A GUIDE FOR THE CONTROL OF FLIES IN ALBERTA

CONFINED FEEDING OPERATIONS

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Introduction to Nuisance Flies

Implementing a fly management program on a confined feeding operation (CFO) is important for controlling fly populations. Farm operators should be concerned about possible economic losses and nuisance complaints from neighbours caused by high fly populations. Taking a proactive approach to fly control will help maintain a low level of flies from the CFO, prevent costly control of outbreaks, and help ensure good neighbour relations.

On CFOs, flies can cause economic losses as a result of decreased weight gain or production and increased food safety risk. Cattle will try to avoid fly pestering by foot-stamping, head-swinging and tail-flicking. Cattle will also group themselves closely together in order to avoid fly attack. This avoidance behaviour can lower feed intake and increase stress, resulting in a decrease in weight gain or milk production. Because flies can transfer bacteria causing illnesses such as cholera, dysentery, mastitis and salmonellosis, their control in food production facilities, such as dairies and egg laying facilities, has increased importance.

Flies disrupt people at work, at home or in their recreational environment. During warm summer days, flies actively search for new food and shelter. A normal daily flight range for a fly may extend over two kilometres, but occasionally strong windy conditions assist fly dispersal placing them several kilometres away from where they originated. Flies become a nuisance to neighbours when they rest in large numbers on house walls, swarm in porch areas or garages, and enter homes. The *Agricultural Operation Practices Act* (AOPA) requires that the owner or operator of a CFO employ reasonable measures to control the level of flies present at the facility.

Flies can reproduce in many kinds of organic wastes such as manure piles, decaying silage, spilled feed, soiled bedding and fresh manure. Flies can also reproduce in materials such as garden compost, piles of grass clippings, animal pet droppings, and dead animals. On CFOs, manure and feed management is very important in reducing the possibility of fly nuisance.

Confined feeding operations create a favourable environment for fly breeding due to the constant temperature inside enclosed barns, the ample presence of moisture and decaying organic matter, and the availability of resting places such as building walls. Fly populations can quickly get out of hand and become a nuisance if measures are not taken to interrupt the fly lifecycle.

This guide is intended to provide CFO owners or operators with:

- knowledge of fly biology,
- identification of common fly species found in Alberta CFOs, and
- management options for fly control.

The information provided will assist CFO owners or operators in designing and implementing a fly management program specific to their operation. This guide does not include information regarding other fly species such as the deer fly and horse fly (*Tabanidae*), the face fly (*Musca autumnalis*), or the horn fly (*Haematobia irritans*), which are typically present on operations where livestock are on pasture. Information regarding additional fly pests of livestock can be found in other government publications or publications available on the Internet.

Common Fly Species Found in CFOs

The most common nuisance flies found in Alberta CFOs are the house fly and the stable fly. The house fly (*Musca domestica*) is a non-biting fly, whereas the stable fly (*Stomoxys calcitrans*) delivers a painful bite to feed on the blood of animals, but breeds like a house fly in decaying vegetative material. The lifecycle of these two flies, along with most other nuisance fly species, is very similar. Understanding the biology of flies is very important in managing these insects. Knowing how to identify the various species, identify typical breeding habitat to locate eggs and larvae, and understanding population dynamics will help CFO owners or operators manage the population to prevent outbreaks and nuisance complaints.

A fly management program involves monitoring the population from mid-June to September or continuously throughout the year if the operation is enclosed as in hog barns or poultry facilities. A successful fly management program also involves undertaking a multifaceted approach to controlling the population. Fly management programs consisting of only chemical control will be costly, have temporary results, and will increase the risk of developing pesticide resistance in the fly population. Using cultural control as the first line of defence, and using chemical control only when necessary, will disrupt the fly lifecycle enough to prevent population outbreaks and result in the most successful fly management program.

Biology of a House Fly

The house fly (*Musca domestica*) is the major pest species and the primary target of all fly management programs. It undergoes complete metamorphosis meaning it changes its entire appearance as it develops from egg to adult. The house fly has four distinct life stages: egg, larva, pupa and adult. Similarly, all other nuisance flies found in CFOs exhibit complete metamorphosis, but the rate of development varies from one species to another.

Fly populations typically exist as a mix of flies in various stages of development. The house fly generally develops from egg to adult in seven to 10 days depending upon temperature. A female fly lays 150-200 eggs every three to four days over her life span of two to three weeks. In Canada, house flies may complete three to four generations between May and October.* They survive over winter in their larval or pupal stages under manure piles or in other protected areas.

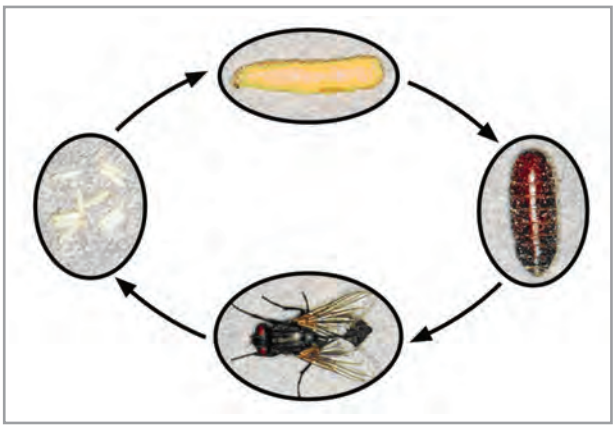

Figure 1.1 House fly lifecycle: egg, larva, pupa, adult

Egg: House fly eggs are white and are about 1.2 mm long. They are laid one-by-one in batches of 75-150 eggs. The eggs hatch in eight to 20 hours into small, first-instar larvae.

* Lysyk. 1993. Seasonal Abundance of Stable flies and House flies (Diptera: Muscidae) in dairies in Alberta, Canada. Journal of Medical Entomology 30: 888-895.

Larva: A larva moults three times. In the final stage (the third-instar), larvae will be about five to nine millimetres long and creamy whitish in colour. At this stage, they are commonly called maggots. Larvae feed on bacteria associated with rotting organic material. Upon reaching their final size, larvae will leave the breeding site and crawl up to 15 metres (50 feet) away to drier locations where they will enter the pupal stage.

Pupa: The larva stops feeding and transforms into a dark brown pupa about eight millimetres long. Its skin will become the protective pupal case that changes in colour from yellow to red, to brown, and then to black as it ages. The pupal stage lasts two to four days. When the adult fly has completely developed, it escapes from the pupal case with the help of an air sac in its head called the ptilinum, which works like a hammer to break open one end of the pupal case.

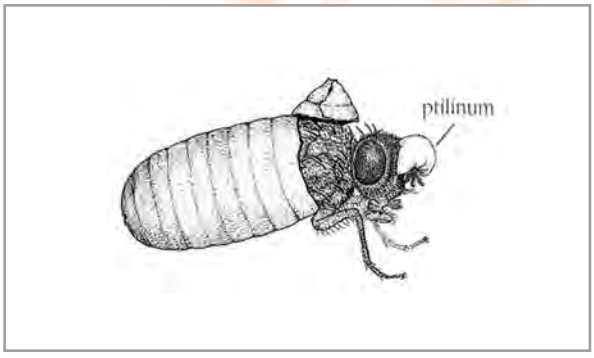

Figure 1.2 Ptilinum of a house fly

Figure 1.3 Adult house fly

Adult: The adult house fly is six to seven millimetres long and the females are slightly larger than the males. Large eyes cover most of its head and are reddish in colour. It has sponging mouthparts on the underside of its head and feeds on liquids containing sweet and decaying substances. Adults also feed on semi-solid and solid materials by liquefying them with regurgitated saliva. The house fly has four distinct black stripes on its thorax (midsection, where the wings are attached). The abdomen (hind section) is greyish with a dark midline and irregular markings on either side. The adult fly can live two to three weeks.

Other Nuisance Fly Species

The **Stable Fly** (*Stomoxys calcitrans*) is similar in size to the house fly, but is distinguished by the presence of a biting mouthpart called a proboscis. The proboscis looks like a spear and is tucked under the head like the letter "L". Both males and females are blood feeders and deliver a painful bite in order to feed. Stable flies not only feed on cattle, they will also bite humans, dogs, hogs and horses. The abdomen is broader than the thorax with checkerboard-like dark spots on the upper (dorsal) side. Stable flies are unique in that they rest on walls with their heads pointing straight up.

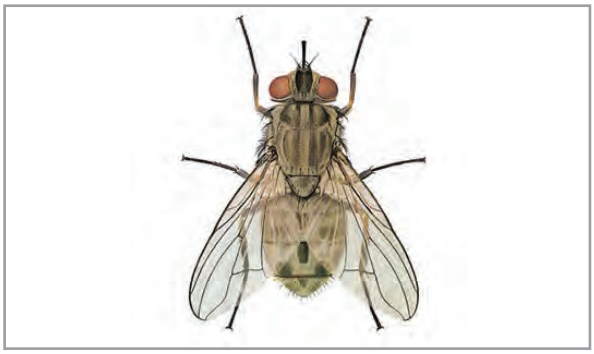

Figure 1.4 Adult stable fly

The **False Stable Fly** (*Muscina stabulans*) is not a blood sucker. It has sponging mouthparts like a house fly, however, it is larger and much more robust than a house fly. The false stable fly is dark grey with a whitish-grey coloured head. The thorax has dark stripes like a house fly but the hind tip of the thorax is pale yellow and the legs are partly red-gold or cinnamon in colour. The false stable fly is abundant in poultry barns (e.g., cage layer operations) where accumulated manure is stored over a long period.

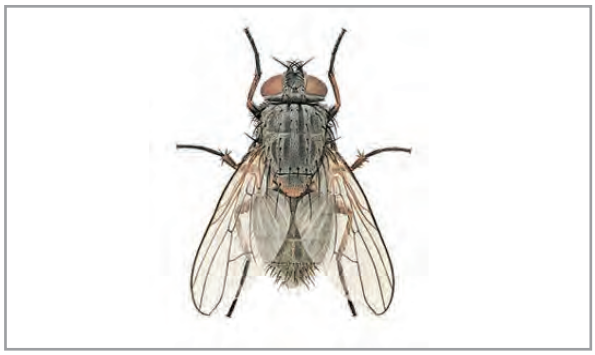

Figure 1.5 Adult false stable fly

The **Blow Fly** (*Calliphoridae*). Blow flies are typically the big and noisy flies found outdoors. Although they may breed in manure and decaying feed, they prefer decomposing animal carcasses or sites contaminated with milk or broken eggs. Blow flies are usually distinguished from other flies by the metallic sheen on their bodies. They can be bright green, blue, bronze-black, and copper in colour. The blow fly lifecycle is very similar to the house fly but slower and may take 10-20 days. There are several species and genera of these flies that breed in animal production facilities. Members of this family are also frequently called cluster flies or bottle flies.

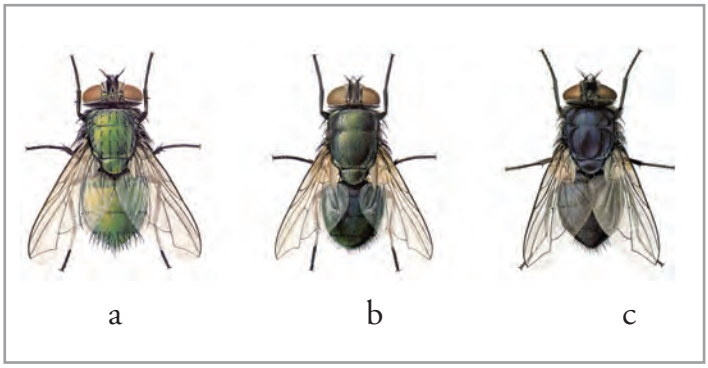

Figure 1.6 (a) Green blow fly (b) Black blow fly (c) Blue blow fly

The **Green Blow Fly** (*Phaenicia sericata*). These flies have a bright, coppery green colour and are commonly found near CFOs.

The **Black Blow Fly** (*Phormia regina*). The distinctive feature of this fly is that the head is black and the body is olive to blackish green.

The **Blue Blow Fly** (*Calliphora vicina and Protophormia terraenovae*). This fly is distinctly blue in colour, while the abdomen and head are black with a reddish-yellow underside.

The **Drone Fly** (*Eristalis tenax*) is covered with dense, short yellow hairs, giving it the appearance of a honeybee. The lifecycle from egg to adult takes 30 days. The larval stage in summer lasts for 18 days and pupal stage about 10 days. The larvae of the drone fly are called rat-tailed maggots because the maggots have a long 'siphon' or breathing tube stretching from their rear that allows them to survive shallow water. Rat-tailed maggots are commonly found in liquid habitats heavily contaminated with manure such as shallow pools of standing water due to poor drainage in livestock areas and contaminated runoff contained by ditches.

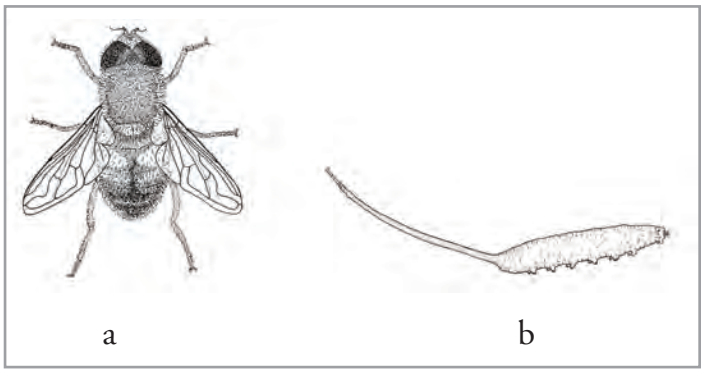

Figure 1.7 (a) Adult drone fly (b) Rat-tailed maggot

Factors Affecting Fly Abundance in CFOs

Flies have tremendous reproductive potential. Beginning in the spring, each pair of house flies can potentially produce many thousands of offspring by autumn. Fortunately, this seldom happens in natural ecosystems because of natural factors that prevent population outbreaks. There are many organisms (predators, pathogens or parasites) that feed on, infect or parasitize fly eggs, larvae and pupae. Collectively, these natural enemies reduce the number of eggs that successfully make it to the adult stage and help keep fly populations to manageable levels.

Actions by CFO operators can either encourage the activity of natural enemies or hinder it. The use of insecticides to kill flies will also kill natural enemies. Therefore, cultural control practices are preferred for fly control because operators can control the fly population while maintaining the population of natural enemies. Temperature, moisture and the availability of breeding material are the three critical factors operators can alter to manage fly abundance on their operation.

Temperature dictates how fast fly development can take place. The natural fluctuating temperatures and humidity in the environment help regulate the development of flies, quickening or slowing development with warmer or cooler temperatures. In the constant warm temperatures of animal housing, flies may complete their lifecycle in one to two weeks versus the normal two to three weeks occurring in a natural outdoor environment. As long as temperatures are warm enough to support development, fly populations will sustain themselves and continue to increase until some other factor controls or limits their development.

Flies breed in moist habitats in order to increase the survival of fly eggs and larvae. These immature stages do not have a strong body coat (exoskeleton) to protect them from water loss. Therefore, when environmental conditions are warm and dry, many fly eggs and larvae may die prior to adult stage due to dehydration. When organic material such as manure or moist feed decomposes, it generates a lot of heat. This heat combined with moisture creates a microclimate that supports fly egg laying and larval development. This breeding material also protects eggs and larvae from extreme weather, changes in temperature and from some predators.

Producers may not be able to control the ambient temperature and humidity on their operation, but they can actively control the availability and the nature of fly breeding material. Any practice that limits degradation of organic material (e.g., drying the material) or removes places suitable for fly larval development will reduce the potential for abundant fly breeding.

Principles of a Fly Management Program

A fly management program should include some form of monitoring and a combination of control methods in order to target various stages of the lifecycle. Fly populations are rarely, if ever, made up entirely of a single stage in the lifecycle. Often there are many more thousands of larvae present than there are adults at any given time. It is for this reason that chemical control of adult flies rarely results in control of the entire population.

Monitoring Methods for Flies

Monitoring for Adult Flies

Monitoring the adult portion of the population is the easiest method for monitoring population growth. However, it is important to remember that adult flies are only the tip of the iceberg. Confined feeding operators may also find it useful to identify areas where fly larvae are likely to develop and inspect these areas for the presence of developing larvae and pupae. Inspecting typical fly breeding habitat can provide an early indication of a future fly outbreak and can also indicate when more stringent sanitation is needed to control the present population.

Spot Card Method Fly spot cards are easy to use and are intended for monitoring infestation and evaluating the success of fly control measures. Spot cards do not provide a direct measure of fly numbers because they only track the number of fly spots (regurgitation spots or fly fecal matter) left behind. A single fly can produce multiple spots on one card. Also, spot cards cannot identify the different species of flies present (except if there are stable flies because their spots are typically reddish in colour due to their blood feeding behaviour).

Figure 1.8 Example of a spot card placed on a beam in a livestock barn

How to use: Place ten 3 x 5 inch spot cards in areas of the barn where flies congregate to rest. You can use index or recipe cards as spot cards. Number each location and record the date on the card using a pencil. Place the cards out of reach of animals and keep them protected from the rain and weather. Change spot cards weekly. An average of 100 spots per card per week is considered a relative treatment threshold for house flies and also indicates a high level of fly activity. Comparing spot numbers on the cards to general observations of fly numbers helps develop a rule of thumb for estimating fly populations.

Animal Leg Counts Stable flies feed on the lower part of cattle legs around the hock. The direct leg count method involves counting stable flies resting on all four legs of at least 15 animals. An average count in excess of 10 flies per animal is considered a high level of activity and warrants management action.

Figure 1.9 Stable flies feeding on the leg of a steer

Baited Jug Traps Baited jug traps are easy to make and provide a method for directly measuring fly activity. Please note that this type of fly trap typically only attracts and captures flies that feed with sponging mouthparts (e.g., house flies, blow flies) and not blood feeding flies (e.g., stable flies).

How to use: Take an empty four-litre milk jug and make four two-inch round holes in the upper half of the jug. Make sure to replace the cap so that the only entry into the trap is through the four holes. This will serve as the fly trap. Place one ounce of dry house fly bait mixture (see local retailer) inside the jug. Hang baited jug traps from the ceiling of the barn in areas where flies congregate. Install several jugs throughout the barn. Change the fly bait and collect and count the dead flies weekly. If required, save some flies for species identification and evidence (for more information regarding proper preservation of fly samples, please see Appendix 1). An average fly count of 250 flies per trap indicates a high level of activity.

Figure 1.10 Example of a (a) home made baited jug trap (b) retail baited jug trap

Monitoring for Fly Larvae

Monitoring for fly larvae is a laborious process but sometimes necessary to identify the source of a fly outbreak, or when decisions need to be made regarding changes in manure handling and facility maintenance in order to control a fly problem. If specific sites are found to harbour a large number of larvae and pupae, they can become priority areas in regular clean up and maintenance activities.

Figure 1.11 Fly third instar larvae and dark brown pupae

Inspect all suspected fly breeding habitats by removing thin layers of the material and closely inspecting for the presence of larvae and pupae. The darker pupal cases and whitish third instar larvae can be seen with the naked eye and are typically in clusters. Key places to look for larvae and pupae are moist accumulations of organic matter (e.g., manure, hay, bedding, straw, silage).

Control Methods for Fly Populations

Flies are inevitable on a CFO due to the nature of farms, but it is important to manage the population below levels that could cause production losses or nuisance concerns. A successful fly management program involves multiple control methods targeting various stages of the lifecycle.

Cultural Control Methods

Confined feeding operators can limit the potential for fly outbreaks by regularly cleaning up and removing areas that support larval development. Flies will not commonly lay eggs in material that is dry; therefore, preventing moisture in potential fly breeding areas is an important factor in fly control. Without reducing the number of breeding sites, even chemical controls will fail. Thus, cultural control is critical in controlling fly populations.

A properly designed facility will have reduced fly problems. Adequate drainage from pens and the farmyard will prevent wet spots and water accumulation, resulting in faster drying of areas with manure. The basic design of a livestock or poultry facility that facilitates easy manure removal, keeps the feeding area dry, and supports proper ventilation and airflow will also reduce the chances of a fly problem. The goal is to reduce the hospitability of the operation for fly development and make fly management easier.

Covering and protecting feed (silage, hay bales and grain) from moisture minimizes rotting and material breakdown, consequently reducing the suitability of the material as fly breeding habitat. Cleaning up spilled grain from under augers and uneaten feed from feed bunkers also removes potential breeding habitat. Similarly, managing manure accumulation can reduce the abundance of fly breeding. Confined feeding operators, depending on the type of operation, can decrease the potential of fly breeding by either 1) frequently removing manure or 2) allowing manure to accumulate over a prolonged period of time. These two management systems work differently in controlling the availability of suitable breeding habitat and need to be managed properly to be effective.

Frequent manure removal systems are commonly used in dairy and hog operations. When manure is frequently and completely removed by scraping and/or flushing, there is no material left behind for fly breeding. Provided these systems are designed carefully and function properly, most fly breeding will be eliminated. However, it is common for these systems to leave small pockets of manure in corners, edges, and areas under railings that will support fly breeding. It is important that these small pockets of remaining manure are manually removed and cleaned up to effectively control fly breeding. Managing manure in storage systems is also an important consideration. Floating mats of manure and debris in open lagoons will support fly breeding; therefore, it is important to have a properly designed manure storage system to accommodate frequent manure removal. It is also important to properly manage these storage systems to prevent fly breeding and nuisance fly outbreaks.

Prolonged manure accumulation typically occurs in cattle feedlots and poultry barns. Accumulated manure systems only work effectively if the manure is made unsuitable for fly breeding and larval development. This happens when the manure is compacted or regularly disturbed by high animal traffic or when is it is dried through proper ventilation to the point where it no longer supports larva survival. Accumulated manure is also a suitable habitat for predators and parasites that attack the fly egg, larva and pupa, reducing

fly numbers. As with frequent manure removal systems, the accumulated manure method creates some concerns that CFO operators have to manage in order for the system to be effective.

Target areas for fly control will vary depending on the type of operation. Each site can be controlled through proper management of manure, feeds and facilities. Remember that the objective is to eliminate the moist organic material that supports fly larvae development by drying the material out, compacting it, or removing it frequently. Because the house fly lifecycle is roughly 10 days, maintenance of fly breeding areas should be done on a regular basis, roughly once a week, in order to effectively interrupt the lifecycle and negatively impact the population.

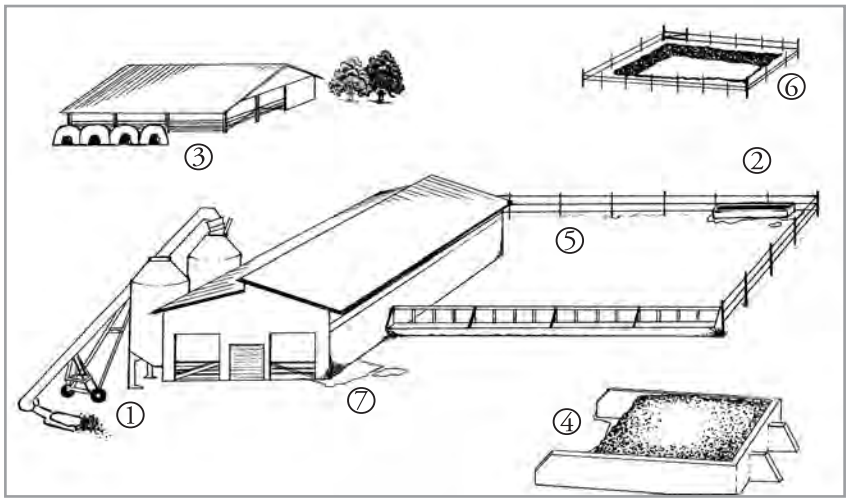

Figure 1.12 Potential Sites for Fly Breeding on a Farm

The following are examples of control measures for sites where flies may breed and population outbreaks may develop (Figure 1.12).

1. Clean up, on a weekly basis, leftover and spilled feed, grain or silage from around silos, feed bins, feed bunkers, and augers.
2. Minimize moist areas around waterers. Utilizing animal watering systems that prevent spillage, leakage and dripping will prevent moisture from coming in contact with manure-mixed soil. Other options could include installing concrete pads underneath waterers.
3. Clean out calf pens, maternity stalls or sick pens on a weekly basis.
4. Cover hay and silage pits to protect from rain and minimize seepage. Control seepage from silage pits.
5. Clean up manure around the edges of pens or stalls that does not get compacted by animal activity. Stock feedlot pens adequately to increase compaction of soil mixed with manure. Scrape loafing areas frequently.
6. Properly maintain manure storage areas and facilities. Agitate liquid manure storage to prevent floating mats of manure and debris. Contour, compact and cover manure piles to prevent moisture infiltration and minimize seepage.
7. Manage surface water run-on and control runoff from barns, livestock yards and manure storage areas.

Chemical Control Methods

Cultural and sanitation methods are the most effective techniques in preventing fly outbreaks. Chemical control should be considered on an as-needed basis and as a final method to achieve the degree of control desired. When using pesticides, the risk of developing chemical resistance increases. Therefore, it is important to limit the use of chemicals on any operation. Insecticide use also poses a risk to livestock, pets, employees and family members. Some insecticides can be quite toxic so reading the label directions and using them properly is highly recommended. Proper personal protective equipment (respirator, gloves, rubber boots, etc.) should also be used to reduce exposure to the applicator and others nearby during application.

There are many different insecticides available on the market for fly control. Visit your local retailer to discuss the various options. Fly control insecticides come in various forms: space sprays, residual wall sprays, fly baits, sticky tapes and larvicides are just a few examples. Remember that the most effective use of an insecticide is in an integrated program with cultural control methods. Insecticide use by itself will only result in short-term control of the population.

Aerosols: An aerosol insecticide (e.g., pyrethrin aerosol spray cans) when used as a space spray gives a quick knockdown of flies in a confined area. This is a temporary fly control measure that kills adult flies exposed to the chemical at the time of application. Aerosols can be applied from handheld containers or placed in battery-operated automatic dispensers. Aerosols are less effective in large open spaces.

Misting: Misting is effective in quickly reducing the numbers of flies in and around a facility. Misting equipment breaks up insecticides into fine droplets by mechanical means or by the shearing action of high volume blasts or both. Special precautions should be made to limit the exposure of livestock and pets to the mist. Wind speed and direction and proximity to animals and animal feed should be considered before and during application.

Fly Sticky Traps: There are various kinds of sticky traps on the market such as: tapes, sheets of paper, plastic, ribbons, and cardboards. Sticky traps contain non-toxic resins with or without pheromones or sex attractants. They catch flies by the sticky nature of the compound. Once the surface area is used up, the traps should be replaced with new ones. These are best suited for indoor use (enclosed or semi-enclosed livestock barns, milk parlours, and other farm buildings).

Container Traps: Retailers often carry various kinds of container traps and baits. They are designed for outdoor use and, depending on the attractant, they can lure flies from six to nine metres (20-30 feet) away. Baits are typically mixtures of insecticide, sugar and an attractant. Common insecticide ingredients in commercial baits are *dichlorvos, methomyl, dichlorfon, and bomyl*. Indiscriminate scattering of bait is wasteful, less effective and increases the risk of exposure to pets and children. Homemade jug traps or container traps purchased from a local retailer can store the bait safely if this method of fly control is chosen. Some of the nuisance flies attracted to this kind of trap are stable flies, blow flies, house flies, blue bottle flies, green bottle flies and various types of small gnats that breed in highly contaminated waters.

Surface Sprays: Insecticides targeting adult flies (adulticides) can be used as surface sprays for walls, posts and ceilings of a building. It is recommended that spraying be restricted to specific areas where flies

congregate to limit chemical use and exposure. Some insecticides used as surface sprays have a longer residual period than those found in aerosols. A coarse spray (40 psi) to wet the surface is sufficient. There is no need to use high-pressure sprayers.

Larvicides: Larvicides are used to spray areas where fly breeding takes place. These chemicals will kill eggs and larvae that ingest or directly contact the chemical. In some countries, oral larvicides are available as animal feed or water additives. Check with your local retailer to determine registration for use in Canada and to discuss the risks associated with the use of these pesticides.

Biological Control Methods

Research in North America has looked at various organisms that have the potential to be used as biological control agents including fungi, nematodes, parasitic wasps, and species of predatory beetles and larvae. Several species of parasitic wasps are now available on the market as biological control agents for the house fly and stable fly.

Parasitoids are typically shipped as immature stages developing inside fly pupae that are packed in sawdust and come to Canada from insectaries in the United States. Parasitized pupae are scattered in the area intended for fly control. The immature parasites kill the parasitized fly pupae and then emerge as adults to locate and lay eggs in other fly pupae in the surrounding area. The unit size of shipped parasitoids and the application (or release) rate is dependent on the parasitoid species, the environment (feedlot versus poultry house), and the target pest fly species.

Fear of chemical resistance, failure of chemical products, concerns over non-target effects on people and animals, or the requirement of non-chemical alternatives in organic livestock production are all possible reasons for CFO operators to consider the purchase and release of biological control agents as a method of fly control. The success rate of biological control agents for fly control has been variable[†], depending on the organism released, the target species, and the environment it is released into (e.g., enclosed barn versus open feedlot). The regular release of parasitic wasps can be useful in a fly management program in combination with various methods of sanitation and the limited use of insecticides.

[†]Currently, research is being undertaken in Canada to try to make the release of biological control agents a more viable option for fly control in confined feeding operations.

Importance of Planning, Communicating and Documenting

Public complaints regarding odour, noise, dust and flies from CFOs have become a significant issue faced by the industry. The best way to avoid conflict with the public is to plan ahead, communicate with the community and document the actions taken on the operation to manage potential issues that may draw complaints. Operators that assume responsibility for their operation's impact on the environment and surrounding neighbours and take a proactive approach will prevent problems and complaints before they occur.

Having a fly management program helps an owner or operator focus on understanding and controlling the fly populations generated on the CFO. It is a good idea to plan and document a fly management program and to record the actions taken to achieve that plan, such as a cleaning schedule, when insecticides were used, or when fly or spot counts were collected as part of a monitoring schedule. This written document and record keeping will be helpful if the owner or operator is ever asked about their fly management by neighbours, or by a Natural Resources Conservation Board (NRCB) Inspector investigating a public complaint. Having something to show neighbours will help alleviate their fears that nothing is being done to limit the operation's impact on their quality of life. It can also serve as a report card of how management practices are improving on the operation.

Talking with neighbours about the steps being taken to minimize fly nuisances will increase the operator's credibility as a good manager and may encourage better communication of issues or concerns before a formal complaint is made with the NRCB. Good public relations are becoming ever increasingly important. Having a fly management plan and sharing the actions taken with neighbours can help maintain positive community relations.

Summary

Confined feeding operators can better control fly populations on their operation by understanding the fly lifecycle and the importance of a fly management program that uses more than one control method. Identifying sites on an operation that support fly development is key to removing and eliminating suitable fly breeding habitats and effectively disrupting the lifecycle. Monitoring fly populations will help operators determine the success of their fly control measures and help them identify when measures need to be improved. Operators with a fly management program will help reduce their risk of negative economic impacts from fly activity and prevent the occurrence of nuisance complaints from neighbours.

References and Additional Information

Alberta Agriculture and Rural Development

The following publications are available by contacting the Publications Office at 1-800-292-5697 (toll-free in Canada) or online at www.agric.gov.ab.ca. The Ag-Info Centre toll free in Alberta at 310-FARM (3276) is also available for access to specialists, information and services.

- **Beneficial Management Practices: Environmental Manual for Feedlot Producers in Alberta.**
- **The Beef Cow-Calf Manual.** Agdex No. 420/10
- **Alberta Feedlot Management Guide.** 2nd Edition.
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Other

- **Fly Control in Livestock and Poultry Production.** Novartis Animal Health Inc. Available at: http://www.flycontrol.novartis.com/species/en/index.shtml
- **A Guide for the Control of Flies in Nebraska Feedlots and Dairies.** John B. Campbell, Extension Entomologist. University of Nebraska-Lincoln Extension, Institute of Agriculture and Natural Resources. Revised March 2006.
- **Stable Fly Control on Cattle.** John B. Campbell, Extension Entomologist. University of Nebraska-Lincoln Extension, Institute of Agriculture and Natural Resources. Revised June 2006.
- **Sanitation for Fly and Disease Management at Confined Livestock Facilities.** John B. Campbell, Extension and Research Entomologist and Duane Rice, Extension Veterinarian. University of Nebraska-Lincoln Extension, Institute of Agriculture and Natural Resources. Revised August 2006.

Appendix 1 - Keeping Proper Fly Samples

There may be times when samples of adult flies need to be collected to have the species identified by an expert. Ideally, flies should be collected live or from bait stations or fly traps one to two days after they have died. Flies that have been collected weeks or months after they have died are often missing parts, shrivelled and may be mouldy which makes species identification much more difficult.

Collected flies should be put into a small glass container filled with rubbing alcohol. A tightly sealed baby food jar is ideal for this purpose. The bottle protects the flies from being crushed when sent by mail. The rubbing alcohol prevents the flies from rotting. A piece of paper should be placed in the jar with the flies. The following information should be written in pencil on the paper:

- Who sent the flies
- Where they are from (nearest town)
- Where they were collected (e.g., cattle barn, poultry house)
- When they were collected (day, month, year)

Do not use ink, which will run when the paper is placed in the rubbing alcohol.

Note that there may be a cost associated with fly identification services, but species identification will provide some insight to where a population outbreak may have begun. It may also be critical in determining the most effective way to control the population based on its known lifecycle and typical breeding habitat. Sample collection may also be useful in clarifying what species are present on an operation in an effort to resolve a nuisance complaint. Occasionally, the fly species present on an operation may or may not be the same as those causing nuisance to the neighbours. Therefore, the cost of species identification is relatively small compared to the benefit of knowing this information.

To find a laboratory that will identify fly species, contact the nearest Natural Resources Conservation Board (NRCB) office or contact Alberta Agriculture and Rural Development at the Ag-Info Centre, toll-free in Alberta, at 310-FARM (3276).