

FOWL-POX

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Fowl-pox is a widespread and commonly occurring disease in communities where poultry is raised extensively. The disease is most prevalent in fall and winter. On some farms it occurs annually. Fowl-pox affects nearly all species of birds; it is especially common in chickens and is frequently observed in turkeys and pigeons. Some investigators have reported that ducks and geese are not susceptible to this disease.

Chicken-pox, canker, avian diphtheria, and contagious epithelioma are names that have been used to designate the pox of fowls. The disease is frequently called chicken-pox; however, it should not be confused with an acute, contagious, eruptive disease of children by the same name. There is little evidence to indicate that pox of fowls is transmissible to human beings.

CAUSE

The causative agent of fowl-pox is a filterable virus. It will pass through a Berkefeld filter but not through a filter of finer texture. The virus is present in the scabs and exudate of the lesions of diseased birds and also occurs in their blood and internal organs during certain periods of the disease.

The virus in scabs may remain virulent for a long time when they are kept dry and stored under conditions of refrigeration. Typical lesions of the disease have been produced with a virus that has been in storage for many years. Resistance of the virus in the scab to various agents that will attenuate or destroy it depends, in part, upon the size of the scabs, as the virulence is reduced rapidly after scabs are finely powdered. Steam heat at 100° C. or dry heat at 200° C. destroys the virus in 30 minutes.

Virus of fowl-pox is perpetuated by inoculating susceptible birds. Only a few successful attempts have been made to cultivate the virus on artificial media.

Cell inclusions, characteristic of pox, have been studied extensively. These so-called inclusion bodies were first observed in 1873. They are circular in outline, measuring about 0.2 micron in diameter. Some investigators believe these bodies to be products of degeneration, while others consider them to be protozoa or the virus

body itself. The cell inclusions have been separated from all other material, and a single body or corpuscle placed in a feather follicle. The single corpuscle produced a lesion characteristic of fowl-pox; whereas pox material freed of the inclusion body did not prove infective.

PERIOD OF INCUBATION

When the virus comes in contact with a slight injury of the skin or mucous membrane of a susceptible bird, lesions of fowl-pox will become visible within 3 to 12 days. Usually it requires from 6 to 15 days to produce lesions with a filtered virus. The incubation period of fowl-pox depends upon the virulence and method of inoculation of the virus.

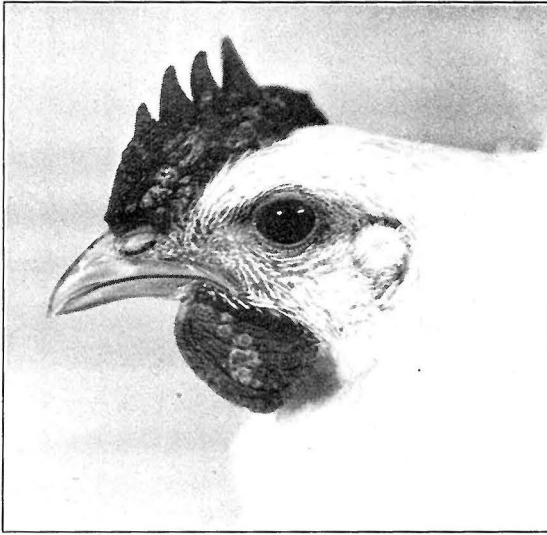


Fig. 1.—Fowl-pox lesions on the comb and wattle

Chickens of any age or breed are susceptible to this disease, unless they have been immunized by previous exposure to the infection. The disease usually does not affect very young or old birds; however, it occurs occasionally in chicks and fowls 2 to 3 years old.

SPREAD OF THE DISEASE

Fowl-pox may be brought to a flock by the introduction of birds from an infected flock, by fowls that have been exposed to the infection at shows, or by recently vaccinated birds. Free-flying birds, especially pigeons, may carry the disease. The crates used

for infected birds and the persons handling such fowls may be the means of carrying the disease from an infected to a non-infected flock.

The infection is readily transmitted to susceptible birds by infective material, especially if the skin is injured; however, the virus does not penetrate the unbroken skin. Infection by ingestion is probable; however, when the virus is placed in capsules and given to susceptible birds, infection usually does not occur.

The natural spread of infection in flocks occurs under conditions not definitely known. Apparently, the virus penetrates through a slight injury of the skin or mucous membranes and is conveyed by the blood to other parts where characteristic fowl-pox lesions develop.



Fig. 2.—Fowl-pox lesions in the mouth

It has been shown that biting insects, such as mosquitoes and flies, will readily transmit the infection. Mosquitoes have proved to be mechanical carriers and may remain infective for 14 to 16 days after feeding on a fowl-pox lesion. Transmission of the infection by mosquitoes may explain the annual occurrence of the disease in epizootic form in some districts. It has been possible to prevent fowl-pox by raising chickens in screened enclosures; this further indicates that biting insects are a means of spreading the infection.

SYMPTOMS AND LESIONS

Diminished appetite and elevation of temperature frequently appear in birds affected with fowl-pox. In some cases, lesions occur only on the skin; in some, solely on the mucous membrane; while in others, there is a combination of the two. There appears to be a seasonal variation in the type of lesions shown by fowls. During the fall and early winter, skin lesions predominate in most outbreaks; whereas during the late winter the mucous membrane is most commonly affected.

The skin or external lesions are wart-like growths raised above the surface of the skin, which vary from $\frac{1}{8}$ to $\frac{1}{4}$ inch in diameter. At times a number of nodules become confluent and form a large scab. The lesions occur mainly on the comb, wattles, eyelids, commissures of the mouth, and skin of the head. Occasionally they are observed on the legs, around the vent and feathered parts. The nodules reach their maximum size in from 4 to 6 days, or usually about 12 days after the skin has been inoculated with the virus. The lesions first appear as small whitish points; as the nodules develop, they change in color from yellowish to a dark brown or black. The nodules are masses of enlarged epithelial cells and form an integral part of the skin. The scabs or nodules may be easily removed 8 to 10 days after they appear and leave a whitish, usually pitted area on the skin.

The lesions on the mucous membranes are manifested by a closely adherent, false membrane in the mouth, pharynx, throat, and eyes. This pseudo-membrane has a yellowish color, is cheesy in appearance, and protrudes from the surface of the mucosa. The lesion at first involves mainly the superficial layers of the mucous membrane, the cells losing their identity through various degrees of degeneration. Later, an edematous area forms around the lesion and the deeper layers become involved. Finally, a fibrinous exudate accumulates and holds the cell elements in a compact, tenacious mass. Bacteria, amoeba, flagellates, and coccidia have been found incorporated in this mass or pseudo-membrane.

MORTALITY

Birds with fowl-pox may die suddenly without showing lesions or noticeable symptoms. The less acute cases continue for a number of days and death may finally occur, due to suffocation or starvation. Suffocation in these instances is due to the accumulation of cheesy masses in the throat, while an involvement of the eyes often leads to starvation. The milder, or chronic, cases usually persist for a number of weeks and the birds recover.

In some flocks, the disease appears in a mild form and only a few birds show lesions; in others, the lesions are severe and many fowls die. The losses are usually much greater when the lesions occur chiefly in the mouth and throat than when they are present on the comb, wattles, or other parts of the skin. The mortality in flocks depends, to a large extent, upon the lesions present and upon climatic conditions. Fowl-pox itself seldom causes a high mortality but lowers the resistance of birds and makes them more susceptible to other diseases. The decrease in egg production usually causes a greater financial loss than does the death of fowls.

TREATMENT

Treatment is usually not very satisfactory. The severely affected birds should be separated from the flock, and special attention will aid in their recovery.

The false membrane or deposits in the mouth and throat may be removed with a pair of forceps. Considerable force is usually required to take away the pseudo-membrane, and on removal a bleeding surface is left. The affected areas should be swabbed with tincture of iodine or a 20% argyrol solution.

The material within the eyelids may be removed and a few drops of a 20% argyrol solution placed in the eyelids twice a day.

PREVENTION

It is almost impossible to prevent susceptible flocks from becoming infected in districts where the disease is prevalent. The most certain method of protecting the birds from becoming infected is to immunize them. One attack of fowl-pox confers an immunity against the disease.

VACCINATION

In vaccinating birds an effort is made to produce the disease in a mild form. Experiments have proved that fowls can be actively immunized by a vaccine containing virulent fowl-pox virus. Killed virus has no satisfactory immunizing value. In 2 to 3 weeks the active virus produces an immunity which varies in duration and degree. The immunity produced by vaccination has been shown to last for at least a year and, in many cases, may persist during the life of the bird.

WHEN TO VACCINATE

Vaccination should be applied to growing fowls of suitable age on all farms where the disease has existed the previous year.

Pullets and cockerels should be vaccinated when 3 to 5 months old while they are on range and when weather conditions are favorable. Pullets should be vaccinated before their combs are fully developed and before egg production begins.

It is not advisable to vaccinate laying flocks unless there is danger of exposure to fowl-pox, and then vaccination should be done as an emergency measure to prevent spread of the disease. Following vaccination the birds may molt, and the egg yield will usually be reduced for a period of 30 to 60 days.

When there are young fowls of different ages on the same farm they should be vaccinated when they attain the proper age. The vaccinated birds must be kept separated from the non-vaccinated fowls. All the susceptible fowls on a farm should be vaccinated within a period of from one to 2 months following the initial vaccination.

Susceptible adult fowls should be vaccinated just before, or preferably following, the molting period, as this procedure will avoid loss in egg production. All susceptible fowls should be vaccinated before they are placed on infective premises.

THE VACCINE

The material used for vaccination is an active virus. The vaccine is prepared by inoculating the combs of susceptible fowls with a virulent fowl-pox virus. In from 10 to 14 days following inoculation the scabs and underlying tissue are removed from the combs, placed in a desiccator, and, when dry, stored under refrigeration. Before the material is used for vaccination, it is ground to a fine powder and suspended in sterile distilled water or in a solution of glycerin. Virulent fowl-pox material may be diluted 100 or 150 times and still produce suitable vaccination lesions. The most satisfactory results are obtained from recently prepared vaccines.

METHOD OF VACCINATION

Cutaneous vaccination has proved to be the most satisfactory method and consists in applying the vaccine to a slight wound in the skin. The site most commonly used for vaccination is the unfeathered area external and posterior to the upper extremity of the tibia. The under surface of the web of the wing is also suitable for this purpose.

Three methods are used for the cutaneous vaccination of fowls:

1.—The scarification method consists of applying vaccine to the skin with a brush after making small incisions in the skin with a

knife having a serrated edge. This procedure is probably most suitable when an attenuated virus is used for vaccination. With a fully virulent virus, this method frequently produces large scabs and marked systemic reactions that are undesirable.

2.—The feather follicle method consists of plucking from 4 to 6 feathers external to the tibia and placing the vaccine in the open feather follicles with a small brush. The feathers must be withdrawn carefully to avoid tearing the skin. In molting birds it is often difficult to obtain open feather follicles.

3.—The stick or skin puncture method consists of piercing the skin once or twice with a sharp-pointed instrument, immediately after it has been dipped in the vaccine. The instruments used for this purpose are knives with narrow blades or small, sharp-pointed scissors. Two punctures in the skin can be made at the same time with scissors; however, the points of inoculation should be about an inch apart. The blades or scissors are wrapped with tape or cord $\frac{1}{10}$ inch from the points. The wrapping regulates the depth of the puncture and also makes certain that a small amount of virus suspension is deposited with each puncture. Absorbent cotton saturated with vaccine is satisfactory for moistening the points of the instruments. The cotton is placed in a wide-mouthed vial and enough vaccine added to saturate it and cause the suspension to rise slightly above the cotton. The point of the instrument is dipped into the saturated cotton before each puncture. Less vaccine is used and birds can be inoculated faster with the stick or puncture method than by the other methods mentioned.

VACCINATION LESION

A fowl-pox lesion must appear at the site of vaccination to produce an immunity. The lesion should be visible in 7 to 10 days after inoculation and persist for 2 to 3 weeks. Immunity generally is established when the lesion begins to heal, which is about 3 weeks after vaccination.

Fowls that have been vaccinated should be examined 10 to 12 days following vaccination to determine whether or not a distinct swelling and scab formation is present at the site of inoculation. Fowls that do not develop lesions will not be immunized. If lesions are not present, it indicates that the vaccine was not active, that the method of application may have been faulty, or that the fowls were already immune.

In routine vaccination the checking of vaccination lesions will be simplified if the same site is used for vaccinating in all cases. It

usually is unnecessary to examine each fowl in a flock 10 days after inoculation, but 25 to 50 per cent of the birds should be examined. If most of the fowls do not show swelling and scab formation at the site of inoculation, each bird in the flock must be examined. All of the fowls that do not show fowl-pox lesions should be revaccinated with a vaccine of known potency. An immunity test may also be made by using a number of the fowls that show no lesions and inoculating them with virulent fowl-pox virus.

REACTIONS AFTER VACCINATION

Young fowls usually become listless and have a diminished appetite during the third and fourth week following vaccination. In most flocks this reaction lasts but a few days. Mature birds usually do not show a marked reaction when they are vaccinated during the time of low production of eggs or near the molting period.

Undesirable reactions occur in some flocks. They are most commonly observed in fowls that are heavily infested with intestinal parasites or in those in poor condition due to other causes, such as improper feeding or housing. In these birds the reactions are severe, and the prolonged absence of appetite causes loss of flesh and occasionally the death of many fowls in a flock.

When marked vaccination reactions are observed, it is advisable to remove the weaker birds from the flock. Efforts to stimulate food consumption frequently are useless after the appetite is greatly diminished and the fowls appear weak. It is suggested that moist mashes or milk be given for 3 weeks following vaccination, or until all evidence of reactions has disappeared.

PIGEON-POX VACCINE

Investigators have shown that pigeon-pox virus will protect fowls against fowl-pox. They found that a vaccine prepared from pigeon-pox virus, when used to vaccinate fowls, did not cause constitutional reactions, emaciation, or loss in egg production.

The vaccine was prepared by inoculating the breasts of pigeons, from which the feathers had been plucked, with pigeon virus and collecting the scabs from the ninth to twelfth day. A one per cent suspension of the powdered scabs was used for vaccination.

Pigeon-pox vaccine, as compared with fowl-pox vaccine, apparently possesses some advantages for immunizing fowls. However, the immunity produced in fowls by pigeon-pox virus is not so satisfactory as that obtained by the use of fowl-pox virus. Studies made at the Ohio Agricultural Experiment Station revealed that

most of the fowls vaccinated with pigeon-pox virus, by the stick and one-feather follicle methods, were not immune when exposed 3 months after vaccination to severe artificial infection with fowl-pox virus. Birds vaccinated in a similar way with fowl-pox virus and exposed in the same manner proved to be immune. In another experiment the fowls were vaccinated with pigeon-pox vaccine, by the stick and one-feather follicle methods, and 4 months later, when placed in contact with fowls affected with the disease, 60 per cent of the birds showed evidence of fowl-pox. The one-feather follicle method appeared to be slightly more efficient than the stick method in protecting fowls. Probably the immunity following the use of pigeon-pox vaccine would be of longer duration if more feather follicles were employed in the vaccination.

PRECAUTIONARY MEASURES

Mixed infection bacterins should not be confused with fowl-pox vaccine. Bacterins will not immunize against fowl-pox.

Fowl-pox vaccine is a living virus and should be handled with caution. The vaccine should be protected from exposure to the sun to avoid loss in virulence. It should be remembered that refrigeration prolongs the period of potency of the virus.

The use of fowl-pox vaccine is not without danger and before attempting vaccination, veterinarians and poultrymen should be thoroughly familiar with the conditions under which the most favorable results can be expected. It is not advisable to vaccinate on farms where fowl-pox has never appeared and where fowls are not likely to contract the disease.

Vaccinated birds should not be placed with non-vaccinated fowls for at least 2 months following vaccination. This precaution is especially applicable to fowls that are to be sold for breeding purposes, since the vaccinated birds may transmit fowl-pox to susceptible flocks.

Flocks in which fowl-pox is present may be vaccinated without hastening the spread of the disease among the non-infected birds and without increasing the severity of the lesions in the infected fowls. However, vaccination is a preventive and not a curative measure, and little protection is afforded until about 3 weeks after inoculation. If the disease is just developing in a flock, vaccination may be justified.

If some disease other than fowl-pox is present in the flock, vaccination should be delayed until the birds have completely recovered.

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