AN EVALUATION OF OLEANDOMYCIN AS A CONTROL OF AMERICAN FOULBROOD DISEASE OF HONEY BEES

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Since the discovery of sulfathiazole about 20 years ago as a control of American foulbrood disease of honey bees, a number of chemicals and antibiotics have been studied as to their effectiveness against bee diseases (Haseman 1961). In 1959, field studies were begun to evaluate the effectiveness of oleandomycin as a control of American foulbrood in Florida.

Oleandomycin is a relatively new antibiotic produced by Sterptomyces antibioticus, a fungus belonging to the Actinomycetes. These fungi are widely found in soils and composts, in air and on dust particles and in close association with plants. Oleandomycin was first described in 1954 under the designation P.A. 105. Chemically it is a basic compound composed of the sugars L-oleandroside and desosamine, glycosidically attached to a complex lactone nucleus, termed oleandolide. The approximate empirical formula is C_{35}H_{48}NO_{12}. This chemical is used medicinally in the treatment of a number of bacterial infections of man. It has also been shown to be effective against viruses, rickettsia and certain protozoa. Combinations of oleandomycin with other antibiotics, primarily with terramycin, are popular, and there are indications that certain combinations achieve both synergistic action and a suppression of the development of resistant bacteria (Colville et al. 1959).

The colonies of bees used in this experiment were obtained by the local bee inspector from several beekeepers. They were in both 8 and 10 frame hives with one to three honey supers. All were infected with American foulbrood. Four levels of oleandomycin were tested. They were 0.125, 0.25, 0.5 and 1 gram of oleandomycin per treatment. Each treatment was replicated three or more times. The oleandomycin used was a 25 per cent concentrate obtained from Chas. Pfizer & Company. Each test level of oleandomycin was thoroughly mixed in one-fourth cup of powdered sugar by sifting 4 times through a kitchen flour sifter.

A simple method of application of the antibiotic was used (Fig. 1). The hives were opened, exposing the brood nest, and the mixture of oleandomycin and powdered sugar was dusted with a flour sifter evenly over the top bars of the brood frames. Applications were repeated in this manner at one to two week intervals until the disease disappeared. No manipulation of the hive to induce brood rearing in all brood frames or supers frames was attempted. No honey, which could harbor disease spores, was removed from the hive. This simplified method of treatment was selected because if successful it would be practical in commercial beekeeping. The method required the minimum of time for the treatment, was inexpensive, and disrupted the colony as little as possible, thereby preventing robbing and a chance of spreading disease through the apiary.

Observations were made of each hive at time of treatment. Records were kept as to the amount of disease present, the population of the hive, conditions of the brood and queen, and the amount of honey in the hive.
The system of rating the amount of disease and hive strength was as follows: 1 to 50 diseased cells was rated A, 51 to 500 cells B, over 500 diseased cells C. Hive strength was rated as follows: three frames or less covered with bees was rated A, three to seven frames of bees B, and eight frames or more was rated C. The amount of stores was estimated in pounds.

Fig. 1. Method of applying oleandomycin to the brood frames of a diseased hive.

RESULTS

In these tests, oleandomycin at all levels of treatment reduced the amount of infection of American foulbrood in a diseased colony. Generally four or five treatments brought about the removal of all disease in the colony that was visible to the naked eye. In some colonies the disease reappeared when the treatment stopped. Diseased hives, while being treated with oleandomycin, produced large numbers of worker bees and average yields of honey when compared with disease-free colonies in the same apiary.

Fig. 2 shows the average response of the colonies treated with the two highest levels of oleandomycin. In both levels of treatment there was a decrease in the amount of disease present and an increase in the number of bees in the colony. Even at 0.125 gram per treatment there was a reduction of disease and an increase in bee population. Some of the hives in each of the four levels of treatment were clear of disease for one or more
Fig. 2. Responses of colonies treated with 0.5 and 1.0 gram oleandomycin per treatment.
months, after 4 or 5 dustings. However, since no effort was made to shift
diseased frames throughout the brood nest to require brood rearing in all
diseased combs, some of the hives later developed diseased brood. Although
no laboratory tests were conducted to determine the length of time oleandomycin remained active in the hive, the results obtained indicate this drug
has little or no residual action against American foulbrood disease.

One of the problems in the use of drugs for treating bee diseases is the
possibility of small quantities of the drug being stored in honey and harming
people who use the honey as a food. Sulfathiazole has been found in
honey produced by colonies while being treated. If laboratory tests prove
that oleandomycin is not residual for any length of time in stored honey,
it might prove preferable to sulfathiazole as a bee disease treatment.

As far as could be determined, oleandomycin at the levels used had no
harmful effects on the egg laying of the queen, the developing larvae, or
on the adult bees. In all cases colonies receiving treatment produced
honey during the honey flow in amounts equivalent to the disease-free
untreated control colony.

A different series of tests were being conducted in this apiary at the
same time using aureomycin, terramycin, sulfathiazole and a combination
treatment of terramycin and sulfathiazole. These tests are still in progress
and the results will be reported later.

When compared with other treatments, oleandomycin was apparently
equal to aureomycin in effectiveness. It was not as effective as terramycin
at 0.175 gram per treatment, sulfathiazole at 1 gram, or a combination of
terramycin and sulfathiazole.

**Summary**

These data indicate the following about oleandomycin:

1. At all levels tested it reduced American foulbrood disease in bee col-

2. Hives increased in population while receiving the drug.

3. No harmful effect was noted on egg laying, brood rearing, or adult

4. Diseased hives produced an amount of honey equal to that from dis-

case-free untreated colonies in the apiary.

5. The drug apparently has no residual action in the hive.

6. Although effective, it was less effective than either sulfathiazole or
terramycin.

**Literature Cited**

*Colville, J. M., Frank Cox, Jr., and E. L. Quinn.* 1959. Comparative
studies of oleandomycin, triacetyleandomycin and erythromycin with
a brief review of the literature concerning oleandomycin. *In Anti-
p. 401-410.
