



# External Parasites of Goats

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## Introduction

Arthropod pests limit production in the goat industry in many ways. External parasites feed on body tissue such as blood, skin, and hair. The wounds and skin irritation produced by these parasites result in discomfort and irritation to the animal. Parasites can transmit diseases from sick to healthy animals. They can reduce weight gain and milk production. In general, infested livestock cannot be efficiently managed.

## Lice

Lice (Order: Phthiraptera) are wingless, dorsally flattened, permanent ectoparasites of birds and mammals. More than 3,000 species have been described, mainly parasites of birds. Lice infest a wide range of domestic livestock, including pigs, cattle, goats, and sheep, and cause a chronic dermatitis (pediculosis), characterized by constant irritation, itching, rubbing, and biting of the hair or fleece. Goat lice are host specific and only attack goats and their close relatives such as sheep.

Lice are divided into two main groups: the Anoplura (sucking lice) and Mallophaga (chewing or biting lice). Biting lice have chewing mouthparts and feed on particles of hair, scab and skin exudations. Sucking lice pierce the host's skin and draw blood. Louse-infested animals may be recognized by their dull, matted coat or excessive scratching and grooming behavior. The irritation from louse feeding causes animals to rub and scratch, causing raw areas on the skin or loss of hair. Weight loss may occur as a result of nervousness and improper nutrition. Milk production is reduced up to 25 percent. Also, the host is often listless, and in severe cases, loss of blood to sucking lice can lead to anemia.

Lice are generally transmitted from one animal to another by contact. Transmission from herd to herd is usually accomplished by transportation of infested animals, although some lice may move from place to place by clinging to flies. Lice are most often introduced to herds by bringing in infested animals.

Goat lice can be controlled by both production practices and chemical intervention. Providing a high-energy diet can be an effective louse control strategy. If possible, it is important to keep animals in un-crowded conditions and to spot-treat or quarantine any infested individuals until they have been successfully deloused. Most louse populations on animals vary seasonally, depending on the condition of the host. Louse populations on livestock are typically greater during the winter months and reach peak activity in late winter and early spring.

Animals under stress will usually support larger louse populations than found under normal conditions. Insecticides are usually best applied in late fall. Control of louse infestations is needed whenever an animal scratches and rubs to excess. Louse control is difficult with just a single insecticide application since they will not kill the louse eggs. A second application is needed 2 weeks after the initial treatment to allow the eggs to hatch.

There are three principle species of biting lice and three principle species of sucking lice that can attack goats.

## Biting Lice

The goat biting louse (*Bovicola caprae*), Angora goat biting louse (*B. crassipes*), and *B. limbata* are the three main species that can be found on goats (Figure 1). All three species live on the skin surface and feed on hair, skin, and detritus. Eggs hatch in 9 to 12 days and on average, the entire life cycle is completed in 1 month. Biting lice of goats are distributed worldwide with winter populations being the most severe. Optimal control can be achieved with a residual insecticide spray with re-treatment in 2 weeks after the initial treatment.

## Sucking Lice

Three species of blood-sucking lice are found on goats: the goat sucking louse (*Linognathus stenopsis*), African goat louse (*L. africanus*), and sheep foot louse (*L. pedalis*) (Figure 2). The goat sucking louse can be dispersed over

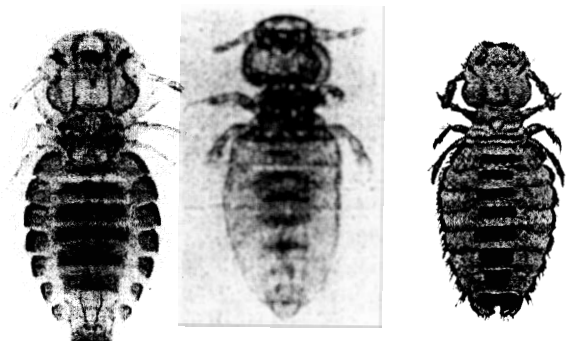
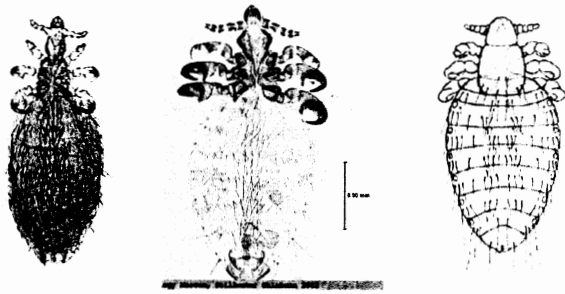


Figure 1. Goat biting louse, *Bovicola caprae* (left), Angora goat biting louse *B. crassipes* (center), and *B. limbata* (right). Credits: K.C. Emerson Entomology Museum, Stillwater, Oklahoma and <http://www.ento.csiro.au>.



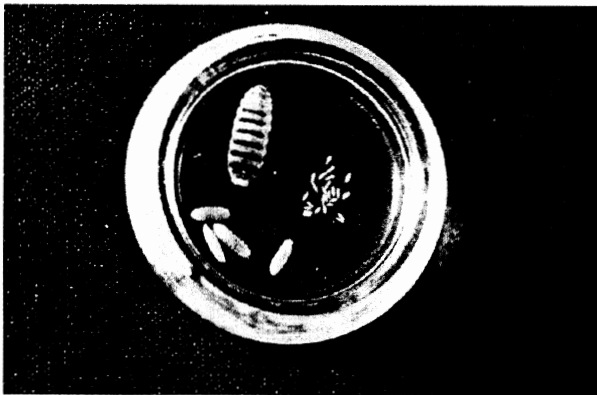
**Figure 2.** Goat sucking louse, *Linognathus stenopsis* (left), African goat louse, *L. africanus* (center), and sheep foot louse, *L. pedalis* (right). Credits: K.C. Emerson Entomology Museum, Stillwater, Oklahoma and <http://www.ento.csiro.au> .

the entire body of goats and the African goat louse is usually dispersed around the head, body, and neck regions. Both the goat sucking louse and the African goat louse are bluish-gray in appearance. The sheep foot louse is an occasional pest of goats and can be found on the feet or legs of the animal. These blood-feeding lice species cause the most severe damage. Excessive feeding causes scabby, bleeding areas that may lead to bacterial infection. Mohair on Angora goats may be damaged to the extent of reduction in value of 10 to 25 percent. Control can be obtained utilizing the same methods described for biting lice.

### Nose Bot Fly

The nose bot fly exhibits a unique quality by depositing live larvae (maggots) (Figure 3), not eggs as in the case of other fly species, in the nostrils of goats. Larvae migrate to the head sinuses and, after development, migrate back down the nasal passages, dropping to the ground where they complete development. Migration of the bot larvae to and from the head sinuses causes nasal membranes to become irritated and secondary infections can occur at the irritation sites.

Infested animals exhibit symptoms such as discharge from nostrils, extensive shaking of the head, loss of appetite and grating of teeth. Another sign of a nose bot infestation is the



**Figure 3.** These are the larval instars of the nose bot fly. The third instar is at the top of the photograph, followed clockwise by the first and second instars. Credits: J.E. Lloyd, University of Wyoming.

presence of blood flecks in the nasal discharge. The behavior of goats in the presence of adult bot flies is very excitatory and usually animals will snort with their noses towards the ground.

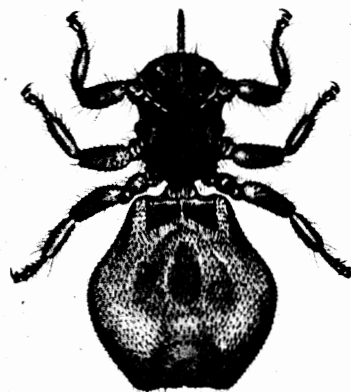
At this time there is only one effective product available for the treatment of nose bots in goats. Ivomec® (ivermectin) is registered as a 0.08 percent AI oral drench. **Since it is labeled for sheep only, you should contact your local veterinarian for off-label prescribed usage and the correct dosage and withdrawal instructions for goats.** Nose bots are usually a winter problem so treatment should be administered after the first hard frost, which kills the adult bot flies and assures no re-infestations.

### Keds

Keds, more often called sheep ticks, are actually a wingless fly (Figure 4). They spend their entire life cycle on sheep or goats, transferring between animals by contact. Sheep keds, *Melophagus ovinus*, are primarily a pest of sheep, but occasionally are found on goats. Adults are grayish-brown, six-legged, and 1/4 inch long with a broad, leathery, somewhat flattened, unsegmented, saclike abdomen covered with short spiny hairs. Sheep keds can live up to 6 months, during which time the female produces around 10 to 15 young at the rate of one every 8 days. Reproduction is continuous, though slow during the winter, producing several generations per year.

Unlike most insects, the female sheep ked gives birth to living maggots, which are nourished within her body until they are fully grown. The maggots are 1/4 inch long, whitish, oval, and without legs. The skin turns brown within a few hours after birth and forms a hard puparium (case) around the larva. These cases are often called eggs, nits, or keds. Adult keds emerge from the pupal cases in 2 to 5 weeks, depending on temperature. They crawl over the skin and feed by inserting their sharp mouthparts into capillaries and sucking blood, much like a mosquito. This results in considerable irritation, which causes the animal to rub, bite, and scratch. Another effect observed from animals infested with keds is the condition known as "cockle." Hide buyers downgrade skins with "cockle" because it weakens the hide and discolors them.

Keds usually do not cause great damage if the animal is fed on a highly nutritious diet, but goats grazed throughout the year on pasture or range may acquire heavy burdens of



**Figure 4.** Illustration of an adult sheep ked. Credits: D. Rutz Cornell University.

keds during winter months and early spring. In addition, keds in large numbers can cause anemia, which can weaken the animal and make it more susceptible to other diseases.

Sprays, dips, and hand-dusting with insecticides are all effective methods for controlling sheep ked.

## Mites

Goats can be infested by several species of mites, but the species more commonly found on goats are goat follicle mite (*Demodex caprae*), scabies mite (*Sarcoptes scabiei*), psoroptic ear mite (*Psoroptes cuniculi*), and chorioptic scab mite (*Chorioptes bovis*) (Figure 5).

The goat follicle mite causes dermal papules and nodules and this resulting condition is known as demodectic mange in goats. These papules or nodules are caused by hair follicles or gland ducts becoming obstructed and producing these swellings, trapping the mites within these lesions. These continue to enlarge as the mites multiply, sometimes reaching several thousand mites per lesion. Cases of demodectic mange occur most commonly in young animals, pregnant does, and dairy goats. Papules usually appear on the face, neck, axillary region, or udder and these papules can enlarge to 4 cm in diameter as mites multiply. Nodules can rupture and exude the mites, resulting in transmission of the mite to other animals. Transmission of the goat follicle mite to newborn goats typically occurs within the first day following birth. Other possible means of transfer are licking and close contact during mingling or mating. Certain breeds of goat (e.g., Saanen) tend to be much more sensitive to demodectic mange than others.

The scabies mite burrows into the skin of its host, causing varying degrees of dermatitis, a condition known as sarcoptic mange. Although cases of sarcoptic mange in goats often resolve themselves without developing severe signs, heavily infested goats may exhibit crusty lesions and extensive hair loss around the muzzle, eyes, and ears; lesions on the inner thighs extending to the hocks, brisket, underside, and axillary region; dermal thickening and wrinkling on the scrotum and ears; and dry, scaly skin on all parts of the body, especially in areas of hair loss.

The psoroptic ear mite or ear mange mite causes lesions on or in the ear of the host animal. These lesions cause crust formation, foul odor discharges in the external ear canal, and behavioral responses such as scratching the ears, head shaking, loss of equilibrium, and spasmodic contractions of neck muscles. Psoroptic ear mite lives its entire life under the margins of scabs formed at infested sites. There the eggs

are deposited and hatch in 4 days. The complete life cycle takes about 3 weeks. All stages of this nonburrowing mite pierce the outer skin layer. Transmission of this mite occurs between animals by direct contact. Prevalence rates as high as 90 percent have been reported in dairy goats, including both kids and adults, in the United States. Goats usually less than 1 year old generally exhibit higher infestation rates than do older animals. Signs of the psoroptic ear mite in kids are often observed as early as 3 weeks after birth, reflecting transfer of mites from mother to young. By 6 weeks of age, most kids in infested goat herds are likely to harbor these mites. Chronic infestations have led to anemia and weight loss in goats.

The chorioptic scab mite causes chorioptic mange in domestic animals, especially in cattle, sheep, goats, and horses. This mite occurs primarily on the legs and feet of its hosts, where all of the developmental stages are likely to be found. Eggs are deposited singly at the rate of one egg per day and are attached with a sticky substance to the host skin. Adult females usually live for 2 weeks or more, producing about 14-20 eggs during this time. Eggs hatch in 4 days and are often clustered as multiple females lay their eggs in common sites. The immature stages last anywhere from 11 to 14 days and the entire life cycle is completed in 3 weeks. Infestations of chorioptic scab mite tend to be higher in goats than in sheep, with up to 80 to 90 percent of goats in individual herds being parasitized. The mites occur most commonly on the forefeet of goats, where the largest numbers of mites and lesions are usually associated with the accessory claws. However, they also can occur higher on the foot. Lesions are generally mild and seldom draw attention.

Treatment and control of mites should focus on all animals in a herd to achieve control. Delayed egg hatch requires retreatment at 10 to 12 days. To reduce the risk of introducing mites into herds, isolation of new animals should be practiced with at least a week to observe the animal for signs of mange.

## Fleas

Adult fleas are small (1 to 8 mm), wingless insects that are narrow and are compressed on the sides with spines (combs) directed backwards. Most species move a great deal and remain on the host only part of the time to obtain a blood meal. The legs are well developed and are utilized to jump great distances (7 to 8 in.).

Fleas develop through a complete life cycle with four stages: egg, larva, pupa, and adult. Under ideal conditions, a generation can be completed in as little as 2 weeks. Mating

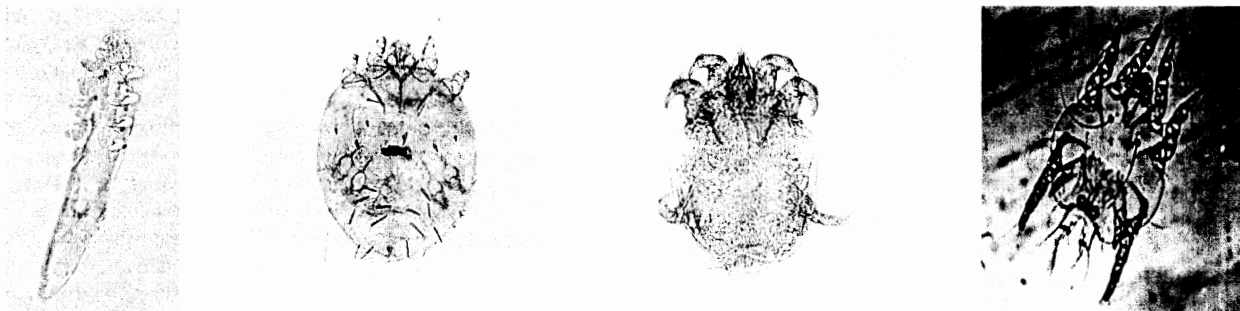
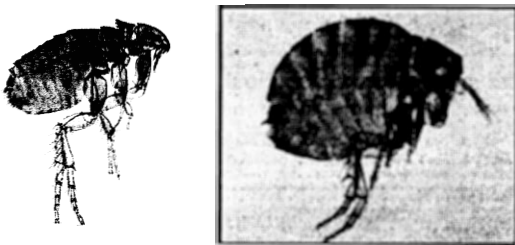


Figure 5. (left to right) Goat follicle mite, (*Demodex caprae*), scabies mite (*Sarcoptes scabiei*), psoroptic ear mite (*Psoroptes cuniculi*), and chorioptic scab mite (*Chorioptes bovis*). Credits: S.J. Upton, Kansas State University and Thomas Nolan, University of Pennsylvania.

takes place and eggs are laid on the host. Eggs then drop off the host to the ground or bedding material and hatch in 2 days but can delay hatching up to several weeks. Development of the larval and pupal stages occurs in the host's bedding material. Larvae are very small, worm-like, legless insects with chewing mouthparts. In several weeks they go through 3 larval stages, feeding on organic material. The pupal stage lasts approximately one week and then the newly emerged adult flea is ready to feed on blood within 24 hrs.

There are two species that commonly infest goats: the cat flea (*Ctenocephalides felis*) and sticktight flea (*Echidnophaga gallinacea*) (Figure 6). Female cat fleas can lay up to 25 eggs per day for a month, contributing to very high densities of fleas in a relatively short time. Cases of severe anemia associated with high numbers of cat flea bites have been reported in domestic animals. The sticktight flea attaches firmly to its host usually around the face and ears. This species remains attached to its host for as long as 2 to 3 weeks. Large populations of this flea may cause ulcers on the head and ears. Both of these flea species can easily spread to other animals so special considerations of monitoring herd dogs should be implemented if fleas become a problem in a goat herd.



**Figure 6.** Cat flea, *Ctenocephalides felis*, (left) and sticktight flea, *Echidnophaga gallinacea*, (right). Credits: S.J. Upton, Kansas State University and <http://www.capcvet.org/copy/pics/fleas6.htm>.

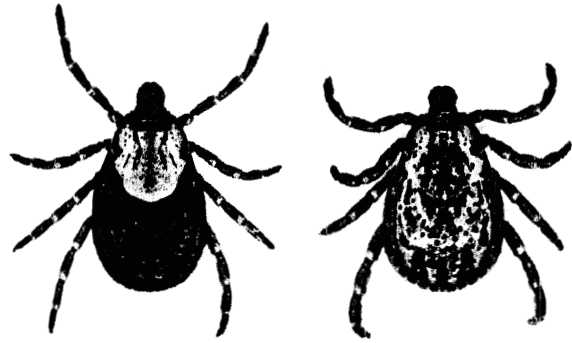
## Ticks

Ticks harm their hosts by injuries caused by their bites that result in blood loss and transmission of disease pathogens. Ticks can be classified in three groups: one-host, two-host, and three-host ticks. Ticks commonly parasitizing goats in Oklahoma mainly belong to the three-host group. As the name implies three-host ticks infest three different hosts throughout their life cycle, which can make control difficult.

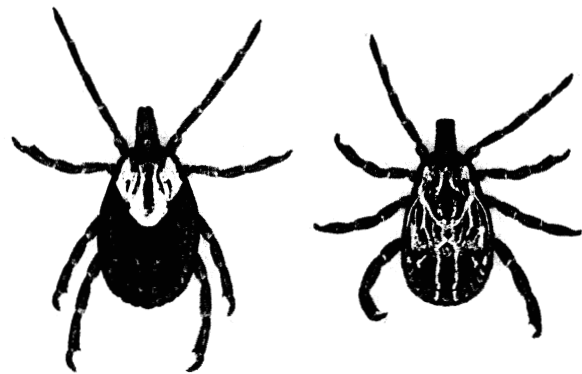
Research in Oklahoma identified three species of ticks parasitizing goats. The three tick species observed were: American Dog Tick (*Dermacentor variabilis*), Gulf Coast Tick (*Amblyomma maculatum*), and Lone Star Tick (*Amblyomma americanum*).

The adult American Dog Tick can be identified by their reddish-brown color with silver-white markings on the back and upper body regions (Figure 7). The silver-white markings are on the scutum (u-shaped area behind the mouthparts) in females and on the male they extend over the whole back. Females increase in size dramatically when fully engorged (from 1/4 to 1/2 inch), resembling a gray bean.

The Gulf Coast Tick is most commonly found on goats with horns and more specifically at the base of the horns. Occasionally, some Gulf Coast Ticks are found in the ears of



**Figure 7:** Female (left) and male (right) American Dog Tick. Credit: R. Grantham; Oklahoma State University

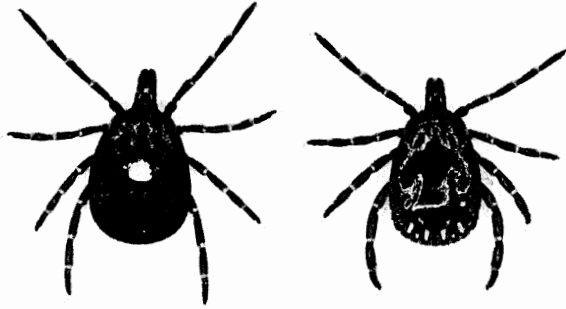


**Figure 8:** Female (left) and male (right) Gulf Coast Tick. Credit: R. Grantham; Oklahoma State University

the animals. They are reddish brown with pale reticulations (Figure 8) and very similar to but slightly smaller than American Dog Ticks. Gulf Coast Ticks have longer mouthparts than the American Dog Tick. The Gulf Coast tick is considered a presumed vector of *Ehrlichia ruminantium*, the rickettsial causative agent of heartwater, an African disease of ruminants that may enter the United States from the Caribbean.

Lone Star Ticks are more commonly found along the withers and neck areas of the goats. Occasionally, they can be found on the head and arm-pit regions. Adult females can be easily identified by the single lone spot on the back (Figure 9). Adult males have non-connecting white markings along the posterior margin. This tick has much longer mouthparts when compared to the previously mentioned ticks. Research has shown that goats can serve as reservoirs of *Ehrlichia chaffeensis*, which is the bacterial agent responsible for human monocytic ehrlichiosis and the primary vector is the Lone Star Tick. Care should be taken when handling goats that are heavily infested with Lone Star Ticks.

All of the tick species found on the goats are three-host ticks which can complicate control since each life stage can parasitize different animals. A seasonal cycle of these ticks indicates that Gulf Coast Ticks begin to parasitize goats in April with the latest occurrence observed in June. The American Dog Tick and Lone Star Tick are observed on goats from May to August. Targeted insecticide applications should control



**Figure 9: Female (left) and male (right) Lone Star Tick.**  
**Credit: R. Grantham; Oklahoma State University**

all of these tick species, but re-application may be warranted 3 weeks later. Currently, there are very few insecticides registered for goats so extreme vigilance should be taken when selecting products to treat your goats.

## **Summary of Currently Available Insecticides Registered for Goats**

### **Permethrin:**

Artoban 11% EC Insecticide – spray concentrate for flies, mites, ticks, lice, and keds.

Catron IV – aerosol for control of flies, maggots, and ear ticks.

GardStar 40% EC – spray concentrate for flies, ticks, and lice.

### **Zeta-pymethrin:**

Python Dust – dust insecticide for flies, lice, ticks, and keds.

Although many other brands and chemicals are effective against external parasites, they are not currently labeled for use in goats. Before you use such products, you should check with your local veterinarian for off-label usage instructions on dosages, withdrawal times, and special considerations for use on goats.

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