Effects of the Chicken Body Louse, *Menacanthus stramineus*,¹ on Caged Layers²

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ABSTRACT When 23-, 35-, and 49-week old Ideal 236 White Leghorn hens were infested with the chicken body louse, *Menacanthus stramineus*, percentage egg production 12 weeks later had decreased by 16, 34, and 46%. Meanwhile, the average hen weight had decreased by about 85, 300, and 450 grams compared with uninfested control hens of the same age. There were also significant decreases in clutch size and feed consumption of the infested hens. All the decreases correlated with populations of lice.


ALTHOUGH the chicken body louse, *Menacanthus stramineus* (Nitzsch), is the louse most commonly found on chickens, *Gallus domesticus*, in the United States, the data concerning the effect of this parasite on the laying hen are conflicting. For example, Warren et al. (1948) and Stockdale and Raun (1960) did not detect differences in egg production between hens infested with *M. stramineus* and uninfested hens. In contrast, Edgar and King (1950) found that body lice caused a loss in egg production though the loss was "not quite significant at the 5% level"; however, they concluded that it was "economically worthwhile for poultry men to keep hens as free of lice as possible."

Glees and Raun (1959) found a definite decrease in egg production by infested hens. All these studies were conducted in floor-type pens with control and infested birds in the same room or pen. Thus the control birds could become infested.

The present study was made to determine the effects of heavy infestations of *M. stramineus* on the egg production, body weight, feed consumption, egg size, and clutch size of caged White Leghorn hens. Also, 3 ages of hens were used to determine whether there were differences in the effects of the lice when hens were coming into production, were at the peak of production, and were showing declining egg production.

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¹. Mallophaga: Menoponidae.
². Mention of a commercial or proprietary product in this paper does not constitute an endorsement of this product by the USDA.
METHODS AND PROCEDURES

Three pairs of rooms within a Butler-type building were used in the tests. Four rooms (2.93 x 3.66 m.) were equipped with 24 single deck cages, 41 x 25 x 46 cm.; two rooms (5.97 x 3.66 m.) were equipped with 72 stair step cages of the same size. The smaller rooms were equipped with a 250-c.f.m. and the larger rooms with a 750-c.f.m. centrally located turbine roof-mounted exhaust fan. Each room also had a 9500 B.T.U. window air conditioner. Temperature ranged from a low 7°C in the winter to a high of 33°C in the summer; the average was 20-22°C for all tests. R.H. ranged from 30 to 85%. Time clocks were used to maintain 15-16 hr. of light per day. Feed (16% Purina Layena Crumbles®) and water were supplied ad libitum throughout the test. Manure was collected on plastic sheets and removed weekly to prevent fly cultivation or odor accumulation.

The test hens were debeaked White Leghorn pullets (Ideal 236) that were randomly selected and placed in individual cages in paired rooms when they were 20 weeks old. They had been vaccinated against Marek's disease at 1 day of age, against Newcastle-bronchitis at 10 days, and 4 and 16 weeks, and against fowl pox at 16 weeks. No further medication was given. These hens were infested at different ages with 200-500 lice that had been mechanically aspirated from carrier hens (they were therefore of various ages). In Test 1 (9/30/73-6/27/74), both the control and the infested groups consisted of 72 hens that were infested when they were 35 weeks old, treated with pyrethrum when they were 52 to 54 weeks old, and then reinfested with lice when they were 61 weeks old. In Test 2 (1/6/74-4/6/74) and Test 3 (1/20/74-4/20/74), the groups consisted of 24 hens each. Those in Test 2 were infested when they were 49 weeks old and those in Test 3 when they were 23 weeks old.

The weight data for hens, eggs, and feed were obtained by using platform scales with an accuracy of ± 2 grams. Egg production records were maintained on a hen day basis, but all eggs for each group were weighed daily. Individual hens and feed for each group were weighed weekly.

Estimates of the louse population were made each week when the hens were removed from the cage for weighing. The following index was established: (0) no lice, (1) very light, 1-10 lice seen in vent area only, (2) light, 10-50 lice seen in vent area only, (3) medium, > 50 lice in vent area and occasional lice seen at other feather partings, (4) heavy, numerous lice and lice eggs present in vent area and with more than 10 lice seen per feather parting on thigh and breast of the bird, and (5) extra heavy, numerous lice and lice eggs in vent area as well as the rest of the body feathers.

Data were statistically analyzed using regression analysis for percent egg production, hen weight, and clutch size. Average egg size and feed consumption were compared using the sign test. A LSD value was calculated for percent egg production and hen weight in each test to aid the reader in comparing weekly differences in percent egg production and hen weight.

RESULTS AND DISCUSSION

Test 1. Data showing the effects of lice followed by insecticidal treatment and subsequent reinfection are presented in Figure 1. The lice population increased rapidly following infestation of the hens at 35 weeks (see infestation index, Fig. 1). By the 42nd week the average hen weight had decreased significantly for the infested hens and the average daily feed consumption for these hens had decreased by 17 g./hen/day. Percent egg production was significantly reduced by the 44th week. Between the 44th and 50th week the lice population continued to increase
Fig. 1. Effects of *Menacanthus stramineus* on egg production and weight of White Leghorn hens infested when they were 35 weeks old, treated with pyrethrum at 52-54 weeks, and reinfested with lice at 61 weeks. LSD value is 12.1% for egg production and 64.5 g. for hen weight during weeks 34-50 and 6.3% for egg production and 56.1 g. for hen weight during weeks 62-73.

Rapidly on the infested hens. Regression analysis showed that the percent egg production dropped by 3.6%/week for the infested hens as compared to 1.0%/week for the control birds. In this period the infested hens lost an average of 31.4 g./week while the control hens gained an average of 25.8 g./week. At the end of 51 weeks, the infested hens were also consuming about 30 g. less feed/day than the control hens.

At the beginning of the 52nd week, both the control and infested hens were deprived of food and water for 3-1/2 days to induce molting. At this time the fluffy area of the body feathers on the infested hens had been eaten so badly by the lice that they would not support a heavy reinfestation of lice following treatment. They were treated 4 times with 0.05% pyrethrum spray during the 52nd to 54th week to be sure that all viable lice forms were killed. About 80% of the infested hens showed a partial or complete molt; but < 30% of the control hens showed signs of molting. The infested hens also consumed about 9 g. more feed/day during this treatment period than did the control hens.

After reinfestation at 61 weeks, the louse population built up much slower than after the initial infestation. Only about 1/3 of the hens had a heavy population of lice at the end of the test and many had only a light infestation. From the 64th to the 70th week of age the infested hens laid significantly more
eggs than the controls. This increase would be attributed to the length of time the hens were out of production, treatment to remove lice, and the partial molt. Although the weight of the infested hens remained significantly less than the controls, they were steadily increasing. There were no differences in feed consumption nor clutch size in this part of the test.

Test 2. Results of the data showing effects of lice on hens infested at 49 weeks of age are shown in Fig. 2. As in Test 1, the lice population built up rapidly and remained extra heavy for the last 6 weeks of the test (index, Fig. 2). During this 6 weeks the infested hens consumed an average of 29 g. less feed/day than the controls. Hen weight became significantly different in the 55th week and the infested hens weighed about 450 g. less/hen than the controls at the end of the 61st week. Egg production was significantly less beginning with the 54th week and by the 61st week the infested hens were laying 46% less than the controls. Regression analysis showed that the percent egg production decreased by 3.8%/week for the infested hens but by only 0.2% in the control hens. Infested hen weights decreased by 26.3 g./week while the control hens weight increased by an average of 7.1 g./week.

Test 3. The effects of *Menacanthus stramineus* on caged White Leghorn hens when infested at 23 weeks of age are shown in Figure 3. The lice population on hens in this test increased

![Graph showing egg production and weight of hens](image_url)

Fig. 2. Effects of *Menacanthus stramineus* on egg production and weight of White Leghorn hens infested when they were 49 weeks old. LSD value is 9.2% for egg production and 133.4 g. for hen weight.
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61st week,

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61st week

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the control of 7.1

Menacanthus stramineus on

infested at

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increased

slowly compared to Tests 1 and 2. It was

not until the 33rd week (10 weeks after

infestation) that all hens were heavily infested

and even then some of the hens had begun

to lose some of their lice. Feed consumption

was significantly reduced by the infested hens

during the 30th week and for the last 6 weeks

the infested hens consumed about 12 g./hen/day less feed than the controls. The

infested hens weighed about 65 g. more/bird

at the start of the test than the control birds

and it was not until the 32nd week that they

weighed significantly less than the controls.

There was a significant difference in egg

production by the 26th week. During the 28th

week the control hens were found to be

heavily infested with the northern fowl mite.

They were therefore moved to a separate

building and treated 3 times with pyrethrum

before being moved back into the building

10 days later. As a result their egg production

decreased but was back to normal by the

30th week. There was a 22% difference in

production at the end of this test. Regression

analysis showed a decrease in the percent

egg production by 2.3%/week and

0.3%/week for the infested and control birds,

respectively, for weeks 25-36. Hen weight

increased by 5.4 g./week for the infested

hens but by 22.7 g./week for the control

in this same period of time.

It appeared that after a given period of
time, heavily infested hens abruptly quit
laying. However, clutch size was calculated
for the last six weeks in each test. Data in
Table 1 show that the infested hens also had
TABLE 1.—Effects of Menacanthus stramineus on average clutch size during the last six weeks of each test

<table>
<thead>
<tr>
<th>Test no.</th>
<th>Age of hen (weeks)</th>
<th>Average no. eggs/clutch</th>
<th>Infested</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>46-51</td>
<td>3.3</td>
<td>4.4</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>56-61</td>
<td>2.6</td>
<td>4.0</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>51-56</td>
<td>6.5</td>
<td>15.2</td>
<td></td>
</tr>
</tbody>
</table>

a decreased clutch size prior to the time they completely went out of production.

Even though Tests 2 and 3 were essentially run during the same period of time, with same strain of birds, and under the same physical conditions, there was a definite difference in the numbers of lice the 2 groups of birds maintained. However, from available unpublished data this would appear to be a “substrain” difference rather than an age difference. Reasons for the slow population build-up in Test 3 and on the reinfested birds in Test 1 are unknown. The effect of increasing daily temperatures and host immunity warrant further study.

The average egg size for infested and control hens were calculated for each test. In some tests there appeared to be a decrease in egg size as lice populations increased and feed consumption and body weight decreased. Future studies should correlate lice populations with individual hen weights and egg weights to show the direct effect, if any, of lice populations on egg weights.

These tests demonstrated that moderate to heavy lice infestations can significantly reduce the feed efficiency and egg production of laying hens, thus reducing the profit to the producer.

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REFERENCES


