ing biological control organisms
the water quality can be expected
to improve. As a result, this coun-
ty’s commitment to the Mexican
government to supply better quali-
ty water from the Colorado River
drainage system can be more readi-
ly realized. Also, the widespread
distribution of fish such as the
Tilapia that are capable of reducing
mosquito-breeding habitats un-
doubtedly will reduce significantly
the threat of invading mosquito-
carried viruses such as Venezuelan
equine encephalitis, and the need
to control such mosquitoes with
insecticides.

We anticipate that within a year
most waters in the Southern Cali-
fornia desert will be treated at
savings of one-half to one-third
over current techniques . . . a sav-
ings over $500,000 in direct costs
alone. In addition, water will be
delivered to users more efficiently,
and indirect savings to users will
be realized in the form of more
efficient irrigation and greater crop
returns.

Conclusions
The biological control of aquatic
weeds by imported African Tilapia
fish in the lower Sonoran Desert of
California is possible in practical
levels in irrigation canals and
drains, and in recreational lakes.
In order to extend this control to all
portions of the irrigation system,
a concentrated effort to increase
fish production and efficiency of dis-
semination are being emphasized
to make available large numbers of
fish early in the season for annual
stocking of problem areas. Severe
winter water temperatures reduces
the numbers of these tropical spe-
cies to levels below those necessary
for practical control.

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A number of variables govern
the amount of feed consumed daily
by full-fed laying hens. Most im-
portant are body weight, ambient
temperature, energy level of the
feed, and egg production rate. A
change in any one of these vari-
ables causes a compensatory change
in feed intake as the birds attempt
to adjust energy consumption to
energy needs. But chickens are not
all equally proficient in making
that adjustment.

For a number of years, broiler
breeder stock has routinely been
maintained on limited feeding pro-
grams, because these heavy strains
tend to overconsume energy when
given continuous access to feed.
Overconsumption results in a
buildup of excessive body fat and
less efficient conversion of feed to
hatching eggs.

White Leghorn strains, which
produce most of California’s mar-
et eggs, are considerably more
efficient than the broiler breeds in
regulating energy intake to meet
energy requirements. Therefore, it
is common commercial practice to
full-feed Leghorn layers, giving
them access to feed 24 hours a day.

In the past, few questions have
been raised concerning the validity
of this practice, but more recently,
researchers have been reexamining
the possibility that Leghorns, too,
tend to overeat and that some feed
restriction might result in more
efficient egg production. The dra-
matic rise in feed prices has
prompted an increase interest in
the subject.

The University of California Co-
operative Extension has been con-
ducting field trials over the past
several years to test the practicality
of restricted feeding of Leghorn
layers in cages under commercial
conditions. The trials to be reported
here was carried out in open-type
housing at the Orange County
Industrial Farm. Access to feed
was controlled by hinged covers on
the feed troughs (see diagram).
From a central cable running the
length of the house, a nylon cord
was attached through a set of
pulleys to each trough cover. A
hydraulic ram, when activated by
an automatic time clock, pulled the
central cable and raised the hinged
covers, giving the birds access to
the feed. At the end of each
feeding period, the ram action
reversed and the covers returned to
a closed position.

Experimental design
This trial was designed to test
three different treatment effects:
1) Effect on performance of full
feeding (free access 24 hours per
day) vs. restricted feeding (three
1-hour feeding periods per day).
2) Bird density effect on feed
intake under full- and restricted-
feeding regimes (3 vs. 4 birds
per 12-inch by 18-inch cage).
3) Effect of age of bird at initi-
ation of feed restriction (24 vs. 32
vs. 40 weeks) on performance.
The eight treatments were repli-
cated four times, with each rep
consisting of 24 layers weight 3-bird
cages or six 4-bird cages. The 768
birds in the test were all of the
Shaver strain. Egg production, egg
size, feed consumption, and body
weight records were kept, starting
at 24 weeks of age and continuing
through 64 weeks of age.
All treatments received the same
ration. During the warm months of
the year it was formulated to
contain 17 percent protein and
1,225 kilo-calories of metabolizable
energy per pound; for the
colder winter period the protein
level was dropped to 16 percent
and the energy raised to 1,250 kcal
per pound.

Results
Bird density effect: A comparison
of the data in tables 1 and 2
quickly confirms what we have
learned in other trials: that crowd-
ing layers in cages adversely affects
egg production and feed conver-
sion. The higher density treatment
was included in this test to deter-
mine if crowding further reduced
feed intake when feeding time was
limited. Percentage-wise, there was
a greater restriction in the 4-bird
cages. However, average daily intake in pounds was
Leghorn layers

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To control access to the feed, trough covers are opened and closed by the action of a hydraulic ram attached to a central cable. The time clock activates a solenoid valve leading to the ram.

Some restriction may be in order with substantial economic savings a possibility. Under the conditions of this study, a 12 to 13 percent reduction in feed intake did not adversely affect performance.

A commercial egg producer wishing to adopt the practice of restricted feeding should first carefully assess his present program. What is the current daily feed intake of his flock? Based on the ration formula and intake level, are the birds overconsuming on energy, protein, and other nutrients, according to accepted standards?

If the decision is made to follow a restricted feeding program, continuous monitoring will be necessary to avoid problems. Consultation with a nutritionist would be advisable. It is recommended that a portion of the flock be maintained as full-fed controls so that performance comparisons can be made directly.

Conclusions

These results and other data obtained through Cooperative Extension field studies suggest that Leghorn layers do tend to overconsume on full-feeding programs.