EXTERNAL PARASITES OF CATTLE

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No other malady of cattle is as common as the tick, mite or insect parasite. They likely cause greater losses to the livestock industry than all infectious diseases, but since the nature of their losses is insidious and generally does not result in death, they do not receive the attention that they warrant. The impact on animal performance from irritation and annoyance from bites of parasites and their competition with cattle for nutritional components is very difficult to assess.

In addition to extra labor and pesticide costs involved in parasite management, losses to parasite infestations may entail: (A) death when parasitism is compounded with a poor nutritional plane; (B) stunted growth, decreased production of milk, loss of edible tissues and product quality reduction such as hides. Production loss is frequently dramatic since unthrifty cattle are "poor-doers" as a result of decreased aggressiveness and a reduction in foraging energy; (C) death or production loss from arthropod-borne diseases such as anaplasmosis, anthrax or babesiosis. Arthropods, either insects or ticks, are required in the biological cycle of many important livestock diseases such as those mentioned above; and (D) lowered resistance to other parasites and infectious diseases. Parasitized and weakened animals are more susceptable to further parasitism and infectious diseases since their natural immunity has been reduced.

If we are to more efficiently utilize the bovine to convert the vast quantities of low quality forage found on U.S. range to a marketable product, we need to maintain an animal with an acceptable parasite burden. Technologies are available today to economically control many of the common parasites on beef cattle. The most important external pests of bovine are the ticks and mites, the biting flies (horn flies, stable flies, mosquitoes and horse flies), the non-biting flies (face flies, house flies and cattle grubs) and lice. The general biologies and methods for control will be outlined in the succeeding text.

Common Ticks of the Southwest

Probably all species of terrestrial vertebrate animals are subject to attack by ticks. Stockmen suffer tremendous losses annually due to ticks feeding on livestock. In addition to the irritating bites, ticks can also cause various diseases of man and animals. Ticks are responsible for reducing weight gains on beef animals and milk production in dairy cattle. Tick bites cause dermatosis (an itching, swelling, inflamed condition of the skin) of the host. Ticks can also cause secondary bacterial infections. Exsanguination (loss of blood) can cause secondary anemia and possible death to an animal.

The absence of many enemies and the wide host range of many species increase their longevity. These factors account for some of the tremendous population buildups. Some species are long-lived, having a life span of several years.

Ticks can be readily distinguished from insects in that their bodies are not divided into distinct segments. The fusion of the thorax and abdomen gives them a leathery sac-like appearance. A distinct head is lacking, but the mouthparts form an apparent head of varying lengths, depending on the species. Adults and nymphs have four pairs of legs, while the larval form is six-legged.

The life cycle and seasonal activity vary considerably for each species and will be discussed separately for each. Depending on the species, they are classified as a one-two-or three-host tick. As a one-host tick, the larva will attach itself to and remain on a single animal throughout its feeding stages (larva, nymph, adult). After the female has fed, she will drop from the host and lay her eggs on the ground in masses ranging from a few hundred to several thousand. The eggs hatch and the young wait for a suitable host to which they can attach themselves. The larvae crawl onto vegetation and transfer to the host as it passes.

The two-host tick will undergo the feeding and moulting process as the larva and nymph on one host. After the nymph feeds, it drops to the ground, molts, and the adult seeks the second host to complete the feeding cycle. Generally, the second host is larger than the first.

The three-host tick will feed on a different host for each of its three life stages. Usually the host becomes increasingly larger with each molt (i.e. larva on rat; nymph on rabbit; adult on cattle). After feeding on the third host, the tick will drop to the ground and lay its eggs.

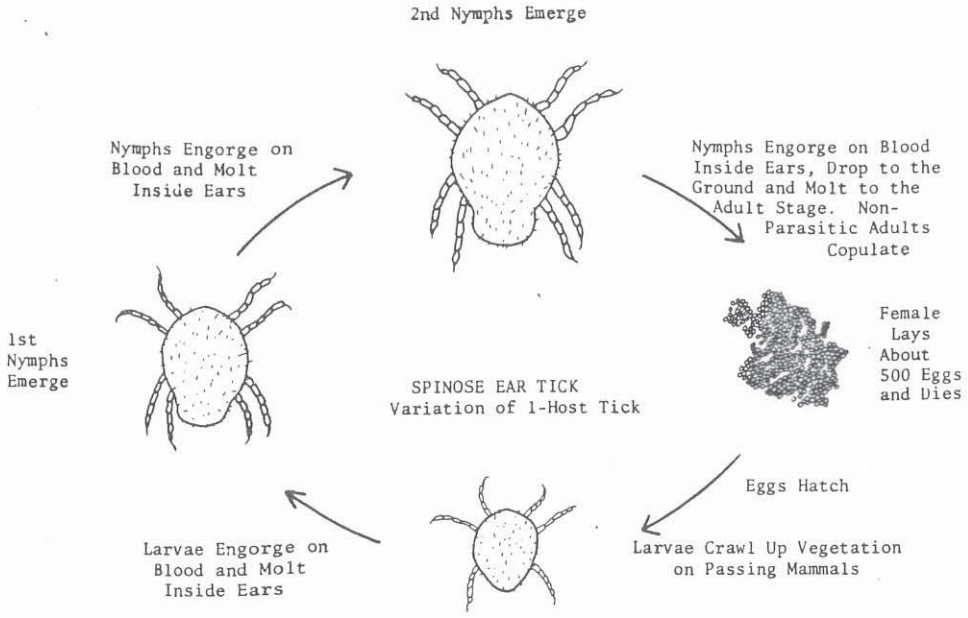
There are two families of ticks: soft ticks and hard ticks. The soft ticks are represented by two important species that cause concern to livestock and poultry producers; the fowl tick of poultry, and the spinose ear tick of cattle. The hard ticks are represented by a number of species, but only six of the more important species will be considered here.

SOFT TICKS

Spinose Ear Tick. The spinose ear tick is a common pest of cattle and horses, especially in the western areas of the Southwest. Other domestic and wild hosts may also be attacked. The tick is found in the ear canals of its host. The presence of large numbers can cause severe irritation, inflammation and deafness of the animal. Secondary bacterial infections may cause sloughing of the tissue in the inner ear. Infested cattle develop a "flop-eared" condition and show discomfort in movement of the head.

The immature stages, larva and nymph, are the parasitic stages, with the adult being non-parasitic. The larva and nymph are the stages usually found in the ears. The nymph is easily recognizable by the spines on the

integument and the violin shape of the body. After the last feeding, the nymph leaves the host and molts to the adult stage. The female lays her



eggs under feed bunks, boards, and other suitable protected areas. The newly hatching larva crawl up feed bunks, or other objects and await contact with a passing host.

HARD TICKS

Black-legged Tick. The black-legged tick is an important pest of livestock and wildlife. It is also known to inflict painful bites on man. It congregates along paths, trails, and roadways awaiting its host. The adults become active in late September and October and are present until January or February. It is often the most common tick on deer and cattle during the early fall. During the larva and nymph stages it feeds on smaller animals.

This tick is considered a vector in the transmission of anaplasmosis to cattle. The black-legged tick is without colorful markings and is a three-host tick.

Winter Tick.. The winter tick is an important pest of horses, cattle, deer, and elk. It is a one-host tick spending its entire life cycle on one host. Heavily infested range animals may be killed due to blood loss if left untreated.

The adults are most active during the late fall, winter, and early spring. Egg-laying occurs after the final feeding and the eggs hatch in 3-6 weeks. The larvae bunch together and remain inactive until the onset of cool weather the next fall. Coloration of the dorsal shield (scutum) varies from none to almost complete covering with white. This tick is believed to be important as a vector of anaplasmosis.

American Dog Tick . The American dog tick is a common pest of dogs and other small, wild or domestic animals which are the preferred hosts for the adults of this species. It will attack hosts other than dogs more freely than the brown dog tick. It is commonly found on a variety of large animals including horses, cattle and humans. The immature stages feed on small rodents, such as mice, rats and rabbits.

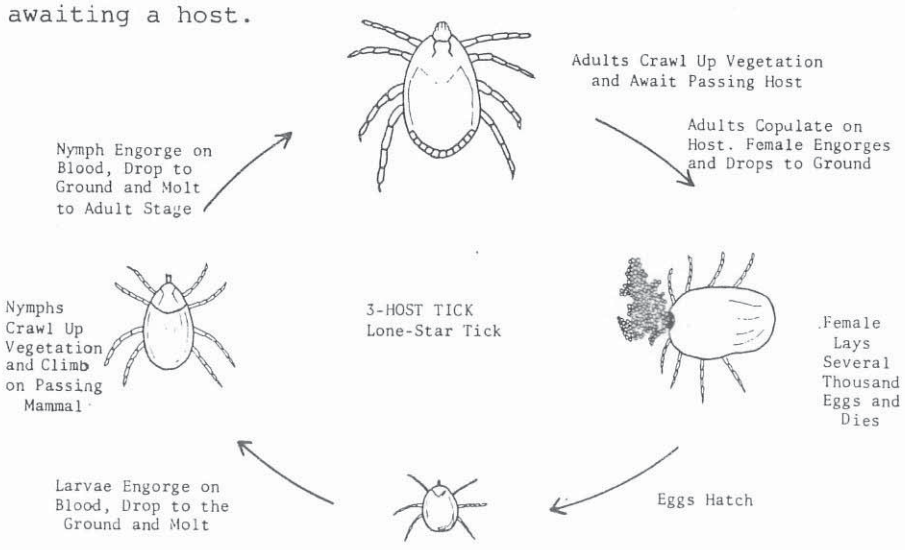
This is a colorful species, having spots of light colors (white, gray, silver) scattered and superimposed over the basic brown or black body color. The larval and nymphal stages have been known to survive two years or longer without feeding. Under suitable conditions, the life cycle from egg to adult may not require more than three months.

Brown Dog Tick. Though not a pest of cattle, this pest is important to the cattleman since it frequently infests stock dogs and other canine or feline pets around farm improvements.

The brown dog tick is probably the most widely distributed tick species in the world and is very common. Dogs are the primary host, but when dogs and their bedding places are in close association with man, the bites to man becomes more frequent.

The adult ticks are most often found in the ears and between the toes of dogs. The larvae and nymphs are found in the long hair on the back of the neck. The eggs are deposited in cracks and crevices of the dog kennel. These ticks have a tendency to crawl upward and are commonly found in cracks in the roof of dog kennels or ceilings of porches. These ticks will also become established in houses or other buildings which are being inhabited by dogs.

Lone Star Tick. The lone star tick is an important tick of all livestock, wildlife and man. This tick will attack man in the larval, nymphal and adult stages. This is probably the tick most commonly encountered by man in his association with nature. Ticks will congregate along trails or pathways awaiting a host.



This tick receives its name from the lone spot on the dorsal shield of the female. The male has non-connected white markings around its posterior margin. This species' mouthparts are much longer when compared with the other ticks discussed previously.

The lone star tick is a three-host tick and is active from early spring to late fall. The female is capable of laying 9,000-12,000 eggs. Under optimum conditions, the life cycle can be completed in three months.

This species is also important from a public health standpoint. It is known to transmit Rocky Mountain spotted fever, Tularemia, and American Q fever.

Gulf Coast Tick. As larva and nymph, the Gulf Coast Tick is a common pest of ground-inhabiting birds such as meadowlarks and bobwhite quail or small rodents. The adults primarily attack cattle but a variety of other hosts including dog, horse, sheep, deer, coyote, and man may be attacked. These ticks are generally confined to a geographical area within 100 miles of the Gulf Coast, but recently this tick has become an important pest of cattle in Oklahoma, much of Texas, western Arkansas, parts of Kansas and other states. The adults attach to the ears of cattle, and may appear in numbers from early April to July. When infestations are high on cattle the ears may become thickened and curled causing a condition called "gotch ear". This tick reportedly has produced tick paralysis in man and dog. The tick is also a principal predisposing factor in screwworm attack when the distribution of the tick and fly overlap.

The reader is referred to OSU Extension Facts No. 7001 for photographs depicting the above described pests.

Control - Because of the tremendous differences in behavior of the different species of ticks, no one control measure will do for all species found on cattle. Generalized control procedures are as follows: Ear ticks - Insecticidal impregnated ear tags are economical and completely effective against the Gulf Coast and spinose ear ticks. However, if the inner ear of cattle are infested with spinose ticks before tag application, clean ticks and debris from the ear canals and apply a small quantity of insecticidal dust to the inside of the ear at the time of tag application. Commerical "puff-dusters" are available for such pruposes. Co-Ral is one such product. You must use tags to maintain control. Replace tags every 4-5 months as needed. Body ticks - This group of ticks are those other than the ear ticks mentioned above. If a dipping vat is available, this is the best method of pesticide application for ticks. If not, then resort to a high-pressure spray delivered at 3-400 psi. Make sure total body coverage is had, being careful to treat the underlying regions and head areas of the animals' body. Allow 1 gal. finished spray for mature cattle in the summer and 1½ gal. during the winter. Delnav and Copper-tox are 2 of the most cost-effective compounds available for use today.

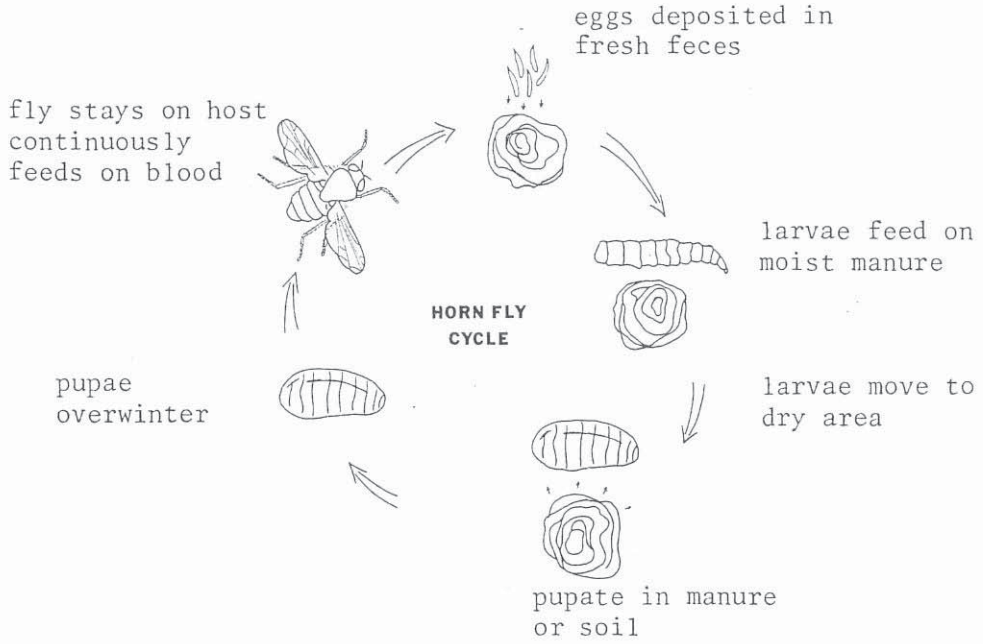
To effectively manage ticks on a long-term basis, the most economically sound practice is to supplement chemical control practices with pasture improvement. It is particularly important in the management of lone star, black-legged and American dog ticks.

Control ticks on working dogs with shampoos to the animal and sprays

to its resting areas such as kennel.

COMMON BITING FLIES

Horn Fly. The annual losses in control costs and production losses due to horn flies is estimated to be in excess of 365 million dollars. The horn fly is a small obligate blood-sucking parasite of cattle. The female leaves its host only for short periods of time to oviposit on fresh manure. The fly feeds 24-38 times per day, thus causing continued annoyance to its host. Depending on the location, several thousand flies may build up on the withers of cattle during the peak season of activity. Flies are active 3-4 months in the northern part of the country with some fly activity being present during most of the year in the southernmost area.



The eggs hatch within 10-12 hrs. and the 1st instar larvae burrow into the manure pat where development continues through 3 larval instars. Pupation takes place either in the pat or in the soil immediately beneath or around the pat. In the southern climate, adult emergence will occur within 7-9 days in peak season; in the north this time is considerably longer with up to 4 weeks required in Canada.

Control - This fly is easily controlled on a season-long basis with insecticidal impregnated ear tags. Delay tag application until early summer (May) if possible so that 1 application will afford season-long control.

The Stable Fly. Stable flies cause irritation and weakness in animals and account for much blood loss where severe infestations occur. Bite wounds also can serve as sites for secondary infection. Its feeding activities may interfere with grazing activities, and in heavily infested areas animals cannot be pastured during the day. These flies are easily interrupted in feeding and are therefore good mechanical transmitters of

anthrax, equine infectious anemia (swamp fever), anaplasmosis and stomach worms, Habronema.

The stable fly or dog fly is similar to the house fly in size and color, but the boyonet-like mouthparts of the stable fly differentiate it from the house fly. Both sexes are vicious biters. They are strong fliers and range many miles from the breeding sites.

Stable flies breed in soggy hay, grain or feed, piles of moist fermenting weed or grass cuttings, spilled green chop, peanut litter, seaweed deposits along beaches and sometimes in manure well mixed with hay. The female, when depositing eggs, will often crawl into loose material, placing the eggs in little inner pockets. Each female may lay a total of 500-600 eggs in 4 separate layings. Eggs hatch in 2 to 5 days and the newly hatched larvae bury themselves, begin to feed, and mature in 14 to 26 days. While the average life cycle is 28 days, this period will vary from 22 to 58 days, depending on weather conditions. Adult flies are capable of flying up to 80 miles. This fly is a pest in every region of the country. That is, economic damage is caused to cattle in every state.

Control - Stable flies often are produced in staggering numbers in wet organic matter of the premises; therefore, control at any facility implies sanitation (elimination of breeding sites) and water management. After breeding site is controlled, other suppression tactics may be used to advantage to decrease animal annoyance. The most effective available method of chemical control is the application of long residual insecticides to vertical stable fly resting surfaces near animals, for example, barn and stable walls. Individual animal spray treatments, i.e., the pyrethrin-synergist combinations, provide effective protection for 6-9 days and may be used for protection of high quality show or breeding stock.

The Horse Fly. The annual losses in production and control costs due to horse fly and deer fly attack on beef cattle is estimated by the USDA to be 40 million dollars annually, of which, 30 million dollars was attributed to reduction in weight gains. Reductions in cattle body weight have averaged 100 lb/animal during massive outbreaks. Horse flies are important vectors in the epidemiology of several animal diseases. The horse flies are large and stoutly built and are strong fliers. The deer flies are relatively small flies with clear wings except for a dark band located vertically down the middle of the wing and a darkly pigmented anterior border.

All horse flies follow a basic life cycle pattern. The cylindrical eggs are from 1 to 2.5 mm long and are deposited in neatly arranged piles on stems and leaves of aquatic plants. The number of eggs per mass varies from 100 to 1000. The eggs hatch in from 5-7 days during the summer months. The larvae are free-living animals feeding on organic debris and undergo rapid growth during the summer and fall. They become quiescent with the onset of winter. By the following spring, the larvae will have passed through 4-9 instars. Prior to pupation they move to drier earth -- usually 1-2 inches below the surface. The pupal stage requires 2-3 weeks varying with the species. Laboratory studies have shown that one species goes from egg to adult in 70 days.

Some of the more important horse fly pests of livestock are widely

distributed within the United States although each region has species that are most abundant and most annoying.

Control - Although research has shown that horse flies are susceptible to many insecticides, little data are available which indicates effective control on range cattle. The application of insecticides directly to the animal has not been successful since residual time on the animal is quite short. The economics of frequent direct applications to cattle and the poor success has discouraged this type of control procedure.

Large area control programs (county-wide) utilizing aerial or ground application of ultra-low-volume insecticide, as is used in mosquito control programs, has recently shown promise, but is questionable economically. Management practices for the control of this pest is one of the most demanding livestock pest control needs at this time.

COMMON NON-BITING FLIES

The Face Fly. The annual losses in control costs and production losses due to face flies is estimated to be in excess of $150 million. The face fly was recently introduced into the North American continent and entered the United States from Nova Scotia in 1952. Since then its spread has been rapid across the northern tier of states and then southward with the only states free of the face fly today being Texas, Louisiana, Florida, New Mexico and Arizona.

Female face flies do not have mouthparts capable of piercing the skin of their hosts, so they are not normally blood feeders, but cause annoyance while feeding on wounds or the moist mucus secretions of the face. Annoying populations of flies can build up under range conditions, causing the animals to group together head first in an attempt to keep the flies off. Face fly populations have been correlated to pinkeye incidence. Shuggert in Nebraska has demonstrated that only 1-2 flies can cause the transmission of pinkeye. Serious, untreated cases can lead to blindness of the animal.

Females oviposit on fresh cattle manure; larval development takes place within the pat and pupation occurs in the soil around the pat. Continuous overlapping generations occur and the fly overwinters as adults in barns, farm houses, under tree bark and other shelters. The behavior of male face flies differs significantly from the female. Males spend little time on cattle or feeding on fecal fluids, but are anthophilic feeders on a number of flower species and thus frequent pasture margins, wooded areas at pasture edges and fence rows. Fly populations appear to fluctuate and damaging infestations vary from year to year. It is potentially a national pest with only the southwest escaping its economic effects up to now.

Control - Chemical control methods are frequently only aids that are marginally effective. Currently utilized control technologies include a number of self-treating devices such as dust bags and oilers of various designs. Feed-through insecticides, sprays and ear tags have limited use.

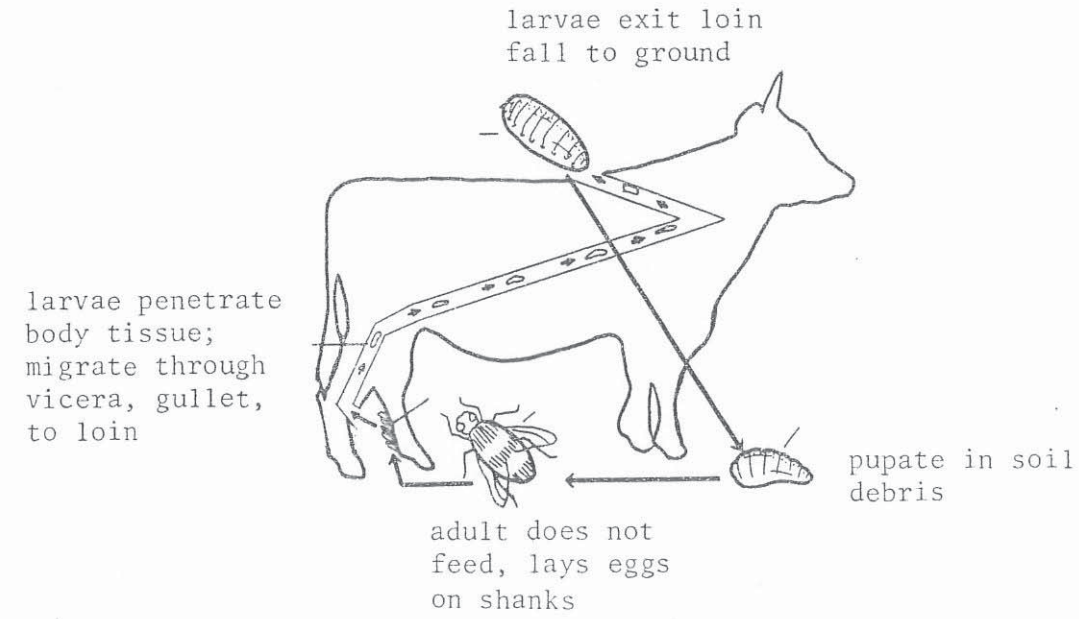
Dust stations are perhaps most effective of available methods to man-

age this pest, and must be properly positioned if good control is to be had. Locate stations under a shelter between pastures or at the entrance to a watering area. Force animals to use station at least once a day - if they do not, then effective control will likely not be had. Several of the newer ear tags give some degree of control for this pest.

The Heel Fly (Cattle Grub). The annual losses in control costs and production losses due to cattle grubs is estimated to be $360 million. Cattle grubs, the common and northern, affect rangeland cattle throughout most of the United States. The common grub is found throughout the U.S. and Canada; however, the northern grub is limited in its distribution to Canada and the northern 2/3 of the U.S.

The adult becomes active in the late spring-early summer, depending on the location, and attaches its eggs to the legs or underside of cattle. To avoid the female, cattle will often run ("gadding"), thus causing injuries and possible weight loss if the animals are to be marketed during the heel fly season. The young larvae penetrate the skin and development takes place during the ensuing months with the mature grub emerging in the backs of cattle during the winter months. This causes losses of meat due to necessary trimming at slaughter and damage to the hide resulting in a lower value.

CATTLE GRUB CYCLE



Control - Cattle grubs are easily managed with seasonal application of systemic pesticides registered for this purpose. Systemic insecticides applied either as sprays or pourons are effective in reducing number of grubs in the body of the animal and the resulting pupae and adults. Applications should be made after fly season, but before the cut-off date - not later than 1 September for most of the nation, earlier for Texas and deep-South.

The House Fly. The house fly has a life cycle and developmental requirements very similar to that described for the stable fly mentioned a-

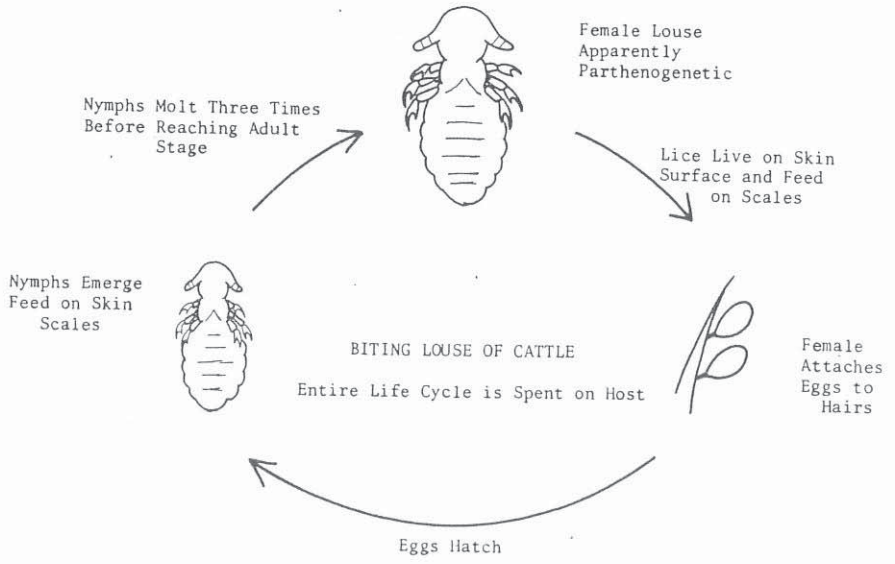
bove. They differ however in that the house fly does not suck blood, but rather feeds on body secretions or other organic substances.

Control - Control is best had through good sanitation practices. Once the problem is present, combine with sanitation residual sprays to building walls and ceilings. The new synthetic pyrethroids offer the best long-term residual to buildings and are probably most cost-effective. Remember, pesticides alone will not do a good job at managing this pest, or stable flies. Also avoid water tank overflow and spilled feedstuffs.

BITING AND SUCKING LICE

Cattle Lice. The annual losses in control costs and production losses due to lice on beef cattle are estimated to exceed $100 million annually. Lice are common on cattle throughout the U.S.. The long-nosed louse is most important on cattle in the western U.S.; the tail louse is most common in the Gulf Coast states. The little blue louse is most common in the southeast and the short-nosed louse is most important on young animals throughout the country. The biting louse is an important species on dairy cattle throughout the U.S.

Economic louse infestations on cattle are often confined to the cooler (wintertime) parts of the year. The sucking lice are believed to be much more important economically and from an animal health view than the chewing (biting) louse. In addition to the damage caused by blood loss and irritation, sucking lice may also be vectors of disease.



Blood losses cause direct economic losses because of reduced weight gains and, possibly, lowered vitality and resistance to other diseases. This becomes more important when cattle are under the stress of cold inclement weather or low nutritional levels. Heavily infested animals may

die from anemia. Life threatening anemia is usually confined to cows infested with long-nosed lice and on calves infested with the short-nosed louse.

Control - Control is most economically done in the fall or early winter before "clinical" signs of lice appear. Populations are most generally low during October-November and if treatment is done at this time more favorable temperatures are also encountered. Total body sprays to affected animals is desirous in order to prevent reoccurrence of infestations. If populations are high and numerous eggs (nits) are present at the time of treatment, animals should be monitored for reoccurring infestation and a second treatment 2-3 weeks after the first may be in order. Dust stations and ear tags afford some protection against louse buildup.

Mange Mites. The annual losses in control, production costs, and costs associated with quarantine due to mange are estimated to be in excess of $250 million. Most of these losses occur in the Great Plains region.

Psoroptic scabies mites live on the surface of the skin of cattle where they feed on lymph or plasma obtained by piercing the skin. The activity and secretions of the mite cause intense itching that produces scratching, biting, or rubbing by the host. The lesions caused by the mites become crusty and increase in size as the populations increase. The higher populations occur in the winter months and can spread rapidly throughout a herd.

The irritation caused by the mites results in considerable physical damage and can interfere with weight gains. Another serious problem is related to the restriction or embargo placed on the movement of cattle due to the quarantine for scabies. Scabies is considered by State and Federal regulatory agencies to be a quarantineable disease and any known or suspect cases are required by law to be reported to the nearest animal health officer.

Control - Control is best accomplished by dip-vat. Four products are currently approved for use against psoroptic scabies (scab) of cattle. These are: (1) hot lime-sulfur (95°-105°F) 2% polysulfides of sulfur, (2) toxaphene 0.5-0.6% aqueous emulsion, (3) coumaphos 0.29-0.31% aqueous suspension, and (4) phosmet (Prolate) 0.20-0.25% aqueous suspension with 10 lbs of super phosphate or triple super phosphate fertilizer (0-45-0) added per 100 gallons of dip. The phosphate is necessary as a buffer so that the phosmet will not deteriorate upon standing in the vat due to excess acidity.

Cattle that are known to be infested or directly exposed to scabies are quarantined and dipped twice at 10- to 14-day intervals in the first 3 compounds and a 7- to 10-day intervals in phosmet. The double dipping was originally required to reduce the possibility of missing some animals, but since coumaphos and phosmet were added to the permitted list, 2 dippings are known to be necessary to kill all mites on animals dipped in those 2 products. Several dippings may be necessary in hot lime-sulfur before eradication of mites is achieved. Federal Memorandum 556.1 specified the treatment of cattle infested with or exposed to scabies in an emersion type (plunge or cage) vat or in a spray-dip machine, but some states

(e.g., Texas) limit the use of the spray-dip machine.

Some states (e.g., Wyoming, South Dakota and Montana) permit the use of only toxaphene on infested cattle, or on cattle being imported from the "south". Hot limesulfur is the only material that can be used to treat lactating dairy cows, and there is no withholding period required between its use and the slaughter of treated animals. There is also no withholding period required following the use of coumaphos, but cattle treated in toxaphene or phosmet must be withheld from slaughter for 28 or 21 days, respectively.

Laws now in force call for animals to be held for 3 minutes in a lime-sulfur vat and for 1 minute in vats containing the other 3 compounds. However, since it has been found to be impossible to hold cattle in a plunge dipping vat for more than a few seconds, the recommendations are being modified and will only require that dipped animals be "wet to the skin". Since most of the evaluations which were done earlier and upon which efficacy data and field recommendations were constructed were geared to the 1 minute dip, reevaluation and reconsideration of currently permitted dips may have to be made.

As far as the Federal regulatory agencies are concerned, quarantines may be lifted after cattle have been dipped the second time. Some states require negative post-dipping examinations before quarantines can be lifted, but their value is questionable.

Finally, there are Federal regulations governing the movement of scabies infested or exposed cattle directly to slaughter if such movement is carried out within a certain limited time and in placarded vehicles. The various states may have other regulations which would supercede the Federal ones.

Only recommended products and control methods should be used on livestock. Misuse of pesticides may result in death to the livestock or pesticide applicator. Further, undesirable residues may persist in edible tissue destined for market, and "poisoned" cattle are slow to regain effeciency. The most important business consideration, perhaps, is that improper use of pesticidal product generally equates waste.