BACILLARY WHITE DIARRHEA OF CHICKS

BY ROBERT GRAHAM AND E. A. TUNNICLIFF

A brief statement of the cause, diagnosis, and prevention of the most serious disease of baby chicks

Young chicks affected with the fatal type of bacillary white diarrhea
BACILLARY WHITE DIARRHEA
OF CHICKS

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Bacillary white diarrhea is a highly fatal and contagious disease of young chicks. A large percentage of disease losses in chicks under three weeks of age, evidence suggests, is traceable to this cause. Its ravages have rendered many flocks unprofitable.

The disease is one of the few affecting adult fowls that may be transmitted directly thru the egg to the newly hatched chick. It is rare that mature stock infected with the disease show any symptoms, yet when infected hens are killed and the body cavity opened, abnormal or diseased yolks are found. Infected parent stock and contaminated incubators and brooders are largely responsible for the presence of the disease in young chicks.

The specific cause of bacillary white diarrhea is a microscopic germ known as Salmonella pullorum. This organism gains entrance to the chick thru the digestive tract with contaminated feed or water, or, as indicated above, may have been in the egg from which the chick was hatched. The germ is found in the blood, the unabsorbed yolk, and in the internal organs of baby chicks following death from the disease. The droppings of affected chicks, as well as infertile or unhatched eggs from infected breeding fowls, often contain Salmonella pullorum in large numbers.

Conditions which tend to weaken the vitality of baby chicks are regarded as important factors in susceptibility to the disease. Proper brooding and handling of chicks from infected stock or of those exposed to the disease are regarded as helpful in reducing losses.

Symptoms in Baby Chicks

Chicks are most susceptible to the disease before they are five days old, tho symptoms may not be observed for several days after exposure. Heavy losses in chicks under two weeks of age are often traceable to an acute type of the disease. Affected chicks are weak and unsteady in standing or walking. The feathers are ruffled, the eyes closed, and the wings drooping. Diarrhea usually develops, with a “pasting up behind,” and death follows in a few hours. Chicks suffering from an acute type of the disease, however, may die before symptoms of diarrhea appear. The absence of diarrhea, therefore, cannot be regarded as definite evidence of some other trouble.

A positive diagnosis of bacillary white diarrhea can be made only by laboratory examination. A flock owner who suspects the presence
of the disease should select typically affected chicks and send them alive to a properly equipped laboratory for examination. Specimens in limited numbers, addressed to the Laboratory of Animal Pathology and Hygiene, University of Illinois, will be examined for the nominal fee of $1.00.

Surviving Chicks Should Not Be Used as Breeders

Chicks that suffer a temporary setback from a mild attack of bacillary white diarrhea, followed by apparent recovery, develop a low-grade, chronic type of the disease in the yolks or ovaries and as mature birds they will pass on the infection to young chicks in subsequent hatching seasons. Chicks that survive an attack of bacillary white diarrhea therefore should not be kept for breeders.

Symptoms of unthriftiness and lameness and a tendency to develop large abdomens are usually observed in some of the chicks that survive an acute attack of the disease.

How the Disease Spreads

The part which mature infected fowls play in transmitting the disease to baby chicks thru the egg has been established in experimental tests, and confirmed in outbreaks of the disease in farm flocks.

In fact, repeated heavy losses of baby chicks unexplained by other causes is often the first suggestion that the disease exists in mature fowls.

Bacillary white diarrhea may thus be regarded as being transmitted thru the egg to the chick, and from egg-infected chicks to healthy chicks thru contaminated droppings in incubators, brooders, and
FIG. 2.—NORMAL YOLKS OF A HEALTHY HEN

FIG. 3.—YOLKS HARBORING *Salmonella pullorum*. THE DARK RED ANGULAR YOLKS ARE VISIBLY DISEASED
water and feed containers. A single infected chick at hatching time is capable of spreading the disease thru a healthy brood.

While it is not definitely established that bacillary white diarrhea is commonly spread among adult hens thru association with infected hens or by an infected male thru breeding, it is possible that the rapid progress of the disease in some breeding flocks may be accounted for in that way.

The Control of Bacillary White Diarrhea

The control of bacillary white diarrhea depends largely upon two factors: first, the detection of infected breeding fowls by means of certain tests, and their removal from the flock; second, the sanitary protection of healthy chicks against infection in incubators, brooder houses, and contaminated runways.

The greatest progress in freeing flocks from bacillary white diarrhea infection has been made by owners who have experienced improved chick livability following the removal of infected breeding stock and the application of fundamentals of chick sanitation. In healthy, vigorous flocks, properly managed, the complete extermination of the disease seems possible. In fact, several clean flocks have been established and the amount of infection greatly reduced in others. It is to be expected that some flock owners will be more successful than others in stamping out this disease, yet anyone can reduce losses by adopting approved methods of sanitation and testing his flock regularly.

Tests for Detecting the Disease

The testing of flocks for bacillary white diarrhea is generally done in the late fall, after culling. The value of the tests in detecting infected breeding stock over one year of age is well established, yet it must be acknowledged that no biological test is perfect. The tests for bacillary white diarrhea represent but one part of the control program. In order that they may give the best results, they should be applied by skilled persons.

The Agglutination, or Blood Test

For the agglutination, or blood test, samples of blood are collected from the wing veins of the fowls. The clear blood serum is mixed with a suspension of the Salmonella pullorum organism. The mixture of serum and bacterial suspension are incubated at body temperature (37.5°C) for 48 hours or for 15 minutes if a heavier bacterial suspension is employed. The serum from non-infected fowls fails to agglutinate, or clump, the bacterial suspension, while the serum from infected chickens agglutinates the suspension, which settles to the bottom of the tube, leaving the mixture clear.
The blood samples for this test are collected by qualified veterinarians and the tests made at district laboratories which are under the direction of the State Department of Agriculture. The Department specifies that the methods used in the district laboratories shall be those approved by the Laboratory of Animal Pathology and Hygiene, of the University of Illinois, where a careful study of them has been made.

**The Pullorin, or Wattle Test**

This test, called by the two above names, is made by injecting the test fluid (an extract of *Salmonella pullorum*) into the skin at the edge of the wattle. An infected fowl, in 18 to 24 hours, will show an inflammation and swelling at the point of injection. No reaction occurs in healthy fowls.

During the past four years the wattle test has been used experimentally in flocks, alone and in conjunction with the agglutination

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1The following district laboratories are accredited by the Department: Drs. Pilon and Wooters, Champaign; Dr. J. A. Owens, El Paso; Dr. E. H. Marquardt, Bloomington; W. F. Straub laboratories, 3570 Norwood Park Ave., Chicago; Dr. H. R. Schwarze, East St. Louis; Dr. H. W. Leib; Winchester.
test. Both tests (the agglutination and pullorin) have also been used on chickens that later were killed and examined. The comparative results of the two tests on the same chickens suggest that the wattle, or pullorin, test being quite delicate, is subject to error, but if skilfully handled, it may detect 70 to 75 percent of the fowls that react to the agglutination test. It has the advantage of being more easily dispatched, yet final judgment as to its value will have to be withheld pending results over a period of years.

The pullorin test is recognized by the State Department of Agriculture only when applied by accredited veterinarians who have received instruction in its application.

**Ten Essentials in Sanitation and Testing**

To successfully combat bacillary white diarrhea, a flock owner must adhere carefully to the following practices:

1. Avoid purchasing eggs or breeding stock from infected flocks.
2. Disinfect incubators, brooders, and houses.
3. Arrange to grow newly hatched chicks on clean grass range not previously occupied by fowls for a period of one year, or spade up old ground frequently.
4. Brood and feed very carefully to avoid weakening chicks and rendering them susceptible to disease.
5. Test all breeding fowls annually for bacillary white diarrhea.
6. Promptly remove reactors to the test regardless of their value.
7. Refrain from hatching, in the same incubator, eggs from tested and non-tested birds.
8. Avoid feeding infertile uncooked eggs to the flock.
9. Destroy all dead chicks by burning.
10. Thoroly clean and disinfect houses once a month.

**Infected Hens Lay Fewer Eggs**

In mature stock loss in egg production from bacillary white diarrhea is more serious than the death rate. Investigations conducted in different states show that infected hens are apt to lay fewer eggs than hens that are free from disease, other factors being equal. There is also evidence that eggs from hens that are free from bacillary white diarrhea have a higher hatching rate than eggs from infected stock. The increased livability of chicks from healthy stock, over chicks from infected stock, as first reported experimentally, has been repeatedly confirmed in the experience of farmers and hatcherymen who have used sanitary measures and testing in attempts to wipe out the disease.

**Flocks Accredited by State Department of Agriculture**

As a means of helping to control this disease in the state, the State Department of Agriculture has undertaken the accrediting of flocks which, upon being tested, are found to be free from the disease and
also flocks in which the disease has been found by test, and the reactors removed. Order No. 11 of the department on bacillary white diarrhea is reprinted below.

ORDER No. 11

The Prevention and Control of Bacillary White Diarrhea

State Department of Agriculture
Springfield, Illinois

In order to assist breeders, hatcherymen and flock owners in keeping flocks and day-old chicks free from bacillary white diarrhea, the following plan of procedure is suggested. The certificate issued to owners and hatcherymen who comply with the following regulations is evidence that the plan outlined by the State Department of Agriculture has been carried out in a satisfactory manner:

**Plan**

1. The prevention and control of bacillary white diarrhea is based upon sanitary measures and the testing of mature stock by local accredited veterinarians.
2. To benefit by the plan the owner must place his flock under supervision of the State Department for the control and prevention of bacillary white diarrhea.
3. Bacillary White Diarrhea free flocks under the plan of the State Department of Agriculture are those in which no evidence of bacillary white diarrhea has been found over a period of one year, or flocks showing no evidence of the disease and negative to the test for this disease.
4. The Illinois State Department of Agriculture will conduct co-operatively with the owner and local practicing veterinarian the plan for the control and eradication of bacillary white diarrhea in any flock or flocks in the state. The owner is the chief benefactor and must bear the expense of the local practicing veterinarian.
5. The flock shall be tested annually for bacillary white diarrhea and reactors to the test removed, houses disinfected, lots plowed and cropped.
6. Following testing and removal of reactors, the premises must be cleaned and thoroughly disinfected under the supervision of an accredited veterinarian.
7. Stock hatched from accredited flocks and reared on farms where no other chickens were hatched and reared are eligible for accreditation after tested and found free from bacillary white diarrhea.
8. A fee of five cents per sample is charged for the blood test and an authorized veterinarian's fee of five cents per sample is charged by the accredited veterinarian for collecting samples, advising regarding removal of reactors, disinfection and inspection of premises and poultry yards. A fee of seven cents is authorized for the application of the intradermal test by approved veterinarians.
9. The owner agrees to maintain his premises in sanitary condition and to purchase new stock from tested flocks only. At the same time the State Department of Agriculture reserves the right to retest any accredited flock at the owner's expense.

**Accredited and Tested Flocks**

Flock owners complying with the above regulations upon sworn affidavit of the accredited veterinarian regarding the sanitary condition of the premises and the absence of reactors to bacillary white diarrhea will receive an accredited certificate from the State Department of Agriculture accrediting the flock free of bacillary white diarrhea or a certificate to indicate that the flock has been tested and the reactors removed.

Director of Agriculture

Superintendent—Division of Animal Industry

Chief Veterinarian

December 1, 1927

Printed in furtherance of the Agricultural Extension Act approved by Congress May 8, 1914.

H. W. Mumford, Director