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IPM for Managing Barn Flies

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Overview

Concept	Activity	Handouts
<p><i>This module includes an optional barn and yard walk. If you elect to do this, your host will be allowing participants to examine and evaluate the farm's current fly situation, and suggest possible improvements. This must be handled with tact and sensitivity and you must ask permission ahead of time. More below</i></p>		
<p>Flies may cause economic damage. The cumulative effect of flies along with other livestock pests—lice, mange, and external parasites—can reduce milk production, feed conversion efficiency, and grazing time. They also transmit disease and cause blood loss.</p>	<p>#1: Monitoring Barn Flies</p>	<p>A. <i>Barn Flies Happen</i> (quiz) Your state's fly ID sheets or download ours: (http://www.nysaes.cornell.edu:80/ipmnet/ny/livestock/barn.flies/barn.flies.html)</p> <p>B. <i>Fly Features and Life Cycles</i> C. <i>Barn Flies: the Problem</i> D. <i>Barn Flies: the Solution</i> E. <i>Sanitation Survey</i> (use one copy)</p>
<p>Fly populations can quickly become resistant to insecticides. A range of management techniques—biological, cultural, and chemical—is necessary to prevent massive population explosions.</p>		
<p>Flies tend to breed in predictable places—and some unanticipated places, too. It's important to locate breeding sites and learn the best management techniques for each type of situation.</p>	<p>#2: Optional Barn and Yard Walk</p>	<p>E. <i>Sanitation Survey</i></p>
<p>Resources</p> <p>Integrated Fly Management around Confined Livestock, video (622VIFM) Cornell Cooperative Extension</p> <p>Pest Management Recommendations for Dairy Cattle. Cornell and Penn State Cooperative Extension Publication. State College, PA: Penn State University http://www.nysaes.cornell.edu/ipmnet/ny/livestock/dairyinfo.html</p> <p>Livestock and Livestock Building Pest Management. Ohio State University Extension Bulletin 473</p>		<p>Related Topics:</p> <p>Module 11: Manure as a Resource</p>

Here's what you'll do:

Beforehand

- ◆ Set this up with a cooperating farmer ahead of time. In particular, discuss your host's willingness to do Activity #2. Meet your host a week beforehand to walk through the areas you'll be examining during class, and be sure he or she is comfortable with the plan. Put blank, dated "fly spot" cards in place.
- ◆ Count spots on your "known # of spots" card (see page 13).
- ◆ Remind people to wear barn boots to the meeting. Bring boot wash kit or plastic booties.

Today, on site

- ◆ Learn how barn flies affect both animal health and the bottom line—profits.
- ◆ Learn why no single control method works for long.
- ◆ Learn which factors favor or mitigate fly breeding.
- ◆ Learn how to judge relative fly populations, determine treatment thresholds, and devise a management plan.

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IPM for Managing Barn Flies

ACTIVITY #1: Monitoring Barn Flies

Setting	Time Required	Materials	Handouts
<p><i>Barns and these areas: livestock confinement, calf holding, and animal loafing.</i></p> <p><i>Any time it isn't too busy, as long as there are flies to be seen. Peak populations are usually expected from mid-June to mid-August.</i></p> <p><i>Start inside, if possible, where people can work at a table or clipboards. If you can't arrange this, meet in the barn.</i></p>	<p><i>Up to 1 hr</i></p>	<p><i>clipboards and pencils</i></p> <p><i>(1) 3x5 index card with a known number of fly spots on it</i></p> <p><i>(6-10) 3x5 index(fly spot) cards (installed previous week)</i></p> <p><i>(2 or 3) 3x5 piece clear acetate marked with 1-inch squares</i></p> <p><i>collection jars</i></p> <p><i>magnifying lens</i></p> <p><i>collected fly specimens (for off-season meeting)</i></p> <p><i>biosecurity: boot wash kit or plastic disposable boots</i></p> <p><i>trowels</i></p>	<p><i>A. Barn Flies Happen (quiz)</i></p> <p><i>Your state s fly ID sheet (or download ours see overview)</i></p> <p><i>B. Fly Features and Life Cycles</i></p> <p><i>C. Barn Flies: the Problem</i></p> <p><i>D. Barn Flies: the Solution</i></p> <p><i>E. Sanitation Survey (one copy for activity #1)</i></p>

Q:	Pose a series of questions:	A:
<p><i>For starters, an announcement: trade names used herein are for convenience only. No endorsement of products is intended, nor is criticism of unnamed products implied.</i></p> <p><i>These guidelines are not a substitute for pesticide labeling. Read the label before applying any pesticide.</i></p>		
<p>What types of animal facilities do each of the participants have?</p>	<p><i>Answers vary</i></p> <p><i>Free stalls, tie stalls, calf hutches, calf greenhouses, etc...</i></p>	
<p>How do people perceive their annual fly problems?</p>	<p><i>Answers vary</i></p> <p><i>None, low, moderate, high...</i></p>	
<p>What are the different control techniques that people use? How effective are they?</p>	<p><i>Answers vary</i></p> <p><i>Sanitation, fly baits, sticky tapes, parasitoids, insecticides...</i></p>	
<p>What are participants' overall manure management practices?</p>	<p><i>Answers vary</i></p> <p><i>Clean out frequently, storage, bedded pack, cow vs. calf area...</i></p>	
<p>How do house and stable flies affect livestock?</p>	<p><i>They cause or transmit:</i></p> <ul style="list-style-type: none"> ◆ Irritation and annoyance stresses animals, reduces amount of time they spend grazing as well as feed conversion efficiency ◆ blood loss, as well as hide damage and hair loss ◆ diseases 	
<p>Can these problems affect long-term performance?</p>	<p><i>Yes. Calves harassed by flies and other external parasites may have lowered performance over their life spans.</i></p>	

Q:	Continue your discussion	A:
<p><i>Hand out the Barn Flies Happen (quiz) and some clipboards. Or go someplace where participants can work at a table. Allow time for participants to record and respond. Discuss the quiz at the end of the session to find out and clarify things that people still may not understand.</i></p>		
<p>What are the economics of fly IPM?</p>	<p>You can lower fly populations by 50% or more. You can reduce pesticide costs by up to 80%—and you don't need to suit up nearly as often. Nor will you need to keep hunting down new insecticides as flies develop resistance to older ones. You'll be protecting beneficials as well. Contented cows and happier farm workers are plusses, too.</p>	
<p>Can you give a dollar figure for lost production due to flies?</p>	<p>We can't break it down that far, but studies show that the cumulative effect of flies along with other livestock pests—lice, mange, and other external parasites—can cause annual production losses ranging from 5 to 25%. In other words, assuming milk prices at \$13.50 per cwt., you could lose anywhere from \$94 to \$470 per cow, or \$47,000 per hundred lactating cows per year.</p>	
<p>What other problems can barn flies cause?</p>	<ul style="list-style-type: none"> ◆ Public health concerns ◆ Neighbor relations may sour ◆ Passing—or not passing!—milk house inspections ◆ Resistance to insecticides ◆ Worker discomfort and safety issues 	
<p><i>Mini-lecture:</i> <i>Insecticide-resistant populations of houseflies have been detected from virtually every dairy farm tested in NY. These populations have been particularly resistant to residual spray materials such as permethrin (Ectiban and Atroban) and rabon. To protect beneficial insects (spiders, also) and minimize risk of developing insecticide resistance, these materials should be used sparingly and only as a last resort to control fly outbreaks that cannot be effectively managed by other means.</i></p>	<p><i>Back at the barn, hand out Fly Features and Life Cycles. Examine live flies (or pinned specimens) with a magnifier. (Stable flies especially remain on walls for easy viewing of mouthparts.) Compare and contrast the differences in insect morphology (note pointed, spear-like proboscis on stable fly), life cycle, etc. Key points of comparisons houseflies don't bite, have shorter life cycles. If you manage for house flies you are likely to break the life cycle of stable flies.</i></p>	
<p><i>Now ask (encourage each person to respond in turn):</i> What is your “rule of thumb” for deciding when you need to control for flies? <i>Discuss the advantages and disadvantageous of different approaches. Some are quick and dirty, others involve more work but provide longer-lasting control, etc.</i></p>		
<p>Can we rely solely on visual inspection for flies?</p>	<p>Probably not...</p> <ul style="list-style-type: none"> ◆ Perceptions of “the problem” often vary with the individual... can lead to miscommunication. ◆ It's hard to compare from week to week, let alone year to year. ◆ Adult flies are the tip of the iceberg. The issue is: where are the maggots? <p><i>Written notes and records are more reliable than personal memory!</i></p>	
<p><i>Hand out ID sheets and prepare a Sanitation Survey for one person to fill out. If you aren't already there, go to the barn where you installed the fly spot cards last week. Be sure you've got a couple trowels handy.</i></p> <p>Note: Use good biosecurity practices: provide disposable boots or sanitize footwear, trowels, etc. with a sanitizing cleanser or 10% bleach solution before and after visiting the barn areas.</p> <p><i>Say that you'll be using two assessment methods direct and indirect to assess fly populations and the extent of current control. But first, just look around</i></p>		

Q:	Still more discussion	A:
<p>Where are most of the flies congregating? <i>Where are they breeding?</i></p>	<p>Windows... <i>but they breed in corners...</i> water sources... feed bunks... calf bedding... any place where moisture and organic matter coincide. <i>Moisture, not manure, is key. Too dry or too wet and they can't breed. And they need oxygen, so they won't breed in the middle of the manure pack.</i></p>	
<p><i>Hand out a couple of trowels.</i> What do we find when we dig into some of those areas? <i>Mention that what we've just done is a direct assessment.</i></p>	<p>Other sorts of insects... fly cadavers infected with fungal disease... fly pupae with emergence holes... <i>Note presence of parasitoids and predators you'll probably see mites as well as ground beetles and rove (staphylinid) beetles.</i> <i>Also note any other pests you find, such as rat-tailed maggots.</i></p>	
<p><i>Point out the fly spot cards you put up last week. Take one down and describe its use as an indication of thresholds. Show how you noted date and location on each card.</i></p> <ul style="list-style-type: none"> ◆ <i>Now hand out a couple pieces of calibrated acetate and have people gauge the numbers of fly spots. Ask someone to record them on the Sanitation Survey. These numbers give you a relative gauge of fly population density.</i> <p><i>There's another way to estimate fly populations, too: the baited jug trap method.</i></p> <ul style="list-style-type: none"> ◆ <i>Place baited jug traps throughout the barn in areas where flies tend to congregate (calf pens, feed storage or feed bunk areas, tie stalls, etc.). Change weekly. Follow label instructions.</i> 		
<p>What are the advantages of fly spot cards or baited jug traps? Their disadvantages?</p>	<ul style="list-style-type: none"> ◆ <i>Easy to use.</i> ◆ <i>Results can be compared over time (remember to date and identify fly spot cards!).</i> ◆ <i>May help address nuisance fly complaints.</i> ◆ <i>BUT they don't provide a direct measure of fly numbers.</i> ◆ <i>And estimates may be skewed if flies may be coming on to the farm from off-site breeding areas.</i> ◆ <i>Nor do they tell you which kind of flies you've got.</i> <p><i>We'll discuss the ramifications of this in just a minute...</i></p>	
<p><i>Fly spot cards and baited jug traps can also help you track the effectiveness of fly management practices, including use of insecticide sprays.</i></p> <p><i>If you spray but still find lots of flies or spots, it may be that some aspect of your fly management program is less than effective including the possibility that flies are becoming resistant to sprays, or that timing, application methods, calibration, or spray rates are inadequate or incorrect.</i></p>		
<p>OK—you've estimated the numbers, but what do they mean?</p>	<p>An average of 100 spots per card, per week, is a suggested action threshold for treating fly problems.</p> <p>Average trap counts in excess of 250 flies per trap (about 1/4 cup of flies) indicate high levels of fly activity.</p> <p>Comparing spots on cards to your visual impressions of fly numbers helps you develop another rule of thumb for guestimating fly populations.</p> <p><i>Of course, each farmer's tolerance will vary some. 100 spots per card or 250 flies per trap per week may be too high a threshold for some. Encourage people to identify their tolerance level and keep records of fly populations over time.</i></p>	
<p><i>When fly spots begin to top out at over a hundred per card or you've got more than about 1/4 cup of flies in your trap check barns and calf holding areas to find the breeding sites.</i></p> <p><i>Noting location on cards helps identify the relative location of possible fly breeding sites.</i></p>		
<p>When are we likely to have the highest populations of flies?</p>	<p>Usually flies peak from late May to mid-August (depending on your location)—but they may increase during cooler fall weather as flies immigrate from outside.</p>	

Q:	Carry on	A:
<p>Stable flies are harder on cows than house flies are. The cards don't reliably* distinguish between them. How can we be sure we're treating them when we need to?</p> <p><i>*Stable fly spots may be a dark brownish-red color that s from the blood content (they bite, then drink blood.).</i></p>	<p>Check at least 15 animals at random and count the total number of flies on all four legs of each. Be sure to monitor calves and young heifers.</p> <ul style="list-style-type: none"> ◆ Note scarred or pocked areas on animals' hair coats, lower legs, and bellies. ◆ An average of 10 stable flies per all four legs of an animal is a suggested action threshold—regardless of what the fly spot cards indicate. 	
<p><i>Hand out copies of Barn Flies: The Problem and Barn Flies: The Solution. Refer to them during the next discussion.</i></p> <p>So—we've got flies. What can we do to manage them?</p> <p>Spray recommendations vary from state to state. Check your state s pesticide regulations and read and follow the label.</p>	<ul style="list-style-type: none"> ◆ Remove manure, wet bedding, spilled silage, etc. weekly or more often. <p><i>Mini-lecture: Three most important rules in fly IPM: sanitation, sanitation, sanitation. Waste management is the first line of defense.</i></p> <ul style="list-style-type: none"> ◆ Put up sticky tapes or ribbons. (These also provide a relative indication of fly populations.) ◆ Set out insecticide fly baits in jug traps. ◆ Baits and synergized pyrethrin space sprays present relatively low risk to both parasitoids and predator populations. ◆ “Least harmful” pyrethrin sprays include Agway Residual Milk Room and Parlor Spray, Py-Vona, and C-Em-Die. ◆ Use residual premise sprays as a last resort. Permethrin (Ectiban, Atroban), cyfluthrin (Tempo), naled, tetrachlorvinphos (Rabon), and dimethoate (Cygon) are very harmful to beneficials. Don't use them till late in the season—August 1st or so. ◆ Parasitoid releases. 	
<p>Why not use residual sprays sooner?</p>	<p>They expose both pests and beneficials to the effects of the insecticide over extended periods of time—and can increase the rate of resistance development. <i>(Check your state's recommendations.)</i></p>	
<p>Won't predators and parasitoids do the job?</p>	<p>Not by themselves, unfortunately. Flies develop twice as fast as parasitoids and lay 10 to 40 times as many eggs.</p> <p><i>But natural enemies have great potential when integrated into a least-toxic fly management program.</i></p>	
<p>In the handout it says to adjust predator releases according to the situation. How do we do that?</p>	<p>It's an experiential thing. It can vary with the farm, type of barn, manure management, drainage, etc. But mostly it depends on sanitation.</p> <p><i>Repeat the mini-lecture: Three most important rules in fly IPM: sanitation, sanitation, sanitation. Waste management is the first line of defense.</i></p>	
<p>Why such a difference between releases for cows and calves?</p>	<p>Calf pens are the primary fly breeding area on many farms.</p>	
<p>How long should we monitor fly populations?</p>	<p>Roughly from Memorial Day <i>(in Delmarva, as early as late April)</i> through the first frost. (Of course, the rate of fly development depends on temperature.)</p>	
<p>How can we keep milk rooms “fly-free”?</p>	<p>Use screens and—if the inspector allows—sticky ribbons.</p>	
<p><i>Hand out copies of Sanitation Survey for each participant to use at home.</i></p>		

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ACTIVITY #2: Optional Barn and Yard Walk

Setting	Time Required	Materials	Handouts
<p>Barns and these areas: livestock confinement, calf holding, and animal loafing.</p> <p>Any time it isn't too busy, just so long as there are flies to be seen. Peak populations are usually expected from mid-June to mid-August.</p> <p>Start inside, if possible, where people can work at a table or clipboards. If you can't arrange this, meet in the barn.</p>	Up to 1 hr	<p>clipboards</p> <p>collection jars</p> <p>magnifying lens</p> <p>biosecurity: boot wash kit or plastic disposable boots</p> <p>trowels</p>	E. Sanitation Survey (one copy for this activity)

Q:	Survey and discussion	A:
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Optional farm tour which you cleared ahead of time!

Again fly control can be a **very sensitive issue**.

Be sure you discussed the particulars **and walked it through** with your host ahead of time!

After all, the group will be going through all your host's barns and feed storage areas, even manure handling areas.

Everyone will be assessing the setup for what works and what doesn't, and evaluating the results on site.



Thank your host for inviting the group to go mucking around looking for flies and explain that he or she graciously left certain conditions for demonstration purposes.

Hand out the Sanitation Survey.

We've already checked some areas for fly larvae and pupae and for beneficial organisms. Now let's take a closer look at the maternity and infirmary pens, calf holding pens, heifer stalls, feeding areas, and waste handling areas. We'll analyze each situation, discuss any problems we see, and talk about solutions.

In each animal area, note if feed and water are separate or close by and look at the drainage. (Identify improvements that could be made.)

As you take the group through the following questions and comments, ask someone to record the group's observations on the Sanitation Survey

You may analyze the survey as you go or wait till you're done with the tour.

In calf holding areas

Calf pens are the primary fly-producing areas.

Calves are small and don't crush larvae. Also, pens aren't cleaned daily.

Where do we find breeding in calf-holding areas?

- ◆ Look around spilled water and feed, in corners and bedding outside the pen.
- ◆ Feed and water should be separated.
- ◆ Consider the overall drainage—can it be improved?

Ask: where can we put fly spot cards?

Q:	Survey and discussion	A:
<p><i>In the large animal areas</i></p> <p>Large animal areas generally produce flies only where animals can't easily stand (the animals' weight crushes and kills fly larvae).</p>	<p><i>Where do we find breeding In stanchion and tie-stall barns?</i></p> <ul style="list-style-type: none"> ◆ Flies generally breed in difficult-to-clean areas. Look under waterers, around poles and posts, in corners, under feed troughs, under stall and fence panels, in manure gutters areas that scrapers don't reach, etc. <p><i>Where do we find breeding in free stall barns?</i></p> <ul style="list-style-type: none"> ◆ Usually these are problem-free. If manure leaks from the ends of the barn, you may have problems. Manure that accumulates in the collection pit can produce flies only if it is not pumped out. ◆ Check feed bunks for spills, etc. <p><i>Where do we find breeding in animal pens?</i></p> <ul style="list-style-type: none"> ◆ Pens that aren't cleaned regularly usually produce flies. ◆ Look under fence panels, around water tanks or feed bunks, at corners and edges, and near doorways. <p><i>Ask: where can we put fly spot cards?</i></p>	
<p><i>Around feeding areas, silos, round bale storage, hay elevators</i></p>	<p><i>Where do we find breeding in feeding areas?</i></p> <ul style="list-style-type: none"> ◆ <i>Outdoor feeding areas produce flies where feed (hay, silage, grain, etc.) mixes with soil or organic matter. Feeding should take place on a concrete pad (where possible); site should have good drainage; area should be cleaned weekly.</i> <p><i>And in feed storage areas?</i></p> <ul style="list-style-type: none"> ◆ Check front and sides of bunker silos... and base of upright silos... look for larvae and pupae. Spilled silage and wet, muddy areas around silos are likely fly production centers. ◆ Bale storage... stable flies reproduce at bale/soil interface. Store on gravel or concrete pad or in well-drained area; cover with tarp where possible. ◆ Hay elevator... area around elevator should be cleaned regularly. <p><i>Ask: where can we put fly spot cards?</i></p>	
<p><i>In the waste handling area</i></p>	<p><i>Where do we find breeding in the waste handling area?</i></p> <ul style="list-style-type: none"> ◆ Manure handling areas (including gutter scrapers, unloaders, and spreaders) can produce flies if not cleaned regularly. ◆ Well-constructed manure lagoons and pits don't typically produce many house and stable flies because they develop a thick, dry crust that's unattractive to fly breeding. Proper site selection, good drainage, and diversion of surface water are crucial. Where possible, mow around the lagoon to help eliminate harbors for insect and vertebrate pests. ◆ But... you can get lots of flies around the edges where crusts only partly form or where water accumulates. In these cases, agitating lagoons or pits breaks up existing—and <i>potential</i>—fly breeding areas. <p><i>Ask: where can we put fly spot cards?</i></p>	
<p><i>Anything else?</i></p>	<p>Any area where organic materials—hay, manure, straw, and grain—mix with soil or water can produce flies—even if these locations are hundreds of yards from animals.</p>	
<p><i>If you missed discussing any points on the Sanitation Survey during your tour do it now.</i></p>		

A. Barn Flies Happen (quiz)

Worksheet for Activity 1

1) Which of the following flies are most commonly found in barns?

House Flies Face Flies Stable Flies Horn Flies

2) Which of the following flies are most commonly found on animals on pasture?

Horn Flies House Flies Stable Flies Face Flies

3) How far can house flies fly?

100 ft 100 yards 500 yards 1 mile More than 1 mile

4) How many eggs does the typical house fly produce over her lifetime?

20-50 100 - 200 400 - 600 2000 - 3000

5) How long does it take a house fly to mature from egg to adult?

@ 68 F: 6-8 days 9-11 days 14-18 days 19-22 days

@ 95 F: 6-8 days 9-11 days 14-18 days 19-22 days

6) How long can the typical adult house fly live?

1 week 2 weeks 1 month > 1 month Not long, if it's in the office

7) If a female house fly started laying eggs June 1st, all of her offspring survive to reproduce, and flies were not controlled, how many total flies could be produced by August 1st (8 weeks)? (circle one):

1 million 10 million 64 million 25 billion

8) Which of the following are blood feeders?

House Flies Stable Flies Face Flies Horn Flies

9) Identify the organism(s) most likely to bite workers around the ankles.

House Flies Stable Flies Barn Cats Horn Flies

10) Which location is likely to be most attractive for fly breeding?

Feed Bunk Silo Stanchion Calf pen Manure Handling area

11) Baited jug traps control which flies?

Stable Flies Face Flies House Flies Horn Flies

12) When using baited jug traps for fly control or monitoring how often should the bait be changed?

Weekly Every 2 weeks Every month Once a season

<i>Answers to barn fly quiz:</i>		
<ul style="list-style-type: none"> ◆ House flies and Stable flies ◆ Horn flies and Face flies ◆ 1 mile usually, can go farther ◆ 400-600 	<ul style="list-style-type: none"> ◆ @68°F 19-22 days, @ 95°F 6-8 days ◆ About 1 month ◆ >25 billion ◆ Stable flies and Horn flies 	<ul style="list-style-type: none"> ◆ Stable flies ◆ Calf pen ◆ House flies ◆ Weekly (read label)

B. Fly Features and Life Cycles

Handout for Activity 1

Fly Features

Features	House fly	Stable fly
Feeding	<ul style="list-style-type: none"> ◆ Non-biting flies: sponge-like mouth parts, non-biting proboscis ◆ Found on animal feeding areas and manure 	<ul style="list-style-type: none"> ◆ Biting flies: obvious spear-like biting proboscis ◆ Attack animals on hocks or lower legs, will attack humans near ankles.
Size	<ul style="list-style-type: none"> ◆ Adults 1/4 inch long; larvae 1/3 to 1/2 inch long 	<ul style="list-style-type: none"> ◆ Adults 1/4 inch long; larvae 1/3 to 1/2 inch long
Resting	<ul style="list-style-type: none"> ◆ Rest on surfaces, near lights, windows, water sources, on animals (especially near eyes and nose). 	<ul style="list-style-type: none"> ◆ Rest on surfaces, near lights, windows, water sources, barn posts, beams, milk lines, on animals, etc. Tend to rest facing head up.
Other Signs	<ul style="list-style-type: none"> ◆ Dark spotting on white-washed areas, lights, and other resting areas 	<ul style="list-style-type: none"> ◆ Dark spotting on white washed areas, lights, and other resting areas ◆ Animals stomp hooves to dislodge flies, some hair loss on body areas attacked by flies.
Threshold	<ul style="list-style-type: none"> ◆ An average of 100 spots per card per week is considered a relative treatment threshold. 	<ul style="list-style-type: none"> ◆ An average of 100 spots per card per week is considered a relative treatment threshold. ◆ Visual inspection of animals: average of 10 flies per 4 legs.

and Life Cycles:

Life Cycle	House fly	Stable fly
Breeding Area	<ul style="list-style-type: none"> ◆ Moist areas, manure, wet straw, decaying silage, spilled feed, calf bedding, and other decaying organic matter 	<ul style="list-style-type: none"> ◆ Moist areas, spilled feed, manure, straw or other vegetation, and calf bedding. At soil interface around round bales, base of silo or feed bunk, barn door threshold to loafing area, piles of vegetation (grass clippings, etc.)
Overwinter	<ul style="list-style-type: none"> ◆ Continuous breeding 	<ul style="list-style-type: none"> ◆ As pupae
Fecundity	<ul style="list-style-type: none"> ◆ Females lay 5 to 6 batches of 75 to 100 eggs at 4 day intervals (up to 600 eggs/female) 	<ul style="list-style-type: none"> ◆ Females lay 200 to 400 eggs over their lifetime
Development Time	<ul style="list-style-type: none"> ◆ Eggs to adults in 10 to 14 days (depending on temperature) 	<ul style="list-style-type: none"> ◆ Eggs to adults in 3 weeks to 3 months (depending on temperature)
Adult Life Span	<ul style="list-style-type: none"> ◆ 19 to 70 days, 25 to 30 days average 	<ul style="list-style-type: none"> ◆ 20 to 30 days average
Generations	<ul style="list-style-type: none"> ◆ 7 to 10 generations per year 	<ul style="list-style-type: none"> ◆ 5 to 7 generations per year

Key points of comparison *house flies do not bite and have a shorter life cycle. If you are managing for house flies you are also likely to break up the life cycle of stable flies.*

Constant temperature	Hours to hatch	Days to pupation	Days to adult emergence	Total days*
68	23	8 - 10	10 - 11	18 - 21
77	14	7 - 8	7 - 9	14 - 17
86	10	5 - 6	4 - 5	9 - 11
95	8	3 - 4	3 - 4	6 - 8

*NOTE: Actual fly development times will vary with normal daily temperature fluctuations.
House flies lay 75-100 eggs per day, and can lay five to six batches of eggs over their lifetime.

C. Barn Flies: the Problem

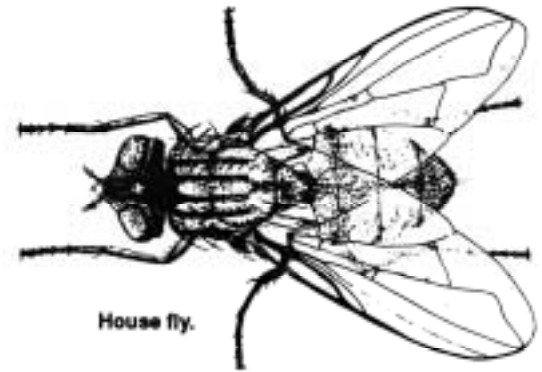
Handout for Activity 1

House flies and stable flies

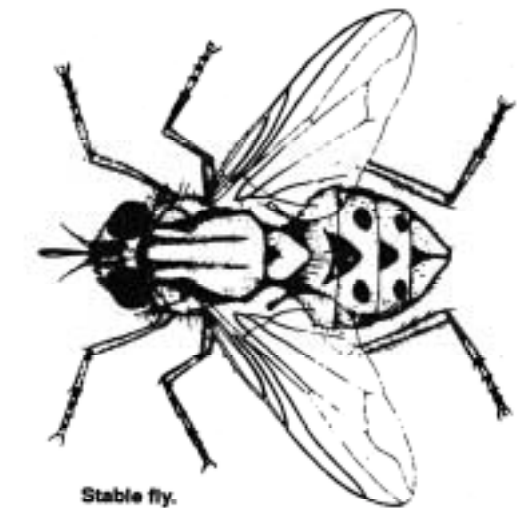
- ◆ annoy cows. They're part of the 5%-25% loss in milk production attributed to all external parasites of livestock
- ◆ annoy farm workers
- ◆ annoy residents, neighbors

Plus you ve got problems with

- ◆ tighter profit margins
- ◆ loss of pesticides—registrations, etc.
- ◆ residential encroachment
- ◆ development of insect resistance to pesticides



House fly.

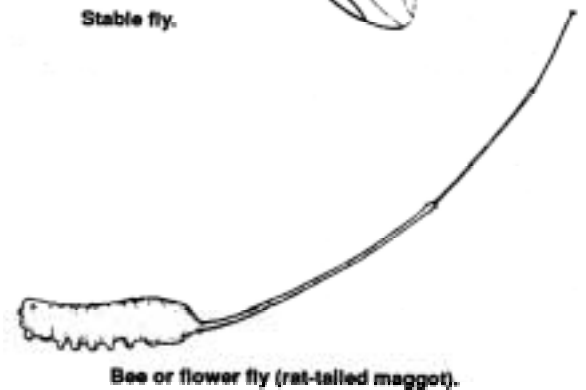
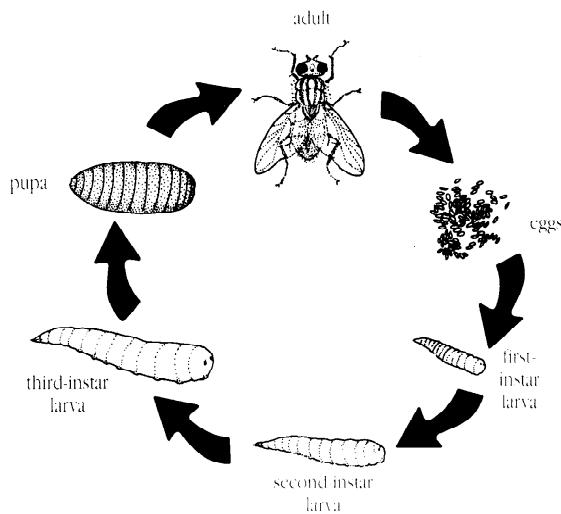


Stable fly.

Cumulative effect of flies, lice, mites, etc.

Estimated annual production loss*	= \$ per cow	X 65 cows = \$ loss per herd
5%	\$94	\$6,110
10%	\$188	\$12,220
15%	\$280	\$18,200
20%	\$375	\$24,375
25%	\$470	\$30,550

*Drummond, R.O, G. Lambert, H.E. Smalley, Jr, C.E. Terrill. 1981. Estimated losses of livestock to pests. IN Handbook of pest management in agriculture. Volume 1. D. Pimentel (ed) CRC Press. pp 111-127.
 Steelman, C. D. 1976. Effects of External and Internal Arthropod Parasites of Domestic Livestock Production. Ann Rev of Entomology 1976 v. 21:155-178.



Bee or flower fly (rat-tailed maggot).

D. Barn Flies: the Solution

Handout for Activity 1

Use several control tactics to maintain relatively low fly populations.

Sanitation (managing manure and organic matter) is your top priority. No other single tactic will be successful for long.

Monitoring and action thresholds

Visual inspection, spot cards, insecticide baited traps.

Spot card method: Place ten 3 x 5 white index cards throughout the barn in areas where flies tend to congregate. Number by location, record the date, and place cards out of reach of animals. Change weekly. Estimate number of fly spots per card. Average counts in excess of 100 spots per card indicate high levels of fly activity.

Baited jug trap method: Place baited jug traps throughout the barn in areas where flies tend to congregate (calf pens, feed storage or feed bunk areas, tie stalls, etc.). Change weekly. Average counts in excess of 250 flies per trap indicate high levels of fly activity. (See chemical controls, below.)

Leg count method (stable flies): Count flies on all four legs of at least 15 animals; average counts in excess of 10 flies per animal warrant management action.

Sanitation:

Good sanitation is the cornerstone of a successful integrated fly management program.

Fly population develops in any moist, undisturbed organic matter.

During warm weather, generation time for flies is 7 - 10 days.

Clean often enough and well enough to disrupt fly breeding.

Biological controls: (Let the good guys help)

Where flies breed, there are usually some beneficial insects, mites, and other natural enemies present. Preserve them by making careful choices on pesticide use.

Supplemental releases: Natural populations of good guys are usually not numerous enough, especially early in the season. Parasitoids can be purchased and released on a regular basis.

We recommend:

Northeast-adapted *Muscidifurax raptor*.

Don't get *Nasonia vitripennis* (good for poultry, though).

200/cow (milking), 1000/calf per week; adjust for your situation.

Release weekly, late May or early June through August.

Place parasitoids near breeding areas (not necessarily where adult flies are seen).

Only supplier in Northeast is IPM Labs, Inc, Locke, NY 13092; (315) 497-3129. No endorsement of this company is implied.

Choose least harmful insecticides to complement parasitoid releases: Use sprays containing synergized pyrethrins such as Agway Residual Milk Room and Parlor Spray, Py-Vona, and C-Em-Die.

Physical controls:

Fly tapes and ribbons, bug zappers, terminator traps, screens, fans, etc. can be helpful.

Chemical pesticides:

Follow your state's guidelines; read and follow pesticide labels.

May be necessary on occasion for knockdown during pest outbreaks.

Insecticide baits in jug traps containing (for example) Golden Malrin, Blue Streak, and Musca-cide fly bait.

Short-residual pyrethrin sprays and baits are less harmful to beneficial species.

Use residual premise sprays, such as permethrin (Ectiban, Atroban), tetrachlorvinphos (Rabon) and dimethoate (Cygon),

only as a last resort.

These materials are very harmful to parasites and predators that attack flies.

Avoid resistance: rotate between chemical families with different modes of action; use pesticides judiciously.

Always follow label instructions.

Keep written records of pesticides used to track rotation and document possible resistance.

Rotate between these insecticide families (check label for current registration):

Botanicals	Insect Growth Regulators	Organophosphates		Pyrethroids	Carbamate
pyrethrin	diflubenzuron	chlorpyrifos	dichlorvos	cyfluthrin	Methomyl
	methoprene	diazinon	dimethoate	permethrin	
		dibrom, naled	tetrachlorvinpho	resmethrin	

E. Sanitation Survey
Worksheet for Activities 1 and 2

Farm _____ **Date** _____

Activity #1: Record fly spot counts:

location	# spots	comments	location	# spots	comments

Activity #2: Identify barn fly breeding areas:

Checkmark (✓) all possible fly breeding locations for presence of moist organic matter (spilled silage or grain, manure, soiled bedding, around waterers, corners, etc.) and for signs of fly breeding.

- ◆ At each site, look for presence of potential fly breeding substrate (bedding, feed, etc.). Checkmark them.
- ◆ For those checked, note fly life stage(s) observed even if you see only one.

Describes site on farm?	Possible fly breeding locations	Breeding substrate present	Fly eggs	Fly maggots	Fly pupae	Fly adults	Comments
(✓)		(✓)	(✓)	(✓)	(✓)	(✓)	
	Calf individual stall						
	Calf pen/tie area						
	Calf hutches						
	Calf "greenhouse						
	In-barn feed area(s)						
	Maternity						
	Hospital						
	Heifer barn						
	Dry cow barn						
	Cow barn #1						
	Cow barn #2						
	Feed-mixing area						
	In-barn feed distribution						
	Door threshold / soil						
	Concrete pad / soil						
	Manure handling area						
	Manure lagoon / pit						
	Standing silo - base						
	Bunk silo - end/edge						
	Big Bale Storage						
	Feed bunk - barnyard						
	Water trough, etc.						
	Wet areas - barnyard						
	Other: (describe)						

<http://www.nysaes.cornell.edu/ipmnet/sare.mod/>

www.nysaes.cornell.edu:80/ipmnet/ne.ipm.region



Module Feedback

IPM for Managing Barn Flies

Adapt this form as needed:

Tell us a little about yourself:

<p><i>I m a</i></p> <ul style="list-style-type: none"> ◆ Farmer _____ ◆ Crop advisor _____ ◆ Industry rep _____ ◆ Extension educator _____ ◆ Other _____ 	<p><i>My commodity area is:</i></p> <ul style="list-style-type: none"> ◆ Dairy and field crops _____ ◆ Vegetables _____ ◆ Fruits and berries _____ ◆ Greenhouse and nursery stock _____ ◆ Other _____
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Let us know what you think:

<p>What part of the workshop was most interesting for you?</p>
<p>What part of the workshop was most valuable to you?</p>
<p>What two new ideas would you like to try on your farm or in your business?</p>
<p>Do you feel you understand IPM—and how to use it—better now?</p>
<p>What other information should be included in this module?</p>
<p>What other topics would you like us to cover in future modules?</p>

Teachers, please fill out an evaluation as well. Photocopy and send all informative evaluations to:

NE-IPM Modules, NYS IPM Program, Box 28 Kennedy Hall, Cornell University, Ithaca NY 14853