ALABAMA DEPARTMENT OF
AGRICULTURE AND INDUSTRIES

STUDY MANUAL FOR

AGRICULTURAL ANIMAL PEST CONTROL

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CONTENTS

PREFACE

This training manual is intended to provide you with the information you will need to meet the minimum standards of the Environmental Protection Agency for pesticide certification and prepares you to take an examination given by the State Department of Agriculture based on this manual. It is not intended that this training will provide you with all the information you need for effective Agricultural Animal Pest Control. Additional information in the form of publications and short courses can be obtained from the Cooperative Extension Service.

Agricultural Animal Pest Control

PESTS OF AGRICULTURAL ANIMALS

THERE ARE many different types of livestock. Each type provides food, pleasure, or companionship. For example: horses are raised mainly for companionship and pleasure; dairy cattle and milk goats provide milk; beef cattle, hogs and broilers provide meat; hens provide eggs; sheep provide wool and meat. Each type of agricultural animal is attacked by one or more external parasites and these parasites require control. When control involves the use of pesticides, caution must be exercised to prevent contaminating humans, their food supply, and their environment.

Many different external parasites attack agricultural animals. Flies, mites, lice, ticks, bots, and grubs cost producers large sums of money annually. More than $500,000,000 are lost in livestock production in the United States each year. In Georgia, it is estimated that animal pests cost livestock producers over $20,000,000 yearly. They (1) weaken animals and predispose them to diseases; (2) cause anemia (due to blood loss); (3) reduce weight gains; (4) reduce feed efficiency; (5) transmit several important animal diseases (encephalitis of horses, anaplasmosis of cattle, heartworm of dogs, bluetongue of sheep, etc.); (6) ruin hides; (7) irritate animals; (8) reduce milk production; and (9) can kill infested animals.

For the most effective, efficient and safe agricultural animal pest control program, producers should first determine which parasite needs to be controlled. Then a pesticide application system should be selected which can be used to effectively and efficiently apply pesticides to the infested animals. Finally, a pesticide should be chosen which will provide effective, efficient and safe control of the pest causing the damage. The following are some of the more common pests which attack agricultural animals, the damage they cause, and their habits. An understanding of the biology of the pests to be controlled is necessary for effective, economical and safe pest control.

MOSQUITOES

These very common insects have piercing-sucking mouthparts. Only female mosquitoes suck blood from livestock; males feed on plant nectar. Mosquitoes develop in water. Adults are usually more abundant in shaded areas. Most damage to animals takes place during early morning, late afternoon and night.

Most mosquitoes spend the winter in the egg stage (Figure 1). Some winter as adults, others as larvae. When the weather warms, adults become active and mating takes place. From egg laying to adult emergence requires 10 days to three weeks. Adults normally live 30 days.

Mosquitoes are difficult to control. Larvae can be destroyed by draining their breeding areas, by applying larvicides, or by using mosquito feeding fish. When large bodies of water are infested or when breeding sites are numerous and widely scattered, it may not be feasible to attempt larval control. Adult control measures usually include frequent applications of pesticides to cover all animal body parts. Frequent applications are required when short residual pesticides are applied unless the population of mosquitoes subsides. Sprays are usually most effective. Residual wall sprays can help where animals are confined in stables and barns.

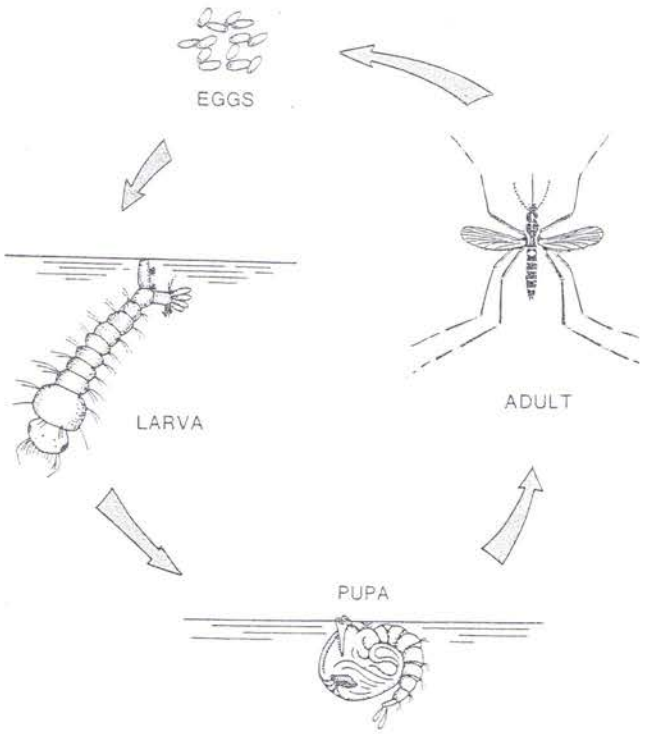


Figure 1. Mosquito life cycle

STABLE FLIES

In some animal operations, especially in dairies and horse stables, this is the most troublesome external parasite (Figure 2). Adults look like adult house flies, except stable flies have needle-like mouthparts that protrude from underneath the head. These mouthparts puncture the skin and suck blood from livestock (Figure 3). Feeding takes place primarily on the legs and lower sides of animals. Flies that feed on the legs are difficult to control because the legs don't retain pesticides for long periods. The flies visit animals only to feed. Since they are in contact with the animal only a short time, control is difficult.

In most areas, stable flies overwinter as pupae in wet straw piles or strawy manure. In early spring adults emerge, mate and lay eggs—usually in manure mixed with straw. Extreme populations may develop in green chop, etc., causing very high populations on dairy farms. About 20 to 30 days are required for development from the egg stage to the adult.

Sanitation helps control stable flies where breeding sites are removed and destroyed. Stable flies have been shown to migrate up to 70 miles in only two days, so breeding areas could be some distance from the farm. Pesticides can be applied in a number of ways but care must be taken to thoroughly cover the animal's legs and lower sides. Residual wall sprays can kill stable flies that are resting after taking a blood meal.

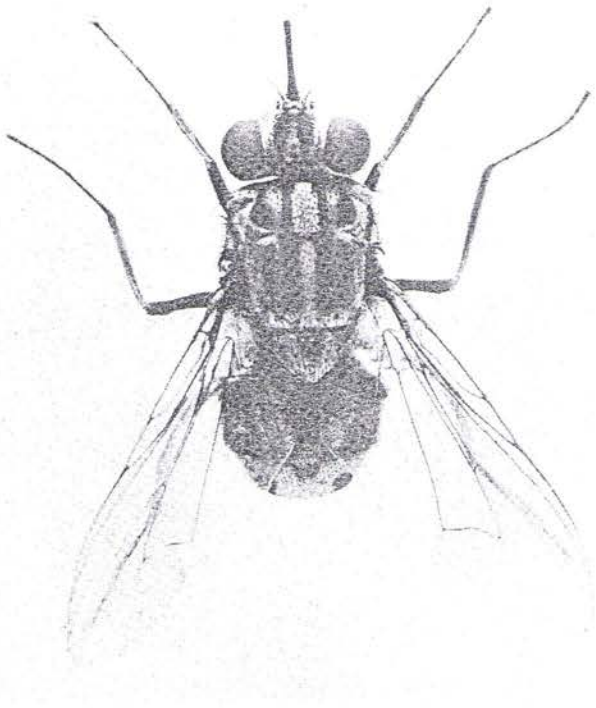


Figure 2. Adult female stable fly

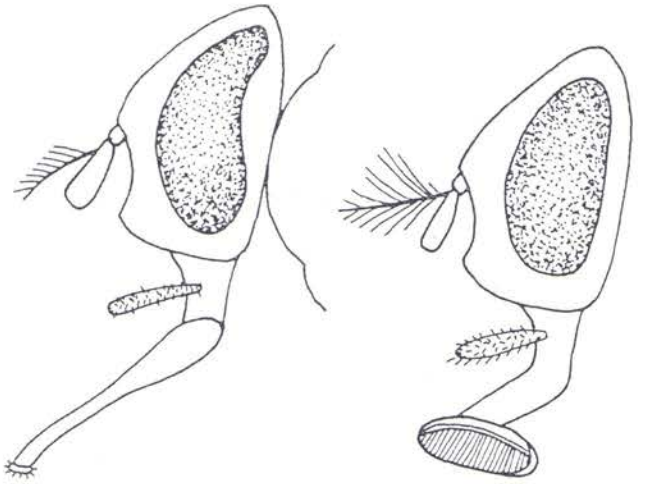


Figure 3. Piercing and sponging mouthparts

HORSE FLIES AND DEER (OR YELLOW) FLIES

These pests are vicious, persistent, blood-sucking external parasites of animals. After alighting on an animal (if they are not dislodged), they cut through the skin with their knife-like mouthparts and suck blood. When they fly away, blood usually comes out of the wound. They are efficient vectors of both cattle and horse diseases.

Development takes place in water or soil in damp, wooded areas. Some species require more than one year to complete development. The winter is passed as larvae in soil around lakes and streams, or in swampy areas. Adults can fly long distances. They are most troublesome in or near wooded areas.

Fencing animals away from wooded areas and providing artificial shade can help reduce horse and deer fly attacks. Larval control is not feasible due to the large larval breeding areas involved. Pesticides that are recommended are effective in controlling horse flies but the ability of the horse fly to reinfest treated animals from long distances makes control difficult.

HOUSE FLIES

House flies breed in many types of organic matter such as garbage, animal manure, and accumulations of waste feed. As many as a thousand can complete development in one pound of suitable breeding material.

House flies usually become active in early spring. Adult house flies mate and females lay eggs on decaying organic matter. Between 100 and 150 eggs are laid at a time, each female laying a total of 500 eggs during her 30-day life. In eight to 30 hours, the eggs hatch into tiny,

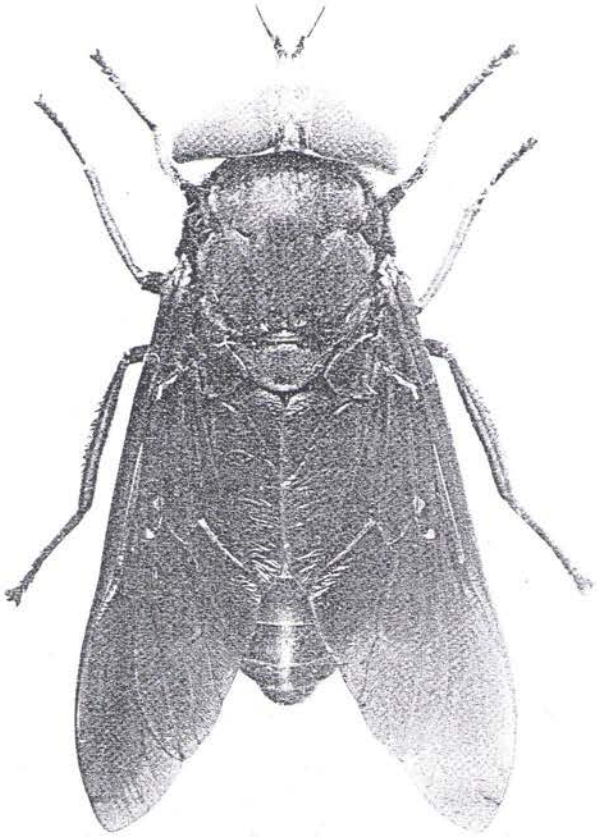


Figure 4. Adult black horse fly

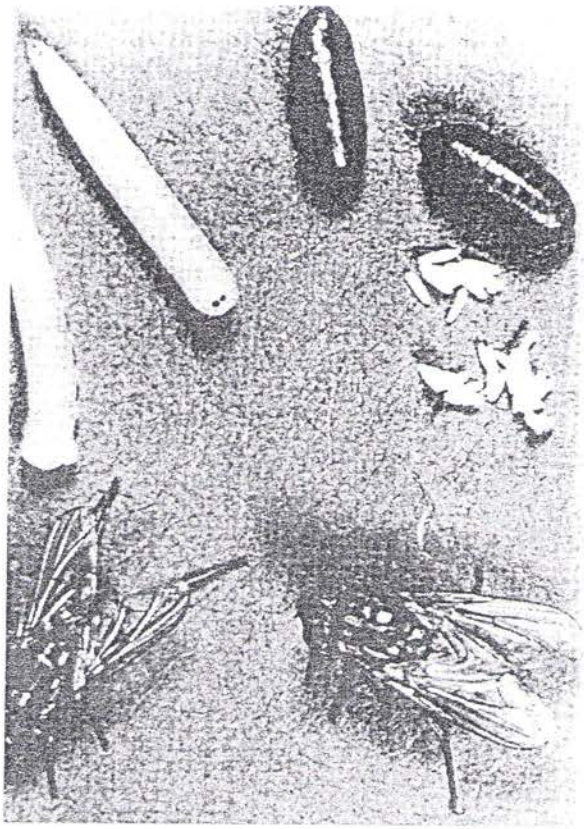


Figure 6. House fly life cycle

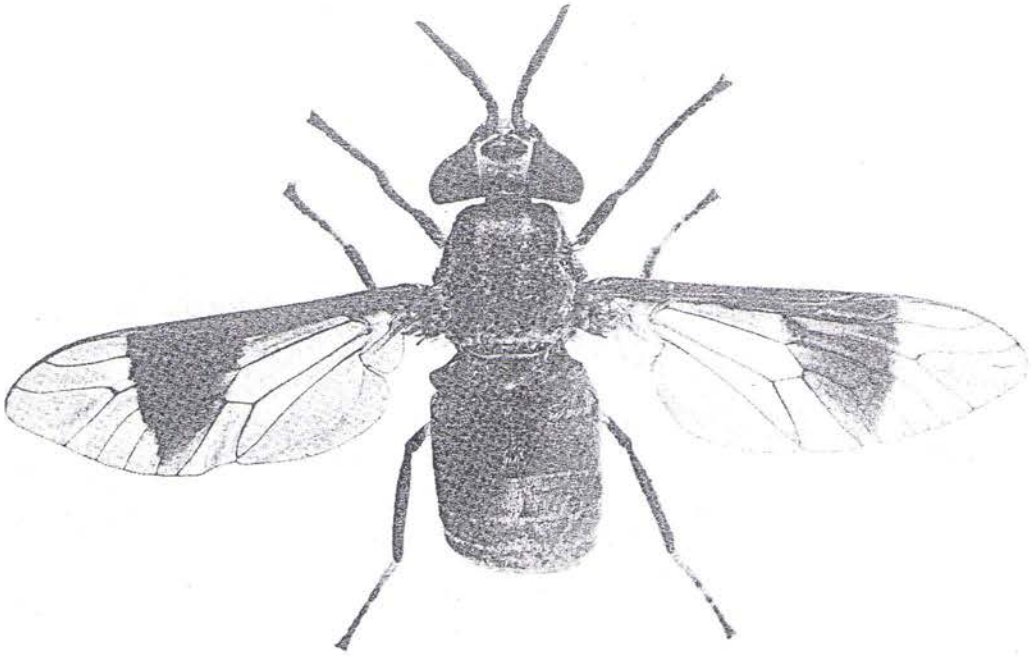


Figure 5. Adult deer fly

white, legless maggots which begin developing in the breeding material. When the maggots reach maturity—one to two weeks later—they change into the pupal or resting stage. After three to 10 days, the adult emerges from the pupal case. From one to three weeks are required to complete each life cycle (Figure 6) from the egg stage to the emergence of the adults from the pupal case.

House flies overwinter as full-grown larvae or pupae in or beneath breeding materials. Some adults probably survive the winter in warm, protected areas in buildings. In periods of warm weather during the winter, these overwintering flies become active. If the warm weather is of sufficient duration, adult flies can emerge from protected pupal cases.

HORN FLIES

Horn flies are serious external parasites of beef cattle and dairy cattle. During the summer months, it is not uncommon to find 300 to 2,000 hovering over one animal's back and crawling down among the hairs on the withers, back or belly. Adults suck blood, feeding intermittantly 20 times each day. Five hundred adult horn flies can reduce animal weight gains up to a half pound per day. They look like stable flies, but are only half as large (Figure 8).

Horn flies generally overwinter as larvae or pupae in or beneath cattle droppings. When the weather warms, adults begin to appear. Adults feed on cattle, mate and lay eggs on fresh cattle droppings. Development from the egg to adult stage requires about two weeks. Adults remain on cattle most of the time. They will leave the animal to deposit eggs and some fly short distances to infest other cattle.

Since adult horn flies remain on animals during most of their lives, control is relatively easy using recommended pesticides. Rubbing devices are particularly effective against this pest. Larvae can be controlled by feeding animals on pesticide-treated mineral, salt and ration mixtures. For effective control, animals must consume recommended daily amounts of the pesticide. This external parasite is the most prevalent and damaging pest found on beef cattle in the southeastern states, yet it is the easiest to control.

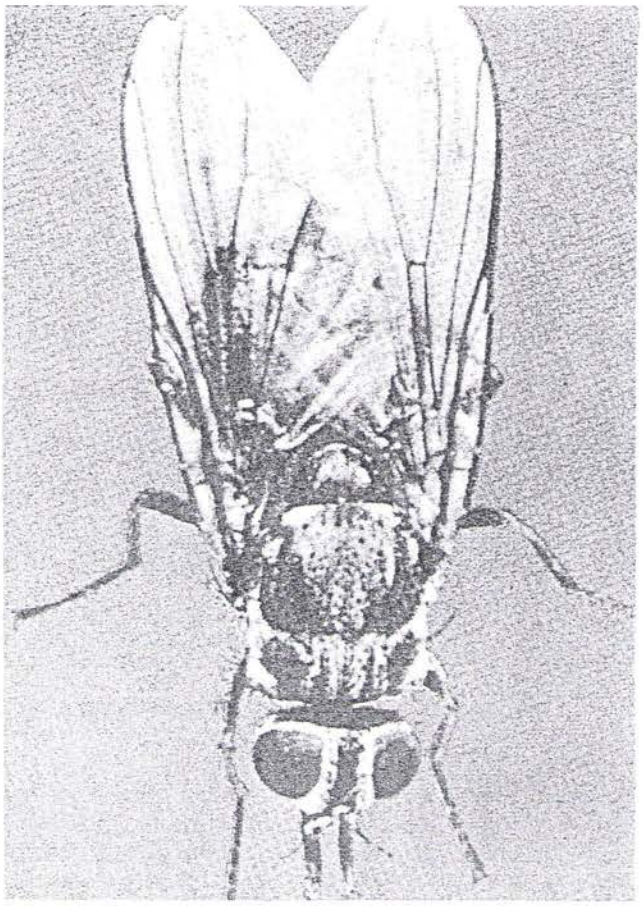


Figure 7. Adult horn fly

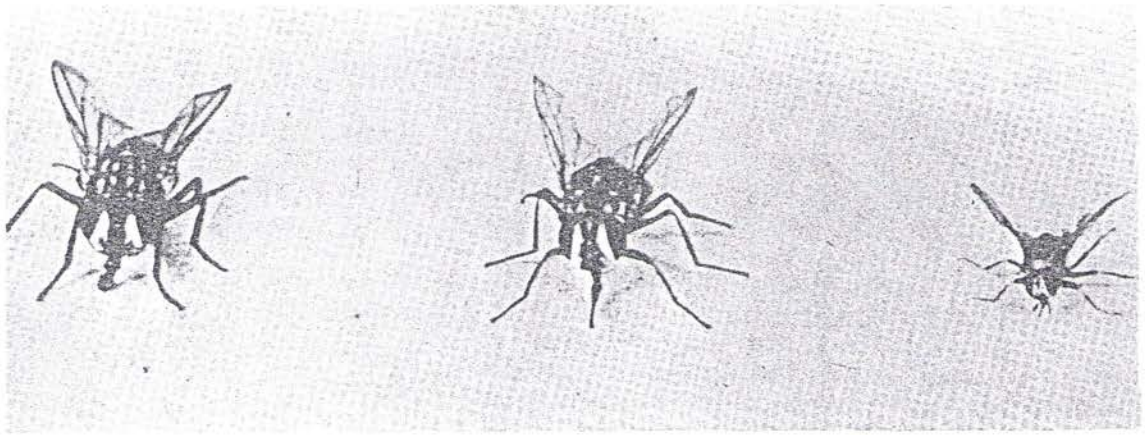


Figure 8. From left to right: Adult house fly, adult stable fly, adult horn fly

FACE FLIES

Face flies (Figure 9) are common external parasites on horses, beef cattle and dairy cattle in many sections of the United States.

They closely resemble house flies. Face flies are very persistent feeders. They mostly feed around the natural openings on the animal's face. Their mouthparts are of the sucking (sponging) type (Figure 3) and cannot pierce the skin of the host. They are capable of transmitting the causative organism of "pink eye" *(Morexella bovis)*. Face flies probably spend the winter as adults in protected locations, such as the attics of homes. Adults emerge and mate when the weather warms. Female face flies lay their eggs in fresh cattle droppings. The maggots develop in the manure, pupate in the adjacent soil and emerge as adults. A female fly lays 25 to 50 eggs during her 30-day life. The total life cycle—from the egg stage to the adult stage—requires two to three weeks.

Since these pests feed mostly on the animal's face and fly long distances to reinfest treated herds, control is extremely difficult. Pesticides do not adhere readily to the animal's face and pesticides applied to the face are frequently diluted or washed away.

Frequent applications of effective pesticides to the animal's face are required. Daily forced use of rubbing devices such as dust bags and ear tags offers the best means of reducing face fly populations in most situations. Sprays over the animal's body are effective for short periods only.

WOUND-INFESTING LARVAE

Many species of fly larvae can attack animal wounds and cause injury and sometimes even death of animals (Figure 10). Adult flies lay eggs on wounds. The eggs soon hatch into tiny, legless maggots which then infest the wound. When the larvae reach maturity, they drop to the ground and develop into pupae. From this stage, adult flies emerge. Primary screwworm larvae are of most concern as wound-infesting larvae because they feed on living tissues. They can eventually kill an animal. Presently, the primary screwworm has been eradicated from the southeastern United States. Other fly larvae also infest wounds, but they feed mostly on dead tissues. Constant checks of wounds are necessary to reduce damage by wound-infesting larvae.

If open wounds are found infested with larvae, the larvae should be submitted for identification. Treat the wound and surrounding area with pesticides. These can be applied as dusts, aerosol sprays or wetting sprays. Repeat applications if necessary.

LICE

Lice which attack animals are of two types—blood-sucking and chewing (Figure 11). Blood-sucking lice are most prevalent on beef cattle, dairy cattle, hogs and horses. They cause damage by irritating animals when they pierce the skin with their piercing-sucking mouthparts; and by removing blood, causing the animals to be unthrifty. Heavy populations of blood-sucking lice can cause severe anemia in the host animal. Chewing lice are more prevalent on poultry. They have chewing mouthparts and cause a scab-like injury.

Lice are most abundant during the cold months when the hair coat becomes thick and long and the skin is relatively dry of oil. During these months, all growth stages of lice are on the animal.

Eggs are attached to hairs (Figure 12). Hatching occurs in a few days. The young louse feeds, molts and reaches maturity in about three weeks. Each female produces approximately 20 eggs, so heavy populations can build up rapidly. When the animal's hair coat is shed in the spring, lice seem to disappear and don't build up again until cold weather approaches. As an example, in-depth information on hog lice will be presented here.

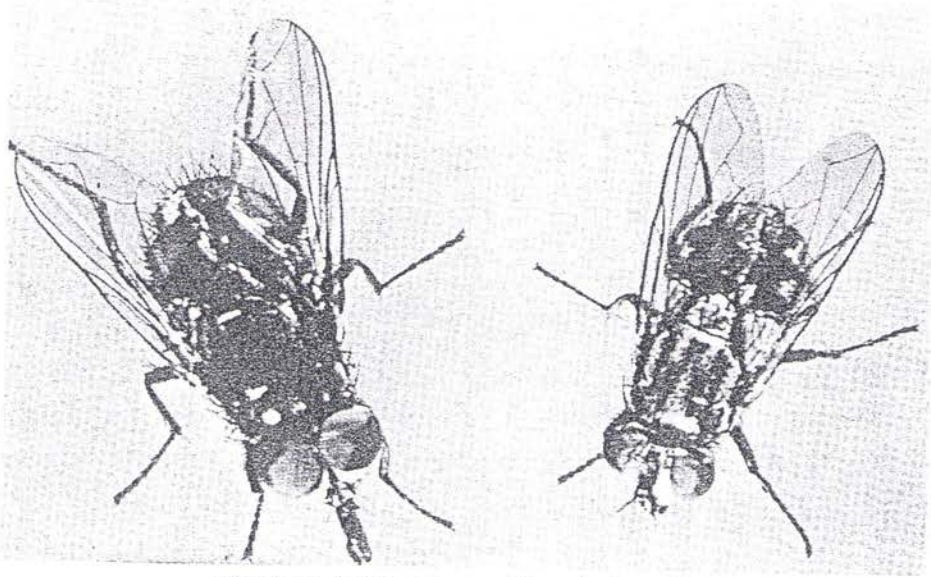
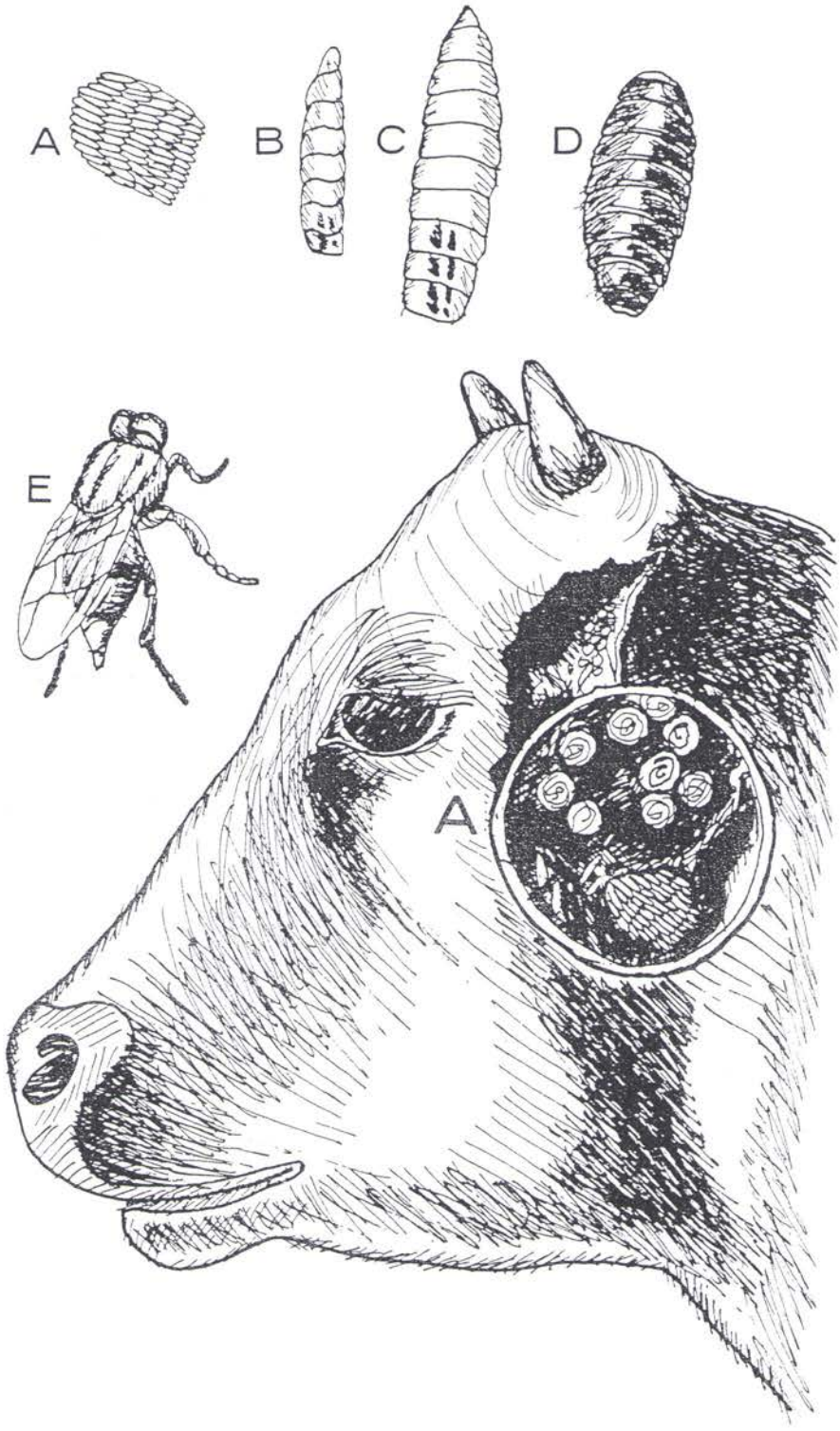
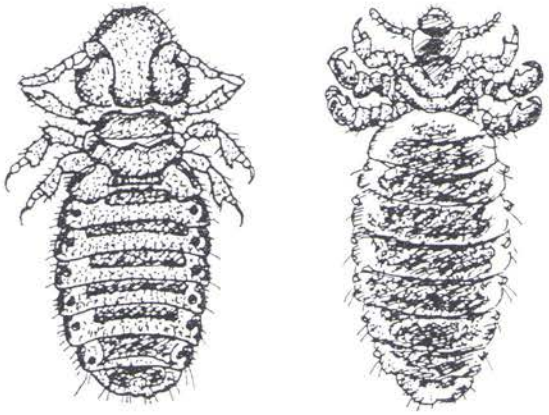


Figure 9. Adult male and female face flies



A, Egg mass; B, Young larva; C, Mature larva; D, Pupa; E, Adult fly. A, Part of an infested wound showing egg masses, very small larvae, and the posterior ends of mature larvae.

Figure 10. Life cycle of wound-infesting fly



Adult chewing louse *Adult sucking louse*

Figure 11.

Hog Lice

Hog lice are the most destructive external parasites of swine in Georgia. They slow weight gains, reduce feed efficiency, and make swine more susceptible to other parasites and diseases. Direct money loss is an estimated two to six percent of the hog's market value.

Damage: Nymphs and adults attack swine. Their mouthparts are of the piercing-sucking type. They move about over the hog puncturing its skin with long, needle-like stylets and removing blood. This causes the animal to rub vigorously against any convenient object and to scratch with their feet. The skin becomes thick, cracked, tender and sore. The animal is restless and unprofitable.

Description: Hog lice are the largest blood-sucking lice found on any farm animal. They reach a length of nearly one-fourth inch. Due to their large size, they are easily seen. Hog lice are dirty gray-brown in color almost matching the skin of the hog. The margins of their bodies and legs are bordered with black. Large claws on their legs are adapted for grasping the hairs on the hog.

Life History and Habits: Hog lice are most noticeable on swine in cold weather. In winter, they usually cluster on the inside of the ears, in folds of skin about the neck, or on the inside of the upper part of the legs. Adults and nymphs together cling to the hog's hairs by their legs, which are adapted to clamp about the hair very securely. They feed frequently, puncturing the skin each time with very slender stylets. The stylets are completely withdrawn into the head when the lice are not feeding.

Egg-laying goes on all winter. A female lays three to six eggs a day, gluing each egg to a hair close to the skin. The eggs are elongate and big enough to be seen. The smaller end of the egg is glued by one side to the hair on the infested animal; the larger end has a rounded cap. The eggs are whitish when fresh, but after a few days they become yellowish or brownish. Most of the eggs are found on the lower half of the body.

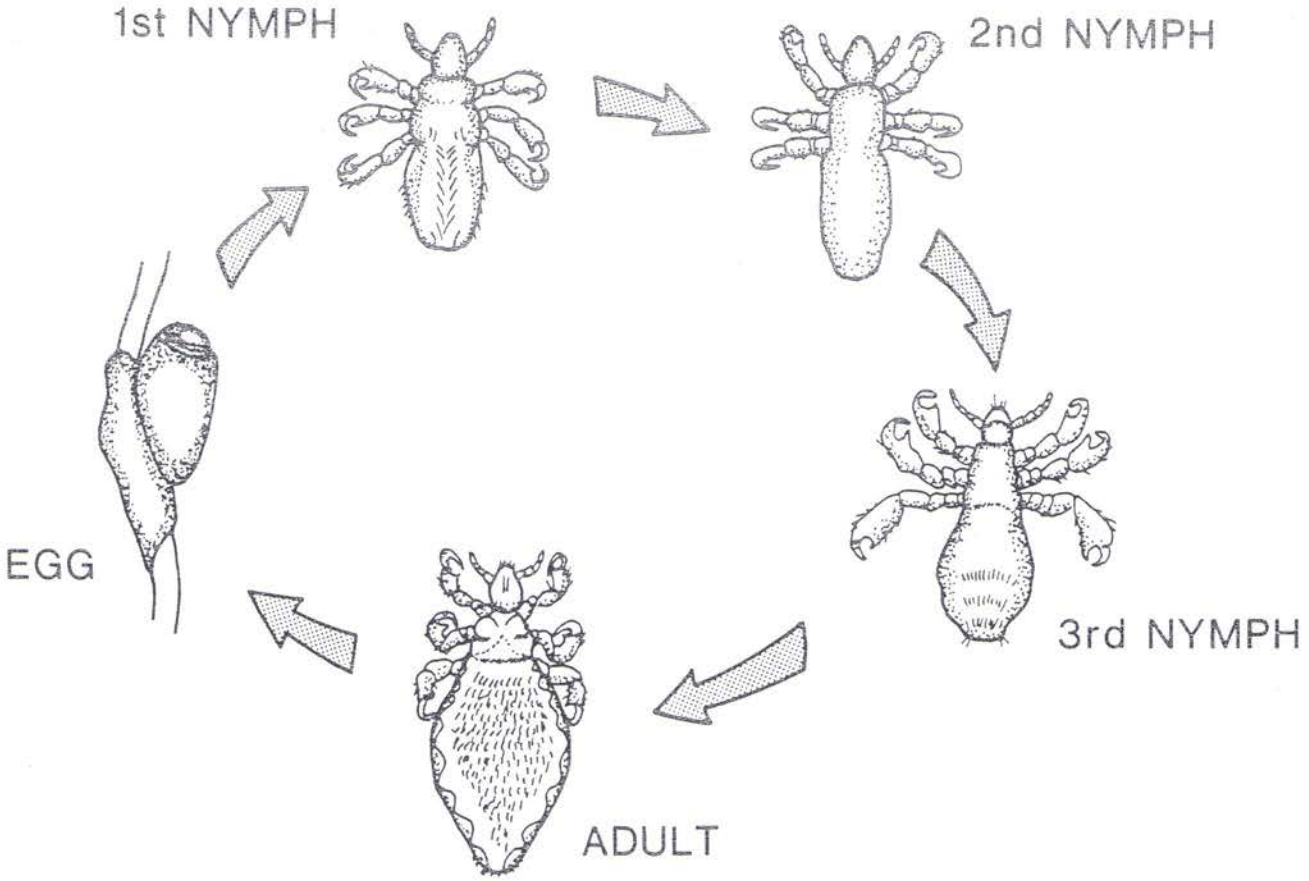


Figure 12. Life cycle of a louse

In two or three weeks, the small louse pushes off the rounded cap on the large end of the egg, seeks a tender place on the skin, inserts its stylets, and sucks blood until engorged. It then withdraws its mouthparts and soon punctures the skin in another place.

The young lice are the same shape as the adults, but pale-colored and smaller. In two weeks, during which time they molt three times, they are fully grown, ready to mate and lay eggs. The females live about five weeks. During the last three, they lay eggs almost every day. Female lice lay about 90 eggs during their lives.

There are probably six to a dozen or more generations a year. All stages are passed on the host. The lice never voluntarily leave a hog, except when they crawl directly upon the body of another hog. If dislodged from the animal, they rarely live more than three days.

Since most pesticides that are applied for lice control are poor ovicides, two applications may be needed 14 days apart for more thorough control. Some residual materials may remain for sufficient periods to control newly hatched lice. Penetration of the animal's coat of hair is essential. Pour-on applications of systemic pesticides are helpful when treating animals in cold weather.

MITES

Many species of mites attack animals (Figure 13). Every type of livestock has at least one species of mite which depends upon it for existence. Most mites are extremely tiny. Some are invisible to the naked eye. Skin scrapings are usually needed for positive identification of mites that infest the dermis of animals.

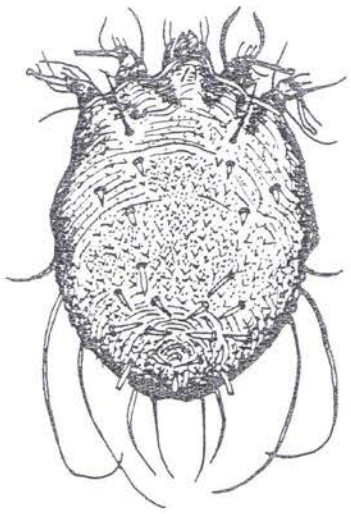


Figure 13. Adult mange mite

Some mites cause damage by burrowing into the animal's skin, sucking blood and discharging an irritating fluid while they feed. Bacteria may invade their burrows, causing further damage. Other mites remain on the surface of the skin and suck blood with their piercing-sucking mouthparts. Mites have four pairs of legs as adults but only three pairs in the immature (larval) stage. Immature mites emerge from eggs laid by adult females. Completion of a life cycle for many mite species requires less than four weeks.

Three important mites will be discussed here in greater detail: the poultry-infesting northern fowl mite and two swine-infesting mange mites.

Northern Fowl Mites

The most important ectoparasite which attacks poultry is the northern fowl mite *(Ornithonyssus sylviarum).* This ectoparasite reduces egg production, reduces breeder egg hatchability, annoys layers, sucks blood, and weakens infested poultry. Anemia and the predisposing of infested birds to diseases are the results. Northern fowl mites can also cause extreme irritation among workers when these mites crawl over the workers as they gather eggs and care for the birds.

Habits of Northern Fowl Mites: These blood sucking external parasites of poultry are tiny, but visible to the naked eye. They usually remain on the bodies of infested birds. Female mites deposit two to five eggs on feather barbules, mostly near the body of the infested bird. Eggs hatch in one to two days into tiny larval mites that begin scurrying over the body of the bird. They molt to the nymphal stage in a few hours. Nymphal mites begin feeding by piercing the skin and extracting blood and other fluids mostly from the skin around the vent of birds. Young mites continue to feed and molt until they reach maturity in three to eight days. Then mating occurs. Females deposit eggs to begin the next cycle. Infestations tend to increase as the weather cools, so mite populations are generally higher in late fall, winter, and early spring. The complete life cycle usually requires from four to 10 days, depending on temperature and humidity.

Hog Mange Mites

Two types of mange mites affect swine. *Sarcoptes scabiei* var. *suis* is the most common mite found on swine. *S. scabiei* burrows into the upper two-thirds of the skin. Initial infestations generally begin in the inner ear and spread over the head, along the neck, and then across the body. The life cycle takes about 15 to 25 days to complete. Females mate close to the skin surface and then begin new tunnels for their young. This is the only external exposure during the life cycle. The adult female lays one to three eggs daily for about 15 days. These eggs hatch in tunnels in five to 10 days and mature to adults in 10 to 15 days. The mature female lives approximately 30 days.

Symptoms: First, the skin has small raised areas covered with brownish scabs. This is followed by the skin becoming thickened and rough. An intense itching may accompany the infestation, although in mild infestations itching may be negligible. The activity of the mites increases as skin temperature is elevated by fever or high environmental temperature. This increases the irritation and feeding rates and may intensify the itching in affected pigs. Probably the highest mite activity occurs during the

summer. The increased activity by the mites seems to create less of a problem for producers because there is less spread by direct contact among animals and control methods applied are more effective. High winter populations probably reflect the difficulty of adequately applying control procedures and there is more contact among hogs resulting in increased spread of mites.

Infestations of *Demodex phylloides* are uncommon in swine. The mites live in the hair follicles and produce a pimple-like lesion. The complete life cycle is not known, but the mites require about three weeks to develop through three larval stages to the adult. Adults will live for one to two months. Initial infection begins around the nose and eyelids, then moves to the abdomen and inner thigh areas. No serious itching nor other clinical problem is involved with this parasite. Occasionally, the pimples become infected and an abscess develops.

Control: Successful control of mange is difficult because it requires a complete break in the parasite's life cycle. Because of the increased susceptibility of baby pigs to mange and the greater toxicity of many chemicals to pigs under weaning age, the sow becomes a focal point for pest control measures.

Sows should be treated routinely with pesticides for mange control 45 days prior to farrowing. An additional treatment 30 days pre-farrowing may be needed for satisfactory control. The mange mites, because of their habit of burrowing deep into the skin and the tissue debris which results, are protected from many suface-applied products. High pressure spraying (100-250 psi) to force pesticides into tunnels and to cover the animal completely, particularly around the head and neck, with two to four quarts of finished spray is required. Because of the better coverage and penetration of approved pesticides, spray applications currently are most successful in mange control. Eradication of sarcoptic mites is extremely difficult under field conditions; however, routine spraying will keep the pest in check.

A successful sow pest control program should be followed by a maintenance program for the growing-finishing pig. Animals about eight weeks of age should be sprayed with an approved pesticide. A follow-up spraying in two weeks is recommended for better control. Additional applications can be made as needed to market weight provided withdrawal restrictions are followed.

If the sow pest control program has not been followed, mange infestations in suckling pigs can be reduced by applying pesticides to the pigs. When they are more than eight weeks of age, the control program listed above must be followed.

Infested animals should be isolated. Since mites cause severe skin problems, these should be treated along with mites. Nearly every infestation requires at least two treatments spaced two weeks apart for effective control. Severe cases may not respond to treatment. These animals should be destroyed.

TICKS

Several species of ticks parasitize agricultural animals. Ticks are usually more abundant in wooded areas and along animal paths. Most mature ticks are fairly large (about one-fourth to one-half inch long when mature), flattened, leathery, eight-legged and blood-sucking external parasites.

Both males and females suck blood. Mating occurs on the host. After feeding, engorged females drop from the host and deposit thousands of eggs on the ground (Figure 14). The eggs hatch in about two weeks and the six-legged larvae or "seed" ticks find a host and attach themselves. After about five days feeding, they drop off, shed their skin and become eight-legged nymphs. The nymphs feed, molt, and go through two or three stages to become adults. The entire life cycle requires a minimum of 30 to 40 days if food and temperature are suitable, but frequently the interval is much longer—as much as a year may be needed.

Control can be obtained by thoroughly covering animals with spray or dip applications of pesticides. Penetration of the hair coat is essential. Removal of heavy vegetation and fencing cattle away from wooded areas will help prevent infestations.

BOTS AND GRUBS

Adult grub and bot flies resemble bees. Cattle grub adults (heel flies), *Hypoderma lineatum* (common cattle grub), *Hypoderma bovis* (northern cattle grub) usually attach eggs to hairs on the animal's body, especially hairs of the legs and belly (Figure 15). Sheep and horse bot fly females deposit eggs in the nostrils and on the lips and legs of animals. Tiny larvae hatch from the eggs, burrow through the host's skin and begin migrating through the tissues of the host. Some attach to linings of the digestive tract. All eventually leave the animal to pupate in the soil. Adults emerge from the pupal case, mate and females lay eggs. Normally, there is one generation each year.

Treatment is normally applied in the form of systemic pesticides. These should be administered as feed additives, sprays, dips, pour-ons and spot-ons as soon as the adult heel fly season is completed and at least six weeks before the grubs are expected in the animal's back in the case of cattle grubs.

If beef cattle are treated for grubs when large numbers of larvae are present in tissues around the gullet and spinal column, these animals can show toxic side effects. This can be prevented by not treating imported cattle, those brought in from areas outside the southeastern United States, during October through February. Animals from the southeastern United States can be treated any time during the year except when label directions disallow treatment during specified months of the year.

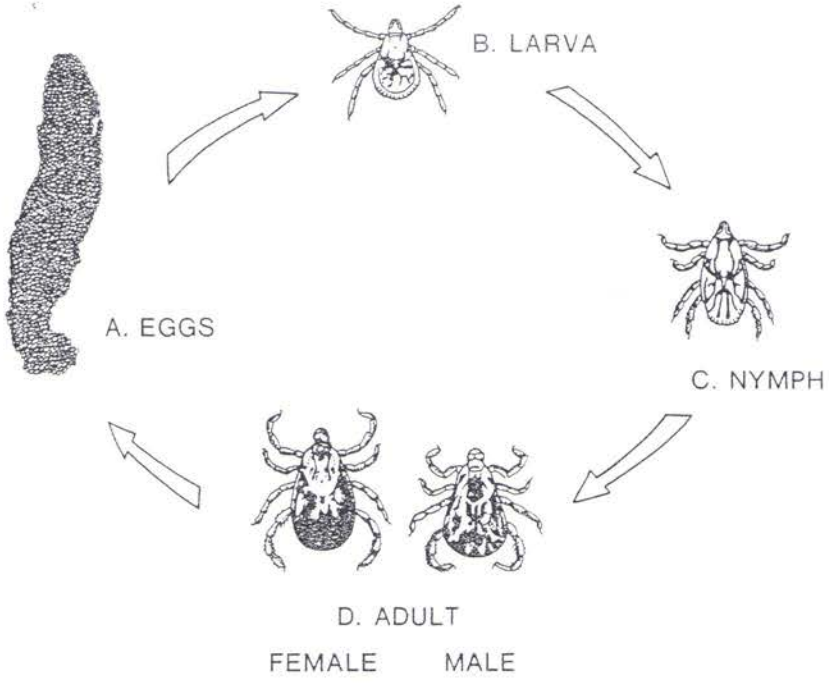


Figure 14. Life cycle of a tick

A, Eggs attached to hair; B, Small larvae, ; C, Encysted larva and the hole in the hide; D, Puparium under litter; E, Adult heel fly

Figure 15. Life cycle of a grub

PESTICIDES FOR AGRICULTURAL ANIMAL PEST CONTROL

PESTICIDE TOXICITY

Pests of agricultural animals weaken the animals, causing them to be unthrifty and predisposed to diseases. These pests can even cause an animal's death. Pesticides will protect animals from pests; however, all pesticides are poisons and can be toxic to warm-blooded as well as cold-blooded animals. For this reason, recommended pesticides must be applied properly to prevent injury.

Individual animals can show toxicity to certain pesticides and materials contained in pesticide formulations. Applicators should always be aware of this. Sensitive animals should not be treated or should be treated only with pesticide formulations non-toxic to the animal. Brahman cattle can show sensitivity to some organic phosphate pesticides. For this reason, organic phosphate pesticides should not be applied to these animals if so indicated on the pesticide label. Signs of poisoning are excessive salivation, defecation, urination, watering eyes, and muscle twitching.

Animals which are under stress or which will be put under stress should not be treated.

Pesticides should not be applied in combination with other pesticides unless so stated on the label.

The skin of some horses is extremely sensitive to various pesticide formulations. Before treating horses with pesticides, it is recommended that a small patch of skin on each animal be treated with the pesticide formulation approximately 24 hours before the entire animal is treated.

RESIDUE POTENTIAL

Most agricultural animals are raised to provide food products for humans. For this reason, it is extremely important that pesticide residues not be allowed to accumulate in illegal amounts in edible tissues. Producers should apply only approved pesticides to animals which are being finished for slaughter or are producing edible products such as milk. Some pesticides are eliminated slowly from animal tissues. Others are quickly eliminated. For this reason, intervals between application, and slaughter or use of eggs and milk as human food, should be strictly adhered to. For these reasons, label directions should be followed to the letter. Failure to do this can result in animal products and animals being confiscated and responsible individuals could be prosecuted.

PESTICIDE HAZARDS

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. When temperatures are below freezing, it is not advisable to spray or dip livestock. This can predispose them to diseases such as pneumonia. Pour-on and dust pesticide formulations are recommended when treating animals in freezing temperatures because they do not add excessive amounts of moisture. Pesticides applied during very hot, still days may cause damage to treated animals. When applying ready-to-use oil sprays, be careful not to allow the oil to penetrate the animal's hair and come in contact with the skin. Some types of agricultural animals show toxic effects when oils are applied to their skin.

Individual animals can show allergic responses to certain pesticide formulations. Applicators should be aware of this and be prepared to apply remedial measures, such as removing the pesticide from the affected animal. Sensitive animals should not be retreated unless a suitable pesticide formulation can be used.

Pesticide Application Techniques

When treating agricultural animals for external parasites, it is important that pesticides be placed so that contact with the external parasites will occur. The selection of a pesticide delivery system will depend upon the animal to be treated and the pest to be controlled. For example, when treating animals for lice, mites and ticks, penetration of the hair coat by the pesticide is very important. Use 100 to 200 pounds of pressure when applying pesticides to control these pests. Pesticides kill only the mites and lice, not the eggs; so retreatment is normally needed to control newly hatched pests.

Grub spray treatments should be applied so the skin, not just the hair, of the animal becomes thoroughly wet. Spray pressures of 100 to 400 pounds per square inch are recommended, depending on the thickness of the animal's coat of hair. Apply treatments after egg laying by the female grub has been completed.

Power sprayers, knap-sack sprayers, compressed air sprayers, and rubbing devices such as back rubbers and face rubbers are satisfactory for applying liquid pesticides to agricultural animals. Rubbing devices usually consist of a pesticide reservoir and a material on which animals rub that acts as a wick to pull the pesticide from the reservoir, thereby keeping the rubber saturated with pesticide. Homemade rubbing devices (Figure 16) normally consist of burlap bags rolled around chains or wire. The pesticide is poured on the burlap bag to keep it charged. Automatic sprayers are commonly used to apply pesticides to animals on a frequent basis. For example, they are used to treat lactating dairy animals as they exit milking parlors.

Dusts may also be used to control some external parasites on agricultural animals. They may be applied by

Figure 16. Homemade backrubber

hand or in suspended, self-treatment dust bags (Figure 17).

Pesticide impregnated ear tags are effective rubbing devices. The reservoir is normally PVC (polyvinyl-chloride).

Systemic pesticides are pesticides which are picked up by the animal's blood system and transported throughout the animal's body. They can be applied as pour-ons, spot-ons, sprays, feed additives, and in dipping vats. Some systemic pesticides are very effective against grubs, horn flies and lice.

Age and Size of Animals

Even when animals are healthy, their age and size are important considerations when applying pesticides. Many pesticides are applied according to the size of the animal, with less being applied to small animals and more to large animals. Many applications are applied to point of run off. Generally, this is the amount of pesticide recommended for use on animals. Systemic pesticides and ready-to-use oil sprays must be applied in exact amounts for adequate control of pests and prevention of injury to animals.

Young animals, especially those under six months of age, should not be treated when information on the pesticide label specifically prevents application to younger animals.

Extent of Treatment

Many pests of agricultural animals can be controlled with very small quantities of pesticides when applied to specific areas on the infested animal. For example, when treating infested wounds on animals, only treat the wound and immediate surrounding area.

When treating livestock for fly control, it is usually more efficient to treat animals daily with small quantities of pesticides. If rubbing devices such as back rubbers and dust bags are placed where animals cannot avoid them and ear tags are attached to the ears of the cattle, the cattle will treat themselves daily with small amounts of pesticides. This system gives good pest control with less material.

The application technique that gives adequate control with the least excitement of treated animals and least contamination of the environment should be used for the most effective, economical and safe control of agricultural animal parasites.

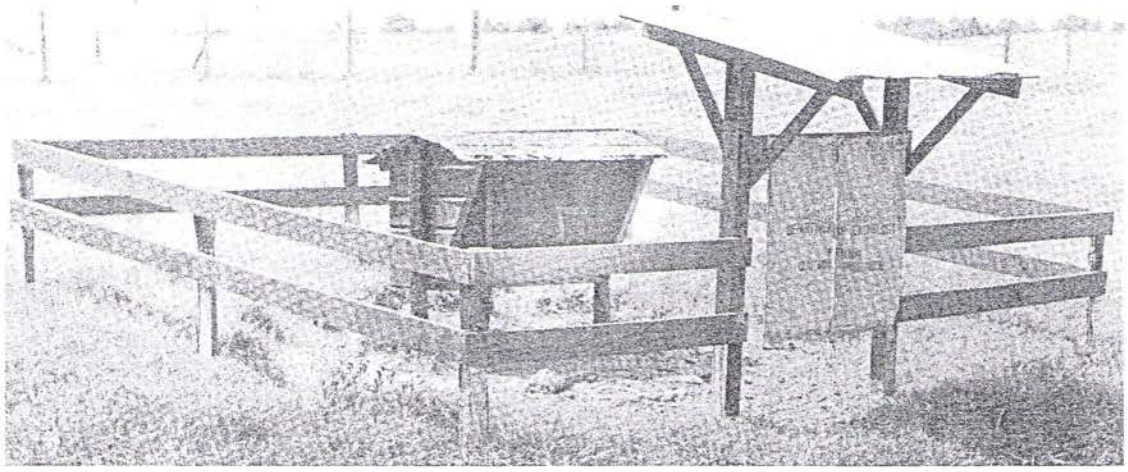


Figure 17. Homemade dusting station