

ANIMAL WELFARE ON ORGANIC FARMS FACT SHEET SERIES

**MANAGEMENT OF PEST FLIES ON ORGANIC FARMS**

Produced in consultation with the ECOA Animal Welfare Task Force, July 2009

**THE PROBLEM**

Flies are more than an irritation for animals, workers, and neighbours. They affect the health and comfort of animals and reduce feed intake impacting weight gains, milk production and milk fat content. Research shows that stable flies can reduce feed conversion by up to 20% and economic impacts are observed with as few as five flies per animal. Flies can spread bacterial and viral disease with potential for threats to human health as well as increased veterinary costs. Mastitis, for example, can be spread by flies and fly bites will also cause sores on teats.

Fly management is essential to maintain good animal welfare but organic farmers cannot use synthetic insecticide sprays or impregnated ear tags. This factsheet provides information on some of the alternatives available. The first step in any management program is to know the pest. Appropriate identification of your enemy is critical in developing control strategies.



**Mainly inside buildings**



**Stable fly (*Stomoxys calcitrans*)** 5-8mm long with gray abdomen and piercing proboscis. It is a biting fly which normally attacks legs and bellies causing cows to stamp their feet.

Breeding sites: organic debris, feed areas, manure and urine soaked straw or wood chips.



**House fly (*Musca domestica*)** 6-9mm long, grey and black flies with four black stripes on their thorax. A non-biting fly but can transmit disease and parasites. The specks they leave on surfaces can foul the environment and contaminate milk or eggs.

Breeding sites: debris, manure piles, animal bedding and spilt feed (hay, grain, silage).

**Outside buildings and on pasture**



**Horn fly (*Haematobia irritans*)** 3-5mm long with a piercing proboscis. It is a biting fly which congregate on the backs, shoulders and sides of cows, moving to the underside in very hot or rainy weather. It is often considered to be the

most important pest of grazing cattle. The adults are smaller than the other fly pests and remain on the host almost continuously. They can also be found in open barns.

Breeding site: very fresh manure.

Flies overwinter as pupae in or under dung pats.



**Face fly (*Musca autumnalis*)** 6-10mm long, similar to the house fly. It is a non-biting fly which feeds on animal secretions. They cluster around the eyes, mouth and muzzle and can spread pinkeye.

Breeding sites: Fresh droppings on pasture. Adult flies overwinter inside buildings.

The **life cycles** of these pest flies follow the same basic pattern with timing differences

depending on the species and climatic conditions. In warm humid conditions (> 29°C) the cycle may take 9-10 days compared with 21-28 days when it is cooler (21°C). An adult female can lay 100 or more eggs every 4 days for up to 3 weeks and generally up to 500 eggs in a lifetime. Eggs hatch within hours if conditions are right (70% moisture, high temperature). Maggots feed on fresh or decomposing organic matter and pupate within 6-7 days to emerge as adults 5-6 days later. There can be 8-10 fly generations in a year. Flies can disperse considerable distances; about 8 km for horn flies and more than 30 km for stable flies.

Other flies affecting livestock on pasture:

**Warble flies (cattle grub) - the Heel or Gad fly** (*Hypoderma spp.*) is most active in June and July. Their eggs are laid on hair on the legs and lower body regions of cattle. The larvae burrow into the skin and eventually migrate into the animal's back where they form warbles. The grubs emerge and pupate in pasture litter and soil, developing into an adult fly in 6-8 weeks.

**Bot flies** are a concern for horses and sheep. The sheep nose bot fly (*Oestrus ovis*) deposits larvae in or around the nose. The larvae migrate to the nostrils, develop in the sheep during the winter and are sneezed out the following spring. The horse bot fly deposits its eggs on the hair of the host and the larvae develop in the stomach or intestine following oral entry (usually from grooming behaviour).

**Deer, horse flies and mosquitos** can be a particular problem in pastures that border woodlands or wet marshy areas. Wounds caused by their bites may then attract other flies.

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## CONTROL OPTIONS

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For organic farmers there are four main strategies and all should be used simultaneously. A multi-prong approach using all methods outlined in this fact sheet gives the best results.

### Mechanical

Good sanitation to prevent the breeding of flies is the key for management; keep areas clean and dry. Remove breeding sites (manure, bedding and spilt feed) once a week or more frequently to break the life cycle of the fly. Barns should be designed to simplify cleaning and scraping and to avoid accumulation of organic material. Check for

water leaks; waterers should be checked daily. Ventilate to ensure good air circulation which reduces manure moisture and discourages flies from laying eggs. Keeping the bedding dry should decrease the number of flies emerging. Avoid build up of manure and mud along fence lines in exercise yards, or in gaps under feed bunks. Keep solid manure as dry as possible and turn compost piles to ensure heating which will kill eggs and maggots. Maintain a fly free zone in the milk room with screen doors and windows and keep in-out traffic to a minimum. In poultry barns where accumulated manure is dry, only a small area of wet manure is suitable for fly breeding, but fresh manure accumulating within two days of cleanout provides an ideal breeding site which can result in severe outbreaks 3 to 6 weeks later. It is best to remove manure from poultry barns in the cooler months when adult flies are less active.

### Physical

Traps are effective for reducing adult fly numbers, especially inside buildings. These include sticky traps (roll, sheet or tape), light traps and baited traps (stinky traps) with various combinations e.g. using a glue board with a pheromone attractant. The most economical sticky traps are usually the "clothes line" type such as Sticky Roll™ but they are also sold under other brand names. Dairy supply companies usually carry a range of traps.



Electrocutor traps can be effective, but should be used with extreme caution because there is a danger of spreading pathogens carried on the surface of the fly exoskeleton when it disintegrates. Do not use close to processing areas.

Some trap types are designed to attract and catch adult flies outdoors by using bait. Their efficacy will depend on the type of bait used. Flies become trapped and die of dehydration but often the species of flies captured are not the target pest, limiting their efficiency.



### Use of natural products (soaps, bedding additives, essential oils)

Many natural products added to animal bedding (or even the type of bedding itself) have shown an effect on fly development. Essential oils applied to bedding and to the animals have been found to repel flies for up to a day.

- Straw bedding usually sustains more flies than woodchips or sand.
- Some products (such as diatomaceous earth, lime, and various plant by-products, e.g. coconut hull, peanut hull) added to the bedding may help in reducing the number of flies but they have not been tested scientifically.
- Peppermint, basil, pine and lavender have shown acceptable repellence in laboratory tests.

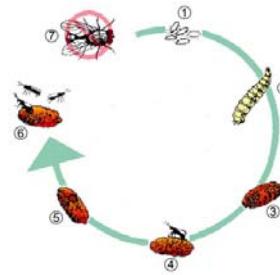
Research at the Université de Guelph – Campus d'Alfred is currently investigating the use of essential oils and biocontrol agents for fly control.

Products sold to control or repel pests must be registered for that use by the Pest Management Regulatory Agency (PMRA). Also check with your certifier for their suitability for organic production. Pyrethrum products are only allowed if they are free of piperonyl butoxide (currently none are registered in Canada).

### Biological control agents - parasites and predators

**Parasitic wasps** (mainly *Muscidifurax spp.* and *Spalangia spp.*) occur naturally in the barn vicinity. They lay eggs in fly pupae and an adult wasp will emerge instead of a fly. They are not as prolific as the flies and have a slower rate of development.

Life cycle



Wasp laying eggs in fly pupa



Photo credit: USDA

If they are to be effective as biological control agents, natural populations must be augmented by frequent releases of large numbers. Parasitic wasps are available commercially for use in all types of livestock operations and are shipped as parasitized pupae in wood shavings.

- Release large numbers every 1-2 weeks.

Animal type	Minimum rates
Horses, beef and dairy cattle	250/animal
Dairy calves	1000/calf
Chickens	6/bird

- Start early (late May in most regions) and continue until mid September or until the fly season is over.
- Scatter the parasitized pupae around known fly breeding sites or scratch a ½ inch hole in the ground or manure pile, drop in a handful of pupae, cover with straw, earth or manure to protect from wind, rodents and birds.
- Sprinkle around the inside edges of calf hutches.
- Parasitic wasps can contribute to 50% less flies when used in combination with adequate manure removal.
- Mixtures of wasp species are likely to be more effective as each has different preferred breeding conditions. Suppliers may change the mix depending on the time of year they are to be released, and your location.
- Effectiveness against house and stable flies was shown to be highly variable depending on animal type, climate, type of bedding, species released, indoor or outdoor locations.
- Prices vary; large quantities are more economical.



Shipping package of parasitized pupae in wood shavings.



**Canadian suppliers** shipping across the country:  
Bugs for Bugs Guelph, Ontario; 1-866-777-1117; [www.bugsforbugs.ca](http://www.bugsforbugs.ca)  
Goodbugs Nanoose Bay, BC; 250-739-0755; [www.goodbugs.ca](http://www.goodbugs.ca)  
Koppert Canada, Scarborough, ON; 1-800-567-4195  
Natural Insect Control (NIC), Stevensville, ON; 905-382-2904; [www.naturalinsectcontrol.ca](http://www.naturalinsectcontrol.ca)  
Manbico Biological, St Pauls, Manitoba; 204-697-0863

**Nematodes** (e.g. *Steinernema feltiae*) are used to control maggots in the soil or bedding and are generally applied as a mixture of water and vermiculite to infested breeding sites. Keep the substrate very moist for best results.

**Hister beetles** (*Carcinops pumilio*) are used for control of eggs and small maggots in poultry manure only. They can carry poultry disease and should not be transferred from one barn to another if disease problems exist.

**Birds** – Put up nest boxes to increase numbers of insect eating birds such as swallows.

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## FLY CONTROL ON PASTURE

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Flies on pasture are more problematic as it is difficult to avoid or remove the breeding sites. Manure management in and around barn areas has little impact. The following practices may help:

- Encourage diversity in natural insect populations. Dung beetles and other manure insects can increase manure pie degradation decreasing both fly numbers and internal parasites. Little is known yet about the effects of dung beetle activity in Canada.
- Use of Ivermectin dewormer (not allowed for organic production except under the derogation specified in CAN/CGSB 32-310, 6.7.9b) will negatively affect dung beetle larvae with effects lasting up to 20 weeks.
- A healthy soil may also increase manure degradation.
- Rotational grazing systems may increase dung beetle populations.
- Use of chickens in pasture rotation immediately after cattle rotation. They will feed on maggots and pupae.
- Natural repellents applied to animals; these can be applied using sprayers.

- Drag pastures in hot dry weather to break up manure pats so eggs dry out and die.
- Place walk-through traps in places cattle must pass e.g. between pasture and source of water.
- Use baited traps near where cows congregate. These can be purchased commercially or home made.
- Keep animals healthy; they will be less affected by diseases and flies.

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## SOURCES OF INFORMATION

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## CREDITS & ACKNOWLEDGEMENTS

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