

Horn Fly Management¹

P. E. Kaufman and E. N. I. Weeks²

Horn flies (Figure 1) are one of the livestock pests with the greatest impact on the health and productivity of cattle. Economic losses due to horn fly damage are estimated at \$36 million annually in Florida alone. In the U.S.A. annual losses total between \$700 million and \$1 billion, with up to \$60 million spent on insecticidal control.

Horn fly damage is caused by blood feeding. The flies feed frequently and exclusively on blood, piercing the skin of cattle with their proboscis and taking around 20 small blood meals each day. Pain and irritation due to the constant presence of the flies and their bites causes defensive behavior in the cattle that prevents adequate food consumption and rest.

Biology

Horn flies (Figure 2) are small flies, about 3 to 5 mm long. The common house fly is usually 4–12 mm in length, over twice the size of the horn fly. Unlike the house fly, which has mouthparts suitable for soaking up liquid food, the horn fly has piercing, sucking mouthparts for piercing skin and sucking blood. Both males and females feed exclusively on blood. The adults are usually on the host, clustered on the withers, back, and sides, but will move to the belly during hot weather (Figure 3). Eggs are laid by the adult female in cattle manure that is very fresh, usually within 10 minutes of dropping. Horn fly eggs are oval, approximately 1.2 mm long and reddish-brown (Figure 4), making detection in manure difficult for monitoring.



Figure 1. Adult Horn fly.

Credits: J. F. Butler, University of Florida

Within 18 hours the eggs hatch and the first stage larva or maggot emerges and starts to feed. At this stage the maggot is white and about 1.5 mm long with a pointed head. Development through three instars occurs in the manure over 3 to 5 days. The mature maggot, which is 6.5 to 7.5 mm long (Figure 4), pupates in the manure. The pupal stage is reddish-brown and 3 to 4 mm long (Figure 5). The adults emerge from the pupal stage after 3 to 5 days. Adult flies begin mating 3 to 5 days after they emerge, and the females start to lay eggs 3 to 8 days after emerging from the pupal stage. Development from egg to sexually mature adult takes from 10 to 14 days. Each female fly may lay up to 200

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2. P. E. Kaufman, associate professor/Extension entomologist; E. N. I. Weeks, assistant research scientist, Entomology and Nematology Department, Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida, Gainesville, FL 32611.

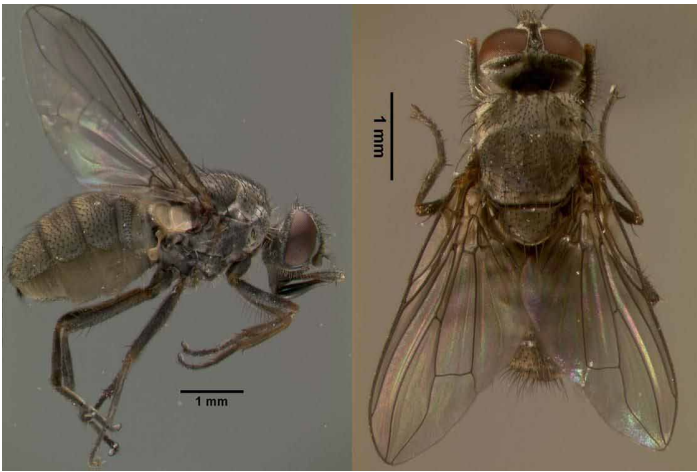


Figure 2. Adult horn fly from the side and above.
Credits: D. Fitzpatrick, University of Florida.

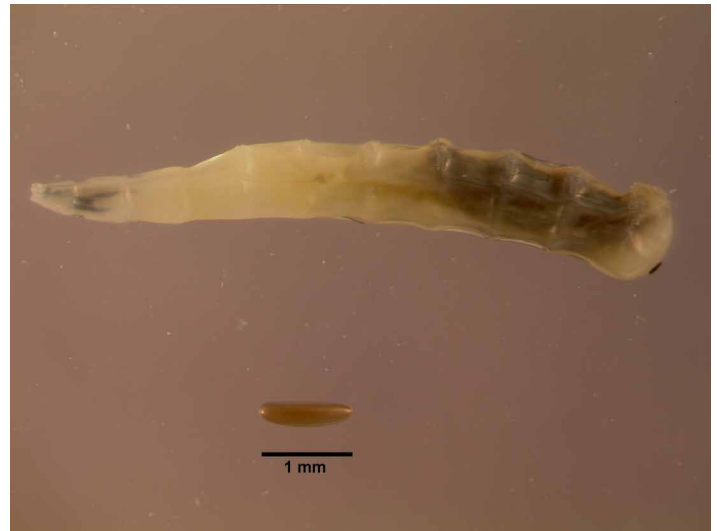


Figure 4. Horn fly egg (bottom) and third instar larva (top).
Credits: D. Fitzpatrick, University of Florida.

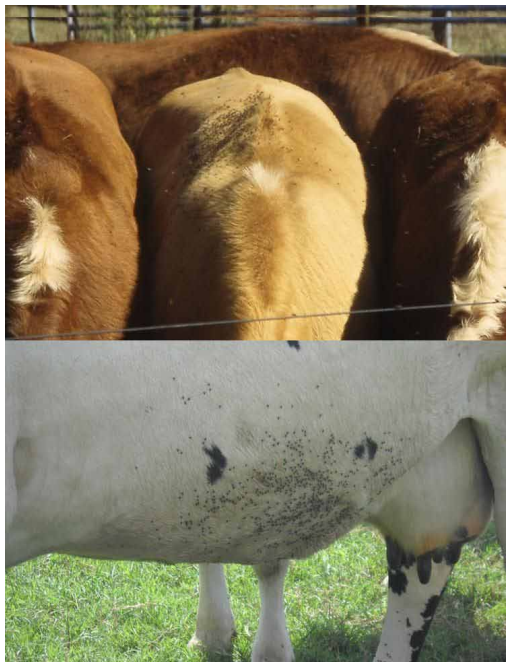


Figure 3. Horn flies clustered on the withers and belly of dairy cattle.
Credits: P. E. Kaufman, University of Florida.



Figure 5. Horn fly pupae in manure.
Credits: E. N. I. Weeks, University of Florida.

eggs, in batches of 14 to 17 eggs. Horn flies spend most of their time on the host, leaving only when it is necessary to relocate to a new animal or to lay eggs in freshly deposited manure. See EENY490, “Horn Fly *Haematobia irritans irritans* (Linnaeus) (Insecta: Diptera: Muscidae),” for more information on horn fly biology.

In subtropical and temperate climates, the pest stage or the adult horn flies are present only in the warm months. The flies spend the winter as pupae. Initiation of the pupal stage is triggered by cooling temperatures and decreasing day length. The adults will not emerge until the conditions are warm enough in the spring. In Florida and other southeastern states, biting horn flies are present throughout the year,

and although populations decline in the winter, they do not undergo a diapause (a period of dormancy).

Damage

Horn flies are blood-feeding insects that take multiple blood meals from their cattle host daily. Defensive behavior, such as head-tossing and tail-switching to dislodge the flies, uses up the cattle’s energy reserves and causes decreased growth and production. The irritation and blood loss caused by horn flies leads, cattle to lose 0.3 to 0.5 lbs in weight per day, and it reduces milk production in dairy animals. Although an individual horn fly only consumes 1.5 mg of blood per meal, horn flies take many meals per

day, and large populations may cause substantial blood loss. Irritation of the skin due to high numbers of horn fly bites in small areas may cause open wounds, which can increase the risk of secondary infections. The bite lesions, particularly if infections develop, may lead to damaged hides and potentially reduce hide values. Horn flies are vectors of several pathogens, including a filarial nematode that causes skin disorders in cattle in the western and southwestern U.S.A. and Canada. Mastitis or teat infection in dairy cows also has been associated with horn fly feeding, wherein flies mechanically transmit *Staphylococcus aureus* and other bacteria that cause mastitis in dairy cattle. Horn flies have been shown to cause severe damage to teats on heifers. Management of horn fly populations can reduce the number of cows suffering from mastitis. Horn flies also are suspected of mechanical transmission of anaplasmosis, anthrax and other disease-causing pathogens within herds.

The economic thresholds for horn fly presence on cattle are 100 or more per lactating dairy cow or 200 or more per beef cow. In some cases, horn flies are present at extremely high densities. For example, up to 20,000 flies per animal has been reported. In areas where flies are present at such high densities per cow, the blood loss due to feeding also has an impact on production, with the population consuming over a liter of blood per week. In general, horn flies are present at lower population densities on dairy cattle than on beef cattle. The reason for this is that dairy cattle are often fed grain-based feed that reduces the survival of immature horn flies in the manure, resulting in lower fly production.

Treatment of cattle for horn flies is highly beneficial. Weight gain and lactation are consistently lower on animals that are not treated for horn flies. When fly densities reach or exceed the economic thresholds (100 per dairy cow and 200 per beef cow), the cost of treatment is always exceeded by the benefit in terms of cattle health and production. For example, the control of horn flies on beef cattle resulted in increased growth of their calves believed to be due to increased milk production.

Horn flies may blood feed on other hosts such as horses, dogs, pigs, and humans, but the immature stages can only develop in cattle manure.

Monitoring

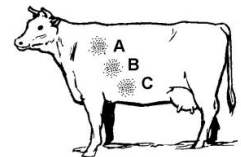
Observing cattle behavior should give a warning of horn fly or other biting fly activity. Cattle being bothered by horn flies will act defensively, licking and twitching their skin, switching their tails, and kicking at their bellies. The number of horn flies per animal may be easily estimated in

the field under sunlit or shade conditions. Animals should be selected randomly, and estimates should be made for 10 animals per herd (Figure 6). Experimental results indicate that 50 flies per side on a dairy cow or 100 flies per side on a beef animal is the economic threshold.

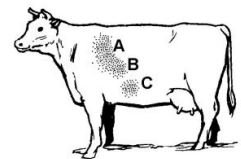
The criteria in Figure 6 should be used for estimating fly numbers.

Use the following criteria to estimate fly numbers:

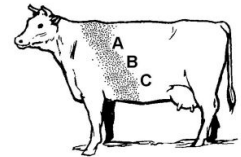
1. A single small patch of flies = 25 to 50 flies. The patch is located in area A, B or C.



2. A single patch of flies that covers areas A and B, or B and C = 100 to 125 flies.



3. A patch of flies that extends through areas A, B and C = 200 to 350 flies.



4. A patch of flies that extensively covers areas A, B and C = 500+ flies.

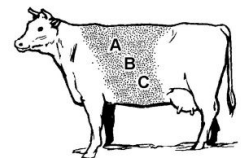


Figure 6. A method of estimating horn fly numbers in the field.

Control

The close association of horn flies with cattle (the flies leave the host only to lay eggs or to relocate to a new animal) makes horn flies particularly suitable for on-animal chemical control measures. However, in Florida and other states, the flies have developed resistance to many of the insecticides found in ear tag formulations. Check with your local Cooperative Extension Service Educator to determine which treatments should be used for horn fly control in your area.

Several different methods can be used to apply insecticide to cattle for horn fly control, but ear tags and forced-use dust bags provide the best control. Self-treatment methods such as dust bags and back rubbers will provide control, although backrubbers are usually less successful on horn flies (Figure 7). For self-treatment devices to be effective,

cattle must be “forced” to use them. For example, dust bags may be hung in exit alleyways from barns or placed between pasture and a water or feed source.

See ENY-279, “Self-treatment Methods for Livestock—Backrubbers,” and ENY-281, “Management of External Parasites with Forced-use Dust Bags,” for information on the use of self-treatment options for horn fly control.

Sprays and dips also may be used successfully for horn fly control. Application of residual sprays must reach 1–2 quarts per animal at 150 to 200 psi to ensure complete coverage of the animal and penetration to the skin. Animals should be treated in small groups to ensure that all animals receive an even application of the treatment.

The immature stages of the fly may be controlled in the manure by the application of feed-through additives. However, the effect of immature control may not result in a decline in the adult population because flies emigrate from neighboring areas.

A walk-through trap is a non-chemical method of control that collects and kills horn flies directly from cattle. The animals must be “forced” to pass through the trap regularly as with the other self-treatment options described above.

See ENY-274, “External Parasites on Beef Cattle,” and ENY-251, “External Parasites on Dairy Cattle,” for specific control information. See ENY-272, “Pesticide Safety around Animals,” for information on how to correctly and safely treat livestock with insecticides.



Figure 7. Forced-use backrubber being used to treat cattle at a dairy.
Credits: P. E. Kaufman, University of Florida.

Selected References

- Byford, R. L., M. E. Craig, and B. L. Crosby. 1992. A review of ectoparasites and their effect on cattle production. *J. Anim. Sci.* 70: 597–602.
- Cupp, E. W., M. S. Cupp, J. M. C. Ribeiro, and S. E. Kunz. 1998. Bloodfeeding strategy of *Haematobia irritans* (Diptera: Muscidae). *J. Med. Entomol.* 35: 591–595.
- Foil, L. D., and J. A. Hogsette. 1994. Biology and control of tabanids, stable flies and horn flies. *Rev. Sci. Tech.* 13: 1125–1158.
- Hogsette, J. A., D. L. Prichard, and J. P. Ruff. 1991. Economic effects of horn fly (Diptera: Muscidae) populations on beef cattle exposed to three pesticide treatment regimes. *J. Econ. Entomol.* 84: 1270–1274.
- Krafsur, E. S., and C. M. Ernst. 1986. Phenology of horn fly populations (Diptera: Muscidae) in Iowa, USA. *J. Med. Entomol.* 23: 188–195.
- Mendes, J., and A. X. Linhares. 1999. Diapause, pupation sites and parasitism of the horn fly, *Haematobia irritans*, in south-eastern Brazil. *Med. Vet. Ent.* 13: 180–185.
- Moon, R. D. 2002. Muscoid flies (Muscidae), pp. 45–65. *In* G. R. Mullen and L. A. Durden (eds.), *Medical and Veterinary Entomology*, vol. 2. Elsevier, San Diego, CA.
- Owens, W. E., S. P. Oliver, B. E. Gillespie, C. H. Ray, and S. C. Nickerson. 1998. Role of horn flies (*Haematobia irritans*) in *Staphylococcus aureus*-induced mastitis in dairy heifers. *Am. J. Vet. Res.* 59: 1122–1124.
- Pruett, J.H., C. D. Steelman, J. A. Miller, J. M. Pound, and J. E. George. 2003. Distribution of horn flies on individual cows as a percentage of the total horn fly population. *Vet. Parasitol.* 116: 251–258.
- Watson, D. W., S. M. Stringham, S. S. Denning, S. P. Washburn, M. H. Poore, and A. Meier. 2002. Managing the horn fly (Diptera: Muscidae) using an electric walk-through fly trap. *J. Econ. Entomol.* 95: 1113–1118.