Methods of External Parasite Management

Ashley K. Edwards, Ph.D., Assistant Professor, Extension Beef Cattle Specialist

Overview

External parasites are a common burden to the beef cattle industry, causing significant financial losses to producers. While the majority of external pests feed on blood, some feed only on skin. Importantly, both feeding habits can reduce performance and quality of the animal through loss of blood, skin irritation, and stress to the animal. More specifically, infestations of external parasites can result in:

- Reduced weight gains
- Decreased meat and milk production
- Increased disease transmission
- Loss of energy and general weakness of the animal
- Sites of secondary infections
- Damage to the hide and meat

A variety of external parasite species may be found throughout Louisiana and the southeastern region of the United States. Although many of these pests are more common during spring and summer, the warm climate may result in some affecting livestock throughout the year. As such, management of external parasites should include both prevention and treatment strategies.

Heavy fly load on cow prior to treatment with pesticide. Photo by Ashley K. Edwards

Integrated Pest Management

Integrated pest management (IPM) is the strategic employment of cultural, biological and chemical control methods. When utilized together, these methods offer both efficient and successful suppression of external parasites.

Cultural Control

Managing environmental conditions to minimize external parasite breeding and prevent infestations is known as cultural control. These management practices are simple to implement in any livestock operation and are often the most effective way to control pest populations. It should be noted that the proper identification of pests is crucial when deciding which control method(s) to utilize.

Examples of cultural control practices include:

- Quarantine newly purchased cattle to check and treat for parasites as needed before being added to the herd.
- Avoid feeding in the same location repeatedly, when possible. The accumulation of urine and feces serves as an ideal breeding site for many parasites.
- Utilize hay rings or roll out hay to reduce waste. Likewise, move hay feeding areas, when possible, to avoid feeding in the same location multiple times.
- Remove manure frequently from stalls, pens and high-traffic areas. Spreading it on pastures or in an area where it can dry is more ideal than placing it into a large pile.
- Maintain clean water troughs and eliminate areas of stagnant water. Keep drainage areas free of weeds and other blockage.
- Prevent overgrowth of pastures by maintaining adequate grazing pressure or cutting when needed. Overgrowth and added moisture under overgrown forage promotes pest infestations.
- In the case of animal loss, remove and dispose of carcasses quickly and properly.

Hay was unrolled in a pasture to reduce waste and avoid buildup of hay waste and fecal material in a single spot. Photo by Amelia Kent

Biological Control

Biological control refers to the use of living organisms to reduce or control populations of external parasites. Insects and other organisms that are harmless to humans can reduce pest populations through predation. Examples include:

- Mosquito larvae may be eaten by some small fish and some fly species.
- Dung beetles work to reduce manure, allowing it to dry at a faster rate which makes it less desirable for pests to inhabit.
- House flies, horn flies and stable flies may be controlled by several species of parasitic wasps. These wasps lay eggs inside the immature flies. Once hatched, the wasp larvae will feed on the immature flies.
- House fly larvae are consumed by black fly larvae living in the same environment.

Remember that proper identification of pests is crucial when selecting a control method. Working with a local extension agent or entomologist is encouraged before deciding to implement the use of a biological control method.

Chemical Control

Implementation of chemical pesticides for prevention and control of pests is appropriately termed chemical control. Administration or use of pesticides should be done only when pests have surpassed an economic threshold and other control methods are ineffective or unavailable. Economic threshold is the point in which a pest population is large enough that methods of chemical control can be justified from an economic standpoint. It is important to understand that the pesticides in this manual are listed as a reference. Cattle producers should always read and follow label directions on individual pesticides. Improper use of pesticides is not only ineffective at controlling pest populations but also promotes pesticide resistance.

Insecticide Application Methods for Livestock

Various pesticide applications exist to best fit individual livestock operations. Producers should consider which method will be the most efficient in treating their livestock. Occasionally, more than one method of application and more than one pesticide are utilized at the same time. As mentioned previously, reading the label is essential to ensure proper use and maximize effectiveness of the pesticide(s) being used.

Baits

Bait stations and strips utilize a sweet substance containing a small amount of insecticide to attract and kill targeted pests. Baits may be used for the control of flies, such as the house fly, around structures like stalls, barns and milking parlors. They can also be effective in controlling other biting insects like mosquitoes and lice. When hanging bait stations or strips, it is important to hang at a height that cannot be reached by livestock, pets and children.

Feed Throughs

Feed throughs consist of pesticides provided within minerals or feed. The active ingredients pass through the digestive system and into the manure where they work to control development of flies. Several considerations should be made when implementing feed through pesticides into management protocols. There is a delay before they begin to work as they take time to build up within an animal's system and become active. Feed throughs should typically be fed a month or more in advance of fly season. Labels will specify the duration of feeding time needed. Since adult flies can travel to herds from other locations, other methods of treatment, such as injectables or a pour-on may be needed. Efficacy of feed-through products is largely based on consistent intake of the product. Producers should ensure consistent availability of the mineral or feed containing the pesticide. Flies may still travel from neighboring farms so a second mode of control may be necessary to complement these products.

Mineral containing an insect growth regulator (IGR) designed for cattle. Photo by Ashley K. Edwards

Boluses

Boluses allow for the slow release of pesticide into an animal's digestive tract. They have a similar mode of action to feed throughs in that the active ingredients pass through the digestive system and into the manure where they work to control development of fly maggots. Because of this mode of action, they take a while to be effective and should be implemented prior to fly season. Labels will specify the timing of administration needed. While they do guarantee an animal receives the treatment, it can be difficult to individually restrain and administer boluses to large herds.

Dip Vats

Dip vats can be created for individual or group treatment of animals. They allow for the animal(s) being treated to be almost completely submerged within the solution. Only products labeled specifically for dip vats should be utilized in this manner. Vat solutions must be properly mixed and recharged to maintain pesticide efficacy. While effective, not all livestock operations have the ability to make practical use of dip vats.

Dust Bags

Dust bags work well as an individual treatment method when livestock commonly pass through a specific area. For example, dust bags may be suspended at shoulder height underneath a gate or entry where animals frequently pass to reach feed or water. Dusts may become caked in areas of high humidity. They should be checked and refilled or recharged as needed throughout the season.

Blue fly tag placed into a cow's ear. Photo by Marcelo Vedovatto

Ear Tags

Ear tags work to control pests such as horn and stable flies, ear ticks, mosquitoes and lice through a slow-release method for up to five months, depending on the pesticide. Two tags are typically warranted per animal. Using less than the recommended rate or leaving tags in longer than needed will increase risk of pesticide resistance.

Injectables

Some injectable products utilized for internal parasite control are also formulated for external parasites such as lice and grubs. Injectable products are not labeled for all species. These products should not be used for exclusively for external parasite control.

Pour-Ons and Spot-Ons

Topical products that may be applied down the length of the back (pour-ons) or to a specific spot on the back (spot-ons) are absorbed through the skin and work systemically to control pests such as flies, grubs or lice. Some products, particularly some spot-ons, may require a specific applicator. Pour-ons that are also approved for internal parasites should not be used exclusively for external parasite control.

Spray Concentrates

Spray concentrates may be mixed to coat the entire animal for treatment of lice, mites, ticks or grubs. They can be prepared in small amounts needed to treat a specific number of animals.

Precautions for Utilizing Livestock Insecticides

The following are considerations producers should make prior to administering insecticides in livestock.

- Always read and follow the label directions. The label is the law.
- Extralabel use of EPA approved products is not allowed. Only use in species of animal(s) listed on the label.
- Be cognizant of withdrawal times in relation to planned slaughter dates to prevent residues on meat products.
- Underdosing of an insecticide is not only ineffective at treating pests but also promotes insecticide resistance.
- Administering more than the recommended rate of a product may cause harm to the animal or lead to residues on meat products.
- Avoid administering pesticides to animals that are stressed, injured or ill.
- Follow guidelines for storage and disposal of pesticide products.
- Avoid drift and drainage of pesticides when applying them.
- Only utilize specified troughs for products containing pesticides to prevent contamination of other feeders and waterers.
- Wear personal protective equipment such as appropriate clothing, masks or respirators as recommended by the label.

External Parasites Common to Beef Cattle

Black Fly (Buffalo Gnat)

Black flies are small, dark and distinguishable by their humpback. The female black fly can simply irritate cattle with their strong bites. Bites from larger populations are painful enough to cause cattle to run erratically into structures or trample smaller animals. Blood loss can result in weakness, acute toxemia, shock and death. Extreme infestations can suffocate animals, and death from large populations can occur withing hours.

The black fly deposits eggs on solid structures, such as rocks or wood, in fast moving water. Their life cycle from egg to adult can take anywhere from 20 days to 15 weeks, which can make controlling or preventing outbreaks difficult with conventional insecticides. It is possible to utilize microbial insecticides in water sources, but this requires appropriate coordination and timing. Cultural control practices like using shelter, smoky fires and moving animals from water that may be infestation sources can aid in quick relief. Some dusts, ear tags, pour-ons and sprays can also help to limit black fly bites.

Blow Fly

Blow fly species are larger in size and notable by their metallic coloration. Adult blow flies are a nuisance, but their maggots are the cause of infections. Larvae are laid in open wounds, decaying flesh, carcasses, dog manure and wet garbage. Blow fly maggots can be problematic to wounds from simple management practices such as dehorning, tail docking, castration and branding. Monitoring wounds and treating them if they become infested is crucial in controlling blow fly populations.

It should be noted that blow fly maggots do not actually consume live flesh in open wounds. They feed on dead flesh. However, they may cause death of live tissue in open wounds, further promoting infection and infestation. The presence of fly larvae in living flesh of a host animal is referred to as myiasis.

Cattle Grub (Heel Fly)

Adult heel flies are large, hairy flies with a black and yellow coloration resembling that of a bumble bee. The larval stage, referred to as a cattle grub, is the most harmful to cattle. During the spring, heel flies lay eggs on the lower portion, typically the legs, of cattle. After hatching, the cattle grubs (larvae) penetrate the skin and migrate through the body to the esophagus and then spinal column. By late summer, the grubs have migrated to the host animal's back and by early fall have created a cyst-like structure known as a warble. Cattle grubs will then form a respiratory opening in the warble and continue to mature for six to eight weeks before falling to the ground for the final development into adult flies.

Mature heel flies can irritate cattle, causing them to run erratically with their tails in the air, a behavior referred to as gadding. Cattle will also stand in water to escape heel flies. The presence of cattle grubs may result in decreased milk production, reduced weight gains, carcass damage, damaged hides and secondary infections from warble formation.

Systemic insecticides should be applied at the end of heel fly season before cattle grubs migrate to the esophagus, spinal column and back. This decreases the risk of negative reactions such as swollen esophagus, paralysis and even death.

Fleas

Adult fleas are small, wingless insects that feed on blood from their hosts. The life cycle of a flea consists of four stages (egg, larva, pupa and adult) and can be as short as two weeks. Adult fleas may attack any part of the host animal's body but are commonly found around the ears and face. Eggs are laid on the host and then fall into the bedding material or onto the ground. After hatching, the larval and pupal stages continue to mature in the bedding before the newly emerged adult moves onto a host animal. Flea infestations are typically found in cattle that are housed in stalls or smaller areas. However, they can be found on cattle grazing in larger pastures.

Affected animals may go off feed or show decreased performance due to stress or anemia from heavy flea populations. Ulcers may form on the ears, face or other portions of the body that are heavily populated by fleas. Fleas may move to other hosts such as dogs, cats and humans. In addition to treating the animals, infested bedding materials should be removed, and the affected area treated, as well.

Horn Fly

Horn flies resemble both the house and stable flies in coloration but are smaller in size. The horn fly is perhaps the most common and serious external pest for cattle. Horn flies are a blood-sucking pest that dramatically decrease production efficiency of livestock through irritation and stress. Milk production and weight gain are significantly impaired in livestock affected by large horn fly infestations. Cows will wean lighter calves, while stocker and yearling cattle exhibit a reduction in growth. In Louisiana, populations of horn flies typically reach an economic threshold (200 to 250 flies per side in beef cattle) during late spring, and high population levels last until fall.

Adult horn flies require a host animal to feed on and intact manure pads to lay eggs. Both the larval and pupa stages are completed in the manure. The newly emerged adult fly will quickly seek out a host animal to feed on. Because adult horn flies spend the majority of their life on a host animal, various chemical insecticides are effective in preventing and treating infestations. It is important to note that continuous use of the same insecticide is not effective and will lead to insecticide resistance. Producers should remember to rotate active ingredients in both the prevention and treatment of horn fly populations.

Horse and Deer Flies

There are numerous species of both horse and deer flies that belong to a large group of flies known as tabanids. Although tabanids differ in size and appearance, collectively they are blood-sucking flies with blade-like mouthparts that are broad and flat. These allow the adult female flies to cause deep and painful wounds, while male tabanids do not bite or suck. Eggs are often laid on vegetation near a water source. Development of the larval stage occurs in water, but the pupa develops in drier soil. Length of

the life cycle varies with each species of tabanid, lasting anywhere from two months to two years.

The painful bites from tabanids can cause animals to run erratically in an effort to escape fly populations. Stress from fly attacks can result in reduced weight gain and decreased milk production and impair other production traits in livestock. Additionally, tabanids release an anticoagulant into the bite wounds, causing the animal to bleed more. This makes wounds more susceptible to secondary infections and invasions from other insects.

Tabanids are intermittent feeders, meaning they do not stay to feed on a single host. Instead, they travel from one animal to the next. This makes them excellent mechanical transmitters of diseases, such as anaplasmosis. It also makes them more difficult to control since a large portion of their life cycle occurs away from animals. Since most tabanid species are commonly found near aquatic sources and in brush or tree-covered areas, moving cattle away from these areas may help mitigate attacks. Additionally, some sprays and other chemical insecticides may provide relief.

House Fly

The house fly is abundant in areas of confined livestock. Although they do not bite, they feed on bodily fluids such as blood, sweat and saliva. They also infest wounds with maggots, which can exacerbate injury and spread pathogens. Cattle may shake their heads or flap their ears in response to house flies.

House fly maggots develop in manure and moist decaying organic matter, such as wet hay or bedding. Prevention through removal of manure and wet organic matter, as well as the use of baits or traps in barn areas, can help reduce house fly populations.

Lice

Numerous species of lice have been described. While they infest a range of domestic livestock species, they may be host-species specific, meaning that some may only affect cattle while others will only affect sheep or goats. Generally speaking, lice may be classified as either Anoplura (sucking lice) or Mallophaga (biting or chewing lice). All species can cause pediculosis, or chronic dermatitis, on the host animal. Pediculosis can be characterized by constant scratching, itching, rubbing or biting of the irritated areas of the hair.

Lice are transmitted from one host to another through direct contact between animals. Most species can be controlled through both management practices and chemical insecticides. Since lice are often introduced into a herd on new animals, proper quarantine procedures can reduce the risk of infestations. Preventing constant crowding of animals can also reduce the likelihood of lice transferring from one host to others quickly. Chemical insecticides may include sprays, dips, rubs, etc. and typically need to be applied twice in order to kill both adults and eggs. Labels will specify mode and frequency of applications.

Biting or chewing lice feed on hair, skin and detritus, while sucking lice feed on blood. Both classifications of lice cause irritation and stress, leading to reduced weight gain and performance. Although excessive feeding from any lice population can cause secondary bacterial infections, blood-sucking lice seem to cause more severe damage. In cases of extreme blood-sucking lice infestations, host animals may become anemic. Along with anemia and reduced performance from stress, economic losses may also be seen from hide damage.

Mites

Numerous species of parasitic mites may affect livestock species. Mites are tiny and most are not visible to the naked eye. Skin scrapes viewed under a microscope are used to determine the presence of mites. Mites are transferred from one host to another through direct contact. Although they are more common in cooler environments, mites may be found on livestock in Louisiana.

Itch and mange mites (*Psoroptes, Sarcoptes* and *Chorioptes*) feed on skin and burrow tunnels just under the skin where they secrete a fluid that dries and forms nodules. This secretion contains a toxin that causes itching and irritation. Affected animals then rub, scratch and bite irritated areas, further exacerbating and inflaming the skin. Large, cracked scabs ultimately form and may be the site of secondary infections.

Similarly, follicle mites (such as *Demodex bovis*) live within the hair follicle of the skin and cause nodular lesions. If lesions break open, they can become a site of secondary infection. Follicle mites are commonly found on the neck, shoulder, udder and between forelegs of an animal.

Mosquitoes

Even though mosquitoes may not commonly be thought of as a livestock pest, heavy infestations can cause death through suffocation and blood loss. In Louisiana, this is more commonly seen following heavy rainfall, hurricane or tropical storm. Mosquitoes tend to feed at night which can cause infestations to go unnoticed by cattle producers. Animals may bunch together or stand in mud to help mitigate mosquito attacks.

Spraying individual animals can help with temporary relief. Control programs utilizing aerial insecticides are often the best approach to controlling populations.

Sand Fly and Biting Midge

The sand fly is a small, biting fly that may also be referred to as biting midges, no-see-ums, or punkies. They are similar to the black fly in that they are commonly found around aquatic habitats and difficult to control. Also like the black fly, extreme populations can result in death through suffocation. Certain species may also serve as a vector for diseases, such as bluetongue.

Screwworm Fly

The screwworm fly is similar to other blow fly species in that it infests dead animals, necrotic tissue, and wounds. The primary screwworm (*Cochliomyia hominivorax*) has been mostly eradicated in the United States. However, the secondary screwworm fly (*Cochliomyia macellaria*) is still present and infests dead tissue. Adult secondary screwworm flies lay their eggs in fresh carcasses. All screwworm infestations should be reported to veterinarians or extension agents for identification.

Stable Fly

Stable flies resemble house flies in size and appearance. Unlike the house fly, the stable fly possesses bayonet-like mouthparts and are vicious biters. They are also able to fly extremely long distances. Adult stable flies breed in moist organic matter. Cultural control methods like cleaning moist areas that promote stable fly breeding can be effective in managing stable fly populations.

Like other biting flies, stable flies irritate and annoy animals causing a decreased production efficiency. Secondary infections may result from bite wounds. Stable flies are also common vectors for diseases such as anaplasmosis and anthrax.

Ticks

Ticks are readily identified by their sac-like leathery appearance. Fully engorged adult females can deposit anywhere from 100 to 18,000 eggs onto the ground. Emerging seed ticks (larval stage) migrate up low vegetation to gain contact with host animals. Mature males and females, as well as immature ticks, feed on both blood and lymph. Tick bites and feeding causes itching, inflammation and swelling at the site of penetration. Blood loss, secondary infections and disease transmission may also result from tick infestations. Insecticides exist for both premises control and treatment of infested animals.

Summary

Cattle producers may experience significant financial losses due to external parasite infestations, specifically during the spring and summer. When left untreated, cattle can experience reduced weight gains, decreased meat and milk production, increased disease transmission, loss of energy and general weakness of the animal, increased secondary infections, and damage to the hide and meat. Importantly, management of external parasites should include both prevention and treatment strategies. Your local veterinarian and extension agent can assist you in developing best practices to reduce infestations of external parasites that best fit your operation.

Selected References

Baldwin, J.L. and Foil, L.D. 2008. Control of External Parasites of Beef Cattle. Louisiana State University Agricultural Center. Pub. 1418. www.lsuagcenter.com.

Barker, R.W., Stacey, B., and Wright, R. 2017. Beef Cattle Ectoparasites. Oklahoma Cooperative Extension Service. VTMD-7000. https://extension.okstate.edu/fact-sheets/beef-cattle-ectoparasites.html.

Kaufman, P.E., Koehler, P.G., and Butler, J.F. 2022. External Parasites on Beef Cattle. University of Florida Institute of Food and Agricultural Sciences Extension Service. ENY-274. http://edis.ifas.ufl.edu.

Palmer, K., Swiger, S., Hinkle, N., and Loftin, K. 2021. Managing External Parasites of Beef Cattle in the Southeast. The Alabama Cooperative Extension System. ANR-2838. www.aces.edu

Swiger, S.L. 2012. Managing External Parasites of Texas Cattle. Texas A&M University AgriLife Extension. E-570. http://agrilifebookstore.org

P3956-C (online) 10/25

The LSU AgCenter and LSU provide equal opportunities in programs and employment.