Iowa Commercial Pesticide Applicator Manual

Category

1E

Animal Pest Control

IOWA STATE UNIVERSITY
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Iowa Commercial Pesticide Applicator Manual

Animal Pest Control

Category 1E

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This manual has been developed for individuals wishing to become certified in commercial pesticide applicator Category 1E, Animal Pest Control. It contains specific information that an individual must know before becoming certified in Category 1E. This manual has been designed to supplement the general information contained in the *Iowa Core Manual* (CS-445) and should not be used for certification preparation without referring to the *Iowa Core Manual*.

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Contents

Agricultural animal production

Several types of agricultural animals are produced in Iowa. Some are produced for food, others for pleasure or companionship. Each type of animal can be attacked by one or more pests that may require control. When this control involves the use of pesticides, caution must be excercised to protect humans, their food supply, and their environment. A practical, working knowledge of agricultural animal production is essential before using any pesticide as a tool in a pest management program.

Pests of agricultural animals

Agricultural animals can be attacked by insects, mites, ticks, and animal predators. These pests affect animal productivity by:

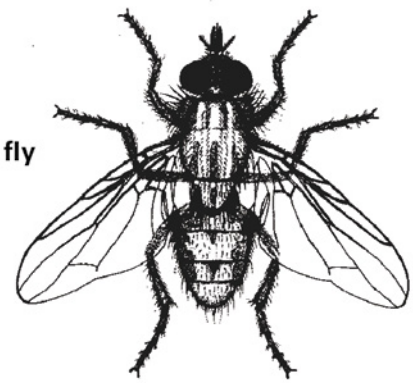
- killing animals,
- spreading disease agents and parasitic worms,
- causing loss of blood (anemia),
- causing physical damage to animals or animal products,
- reducing weight gains,
- reducing milk or egg production, and
- decreasing animal resistance to other diseases.

Control of pests affecting agricultural animals is necessary to maintain production efficiency and quality standards in livestock production. Actual losses due to these pests are difficult to determine, but estimates base annual losses for the United States in excess of $800 million. It is reasonable to assume that significant losses occur in Iowa because our state ranks among the leaders in livestock production.

Pests of cattle

Horn flies

Horn flies are the smallest of the pest flies, about one-half the size of the common house fly and about the same color. They cause injury by sucking blood from cattle. Female flies periodically leave the animals to deposit their eggs in fresh cattle manure. Larval development takes place in the manure, with pupation occurring either in the manure or in the soil immediately beneath or around the manure. The entire life cycle is completed in about 10 to 14 days. Under favorable conditions many generations are produced in a single season. Horn flies generally overwinter as pupae in or beneath cattle manure.


Horn fly

Horn fly problems are limited to pasture and range situations and are not of significance in feedlot operations. Because adult horn flies spend most of their life resting or feeding on cattle, they are relatively easy to control. Sprays or pour-ons are effective in controlling horn flies, but usually require frequent reapplication. Backrubbers and dust bags provide efficient

control if they are kept in proper working condition and placed in locations that force the animals to use them on a daily basis. Insecticide-impregnated ear tags offer a convenient method to control horn flies. Tags are placed in the ears of cattle in early spring and provide control throughout the summer. In most parts of Iowa, however, horn flies have developed resistance to some ear tags containing pyrethroid-active ingredients. Producers who have used pyrethroid ear tags in the past may want to consider the use of organophosphate ear tags or alternative control measures. Feed additives also are available for controlling horn fly larvae that develop in manure. Cattle must ingest the proper amount of feed additive daily for this method to be effective. Because adult flies are not controlled, supplemental control methods may be necessary.

Face flies

Adult face flies closely resemble house flies, except that they are slightly larger and darker. In the field they are best identified by their habit of swarming and lighting about the nostrils, muzzle, and eyes of cattle. Like house flies, they have sponge-type mouthparts and are not capable of piercing the skin of animals. Face flies feed on the mucous of eyes, nose, and mouth and on blood oozing from insect bites or open cuts. Irritation resulting from face fly infestations may cause cattle to huddle or seek shelter and refuse feed. Face flies also are capable of transmitting pinkeye and certain species of eye worms.

Face fly

Face flies are primarily a pest of pastured or range cattle. They only infest animals during the day and avoid darkened buildings and shady areas. Female flies lay their eggs in fresh cattle manure and the larvae pupate in adjacent soil. The entire life cycle requires about 15 to 25 days to complete. Several generations may occur during the summer and fall. Face flies overwinter as adults in protected locations such as attics and within walls of buildings.

Face flies are very difficult to control. Factors contributing to this difficulty include the following:

- the habit of feeding primarily upon the face of an animal, an area extremely difficult to treat,
- the limited time flies actually spend on the animal, and
- the ability of flies to disperse long distances to infest animals.
- Control methods currently available include sprays, dust bags, backrubbers, facerubbers, insecticide-impregnated ear tags, and feed additives. None of these methods are highly satisfactory.

Cattle grubs (Heel flies)

Both common cattle grub and the northern cattle grub attack cattle in Iowa. Adult grubs of both species are called heel flies and resemble honeybees in size and color. Female flies attach their eggs to hairs on

the legs and belly of cattle during late spring or early summer. Eggs hatch in 2 to 6 days, and the larvae (grubs) penetrate the skin. Larvae move around within the connective tissue during the next 6 to 8 months until reaching the gullet (common cattle grub) or spinal canal (northern cattle grub). Common cattle grubs reach the backline from December to late February, whereas northern cattle grubs arrive from mid-February to April. Grubs of both species cut breathing holes in the hide and complete development in cysts (warbles) under the skin. Mature grubs squeeze through the breathing holes and drop to the ground to pupate under trash or manure. Adult flies emerge from 3 to 10 weeks later. The complete life cycle requires about one year, most of which is spent as a grub inside the animal's body.

Heel fly

Cattle grub

Cattle grubs cause economic damage as they move through the animal's body. Tissues underlying the cysts must be trimmed from the carcass, resulting in a loss of meat and a lowered price. The sale value of a grubby, perforated hide also is reduced. Heavy grub infestations also can adversely affect weight gain and milk production. Cattle grub adults cause further losses during the spring egg-laying period. The adults do not bite, but cattle attempting to avoid egg-laying activity may injure themselves and have decreased weight gain or milk production.

Systemic insecticides provide effective control if timed correctly and applied properly. Systemics can be applied as a spray, dip, pour-on, spot treatment, bolus, or injectable. To avoid harm to the treated animal, insecticide application needs to be made while grubs are still small and before they reach the gullet or spinal canal. Heavily infested cattle treated late in the grub's life cycle may experience serious side effects. The gullet may swell, causing bloat or difficulty in breathing, or grubs may block nerves in the spinal canal, causing various degrees of hindquarter paralysis. The best time to treat cattle summer-grazed in Iowa is between August 15 and November 15. Follow the treatment cutoff dates listed on the label for cattle shipped from other states. Systemic insecticides are not registered for use on lactating dairy cattle. They may be used on dry dairy cows if the labeled waiting period (freshening interval) between time of application and marketing of milk is observed.

Stable flies and house flies

Stable flies are grayish with distinct white areas on the face, and have a checkered abdomen and long piercing mouthparts. They feed by sucking blood and are vicious biters. Stable flies are typically outdoor, daytime-biting flies, abundant during the summer and fall, and often more abundant after periods of heavy rainfall. Both male and female flies feed on cattle and usually attack the lower leg areas.

Stable fly

House flies are about the same size as stable flies. Their color differs in that the underside of the abdomen is white to yellow rather than gray. House flies cannot bite, but feed on manure and animal secretions through sponging mouthparts. Populations increase in the spring and summer and reach maximum numbers in late summer or early fall. Large numbers of flies may annoy feeder and dairy cattle, causing reduced efficiency or production and increased bacterial counts in milk. House flies also can transmit several animal diseases.

House fly

Stable flies and house flies are primarily pests of feedlot and dairy cattle. Both flies breed in a variety of organic materials such as decaying silage, spilled feeds, animal bedding, manure, moist hay, and other decaying forage and aquatic plants. The complete life cycle takes about 20 to 30 days for stable flies and 10 to 20 days for house flies.

Sanitation is the most important step in controlling stable flies and house flies. Frequent removal and disposal of animal wastes and organic debris are essential. Chemical control works only when used in conjunction with good sanitation practices. Because flies only remain on animals for short periods of time, direct spray applications are usually not effective. Residual sprays offer some protection around barns, sheds, and feedlots if the sprays are applied to fences, feedbunks, the sides of buildings, and other places where flies rest. Space sprays by ground or aerial application also may be effective. Feed additives are available for controlling fly larvae breeding in manure, but they are not effective against existing adult flies or larvae developing in other organic material. Application of larvicidal sprays to breeding materials that cannot be regularly removed also may be helpful. Baits are sometimes useful in supplementing other control measures for house flies but are not effective for stable flies.

Horse flies and deer flies

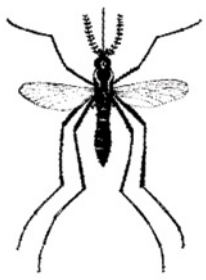
Horse flies and deer flies are persistent, blood-sucking pests of cattle and horses. They are also efficient transmitters of both cattle and horse diseases. Only female flies feed on blood and produce painful bites that usually continue to bleed after the fly leaves. The larval stage of these flies may be found in water or wet soil in wooded areas or meadows. Some species require more than one year to complete their life cycle.

Horse fly

No satisfactory methods are currently available for controlling horse flies and deer flies. Repellents, or repellents plus a quick-acting insecticide applied as a fine mist or wipe-on, may be of some benefit. Although most insecticides applied directly to animals may eventually be fatal to horse flies and deer flies, the flies are usually able to complete feeding before being affected. Frequent applications are necessary and the flies' ability to disperse long distances to quickly reinfest animals makes control difficult.

Mosquitoes

Mosquitoes are very common bloodsucking insects that attack humans and many agricultural animals. Only female mosquitoes feed on blood. The life cycle of mosquitoes varies greatly, depending on the type of mosquito and the environment. The female lays eggs on water or in areas subject to flooding.



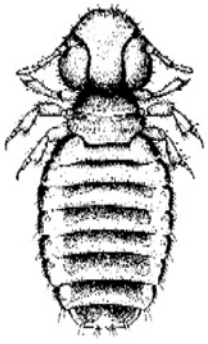
Mosquito

The larval and pupal stages develop in water before maturing into adults. Mosquitoes transmit diseases of animals and humans and may affect efficiency of meat and milk production. Most damage to animals takes place during early morning, late afternoon, and night.

Most mosquitoes are difficult to control. The best method is to eliminate or minimize mosquito breeding areas such as potholes, water tanks, unused receptacles, and other synthetic containers. Larvicidal insecticides also can be applied to breeding areas. Adult mosquito control measures include direct spray applications to animals and area wide applications to mosquito resting areas by using mist blowers, foggers, hydraulic sprays, or aerial applications.

Lice

Both chewing (biting) and sucking lice infest cattle in Iowa. Chewing lice feed on sloughing skin, whereas sucking lice pierce the skin and feed on blood. The feeding activity of both types of lice produces an intense irritation that leads to scratching, rubbing, licking, and biting of infested areas. Heavy louse infestations may result in decreased weight gain, reduced milk production, general unthriftiness, and anemia.



Chewing louse

Lice are host specific and spend their entire life on the animal. Eggs (nits) are attached to hair and hatch into nymphs. Nymphs resemble adults except they are smaller. Development from egg to adult generally requires about 30 days. Lice are spread by direct contact with infested animals. There are some animals (carriers) in most herds that seem to harbor infestations each year. These animals are instrumental in reinfesting entire herds each year. Lice populations are generally light during the summer and early fall but increase rapidly in the winter and early spring.

Lice can be successfully controlled with insecticidal sprays. Complete wetting and thorough coverage are essential and repeat applications may be necessary. Although not as effective as sprays, dust treatment may be used when cold weather does not permit spraying. Pour-ons formulated for louse control also can be used during cold weather. Backrubbers and dust bags will help reduce louse infestations if they are made available in the fall and are used continuously.

Sucking louse

Systemic insecticides can provide effective control of sucking lice but have limited effectiveness against chewing lice. Systemics can be applied as a pour-on, spot treatment, spray, dip, bolus, or injectable. Systemics should not be used for louse control after November 15 on cattle that have not received cattle-grub treatment. Use of these materials after this date may result in grub reaction. Systemic pour-ons may be safely used for lice control during the winter and early spring on cattle that have been treated for cattle grubs prior to November 15.

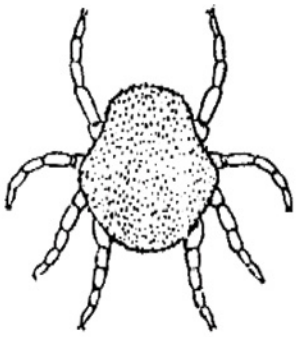
Systemic insecticides are not registered for use on lactating dairy cattle. They may be used on dry cows if the labeled waiting period (freshening interval) between time of application and marketing of milk is observed.

Ticks

Ticks are important parasites of cattle. Loss of blood and injection of toxins during tick feeding can affect animal health, weight gain, and milk production. Ticks also can transmit several animal diseases.

Hard tick

Correct identification of ticks is important for economical and effective control. Ear-infesting ticks (Gulf Coast and spinose ear ticks) may be controlled by applying pesticides directly to the ears as sprays, smears, or dusts. Insecticide-impregnated ear tags also will control these ticks.

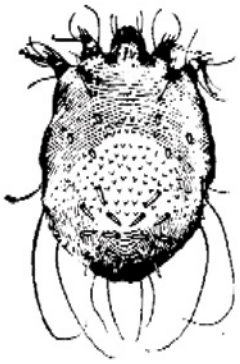


Spinose ear tick

To control ticks infesting the body, treat the entire body with high-pressure sprays or dips. Retreatment may be necessary for some tick species.

Scabies (Cattle mange)

Scabies is a highly contagious disease of cattle caused by tiny parasitic mites that live on or in the skin. The feeding and tunneling activity of these mites causes intense localized inflammation due to the irritant properties of their saliva.



Cattle scabies mite

The first lesions may occur on any portion of the body, but are usually found on the shoulders, top of the neck, and around the base of the tail. Excessive hair, skin, and water loss may develop. Severe weight loss and reduced milk production may result, and heavily infested animals may die. Scabies infested animals are also more susceptible to other cattle diseases. Transmission of scabies is by direct contact with infested animals or mite-contaminated material.

Scabies control is regulated by federal quarantine laws. Animals suspected of having scabies should be quarantined and a veterinarian should be consulted. Regulations specify the chemicals that must be used for treatment. Treatment methods include the use of a dip vat, a spray dip machine, or an injectable. Treatment methods and materials must be approved by federal or state veterinarians.

Pests of swine

Flies

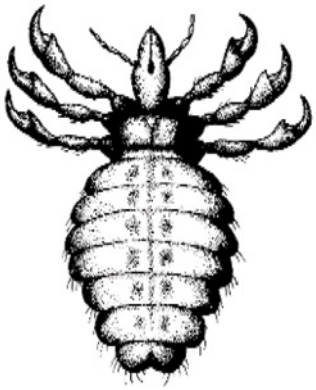
House flies and stable flies also may be pests of swine. Refer to the descriptions and control recommendations for these flies on pages 7 and 8.

Lice

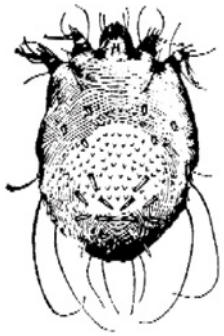
The hog louse is the largest bloodsucking louse infesting domestic animals. Lice are most commonly found in the winter, but may cause problems throughout the year. The presence of hog lice may be indicated by excessive scratching and rubbing. Lice may be found all over the body, but are more likely to be seen inside the upper legs, around the tail, and on the ears and neck. Damage from hog lice is primarily irritation, making hogs restless and decreasing feed intake and growth rate. In addition, anemia may occur in young pigs due to blood loss. Hog lice also are capable of transmitting swine pox virus and other diseases to susceptible pigs.

The life cycle of the hog louse is similar to that of the cattle louse and takes from 25 to 30 days to complete. Transmission is by direct contact with infested animals or louse-contaminated materials.

Hog lice can be successfully controlled with insecticidal sprays, pour-ons, injectables, or feed additives. In addition, dust formulations also may be used on young and mature pigs and as a bedding treatment. Treatment may have to be repeated periodically for effective control.



Hog louse



Hog mange mite

Mange mites

Hog mange is caused by tiny parasitic mites that burrow into the skin to feed, lay eggs, and spend the majority of their life. This burrowing activity produces intense irritation and causes infested animals to rub and scratch themselves. The hide of infested animals appears dry, cracked, and bloody. Scabs may appear on the hide, especially in or near the ears. Mange mites may be present throughout the year but are more of a problem in coldweather months. Mange is highly contagious and may spread rapidly through a herd. Transmission is by direct contact with infested animals or mite-contaminated materials.

Because mange spreads rapidly, good management practices are essential. A routine treatment program will help prevent an outbreak. Such a program requires treatment of the following:

- pigs at weaning,
- sows a month before farrowing,
- boars prior to breeding season, and
- all feeder pigs and other hogs in the fall before they are put in with other hogs.

If an outbreak of mange is detected, treat the entire herd even though certain animals may appear uninfested.

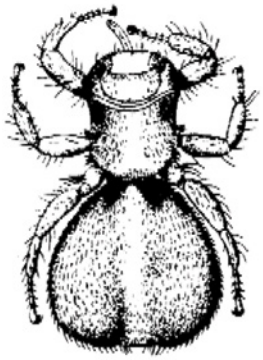
Insecticide sprays, pour-ons, injectables, or feed additives provide effective control of mange mites. Thorough treatment is essential. Dust formulations are also available for treating young and mature pigs and can be used to treat bedding.

Pests of sheep and goats

Sheep keds (Sheep ticks)

Sheep keds are wingless flies that spend their entire lives on sheep. The sheep ked life cycle is unique. A single egg hatches into a larva within the female ked uterus. The larva develops to maturity in about eight days and is deposited and cemented in place on the wool. It quickly forms a

red, barrel shaped puparium from which an adult emerges about 2 to 3 weeks later. Female keds live about 3 to 4 months and produce 15 or more larvae during their lifetime.



Sheep ked

Adult sheep keds feed by sucking blood. The feeding activity of keds produces an intense irritation that leads to scratching, rubbing, and biting of infested areas. Sheep supporting large numbers of keds may become anemic and have reduced weight gain. In addition, keds can transmit bluetongue disease in sheep and cause cockle defects in sheepskins. Ked infestations are heaviest during the winter and early spring. Populations decline during warm months although a few keds survive on the sheep in the summer. Sheep keds may occasionally be found on goats but do not occur on other animals.

Insecticides applied as sprays or pour-ons are effective in controlling sheep keds if they are used as a routine part of good sheep and lamb management. Treatments applied after shearing provide the most efficient control due to increased penetration and cover-age. In addition, most of the ked pupae and adults are removed with the fleece during shearing. Shorn wool should be removed from the vicinity after shearing to prevent reinfestation. Treat all animals within the flock and all additions to the flock. One or two untreated animals are capable of reinfesting the entire flock. Dust formulations provide good ked control and may be more desirable to use during cold weather. Dusts are most effective when worked into the wool. Dusting is practical only when a few animals are involved in treatment.

Lice

Both chewing (biting) and sucking lice infest sheep in Iowa. Chewing lice feed on wool fibers and dry skin scales, whereas sucking lice pierce the skin and feed on blood. The feeding activity of both types of lice produces an intense irritation that leads to scratching, rubbing, and biting of infested areas. Heavy infestations may result in reduced quality and quantity of fleece, decreased weight gain, general unthriftiness, and anemia.

Lice spend their entire lives on the animal. Eggs (nits) are attached to wool fibers and hatch into nymphs. Nymphs resemble adults except that they are smaller. Development from egg to adult requires about 30 days. Transmis-sion is by direct contact with infested animals. Lice populations are generally light during the summer and early fall but increase rapidly in the winter and early spring.

Lice can be successfully controlled with insecticidal sprays or pour-ons. Treatments applied after shearing provide the most efficient control due to increased penetration and coverage. Dust formulations provide good control and may be more desirable to use during cold weather. Dusts are most effective when worked into the wool and are practical only when a few animals are involved in treatment.

Wool maggots (Fleeceworms)

The maggots (larvae) of several species of blow flies frequently in-fest sheep in Iowa during the warm months.

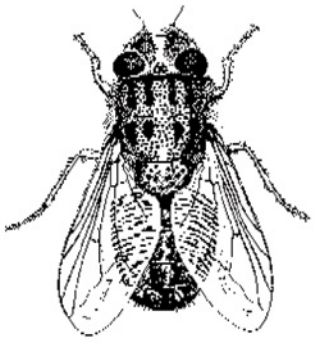
The life cycle of these flies is very similar. Female flies are attracted to foul odors emitted from soiled, wet wool or open, running wounds. Eggs are deposited in the wool surrounding these wounds or in the wet, matted wool around the crotch of the animal. After hatching, the fly maggots spread over the animal and feed on the skin surface causing severe irritation. Animals become restless, stamp their feet, and bite infested areas. As the infestation worsens sheep frequently leave the flock to hide in secluded areas. Heavily infested sheep become weak and may die.

Wool maggot infestations can be prevented by good flock management. Sheep should be kept as clean as possible and areas under the tail and between the hind legs should be clipped if they become saturated with urine and feces. Shearing early in the spring before blow flies become active is a good preventive practice. Prompt medication of wounds is also important.

Early lambing is advisable for protection of both ewes and lambs because soiled wool of ewes from afterbirth and exposed umbilical cords of lambs may attract flies. When lambing occurs early, docking and castrating can often be performed before blow flies become active. Infestations of wool maggots can be effectively controlled with insecticidal sprays.

Sheep bots (Nose flies)

Female sheep bot flies deposit living larvae in or around the nostrils of sheep during the spring and summer. The larvae move to the head sinuses where they attach and feed upon internal secretions. The larvae are sneezed out or drop out and pupate in the soil. Adults emerge about 1 to 2 months later and the life cycle is repeated. The feeding activity of the larvae irritates membranes lining the nasal passages and predisposes the sheep to bacterial infection. Infested animals shake their heads, stamp their feet, or hold their noses to the ground. The presence of larvae in the head sinuses may cause blind staggers or giddiness. Sneezing and labored breathing also may be common among infested sheep.



Sheep bot fly

An oral drench is the only registered treatment currently available for controlling sheep bots. Infestations may be reduced by frequently changing grazing or watering areas because adult flies are short lived and not capable of dispersing long distances to infest sheep.

Sheep scabies

Sheep scabies (wet mange) is caused by tiny parasitic mites that live in or on the skin of sheep. These mites cause wool to fall out and skin to become roughened and covered with a dried crust or scab. Animals become irritated and bite or rub infested areas continuously. Sheep with serious infestations may gradually weaken and eventually die.

Scabies control is regulated by federal quarantine laws. Because of the severity of this pest a nationwide eradication program

has been in effect since 1960. Animals suspected of having scabies should be quarantined and a veterinarian consulted. The preferred method of treatment is dipping. Treatment methods and materials must be approved by state or federal veterinarians.

Pests of horses, mules, and donkeys

Flies

Horn flies, face flies, stable flies, house flies, horse flies, deer flies, and mosquitoes also may be pests of horses. Refer to descriptions and control recommendations in the cattle section.

Horse bots

The nose bot, chin (throat) bot, and common bot all attack horses and have similar life cycles. Adults become active in late summer and early fall and are not capable of feeding. Mating occurs and females attach their eggs to the hair of horses. The eggs hatch and the larvae are transferred to the animal's mouth. The larvae move to the stomach and intestinal area where they attach and feed on membrane secretions. When mature, the larvae detach and are eliminated with the feces. Pupation occurs in the soil and adults emerge the following summer. Horse bots usually have one generation each year.

Horse bot larvae cause intense irritation to the stomach and intestinal membranes. Reduced absorption of nutrients and obstruction of food flow may occur in heavily infested animals. Inflammation or perforation of the stomach lining may occur that could result in colic, ulcers, peritonitis, or death.

Horse bots can be effectively con-trolled using insecticidal drenches, feed additives, oral pastes, or injectables. Treatments are most effective if administered about 30 days after the first killing frost when adults are no longer active.

Horse bot fly transparent

Lice

Both chewing (biting) and sucking lice may infest horses. Chewing lice feed on sloughing skin, whereas sucking lice pierce the skin and feed on blood. Both types of lice spend their entire lives on the animal and have similar life cycles. Females attach their eggs (nits) to horse hair. These eggs hatch into nymphs that resemble adults except that they are smaller. Nymphs mature into adults and the entire life cycle takes about 30 days to complete. Lice populations are generally light during the summer and early fall but increase rapidly in winter and early spring. Transmission of lice is by direct contact with infested animals.

The feeding activity of both types of lice produces an intense irritation that leads to scratching, rubbing, licking, and biting of infested areas. Damage includes loss of hair, scrufiness of skin, and irritability of the animal. Heavily infested animals may become anemic and suffer a loss of condition. Animals also may become unmanagable and injure themselves.

Lice can be successfully controlled with insecticidal sprays. Thorough coverage is essential and repeat applications may be necessary. Although not as effective as sprays, dust treatments may be used when cold weather does not permit spraying.

Ticks

Several species of ticks also may be pests of horses. Refer to descriptions and control recommendations in the cattle section.

Pests of poultry

Flies

Several species of flies may be pests in poultry operations. The house fly is the most common pest. Adult flies dispersing from poultry operations into the surrounding environment are considered to be a nuisance and public health hazard. The flies also may transmit several diseases to poultry, humans, and other animals.

Good sanitation and proper manure management are essential for successful fly control in poultry operations. Chemical control is only effective when used in conjunction with a good sanitation and manure management program. Insecticides may be applied as residual sprays to fly resting areas or as larvicidal sprays to fly breeding materials.

Northern fowl mites

Northern fowl mites are the most important blood-sucking pests of poultry. The life cycle of this pest has five stages: egg, larva, protonymph, deutonymph, and adult.

Only the protonymphs and adults feed on blood. Females attach their eggs to feathers, and the entire life cycle can be completed in less than a week. Mites spend all of their lives on the birds and are usually aggregated near the vent area. Transmission is by direct contact with infested poultry. Mites also may be transmitted by direct contact with infested wild birds. Other means of transmission include direct contact with mite-infested feathers, poultry handling equipment, flats, crates, and workers.

Northern fowl mites cause damage due to their blood-feeding activity. The skin may become irritated and scabs may develop. Heavily infested birds may become anemic, and decreased weight gain, reduced egg production, and death may result.

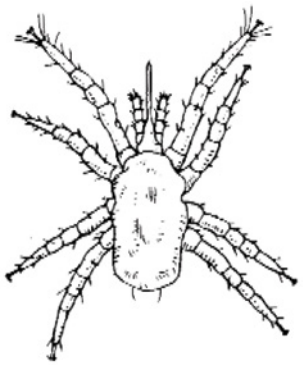
Mite infestations can be prevented or minimized by using a good management program. Wild birds should be prevented from entering poultry facilities. Feathers that accumulate in facilities should be removed and disposed of properly. Equipment, flats, and crates should be routinely cleaned and disinfected. Clean boots and clothing should be worn by all those entering the facility, particularly if they have been in contact with other poultry operations.

Northern fowl mites can be effectively controlled using insecticidal sprays. Treatments should be directed at the vent area and repeat applications may be needed. Although not as effective as sprays, insecticides can be applied by dusting or providing self-treatment devices such as dust boxes.

Roost mites (Red mites)

The roost mite is another important blood-sucking pest of poultry. The life cycle of roost mites is similar to that of northern fowl mites, but the behavior of these two pests differs. Roost mites are nocturnal and hide in cracks and crevices during the day. At night these mites infest poultry and feed on blood. A mite only stays on the bird long enough to feed and the remainder of the life cycle is spent off the host. Trans-mission of roost mites and the damage caused are similar to that of northern fowl mites.

Preventive management practices discussed for northern fowl mites also will be effective in eliminating or minimizing a roost mite infestation. Frequent removal and destruction of nesting material and other debris will eliminate mite hiding places and breeding areas and is also an essential part of a good control program



Roost mite

Roost mites can be effectively con-trolled using insecticidal sprays. Because this pest only stays on the bird long enough to feed, insecticide treatment should be applied to cracks, crevices, and other areas of the poultry house where mites may hide. Reapplication may be necessary for effective control.

Chiggers

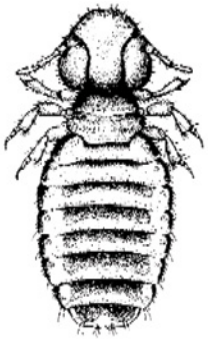
Chiggers are the larval stage of several species of mites. These pests are primarily a problem on range birds, especially turkeys. Chiggers have piercing mouthparts and feed on lymph and other cell contents. Primary areas infested include the thighs, breast, underside of the wings, and vent. The feeding activity of chiggers causes scabby lesions that may result in a downgrading of turkey carcass value.

Control of chiggers involves the application of pesticides to the range area as sprays or dusts. Repeat applications may be necessary for effective control.

Lice

Several species of chewing (biting) lice may infest poultry. These lice feed on skin scales, feathers, and scabs and spend their entire lives on the bird. Fe-males attach their eggs (nits) to feathers. These eggs hatch into nymphs that resemble adults except that they are smaller. Nymphs mature into adults and the entire life cycle takes about 14 to 21 days to complete. Lice populations are generally more common during cold weather, and transmission is by direct contact with infested poultry.

The feeding activity of these lice causes an intense irritation. Infested birds may become restless and injure themselves by pecking at infested areas. Heavy infestations may result in decreased weight gain, reduced egg production, and lowered bird vitality.

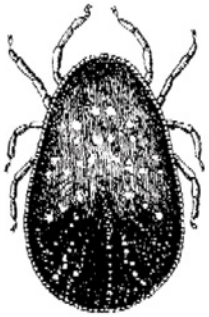


Chewing louse

Lice can be effectively controlled with insecticidal sprays. Thorough cover-age is essential and repeat applications may be necessary. Although not as effective as sprays, insecticides also can be applied by dusting or providing self-treatment devices such as dust boxes.

Fowl ticks

Although several species of ticks may infest poultry, the most common is the fowl tick. All active stages (larvae, nymphs, and adults) of this pest at-tach to poultry and feed on blood. Fowl ticks only attach and feed on poultry for short periods of time. When not on the host, these pests prefer to hide in cracks and crevices in poultry facilities. Mating and egg laying also take place off the host in these protected locations.



Fowl tick

The fowl tick causes about the same type of damage as poultry mites. The feeding activity of these pests causes skin irritation and heavily infested birds may become anemic. Loss of blood in chicks may be great enough to cause death. In addition, infestations may result in decreased weight gain, reduced egg production, and lowered bird vitality. Fowl ticks can be effectively controlled with insecticidal sprays. Because this pest only stays on the bird for a short period of time, insecticide treatments should be applied to cracks, crevices, and other areas of the poultry house where ticks may hide. Repeat applications may be necessary for effective control.

Bed bugs

Bed bugs can be serious pests in poultry houses and may become pests of humans.

These pests have piercing mouthparts and feed on blood. Bed bugs are nocturnal and only attack poultry at night. During the day they prefer to hide in nests, under loose boards, or in cracks and crevices in poultry facilities. Because their bodies are flattened, they are able to hide in very narrow areas and can be easily overlooked. Females lay their eggs in these protected locations. These eggs hatch into nymphs that resemble adults except that they are smaller. There are five nymphal stages that require 4 to 6 weeks to develop into an adult. All nymphal stages and adults feed on blood. Adults are very resistant to starvation and have been known to survive up to a year without feeding.

Bed bug

Bed bugs damage poultry by their blood-feeding activity. Heavy infestations may result in anemia and possible death. This feeding activity also can result in decreased weight gain, reduced egg production, and lowered bird vitality.

Control of bed bugs involves the application of insecticidal sprays to cracks, crevices, and other areas where bed bugs may hide. Repeat applications may be necessary for effective control.

Animal predators

A variety of large and small predators can attack livestock and poultry. Live-stock and poultry may be injured or killed:

- by direct predator attack,
- as a result of stampeding when frightened by a predator, or
- by predator transmitted diseases.

Predator controls consist mainly of trapping, shooting, poisoning, and correct livestock and poultry management. Control of some species and certain control methods are regulated by state and federal laws. You must know and follow appropriate regulations and make sure that you correctly identify the predator causing the damage.

Pesticide safety

Pesticide toxicity

Pests of agricultural animals can weaken livestock, thereby causing them to be unthrifty. They also can predispose animals to disease, and can even result in death. Pesticides will protect animals from these pests. All pesticides, however, are poisons and can be toxic to the animals being treated, as well as to the pests. For this reason, recommended pesticides must be applied properly to prevent injury to the animals.

Individual animals can show toxicity to certain pesticides and materials contained in pesticide formulations. Poisoning signs usually include excessive:

- salivation,
- eye watering,
- defecation,
- urination, and
- muscle twitching.

Residue potential

Most agricultural animals are raised for the human food products they produce. Thus, pesticide residues in excess of determined tolerance levels are not allowed in meat, milk, or eggs. Some pesticides are eliminated slowly from animal tissues. Other pesticides are quickly eliminated. To avoid excessive, undesirable residues in animal products, slaughter intervals are established for all pesticides used on agricultural animals. The slaughter interval is the time in days required by law before an animal or product can be slaughtered or consumed after a pesticide treatment.

Although many pesticides cannot be used on lactating dairy cows, they may be safely and legally used on nonlactating animals. If the cow, however, freshens soon after the treatment has been made, illegal pesticide residues may be present in the milk. Therefore, a freshening interval is usually given for most pesticides used on agricultural animals. The freshening interval is the time in days that must elapse after a pesticide treatment is made before the milk can be marketed.

Livestock producers should follow la-bel directions and be aware of slaughter and freshening intervals before any pesticide treatment is made. Failure to observe these intervals can result in illegal residues in meat, milk, and eggs. The animals or animal products may be confiscated and responsible individuals prosecuted.

Pesticide formulations

The pesticide formulation to be used must be taken into consideration when treating agricultural animals. Sprays are generally suited for treating most animals except in freezing weather. Spraying during freezing weather may predispose animals to diseases such as pneumonia. During periods of cold weather it may be more advisable to use pour-on or dust formulations because these materials do not ex-pose animals to excessive amounts of moisture.

Some types of agricultural animals may show toxic effects when oils are applied to their skin. Therefore, when applying ready-to-use oil sprays care should be taken to not allow the oil to penetrate the animal's hair so it comes in contact with the skin.

Stress

Pesticide applications should not be applied to animals that are under stress or that will be put under stress. Animals should not be treated with any pesticide when under stress from:

- shipping,
- vaccination,
- dehorning,
- castration,
- disease,
- exhaustion, or
- weaning.

Combination treatments Pesticides should not be applied in combination with other pesticides unless so stated on the label. An unlabeled combination treatment may result in pesticide toxicity to the ani-mal. Systemic pesticides should not be applied in conjunction with or immedialtely after other pesticides, oral drenches, or internal medications for worm control, or after phenothiazine administration.

Age and size of animal

Even when animals are healthy, their age and size are important considerations when applying pesticides. Young, unweaned animals generally should not be treated with any pesticide unless the label clearly states that such a treatment is safe. Treating animals during weaning also may be stressful to the animal.

Many pesticides are applied according to the size of the animal, with less being applied to small animals and more to larger animals. For pests that require full-body coverage, sprays are usually applied to the point of runoff. Systemic pesticides and ready-to-use oil sprays, however, must be applied in an exact amount for adequate control of the pests and prevention of injury to the animals.

Breed of animal

Individual breeds of animals can show toxicity to certain pesticides and materials contained in pesticide formulations. Sensitive breeds should not be treated or should only be treated with pesticide formulations nontoxic to the animal. Brahman and certain exotic breeds of beef cattle can show sensitivity to some organophosphate insecticides. For this reason, organophosphate pesticides should not be applied to these animals if so indicated on the pesticide label.

The skin of some horses is extremely sensitive to various pesticide formulations, and treatments may result in an allergic reaction. Before treating horses with pesticides, treat a small patch of skin with the pesticide formulation approximately 24 hours before the entire animal is treated.

Personal protective equipment and clothing

The proper use of personal protective equipment (PPE) and clothing is an important way to reduce pesticide exposure. Specific PPE requirements are related to the pesticide's toxicity and can be found in either the "Precautionary Statements" or the "Directions for Use" sections of the pesticide label. Applicators must follow the pesticide label instructions regarding required PPE and must correctly wear all PPE listed on the label during mixing and application. If two or more pesticides are used at the same time, the PPE used must be from the pesticide label that is the most restrictive, or that re-quires the most protective PPE.

To provide protection to the applicator, all PPE must be cleaned and stored correctly away from pesticide-contaminated areas after each use. All PPE should be regularly inspected for damage, wear, and pesticide contamination and be repaired or replaced if necessary.

Before Using Any Pesticide

STOP

READ THE LABEL

All pesticides can be harmful to health and environment if misused.

Read the label carefully and use only as directed.