



Integrated Fly Management for Livestock Farms

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Introduction

Flies that breed in fresh manure, spilled feed, silage, moist animal bedding, human waste or any fresh moist organic matter (moisture content between 50-85% and decomposing) are collectively called filth flies. In Nova Scotia, these include the common house fly, lesser house fly, stable fly, rattail maggot fly, blow fly, black scavenger fly, dung fly, and the black garbage fly. Larvae of these fly species compete for habitat, thus their relative abundances will vary depending on which mix of species are present and which are the most successful at reproducing and utilizing the habitat they have colonized.

A variety of other fly species can occur in the same habitat, but usually in low numbers. Many other species of insects and mites can and do live in filth, but generally are beneficial and not considered a nuisance or health concern. The house fly is by far the most common species found in manure and household garbage. Because they are attracted to human habitats and can build up high populations very quickly during the summer months, they have the greatest potential of becoming a nuisance and a health concern. Therefore producers should take planned steps to minimize fly populations.

An Integrated Fly Management (IFM) approach, which includes cultural, physical, biological and chemical options, is recommended. Better community relationships and lower control costs result from good IFM programs. Preventing a fly population build-up is easier and will cost less than trying to control fly populations once they become established. For an IFM program to be successful, livestock producers need to have information about house flies, what management options are available, and how these options can be implemented. Usually the best strategy is to use a combination of least toxic options. Eliminating the fly breeding source is key to good fly management.

Monitoring the occurrence and abundance of pests and beneficial species of organisms is essential and, although it requires some time and scheduling, will prevent a lot of grief in the long term. Understanding the species in manure and organic waste ecosystems will make IFM decisions much more noticeable and effective. The remainder of this fact sheet deals with specific monitoring techniques and IFM options.

Components of an IFM Program

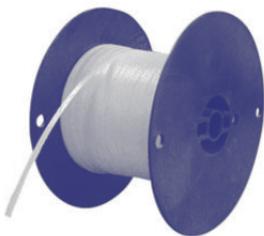
Monitoring Techniques

Fly populations should be monitored in barns on a weekly basis. Baited jug traps, spot cards and sticky ribbons are useful for this purpose. Nuisance thresholds are an average of 250 house flies per jug trap per week, 50 fly specks per spot card per week and 100 flies per 300 m total walking distance for two consecutive times. Refer to your specific farm type factsheet for placement recommendations and remember to always keep accurate records of trap and card counts. Monitoring also involves frequent inspections of manure.

Bated jug traps can be made from 4 litre plastic jugs. Cut four 5-7 cm (1-2") access holes around the upper part of the jug, attach a wire for hanging, and add commercial fly bait to the trap. The active ingredient in such bait is usually methomyl. Jug traps should be checked once every week May through September. Use a minimum of 5 jug traps per average size barn. At each check, count (estimate) the number of house flies in each trap, remove the flies and the old bait and add about 30 grams of fresh bait. These traps are sensitive to fly population changes and are therefore very useful for determining the effectiveness of a fly management program.

Spot cards are simply 8x13 cm (3x5") white index cards. Ten or more cards per average size barn should be stapled flush against braces, ceiling beams, the ceiling or any location where flies like to rest. One can identify fly resting areas by the relative abundance of fecal and regurgitation spots - the more spots the better the area for placing cards. Cards should be dated and replaced every week. A record of the average number of spots on a weekly basis can be a useful indication of the need for control measures. Cards should be replaced in the same position at each renewal. Spot cards should be kept because they provide documentation of house fly populations if needed, in response to complaints.

The moving sticky tape method may also be used. This method involves holding a one metre sticky tape in one hand at shoulder height and walking a measured distance in the barn, two consecutive times. The result can be calculated and compared to the nuisance threshold which is 100 house flies per 300 m total walking distance.



Sticky ribbons (ie. Aerotack II or SilvaLure) are plastic strips or strings covered with a non-toxic glue which can be hung in barns. They should be replaced every week. A weekly count of 100 flies per strip indicates that fly populations have exceeded the nuisance threshold and control measures are required. These sticky tapes can be purchased at local farm supply stores.

Gemplers

Figure 1: Examples of fly monitoring tape.

Visual Observations

Look around the inside and outside of the barn. Large numbers of adult flies resting on rafters, water lines, ceiling area, light fixtures, and electrical wires indicate a fly problem. High concentrations of adult house flies on the south side of buildings in cool, overcast weather also indicate a problem.

Physical Management of Flies

Plastic tarps (especially black silage plastic) have been found to be useful for controlling house flies in manure stockpiles. The edges must be sealed tightly with soil or other suitable material. Plastic helps to control flies in manure piles in three ways: 1) preventing the adult flies from using the pile as a breeding site; 2) keeping the pile dry or preventing it from becoming saturated if it should rain; and 3) solar radiation helps heat up the pile to high enough temperatures that fly larvae and pupae are killed. One disadvantage to using tarps is that scavenging birds and mammals sometimes tear holes in the plastic to get at dead bird parts that may be in the manure. Once the tight seal is broken flies will breed in the exposed areas.

Mass trapping can also contribute to reducing the numbers of nuisance house flies. Solar traps or other types of baited traps can be used for this purpose. The number of traps and their placement will vary depending on the type used. These traps can be placed around barns, manure stockpiles or fields.

Also mass trapping of flies can be used to help control flies, especially in small farm situations. Using sticky traps and baits mentioned above at a higher density can reduce adult numbers. However, this is not always cost effective, as traps will need to be replaced often in times of high fly population.

Cultural Management of Flies

Cultural practices are very important for preventing fly outbreaks. These include: 1) time of year for manure removal and special treatment of maggot infested manure, 2) keeping manure dry 3) composting manure, and 4) more frequent clean out schedules.

Consideration should be given to how livestock are handled and if structural or operational changes can be made that may reduce fly numbers. For example, in certain livestock operations managing feed and feed spillage can be as important as manure handling. Consider changes in livestock movement that will limit soil disturbance and the pooling of water and manure that often occurs.

Biological Management of Flies

The house fly has many natural predators and habitat competitors. These include some predaceous beetles, mites, other fly species, and parasitic wasps. Also some birds and mammals eat house fly maggots, pupae and adults. The key to using and encouraging biological controls for house flies is proper cultural techniques and restricted pesticide use. In confined areas like barns, there is the potential for the release of parasitic wasps. However, success with this approach depends on manure age and moisture content of manure. It also depends if the parasitic wasps are climatically adapted for your region. A more practical approach is to encourage natural enemies to thrive and survive in and around manure. This can be done by limiting or avoiding pesticide use, composting, and leaving some old manure in the barn at clean-out time. Composted and old manure is good for fly control because it has undergone enough decomposition to be less suitable for fly breeding and has had time to become balanced ecosystems where many organisms coexist and interact. The result is that no single species dominates and that outbreaks are rare. In a balanced ecosystem, the house fly is at a major disadvan-

tage and cannot successfully compete or survive.

Many species can be introduced into ecosystems, but they often need to be introduced before an outbreak has occurred. They are best used as a preventative treatment to reduce the number of flies emerging in the next generation. No biological control option should be considered as a stand-alone control option. Manure management, sanitation, monitoring, and trapping should all be implemented to aid in the efficacy of the biological controls.

Table 1: Beneficial Insects and Animals Associated with Fly Management

Biological Control Organisms	Species	Fly Stage Controlled
Beetles	<i>Histeridae</i> and <i>Staphylinidae</i> (hister and rove beetles)	Eats eggs and larvae
Mites	<i>Macrochelidae</i> and <i>Uropididae</i>	Eats eggs and larvae
Flies	Other muscoid and soldier flies	Compete with house flies for breeding space
Parasitic wasps	<i>Pteromalidae</i> and <i>Encyrtidae</i>	Parasitize pupa
Entropathogenic nematodes	<i>Heterorhabditidae</i> and <i>Steinernematidae</i>	Parasitize pupa and larvae
Birds	Muscovy ducks, gulls, etc	Eat larvae, pupa, and adults
Mice and shrews		Eat pupa and adults

Many of these beneficial insects can be purchased commercially through various companies like Koppert and BioBest.

Chemical Management of Flies

The house fly and similar species can and have become resistant to many insecticides through avoidance behaviour and detoxification mechanisms. Resistance can happen rapidly and to a high degree. Therefore if insecticides are a part of your fly management program it is important to rotate the products used, so the same active ingredients are not used in succession.

Insecticides should only be used as a last resort. If insecticide use does become necessary, choose products that are the least harmful to beneficial predators and parasites of the house fly. Methomyl scatter baits and pyrethrin space sprays are acceptable if used properly. Residual premise sprays such as permethrin and dimethoate are very toxic to beneficial insects and can lead to extra stresses on the animals, especially in confined spaces.

Listed in Table 2 are examples of active ingredients that could be used to knockdown populations of adult flies. With over 70 products registered for fly control in and around livestock buildings in Canada, the table below is not meant to be inclusive, but rather provide a list of some common products used in Nova Scotia.

This guide does not endorse any one product and it should be used as a reference when sourcing any insecticide from your local supplier. Great caution should be taken when selecting any product, as the application method and allowable species can vary from product to product, even though the active ingredients may be the same. Product concentrations and formulations can play a big role in toxicity risk for the applicator and the livestock. It is critical that every applicator reads and understands the individual product labels before applying any insecticide. Always apply an insecticide according to the product label.

Table 2: Commonly Used Insecticides

Common Products	Active Ingredients	Application Type	Registered For
STARBAR	Methomyl z-9-tricosene	Attract and kill fly bait	In and around agricultural buildings such as poultry houses, dairies, stables, hog houses, livestock barns, and feed lots.
DISVAP III	Dichlorvos Pyrethrins Piperonyl butoxide	Space spray (electric fogger)*	Barns, beef barns, stables etc.
DISVAP IV	Pyrethrins Piperonyl Butoxide	Space spray (electric fogger)*	Farm buildings such as dairy barns, milk rooms, horse barns, piggeries, poultry houses, shelter sheds, and other types of livestock buildings
DISVAP V	Permethrins Pyrethrins Piperonyl Butoxide	Wall spray	In hog, dairy and beef barns, milking parlors, milk rooms dairies, and poultry houses.
DISVAP MEC	Chlorpyrifos	Livestock premise spray	In and around dairy cattle, beef cattle, swine, sheep, poultry, horse premises, feedlots, stockyards, holding pens, and other livestock holding areas.
DISVAP Spray	D-Trans-Allethrin Piperonyl Butoxide	Space spray*	Milkhouses, milking parlors barns
Pro Malathion 50EC	Malathion	Surface or space sprays	Barns, pig pens, poultry houses, dairies, and outbuildings

*Remove animals before application

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