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# CONTROLLING HORN AND STABLE FLIES

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# Controlling Horn and Stable Flies

L. HASEMAN

ABSTRACT.—This bulletin reports the results of experiments in attempted control of horn flies (*Stomoxys calcitrans*) and of stable flies (*Haematobia irritans*). Formulae are given for the killing and repellent sprays that were found most effective. Tests of a commercial fly salt are also reported, showing that feeding cows this salt had no effect in reducing the number of flies on them. Observations on the effect of color revealed the fact that about fifty per cent more horn flies were counted on dark-colored cows than on light-colored cows, but that there were slightly more stable flies feeding on the light-colored cows than on the dark-colored cows.

Hordes of blood-sucking flies attack cattle and other livestock during the summer. No one has ever been able to estimate accurately the actual amount of damage the horn and stable flies do to dairy and beef cattle. However, it is evident that the enormous drain of blood which these flies make, besides the serious irritation from their bite, causes much damage to livestock. This is one of the most serious drains that the dairy and beef cattle industries in Missouri suffer. The fact that livestock men are ready to invest in any commercial product such as the so-called fly salts and fly sprays is evidence that they recognize the fly problem as a serious one.

Besides proving a very severe drain on the animals, these blood-sucking flies may transmit certain diseases of livestock. This is especially true of the stable fly. In cases of unusual epidemics of flies their attacks may also actually result in the death of many animals. The farmer loses much, also, due to the fact that at times it is practically impossible to manage teams in the field or on the road. The total annual loss in this country from the attacks of these two blood-sucking flies doubtless amounts to millions, and farmers will welcome definite means to check these losses.

The problem is all the more serious due to the fact that there is no simple effective defense against the horn fly and the stable fly. It is the purpose of this bulletin to discuss the breeding habits of these two flies and to give the best known measures for checking their ravages. A number of simple home-made fly sprays which have been tested at this Station are included. Along with prac-

tical suggestions on the control of these two flies are included the results of an investigation of a widely advertised fly salt. These results clearly indicate that such materials are useless as recommended for the control of blood-sucking flies.

### DISTRIBUTION OF THESE FLIES

The stable and horn flies are most abundant and destructive in the important livestock centers but they are widely distributed throughout the world. In this country they are most important in the Mississippi Valley, in the Southern States and in the western range lands. In all parts of Missouri livestock suffers severely from these flies.

### LIFE CYCLE OF STABLE FLY

The stable fly (known scientifically as *Stomoxys calcitrans*) closely resembles the common house fly and has very similar breeding habits. It is often spoken of as the biting house fly. On hot, sultry days it often comes into the house and is very annoying with its stinging bite. Both male and female flies bite. The pest passes the winter in Missouri, largely if not entirely, as the larva and pupa, in straw and manure.

The adult flies begin to attack livestock about the first of May but are seldom very abundant until June. They become most annoying during the summer and fall.

It is generally supposed that the stable fly, like the house fly, selects horse stables and fresh horse manure for laying its eggs. Careful observations, however, show that decaying straw is the maggot's favorite food material. Horse manure mixed with straw or similar bedding material is also commonly used, but horse manure alone is not used extensively. The female usually lays her eggs in small clusters down in the straw or loose manure. Similar to other species of flies she usually lays several eggs and then feeds for a time and later returns to the work of egg laying.

The egg is a small oblong white object about one twenty-fifth of an inch long which can be readily seen without magnification and closely resembles the eggs of blow flies. The eggs require from one to two or three days to hatch, depending on the temperature.

On hatching, the larvae are very small, but feed readily and soon appear as fair-sized maggots not greatly different from those

of the common blow flies. They usually become full fed in from 11 to 15 days, if food is abundant and the temperature is favorable. However, they may remain in the larval stage much longer under unfavorable conditions. When full fed they are about four-fifths of an inch in length and of a yellowish white color.

When full fed, the larva changes to the puparium, which takes on a reddish brown color. The puparium is much shorter than the larva and is oval in outline. It remains in this condition during the summer for from six to twenty or more days. Then the adult emerges and soon prepares to feed, mate and lay eggs.

### LIFE CYCLE OF HORN FLY

The horn fly (*Haematobia irritans*) is primarily a pest of cattle and at times collects on their sides and backs in such numbers as to almost cover them. The bite, while not so severe as that of the stable fly, causes considerable pain and in large numbers they draw much blood.

The adult flies become abundant by early summer and increase in abundance as the summer advances. They remain active until cold weather in the fall. When it is cool in early spring or in the fall the flies crawl under the hair to escape the cold. The heat from the animal's body also helps to keep them warm.

The adult females lay their eggs on the surface of fresh cow manure soon after it is dropped. The eggs are light reddish brown when first deposited. They usually hatch in one or two days and the larvae enter the surface layer of the fresh cow manure.

The larva is very similar to the maggot of other flies and after feeding from four to six days it is full fed and about one-fourth inch long. Then it usually enters the ground beneath the cow manure and changes to a small, oval, dark brown object, the puparium, in which the insect passes the true resting or pupa stage.

The insect remains in the brown case in the summer for five to eight days when it emerges, in the adult stage.

The insect may require from ten to sixteen or more days to pass from the egg to the adult stage. There are therefore many generations each summer, and this accounts for the greater abundance toward fall.

### METHODS OF CONTROL

With pests of this sort it is usually possible to attack them in their developing stages and in the adult stage. Unfortunately

these two species cannot be attacked with effective results in either of these stages. However, some relief can be had and it is the purpose of the writer to point out what can be done.

In the first place, with the stable fly breeding largely in decaying straw, manure and similar vegetation, the prompt spreading of all such material on the fields as fertilizer will greatly reduce the chances of heavy breeding of this species. With the horn fly breeding mostly in fresh cow manure in feedlots and pastures, it is not easy to check its breeding. However, something can be done by spreading out the piles of cow manure so they will quickly dry and prove unfavorable as food for the maggots. Anything that can be done to check increase will result in fewer flies to contend with later.

In the adult stage the pests can be attacked with (1) killing sprays, (2) repellents, and (3) traps. In case of show cattle and horses, blankets or fly nets are occasionally used.

### KILLING SPRAYS

At milking time one can carefully use sprays for killing the flies with fair success. These same sprays may be prepared so that they also serve as repellents later. Some of the commercial fly sprays are quite good for this purpose but they are usually too expensive for general use especially when the farmer can prepare home mixtures which cost but little and which give the same results.

The following simple home mixtures have been used at this Station with satisfactory results as fly killers and as repellents, though it should be kept in mind that the best repellent sprays are thoroughly effective as such for only a limited time. For a few hours the repellents may be very effective but later the more hungry flies will begin to gather and feed in spite of the odor. Home mixtures and commercial preparations which have been tested at this Station are alike in this respect. None of the preparations tested will prove effective for such periods as two to six or more days as some have claimed. They should be applied at least once a day and preferably nights and mornings. In all cases care must be taken to avoid too heavy application, as the hair or hide may be injured. Such sprays must be so used that they will not get into the milk. A small hand sprayer which throws a fine mist spray proves the best and simplest way to apply the sprays.

### **Coal Oil and Naphthalene Spray**

Coal oil, 2 gallons,

Flaked naphthalene, 1 pound.

Use this sparingly as very fine mist spray, night and morning.

### **Crude Oil, Coal Oil and Naphthalene Spray**

Coal oil, 1 gallon,

Crude oil, 1 gallon,

Flaked naphthalene, 1 pound.

Use this in same way as the coal oil and naphthalene. The crude oil gives it more body.

### **Crude Carbolic Acid or Creosote and Coal Oil Spray**

Coal oil, 2 gallons,

Crude creosote or carbolic acid, 1 pint.

Use this sparingly as very fine mist spray, night and morning. If used too heavily, carbolic acid poisoning may result.

### **Crank Case Oil and Naphthalene Spray**

Crank case oil, 2 gallons,

Flaked naphthalene, 1 pound.

This mixture is naturally very inexpensive but must be carefully used as it may contain some gasoline and, as with the other oil sprays, may injure the hide and hair if used too heavily.

Mixtures containing fish oil and pine tar are sometimes used. Both pine tar and fish oil have been tested in fly sprays at this Station, but they do not seem to have any more lasting repellent qualities than the coal tar by-product and they are less easily secured by the farmer.

### **Applying the Sprays**

These fly sprays all contain oil and the farmer should keep in mind that they should be applied sparingly. The animal should never be thoroughly wet with the sprays as injury may result and those containing carbolic acid may result in poisoning of the animal if used carelessly. It takes but very little to treat an animal. For the horn flies, apply the spray over the back of the animal. For the stable flies be sure to treat the legs. In the case of milk

cows, if applied a short time before milking, the animals will not be annoyed by flies during milking. In the case of beef animals it is usually not so convenient to treat them but where practicable to do so they should be treated in the morning.

### **The Use of Fly Traps**

Efforts have been made to prepare types of traps for brushing off and trapping the flies from dairy cattle as they come into the barn at milking time. There are some elaborate machines for this purpose but they are not used very much as yet. Those on the market are too expensive for the average farmer and they are too complicated to be practical. It would seem that some simple device might be used at the door of the dairy barn to trap the flies which come in on the cattle.

### **Shade and Water in Pasture Help**

On the farm it is a well known fact that plenty of shade and a pond or stream of water proves a great help to cattle during the heat of the day. Besides escaping the heat they are better able to fight off the flies where they crowd together or stamp about in the water. Low bushy retreats also help them to brush off flies when they become so abundant as to be unbearable.

## INVESTIGATION OF COMMERCIAL FLY SALT

During the summer of 1926 manufacturers of certain brands of stock salt were very active in recommending their salt as a remedy for blood sucking flies. Missouri farmers and dairymen became interested in the claims of the manufacturers and the department of entomology at this Station undertook a careful test of one of these salts so as to be able to tell the farmers what value if any the salt had in keeping flies off cattle. The department of dairy husbandry cooperated in the experiment, placing the Station dairy herds at the disposal of the investigators. Fifteen cows of Holstein,

TABLE 1.—AVERAGE NUMBER OF FLIES ON COWS FED FLY SALT AND ON THOSE FED ORDINARY SALT

Cow No.	Salt	Average Number Horn Flies	Average Number Flies	Average Number Stable Flies Feeding
503	Fly salt	26.3	3.9	3.0
517	Fly salt	25.1	3.1	2.8
521	Fly salt	38.4	3.5	3.0
526	Fly salt	15.7	2.0	1.7
527	Fly salt	15.2	2.5	2.1
266	Fly salt	12.3	1.7	1.6
278	Fly salt	24.6	3.2	3.2
285	Fly salt	10.9	4.9	4.6
125	Fly salt	20.5	3.0	2.6
126	Fly salt	15.9	2.4	1.9
128	Fly salt	14.5	1.6	1.5
151	Fly salt	17.9	1.9	1.4
154	Fly salt	16.6	4.6	3.7
176	Fly salt	23.9	1.9	1.8
177	Fly salt	21.3	3.1	2.9
Average for all on fly salt		20.5	3.0	2.7
508	Ordinary salt	11.9	1.9	1.5
509	Ordinary salt	15.5	1.6	1.4
510	Ordinary salt	20.7	2.5	2.2
511	Ordinary salt	34.9	2.9	2.5
515	Ordinary salt	21.3	2.4	2.1
525	Ordinary salt	15.4	2.6	2.1
531	Ordinary salt	12.7	2.7	2.6
537	Ordinary salt	14.2	4.6	3.7
538	Ordinary salt	13.1	3.4	3.1
325	Ordinary salt	5.4	4.3	3.9
326	Ordinary salt	13.9	3.2	2.7
327	Ordinary salt	9.0	2.4	2.1
328	Ordinary salt	19.0	2.1	2.7
270	Ordinary salt	41.1	3.9	3.5
274	Ordinary salt	17.2	3.2	2.7
163	Ordinary salt	11.4	4.7	4.4
164	Ordinary salt	12.6	3.7	3.4
165	Ordinary salt	8.7	3.4	3.1
167	Ordinary salt	16.2	2.3	2.1
173	Ordinary salt	26.0	1.7	1.5
Average for all on ordinary salt		17.0	2.9	2.7

Jersey and Guernsey breeds were fed on the fly salt in their regular rations and twenty cows of the same breeds and in adjoining stanchions received like rations except that they had the regular stock salt. The rations included 800 pounds corn, 400 pounds bran, 100 pounds linseed oil meal, 100 pounds cotton seed meal, 100 pounds gluten and 20 pounds salt. The experiment began September 23, 1926, and continued until November 1, 1926, when it was discontinued due to the scarcity of flies.

Along with the test of the salt some interesting information on the influence of color as an attraction for flies was secured. The test and check animals were selected so that the question of color was not a factor in the salt tests.

From these data it is clearly evident that the fly salt had absolutely no effect on the abundance of flies observed on the test cows or on the abundance of stable flies feeding.

### INFLUENCE OF COLOR ON FLIES

Since the test salt had no effect in reducing the number of flies which either fed or rested on the cows, the entire herd may be considered from the point of view of color and its influence on the number of horn flies. In the case of those cows which were ninety per cent or more black there was an average of 22.5 horn flies on each cow while in case of those which were less than 90 per cent black there were on the average only 15.1 flies. This means a difference of about fifty per cent in favor of the lighter color as a protection from horn flies. On the other hand the darker cows had on the average slightly fewer stable flies feeding than did the lighter colored cows.