The Screwworm

ADULT

PUPAE

EGGS

LARVAE

THE AGRICULTURAL AND MECHANICAL COLLEGE OF TEXAS
TEXAS AGRICULTURAL EXTENSION SERVICE
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THE SCREWWORM

THE SCREWWORM probably causes more financial loss in Texas than any other insect attacking livestock and wildlife. Estimated millions of dollars are lost annually because of expense in labor and medication for treatment of wounds, reductions in weight, deformities resulting from screwworm infestation and increased susceptibility to disease and actual death of animals.

The screwworm, the maggot of one of a group of insects commonly referred to as blow flies, infests practically all kinds of wild and domestic animals, poultry and man, but is more common among cattle, hogs, deer, sheep and goats. Screwworms infest only wounds of warm-blooded animals and attack only living flesh. Some of the maggots infesting these wounds may be of other blow flies which breed in carcasses. Carcass-breeding maggots usually are found feeding on soiled wool or in wounds containing decaying blood and tissue.

The screwworm fly is about twice the size of a house fly and is bluish green with three dark stripes on its back. Full-grown screwworm maggots have noticeable rows of spines that surround their bodies, giving them the screw-like appearance from which their name is derived. The front end of the screwworm tapers and contains the mouth hooks. The true screwworm is distinguished from common blow fly maggots by the presence of two dark parallel air tubes. These tubes in full-grown maggots of the screwworm are readily visible with the naked eye, but are scarcely visible in the maggots of common blow flies. Most common blow fly maggots have white, yellow or gray colors. Screwworms have a pinkish tinge when they have completed feeding and are about ready to leave the wound. The only sure way to identify a screwworm case, however, is to collect maggots for microscopic examination by a specialist.

DISTRIBUTION

The true screwworm occurs only in the Western Hemisphere. The flies usually spread during the summer from overwintered areas throughout most of the Southwest. Localized outbreaks occasionally
occur in the Central and North Central States from shipments of infested livestock. The limits of winter survival, as well as shipments of infested cattle, determine the areas or states infested from year to year. Screwworm flies generally travel about 35 miles each week.

Within the United States, screwworms normally overwinter in South Texas, in portions of Arizona and California and occasionally in a small section in southern New Mexico. Fluctuations in the winter climate are responsible for variations in the extent of the overwintered areas. Therefore, such areas are large during mild winters and smaller in severe winters. Although screwworms usually overwinter only in South Texas, screwworms attack livestock all over the State by the end of summer.

LIFE HISTORY

The screwworm has four stages of development: egg, larva (maggot), pupa and adult. Weather conditions influence the length of its developmental stages. This discussion includes only the average number of days required for each developmental stage under normal summer conditions.

The female lays tiny, white eggs in shingle-like masses, usually about 250 at a time. Eggs usually

During a

- Severe Winter
- Average Winter
- Mild Winter

Figure 1. Overwintering areas of the screwworm in Texas.
are placed on a comparatively dry area at the edge of a wound and normally hatch in 12 to 24 hours.

Maggots feed with their head downward, with the blunt end exposed for breathing. They become full-grown in 5 to 7 days, then drop to the ground and burrow into the soil \( \frac{1}{2} \) to 1 inch deep to pupate. Pupae can stand brief exposure to freezing temperatures, but they are not able to survive soil temperature under 60 degrees F. for more than 2 months. In warm weather, the flies emerge from the pupal stage after 7 to 10 days and work their way to the surface of the soil. The flies seek food during the first few days of their adult life. They have been observed feeding on the liquids of manure, meat and exudate from wounds, as well as on nectar and plant juices. Flies usually mate when they are 2 days old. Females mate only once, but the males mate several times. After females are 5 to 6 days old, they seek wounded animals on which to deposit their eggs. About 21 days are required for the screwworm to complete a life cycle and the adult fly lives 2 or 3 weeks. Adults may withstand short exposures to temperatures as low as 24 degrees F., but prolonged low temperatures kill them.

**NATURE OF DAMAGE**

The newly hatched larvae feed in wounds, tearing and destroying tissue with their mouth hooks. The wounds usually are in the form of pockets and enough maggots may develop from one egg mass to destroy muscle tissue and make a hole about the size of a lemon. A single infestation in the navel of a new-born animal may be sufficient to cause death. Infested wounds attract screwworm flies and other female flies usually deposit additional eggs on the wound. Infestations in wild or neglected domestic animals frequently are fatal.

**PROPOSED CONTROL PROGRAM IN THE SOUTHWEST**

Based on many years of research and the success of a similar screwworm eradication program in the Southeast, scientists believe that the screwworm can be controlled effectively in the Southwest by the release of sterile males. The sterile male technique is particularly applicable for screwworm control because (1) screwworm flies occur in relatively small
numbers in nature, (2) large numbers of flies can be raised economically, (3) females mate only once but males mate several times and the flies can be sterilized without drastically affecting the mating behavior or life span. Overwintering areas play an important part in the planning and success of proposed control programs because these areas serve as sources for reinestation each spring. Overwintering areas in Texas during average, mild and severe winters are shown in Figure 1.

The proposed control program in Texas consists of a series of large-scale field tests divided into two phases which will be required to answer certain questions concerning the effectiveness of releasing sterile males for screwworm control in this area. Funds currently being raised by the Southwest Animal Health Research Foundation will be used to help finance these tests. Tentative plans for these two phases have been outlined by scientists of the Animal Disease Eradication Division and the Entomology Research Division, Agricultural Research Service, U. S. Department of Agriculture. The areas in which the male sterile screwworm flies will be released will depend a great deal on weather conditions and other circumstances existing at the time the program is actually initiated. Three to 5 years may be required to complete the proposed program.

**PHASE 1**

The first phase of the proposed control program probably will involve releasing sterile males over an approximately 50,000 square mile area in South Texas. This area corresponds approximately to the normal overwintering area in Texas, Figure 1. The primary purpose of the field test is to determine the effectiveness of releasing sterile males in decreasing natural populations of the screwworm fly. While these releases are being made, it also will be necessary to establish certain quarantine lines to prevent animals infested with screwworms from entering the release area. Sterile males will be released in South Texas in an attempt to eliminate the screwworm in this area by the time low temperatures occur. Under normal conditions, winter temperatures will eliminate the screwworm from the remainder of the State. No effect from the release of sterile screwworm males will be noted in the rest of the State until the following year. If Phase 1 proves successful, Phase 2 will follow.
PHASE 2

The second phase of the proposed control program includes the establishment of a buffer zone approximately 100 miles wide along portions of the Texas-Mexico border to prevent the re-entry of screwworms into the test areas as well as to determine the necessary width of such a buffer zone. Attempts also will be made to determine the number of flies per square miles required for release in the buffer zone for it to be effective. As in Phase 1, quarantine lines will have to be established in association with the buffer zone to prevent the entry of screwworm infested animals into the test area.

If Phases 1 and 2 are successful, information will be available to evaluate the possibilities of eradicating screwworms nationwide.

MAJOR PROBLEMS

Following are several problems which may affect the success of the proposed control program in the Southwest:

1. Lack of natural barriers. In the Southeast, the Atlantic Ocean and the Gulf of Mexico served as effective natural barriers against reinestation by the screwworm fly. Such natural barriers do not exist in the Southwest.

2. Effectiveness of sterile male releases in the Southwest. Because of high temperatures and low humidities common to the Southwest, the natural mortality of sterile males may be considerably greater in the Southwest than in the Southeast. This means that more sterile males will be needed or release areas will need to be selected more carefully.

3. Continuing program. Because of the lack of natural barriers in the Southwest, a permanent buffer zone must be maintained in which sterile males are released continually. This will be necessary to prevent the entry of screwworm flies from other areas.

4. Effectiveness of a buffer zone. Although buffer zones have been tested in other areas, it is impossible to predict how effective and economical such a zone in the Southwest will be.

5. Uncertainty of the weather. The occurrence of average or severe winters and favorable conditions
for survival of released sterile males will increase considerably the chances for the success of the proposed control program.

**PREVENTION AND CHEMICAL CONTROL**

Losses from screwworms can be reduced by using good management practices and treating infested wounds promptly. The following practices are sound any time, but will be especially important if a control program using sterile males begins in Texas and the Southwest.

1. During the screwworm season, examine livestock for wounds at least twice a week. Generally, infested animals stray from the herd and seek shelter in brush to avoid further attack.

2. Examine animals being loaded or unloaded and treat all wounds.

3. Avoid injuries to livestock. Treat navels of new-born animals and repeat the treatment, if necessary. Schedule breeding so that births will take place during cool weather. Treat surgical operations with screwworm remedies. Watch all wounds until they are healed. Also treat wounds made by branding, castration, earmarking and dehorning.

4. Check fences, pens and chutes for protruding nails, wire, splinters or other objects that may injure livestock.

5. Control ticks and other external parasites by spraying or dipping the animals with a recommended insecticide.

Several insecticides recommended for controlling screwworms and other external parasites of livestock may be used as smears, sprays or dips. Some insecticides may be purchased in special containers designed to treat individual wounds. For additional information, see Texas Agricultural Extension Service Leaflet 256, *Texas Guide for Controlling External Parasites on Livestock and Poultry*. This guide is available from your county agricultural agent.
This leaflet was prepared by C. F. Garner and R. L. Ridgway, Associate Extension Entomologists, A&M College of Texas, from information supplied by the Entomology Research Division and Animal Disease Eradication Division, Agricultural Research Service, USDA. Photographs, courtesy of USDA.