38 External Parasites on Beef Cattle

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Objectives

- **Discuss the types of external parasites.**
- **Present ways to control external parasites.**
- **Provide resources for updated pest control information.**

Introduction

Cattlemen in Oklahoma must possess some knowledge concerning external parasites on beef cattle because of their ability to transmit disease, causing economic loss. The external parasites most likely to have an economic impact on beef cattle in Oklahoma are the biting flies, lice and ticks. Cattle are affected to a lesser degree by nuisance flies such as house flies and face flies. Generally, only very large populations of external parasites may cause economic impact on beef cattle. The economic threshold may vary greatly between animals of a higher body score and those of a lower body score. Animals in good body condition score are much more tolerant of parasites than animals stressed by low nutrition or other external factors. Cattle producers must use sound management practices in regard to parasite control because fewer pesticides are now available and the overall residual effectiveness of many pesticides has been compromised by the development of resistance to specific classes of pesticides by some pests. Always read and follow label directions on any pesticide used for control on animals or surrounding premises.

Biting Flies

Horn Flies

Horn flies are the most abundant biting flies present during the spring and summer months on cattle in Oklahoma. Horn flies are small flies that feed on cattle in an inverted position with their head facing down. Both male and female horn flies take blood from the host and feed from 20 times to 30 times a day. Horn flies continually stay on the animal and only leave the animal for short periods to lay eggs. Typical feeding areas on cattle include the back, side, belly and legs of cattle. Horn fly populations begin building up in the spring as early as April and last until the first frost. The life cycle of horn flies lends itself to building large populations on cattle, if control is not implemented.

Horn flies complete an entire generation in as few as 14 days during the summer months, which leads to numerous generations of flies during six months to seven months. Horn flies have complete metamorphosis, which consists of eggs, larva, pupae and adults (Figure 38.1). The adult female fly must lay her eggs in fresh cow manure. The eggs hatch within 48 hours into first instar larva that feed in the manure pat and progressively grow into second and third instar larva. Third instar larva crawl from the manure pat to a drier area and pupate. Inside the pupal case, the adult fly forms and the adult will emerge from the pupal case and seek a suitable host, typically cattle. During mid fall, adults do not emerge and the horn fly spends the winter in the pupal stage.

Horn Fly Control

Horn fly control typically is implemented on cattle when the number of horn flies per animal reaches a threshold of

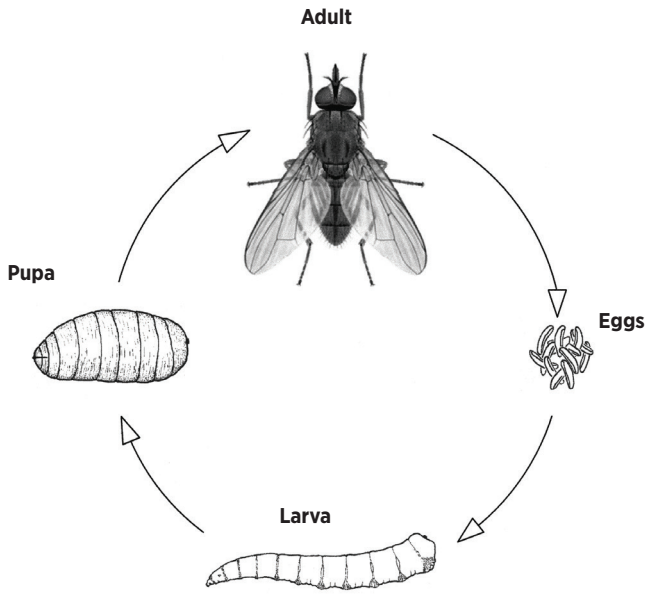

Figure 38.1. Horn fly life cycle.

All Web addresses given in this chapter are subject to change. The links to these websites will be updated regularly at the Master Cattleman website at extension.okstate.edu/programs/master-cattleman.html

200 flies per head. The buildup of fly populations varies from year to year, according to the weather. Populations usually reach this threshold in late spring. Numerous pesticides and application techniques are available to use in the control of horn flies on cattle. Some of the more popular products include insecticides that are incorporated into ear tags and ready-to-use pour-on formulations of pesticides.

Other methods for applying pesticides include sprays, backrubbers, dust bags, paintball gun delivery applications and feed through additives. Many products are dual purpose and may be used either as a spray or in a backrubber application, according to label instructions. Some application methods are much more labor intensive than others. For instance, pesticide sprays must be applied thoroughly and cattle must be gathered to apply sprays properly. Pesticide sprays generally provide only three weeks of control. Materials applied by backrubbers and dust bags give good control as long as these devices are properly maintained. Cattle must be forced to use them or at least must use them frequently to be effective.

Regardless of the method of application, rotation between insecticidal classes is critical to managing insecticide resistance in horn fly populations. Endectocides, which have become very popular for use in controlling internal parasites in the past, will provide four weeks to five weeks of horn fly control, but these products are fairly expensive to use as the primary means of horn fly control. Timing the application of endectocides for control of internal parasites and cattle grubs late in the fly season will allow cattlemen to make one application and reduce two pest problems simultaneously.

Feed-through additives, which contain an insect growth regulator (IGR), can be effective for horn fly control by interrupting the fly life cycle in the manure pat. Developing larvae are not able to complete their development to the pupal stage. Feed-through additives are effective only when most of the cattle in a herd are consuming the required amount of IGR. Feed additives work best when non-treated cattle are not nearby, because horn fly populations will move from one herd to another.

Horn Fly Insecticide Resistance Management

1. Begin horn fly control procedures in the spring, when cattle average approximately 200 horn flies.
2. If ear tags are used, rotate the insecticide classes. Do not use a pyrethroid ear tag more than once every three years. Do not use an organophosphate ear tag more than two years in succession. Continuous use of ear tags in the same insecticide class will eventually result in horn fly resistance.
3. Remove ear tags at the end of the fly season or when they lose their effectiveness. Do not tag cattle more than once per fly season, regardless of insecticide class.
4. If additional horn fly control is needed later in the year, use sprays, pour-ons, paintball gun delivery applications, dusts or backrubbers. If possible, alternate insecticide classes when changing control methods.
5. If pyrethroid ear tags have failed to control horn flies in the previous year, pyrethroid insecticides in any form should not be used for at least two years. In the meantime, use non-pyrethroid ear tags, sprays, pour-ons, etc.

Ideal Rotation for Horn Fly Control

Abamectin → Organophosphate → Pyrethroid
Why?

- Chloride Channel Modulators (Abamectin) Resistance Group 6
- Cholinesterase inhibitors (Organophosphate) Resistance Group 1
- Sodium Channel Modulators (Pyrethroid) Resistance Group 3

Stable Flies

Stable flies are medium-sized flies resembling house flies. Stable flies feed on cattle with their head up and prefer to stay on the feet and legs of cattle. Both male and female stable flies take blood from the host and have a very painful bite. A study in Nebraska showed the economic threshold for stable flies in feedlot cattle was four per leg. Large populations of stable flies on range or pasture cattle often cause cattle to bunch and mill around and often cause them to stand in water when available. Stable flies also have complete metamorphosis, but their larva develop in moist, decaying organic matter associated with spilled feed, soiled hay or straw bedding. They particularly like areas where round bales were fed and the hay is trampled into the ground by feeding cattle. Stable flies are more of a problem with feedlot or confined cattle, but have become a problem on pastured cattle, especially in May and June before cattle are continually grazing summer pastures.

Stable Fly Control

The best method of control for stable flies is sanitation. Keeping cattle-holding areas clean and dry will remove the larval habitat and therefore prevent adult flies. Not allowing spilled feed to accumulate and keeping water troughs from leaking or overrunning are good management practices that aid in the reduction of stable flies. Unrolling round bales has proven effective in limiting stable fly development at round bale feeding sites. Insecticides applied as a spray to the legs will provide some control of stable flies for a week or two, but applications must be made frequently because residues do not last long. The use of sprays to try to control stable flies on pastured cattle is not economically feasible.

Horse Flies and Deer Flies

There are many species of horse and deer flies in Oklahoma. Seven or eight species can be considered significant pests depending on the location. Horse flies vary in size from .5 inches to 1.5 inches or longer. Female horse flies are vicious biters and peak populations of one species or another occur from June through September. Male horse flies do not bite. Horse and deer flies have complete metamorphosis, but generally only complete one generation per year. Many horse flies lay their eggs around

the edges of ponds and their larva develop in the moist mud along the perimeter of the pond, making control in the larval stage impossible. Some of the most important species in Oklahoma lay their eggs in the soil under thick layers of leaves in the heavily timbered areas of the state. Larva develop in the soil. Adult horse and deer flies prefer feeding on the legs and backs of animals. Heavy populations of adult horse flies can cause economic losses, but generally controlling them in a cost-effective manner is not possible. Because the female horse fly is only on the animal for a few minutes while taking a blood meal, it is difficult to get enough pesticide on the animal to deter the fly from feeding. The flies may receive enough pesticide to kill them after they leave the animal, but this is difficult to determine. Because horse flies are continually emerging throughout the summer and many species have an extensive flight range, there will be flies on cattle regardless of whether or not a pesticide treatment has eliminated some of the population. Some pesticides repel horse flies just after spraying the animal, but this is not a practical method of protection. Recently, traps have been promoted to trap out populations of horse flies, but these traps are expensive and numerous traps are required to reduce horse flies in a relatively small area.

Mosquitoes and Black Flies

Certain species of mosquitoes and black flies will feed on cattle in Oklahoma, but normally are not present in high enough populations for a long enough period to cause significant damage. Both of these groups of insects are most prevalent in the spring. Black fly immature stages only develop in running water of streams or rivers. Large populations sometimes occur in May and early June. Mosquito larva develop in standing water and pest populations on cattle are most often associated with water resulting from flooding or heavy rainfall that remains for a week to 10 days. Large populations sometimes occur in pasture areas that hold temporary pools of water. The primary threat from mosquitoes is their ability to transmit disease. The most recent mosquito-borne disease introduced into Oklahoma is the West Nile virus, but cattle are not susceptible to this disease. Horses are much more susceptible to mosquito-transmitted diseases than are cattle.

Nuisance Flies

House Flies

House flies do not bite cattle, as they only possess sponging mouthparts. However, they may cause extreme annoyance to animals when they are present in large numbers. House flies tend to aggregate on specific areas of the animal and can be severe nuisance pests of confined animals, especially calves. They often aggregate around the eyes and mouth because of the moisture secreted by the animal. House flies have complete metamorphosis and their larva develop in moist, decaying organic matter, especially accumulated manure, rotting feed and garbage. House flies will utilize areas associated with spilled feed and hay to lay eggs similar to the life cycle of stable flies. House flies are not often pests of pastured cattle unless such cattle frequent loafing sheds. Good sanitation around barns or feedlot situations is the best method of house fly control. Sprays inside buildings, referred to as premise sprays, also can be utilized to control adult house flies. Premise sprays can be sprayed on the surface areas inside of barns and the flies will contact the insecticide residue when they rest on these surfaces. Automated mist blowers can be used in barns to apply space sprays that will kill adult flies. Commercial baits also can be used to attract house flies to bait containing a pesticide. Baits typically attract only house flies and do not provide control for other fly species. None of these methods of control are relevant to beef cattle on pastures or range.

Face Flies

Although face flies at one time were a pest throughout the northeastern third of Oklahoma, they are now a pest in north-central Oklahoma with an expanded range as far west as Garfield county. Face flies do not bite cattle, but congregate almost exclusively around the eyes and nose. Because of their feeding habits around the eyes, they have been implicated in the transmission of pinkeye. Face flies have complete metamorphosis and the larva develop only in fresh cow manure. Insect growth regulators can be used to help control larva in the manure. Adult face flies are generally not resistant to pesticides and can be controlled with insecticidal ear tags or other control methods listed under horn fly control.

Lice

Lice populations are mainly a problem from November through March in Oklahoma. Lice are not a problem on cattle in the summer months because they are not able to tolerate warmer temperatures in populations high enough to cause noticeable symptoms. Cattle with lice infestations will scratch off their hair in affected areas and lick these areas because of irritation. Cattle can be examined for the presence of lice in a squeeze chute by parting the hair on the face, brisket, shoulders, hips and tail head. Cattle spread lice from one another by close contact and grooming. If control is implemented, all the animals in the herd must be treated. Ringworm and scabies also may present symptoms similar to lice infestations, so cattlemen should check carefully before treating. If in doubt, consult a veterinarian.

Lice have gradual metamorphosis, which consists of eggs, nymphs and adults. Lice must spend their entire life cycle on the host animal, meaning the eggs, three nymphal instars and adults are all present on the animal at the same time. Lice can go from the egg stage to the adult stage in as little as 16 days, depending on the species (Figure 38.2). There are four species of lice found on cattle in Oklahoma.

Biting Lice

The cattle biting louse does not actually bite the animal. Biting lice feed on organic matter on the surface of the skin. Just the presence of the louse causes general irritation, causing the animal to scratch and rub. Biting lice have a wide head to accommodate their chewing mouthparts, which makes their head appear wider than their thorax.

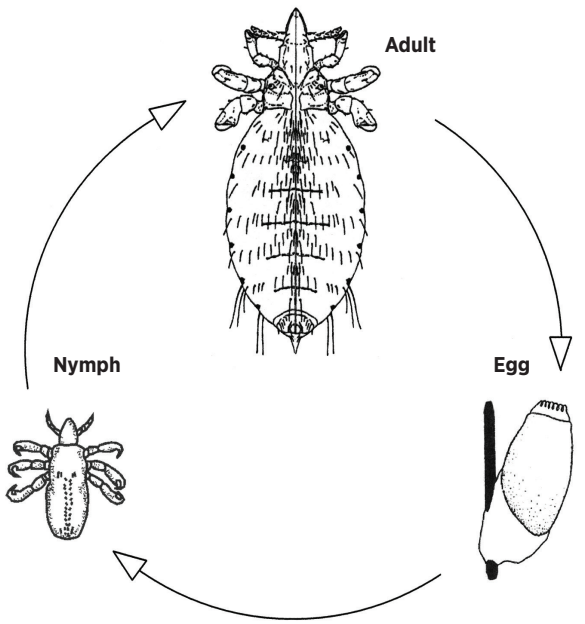

Figure 38.2. Louse life cycle.

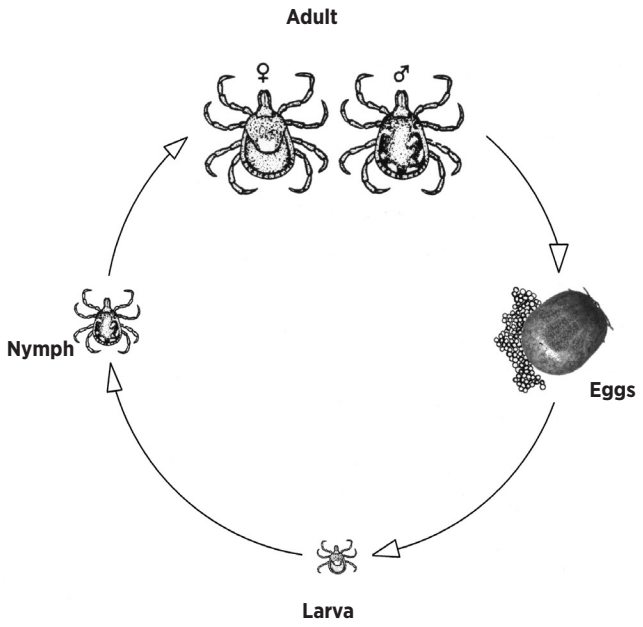

Figure 38.3. Tick life cycle.

Sucking Lice

Three species of sucking lice are present in Oklahoma: the short-nosed cattle louse, long-nosed cattle louse and little blue louse. These species all have narrow, pointed heads. All sucking lice have piercing, sucking mouthparts and pierce the skin to take blood from the animal. All three nymphal stages, as well as the males and females, suck blood. Even a small infestation of sucking lice can cause significant irritation. Lice populations can build very quickly if not treated soon after detection.

Lice Control

Many of the pesticides registered for horn fly control can be used to control lice. Check the label to be sure lice are listed. Several pesticide formulations specifically formulated for louse control also work well. A second treatment for lice control must be made two weeks to three weeks after the initial treatment because the developing eggs present at the time of initial treatment will hatch and the residual pesticide will likely not be of a concentration high enough to kill the newly emerging nymphs.

Ticks

Ticks are arthropods (jointed-legs) and are closely related to mites and spiders. Ticks have two body regions, no antennae, no wings and eight legs in the nymph and adult stages. Ticks have four life stages: egg, larva, nymph and adult. Eggs are always laid on the ground, never on a host. The latter three stages - larva, nymphs and adults - are all parasitic and must obtain blood from some type of host to reach the next stage or in the case of adults, to mate and lay eggs. The change from one stage to another, (larva to nymph or nymph to adult) is called a molt and each stage must take a blood meal to change or molt to the next stage (Figure 38.3).

Ticks may be grouped according to the number of host animals they feed on during their parasitic life cycle. If the larva, nymphs and adults feed and develop on the same host and do not leave the host to molt to the next stage, they are referred to as a one-host tick (e.g. winter tick and spinose ear tick). Those ticks that feed on different hosts in each life stage (larva, nymphs and adults) are referred to as three-host ticks (e.g. lone star tick, Gulf Coast tick, American dog tick and black-legged tick).

There are six species of ticks that commonly infest cattle at some time during the year in Oklahoma. Five of these species are referred to as hard ticks because they have a hard plate on the back. The common names of these hard ticks are the lone star tick, Gulf Coast tick, American dog tick, black-legged tick and winter tick. One pest species of cattle in some parts of Oklahoma is a soft tick known as the spinose ear tick. This tick species does not have a hard plate on its back. In fully engorged hard ticks, the body expands to as much as 10 times to 20 times its nonengorged size, which makes it difficult to see the hard plates. Do not mistake these engorged ticks for the one relatively rare soft tick species that occurs on cattle in Oklahoma. Not all of these tick species are uniformly distributed in Oklahoma and some areas of Oklahoma do not have severe tick problems. Please refer to the description of each species to determine the range of that species in the state.

Ticks also may be grouped according to when they are most abundant, normally the adult stage, on cattle or other large animals. This period when the ticks are most visible and abundant or active is known as their peak seasonal cycle. Thus, it is important to note what time of the year the different tick species and life stages are active. Four species of ticks are most common in the spring or early summer. Perhaps the two most important tick pest species on cattle in most of Oklahoma are the lone star tick and the Gulf Coast tick. Both of these species are most active on cattle from early spring, mid-March to late June. Another hard tick, the American dog tick, is most active from April

to the first of July. This tick is normally not a serious pest on cattle. The adults are often found on dogs and often are a serious pest for humans. The larva of the spinose ear tick, a soft tick, is often found in the ears of cattle in some parts of Oklahoma in the spring. Adults of the black-legged tick often are pests of cattle from late September until January and the one-host winter tick, as the name implies, is most abundant from November into March.

Lone Star Tick

The lone star tick is a three-host species and the most prevalent tick in the eastern half of Oklahoma. It has been collected from 44 Oklahoma counties and is most active on cattle from late March into early July. Male ticks can be found on deer and cattle as early as late January, but nymphs and adults usually begin the parasitic cycle about mid-March. Larva, nymphs and adults feed on cattle, although adults are most noticeable and probably cause the most irritation. Deleterious effects caused by this species are due to the tremendous number of ticks that can be found on an individual animal. This species attaches almost anywhere on the body, but often are found on the belly, legs and tail area of the animal. Adult lone star tick activity usually begins to subside by early July, although some nymphs and larva can remain active into the fall. Larva will feed on a wide variety of rodents, birds, wild carnivores, large hoofed animals and humans. Larva that fail to find a host and take a blood meal by late fall do not survive winter temperatures in Oklahoma. Nymphs and adults can overwinter and are the source of early season tick activity the following year.

Gulf Coast Tick

The Gulf Coast tick is a three-host species occurring in the eastern half of Oklahoma and is reportedly established in 33 counties in the state. Only the adult life stage, male and female, are on cattle and attach primarily on the internal and external surface of the ears, although some are located elsewhere on the head and neck. A severe infestation by this tick, 10 or more ticks per ear, may cause a deformation of the ear due to cartilage damage. This condition is known as gotch ear. Adults of this tick can be found on cattle beginning in mid-March lasting into July, with peak activity in April and May. Adult ticks have been recovered from coyotes as early as January and from white-tailed deer as late as November. The adult is the only life stage found on cattle and other large animals and carnivores. Larva and nymphs feed primarily on cotton rats and ground-dwelling birds (meadow larks, etc.) in pastures and adjacent wooded areas. Larva are active from May through October and nymphs are active from June through October. Unfed larva do not overwinter.

American Dog Tick

The American dog tick is a three-host species occurring throughout Oklahoma. This species is seldom a serious pest of cattle except in specific places, most often heavily wooded areas. Adults of this species are serious pests on many wild animals in heavily wooded areas and are serious pests of domestic pets, primarily dogs. The adult life stages are most active from late March into early July. The adults readily attack humans and are known to transmit the causative agent of Rocky Mountain spotted fever to humans in Oklahoma and the eastern U.S. Larva and nymphs feed primarily on cotton rats and white-footed mice throughout the year.

Black-legged Tick

The black-legged tick is a three-host species occurring in 39 counties, primarily in the eastern half of Oklahoma, although it has occasionally been collected in Comanche County. Adults of this species are only occasionally serious pests of cattle in some areas of Oklahoma. The adults most often are found on white-tailed deer and other wild animals although they do attack dogs, especially hunting or farm dogs that roam in areas deer frequent. The adult life stage is active from late September with peak populations in October and November, then tapering off through April of the following year. Nymphs that overwinter usually become active in March. The larva that hatch from eggs laid by females, which engorged during the fall or winter, begin infesting lizards (five-lined skink) and occasionally white-footed mice, about the first of June. Larva and nymphs feed primarily on lizards or field mice throughout the spring and summer, but do not attack cattle or humans in Oklahoma.

Winter Tick

The winter tick is a one-host species reported from 33 counties across the state, but occurs mostly in the eastern half of Oklahoma. As the name implies, this tick is most active in the winter, with larva first infesting large animals such as cattle, horses and deer starting in mid-October. As a one-host tick, the larva is the only stage seeking a host by crawling up on vegetation in one mass waiting for a host to brush by them. Larva and nymphs engorge and molt on the same animal. The adults appear 30 days to 35 days after the nymph starts feeding on an animal. Therefore, all three stages stay on the same animal for their entire life cycle. Individual animals can be infected with thousands of ticks. Adult populations peak from December through February but can be found in heavily infested areas until March. These ticks can be found all over the body, but often tend to concentrate in the udder areas and between the hind legs from the tail downward.

Spinose Ear Tick

The spinose ear tick is a one-host soft tick species reported from 23 counties in the state, but is not very abundant or much of a problem on cattle except in some very localized areas. The larval life stage becomes active in March and is the only stage that searches for a host. Larva attach in the hosts' external ear canal, where they feed and molt into the spine-covered nymphal stage. Nymphs may feed multiple times during a 30- to 200-day period, before leaving the host. Nymphs are the most commonly seen life stage and can cause a great deal of irritation in the ear canal. They typically are not abundant on the external part of the ear. The adult does not feed and lives on the ground around loafing areas or feed bunks. Adults become active in reduced light or darkness, primarily to mate.

Tick Control

Large tick infestations cause serious irritation and obvious damage to animals, although there is no threshold figure. If many ticks are visible on an animal, surely many more are present. Several pesticides are available for use in tick control. The most effective pesticide formulations are whole-body sprays and pour-on formulations of the synthetic pyrethroid insecticides. These insecticides attach to the hair and remain present for two weeks to three weeks. Many of these formulations are the same as those used for fly control. Be certain the label of any pesticide states can be used for control of ticks. One of the major costs associated with treatment of cattle for ticks is that the animals must be gathered and confined, because each animal needs to be treated thoroughly. The pesticide-impregnated ear tags will give control of only the Gulf Coast tick, which concentrates in the ears. This is expensive control because the tags would need to be applied in April. In most of Oklahoma, early application of ear tags would cause early expression of the resistance factor in horn fly populations and the ear tags probably would not provide adequate horn fly control into June and later. Ear tags will not provide control of the tick species attached elsewhere on the body. The self-use devices such as backrubbers and dust bags do not provide adequate tick control since many of the ticks are attached underneath the animals on the belly and around the udder area.

General Precautions for Livestock Insecticides

- **The label is the law. Always follow the application directions and safety precautions on the insecticide label.**
- Do not treat sick, convalescent or stressed cattle.
- Exceeding labeled use rates may result in illegal insecticide residues in the beef or possible harm to the animals.
- Always observe the preslaughter treatment interval. Treatment of animals closer to slaughter than the number of days prescribed on the label can result in illegal residues in the beef.
- Do not contaminate feed, feed or water troughs or allow runoff into streams, ponds, etc.
- Store insecticides properly and dispose of empty insecticide containers according to regulations.

Other Publications

- Current information on the control of external parasites for cattle is available at extension.okstate.edu or at the local Oklahoma Cooperative Extension Service Office.
- Entomology and Plant Pathology Web Page: entoplp.okstate.edu
- Extension Fact Sheets:
  - VTMD-7000 Beef Cattle Parasite Controls
  - EPP-7001 Common Ticks of Oklahoma and Tick-borne Diseases
  - EPP-7451 Agricultural Pesticide Storage
  - EPP-7453 First Aid for Pesticide Poisoning
  - EPP-7457 Toxicity of Pesticides