Infectious Bronchitis Control

immunization of chicks by willful infection protects laying hens from disease which may be costly to table egg producers

A. S. Rosenwald and D. V. Zander

The following article is a report of progress in a long term field study conducted by the University of California. The laboratories of the California Department of Agriculture cooperated with counsel and by making determinations of disease conditions during these trials. Farm Advisors W. F. Rooney, Tulare County, Ralph Pfoj, Fresno County, W. W. Mitchell, Sacramento County, and Dr. M. A. Nilson, acting extension poultry pathologist, helped plan and conduct the trials.

Infectious bronchitis — IB — was first recognized in California as a disease of young chicks which occasionally caused high mortality but resulted in a lasting immunity in recovered birds.

There is considerable evidence that uncomplicated IB is not of major concern to fryer producers since it results in only minor or temporary setback in the growth of chicks. Death loss from IB has not been a serious problem. It is of greatest importance as an economic hazard to table egg producers.

In California, the greatest need has been to prevent outbreaks of bronchitis in laying hens because it is in this group of birds that economic loss due to disrupted egg production and lowered egg quality has been most severe. Birds that have not had the disease as chicks are still susceptible when they come into the laying period.

A state-wide survey in 1951 indicated that the disease was present in all major poultry producing areas and, while most mature laying flocks were immune, many growing flocks were susceptible and needed protection.

Willful Infection Trials

Field trials were started in 1952 to determine if a program of immunization by willful infection of the chicks before they began to lay would fill the need in California as a similar program has in many other states. In Massachusetts — the first state to use this plan — over three million pullets were immunized in 1953, by swabbing the windpipes of a small per cent of the birds with IB virus and allowing the infection to spread.

The California trials were organized on an area basis with the Orange Cove-Orosi area — in Fresno and Tulare counties — selected for the first series of experiments. Infectious bronchitis in laying chickens had been definitely diagnosed in that area. Most of the poultrymen produced table eggs and all the growers wanted information on immunization. Also, it is well isolated from other poultry areas by extensive fruit or field crop operations or by mountains with the prevailing winds toward the mountains. The number of birds involved were within the limits of practical field experimentation.

To determine the immunity status of flocks in the area a challenge-test was done. Three to six representative birds — from each of several age groups on cooperating ranches — were shipped to Davis. Each bird was inoculated intratracheally — in the windpipe — with IB virus as illustrated by the photograph. If the birds were immune, no symptoms developed. If they had not had bronchitis and were not immune, there would be a take. That is, the birds would sneeze, gurgle or cough.

All replacement chicks on ranches where the adult layers were immune were willfully infected — immunized — with IB virus.

Detailed records were kept for two weeks and general effects were noted for the duration of the trial.

To determine if the immunity induced was satisfactory to prevent a drop in egg production certain growers submitted their flocks to IB challenge on the ranch a year later.

In 1952 there were 87 age groups of chickens — from 34 flocks — tested for immunity to bronchitis by challenge. Based on the challenge-test results, 62 groups were immune, nine were not immune, and 16 were questionable — where one or two birds in the test group developed bronchitis — had takes — while the other chickens did not.

Because of the number of questionable
groups, it was decided to inoculate intra-
tracheally all of the growing chicks—
before 14 weeks of age—in each brood
of laying bird replacements to be immune-
ized. This 100% inoculation was done
to insure that each chick would become
infected and develop immunity.

Challenger of laying flocks which as
chicks had gone through a natural out-
break—as well as those inoculated 100%,
in the trial—indicated that good protec-
tion was obtained through at least a year.

To conserve time and costs it was
decided in 1953 to test the practicability
of inoculating 10% of each brood and
allowing the infection to spread to pen-
mates, thus inducing immunity through-
out the brood or group. As was the case
in previous years, such flocks showed no
drop in production or any adverse effects
when challenged—on the ranch—11
months after this type of immunization.

Rio Linda Area

Following the satisfactory results in
Orange Cove-Orosi, poultrymen in the
more intensive poultry area of Rio Linda
offered their cooperation to obtain ex-
tensive data.

The Rio Linda area was organized
along lines similar to those of Orange
Cove-Orosi. The assistance of veterinary
practitioners in each area was enlisted to
do the immunization. To coordinate the
trials, a steering committee of poultry-
men was formed in each area. Only 10% of
the birds were actually inoculated in
each of the broods to be immunized.

A survey by challenge of the laying
flocks to be included in the Rio Linda
area showed that all were immune. Thus
the trial and inoculation could go ahead
without endangering any susceptible lay-
ing flocks. Cooperating flock owners
could have groups of replacement chick-
cens challenged by veterinarians to deter-
mine the immunity status. If a group
proved to be resistant to IB—as a result of a
natural outbreak—inoculation was not done
when the flocks in the trials are shown in the table
because broods immune on challenge—
therefore not inoculated—were not shown.

Results of All Trials

The over-all mortality from all causes
for the two weeks following willful in-
fection was about 1%; the range was be-
tween 0% and 8.5%. Chicks in 86.8%
of all flocks inoculated developed symp-
toms while in the remainder there were
no takes.

A careful check revealed that con-
current infections—Newcastle Disease,
chronic respiratory disease, or other—
were present in many of the broods
where mortality following immunization
exceeded 1% to 1½%. In some broods,
poor management or brooder failure
contributed to high mortality.

On-the-ranch challenge of the laying
hens—9-12 months after their inocula-
tion as chicks—showed that the im-
munity induced provided adequate pro-
tection during the following laying year:
challenge did not affect egg production
or quality. Similarly, field outbreaks of
definitely diagnosed bronchitis resulted
in satisfactory protection as shown by
later challenge of such flocks except that
in one such case there was a very slight
drop in production.

The lowest mortality reported in the
trials—0.0% for the two weeks following
inoculation—occurred in chicks inocu-
lated 100% at two weeks of age and with
good takes. However, there is a definite
indication from the data that the mor-
tality from all causes for the two week
period following inoculation was much
lower in chicks inoculated at five weeks
of age or older than in chicks inoculated
at three to four weeks of age. It was also
obvious that IB virus should be used only
on growing birds in good health. Its use on
chicks infected with other agents may precipitate increased losses.

Where all chicks in a brood were inocu-
lated directly into the windpipes, the
symptoms occurred within 24-48 hours
and weber over within a week or ten days
except where prolonged by complicating
respiratory infections. When only 10%-
20% of the brood were similarly treated
and the infection allowed to spread, the
beginning of marked signs occurred a
little later and the duration of the out-
break spread out over a longer period.

Results of the trials indicate that under
the conditions encountered in the two
area basis—after the immune state of
all flocks had been determined—pro-
vided satisfactory control of infectious
bronchitis in laying hens. The cooper-
ating poultrymen were thus protected
against economic loss.

It must be emphasized that this
method of immunization is not without
hazard, since the virus spreads—as do
other symptom-producing IB viruses—
to susceptible birds in the area. It should
therefore be used only under carefully
controlled conditions.

The goal must be to find vaccines and
methods which produce immunity—
without perpetuating the disease—
with a view toward its elimination. Research
is continuing on this and other infectious
bronchitis virus strains as immunizing
agents.

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The strain of infectious bronchitis virus
used for both challenge and inoculation
and designated Massachusetts L-43 was obtained
by the Cutter Laboratories, Berkeley. Prior to
that time the virus was prepared in University of Cali-
ifornia laboratories at Davis. The
poultrymen in both areas and Drs. Ian
McDonald, Jack Pfluech, and S. F. Exstrom
coparently in the trials reported.

<table>
<thead>
<tr>
<th>Trial</th>
<th>Flocks</th>
<th>Birds</th>
<th>Mortality 2 wk. post inoc.</th>
<th>Flocks</th>
<th>Birds</th>
<th>Mortality 2 wk. post inoc.</th>
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</thead>
<tbody>
<tr>
<td>Orange Cove-Orosi, 1952-1953</td>
<td>100%</td>
<td>77</td>
<td>84,505</td>
<td>911</td>
<td>1.08%</td>
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<td>Orange Cove-Orosi, 1952-1953</td>
<td>10%</td>
<td>59</td>
<td>64,110</td>
<td>401</td>
<td>0.63</td>
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<tr>
<td>Orange Cove-Orosi, 1952-1953</td>
<td>10-20%</td>
<td>89</td>
<td>213,726</td>
<td>2,735</td>
<td>1.28</td>
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<td>Rio Linda, 1953-1954</td>
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<td></td>
<td></td>
<td>78</td>
<td>188,820</td>
<td>2,452 1.29</td>
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<td>Totals</td>
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<td>225</td>
<td>362,341</td>
<td>4,047 1.12%</td>
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