Economic Losses, Buzz Off

Hotter temperatures signal it's time to treat cattle for increasing fly populations on your operation.

by ***Haley Stark***

Fall Management

As producers transition to the dog days of summer and fly populations increase, it's imperative for every cattleman to implement some form of fly control to ensure proper herd health and productivity. There are many different fly control options available for livestock producers, but it's important to note that each operation's fly control program will vary based on geographical location, management practices and the production setting.

Although last year's fly control programs should be revisited in the spring, once fly numbers begin to reach 200 to 250 per animal, it's time to start treating the animals. Annual weather conditions will affect fly numbers drastically, and additional rainfall will have a dramatic effect on populations. Depending on regional location, fly control treatments could be applied as early as March.

Jason Banta, Extension beef cattle specialist at Texas A&M University, says the most common mistake he sees among cattle producers is misidentification of the actual species of fly. Because fly treatment depends specifically on the type of fly, confusing one species for another often leads cattlemen to treat their cattle incorrectly. Regarding the economic impact on pastured cattle, there are four common fly species: the horn fly, the face fly, the stable fly and tabanids (deer and horse flies).

Understanding the characteristics of each common fly species and how it reproduces will not only aid cattlemen in properly identifying the most prominent flies on their operation but will also ensure a more effective and progressive treatment plan during summer months.

Know your enemy

Horn flies are often found on the backs, sides and poll area of cattle. They are small in size, approximately 3⁄16 of an inch in length, and are often smaller than a house fly. These flies can cause the most problems for cattle because they don't leave the animal very often, commonly feeding 30 to 40 times a day. Only the female fly will leave the animal to deposit its eggs in fresh cattle manure.

The horn fly reproduces with a rapid life cycle. After being deposited, it takes eggs less than one week to hatch, and then the larvae will feed and mature in fresh manure. According to University of Nebraska-Lincoln (UNL) Entomologist David Boxler, in the Midwest region, a horn fly can complete its entire life cycle from egg to adult in 10 to 20 days. Midsummer, Boxler estimates that this life cycle is about 14 days. In a normal summer season, anywhere from eight to 10 generations can arise.

States with higher rainfall will attract increased populations of face flies. Adult face flies look similar to house flies except they are slightly darker. These nonbiting flies feed directly on animal secretions and are found clustered in an animal's eye, mouth and muzzle region. Only the female face fly visits the animal; the male face fly feeds solely on plant nectar.

Although face flies are not as prominent in southern states, in the Midwest, face fly populations peak in late July and August. An abundance of these flies causes damage and irritation to cattle eye tissues, often leading to pinkeye or infectious bovine keratoconjuctivitis. Higher face fly populations can be found along waterways, in irrigated pastures and in areas with trees and shaded vegetation.

Stable flies are blood feeders and are found mainly feeding on the lower, foreleg area of cattle. They visit the animal two times a day to collect a blood meal, remain there for three to five minutes, then fly away to a shaded area to digest the blood. Their bite is extremely painful to cattle, which often react to stable flies by stomping their legs. Additionally, in an attempt to stop the biting, herds will bunch into pasture corners or stand in water.

In contrast to the horn and face fly, the female stable fly prefers to deposit eggs in spoiled or fermenting organic material. If moisture is present in pastures, round hay bale feeders often serve as an ideal area for stable fly larval development. Stable flies can complete their life cycle in approximately 14 to 24 days.

Horse flies and deer flies are an aquatic species that belong to the family Tabanidae and are found more heavily in the Midwestern region. These flies are also blood feeders and cause significant issues among cattle herds when feeding. The appearance of horse and deer flies stands out from other fly species — they are fairly large in size and aggressive biters.

Horse flies are the largest at 0.4 to 1.3 inches in length and take a large amount of blood from the host. Deer flies are smaller than horse flies, around 0.2 inches long, but they are yellow to brown in color with patterned wings. Because they infrequently visit the host animal, it is very difficult to control horse and deer fly populations.

Horn fly control

There are numerous approaches to controlling horn fly populations within cattle herds. Although these flies can cause the greatest economic loss within an operation, their feeding behavior lends many fly control options.

Animal sprays delivered by a mist blower sprayer can provide a more convenient way to treat cattle for flies in a pasture setting. It allows the breeder to treat the group without having to bring the animals to a central location to administer the insecticide.

PHOTO COURTESY OF DAVID BOXLER

Insecticide ear tags can provide excellent horn fly control for producers across the country.

"Given the fact that the horn fly spends almost all its time on the animal, that would be the easiest fly to control," Boxler explains. "We have a lot of treatment methodologies available to livestock producers and it all depends on their management style as to which methods they choose."

Among these control methods are insecticides, which can be applied in several ways. For 20 to 30 years, dust bags and backrubbers have been frequently used as an economic, yet successful, means of horn fly control if the cattle are forced to use them. For dust bags and backrubbers to be effective, Boxler stresses that they must be placed in a high-traffic area that cattle will have to travel through often, like down an alleyway to get to water or mineral.

Banta also reminds cattlemen who utilize backrubbers for fly control to use mineral oil or vegetable oil rather than mixing it with diesel. If a product's instructions say to mix it with diesel, Banta suggests finding another product to use. Diesel can be absorbed through the cattle's hide and then be stored in the fat of those animals. This possibility could lead to a diesel residue taste in a meat product, which ultimately is bad for consumers and a negative reflection of the beef industry.

Animal sprays are an alternative topical application method for insecticides. They can be delivered either by using a low-pressure sprayer or by using a mist blower sprayer. A mist blower is easier to take out into a pasture setting and to spray the cattle in a group without having to bring the animals to a central location to administer the treatment. Pour-on products are also used frequently, especially in the last 10 to 15 years. Here, cattle will have to be gathered and run through an alley to apply the product on each animal's topline. Both animal sprays and pour-on products will provide seven to 21 days of control but will have to be reapplied throughout the summer fly season.

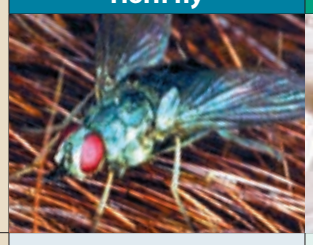
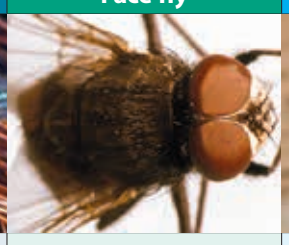
Another, newer delivery method of horn fly control is administered through the Vet Gun™. This air-powered instrument, resembling a paintball gun, applies an individual capsule of insecticide to an animal from 15 to 30 feet away. This method provides fly control from seven to 21 days and eliminates gathering cattle for the application. Boxler explains that this could be a more convenient method of delivery for producers who water cattle out of stock ponds rather than have fenced-in areas to place forced-use methods.

Self-administered delivery systems include feed-through products or insect growth regulator (IGR) hormones. These are formulated into mineral where cattle will consume them, and the active ingredient will be excreted into the manure. This method causes the developing fly larvae in the manure to be killed. Feed-through products, whether a traditional oral larvicide or IGR, have no effect on adult flies.

Insecticide ear tags were a significant innovation when first introduced in the late 1970s. Ear tags allowed livestock producers to apply a one-time treatment that provided a desirable level of

continued on page 40...

Fly identification and management summary

	Horn fly	Face fly	Stable fly	Deer fly	Horse fly
Type of fly					
Identifying characteristics	Smaller than house fly; 3/16 inch long; found on backs, sides and poll area of cattle	Darker than house fly; found on eye, mouth and muzzle region	Smaller than house fly; black spots on a gray abdomen	Smaller than horse fly, 0.2 inches long; yellow to brown in color with patterned wings	Largest in size, 0.4 to 1.3 inches long; stout-bodied with large, bright patterned eyes
Preferred host material	Fresh cattle waste	Fresh cattle waste	Spoiled or fermenting organic material	Aquatic species; mud or saturated vegetation in marshes or near pond or creek	Aquatic species; mud or saturated vegetation in marshes or near pond or creek
Life cycle	10-20 days	3 weeks	14-24 days	Adult flies emerge from late spring into summer; most species complete 1 generation per year, some deer flies can complete 2-3 generations per year	Adult flies emerge from late spring into summer; most specie complete 1 generation per year, some large species require 2-3 years to complete larval development
Management materials	Dust bags, backrubbers, residual and contact sprays, insecticide ear tags	Dust bags, backrubbers, insecticide ear tags	Residual and contact sprays; sanitation or clean-up of wasted feed and hay; treat feeding sites with larvicide	Insecticide sprays and repellants; commercially produced fly traps	Insecticide sprays and repellants; commercially produced fly traps

Horn fly photo provided by Craig Sheppard, University of Georgia, *Bugwood.org*
Face fly photo provided by Clemson University – United States Department of Agriculture Cooperative Extension Slide Series, *Bugwood.org*
Stable fly photo provided by Whitney Cranshaw, Colorado State University, *Bugwood.org*
Deer fly photo provided by Jon Yuschock, *Bugwood.org*
Horse fly photo provided by Jessica Louque, Smithers Viscient, *Bugwood.org*

...Economic Losses, Buzz Off continued from page 39

horn fly control for the entire fly season. However, in the early 1980s, horn fly populations in some locations across the country began to express resistance to synthetic pyrethroid ear tags. As a resistance management strategy, animal health companies made available ear tags with organophosphate or mixtures of organophosphate and pyrethroid insecticides. As the next generation pyrethroid compounds were developed, they were incorporated into the ear tag delivery system.

Insecticide ear tags available today contain organophosphates (3rd or 4th generation synthetic pyrethroids mixed with synergists to increase efficacy) and abamectin (a macrocyclic lactone class of insecticide) with a synergist. Many of the new generation insecticide tags are providing good horn fly control, with some providing excellent control. Pyrethroid resistance can vary throughout a region or within a state, so producers should contact their local Extension office to determine which ear tag is working well in their specific area.

An important aspect to consider when utilizing insecticide ear tags is application time. Many livestock producers will apply ear tags as they turn animals out to pasture early in the season, which may be well before horn flies are present. As soon as an ear tag is applied, the control product is released. If fly numbers are not present, the product is wasted. Then late in the fly season, when fly numbers are the highest, the tag will be without product resulting in less than desired fly control.

Resistance occurs when a small percentage of these horn flies survive the effects of insecticides. The surviving flies then reproduce and their resistance trait is passed down to succeeding generations. There are a number of resistance mechanisms.

Fighting horn fly resistance consists of rotating insecticide classes during a fly-treatment season. This concept, however, is not black and white and is often misunderstood by livestock producers.

"One mistake some producers make is that they switch brands of insecticide rather than rotating chemical classes," Banta says.

In order to simplify and to better understand how to effectively rotate insecticide, the Insecticide Resistance Action Committee (IRAC) has created a Mode of Action (MoA) classification system that provides livestock producers a guide for an insecticide rotation strategy. This guide assigns each chemical group and subgroup a number. Rotating insecticide classes consists of switching groups, not brands.

The MoA numbers are featured on each product's label. For example, if a producer is controlling flies with an organophosphate insecticide product, denoted as group 1B, halfway through the summer he or she will need to switch to another group like pyrethroids, denoted as group 3A.

With ear tags, Boxler suggests switching MoAs yearly, whereas with sprays he suggests changing midseason.

Sonja L. Swiger, veterinary/medical Extension entomologist at Texas A&M University, stresses the importance of an integrated pesticide management (IPM) approach to also counteract fly resistance.

"With IPM, it allows the flies populations to be attacked at all the life stages, egg, larva and adult," Swiger explains. "This is achieved by rotating pastures when possible, using feed-through treatment options to kill larvae in the manure, and using topical treatments that control for horn fly adults."

Regardless of the method a livestock producer chooses to combat horn fly populations, it's important to follow each product's label and corresponding directions. Insecticides like backrubbers or topical treatments should not be applied near a water source to avoid contamination. If insecticide-impregnated ear tags are utilized, cattlemen should avoid tagging too early. Most cows and calves can tolerate the low horn fly populations in the early spring and waiting until late May or early June to put the tags in will maximize season-long fly control.

Controlling inconsistent visitors

Fly control tactics modify when focusing on how to treat the species that spend less time on the host. Designing a fly control program to tackle face flies, stable flies and tabanids varies from that of horn flies, and these infrequent visitors are often trickier to tackle.

Face flies are difficult to treat because of their habit of feeding around the face. There are only about two feed-through products that will kill the developing face fly larvae in manure. Boxler suggests that the most effective way to suppress face fly populations is the insecticide ear tag because it focuses the pesticide around the eye and face area where the female fly feeds. Using this method not only fights against face flies but also reduces horn flies. Additional management practices are dust bags, oilers and sprays.

In contrast, ear tags are not very effective against stable flies. According to Boxler, using an animal spray and applying it through a low-pressure sprayer or mist-blower sprayer is the most effective way to reduce stable flies because it directs treatment to the leg area.

Understanding the biology and behavior of the stable fly also lends a possible control option. After it feeds, the stable fly travels to a shaded area to rest and to digest its blood meal. Windbreaks or shaded buildings and water tanks will contain resting stable flies in the afternoon. Treating these areas with a spray can help combat their numbers.

Stable flies differ from horn flies and face flies in that they reproduce in fermenting organic material like wasted hay. Boxler points out that simple sanitation strategies can help reduce stable fly populations. Winter feeding areas where there is excess hay and spillage are ideal breeding grounds for stable flies when combined when moisture. Cleaning these areas, moving the feeders and spreading out wasted hay to dry up will help reduce stable flies. A producer could opt to apply a larvicide, like Neporex®, to the area as well.

Dry breeding grounds will also encourage beneficial organisms such a predators, parasites and natural competitors to develop in the same areas as stable fly larvae. Predatory mites and dung beetles will thrive in dryer areas and assist in killing the eggs and larvae of stable flies.

Enumerating horn fly numbers

David Boxler, University of Nebraska-Lincoln (UNL) etomologist, points out the definition of control and what it means in regards to fly management. "When control is referenced, it means where we can maintain the horn fly population numbers under 200 per animal," Boxler says. "This is also known as the Economic Injury Level, where the impact of the specific pest is equal to the cost of treatment."

To quantify horn fly populations, a computer technology called GNV Image Manipulation Program (GIMP) is used. An assessment of horn fly numbers on animals is usually made every seven days. At the University of UNL, this assessment is made using digital photographs of one side of 15 randomly selected animals from each treatment group between the hours of 8 and 11 a.m. on each observation day. The images are then viewed using the computer imaging program GIMP 2.6.11. The count for each image is doubled to express the total number of horn flies per animal. HW

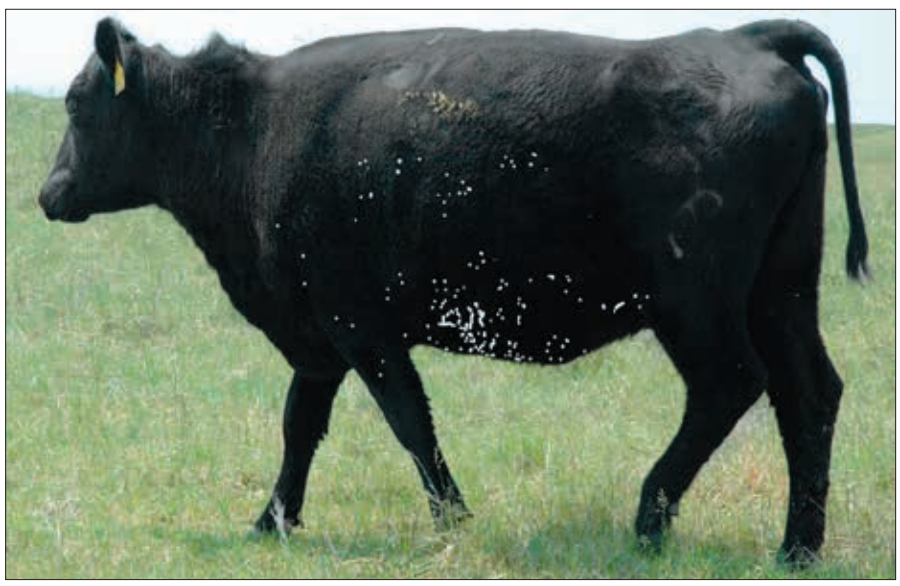


PHOTO COURTESY OF DAVID BOXLER

The horn flies on the animal are being counted with GIMP 2.6.11, a GNV Manipulation Program. The white dots on the animal represent the number of horn flies that were on the left side of the animal when the picture was taken.

Although naturally occurring parasitic wasps are sold commercially, the optimal location for these parasitic wasps is in an enclosed area like a 4-H barn, feedlot or dairy, not in an open pasture setting.

Tabanids, more commonly known as horse flies and deer flies, are an aquatic developing species and the most challenging to control, because they do not breed in manure and do not feed solely on livestock. Insecticide sprays and repellants combined with commercially produced fly traps are among the few methodologies to reduce tabanid numbers. Box traps and CO2 baited sticky traps are two trap options for these species.

With increasing concern for the environment and insecticide resistance, there are more efforts toward developing a more natural approach to fly control. Over the past few years UNL has been identifying and evaluating products called natural biopesticides that will repel or kill the fly. For 12 years the university has been examining and working with formulations of a natural biopesticide derived from fatty acids. Boxler is optimistic new studies on the biopesticides will lead to a fly control product that will target all four species of flies.

"Hopefully we can refine these materials and extend their period of activity," Boxler explains. "The ones we've looked at are safe to animals, humans and the environment."

Neglecting fly control in an operation can cause excessive fly populations during summer months. Once horn fly numbers exceed 200 flies per animal it causes a significant negative impact on cattle efficiency, productivity and herd health.

Regional variation

Regional climate variations drastically impact fly control protocol throughout the year. Southern cattle operations must adapt Midwestern fly control methodologies to combat against a fly season that is longer lasting and, at times, year-round. Horn flies are the most prominent fly species in southern states and lead to added stress in cattle.

Banta helps educate cow-calf and stocker producers in east and northeast Texas and suggests implementing fly control products as early as March. He believes the best way to treat horn flies is feeding an IGR year-round, complemented with topical treatments.

Fly tags are the longest-acting topical fly control treatment for southern ranchers. In those southern states, most products are labeled as one tag for three months of control or two tags for five months of control. Even if producers get a full five months of control from two tags, which commonly doesn't happen, that still doesn't cover the extended regional fly season. That's where an additional feed-through IGR product is helpful.

According to Banta, feeding an IGR through mineral year-round only works well if cattle are consistently visiting and consuming those minerals. Cattle that don't eat the mineral as consistently, which tends to be more common in Brahman or Brahman-influenced breeds, need alternative fly control products. As a cattle owner himself, Banta has also faced this dilemma.

"My cattle don't always eat mineral consistently," says Banta. "I used to use fly tags, but over the past couple years we've actually gone back to spraying. We have a 15-gallon spray tank that will set on a four-wheeler, we pen the cows, put them in a big lane and with a 50-foot hose we'll spray them every few weeks in the spring as needed."

Economic incentive

Numerous studies through universities and industry professionals have shown that not treating fly species populations can drastically affect cattle efficiency, productivity and herd health. Neglecting fly control in an operation can cause a substantial economic cost.

According to UNL, horn flies are associated with economic losses estimated at more than $1 billion dollars annually in the United States. In addition to horn flies causing irritation, they are also responsible for decreased grazing efficiency, reduced weight gains and decreased milk production in cows. Both Boxler and Banta emphasize the economic impact horn flies can have on cattle weight gains.

Boxler points out once horn flies get higher than 200 flies per animal, also known as the Economic Injury Level, they can significantly affect calf weaning weights, decreasing gains anywhere from four to 15%. Yearling weights can be reduced by as much as 18%.

Weight losses per head can add up. Banta explains how initially small reductions in weight can amount to a staggering amount. Stocker calves and heifers can lose 0.2 lb. every day; that means every five days a producer is losing 1 lb. of gain per animal. If cattle are converting and growing faster, the weight loss is even greater.

"The more genetic potential cattle have, the more horn flies can hurt that weight gain," says Banta. "This can amount up to a 0.25 lb. of loss every day or more."

Studies conducted by Swiger indicated heifers are more heavily impacted by horn flies, and a producer can see on average a weight gain difference of 50 lb.

Horn flies have also been linked to the spread of summer mastitis in cows.

With a very painful bite, stable flies cause implications in herds, and those bites cost livestock producers.

"If stable flies are present, their impact is as great as the horn fly," Boxler says. "It takes fewer stable flies to make an impact."

> "The loss definitely justifies the cost associated with implementing fly control."
>
> — Jason Banta

In the Midwest, UNL research recorded a reduction in average daily gain of 0.44 lb. per head in pasture cattle that received no insecticide treatment for stable flies as compared to livestock that were treated. If a person takes the individual weight reduction and multiplies it by the total number of head one cattle producer owns, suddenly the economic loss is apparent. As Banta points out, "the loss definitely justifies the cost associated with implementing fly control."

In the Sandhills of Nebraska, cattle will bunch in the corners of pastures to escape stable flies. Because the Sandhill pastures are fragile, bunching can lead to a blow out, knock fences down and prevent uniform grazing.

Although face flies have not been documented for weight loss, they still decrease cattle health. Face flies are common vectors for *Moraxella bovis*, the agent of pinkeye in cattle. This costs the producer time and money as the cattleman has to go out to the pasture, bring the infected animal in, isolate the animal from the herd and do multiple treatments on the eye. If the eye is not treated, the problem could result in permanent damage or the animal losing the eye.

If face flies and pinkeye are reoccurring problems within a herd, there are pinkeye vaccines available.

Cattle production is a business, and fly control makes it a more profitable one, but a fly control program is also essential for animal welfare and genuine herd health.

"Fly control also helps the overall health of the animal," Boxler says. "They're more content, they're not agitated or stressed."

Cattle that are treated for fly populations, regardless of the region or fly species, will display a calmer, settled attitude and perform better in the pasture. Swiger reminds livestock producers that no matter what they decide to use, they should use something.

"My published work shows that any type of control is better than no control, you will always have a significant impact to the population with any topical product available on the market," Swiger says. "Lowering the fly population is better for the cattle in many ways, it is more humane and allows them more time to concentrate on eating instead of swatting flies."

Contacting a local beef Extension specialist, entomologist or herd veterinarian is a great way to get started on designing a fly control program. With summer in full swing, it's time to double-check that fly control methodologies are working and proving effective on the farm. HW