Muscid Flies
Diptera: Muscidae
house fly, face fly, horn fly, stable fly

Muscid Flies
Where they're produced

<table>
<thead>
<tr>
<th>Horn fly</th>
<th>fresh manure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Face fly</td>
<td>fresh manure</td>
</tr>
<tr>
<td>House fly</td>
<td>organic material, garbage, feces, wet media to support aerobic microbial fermentation</td>
</tr>
<tr>
<td>Stable fly</td>
<td>mixture of organic material (feed, manure, soil) and moisture (water, urine)</td>
</tr>
</tbody>
</table>

Range and pasture
Confined animal facilities

Horn Fly
Life History

Egg: oblong, white, 25 - 30 per day
Larva: legless, tapered, feed on wet substrate,
Pupa: barrel shaped
Adult: house fly shape

Developmental time: 1 to 3 weeks in summer
Horn fly

Piercing/sucking mouthparts
- Lacerates skin
- Ingest blood: ♂ & ♀
- Obtain all nutrients from blood

Horn Fly Biology Facts

➢ Most common biting fly on pastured cattle in Montana
➢ Prefer mature, weaned cattle, not calves
➢ Adult flies spend 95% time on animal
➢ Both sexes feed on blood, 25X per day

Horn Fly: Veterinary Importance

• Production losses $700 – 800 M due to fighting flies
• Not a biological disease vector
  • Mechanical vector of mastitis?
• Losses attributed to expending energy fighting flies
  • Defensive responses (tail flicks, head tosses, restless)
  • Less time grazing, more time walking
  • Reduced feed efficiency
  • Lower milk production
Horn Fly Economic Threshold

- Established at 300 flies per cow for ≥ 1 month

**THIS INFESTATION LEVEL WILL:**
- Decrease milk production
- Reduce calf weaning weights (10 – 20 lb)
- Decrease grazing efficiency
- Stocker cattle weight reductions (up to 18%)
Horn Fly

Management
Mechanical
Biological
Chemical
- Direct application
- Self-application
- Sustained release devices

Horn fly management

Mechanical
- Physically removing flies from cattle

http://www.youtube.com/watch?v=vANO6N8-i0

Horn fly management

Biological
- Wasp parasites
  - Parasitize pupae
  - Releases across range and pasture labor and cost intensive
  - Short dispersal distances
  - Parasitism rate is low (5% seasonal average NE)
- Predators
  - Staphylinids and histerid beetles
  - Feed on eggs, larvae and pupae
- Competitors for same food source
  - Dung beetles
  - Reduce dung accumulation
  - Improve pastures
  - Increase fertility, Improve soil structure,
Horn Fly Application Methods

Direct Application
• Sprays and pour-ons

Self-application
• Dust bags
• Oilers/backrubbers
• Insecticide ear tags

Feed supplements
• Oral larvicides

Horn Fly management

Chemical

Direct Application
• Sprays and pour-ons
  • Avermectin (ivermectin and generics)
  • Pyrethroids
  • Spinosad
• 2 - 4 wk horn fly control

Chemical

Self-application: Dust bags, oilers
• Forced-use is best
• 75 - 80% control
• 1 bag per 10 - 20 mature cattle
• Check weekly
Horn fly management

Self-application

Oilers/backrubbers

Chain wrapped with burlap
Diesel + insecticide
(1 gal : 1 pint)

Pyrethroids, Co-Ral, Rovral

Insecticide ear tags

* Revolutionized horn fly control
  * Insecticide slowly released
  * Distributed through hair coat
  * Kills horn flies on contact

Insecticide ear tags

Advantages
  * Ease of application
  * Extended efficacy
  * Small amounts of insecticide on specific targets
  * Reduced risk to applicators

Disadvantages
  * Cost
  * Working cattle
  * Resistance
Horn fly ear tag rotation study

- Objective: Horn fly resistance could be prevented by rotating tags with different insecticides and modes of action
- MSU Ft. Ellis Research Farm

3-year tag rotation cycle (Insecticides have different modes of action)
- 2008 (Year 1) – Python Magnum, pyrethroid (zeta-cypermethrin + synergist)
- 2009 (Year 2) – XP 820, avermectin (abamectin)
- 2010 (Year 3) – Warrior, organophosphate (chlorpyrifos and diazinon)
- 2011 (Year 4) – Python Magnum
- 2012 (Year 5) – XP 820
- 2013 (Year 6) – Warrior
- 2014 (Year 7) – Python Magnum
- 2015 (Year 8) – XP 820

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Horn Fly Control: 3-yr. tag rotation cycle

<table>
<thead>
<tr>
<th>Year</th>
<th>Tag</th>
<th>% control</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>Python Magnum</td>
<td>97</td>
</tr>
<tr>
<td>2009</td>
<td>XP 820</td>
<td>96</td>
</tr>
<tr>
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</tr>
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<td>2015</td>
<td>XP 820</td>
<td>92</td>
</tr>
</tbody>
</table>

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Insecticide ear tags:

**Innovative delivery method**

Python strip: zeta cypermethrin + piperonyl butoxide

XP 820 strips: abamectin
Insecticide strips: seasonal adult fly counts 2014

Control
- Avg. 509 flies/cow

Python strip
- Avg. 29 flies/cow

XP 820 strip
- Avg. 26 flies/cow

Innovative Delivery Method:
Mineral Feeder + Insecticide Strips - 2015
Mineral Feeder + Python Strips - 2015

20 strips per feeder
(1 feeder per 10 to 25 head)

Control
- Avg. 416 flies/cow

Treated
- Avg. 128 flies/cow
- Counts below ET
- Resistance Management?

Horn fly management

Sustained release
- Altosid (methoprene) + mineral tub
- Target consumption 4 oz per head per day
- 1 tub per 20 – 30 animals
- IGR passed out in manure, kills fly larvae
- Flies migrate, area wide control necessary

Innovative Delivery Method

VetGun and VetCap
The future for horn fly control?

FlyVax

- Inhibit horn fly's ability to effectively feed on cattle
- Counteracts the horn fly's anti-clotting agent
- Blood clots at the point of the bite wound

http://www.flyvax.com/?dc=1

Face Fly

- Eggs deposited in fresh manure
- Larvae feed in manure
- Pupate in soil
- Adults active from April – October
- Overwinter as adults

Face Fly

Mouthparts
- Spongy with prestomal teeth
- Can't cut skin
- Ingest liquids
- Common among other filth flies

House fly

sponging mouth

labellum

maxillary palp
Face fly

Feeding abrades eye tissues

House Fly  Face Fly

Face fly feeding on conjunctiva

Steer after 8 days of confinement with house flies
Face fly

Effects on cattle
- General annoyance
- Damage eye tissue
- Mechanical vector of pinkeye
  - *Moraxella bovis*
- Biological vector of eyeworm, *Theela*na

Face Fly Management
- Mechanical
- Biological
- Chemical