Vaccinating Fowls for Chicken Pox

By W. A. JAMES and ROBERT GRAHAM
CHICKEN POX, canker, or avian diphtheria of fowls occurs most often during the fall and winter months and is manifest in a majority of infected flocks by yellowish diphtheritic patches in the mouth and throat. This type of the disease is commonly known as canker or avian diphtheria. The comb and wattle, mouth, and eye types may all occur in the same flock. The cause of the different types is identical.

Potent vaccines properly administered to healthy fowls produce a measurable degree of immunity against chicken pox. It is important that fowls to be vaccinated be in a vigorous condition and free from other diseases. Flocks that have never suffered from chicken pox or appear unlikely to contract it should not be vaccinated.

The vaccine is the living virus of the disease and is capable of reproducing the infection. Ten days to two weeks following vaccination it is advisable to examine the vaccinated fowls for "takes." They are characterized by the development of one or more scabs at the point at which the vaccine was applied. Immunity develops in four to six weeks following vaccination. Susceptible fowls that have been properly vaccinated with potent vaccine and failed to register "takes" should be carefully revaccinated. A high percentage of "non-takes" from a single vaccination may indicate that the flock is immune or that the vaccine is nonpotent.

Pullets should be vaccinated before they begin to lay. The vaccination reaction in laying fowls may check egg production and vaccination should therefore be avoided except in an emergency to check the spread of the malady.

A limited supply of chicken-pox vaccine prepared by the Illinois Agricultural Experiment Station is available to qualified veterinarians for demonstration work in vaccinating flocks. Applications for vaccine should be sent to the Laboratory of Animal Pathology and Hygiene. A record of the vaccination and condition of the flock at the time of treatment must be made out by the veterinarian on blanks supplied for this purpose.
Vaccinating Fowls for Chicken Pox

By W. A. James, Assistant in Animal Pathology, and Robert Graham, Chief in Animal Pathology and Hygiene

Chicken pox, canker, or avian diphtheria is a contagious disease affecting chickens of all ages. The canker or avian diphtheria form of chicken pox is more prevalent in Illinois flocks than the comb or wattle type, which reaches its peak during the winter months. The wattle type of the disease, while occasionally recognized during the fall months, is not common in Illinois flocks. In fact the characteristic chicken-pox lesions on the combs and wattles (see cover page) do not appear so frequently as does the mucous-membrane type of the disease, which is characterized by yellowish diphtheritic patches in the mouth and throat, nor do they cause the losses attributed to the latter type (Fig. 1).

Chicken pox affecting the mouth is commonly known as canker or avian diphtheria. The virus of the different types of the disease is the same and can be produced in its various forms by inoculating healthy fowls. Thus the virus in the wattle lesions may be transmitted to the mouth, resulting in canker or avian diphtheria, and vice versa. In some flocks chicken pox may involve the eyes or the skin of the neck, body, and legs (Fig. 2). The lesions on the eyes, combs, wattles, or mouth vary markedly in extent and appearance and mislead the owner regarding the nature of the malady. Chicken-pox lesions on the comb, wattle, and eyes are followed by dry scab lesions, while in the mouth yellowish raised sores develop.

Studies Prove Value of Vaccination

During the past five years, studies in the control of chicken pox at the Illinois Agricultural Experiment Station suggest that a practical degree of protection against chicken pox may be artificially established in healthy fowls by vaccination. The results observed in different groups of vaccinated chickens which were later exposed to the disease along with unvaccinated controls showed that vaccinated fowls are resistant in a high percentage of cases, while unvaccinated fowls are highly susceptible.

These findings under experimental conditions suggested that the malady might be reduced and possibly eliminated in many farm flocks.
by immunization at the proper time. During the winter of 1927-28 chicken-pox vaccine was administered to privately owned flocks by being injected into the layers of the skin. The results obtained in vaccinated flocks compared favorably with experimental tests of the

previous year at this Station. Tho no farm flocks were purposely exposed, vaccinated fowls under farm conditions remained practically free from visible chicken-pox lesions.

**Cutaneous Vaccination Gave Best Immunity**

Preceding the field use of the vaccine, which was prepared from dry scabs, its immunizing value was tested by subcutaneous inoculation (beneath the skin), intraperitoneal inoculation (into the ab-
dominal cavity), and cutaneous inoculation (into the layers of the skin). The latter method of applying the vaccine resembles the method of applying small-pox vaccine in man. This procedure was first suggested in the control of chicken pox by DeBleick of Holland. Of the three methods of administering the vaccine, the cutaneous

application gave the most satisfactory immunity as judged by the results of artificially exposing vaccinated fowls.

The vaccine used in these tests consisted of .5 percent powdered scabs suspended in distilled water or in equal parts of water and glycerin. It was applied by scarifying or puncturing the skin of the outer region of the thigh or wing with small scissors, a knife, or a needle which had been dipped in vaccine, or by removing two to six feathers and applying liquid vaccine in the open feather follicles by means of a camel's hair brush or gauze swab. The knife or prick, as well as the needle-puncture method, was performed with a sharp-pointed knife or with a dull 16-gage needle inserted in the rubber

FIG. 2.—EYE TYPE OF CHICKEN POX

In some flocks chicken-pox tumors develop about the eyes. As the eye lesions progress, impairment of vision and loss of appetite may contribute to emaciation. Chicken pox in any form (eyes, comb, and wattles, or mucous membranes) is more fatal in pullets than in mature fowls.
stopper of the vaccine vial. All methods proved efficient and showed only negligible variations in the percentage of "takes."

Fowls of the heavy, or meat, breeds that were vaccinated for experimental study by the cutaneous method in groups of 100 to 200 each, frequently showed more pronounced reaction than small fowls, such as Leghorns, following vaccination. The different breeds, however, appeared quite resistant to artificial infection 30 to 40 days after cutaneous vaccination.

Precautions Necessary in Vaccinating Farm Flocks

Following the initial favorable results in experimental fowls at the Illinois Station, other state-owned flocks were vaccinated. Later, in the fall of 1929, cutaneous chicken-pox vaccination was extended to farm flocks in different localities of the state thru the cooperation of the local veterinarians. The results obtained in farm flocks to
date compare favorably with the results in the experimentally treated flocks, but it appears that certain precautions are necessary to avoid setbacks from treatment.

**When to Vaccinate**

The best time to vaccinate for chicken pox is in the fall about one to two months before the pullets begin to lay. Fowls vaccinated during heavy egg production may show a decrease or a temporary reduction in egg yield, tho many flocks have been treated without ill effects. If, however, vaccination seems advisable in order to protect the flock from the spread of the disease, it should be done irrespective of the fact that the egg yield may be lowered. Decreased egg production is also a common symptom of the natural disease.

It is not advisable to administer vaccine when more than 25 percent of the flock is already visibly infected with the natural disease. Losses from vaccination may, however, be reduced to a minimum by judicious use of vaccine in the early stages of disease.
From results observed to date it is apparent that there are many factors which may influence the reaction of fowls to chicken-pox vaccine and the degree of immunity which the vaccine establishes. First of all, the health of a flock to be vaccinated should be carefully determined. Vaccination is not recommended in flocks in which the disease has not occurred unless circumstances make it likely that the disease will appear. Fowls of low vitality from undernutrition or faulty housing, or flocks suffering from internal or external parasites, or roup, laryngotracheitis (infectious bronchitis), or other contagious diseases may not withstand vaccination so satisfactorily as healthy flocks. If not vaccinated, such flocks may suffer heavy losses, but it is conceded that the reaction from vaccination may accentuate the natural losses. Thus, irregular results may occur in sick flocks or flocks incubating the disease, tho uncomplicated chicken pox is not feared in vaccination so much as are other diseases.

**Fig. 5.—Preparing Feather Follicles for Swabbing with Vaccine**

When feather follicle vaccination is practiced, two to six feathers are removed from the outside of the upper thigh (A). The feathers are then spread apart (B) and the denuded area exposed.
Methods of Applying Vaccine

In vaccination experiments conducted at the Illinois Experiment Station it was found that 2 cubic centimeters of liquid vaccine were sufficient to vaccinate 100 fowls by the cutaneous method. The amount of vaccine needed may, however, vary with the method employed.

The swab method consists of rubbing the open feather follicles with a gauze and cotton swab placed over the mouth of the vaccine vial as in A. With the prick method a needle is used to prick the skin, as in B, and simultaneously a small amount of vaccine is allowed to flow into the wound.

The follicle method of vaccination (Figs. 5 and 6, A) may be dispatched by placing three or four layers of sterile gauze over the mouth of a vaccine vial, in the neck of which is placed a loose plug of cotton (Fig. 3). With this method, vaccine is applied directly from the bottle and there is no spilling or wasting of vaccine thru the accidental upsetting of an open vial. There is, however, some waste of vaccine thru absorption in the cotton and gauze.

A hypodermic needle inverted in the stopper of a vaccine vial (Figs. 3 and 6, B) is also serviceable in applying vaccine. The amount of vaccine needed is reduced to a minimum by this method.

Nicking the skin of the wing with the point of a knife blade or with
small blunt-pointed scissors which have been dipped in vaccine has also proved an efficient method of applying the vaccine (Fig. 7).

**Handling Fowls to Be Vaccinated**

Fowls to be vaccinated should be held by their feet with their heads down. At least two attendants are necessary for handling and holding them. It is advisable to vaccinate all fowls on the right leg or wing, as this reduces the possibility of error when examining for "takes."

![FIG. 7.—USE OF KNIFE AND SCISSORS](image)

The point of the knife is dipped in chicken-pox vaccine and then thrust well under the skin of the wing (A); or a pair of small, blunt-pointed scissors (B) which have been dipped in vaccine are used to nick the skin of the fowl's wing.

For vaccination thru open feather follicles, the operator, with his left hand, plucks a few feathers (2 to 6) from the outside of the upper thigh (Fig. 5, A). At the same time the feathers overlapping the denuded area are spread apart so the vaccine can be placed on the skin of the defeathered area (Fig. 5, B). The vaccine bottle, in the right hand, is then inverted and the vaccine applied by rubbing the gauze-soaked top of the bottle over the open follicles three or four times (Fig. 6, A). Three hundred fowls have been efficiently vaccinated in an hour by this method, one operator using two assistants to catch and hold the fowls.

Less vaccine is required when the puncture method with needle, knife, or scissors is used. The skin may be punctured in the same area as that selected for follicle vaccination (Fig. 6, B), but the preliminary removal of feathers is not necessary.
Determining Results of Vaccination

Ten to twelve days following vaccination the results should be determined. A reaction, or “take,” is easily detected by the presence of a well-formed scab at the point at which the vaccine was applied (Figs. 8 and 9). A “non-take” means no reaction at the point at which the vaccine was applied.

![Reaction, or “Take,” to Swab Method](image)

The “takes” induced by swabbing vaccine into several open feather follicles are followed by scab formations within 10 or 12 days following vaccination. In the above photograph seven feather follicles show “takes.”

Nonreactors, if any, should be promptly revaccinated. Two negative vaccinations, or “non-takes,” probably indicate immunity, tho failure may be due to the use of vaccine of low potency or to improper vaccination. Experience indicates that fowls showing repeated “non-takes” seldom contract the disease.

After-Effects of Vaccination

Decreased appetite three to four weeks following treatment is usually the only general reaction to be observed in highly resistant flocks that have received chicken-pox vaccine by the cutaneous method. This reaction, as a rule, is of no particular concern and lasts but a few days.
Occasionally a distinct illness, followed by death, occurs after vaccination. Such losses invariably occur in flocks of low vitality. The common assumption in such cases is that vaccination has caused the illness, but it is more likely that predisposing causes of ill health have operated in conjunction with vaccination. Post-vaccination losses are due primarily to low vitality in the fowls or to the coexistence of some other disease.

**Duration of Immunity**

Healthy fowls properly vaccinated with potent chicken-pox vaccine by the cutaneous method develop an immunity to chicken pox in its various forms after four to six weeks. This immunity is measurable or demonstrable by the resistance of vaccinated fowls to artificial exposure.

The length of the immunity in vaccinated fowls is variable but apparently lasts for many months, or even for life. Flocks vaccinated in the early fall as pullets pass thru the winter months without showing symptoms of canker or avian diphtheria. Experimental data and field observations indicate that this immunity is relative and not
absolute, but nevertheless it is of practical value in the prevention of the disease in farm flocks.

Vaccinated fowls should not be sold for food or for breeding purposes until at least two months following vaccination.

**Vaccine Supplied to Graduate Veterinarians**

Chicken-pox vaccine is supplied by the College of Agriculture in limited amounts in liquid form to graduate veterinarians in Illinois for demonstration purposes.

Vaccine should be used promptly upon arrival. If not used at once, it should be kept at ice-box temperature. Unused vaccine should be destroyed by burning.

Two cubic centimeters of liquid vaccine applied by the needle, knife, or scissors method are sufficient for the proper vaccination of 100 fowls. Double this amount is required for the swab method.

Forms such as the following are supplied with the vaccine, which the veterinarian is requested to fill out and return to the Laboratory of Animal Pathology and Hygiene, University of Illinois, for record purposes.

**Record of Chicken-Pox Vaccination (Experimental)**

<table>
<thead>
<tr>
<th>Owner</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breed</td>
<td>Number vaccinated</td>
</tr>
<tr>
<td>Date vaccinated</td>
<td></td>
</tr>
<tr>
<td>Swab</td>
<td>Knife</td>
</tr>
<tr>
<td>Number of “takes”</td>
<td>Date</td>
</tr>
<tr>
<td>Veterinarian</td>
<td>Address</td>
</tr>
</tbody>
</table>

No financial responsibility is assumed by the University in supplying limited amounts of chicken-pox vaccine to veterinarians for demonstration purposes. Its use in any flock is therefore optional with the owner and the veterinarian.

**Caution in Handling Vaccine**

Chicken-pox vaccine is live and is capable of producing the disease. It should not be applied on the combs, wattles, eyes, or mouths of fowls. All unused vaccine should be destroyed by burning.

Vaccinated and unvaccinated fowls should not be allowed in the same pen or house. In fact, all fowls of a flock should be vaccinated.
If the disease has not occurred in the flock or is not likely to occur, vaccination is not recommended. Chicken-pox vaccine is a preventive, not a cure.

Best results are obtained by vaccinating pullets before they come into production.

Mixed bacterins (avian) are suspensions of dead bacteria and should not be confused or used in conjunction with chicken-pox vaccine. Mixed bacterins (avian) are of no value in the prevention or treatment of chicken pox.