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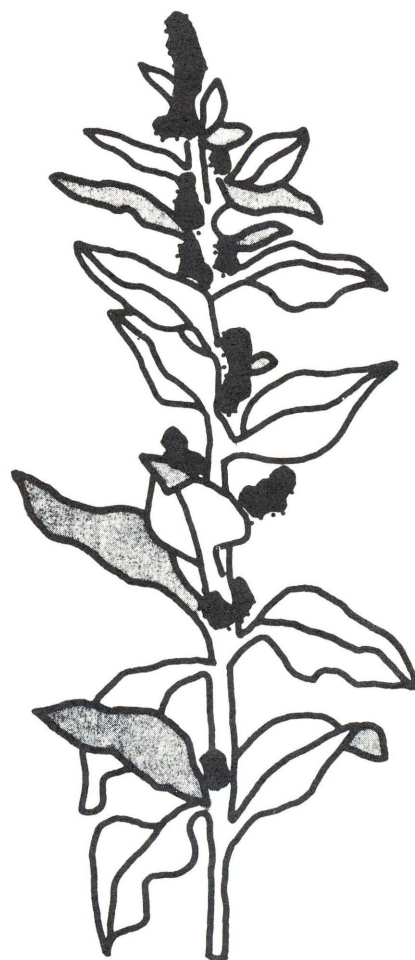
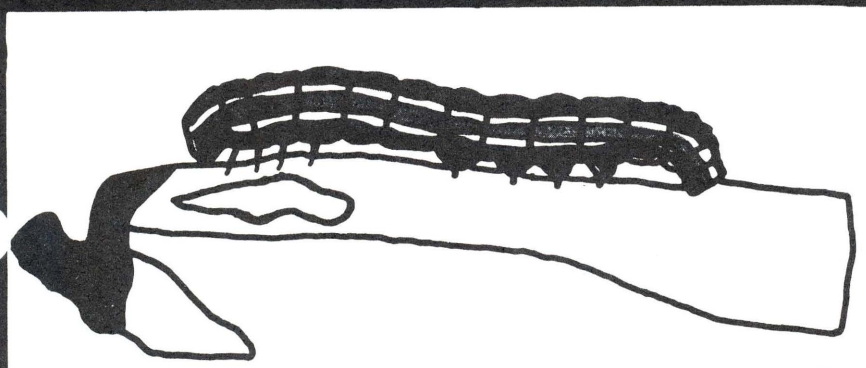
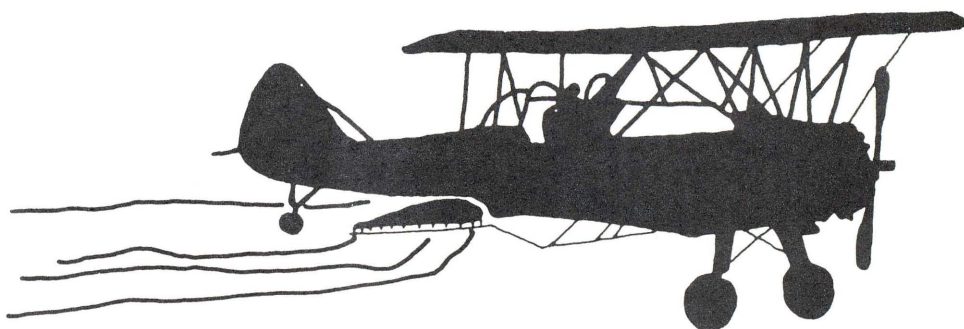
Livestock Pest Management  
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# LIVESTOCK PEST MANAGEMENT

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## PREFACE

This manual is intended to help pesticide applicators to prepare for certification under the Michigan Pesticide Control Act of 1976. The manual was revised from the original in 1982 by Ms. Amy E. Brown of Michigan State University and Mr. Carl Dollhopf of the Michigan Department of Agriculture.

This manual is intended to help you use pesticides effectively and safely when they are needed. We hope that you will review it occasionally to keep the material fresh in your mind.

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## Pests of Agricultural Animals

Agricultural animals are attacked by many different external parasites. Flies, mites, lice, ticks, bots, grubs, etc., cost producers large sums of money annually. More than \$500,000,000 is lost in livestock production in the United States each year. They

- predispose animals to diseases;
- cause anemia (due to blood loss);
- reduce weight gains;
- reduce feed efficiency;
- transmit several important animal diseases (encephalitis of horses, anaplasmosis of cattle, heartworm of dogs, etc.).

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, and females suck blood from livestock. Mosquitoes breed 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, but 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 3 weeks. Adults normally live 30 days.

Mosquitoes can transmit several serious diseases to livestock and pets, including equine encephalitis and dog heartworm. In recent years, Michigan horses have been affected by three strains of mosquito-borne encephalitis.

Most mosquitoes are difficult to control. Larvae can be destroyed by draining their breeding areas or by applying larvicides. When large bodies of water are infested or when breeding sites are numerous and widely scattered, it is probably not feasible to attempt larval control. Adult control measures usually include frequent applications of insecticides to cover all animal body parts. Frequent applications are required when short residual insecticides 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.

#### Stable Flies

In some animal operations, especially dairies and horse stables, this is the most troublesome external parasite. In appearance, adults look like adult house flies, except stable flies have needle-like mouthparts that protrude from underneath the head and are used to puncture the skin and suck blood from livestock. 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 insecticides for long periods. Stable flies visit animals to feed; since they are in contact with the animal only a short time, control is difficult to obtain.

In most areas, stable flies overwinter as pupae in wet straw piles or strawy manure. In early spring adults emerge, mate and soon 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. Insecticides can be applied in a number of ways but care must be taken to thoroughly cover the legs and lower sides. Residual wall sprays can kill stable flies that are resting after taking a blood meal.

#### Horse Flies and Deer Flies

These are vicious, persistent, blood-sucking external parasites of animals. If they are not dislodged after alighting on an animal, they cut through the skin with their knife-like mouthparts and suck blood. When they fly away, blood usually oozes from wounds. These flies 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, streams or 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. Horse flies are killed by the insecticides that are recommended, but their ability to reinfest treated animals from long distances makes effective control difficult to obtain.

#### Houseflies

Houseflies breed in many types of organic matter such as garbage, animal manure and accumulations of waste feed. As many as 1,000 can complete development in one pound of suitable breeding material.

Houseflies usually become active in early spring. Adult house flies mate and females lay eggs on decaying organic matter. Between 100 to 150 eggs are laid at a time; each female may lay a total of 500 eggs during her



30 day life. In 8 to 30 hours, the eggs hatch into tiny , white, legless maggots which begin developing in the breeding material. When the maggots reach maturity 1 to 2 weeks later, they change into the pupal or resting stage. After 3 to 10 days, the adult emerges from this pupal case. From 1 to 3 weeks are required to complete each life cycle.

Houseflies 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.

Many animal diseases can be transmitted by houseflies. The flies feed on manure and animal secretions through their sponging mouthparts. Large numbers of flies may annoy feeder and dairy cattle, resulting in reduced efficiency or production as well as increased bacterial counts in milk.

Proper disposal of animal wastes and organic debris is essential for control of houseflies.

#### Horn Flies

These pests are serious external parasites of beef cattle and dairy cattle. During the summer months, it is not uncommon to find 500 to 2,000 per animal hovering over their backs and crawling down among the hairs on the withers, back or belly. They suck blood and 500 can remove 1/2 pound of blood daily. They look like stable flies but are only half as large.

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 life, control is relatively easy to obtain using recommended insecticides. Rubbing devices are particularly effective against this pest. Larvae can be controlled by feeding animals on insecticide treated mineral, salt and ration mixtures. For effective control, animals must consume recommended amounts of the insecticide daily.

#### Face Flies

Face flies are common external parasites on horses, beef cattle and dairy cattle in many sections of the United States. In appearance, they closely resemble house flies. Face flies are very persistent feeders. They feed mainly around the natural openings on the animal's face. Their mouthparts are of the sponging type and cannot pierce the skin of the host. They are capable of transmitting the organism which causes "pink eye". Face flies probably spend the winter as adults in protected locations as in 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 requires 2 to 3 weeks.

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

Frequent applications of effective insecticides to the animal's face are required. Daily forced use of rubbing devices such as dust bags 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. Adult flies lay eggs in wounds and 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. If open wounds are found infested with larvae, the larvae should be submitted for identification. Treat the wound and surrounding area with insecticides. These can be applied as dusts, aerosol sprays or wetting sprays. Repeat application if necessary.

#### Parasitic Flies

Bot flies, the cattle grubs, and heel flies are parasites of livestock. The eggs of these flies are laid on the hairs of livestock. When the larvae hatch, they bore into the animal.

Bot fly larvae: develop within the digestive tract of horses and are passed out with feces in the spring. A horse badly infested with bots presents a run-down appearance, caused by digestive disturbances, and has a rough coat. Effective control of the horse bot is larval control in the autumn after a hard freeze kills the adults.

Cattle grubs: move through the connective tissues of the body until they reach the back, where they develop just beneath the skin. They cut through the skin when mature, usually from January through June. Cattle grubs result

in ruined hides and poor quality meat. Control measures on Michigan cattle must be implemented between September 15 and November 1 each year to avoid toxic side-effects. Pour-ons and systemic insecticides designed to be fed to the animals may be used. Systemic materials may not be used on milking dairy cattle.

Heel flies: have one generation each year. The larvae (grubs) enter the skin at the base of the hairs. After migrating to the gullet or spinal canal, the larvae move to the loin area. Here they cut breathing holes through the hide and produce cysts (warbles). The fully grown grubs emerge through the breathing holes, drop to the ground, and pupate in the soil. Adults emerge in warm weather.

#### Lice

Two types of lice attack animals: those with piercing-sucking mouthparts and those with chewing mouthparts. Blood-sucking lice are more prevalent on beef cattle, dairy cattle, hogs and horses and 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 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 and hatching occurs in a few days. The young louse feeds, molts and reaches maturity in about three weeks. Each female produces approximately 20 eggs, thus heavy populations can build up



rapidly. When animals shed their hair in the spring, lice seem to disappear and don't build up again until cold weather approaches.

Since most insecticides that are applied for louse 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 insecticides are helpful when treating animals in cold weather.

### Mites

Many species of mites attack animals. 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.

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. Immatures emerge from eggs laid by adult females. Completion of a life cycle for many mite species requires less than four weeks.

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.

Scabies mite of cattle and sheep: are barely visible to the naked eye. They puncture the skin of the animal and feed just beneath it. A gray scab forms on the animal's skin to protect the mite. The feeding causes considerable irritation. This mite problem is regulated by Federal and State quarantines requiring state



veterinarians to recommend the control to be used. This is a reportable disease. Control measures usually include farm quarantine and breaking of the scab areas with a localized pour-on treatment followed by a dip application covering the head as well as the body.

### Ticks

Several species of ticks parasitize agricultural animals. They 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 blood-sucking external parasites.

Both males and females suck blood. After feeding, engorged females deposit thousands of eggs on the ground. 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 of feeding, they drop off, shed their skin and become eight-legged nymphs. The nymphs feed, molt, and go through two or three more stages to become adults. The entire cycle requires a minimum of 30-40 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 insecticides. Penetration of the hair coat is essential. Removal of heavy vegetation and fencing cattle away from wooded areas will help prevent infestations.

Ticks are known to be vectors of certain diseases including Rocky Mountain spotted fever, a highly fatal disease vectored directly into the blood of man and rodents by the bite of ticks. The American dog tick is the principal carrier of this rickettsial disease east of the Rocky Mountains. Tularemia, another tickvectored disease, affects man, domestic and wild animals, and certain

game birds. Tick paralysis, believed to be due to a toxin introduced into the blood stream by the tick's mouth parts, may result when a tick attaches itself at the back of the neck or base of the skull. Complete recovery usually follows careful removal of the intact tick.

### Common Injury and Disease Symptoms

#### Hyperkeratosis

An increase or thickening of the skin is termed hyperkeratosis. This condition may be caused by the feeding of lice such as hog lice. Coal tar poisoning can produce the same effect; this results from skin exposure to certain wood preservatives. Poor nutrition, allergies, and even mechanical injuries can cause the same symptoms. It is important to determine the real cause of hyperkeratosis before considering a pesticide treatment.

#### Lesions

Open wounds, either external or internal, should be considered a serious problem since they can render the animal susceptible to further infestation or infection. Lesions may have many causes, including mechanical injuries, mycotoxin poisoning from moldy feed, bacterial diamond skin disease, ringworm fungus on cattle, and biting lice or other insect pests.

#### Dermatitis and Skin Sloughing

Reddening, irritation, and loss of skin may be due to rape toxicity (the rape plant is toxic at certain growth stages), a pollen allergy, hormonal imbalance, mites, fleas, lice or flies.

### Edema

Edema is a swelling of the body tissues; it may be especially noticeable around the eyelids of livestock. Allergies, scabies mite, lice, viral and bacterial infection, and chemical poisoning may result in edema.

### Nervousness, Loss of Appetite, General Run-Down Appearance

Internal parasites such as bot flies, roundworms, stomach worms, and cattle grubs as well as external pests such as face flies and lice can greatly decrease the efficiency of livestock and poultry.

### Foot Rot of Sheep

This highly infectious disease is caused by two bacteria. This disease is spread in wet areas of the pasture near water holes and by newly purchased or borrowed animals. Quarantine and treat all new arrivals and infected members of the flock. A hoof dip is used to control the problem.

### Using Pesticides for Control of Animal Pests

The certified commercial applicator has the responsibility to minimize adverse effects of pesticides. Proper application, using only registered chemicals, and then only for labeled uses, and proper disposal of excess material and empty containers are all part of this responsibility. Begin all considerations of treatment by first identifying the pest or pests to be controlled, and by evaluating environmental and socioeconomic effects.



### Pesticide Toxicity

Pests of agricultural animals can weaken animals, thereby causing them to be unthrifty, predispose them to diseases and can even cause their 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 to animals.

To prevent harm to the animals, be sure to read the label before using a pesticide, and follow all instructions on the label. Use only suggested dosages; measure carefully. Avoid treatment when animals are sick (especially in winter) or overheated. Animals which are under stress or which will be subjected to stress, as in shipping, dehorning, castration, recent weaning, etc. should not be treated. Young animals should not be treated unless such use is specified on the label. If possible, use a dust instead of a spray on sick or weak animals in winter, or spray on a warm day. If animals are sprayed indoors, turn them out to dry immediately. Avoid undue exposure of the animals to mists or vapors. Do not add chemical to old dipping water. Start with fresh water to avoid poisoning animals and creating excess residues in meat and milk. Do not apply materials directly on animals or apply them in combinations unless label directions specify such use.

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 nontoxic to the animal. Brahman 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. Poisoning is usually exhibited as excessive salivation, eye watering, defecation, urination and muscle twitching.

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 for the human food products they produce. 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 insecticides to animals which are being finished for slaughter or are producing edible products such as milk. Some insecticides are eliminated slowly from animal tissues while others are eliminated quickly. Intervals between application and slaughter or use of eggs and milk as human food should be strictly adhered to. Failure to follow label directions exactly can result in animals being 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 that it is not advisable to spray or dip livestock when temperatures are below freezing. This can predispose them to diseases such as pneumonia. Insecticides applied during very hot, still days may also injure treated animals. When applying ready-to-use oil sprays, be careful not to allow the oil to penetrate the animal's hair so it comes in

contact with the skin. Some 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 insecticide from the affected animal. Sensitive animals should not be retreated unless a suitable pesticide formulation can be used. Pour-on and dust pesticide formulations are recommended when treating animals in freezing temperatures because they do not add excessive amounts of moisture to the animal.

#### Pesticide Application Techniques

When treating agricultural animals for external parasite control, it is important that insecticides be placed so that contact with the external parasites will occur. The selection of an insecticide delivery system will depend upon the animal to be treated and the pest to be controlled. For example, when treating animals for louse, mite and tick control, penetration is normally very important. Use 100-200 pounds of pressure when applying pesticides for control of these pests. Pesticides kill only the adult and lice, not the eggs, so retreatment is normally needed to control newly hatched pests.

Grub spray treatments should be applied in such a manner that the skin, not just the hair of the animal, becomes thoroughly wet. Spray pressures of 200-400 pounds per square inch are recommended depending on the thickness of the animal's coat of hair. Apply treatments after egg laying 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 insecticides 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 insecticide from the reservoir, thereby keeping the rubber saturated with insecticide. Homemade rubbing devices normally consist of burlap bags rolled around chains or wire. The insecticide is poured on the burlap bag to keep it charged. Automatic sprayers are commonly used to apply insecticides to animals on a frequent basis. They are commonly used to treat dairy animals as they exit milking parlors.

Dusts may also be used for control of some external parasites on agricultural animals. They may be applied by hand or in suspended, self-treatment dust bags.

Systemic insecticides are those insecticides 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 insecticides 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 insecticides 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 the point of run off. Generally, this is the amount of insecticide recommended for use on animals. Systemic insecticides 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 unless information on the pesticide label specifically allows application to younger animals.



### Extent of Treatment

Many pests on 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 the 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, they will treat themselves daily with small amounts of insecticides, thus obtaining good pest control with less material. The application technique which will afford adequate control with the least excitement of treated animals and least contamination of the environment should be utilized for the most effective, economical and safe control of agricultural animal parasites.

### Safety

All pesticide chemicals are potentially dangerous. Long pants or coveralls and a long-sleeved shirt should always be worn when mixing, loading, or applying pesticides. Check the label to see whether special equipment such as a respirator, neoprene gloves and boots, or goggles should be worn. Sleeves and pant legs should be tucked inside gloves and boots. Make sure all of your workers are appropriately dressed.

Do not breathe any form of pesticide. Provide good ventilation while using all materials. If any form of pesticide is spilled on the skin, wash immediately with soap and water. Clothing contaminated by pesticides should be removed immediately. All clothes should be washed after each use. Keep them separate from household laundry. Also clean face masks, goggles, gloves, etc. after each use.



Store pesticides in the original labeled containers, safely locked away from livestock, pets, and children.

#### Environmental Considerations

As pesticides are applied, many factors must be considered to safeguard the environment. Prevent drift to adjacent cropland, yards, woodlots, lakes, or ponds. Avoid contamination of feed and water. Keep meat and milk away from chemicals. Do not contaminate mangers, watering cups, milking equipment, or wells with pesticides. When draining dipping vats, make sure old water does not drain into wells, streams, swamps, or places where livestock, fish, or wildlife may come into contact with the solution. Do not spread treated manure on vegetable cropland unless specific materials are approved.

#### Control Techniques

##### Application to the Animal

Direct sprays or dusts: are applied over the back or along the entire body. Read the pesticide label carefully for withdrawal information, number of days until slaughter, and use on lactating animals. Do not let oil sprays penetrate the hair to contact the skin in any weather as irritation may result.

Dust bags: for fly control, should be placed in exits so daily exposure is given to animals. Do not contaminate food, feed or water.

Back rubbers, oilers, rubbing cables: incorporate the pesticide into #2 fuel oil or diesel oil. Do not use motor oil. These rubbing devices should be placed where animals travel regularly, such as near their water source. Do not let animals straddle the device. Do not use rommel prior to marketing animals.

Dust boxes: Lice in poultry houses can be controlled by placing a dust in an area where birds naturally dust and fluff themselves.

Dips and pour-ons: incorporate the material in large volumes of water. Animals are led through the solution, or it is poured on their backs, necks, and tails. Mite and louse infestations can be controlled in this manner. Improperly used dips can be injurious to man and animals. They should be used only at recommended concentrations under carefully controlled conditions. Do not combine different dip chemicals. Animals that swallow dip may be poisoned.

Formulations to be ingested: are used to control internal parasites such as bot flies, roundworms, pinworms, and tapeworms. These applications may be in the form of a pellet, tablet, bolus, or syringe drench or gel. Pellets are indigestible; the pellet releases the pesticide as it travels through the animal's digestive system, and is excreted with the feces. The pesticide carrier in tablet formulations is usually digestible. Some gels and drenches are designed to be released directly into the mouth of the animal by means of a syringe. Syringes must be thoroughly cleaned after each use, and stored according to directions. Follow label directions carefully.

When administering a pesticide internally, it is especially important to check the label for any precautions. Some formulations may not be used on young, pregnant, or lactating animals.

Devices to be worn by the animal: such as flea collars and ear tags, have a long period of insecticidal activity. Read the label for proper placement.

#### Application to the Animal's Environment

Sanitation: is an important step in all pest control programs. Removal of contaminated bedding, stale or moldy feed, and manure accumulations as

well as a flushing water rinse, are essential for pest management in the barn, feed lot, or pen. Following or in conjunction with cleaning, pesticide applications will be more effective.

Liquid residual sprays: should be used to treat floors, cracks, and crevices before bedding is laid down.

Manure drenches: should be applied when manure buildup cannot be eliminated routinely. A drench of residual insecticide/miticide in oil or water will aid in pest control. A sprinkling can may be used for this type of application. Avoid direct contact with birds or other animals.

Fogging or misting: is an effective control measure for adult stages of insects, but does not penetrate manure accumulations or cracks in walls and floors. If used as the only control method, daily application is necessary as directed on the pesticide label.

Baits: are to be applied to clean concrete areas. They should be used along with a wall or ceiling spray for good fly control. Do not use diazinon baits in dairy barns or milk rooms.

Pest strips: are used mainly for indoor pest control. Stored grain pests, mosquitoes, and flies may be controlled. This treatment is effective for a long period of time. Make sure animals and children cannot reach these devices.

Copper sulfate: this fungicide is effective in controlling foot rot in sheep when applied as a foot bath. It is poisonous if consumed and dries out the hoof severely.



Animal Health Pesticides

Carbamates

These compounds have long residual action combined with low mammalian toxicity.

Carbaryl (Sevin): is used in louse and mite control on poultry and pets. Do not contaminate eggs, nest litter, feed or drinking water.

Botanicals

These are plant-derived materials with short residual action and low mammalian toxicity.

Pyrethrum: is used for fly control on horses, beef and dairy cattle, and pets.

Chlorinated Hydrocarbons

These compounds have long residual action. Mammalian toxicity varies and some individual animals may show greater toxic effects than others.

Methoxychlor: is used to control lice and biting flies on beef cattle and swine, and around farm buildings. This material has a low toxicity to humans and warm-blooded animals.

Lindane: may be used to control tick and hornfly on sheep and mange mite on swine. Avoid application to dairy goats or to farrowing sows. Do not use as spray within 30 days of slaughter (60 days if dip is used.)

Toxaphene: is available in special livestock formulations for control of horn flies, lice, ticks, sheep ked and wool maggot. Dips and sprays are effective against scab mites and mange on livestock. Toxaphene is highly toxic to humans. When used in a backrubber avoid exposure on animals less than 3 months old.

### Organophosphates

Organic phosphate materials have a short residual period and are widely used against a large variety of animal pests.

Malathion: has a low mammalian toxicity. It may be used against horn flies, mites, lice, ticks, and fly maggots in manure.

Diazinon: should not be used in dairy barns, milk rooms, or poultry houses. It is especially useful for fly control in barns or on manure piles.

Dichlorvos (Vapona, DDVP): is formulated as an antihelminthic for swine, horses, and dogs. It is also used to control flies, gnats, and mosquitoes on lactating dairy animals and beef cattle; fleas on dogs and cats; and lice on poultry. Apply as a mist, making sure skin surfaces are not wetted.

Dimethoate (Cygon): is used to control fly maggots in manure. Applications in a barn must be made with animals removed.

Fenthion: is an effective insecticide for flies, mosquitoes, and lice. Do not treat dairy cattle of breeding age. Read the label carefully.

Ronnel (Korlan): may be used as a residual treatment for flies. Formulations designed to be administered orally will control cattle grub, lice, horn fly, face fly, screwworm, ticks, sheep ked and wool maggot. Manure in poultry houses may be treated for lice control.

Famphur (Warbex): is formulated as a pour-on to control lice and cattle grubs. Do not use on lactating or freshening dairy animals as well as Brahman cattle.

Crufomate (Ruelene): may not be used on lactating dairy cattle. It may be applied as a spray or a pour-on for cattle grubs, lice, and horn fly on cattle.

Coumaphos (Co-Ral): is registered for use against a wide variety of insect pests including cattle grubs, lice, flies, ticks, screwworms, and common ectoparasites of sheep, goats, horses, swine, and poultry. Do not apply to lactating dairy animals.

Crotoxyphos (Ciodrin): is used for control of flies, lice, and ticks on swine, goats, sheep, horses, and lactating dairy and beef cattle. As dust do not treat calves under 6 month old or apply to Brahman cattle.

Tetrachlorvinphos (Rabon): has a low mammalian toxicity. It is applied for control of house flies, northern fowl mites, chicken mites, lice, screw-worm, horn flies, faceflies, stable flies, and mange. A formulation designed to be administered daily at low levels along with feed is for control of fly maggots developing in feces. Poultry can be present when applied as labeled.

Trichlorfon (Dylox, Proxol): may be used as a premise spray or bait for fly control in and around farm buildings, including dairy barns, milk rooms, and poultry houses.

#### Pesticide Toxicity

Pesticides can protect animals from pests, but they may be toxic to the animals being treated as well as to the pest. Apply them correctly to prevent adverse effects. Animals may be sensitive to certain pesticides. Poisoning signs usually include excessive: 1. salivation. 2. eye watering. 3. defecation 4. urination 5. muscle twitching, and 6. skin irritation.

Do not treat animals which are under stress or which will be put under stress. Be careful not to overdose young or smaller animals. When planning a pesticide application, choose the pesticide which has the least risk of adverse effects and will give good control.



## Disposal Guidelines

### Excess Material

The Environmental Protection Agency recommends ways to dispose of excess pesticides. Consult local authorities for procedures in your area. If you have excess organic pesticides you may dispose of them by:

- \*using them up as directed on the label;
- \*burning them in a specially designed pesticide incinerator;
- \*burying them in a specially designated landfill;
- \*storing them in a safe manner until they can be burned or buried.

### Empty Pesticide Containers

Proper disposal of empty pesticide containers includes the following steps:

#### Liquid formulations:

1. Triple rinse containers immediately after emptying. Add this rinse water to the spray tank.
2. Puncture the top and bottom of the container to prevent reuse.
3. Dispose of the container in any licensed sanitary landfill. On-farm disposal is improper unless the site is a licensed landfill area.

Note that barrels and larger drums may be sent to a reconditioning depot following triple rinse procedures.

#### Dusts, wettable powders, and other dry formulations:

1. Completely empty the contents of the container into the tank.
2. Open both ends of the bag to prevent reuse. Rip or cut the bag carefully - a strong jerk could cause dust to fly up into your face.
3. Deposit the container in a licensed sanitary landfill.

Note that containers should not be burned unless the registered label provides such directions. Burning in most incinerators does not completely break down all pesticides. Containers should not be buried on private property, as this practice would result in accumulations of concentrated pesticides in one area.