but of course have no relation to this disease.

Ordinarily this mite lives on the outside of the bird, but dies under the skin and is then covered with a white deposit which acts as a preservative. This mite should not be mistaken for the common red mite that infests many poultry houses. The white seed-like bodies are frequently seen through the skin of black-feathered birds. There is no record of their causing death losses. They are not considered harmful for home consumption, although if seen before cooking, it is doubtful if

the bird would be relished. When the bird is subjected to the usual cooking methods, they dissolve in the juices and pass unnoticed.

Crop Bound

Occasionally a bird will overload the crop with dry grasses or a mixture of grass and grain. This may cause stagnation of the contents while the bird appears noticeably distended in the region of the crop. If allowed to remain, the mass becomes foul-smelling and will cause an inflammation of the crop and the neighboring skin may turn green. The whole area will at times become a diseased mass which sometimes results in death.

If taken early the crop may be massaged and, if water is introduced, loosened so that the contents will pass through naturally. If this is not a success, take a pair of scissors and, after removing a few of the feathers, cut through the skin and on into the crop itself. Remove the contents with a spoon—wash the crop thoroughly and sew it together again. The operation is quite simple and, if done soon after the mass forms, should be a success. Feed lightly for the next few days.

Constipation

Constipation is not a serious trouble but is seen often enough to warrant mention. It is probably caused by

lack of exercise in too small quarters and a ration containing little or no succulent feeds. To remedy this, one may administer Epsom salts or castor oil. If treatment is applied to an entire flock, the Epsom salts will be found better. The dose is one pound for each 100 birds. Dissolve the salts in water and give it before the morning feeding. For dosing one bird, castor oil will be better. Use about one teaspoonful per bird.

Bumblefoot

Bumblefoot is a swelling on the ball of the foot and may resemble a corn or a dried abscess. Whatever the immediate cause may be, it begins from



FIG. 8. BUMBLEFOOT

The foot is swollen, with an abscess or core in the center of the pad.

an injury to the bottom of the foot and an infection follows. High perches and rough cement floors are sometimes advanced as causes but this is doubtful. When the abscess or swelling has come to a head, it should be opened with a

sharp-pointed knife and the pus drained out. Swab the cavity with tincture of iodine and return the bird to the flock. If the swelling is hard and not unlike a corn, it must be dug out much as one would operate on a corn.

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