



Fly Control

John Currin

▶ What do you consider good fly control?

- Control of horn flies
- Control of face flies
- No pinkeye

The Enemies

Horn Fly



Face Fly



Stable Fly



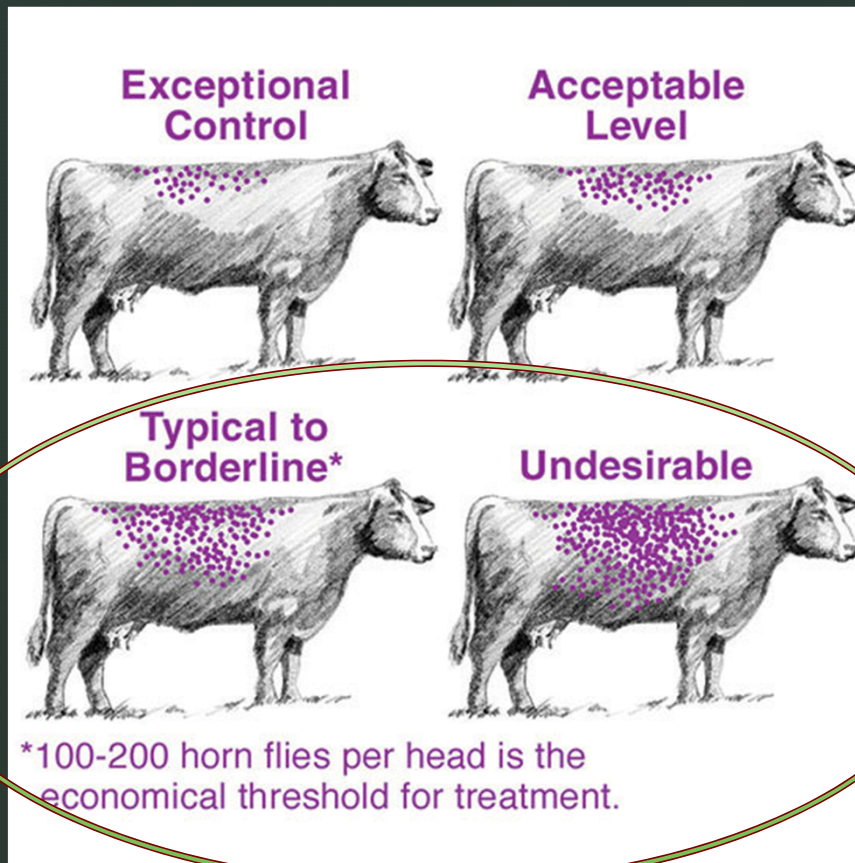
Other problem flies include- horse flies, deer flies

<http://utahpests.usu.edu/schoolipm/structural-pest-id-guide/face-fly>

http://entnemdept.ufl.edu/creatures/URBAN/MEDICAL/Stomoxys_calcitrans.htm

Monitor Horn Flies

More than 200 flies – need control methods



The Drugs

Pyrethrins

Pour Ons
Sprays
Fly Tags
Concentrates

Organophosphates

Fly Tags
Concentrates

Macrocyclic Lactones

Pour Ons
Fly Tags

IGR/Larvicides

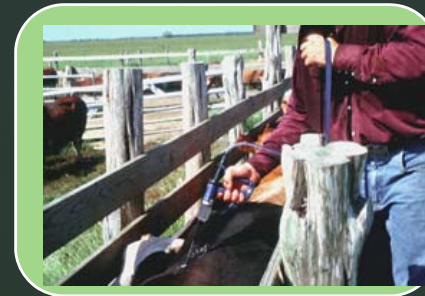
Control Options Flies



Insecticidal ear tags



Backrubbers, dust bags



Pour-on's, Sprays



Oral larvicides/IGR's



Face wipes at mineral feeders



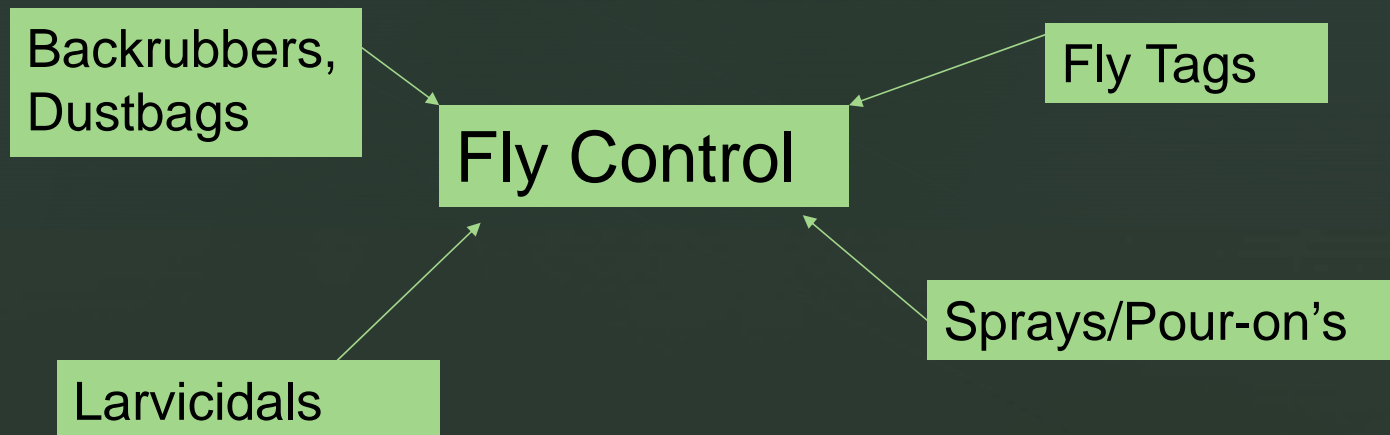
Vet Gun



Resistance

- Rotate Drug classes every time
- Rotate Drug classes annually
- Use the same drug class for everything
- Use multiple drug classes at the same time
- Use multiple avenues to attack flies

Summary – Integrated approach to combat flies in beef cattle



Questions



Why care?

Flies cost the beef cattle industry between
\$500 million and \$1 billion yearly





Face Flies

- Feed on eye and nostril secretions
- Lay eggs in feces
- Transmit pink eye organism
- May not directly affect growth or milk production – welfare issue





Horn Flies

- Spend most of time on cow – around cattle horn bases, shoulders and back.
- Blood feeders – 20 to 40 blood meals per day
- Lay eggs in manure
- Results in decrease in grazing time, depressed milk production, hide damage and decreased weight gain
 - Horn fly control can mean an additional 12 to 20 pounds of weight gain per calf over summer

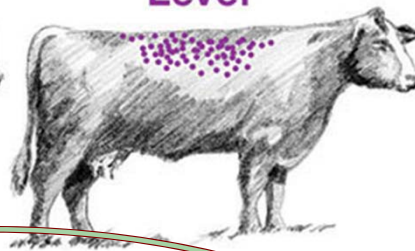
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More than 200 flies – need control methods

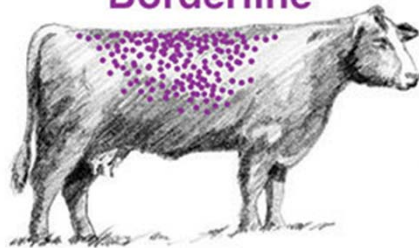
Exceptional
Control



Acceptable
Level



Typical to
Borderline*

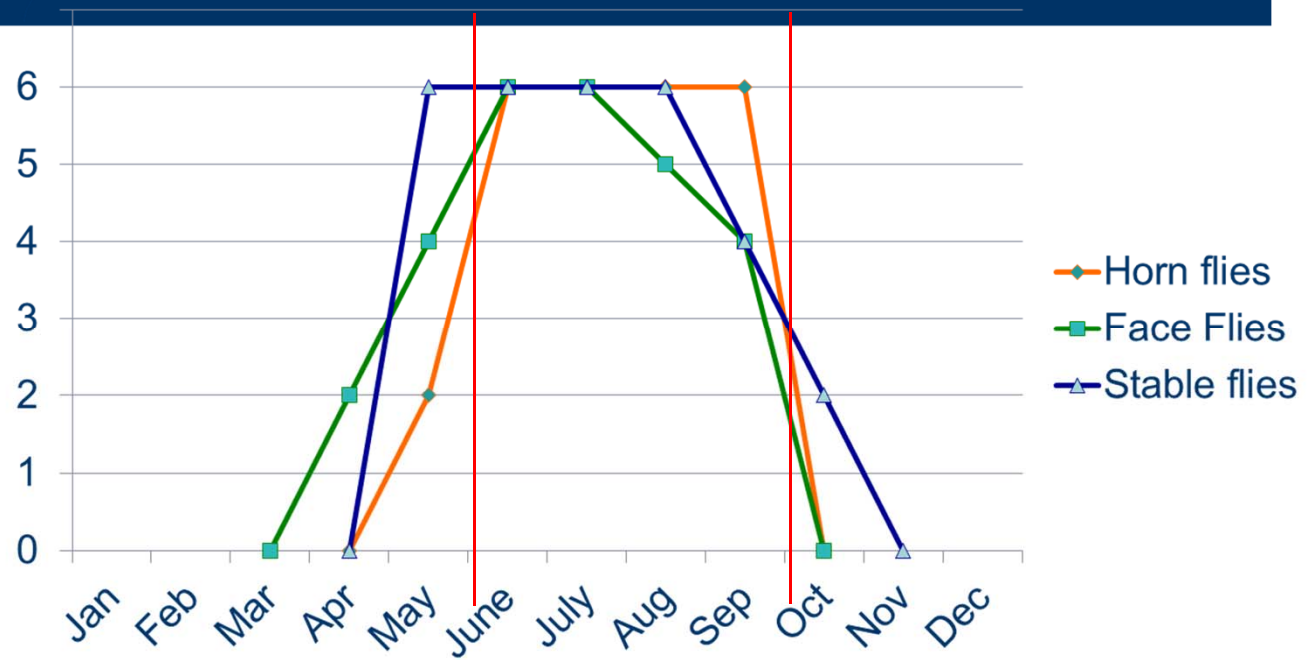


Undesirable



*100-200 horn flies per head is the
economical threshold for treatment.

Seasonal occurrence



Peak Fly season: **June to September**

Control options

- Self-treatment devices:
 - Dust bags
 - Back rubbers
 - Feed through
- Ear tags
- Animal sprays
- Pour-on

Du

Type	Mode of Action	Application	Length of Control	Cost/Treatment/Hd (Cost/Hd/180Day)*
Spray	Kills through contact, transferred through body oil	Saturation of animal's body	21 Days	\$0.50-\$0.65/hd (\$5.40/hd)
Pour-On	Kills through contact, transferred through body oil	Directly to animal's back	28 Days	\$3.00-\$3.50/hd (\$21.60/hd)
Insecticide Ear Tags	Kills through contact, transferred through body oil	Ear Tag, apply 1 or 2 tags	8-12 Weeks	\$2.00-\$2.50/tag (\$5.40/hd)
Feed Additives	Larvicide that controls through manure	Fed through supplement such as mineral	During feeding period	\$3.00/head for 6 months (\$3.00/hd)

*cost/hd is based on the average cost/treatment to provide control over a 180 day period with costs being an average of available products.

Self-treatment devices



Dust bags



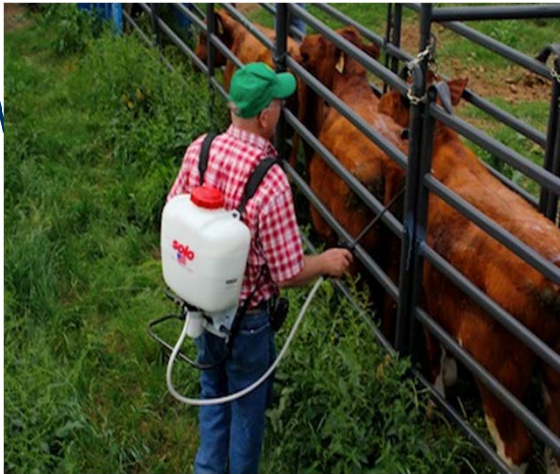
**Back
rubbers**

Sprays

- High volume/ high pressure spr



- Low volume/ low pressure spr



Ear tags

- Install tags after flies first appear in the spring and remove at the end of fly season in September
- Wear gloves
- One study showed the highest percent of fly population reduction with macrocyclic lactone tags (93%) compared to organophosphate tags (82%) and pyrethroid tags (79%)

Ear tags

Pyrethroid Group 3	Organophosphate Group 1B
Permethrin - Atroban Extra, Apollo, Deckem, Ear Force, Gard Star Plus, New Z Permethrin, Permethrin Insecticide Ear Tags, Super Deckem II (10%) 2 tags	15% Coumaphos + 35% Diazinon Corathon 2 tags
<i>beta</i> -Cyfluthrin CyLence Ultra (8%) CyGuard 15% 2 tags	Coumaphos + Diazinon - Co-Ral Plus 1 tag for horn fly, 2 tags for face fly suppression
10% z-Cypermethrin - Python Magnum, ZetaGard 1 tag	20% Pirimifos-methyl - Dominator 2 tags
10% l-cyhalothrin - Saber Extra/Excalibur 2 tags	20% Diazinon OPTimizer / X-Terminator 2 tags
Combination Tags P + OP Groups 1B + 3	40% Diazinon Patriot 2 tags to suppress face flies
6.8 % l-Cyhalothrin + 14% Pirimophos methyl - Double Barrel VP 2 tags	30% Diazinon + 10% Chlorpyrifos Warrior / Diaphos Rx 2 tags
	Abamectin Group 6
	18% Abamectin XP 820 2 tags

Pour-on

- Only treats horn flies
- Short term control – on average 28 days
- Re-treatment may be needed at 3 to 5 week intervals depending on fly pressure



Resistance

1. Base ear tag application and other control methods on high fly load. Start looking in May. Treatment usually starts in June
2. Rotate insecticide classes – every 2 or 4 years
3. Keep records
4. Remove ear tags at end of season in fall
5. Read label – may need 1 or 2 tags
6. Combine with other control methods

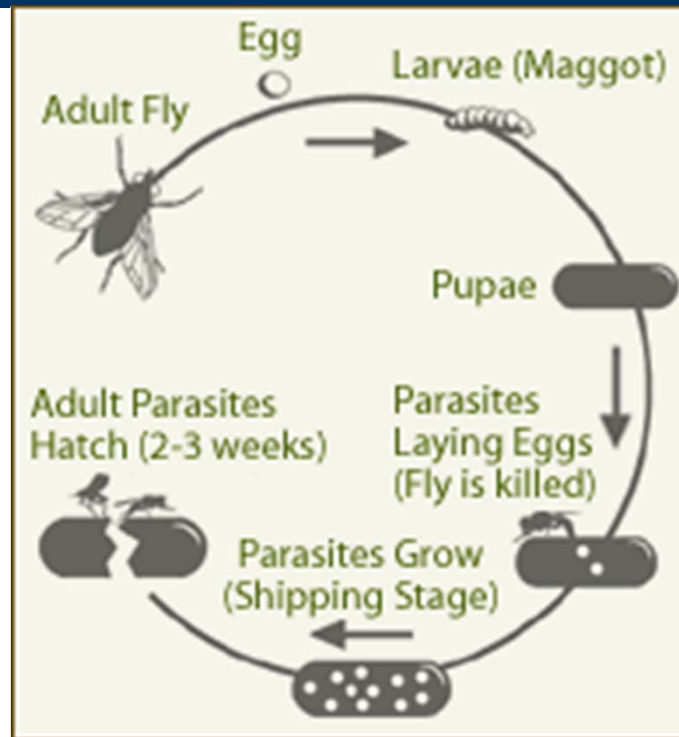
Alternative treatment options



Walk-through horn fly trap



Biological control methods



Conclusion

- There is no one solution to fly control
- Resistance is occurring
- Fly control should be restrained to fly season – from June to September
- Control methods should be used in combination
- Rotate insecticide classes



Questions

What are Your Options?



- New Tags
- Current Tags
- Pour-On
- Back Rubber/Backpack Spray

Tolfenpro™
Insecticide Ear Tag



Questions



Stable flies

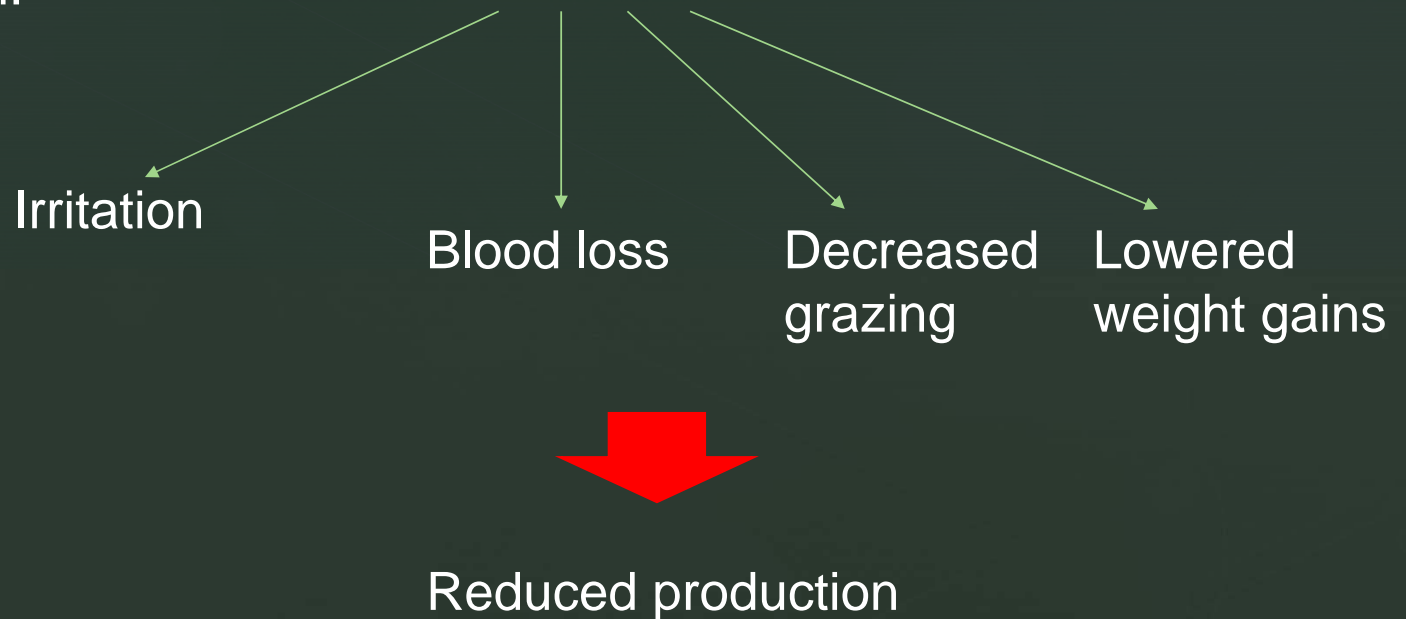


- Feed on animal's feet and legs with a painful bite
- Lay eggs in wet decaying organic material
- Leads to fatigue, reduced grazing, decreased milk production and weight loss
- Best means of prevention is through proper waste management and sanitation



What impact do these flies have?

- Economic loss-Horn fly is biggest culprit
- United States cattle producers lose about 1 billion dollars each year from:



▶
What products did you
use last year?

How did they work?



Horn flies

How do horn flies harm cattle?



Figure 2. (above) Horn flies on the back, neck and shoulders of a bull.

Figure 3. (right) Development of horn flies in fresh manure. (Art Cushman, USDA; Property of the Smithsonian Institution, Department of Entomology, Bugwood.org)

- Found on the back, sides, poll, and belly of cow
- On belly during warmest times of day
- Male and female flies take > 30 blood meals per day

How do horn flies harm cattle?

- Reduce calf weaning weights by nearly 4-15%
 - Studies in Nebraska: calf weaning weights were 10-20 pounds higher when horn flies controlled on mama cows
- Yearling weights can be reduced by as much as 18%
 - When horn flies adequately controlled, grazed yearling cattle had increased weight gain by 0.18 lb/day when insecticidal ear tags used (Drouen et al., 1995, Sanson et al, 2003)

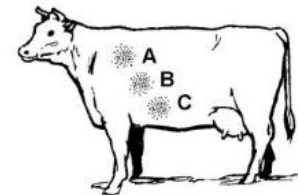


How can you assess horn fly numbers?

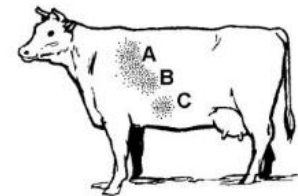
- Assess between 8-11 am when horn flies on topline and sides of animal; (afternoon assessment not accurate because majority of flies on belly)
- Look at about 10 animals to check numbers of flies
- Check for signs of cattle annoyance (stomp feet, throw head, twitch)

Use the following criteria to estimate fly numbers:

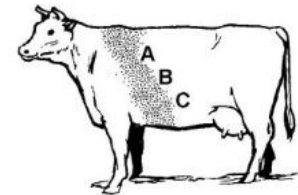
1. A single small patch of flies = 25 to 50 flies.
The patch is located in area A, B or C.



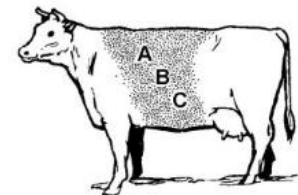
2. A single patch of flies that covers areas A and B, or B and C = 100 to 125 flies.



3. A patch of flies that extends through areas A, B and C = 200 to 350 flies.



4. A patch of flies that extensively covers areas A, B and C = 500+ flies.



Insecticidal Ear Tags

- Through grooming and contact with the hair coat, cattle 's hair oil will help transfer insecticide over the whole hair coat
- Tags contain enough insecticide to control flies for as much as 4-5 months depending on product
- DOC cattle marketing to Pineland Beef-no organophosphate products (avoid products such as Corathon, Dominator, Optimizer, Patriot, Warrior, Double Barrel)





Advantages and Disadvantages of Insecticidal Fly Tags

- Advantages
 - Safe
 - No meat or milk residues
 - Stable in sunlight and rain
 - No carcinogenic ingredients
 - Controls flies, ticks, lice
- Disadvantages
 - Resistance
 - Need to rotate drug classes yearly
 - Need to delay early spring applications of fly tags until >200 flies per animal (about June)

Common Insecticides for Horn Fly Control

Chemical Class	Active Ingredient	Product Examples
Organophosphate	coumaphos coumaphos + diazinon diazinon diazinon + chlorpyrifos pirimiphos-methyl tetrachlorvinphos tetrachlorvinphos + dichlorvos phosmet	CoRal CoRal Plus* Corathon* Patriot*, Optimizer* Warrior* Dominator* Rabon Ravap Prolate
Pyrethroid	cyfluthrins beta-cyfluthrin zeta-cypermethrin lambda-cyhalothrin gama cyhalothrin permethrin	Cutter Gold* CyLence CyLence Ultra* Python Magnum* , , Saber Extra*, Saber, AIM-L VetCaps StandGuard GardStar Plus*, Permethin, Ultraboss, various other brands
Organophosphate-Pyrethroid Combination	cyhalothrin + pirimiphos	Double Barrel*
Botanical	pyrethrins	Prozap and others, several ready-to-use products
Macrocyclic lactone	abamectin eprinomectin ivermectin moxidectin spinosad	XP 820* Eprinex Ivomec, various generic brands Cydectin Elector
Insect Growth Regulator	methoprene diflubenzuron	IGR minerals Vigilante Fly Bolus

* = insecticide ear tag


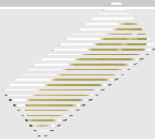




Sources

1. 2014 North Carolina Agricultural Chemical Manual. <http://ipm.ncsu.edu/agchem/agchem.html>.
2. Townsend, L. (2007). Insect Control on Beef Cattle – 2007. Cooperative Extension Service, University of Kentucky. http://www.uky.edu/Ag/PAT/recs/livestk/pdf/ENT-11_Beef.pdf.

Product names are included as a convenience to the reader and do not imply endorsement of the product nor discrimination against similar products not listed.

<http://www.secattleadvisor.com/2014/04/10/horn-fly-control-dealing-with-insecticide-resistance/>

Insecticidal Ear Tags and Strips – some options

Product	Drug Class	Product claimed Length of Control	Non-resistant Horn Flies	Resistant Horn Flies	Face Flies	Cost per tag
XP-820 	Macrocyclic Lactone + piperonyl	5 months	X	X	Aides control	\$2.26
XP-820 strips 	Macrocyclic Lactone + piperonyl	2 strips gets 5 months	X	X	Aides control	\$2.20
CyLence Ultra 	Pyrethroid + piperonyl	5 months	X	X	X	\$2.56
PYthon Tags/strips 	Pyrethroid + piperonyl	Tag 3-5 months 2 strips-4-5 m.	X	X	X	\$1.93
Saber Extra 	Pyrethroid + piperonyl	2 tags gets 4-5 months	X	X	X	\$2.57
GardStar Plus 	Pyrethroid	5 months	X		X	\$1.02

When should tags be put in?

- Apply tags only have horn fly numbers at 200 flies per cow
 - Usually about June. This helps insecticidal levels be high enough during highest fly numbers.
 - Avoid placing tags at the start of the grazing season (April/May) when fly numbers are not causing an issue yet
 - Two tags per cow; 1 per calf gives best results



Fly Tag Application

- Applying tag on the backside of the ear may help increase contact with the haircoat

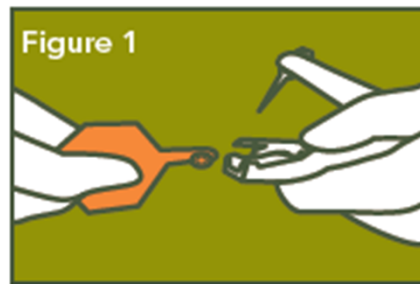
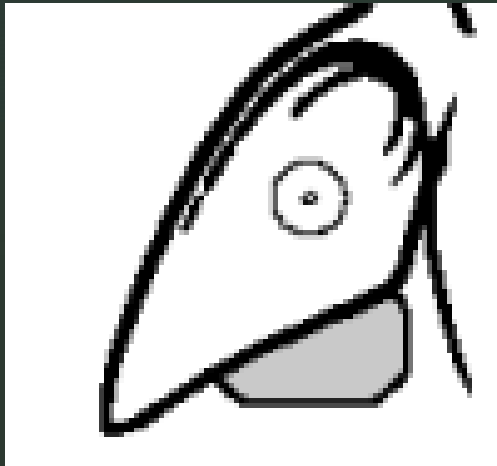


Figure 1
Place tag under clip by depressing lever, raised knob must be pointed down.



Figure 2
Slide button on pin. Tag and button are now ready for application.

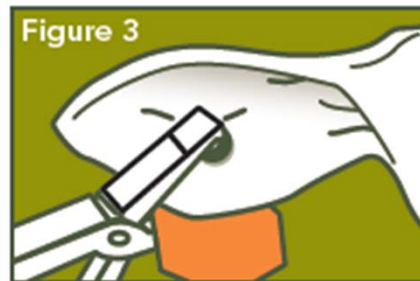
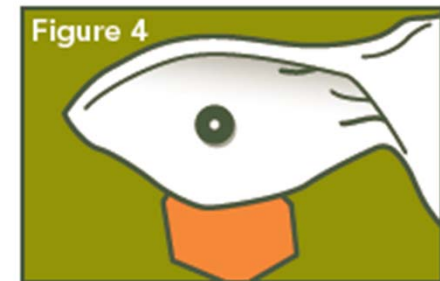


Figure 3
Apply tag through the ear half way between the head and tip. Do not allow shaft of male button to penetrate a rib or blood vessel, as ear damage may result.



When should fly tags be removed?

- Must be removed 4-5 months after application
- If applied in June, then remove by October
 - If tags left in too long, low levels of insecticide still released
 - Sub-lethal levels leads to resistance



INSECTICIDE RESISTANCE AND RESISTANCE MANAGEMENT

Release of Piperonyl Butoxide and Permethrin from Synergized Ear Tags on Cattle and Effects on Horn Fly Mortality

ANDREW Y. LI,^{1,2} J. ALLEN MILLER,² AND JEROME A. KLAVONS

USDA-ARS, Knipping-Bushland U.S. Livestock Insects Research Laboratory, 2700 Fredericksburg Road,
Kerrville, TX 78028

Horn Fly Resistance

- Insecticidal fly tags have been in use since the 1970s
- Generations of horn flies have developed resistance especially to pyrethroids
- This was a study conducted by the USDA Agricultural Research Service at Knipping-Bushland US Livestock Insects Research Lab in Kerrville, Texas
 - 5 Hereford cows with Atroban extra fly tags (permethrin, piperonyl butoxide)
 - They took hole punch samples of the tags over 18 weeks to measure their chemical levels
 - Rubbed filter paper on cows' shoulders and then exposed susceptible and resistant horn flies to the filter papers that got insecticide on them

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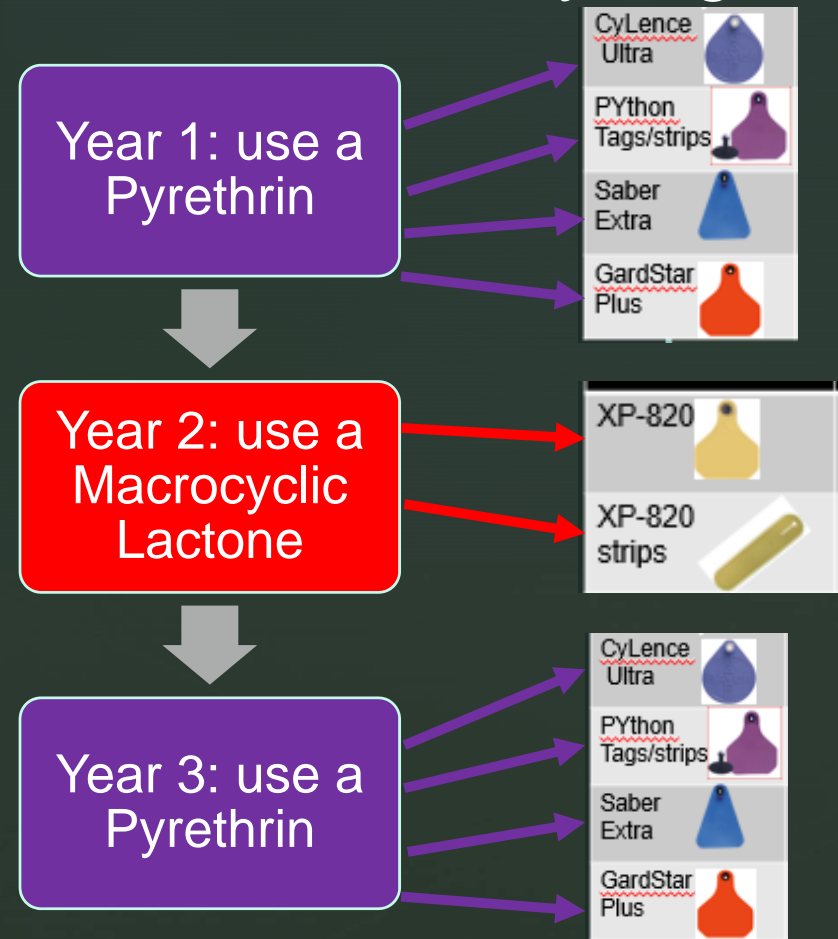
USDA-ARS, Knippling-Bushland U.S. Livestock Insects Research Laboratory, 2700 Fredericksburg Road,
Kerrville, TX 78028

Horn Fly Resistance

- Study found that the ratio of the synergist such as piperonyl butoxide to the permethrin affected the kill of flies
 - Very helpful to have the synergist to improve kill and reduce resistance
 - once the ratio of the synergist: permethrin runs down, no longer effective. Future research is looking at extending release of the synergist .
- What helps fight resistance?
 - Use New generations of pyrethroid chemicals
 - Try products that contain synergists like piperonyl butoxide
 - Rotate drug classes yearly
 - Wait to apply tags when the economic threshold level is reached

Combatting Resistance to Fly Tags

- Apply tags only after numbers reach 200/animal
- Remove them in fall
- Rotate classes each year
 - Rest one class so resistance to it goes down for the next year



Pour on's and Sprays

- Avermectin products
 - Advantages-easy to apply , immediately effective
 - Horn fly control is often an added benefit from using them in deworming calves
- Drawbacks
 - Length of control limited
 - Need repeat applications
 - More time handling, stress, increased labor



How long do pour's on work?

Product	Horn Flies	Face Flies	Stable Flies	Length Effective	Dose	Price
ULTRABoss	X	X	X	~8 weeks	3 mL/100# 30 mL max	\$1.10/oz
CyLence	X	X		~4 weeks	~12 for cattle >800#	\$1.28/oz
Brute	X	X	X	~6 weeks	1.5 mL/100# 15 mL max	\$1.31/oz
Permethrin CDS	X	X	X	~4weeks	1.5 mL/100# 15 mL max	\$1.45/oz

Overall, not economical to use pour-on's alone to control flies due to repeated applications and handling.

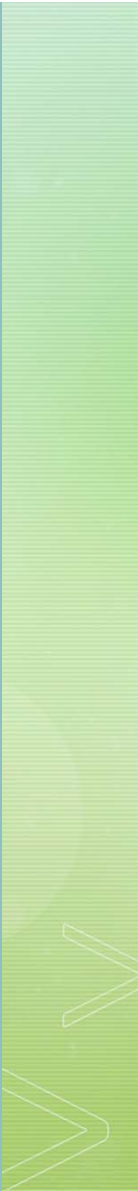


Self Applicator options

- Backrubbers
- Dust bags
- Face Wipes
- Advantages: helps in a multi-pronged horn fly control approach
- Drawbacks: erratic control
 - MUST be forced use to work
 - On the way to trough, for example
 - Maintenance
 - Heavy rainfall can lower performance



How has the larvicide in your mineral been working?



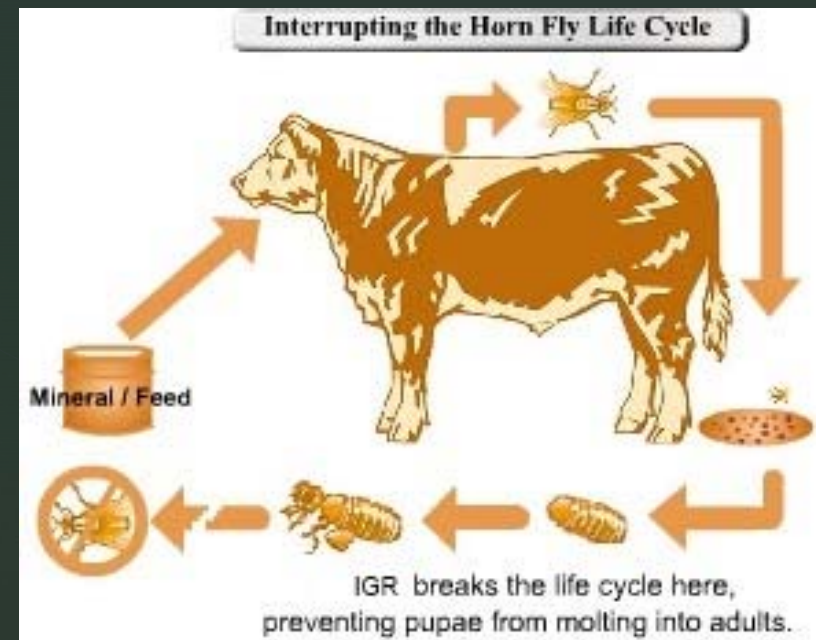
Insect Growth Regulators-Oral Larvicides

- Advantages: Kill larvae developing in manure
 - More helpful for confinement situation, such as feedlot or drylots
- Drawbacks: need steady consumption
 - Horn flies migrate in from neighboring untreated herds can negate their effectiveness
 - Horn flies travel up to 3 miles



Insect Growth Regulator-Oral Larvicides

- Can get IGRs in mineral, boluses
 - Feed through: chemicals inhibit fly eggs from developing in manure
 - One advantage is flies can't develop resistance to these compounds
- Disadvantage-hard to know amount consumed and requires certain level of consumption per day



<http://www.pf4feed.com/productsigr.html>



IGR-Larvicides guidelines

- Need to feed it in loose mineral or in a mineral tub about two weeks before fly season hits (roughly mid May for Virginia)
 - Adult flies present and those coming from neighboring fields mean will still need other measures to control adult flies like tags
- Remove any other mineral/salt products so that cows will use these instead
- Be sure to have adequate water supply near the mineral feeder

IGR/Larvicidal Product-some examples

Product	Chemical	How Given	Cost
Crystalyx	Methoprene	Mineral additive 4 oz/1000#	\$0.08/oz→\$0.32/day
Rabon	Tetrachlorvinphos	Additive to mineral or ration, block- 0.88 oz/100#	\$12.49 for 33.3 lb \$0.19/day
Altosid	Methoprene	Mineral lick or loose mineral Need 4 oz/1000#/day	\$0.04/oz.→\$0.16/day
JustifLY	Diflubenzuron	Mineral mix 1.8 g/day	\$21.99 for 360 grams →\$0.11/day

Vet Gun

- Advantages: Applies gel capsule of insecticide that lasts 21-35 days
 - Pyrethroids and macrocyclic lactone products available
 - No handling needed, can shoot from 15-30 feet away
 - Self-marks which you did
- Disadvantages” Reapplications needed throughout season ; effective control for 4 weeks
- Costs
 - VetGun \$249
 - CO2 propellant cartridges - \$0.08/discharge
 - \$1.99/capsule





Face flies



How do face flies harm cattle?

- Feed on cattle's secretions from the eyes and nose as well as manure liquids
 - Female flies get around eyes, mouth, muzzle
 - Feed on blood and body secretions, especially around wounds
 - Numbers are the highest around water and irrigated pasture
- Major contributor to pinkeye
 - Female face flies damage eye tissue and also spread pinkeye infections



Fighting Pinkeye

- Pinkeye costs us about \$150 million per year from decreased weight gain, milk loss, and treatment costs
- 20 year study showed calves weaning weights 19.6 pounds lower
 - Others say 30-40 pounds lower
- Pinkeye most common disease in breeding age heifers and 2nd most in calves < 3 wks.
- Moderate infestation = 10-20 face flies per animal
- Pinkeye bacteria has over 20 strains and mutates quickly making vaccines disappointing



From Dr. John Currin

Combatting Pinkeye

- *Moraxella bovis* is the bacteria that causes pinkeye; survives on flies 4-5 days
- Needs a compromise to the cornea to invade
- Eye irritation from face flies as well as abrasion from
 - Tall weeds, grasses rubbing cattle's eyes as they walk and graze
 - Feed and dust when cattle eat from overhead feed bunks or the centers of round bales
 - Dust on windy days, sunlight also increase risk
 - Breeds with less pigmentation around the eyes most at risk, e.g. Herefords, Hereford crosses, Charolais, some Holsteins

Combatting Pinkeye

- Fly control strategies-tags, larvicides, backrubbers/face wipes, sprays
- Pasture management
 - Clipping pastures to reduce seed head development and lessen irritation to eyes and decrease the amount of resting places for flies
 - Clip pastures to a low stubble height in May, just after seed heads emerge, and again in mid-summer when weeds appear (to about 10 inches height)
- Provide tree lines, shaded areas
- Select for pigmented eyes-it's a heritable trait
- If possible, lower overhead feeders and roll out round bales
- Isolate animals with pinkeye if you can



How do we control face flies?

- Really hard to control because they only spend short spurts of time on the cattle themselves
 - They hang out most of their time on fence posts, plants, other objects around
- Insecticidal fly tags help
- Daily insecticide applications are the most helpful via dust bags, oilers, or sprayers



Backrubbers and Oilers set up

Products for Back Rubbers and Face Rubbers

Product	Amount/gal oil (ratio of insecticide to oil)	Days To Slaughter
Co-Ral 11.6% EC (coumaphos)	1-1/4 cups (1:13)	0
Delnav 30% EC or 15% EC (dioxathion)	13 Tbs (1:20) or 26 Tbs (1:10)	0
Back Side, Ectiban 5.7% EC, Insectrin, Permethrin II 10% (permethrin)	6.5 Tbs (1:40) 1 qt / 20 gal	0
Lintox-HD (phosmet)	1 qt in 50 gallons (1:100)	3
Ravap 28.7% EC (stirofos+dichlorvos)	9 Tbs (1:28)	1

<http://www.uky.edu/Ag/PAT/recs/livestk/recbeef/beeffly.htm>

Backrubbers and oilers

- Guidelines for use:
 - <http://www.uky.edu/Ag/PAT/recs/livestk/recbeef/beeffly.htm>
 - Estimates about \$25-30 of materials to construct
 - Mix insecticides with mineral oil (diesel oil tends to evaporate more quickly)
 - Make the height so that calves can use it too
- For face fly control:
 - Soak in 1 gallon mineral oil per 20 feet on backrubber once weekly
 - Backrubber most effective against face flies if 18 inch strips of cloth are tied at 4-6 inch intervals along the length
 - Place at entryways to water and mineral feeders



Stable Flies



How do stable flies bother cattle?

- Blood feeders, especially on legs of cattle
 - Lay eggs in spoiled/fermented matter mixed with manure, moisture, and soil
- Very painful bites cause cattle to stomp feet, bunch in corners of pastures, or stand with legs in water to avoid bites
- Cattle become nervous and spend less time grazing



Control of stable flies

- Insecticidal sprays
 - Examples:
 - coumaphos (Co-Ral), permethrin (many brand names), natural pyrethins (many brand names), and Phosmet (Prolate)
- Clean up spilled feed and old feed around winter hay feeding sites, mow around fence lines



Other Fly Issues

- Fly strike-be sure to spray Catron (permethrin) when castration and dehorning sites, wounds, umbilicus (during heavy fly numbers), surgical sites
- Horse, deer flies-use fly tags, backrubbers
- Grubs-Hypoderma bovis- more of a problem out west but recommended not to use pesticide when grubs in deep tissue (November 1 – February 1)



Fly Control Calendar

MAY

- Mid-May: start adding Altosid larvicidal product to mineral



- Clip pastures to a low stubble height



JUNE

- Apply 2 CyLence fly tags , 1 fly tag per calf (if XP-820 was used last year)



- Set-up and charge weekly backrubbers and face wipes



JULY

- Clip pastures to 10" and weeds down



- Monitor fly numbers on animals. If having problems can try sprays or pour-on's.

AUGUST

- Monitor fly numbers on animals and use sprays/pour on's if needed



OCTOBER

- **Remove Fly tags**



NOVEMBER

- Continue to feed Altosid larvicidal product until 30 days after the first frost (feed until about Nov 1st)



Resources

- <https://beef.unl.edu/cattleproduction/controllingflies>
- <https://www.agweb.com/article/fly-control-tips-naa-university-news-release/>
- <http://cdrf.org/2016/01/06/5000/>
- <https://www.drovers.com/article/controlling-flies-pastured-cattle>
- <https://extension2.missouri.edu/g7012>
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Thank you!

