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Controlling Horn Flies on Cattle

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Importance

Economically, the horn fly, *Haematobia irritans irritans* (L.), is the most important arthropod pest of pastured cattle in the United States (Byford et al. 1992). Losses in the United States have been estimated at about $800 million annually. These losses are greatest to lactating cows and growing calves. High horn fly populations cause both significant blood loss and annoyance. Annoyance results in energy losses associated with combating the flies, changes and/or reductions in routine grazing patterns and bunching of animals. Significant reduction in calf weaning weights is well documented. This loss is related to a decline in milk production as a result of horn fly feeding or annoyance. Studies have shown that effective horn fly management can result in a 15-30 pound increase in weight in stocker calves during the growing season. University of Arkansas researchers noted a 17 pound reduction in calf weaning weights for every 100 flies feeding on the cow.

Horn flies have long been implicated in the spread of summer mastitis in non-lactating mammary glands. Louisiana State University researchers identified a link between dairy heifers with *Staphyloccus aureus* mastitis and horn flies. Subsequent research suggested that they are at a higher risk of acquiring mastitis when horn fly populations exceed 50-100 per animal. The horn fly can also serve as an intermediate host of *Stephanofilaria stilesi*, a nematode that causes skin inflammation along the belly of cattle. Although the horn fly is primarily a pest of cattle and requires cattle dung for development, it will occasionally feed on other mammals such as horses, sheep, goats and dogs.

Figure 1. Horn fly feeding on a cow. (Craig Sheppard, University of Georgia, Bugwood.org)

Biology

The horn fly was accidentally introduced into the U.S. from southern France prior to 1886. This small fly (Fig. 1) (approximately 1/8 inch long) is about half the size of a house fly and is known for spending most of its time on the back, head and shoulders of its host (Fig. 2). During very hot or rainy weather, horn flies may move to the belly. In addition to being smaller than the house fly, horn flies can be differentiated by their piercing mouthparts that resemble a beak. Horn flies only leave the animal to lay eggs on fresh cattle manure, less than 10 minutes old. Both sexes feed on cattle by taking 20 to 40 blood meals per day. Populations of up to 10,000

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Figure 2. (above) Horn flies on the back, neck and shoulders of a bull.
Figure 3. (right) Development of horn flies in fresh manure. (Art Cushman, USDA; Property of the Smithsonian Institution, Department of Entomology, Bugwood.org)

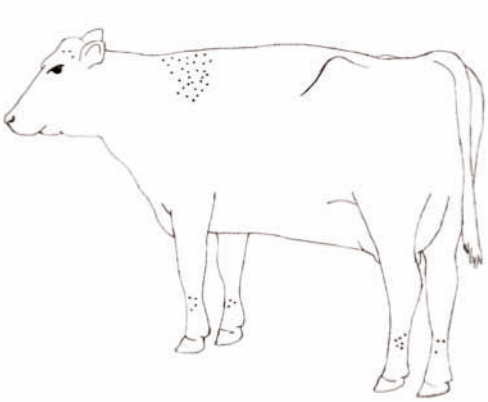

Figure 4a. Illustration of a cow with 50 horn flies.

per animal have been documented but normally do not reach this extreme. Development from egg to adult occurs in as little as 9-12 days. Eggs hatch and larvae develop within the manure (Fig. 3). Mature larvae migrate to the lower portion of the manure pat or in the soil to pupate. Adults emerge after about 5 or 6 days. Horn flies mate and seek a host to begin blood feeding a couple of days after emergence. An adult female may begin laying eggs three days after emergence and may lay up to 400 eggs during her lifetime. With such a short life cycle, many generations per year are possible, making it a very good candidate to develop insecticide tolerance, especially in southern areas.

Horn flies survive the winter as pupae in the soil. Adults emerge in mid-March with populations peaking in late May or early June. Horn fly presence or absence is temperature dependent, while abundance is influenced by humidity and precipitation. Therefore, during the dry and hot months of summer, populations normally decrease. In September, as temperature decreases and humidity and rainfall increase, populations will peak again.

Economic Injury Level and Horn Fly Monitoring

Monitoring horn fly abundance on cattle is important in making appropriate management decisions. Routine monitoring will help producers determine when best to initiate control methods and the efficacy of the current control program. It will also provide early warning to potential insecticide tolerance or other issues that negatively impact control.

Horn fly abundance should be monitored weekly throughout the fly season. Monitoring is best achieved by counting the number of horn flies on the head, shoulders and back of at least 10 cattle (10 to 15). Whole body counts are the most accurate but in practice are difficult to make. Counting the number of flies on one side of an animal may be the only option available. Horn fly counts from at least 10 animals should be used to produce an average. When average counts approach the economic threshold (150-200/head for beef or 75-100/head for dairy), control or supplemental control should be considered. Figure 4a-c illustrates horn flies on cattle and may be helpful in estimating fly numbers.

Control

Walk-Through Horn Fly Trap

The walk-through (Bruce) trap (Fig. 5) will help control horn flies by dislodging the flies as the animal passes through the trap. Dislodged flies are trapped in elements located on the sides of the trap. Trapped flies cannot escape and die from starvation or dehydration. The animals must pass through the

Figure 5. Walk-through (Bruce) trap dislodges and captures horn flies as the cattle pass through.

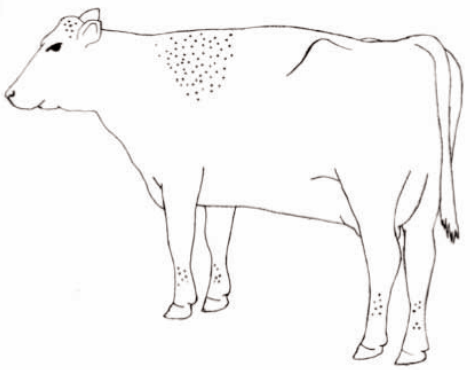

Figure 4b. Illustration of a cow with 100 horn flies.

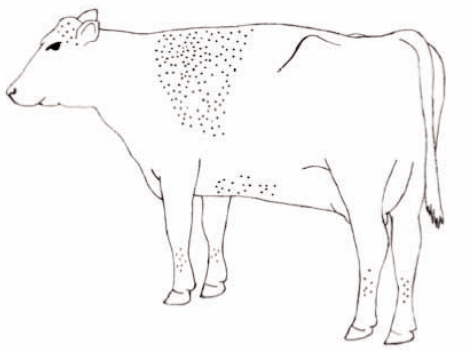

Figure 4c. Illustration of a cow with 200 horn flies.

trap to provide control; therefore, the traps are usually located in an area where animals must pass to gain access to water and/or feed, or in the case of dairy cattle, to travel to the milking parlor. During wet years, observe cattle to confirm use of the trap, as alternative sources of water may be available for the animals to drink; decreased use of traps will reduce their effectiveness for horn fly control.

In one Arkansas trial, an overall reduction of 57 percent of horn flies was noted when compared to an untreated herd. In another trial, the traps helped reduce the frequency of insecticide applications by 50 to 75 percent. Consult your county Extension agent for plans on building these traps.

Insecticide-Impregnated Ear Tags

Insecticide-impregnated ear tags are applied to the ears of cattle and release a small amount of insecticide over a long period of time (Fig. 6). If used properly, they can be an effective tool for controlling horn flies and ear ticks [such as the Gulf Coast tick, *Ambylomma maculatum* Koch, and the Spinose ear tick, *Otobius megnini* (Duges)] and may reduce face fly, *Musca autumnalis* DeGeer, numbers. Ear tags can provide about 12 to 15 weeks of continuous horn fly control.

Figure 6. Insecticidal ear tags being applied to cattle.

The active ingredients of ear tags now fall into five broad chemical categories: synthetic pyrethroid, organophosphate, organochlorine (cyclodiene), macrocyclic lactone and mixtures of the synthetic pyrethroid and organophosphate insecticides. In addition to the active ingredient, several ear tags contain a synergist such as piperonyl butoxide that increases insecticide toxicity to the horn fly.

Since the advent of insecticide-impregnated ear tags in the early 1980s, some horn fly populations in the southern states have developed resistance to the insecticides used in the tags, especially to synthetic pyrethroid and organophosphate ear tags, which for many years were the only insecticide classes used in insecticidal ear tags. Insecticide resistance or tolerance occurs because of the horn fly's short generation time (every 2 weeks) and multiple generations (more than 10) per year coupled with the long residual activity of insecticide-impregnated ear tags. If ear tags are going to be used, a few suggestions should be followed to help optimize effectiveness.

1. Base ear tag application on the horn fly population and economic threshold (150-200 per animal for beef cattle and 75-100 per animal for dairy cattle). If ear tags are applied too early, they may fail late in the season because of normal loss of insecticide activity.

2. Target control to get the most of your application. For example, treatment of lactating animals will help maintain calf weaning weights.

3. Rotate insecticide classes. Do not use the same insecticide class year after year. Instead rotate among synthetic pyrethroid, organophosphate, organochlorine and macrocyclic lactone insecticide classes. Remember, not all insecticide ear tags or classes are labeled to use on lactating dairy cattle. Consult MP144, *Insecticide Recommendations for Arkansas*, for a listing of insecticide-impregnated ear tags.

4. Remove insecticide ear tags when they are no longer effective, when the label recommends removal or in the fall.

5. Read the label; don't rely on ear tag colors or names to determine insecticide class. Different brand names of tags may contain the same active ingredient. The label usually suggests how many tags to use per animal. For face fly suppression and control of ear ticks, one tag per ear (two per animal) is more effective.

6. Consider other control methods such as self-treatment devices, sprays, mechanical trapping, feed additives or pour-on insecticides.

Self-Treatment Devices

If properly used and maintained, self-treatment devices such as dust bags and backrubbers can be an effective and economical horn fly control technique. These devices allow cattle to treat themselves especially when they are forced use (moving through a restricted area on their way to feed or water). Specific synthetic pyrethroid and organophosphate insecticide dust and liquid formulations are labeled for use in dust bags, back rubbers and animal activated sprayers. Consult MP144, *Insecticide Recommendations for Arkansas*, for a listing on insecticides labeled for use in backrubbers or dust bags.

Dust Bags

Forced-use dust bags can be a very effective horn fly control method (Fig. 7). Insecticide dust is applied to the animal as it passes through an opening such as a gateway. Dust bags are constructed of close mesh fabric bags (usually heavy canvas or burlap and available commercially from most farm or feed outlets) that contain an insecticide dust. Inspect dust bags regularly and recharge with insecticide dust when needed. Dust bags should be kept dry to reduce insecticide clumping and loss of effectiveness.

Back Rubbers

Back rubbers are used in much the same way as dust bags. A small amount of oil/insecticide solution is applied to the animal as it rubs under the device when passing through a gateway (Fig. 8). When charging or recharging a back rubber, use a good grade mineral or fuel oil (not motor oil) to mix with the insecticide. Mix the oil/insecticide solution according to label instructions.

Animal-Activated Sprayers

Animal-activated sprayers are similar to self-treatment devices in that the animal is treated on its way to or from a food or water source (Fig. 9). In most devices, the insecticide is sprayed onto the animal when the animal triggers a switch or electronic eye. These are used in gateways leading to minerals or water or as an exit sprayer in a dairy facility. Generally, only a small amount (less than 2 ounces) of insecticide is applied to the animal per application. Normally, animal-activated sprayers are only turned on when the fly population exceeds a predetermined number (i.e., 100-150 horn flies per animal) indicating that routine monitoring of the horn fly population is necessary. Transportable, solar-powered devices are available commercially.

Cattle often require acclimation to these animal-activated sprayers before they will routinely use the device. The device is usually placed in the off position in a gateway that animals must pass through for food or water. After cattle easily pass through the device in the off position, it can be turned to the on position so that cattle become accustomed to being sprayed. The acclimation process may take a week or longer.

Insect Growth Regulators and Larvicides

Insect growth regulators (IGR) and larvicides prevent horn fly larvae from developing into adults. These are administered to cattle as feed additives; immature horn flies (maggots) are exposed to these chemicals in the manure of cattle which consumed the product. Some formulations are available ready-to-feed, in the form of protein or mineral blocks or tubs, while others will require top-dressing or custom blending. One IGR is available in a bolus labeled to provide larval control for up to 150 days. The mode of action of larvicides and IGRs differs. IGRs disrupt

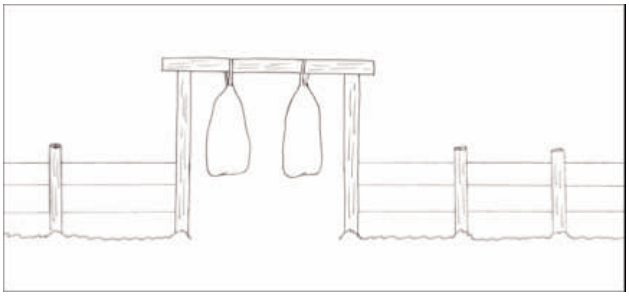

Figure 7. Forced-use dust bags.

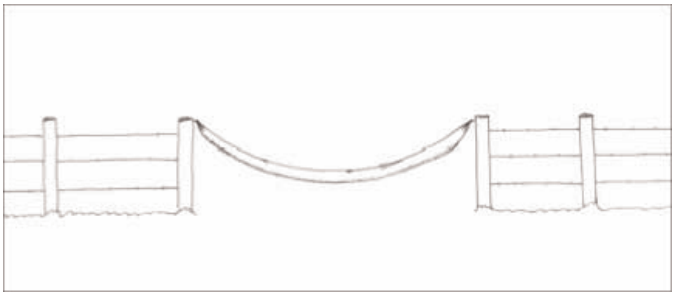

Figure 8. Insecticide-charged back rubbers.

Figure 9a. Battery-powered automatic sprayer.

Figure 9b. Solar-powered automatic sprayer.

Figure 10. Pour-on insecticide application.

normal molting and development of immature horn flies (maggots) whereas larvicides are traditional toxins that kill the maggots.

Use of IGRs or larvicides is normally initiated just prior to the first appearance of horn flies in the spring and throughout the summer and fall until cold weather restricts fly activity. Proximity to untreated herds and adequate consumption by cattle are two factors that can lead to variable results. To be effective, cattle must consume a specified amount, preferably on a daily basis. If consumption is below the specified rate, either increase the number of feeding stations or relocate stations to areas more frequented by cattle. Likewise, if consumption rate is above the specified rate, either decrease the number of feeding stations or relocate stations to areas less frequented by cattle. Supplemental control measures may be required if horn flies are moving in from untreated herds located nearby. Diflubenzuron and methoprene are examples of IGRs; tetraclorvinphos is an example of a larvicide. These products demonstrate similar effect on other flies (such as face flies) developing in cattle manure. Consult MP144, *Insecticide Recommendations for Arkansas*, for additional information on larvicides and IGRs.

Pour-On Insecticides

Pour-on insecticides are ready-to-use formulations applied along the back line of cattle at a dose based on body weight (Fig. 10). The concentration of the insecticide in a pour-on is usually higher than the final concentration used in a spray solution. Rates vary depending upon the insecticide formulation but usually range from 0.5 to 2 ounces per animal. Most conventional pour-on insecticides used against horn flies are formulated from synthetic pyrethroids. However, a few pour-on insecticides, macrocyclic lactones (ivermectin, etc.), are formulated to control internal parasites as well. Reliance on pour-on macrocyclic lactones alone for horn fly control should be limited to lessen internal parasite tolerance issues. Pour-on insecticides will normally provide control from 2 to 4 weeks following application. Consult MP144, *Insecticide Recommendations for Arkansas*, for additional information on pour-on insecticides.

Insecticide Spraying

Figure 11. High-volume, high-pressure insecticide spray application.

High-volume, high-pressure residual insecticide spraying is effective in controlling horn flies and other cattle pests (Fig. 11). About 1 to 2 quarts of an insecticide solution is applied with a power sprayer at a pressure of 150-200 psi. This amount and pressure will provide near complete coverage and penetration to the animal's skin. One drawback to high pressure spraying is the increased cattle handling required to make multiple applications throughout the fly season. Low-pressure, low-volume spraying with hand-held sprayers can be effective for some producers with gentle animals. With low-pressure, low-volume spraying, the applicator walks or drives around cattle applying an insecticide solution on an as-needed basis. Insecticide concentrates labeled to mix with water and apply to cattle primarily include the synthetic pyrethroid, organophosphate and spinosyn classes. Consult MP144, *Insecticide Recommendations for Arkansas*, for additional information on insecticide concentrates.

References

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