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Facts About Fowl Cholera

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Fowl cholera is a specific infectious disease which affects nearly all species of poultry. Quite frequently it occurs as an acute disease, but subacute and chronic infections are also common. It is one of the oldest of the poultry diseases, the infectious nature having been recognized for a century.

Fowl cholera was first reported in the United States in 1880. From that time to the present the disease has accounted for an enormous loss of poultry. It is not of equal importance in all parts of the country. In some areas cholera occurs only sporadically; other areas show a decline in numbers of outbreaks as compared to 15 to 20 years ago. This decline may be due, in part, to better poultry management practices. In other areas fowl cholera is prevalent every year, affecting many flocks and accounting for a high mortality.

In South Dakota, fowl cholera ranks as one of the three most important infectious diseases of poultry. In the veterinary laboratory at South Dakota State College, cholera, together with fowl leukosis and coccidiosis are the poultry diseases most frequently diagnosed. No decline in the occurrence of cholera has been noted in South Dakota as has been reported in some parts of the country.

It is always difficult to make a reliable estimate of the loss from a disease such as fowl cholera. Only a fraction of the total number of outbreaks receive laboratory diagnosis. Records of fowl cholera outbreaks in 151 flocks, averaging 325 birds for each flock, have been reviewed. Some of the outbreaks had been in progress for two weeks or more and others were in the early stages. The average death loss was 45 birds per flock, or 14 percent at the time the diagnosis was made. Losses were still occurring in all of these flocks so that the total mortality was greater. Though information on the total loss is not available, it is not unusual to have a flock mortality of from 25 percent to over 60 percent

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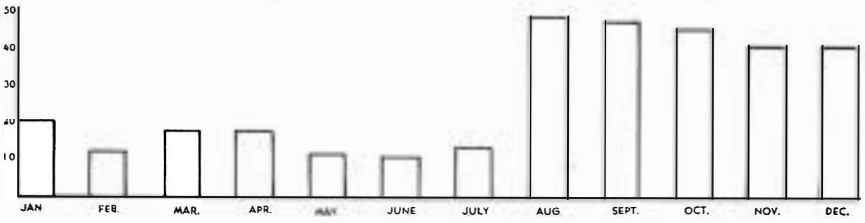
Fig. 1. Total flock diagnoses of fowl cholera by months for 1949 to 1952, inclusive



before an outbreak subsides, or the remaining well birds are marketed.

There are additional economic losses which must be considered in diseased flocks. The production is affected. Additional labor is required in correcting management practices. Labor efficiency is lowered if the flock is depleted. If medicinal agents are used in treatment, this cost must also be included.

In South Dakota, fowl cholera occurs in every month of the year, but is most prevalent in late summer and fall. Figure 1 shows the distribution by months, of outbreaks diagnosed at the laboratory of the Veterinary Department from 1949 through 1952.

The Cause of Fowl Cholera

The specific cause of fowl cholera is a bacterium, *Pasteurella multocida* (Fig. 2). It is a small oval-shaped organism belonging to the hemorrhagic septicemia group. These Pasteurella organisms are not very resistant and can be destroyed with the usual farm disinfectants. In the carcasses of dead birds or in a dirty environment the bacteria may be expected to remain infective longer than on clean surfaces.

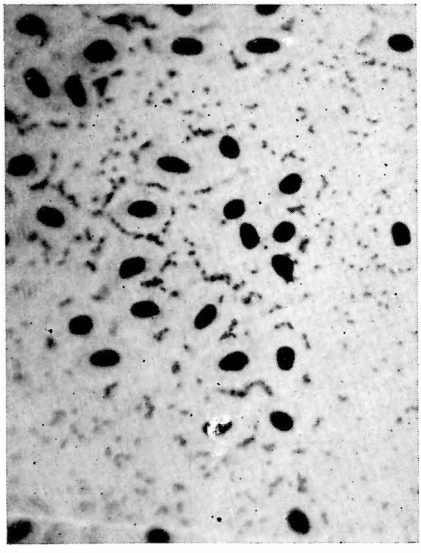


Fig. 2. A stained smear of the blood in acute fowl cholera. Note numerous small Pasteurella organisms among blood cells.

On experimental exposure of chickens to fowl cholera, variations are evident in the ability of the organisms to produce disease. Sometimes a high mortality results, and at other times little or no infection is produced. The same variability of these bacteria apparently exists under natural conditions.

There are factors other than virulence of the organisms which may, at times, have a part in bringing on an outbreak. Overcrowding, poor ventilation, and imbalances or deficiencies in the ration may affect the flock in such a manner as to allow the specific bacteria to gain a foothold. Some flock owners report the start of a cholera outbreak soon after changing to the feeding of newly threshed grain. The importance of these factors is very difficult to assess; however, fowl cholera cannot occur without exposure to the specific organisms.

Species of Birds and Animals Affected

Domestic birds of all kinds may be infected with fowl cholera. The disease is prevalent in chickens. When other species of fowls are maintained on the premises where an outbreak occurs, they also may become infected. Turkeys are considered to be as susceptible as chickens. Geese are extremely susceptible and 100 percent mortality is common in outbreaks in that species. Serious outbreaks have been reported in ducks in other areas. Free flying birds, such as sparrows, having contact with infected domestic fowls may also be infected.

Although infections of farm animals with bacteria of the Pasteurella group are recognized, natural spread from poultry affected with fowl cholera is not a problem. Several species of laboratory animals, such as rabbits, guinea pigs and mice, may be infected when injected with the bacteria. Hog cholera, which affects only swine, is an entirely different disease from fowl cholera.

Sources of Infection

Fowl cholera organisms are given off in body wastes from diseased birds. These contaminate the soil or litter, as well as the feed and water, which accounts for most of the spread of the disease within the flock. The carcasses of fowls which have died of cholera contain a large number of the bacteria and are a source of infection as long as they are left in the poultry house.

It is not always possible to determine how the disease is introduced into a flock. Frequently the outbreak occurs after fowls have been added from an outside source. Although apparently healthy, such birds may be carriers of the cholera organism and capable of spreading the disease through their excretions. In this area, outbreaks of fowl cholera are most prevalent during late summer and fall months when birds are housed. Carrier birds among the older flock held over for a second year often start outbreaks when young susceptible pullets are housed with them.

It must always be recognized that fowl cholera, like many other poultry diseases, may be brought onto the premises on dirty crates, feed bags, or any equipment which has been used previously for poultry. Free flying birds having contact with poultry could also carry the necessary organisms and be responsible for an outbreak.

Symptoms of Fowl Cholera

Outbreaks of fowl cholera usually start without forewarning. In an apparently healthy flock, one or more birds will be found dead under the roost or on the nest. Similar sudden losses may be expected dur-

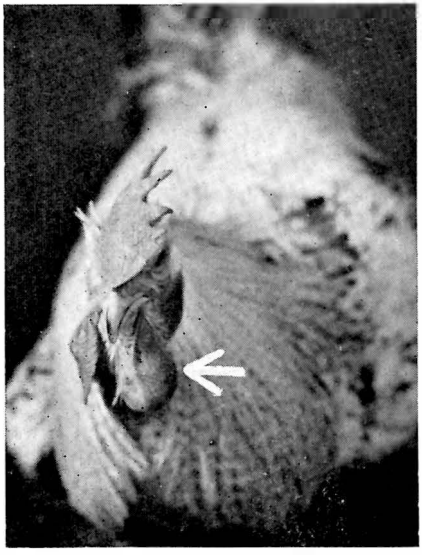
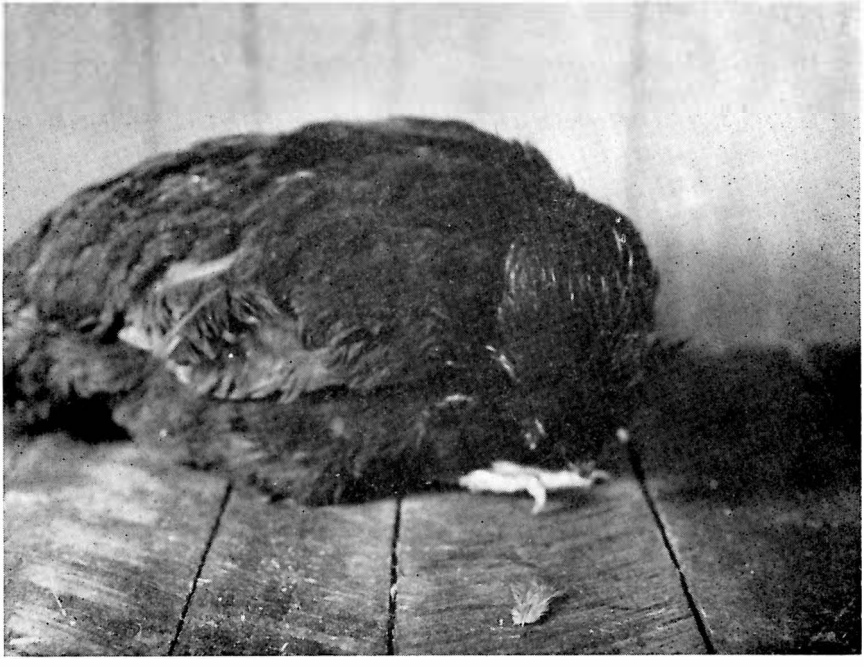


Fig. 3. Swollen wattle, especially common in breeds with large pendulous wattles.

ing the next few days. As the outbreak progresses sick birds are often detected. They become listless and usually stay apart from the rest of the flock on the roost or on the floor. They may die within a few hours or live for a day or two longer. Those that live for a longer period may develop a rattling sound when they breathe and a thick mucous discharge appears at the nasal openings. Diarrhea also may be a symptom in those birds. Those which die suddenly, or within a few hours after first symptoms are noted, frequently develop dark blue combs just prior to death.

As the outbreak of fowl cholera continues, the sudden deaths are of less frequency, but additional sick

Fig. 4. Chronic fowl cholera. Infection in the ear causes twisting of the neck



birds are found almost daily. A variety of symptoms occurs among them. Some develop "colds" with a nasal discharge and rattling noise in breathing. An occasional bird develops swollen wattles (Fig. 3). This is especially common in those breeds with large pendulous wattles. A twisting of the head and neck—wry neck—is another symptom which occurs in a few of the more chronic cases. This symptom results from infection localizing in the ear or at the base of the skull (Fig. 4). Lameness is another symptom which is apt to occur due to the infection localizing in or around the joints of the legs or feet (Fig. 5).

Outbreaks which are associated with the more chronic symptoms are prone to continue over a period of several weeks or even months. In the laying flock, egg production will decrease due to the accumulating deaths and sick birds. The actual death loss varies from a few birds, if the outbreaks are brought under control promptly, to 60 percent or more of the flock in outbreaks of extremely acute nature. Similar losses may occur in outbreaks of a chronic nature.

Fig. 5. Localized infection in the foot

In chicken flocks, there are some birds which appear to resist infection throughout the outbreak, but at least some of these have picked up the fowl cholera organisms and harbor them in the nasal passages. Such "carrier" birds may serve to carry fowl cholera infection over from one year to the next. They may be the source of infection for pullet replacements housed with them.

Post Mortem Changes

The changes which are found in the organs on post mortem examination of birds dead of fowl cholera may aid in the diagnosis. In those which die suddenly or within a few hours after symptoms appear, one usually finds several small pin-point hemorrhages in the fat around the heart. Similar hemorrhages may be seen in the serous membranes lining the body cavities and in the fat around the gizzard. The liver in the acute cases is generally enlarged. Instead of the normal mahogany color, it is yellowish-brown and minute gray pin-point spots are visible with good light (Fig. 6).

Changes in the more chronic cases are less consistent. The small hemorrhages observed in acute cholera are not present. The liver often has a dark color and a greenish cast. A mucous exudate in the nasal passages and trachea is pres-

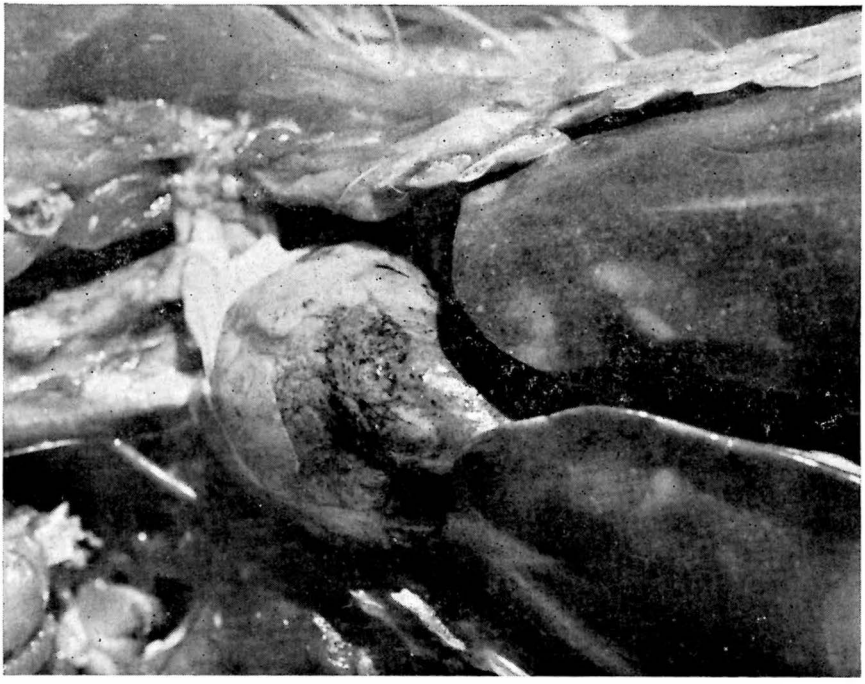


Fig. 6. Small hemorrhages on the heart and minute abscesses on the liver seen in acute fowl cholera. Instead of the normal mahogany color, the liver is yellowish-brown.

ent in those which had shown respiratory symptoms. A dry cheesy pus will be found in swollen wattles or in affected joints or ears. Emaciation, depending on the length of sickness, is common in the chronic cases, but birds which die suddenly are almost always well fleshed.

Diagnosis

The occurrence of sudden death of several birds in a flock that has been apparently healthy is always suggestive of acute fowl cholera. The post mortem findings in those birds may add further proof of the specific nature of the infection. In the laboratory, a diagnosis in the acute cases is confirmed by finding numerous bipolar organisms in the blood or liver by microscopic examination. (Refer to Fig. 2.)

The diagnosis in more chronic outbreaks is often impossible without bacteriological examinations. There are several other poultry diseases which are often confused with cholera on the basis of symptoms and post mortem findings. Fowl typhoid, infectious coryza, vitamin A deficiency, blue-comb and Newcastle disease may result in similar symptoms or organ changes. It becomes necessary, therefore, to con-

duct bacteriological examinations at the diagnostic laboratory in order to make an accurate diagnosis.

In 1938, a rapid whole-blood stained antigen was reported by U. S. Bureau of Animal Industry workers for the detection of "carrier" birds. This test was similar to the one in common usage for pullorum testing, but with an antigen prepared from Pasteurella organisms. Some experimental work has been conducted with such a test in the Veterinary Department laboratory. It has been found that the blood of birds affected with chronic cholera and of birds which have recovered following experimental inoculations will cause positive reactions. The accuracy of the test needs further study, however, and it is not expected that it would prove effective in the diagnosis of cholera in acute outbreaks.

Controlling Fowl Cholera Outbreaks

The medicinal treatment of flocks has generally given results which are disappointing in checking fowl cholera outbreaks. Various disinfectant agents in the drinking water have received wide usage but too often the course of the outbreak is not affected. At best, the disinfectants might aid in destroying the cholera organisms in the water, but not within the body of the fowls or in the environment.

In recent years several of the sulfonamide drugs are being used by flock owners either in the mash or the drinking water to check fowl cholera losses. If such treatment is carried out at the start of an outbreak when sudden losses are occurring, the death loss can often be checked within one or two days. It often happens, however, that when the treatment is discontinued, additional losses occur. It is very important that clean-up measures be taken while the flock is being treated so that the contamination in the house is eliminated and chances of recurrence are reduced. Sulfathiazole, sulfamerazine, sulfamethazine and sulfaquinoxaline have been used. No "sulfa" drug can be given continuously at treatment levels for more than a few days.

When outbreaks have become more chronic, the results with sulfonamide treatment have not been satisfactory, even with intermittent treatments.

Vaccination is another procedure which has received wide usage in attempting to stop the spread in fowl cholera outbreaks. Again, the results with the bacterins which are available for that purpose too often fail to check the losses. The degree of immunity produced is generally too low and too slow in developing to affect the course of the outbreak. Further discussion of vaccination is given under the heading of "Prevention."

Except for the use of one of the sulfonamide drugs in the early stages of acute outbreaks, sanitation and good management practices are still the recommended procedures for handling fowl cholera infection.

A sanitation program in fowl cholera control calls for the prompt removal from the flock of the carcasses of those birds which are found dead, and of all birds showing any evidence of sickness. It also requires increased attention to the cleanliness of the house and the equipment for feeding, watering and caring for the birds. The house should be cleaned thoroughly, and if weather permits, the cleaning should be followed by spraying with a chemical disinfectant. A clean, deep litter should be provided and stirred daily so that the droppings are kept covered. Feeding and drinking equipment should receive at least daily attention by washing and rinsing with a disinfectant. A quaternary ammonium compound in recommended dilutions for disinfection is suitable, for it leaves no odor. This equipment should be constructed so that fecal contamination can be kept at a minimum. Crowded conditions in the house must be avoided. Any deficiencies in the ration should be corrected.

Prevention

In view of the high mortality in many outbreaks of fowl cholera, and the great amount of labor and expense involved in bringing an outbreak under control, every effort should be made to prevent this infection from entering the flock.

Vaccination. Louis Pasteur first reported successfully immunizing chickens against fowl cholera by vaccination in 1880. Much vaccination has been done since, with varying degrees of success. Under controlled experiments the results obtained by most investigators have been unsatisfactory.

At the experimental laboratory of the Veterinary Department, half of a small flock of 83 birds three months old were vaccinated. They were given two injections of a whole culture bacterin spaced six days apart. Seven weeks following the final injection an outbreak of fowl cholera was started in the flock by swabbing the nasal cleft of six unvaccinated birds with a live culture of *Pasteurella multocida*. Three of the inoculated birds died within 24 hours and the remaining three birds were dead after 48 hours. The dead birds were left in the room housing the flock until the outbreak was underway. The mortality for a 30-day period following exposure was 88 percent in the non-vaccinated and 63 percent in the vaccinated birds. Although a little protection may have been provided in the vaccinated group, the immunity was not satisfactory.

Antibiotics at growth promoting levels. The Veterinary Department has carried out a number of trials with chicks which were fed rations containing low levels of antibiotics to determine whether these rations influenced the death rate of chicks exposed to fowl cholera. The chicks used in these trials had been fed the rations containing antibiotics from one day until 4 to 6 weeks of age

when they were infected with cholera by injection with a diluted culture of the organism. Groups of chicks which had received the same ration without antibiotics were handled in the same way. Penicillin, aureomycin and streptomycin were the antibiotics included in the rations at levels varying from 2 grams to 60 grams per ton of feed.

In the early trials the rate of mortality in the groups receiving antibiotics definitely exceeded that of the groups on the ration without these agents. In succeeding trials, however, the results were either reversed or there were no significant differences between the groups. It was concluded that these antibiotics, at the low levels they are used in rations to promote growth, will not materially affect the death loss in fowl cholera. There has not been sufficient work with antibiotics at higher levels in the ration to determine whether they might be of value in preventing infection.

Sanitation. Nothing has replaced good management practices in prevention of fowl cholera. In a sanitation program, consideration must be given to the many ways that infection might be introduced. The following measures are offered as steps to be taken in the care and handling of the flock.

1. No introduction of new birds on the premises should be made except as day old chicks.
2. The young replacement birds should be raised on clean range and completely isolated from mature birds.
3. Dispose of all old birds at the end of their first laying year. If a flock of old birds is to be kept for a second year, house them separately from the young birds.
4. Have the house cleaned and disinfected and put in clean, deep litter prior to housing.
5. Do not overcrowd. Allow 3 square feet for light breeds, 4 square feet for heavy breeds in the laying house.
6. Provide feeding and watering equipment which will minimize fecal contamination. This equipment should be cleaned daily.
7. Stir the litter daily to keep droppings covered. Additional clean litter will be needed from time to time.
8. Dropping pits should be screened.
9. Sparrows and other free flying birds should be kept from the house with screens at windows, doors and ventilator openings.
10. Rodents should be eradicated from the premises.
11. Chicken crates or other pieces of equipment which have been previously used for poultry should not be taken into the poultry house unless they have received thorough cleaning and disinfection.
12. Only the caretaker and persons necessary in the care of the flock should be permitted in the poultry house.
13. If the yards around the poultry house have been used by poultry, it is safer to keep the flock housed continuously after the birds are brought in from the range.