

FLY CONTROL IN LIVESTOCK FACILITIES

Nancy C. Hinkle, Veterinary Entomologist

Dairy Barns, Swine Barns, Livestock Sheds, Other Animal Buildings

RESIDUAL AND BAIT SPRAYS¹

INSECTICIDE ²	MOA	MIXING INSTRUCTIONS	REMARKS
<i>Beauveria bassiana</i> balEnce	biological	7.5 oz/4 gal water/25000 sq ft of adult fly resting sites.	Use a higher rate to treat maggot habitat. BalEnce is potentially hazardous to bees. Do not contaminate surface water with balEnce or its rinsate.
<i>beta-cyfluthrin</i> Tempo 1SC Ultra Tempo 10WP Tempo 20WP	3A	8–16 ml 1SC in sufficient water to cover 1000 sq ft. 10–20 grams 10WP in sufficient water to cover 1000 sq ft.	Remove animals before spraying and do not return them until spray dries. Do not contaminate feed, drinking water, milk, or milk-handling equipment. Do not apply as a space spray. Do not apply directly to animals. Direct as a coarse, wetting spray to surfaces in livestock facilities where flies congregate, such as ceilings, walls, fences, posts, and manure. Apply to point of runoff (1 gal spray/500–1000 sq ft). Repeat as needed. For bait solutions add 1 lb sugar/gal of spray.
<i>bifenthrin</i> ActiShield	3A	0.33–1 fl oz 0.66EC/gal water 1000 sq ft.	For adult fly control in and around animal facilities, spray application should target areas where flies will rest.
<i>chlorpyrifos</i> Durashield	1B	Restricted Use Pesticide. For use by certified applicators.	Restricted use pesticide, for use by certified applicators. Apply according to label directions to adult fly resting sites.
<i>cyfluthrin</i> Optashield CS	3A	Mix 1–2 fl oz with 1 gal water.	Apply 1 gal/1000 sq ft.
<i>deltamethrin</i> 0.02% Annihilator Polyzone	3A	1.5 fl.oz. in 1 gal. water	Apply thoroughly to surfaces until wet. Repeat as necessary, but not more than once/week. Do not spray animals or humans, or apply to animal feed or watering equipment.
<i>dichlorvos</i> Vapona	1B	Restricted Use Pesticide. Mix 1 gal. in 100 gal. water.	Apply as coarse spray, 1 qt/1000 sq ft of surface.
<i>esfenvalerate</i> Onslaught	3A	Mix 1 oz with 1 gal of water and spray 1 gal/1000 sq ft.	Do not apply when feed is present.
<i>imidacloprid</i> QuickBayt Spot Spray	4A	Mix 1.5 cup in 0.5 gal water to treat 500 sq ft.	Spray where flies rest or congregate, indoors or outdoors. Examples include posts, beams, railings, door frames, windows, and walls.
<i>lambda-cyhalothrin</i> Grenade ER 9.7% Insecticide Demand CS	3A	Mix 0.2–0.4 oz (6–12 ml)/gal water to treat 1000 sq ft.	Make a directed application to fly-resting surfaces and allow to dry before reintroduction of animals. Do not apply when animals are present.
<i>permethrin</i> Atroban 05.7 EC Prozap Insectrin	3A	Mix 6.4 oz per gal water.	Do not apply more often than once every 2 weeks. Do not apply directly to livestock or poultry. Do not apply in milk rooms or egg storage areas. Do not spray manure or litter. Apply as a residual surface spray to fly resting areas.

■ FLY CONTROL IN LIVESTOCK FACILITIES

RESIDUAL AND BAIT SPRAYS¹

INSECTICIDE ²	MOA	MIXING INSTRUCTIONS	REMARKS
<i>spinosyn</i> Elector 2.46%	5	2 fl. oz. in 10 gal water. Treats 5000 sq ft	Spray fly-inhabiting surfaces in animal premises to the point of runoff. Use approx. 1 gal of spray/500–1000 sq ft. Repeat as needed, but not more often than once/week. Spray in early morning when flies are resting. Lactating and non-lactating dairy and beef cattle may be present at time of premise treatment; horses not intended for human consumption may be present during premise treatment.
<i>tetrachlorvinphos + dichlorvos</i> Ravap EC	1B	Restricted Use Pesticides.	Apply at a rate of 1 gal of spray/500–1000 sq ft to cover walls, floors, and other resting sites.
<i>thiamethoxam</i> Agita 10 WG	4A	16 oz in 120 fl oz water/1000 sq ft	Water dispersible insecticidal bait for adult house flies. Apply to areas where adult flies rest (ledges, walls, window sills, etc.)

SPACE SPRAYS (AEROSOLS, FOGS AND MIST-SPRAYS)²

INSECTICIDE ²	MOA	MIXING INSTRUCTIONS	REMARKS
<i>dichlorvos</i> Vapona or DDVP 2 lb ai/gal (23.4%) EC, OP	1B	Restricted Use Pesticide. 0.5% or 1%. Mix 1 pt EC in 3 gal or 6 gal of water.	Apply 1 pt of 1% solution or 1 qt of 0.5% solution/8000 cubic ft as a fog or mist. Repeated applications will provide adult fly suppression. Do not use more often than once every 24 hours. Do not use if animals have been treated with other insecticides within 8 hours. Do not apply directly to animals. Close all doors and windows when fogging. Do not contaminate feed, water, milk, or milking equipment.
<i>permethrin</i> Prozap Insectrin 10% EC	3A	Mix 6.4 oz. in 1 gal of water.	Apply fog at 1 fl oz/1000 cubic feet of air space in confined facility. Repeat as needed.
<i>pyrethrins</i> 0.1–1% + <i>synergist</i> 0.5–5.0%	3A	Ready-to-use when purchased.	Apply fogs or spray mists at 1 fl oz/1000 cu ft as fine atomized spray. Repeat as needed.

BAITS

INSECTICIDE ²	MOA	MIXING INSTRUCTIONS	REMARKS
<i>Beauveria bassiana</i> balEnce Bait	Biological		Use as a house fly bait around livestock and poultry facilities. Keep out of the reach of children and animals.
<i>cyantraniliprole</i> Zyrox Fly Granular bait	28	Ready-to-use when purchased.	Apply in bait station that is inaccessible to children, pets, and food animals. Use 2 lb bait/1000 sq ft/yr.
<i>dinotefuran</i> QuikStrike Scatter Bait	4A		Apply around livestock and poultry facilities where house flies are found. Apply as a scatter bait at the rate of ¼ lb/500 sq ft, or place in bait stations. Do not apply where children or animals might have access.
<i>imidacloprid</i> 0.5% QuickBayt	4A	Ready-to-use when purchased.	Scatter bait directly from container onto dry level surfaces so individual granules lie near each other without forming piles. Or place in any commercial bait station. Or mix 1.5 oz bait with 1 fl oz warm water and stir to create a paste; apply with brush to surfaces where flies rest. Bait should be inaccessible to food-producing animals, children, and pets.
<i>methomyl</i> Golden Malrin Bait	1A	Ready-to-use as a dry bait.	As a dry bait: Scatter on floors, walkways, etc., throughout operation but away from animals. Apply heavy (about ¼ lb/500–1000 sq ft) until flies are suppressed. Wear rubber gloves when applying baits. Do not allow workers on treated floors without shoes. Do not allow animals to come in contact with baits.
<i>nithiazine</i> QuikStrike 1% fly abatement strip	4	Ready-to-use strip.	Hang 1 strip/100 sq ft or 300 sq ft depending on fly population in enclosed areas that are protected from rain.
<i>spinosad</i> Gordon's Fly Bait	5	Ready-to-use when purchased.	Follow label directions for scatter bait, station/tray bait, or paint/spray bait use. Locate where inaccessible to animals and children.

LARVICIDES—TREAT MAGGOT-INFESTED AREAS

INSECTICIDE ²	MOA	MIXING INSTRUCTIONS	REMARKS
<i>cyromazine</i> 2% Neporex	17	Ready-to-use or spray.	Scatter granules on maggot-infested sites at rate of 1 lb/200 sq ft. Treat edges and spillage areas where manure accumulates. Treat floor area of calf hutches.
<i>novaluron</i> Tekko 10	15	3 oz in 1 gal water/1000 sq ft	Spray on manure area
<i>pyriproxyfen</i> Archer	7C	1 fl oz/gal of water; 1 fl oz treats 1500 sq ft.	Apply to larval development sites.

1. Residual sprays can be applied as spot sprays to control maggots in manure accumulations if permitted by the EPA label.
2. Space sprays are designed to kill only adult flies that are present when the fog or mist is applied. There is little or no residual insecticide deposit remaining after the application. Fogs or mists must come in contact with the fly. These materials are especially effective in enclosed areas where air movement is minimal. Heavy mists can offer good adult fly kill in open areas such as in feed lots.

BEEF CATTLE EXTERNAL PARASITE AND GRUB CONTROL

Nancy C. Hinkle, Veterinary Entomologist

Insecticides to Use and Ways to Apply Them to Control Beef Cattle Pests

Find the pest to be controlled, then select the method of application (spray, dust, ear-tag, etc.) from the left column. To the right are listed the active ingredients available as well as recommendations for effective use.

CATTLE GRUBS

WAYS TO APPLY INSECTICIDES	INSECTICIDE	MOA	MIXING INSTRUCTIONS	APPLICATION INSTRUCTIONS AND RESTRICTIONS ^{1,2,3}
Injectable Pour-on Spot-on	<i>doramectin</i> 0.5% Dectomax pour-on	6	Ready-to-use when purchased.	Apply 1 ml/22 lb body weight, along midline of the back between withers and tailhead. Safe for all beef cattle and replacement dairy heifers up to 20 months of age.
	<i>eprinomectin</i> Eprinex pour-on	6	Pour-on for beef cattle. Contains 5 mg <i>eprinomectin</i> /ml. Ready-to-use when purchased.	Administer pour-on to cattle 8 weeks of age or older. Apply at the dose of 1 ml/22 lb body weight. Apply pour-on to the top of the animal along the backline from the withers to the tailhead.
	<i>ivermectin</i> Ivomec 1% clear, ready-to-use sterile solution. Agri-Mectin	6	Ready-to-use when purchased.	Administer subcutaneously only 1 ml (10 mg <i>ivermectin</i>)/110 lb body weight. Restrain animals and inject under the loose skin in front of or behind the shoulder. A sterile, 16-gauge, ½-¾" needle is suggested. Divide doses greater than 10 ml between 2 injection sites to reduce occasional transitory discomfort or site reaction. Waiting period between application and slaughter: 35 days.
	Ivomec pour-on 5 mg <i>ivermectin</i> /ml			Ivomec pour-on: Apply 1 ml/22 lb of body weight. Apply along the topline in a narrow strip extending from the withers to the tailhead.
	<i>moxidectin</i> Moxidectin 1% injectable Cydectin 10 mg/ml	6	Ready-to-use when purchased.	Inject 1 mg/110 lb body weight.
	Cydectin Pour-on			Use 22.7 mg/100 lb body weight (mites and lice).

CATTLE LICE

WAYS TO APPLY INSECTICIDES	INSECTICIDE	MOA	MIXING INSTRUCTIONS	APPLICATION INSTRUCTIONS AND RESTRICTIONS ^{1,2,3}
Sprays	<i>coumaphos</i> Co-Ral 6.15%	1B	Mix 5 fl oz/4 gal water	Mix 2.5–5 fl oz/4 gal water and spray to complete wetting. Do not treat fewer than 10 days apart.
	<i>dichlorvos</i>	1B	Mix 1 qt 21.8% EC in 6 gal of water. Restricted Use Pesticide.	Apply 1–2 fl oz as a light mist-spray daily. Spray to cover all parts of the animal. Do not wet the skin. Do not apply more than 2 fl oz/ animal each day.
	<i>permethrin</i> Permethrin Permectrin II Atroban 11% GardStar EC	3A	Mix 1 qt of 5.7% EC, OR mix 1 pt of 10% EC or 11% EC in 100 gal water or mix 30–18 ml of 40% EC in 25 gal of water or apply 1% pour-on as an undiluted spray.	Spray animal thoroughly. Re-treat as needed but not more often than once every 14 days. To control lice or mites, a second treatment may be needed 10–21 days later.

CATTLE LICE

WAYS TO APPLY INSECTICIDES	INSECTICIDE	MOA	MIXING INSTRUCTIONS	APPLICATION INSTRUCTIONS AND RESTRICTIONS ^{1,2,3}
Sprays (continued)	<i>phosmet</i> Prolate/Lintox Prolate/Lintox HD	1B	Mix 1 qt in 25–50 gal water (depending on target pest), and spray to run-off.	Apply as a coarse high pressure spray to thoroughly wet the skin and hair of the animal. Apply up to 1 gal/animal. Do not re-treat within 7 days. Follow label restrictions.
	<i>pyrethrins</i> Pyrethrins—synergized	3A	Ready-to-use when purchased.	Apply 1–2 fl oz daily or as needed. Apply to wet hair not skin. Do not exceed 5 fl oz in any 14 day interval.
	Ravap EC spray <i>stirofos + dichlorvos</i>	1B	Mix 1 pt 28.7% EC in 6 gal of water. Restricted Use Pesticide.	Apply as a coarse spray. Apply 0.5 gal spray/animal. Do not repeat application within 10 days.
Dusts	<i>coumaphos</i> Livestock Dust 1% Co-Ral Livestock Dust 1%	1B	Ready-to-use when purchased.	Use shaker can to apply 2 oz/animal over head, neck, shoulders, and back.
	<i>permethrin</i> Permethrin 0.25% dust	3A	Ready-to-use when purchased.	Use in dust bags or apply up to 2 oz directly to animals. Re-treat 14– 21 days later if needed for lice control.
	<i>zeta-cypermethrin</i> PYthon dust 0.075%	3A	Ready-to-use when purchased.	Apply up to 2 oz/animal evenly as necessary but not more often than every 3 days.
Ear-Tags and Dust Bags (Self-Treatment)	<i>diazinon</i> Optimizer Patriot Max 40	1B	Ready-to-use when purchased.	Attach 1 tag to the inside of 1 or both ears of mature animals. Remove tags when control drops off, at the end of fly or lice season, or before slaughter.
	30% <i>diazinon</i> + 10% <i>chlorpyrifos</i> Warrior 40% insecticide ear tag	1B	Ready-to-use when purchased.	Attach 1 tag to the inside of 1 or both ears of mature animals. Remove tags when control drops off, at the end of fly or lice season, or before slaughter.
	<i>permethrin</i> Permethrin 0.25% dust	3A	Ready-to-use when purchased.	Use in dust bags or apply up to 2 oz directly to animals. Re-treat 14–21 days later if needed for lice control.
	GardStar Plus	3A	Ready-to-use when purchased.	Attach 1 tag to the inside of 1 or both ears of mature animals. Remove tags when control drops off, at the end of fly or lice season, or before slaughter.
	<i>zeta-cypermethrin</i> PYthon 10% PYthon Magnum insecticide ear tag	3A	Ready-to-use when purchased.	Attach 1 tag to the inside of each ear on mature cattle. Remove tags when control drops off, at the end of fly or lice season, or before slaughter. During the horn fly season, 1 tag/animal can be used on cows. Calves can be tagged with 1 tag as needed.
Ear-Tags	<i>zeta-cypermethrin + abamectin</i> Tri-Zap Insecticide Cattle Ear Tag	3A + 6	Use two tags per animal.	Tag all animals in herd (including calves) and replace as necessary.

BEEF CATTLE EXTERNAL PARASITE AND GRUB CONTROL

CATTLE LICE

WAYS TO APPLY INSECTICIDES	INSECTICIDE	MOA	MIXING INSTRUCTIONS	APPLICATION INSTRUCTIONS AND RESTRICTIONS ^{1,2,3}
Backrubbers and Facerubbers	<i>permethrin</i> Permethrin Rubbing Mixture	3A	Mix 1 qt. 5.7% EC in 10 gal diesel fuel or mix 1 pt 10% or 11% EC in 1 gal of #2 diesel fuel or mineral oil	Keep rubbing device charged. Daily forced use provides best results.
	<i>coumaphos</i> Co-Ral Fly & Tick Spray	1B	or mix 118 ml 40% EC in 10 gal of diesel oil or suitable mineral oil.	
	<i>stirofos + dichlorvos</i> Ravap 1% <i>stirofos</i> + 0.25% <i>dichlorvos</i> in oil	1B	Mix 5 oz 28.7% EC in 1 gal of #2 diesel fuel. Restricted Use Pesticide.	Pour 1 gal of mixture/20 ft of cable. Keep rubbing device charged.
Injectable Pour-on Spot-on	<i>cyfluthrin</i> Cylence 1% pour-on insecticide.	3A	Ready-to-use when purchased.	Apply pour-on along the top of the back and top of the head. For horn fly and face fly control apply 4 ml to animals weighing less than 400 lb, 8 ml to animals weighing 400–800 lb and 12 ml to animals weighing over 800 lb. Do not re-treat within 3 weeks following treatment. Double the dose for biting and sucking lice.
	<i>doramectin</i> 0.5% Dectomax pour-on	6	Ready-to-use when purchased.	Apply 1 ml/22 lb body weight, along midline of the back between withers and tailhead. Safe for all beef cattle and replacement dairy heifers up to 20 months of age.
	<i>eprinomectin</i> Ivomec Eprinex pour-on for beef cattle. Contains 5 mg <i>eprinomectin</i> /ml	6	Ready-to-use when purchased.	Administer pour-on to cattle 8 weeks of age or older. Apply at the dose of 1 ml/22 lb body weight. Apply pour-on to the top of the animal along the backline from the withers to the tailhead.
	<i>gamma-cyhalothrin</i> 0.5% StandGuard Pour-on	3A	Ready-to-use when purchased.	For cattle weighing less than 600 lb, apply 10 ml (½ fl oz) product along backline. For cattle weighing more than 600 lb, apply 15 ml (½ fl oz) along backline.
	<i>ivermectin</i> Ivomec 1% clear, ready-to-use sterile solution.	6	Ready-to-use when purchased.	Administer subcutaneously only 1 ml (10 mg <i>ivermectin</i>)/110 lb body weight. Restrain animals and inject under the loose skin in front of or behind the shoulder. A sterile, 16-gauge, 0.5–0.75" needle is suggested. Divide doses greater than 10 ml between 2 injection sites to reduce occasional transitory discomfort or site reaction. Waiting period between application and slaughter: 35 days.
	Ivomec pour-on 5 mg <i>ivermectin</i> /ml.	6	Ready-to-use when purchased.	Apply 1 ml/22 lb of body weight. Apply along the topline in a narrow strip extending from the withers to the tailhead. Waiting period: 48 days.
	<i>lambda-cyhalothrin</i> Ultra Saber 1% pour-on insecticide.	3A	Ready-to-use when purchased.	Apply to beef cattle and calves for lice and horn flies. Apply pour-on down the backline at 10 ml (½ fl oz)/animal for cattle weighing less than 600 lb or at a rate of 15 ml (0.5 fl oz)/animal for cattle weighing more than 600 lb. Repeat as needed but not more often than every 2 weeks and not more than 4 applications within a 6-month period.
	<i>lambda-cyhalothrin</i> with <i>piperonyl butoxide</i> Aim-L VetCaps insecticide capsules	3A	Ready-to-use when purchased.	Apply only with a SmartVet Approved Vetcap Application Device according to label directions
	<i>moxidectin</i> Moxidectin 1% injectable Cydectin 10 mg/ml	6	Ready-to-use when purchased.	Inject 1 mg/110 lb body weight.
Moxidectin Cydectin Pour-on			Use 22.7 mg/100 lb body weight (mites and lice).	

CATTLE LICE

WAYS TO APPLY INSECTICIDES	INSECTICIDE	MOA	MIXING INSTRUCTIONS	APPLICATION INSTRUCTIONS AND RESTRICTIONS ^{1,2,3}
Injectable Pour-on Spot-on (continued)	<i>permethrin</i> Atroban DeLice 1% pour on	3A	Ready-to-use when purchased.	Apply 0.5% fl oz (15 cc)/100 lb body weight of animal up to a maximum of 5 fl oz for any 1 animal. Pour correct dose along back and down face.
	Brute Pour-on 10% <i>permethrin</i> Ultra-Boss Pour-on 5% <i>permethrin</i>			Apply 15 cc (10%) or 30 cc (5%)/1000 lb down mid-line of back. Repeat the application in 10–14 days for mites.
	<i>permethrin</i> 5% + <i>diflubenzuron</i> 3% Clean-up II Pour-on Insecticide with IGR	3A + 15	Ready-to-use when purchased.	Apply 3 ml per 100 lbs of body weight. Do not exceed 30 ml for one animal. Pour along the backline and down the face.

FACE FLIES

WAYS TO APPLY INSECTICIDES	INSECTICIDE	MOA	MIXING INSTRUCTIONS	APPLICATION INSTRUCTIONS AND RESTRICTIONS ^{1,2,3}
Sprays	<i>coumaphos</i> Co-Ral Fly & Tick Spray	1B	1 qt per 50 gal water.	Do not treat less than 10 days apart.
	<i>dichlorvos</i> Vapona EC	1B	Mix 1 qt 21.8% EC in 6 gal of water. Restricted Use Pesticide.	Apply 1–2 fl oz as a light mist-spray daily. Spray to cover all parts of the animal. Do not wet the skin. Do not apply more than 2 fl oz/ animal each day.
	<i>permethrin</i> UltraBoss	3A	Mix 1 qt 11% EC in 5 gal water.	Apply 1–2 oz spray mixture/animal. Spot treat the back, face, legs, and ears.
	<i>pyrethrins</i> Pyrethrins—synergized	3A	Ready-to-use when purchased.	Apply 1–2 fl oz daily or as needed. Apply to wet hair not skin. Do not exceed 5 fl oz in any 14 day period.
Ear-Tags and Dust Bags (Self-Treatment)	<i>cyfluthrin</i> Beta-cyfluthrin CyLence Ultra Insecticide Cattle Ear Tags 8%	3A	Ready-to-use when purchased.	For control of horn flies, face flies, Gulf Coast ticks and spinose ear ticks on beef and dairy cattle (including lactating). For adequate control of horn flies attach 1 tag/animal. For optimum control of face flies, horn flies, Gulf Coast ticks and spinose ear ticks, attach 1 tag to each ear (2/animal). CyLence Ultra Insecticide Ear Tags have been proven to be effective against face and horn flies for up to five months.
	<i>diazinon</i> OPTimizer 21.4% insecticide ear tag Max40 ear tag Patriot 40% insecticide cattle ear tag	1B	Ready-to-use when purchased.	Attach 1 tag to the inside of each ear on mature cattle. Tags should be removed when control drops off, at the end of the fly season, or before slaughter.
	<i>diazinon</i> + <i>coumaphos</i> Corathon ear tag	1B	Ready-to-use when purchased.	Attach 1 tag to the inside of 1 or both ears of mature animals. Remove tags when control drops off, at the end of fly season, or before slaughter.
	Warrior 40% insecticide ear tag 30% <i>diazinon</i> + 10% <i>chlorpyrifos</i>	1B	Ready-to-use when purchased.	Attach 1 tag to the inside of 1 or both ears of mature animals. Remove tags when control drops off, at the end of fly or lice season, or before slaughter.
	<i>lambda-cyhalothrin</i> Saber 10% insecticide ear tag 10% <i>lambda-cyhalothrin</i> + 13% <i>piperonyl butoxide</i>	3A	Ready-to-use when purchased.	Apply 1 tag to the inside of each ear on mature cattle or calves. Remove tags when control drops off, at the end of fly season, or before slaughter.

BEEF CATTLE EXTERNAL PARASITE AND GRUB CONTROL

FACE FLIES

WAYS TO APPLY INSECTICIDES	INSECTICIDE	MOA	MIXING INSTRUCTIONS	APPLICATION INSTRUCTIONS AND RESTRICTIONS ^{1,2,3}
Ear-Tags and Dust Bags (Self-Treatment) (continued)	<i>lambda-cyhalothrin</i> Double Barrel/Double Barrel VP 20.8% insecticide ear tag 6.8% <i>lambda-cyhalothrin</i> + 14% <i>pirimiphos methyl</i>	3A + 1B	Ready-to-use when purchased.	Apply 1 tag to the inside of each ear on mature cattle or calves. Remove tags when control drops off, at the end of fly season, or before slaughter.
	<i>permethrin</i> Permethrin 10% Insecticide Ear Tag Gard Star Plus	3A	Ready-to-use when purchased.	Attach 1 tag to the inside of each ear on mature cattle and calves. Remove tags when control drops off, at the end of fly season, or before slaughter.
	<i>pirimiphos-methyl</i> Dominator 20% insecticide ear tag	1B	Ready-to-use when purchased.	Attach 1 tag to the inside of each ear on mature cattle. Remove tags when control drops off or in the fall, whichever occurs first.
	<i>zeta-cypermethrin</i> PYthon Magnum 10% insecticide ear tag PYthon	3A	Ready-to-use when purchased.	Attach 1 tag to the inside of each ear on mature cattle. Remove tags when control drops off, at the end of fly or lice season, or before slaughter. During the horn fly season, 1 tag/animal can be used on cows. Calves can be tagged with 1 tag as needed.
	<i>zeta-cypermethrin</i> + <i>abamectin</i> Tri-Zap Insecticide Cattle Ear Tag	3A + 6	Use two tags per animal.	Tag all animals in herd (including calves) and replace as necessary.
Injectable Pour-on Spot-on	<i>cyfluthrin</i> Cylence 1% pour-on insecticide	3A	Ready-to-use when purchased.	Apply pour-on along the top of the back and top of the head. For horn fly and face fly control apply 4 ml to animals weighing less than 400 lb, 8 ml to animals weighing 400–800 lb and 12 ml to animals weighing over 800 lb. Do not re-treat within 3 weeks following treatment. Double the dose for biting and sucking lice.
	<i>permethrin</i> Brute UltraBoss	3A	Ready-to-use when purchased.	Apply 3 ml per 100 lbs of body weight. Do not exceed 30 ml for one animal. Pour along the backline and down the face.
	<i>permethrin</i> 5% + <i>diflubenzuron</i> 3% Clean-up II Pour-on Insecticide with IGR	3A + 15		
Bolus, Feed Additives	<i>diflubenzuron</i> ClariFly	15	Mix according to label instructions based on animal weights.	Mix according to label instructions and feed at rates stipulated based on cattle weights. Prevents development of fly larvae in manure of treated cattle. Prevents emergence of horn flies, face flies, house flies, and stable flies from manure of treated cattle. Start feeding early in the spring before flies appear and continue until cold weather restricts fly activity. Does not affect adult flies. No withdrawal; no milk withholding.
	<i>methoprene</i> Altosid mineral mix or block.	7A	Ready-to-use when purchased.	Feed free choice at ¼–½ lb/100 lb animal body weight monthly/ animal.
	<i>tetrachlorvinphos</i> Rabon granular oral larvicide	1B	Pre-mix or ready-to-use blocks and mineral feeds are available commercially.	Mix 7.76% oral larvicide with concentrate feed as directed on label. Feed ready-to-use block or mineral free choice so each animal will consume 70 mg/100 lb body weight daily. Begin feeding before flies appear in spring. Feed continuously until frost. Does not affect adult flies.

HORN FLIES

WAYS TO APPLY INSECTICIDES	INSECTICIDE	MOA	MIXING INSTRUCTIONS	APPLICATION INSTRUCTIONS AND RESTRICTIONS ^{1,2,3}
Sprays	<i>coumaphos</i> Co-Ral 6.15%	1B	Mix 2.5–5 fl oz/4 gal water	Mix 2.5–5 fl oz/4 gal water and spray to complete wetting. Wait at least 10 days between treatments.
	<i>dichlorvos</i> Vapona EC	1B	Mix 1 qt 21.8% EC in 6 gal of water. Restricted Use Pesticide.	Apply 1–2 fl oz as a light mist-spray daily. Spray to cover all parts of the animal. Do not wet the skin. Do not apply more than 2 fl oz/ animal each day.
	<i>permethrin</i> Permethrin II Atroban 11%	3A	Mix 1 qt of 5.7% EC OR mix 1 pt of 10% EC or 11% EC in 100 gal water or mix 30–118 ml of 40% EC in 25 gal of water or apply 1% pour-on as an undiluted spray.	Spray 1 qt of coarse spray per animal. Re-treat as needed but not more than once every 14 days. To control lice or mites, a second treatment may be needed 10–21 days later.
	<i>phosmet</i> Prolate/Lintox Prolate/Lintox HD	1B	Mix 1 qt in 60 gal water and spray to run-off.	Apply as a coarse high pressure spray to thoroughly wet the skin and hair of the animal. Apply up to 1 gal/animal. Do not re-treat within 7 days. Follow label restrictions.
	<i>pyrethrins</i> Pyrethrins—synergized.	3A	Ready-to-use when purchased.	Apply 1–2 fl oz daily or as needed. Apply to wet hair not skin. Do not exceed 5 fl oz in any 14 day period.
	0.5% <i>stirofos</i> + 0.1% <i>dichlorvos</i> Ravap EC spray	1B	Mix 1 pt 28.7% EC in 6 gal of water. Restricted Use Pesticide.	Apply as a coarse spray. Apply ½ gal spray/animal. Do not repeat application within 10 days.
Dusts	<i>coumaphos</i> 1% Livestock Dust Co-Ral Livestock Dust	1B	Ready-to-use when purchased.	Use shaker can to apply 2 oz/animal over head, neck, shoulders, and back.
	<i>permethrin</i> Prozap Insectrin 0.25% Dust	3A	Ready-to-use when purchased.	Use in dust bags or apply up to 2 oz directly to animals. Re-treat 14–21 days later if needed for lice control.
	<i>zeta-cypermethrin</i> PYthon dust 0.075% <i>zeta-cypermethrin</i>	3A	Ready-to-use when purchased.	Apply up to 2 oz/animal evenly as necessary but not more often than every 3 days.

BEEF CATTLE EXTERNAL PARASITE AND GRUB CONTROL

HORN FLIES

WAYS TO APPLY INSECTICIDES	INSECTICIDE	MOA	MIXING INSTRUCTIONS	APPLICATION INSTRUCTIONS AND RESTRICTIONS ^{1,2,3}
Ear-tags and Dust Bags (Self Treatment)	<i>abamectin</i> abamectin 8% XP-820 Ear Tag	6	Ready-to-use when purchased.	For control of horn flies and ticks. Use 1 tag/animal for up to 3 months of control, or 2 tags/animal for up to 5 months of control for flies, and 4 months for ticks.
	<i>beta-cyfluthrin</i> CyLence Ultra Insecticide Cattle Ear Tags 8%	3A	Ready-to-use when purchased.	For control of horn flies, face flies, Gulf Coast ticks, and spinose ear ticks on beef cattle. For adequate control of horn flies attach 1 tag/animal. For optimum control of face flies, horn flies, Gulf Coast ticks, and spinose ear ticks, attach 1 tag to each ear (2/animal). CyLence Ultra Insecticide Ear Tags have been proven to be effective against face and horn flies for up to 5 months.
	<i>coumaphos</i> Corathon Insecticide Cattle Ear Tag 15% <i>coumaphos</i> 35% <i>diazinon</i>	1B	Ready-to-use when purchased.	All mature animals in the herd should be tagged. For optimum control of horn flies, Gulf Coast ticks, and spinose ear ticks, and as an aid in the control of face flies, attach 1 tag to each ear (2/animal). Replace as necessary. Calves less than 3 months of age should not be tagged as ear damage may result. Remove tags at end of fly season or prior to slaughter.
	Co-Ral Livestock Dust			Place contents of package in any commercially available dust bag. Suspend bags in areas frequented by cattle or in gateways or lanes through which the animals pass daily for water, feed, or minerals. Bags may also be suspended in loafing sheds or in front of protected mineral feeders. For lactating dairy cows, bags may be suspended in the exit through which cows leave the milking barn. In all cases the bags should be adjusted so that the bottom of the bag will hang 4–6" below the topline of the cattle.
	<i>diazinon</i> OPTimizer 21.4% insecticide ear tag	1B	Ready-to-use when purchased.	Attach 1 tag to the inside of each ear on mature cattle. Tags should be removed when control drops off, at the end of fly season, or before slaughter.
	Patriot 40% insecticide cattle ear tag			Attach 1 tag to the inside of 1 or both ears of mature animals. Remove tags when control drops off, at the end of fly season, or before slaughter.
	Max 40 ear tag			
	Warrior 40% insecticide ear tag 30% <i>diazinon</i> + 10% <i>chlorpyrifos</i>			Attach 1 tag to the inside of 1 or both ears of mature animals. Remove tags when control drops off, at the end of fly or lice season, or before slaughter.
	<i>lambda-cyhalothrin</i> Saber Extra 10% insecticide ear tag 10% <i>lambda-cyhalothrin</i> + 13% <i>piperonyl butoxide</i>	3A	Ready-to-use when purchased.	Apply 1 tag to the inside of each ear on mature cattle or calves. Remove tags when control drops off, at the end of fly season, or before slaughter.
Double Barrel/Double Barrel VP 20.8% insecticide ear tag 6.8% <i>lambda-cyhalothrin</i> + 14.0% <i>pirimiphos methyl</i>	3A + 1B	Ready-to-use when purchased.	Apply 1 tag to the inside of each ear on mature cattle or calves. Remove tags when control drops off, at the end of fly season, or before slaughter.	

HORN FLIES

WAYS TO APPLY INSECTICIDES	INSECTICIDE	MOA	MIXING INSTRUCTIONS	APPLICATION INSTRUCTIONS AND RESTRICTIONS ^{1,2,3}
Ear-tags and Dust Bags (Self Treatment) <i>(continued)</i>	<i>permethrin</i> Gard Star Plus	3A	Ready-to-use when purchased.	Attach 1 tag to the inside of each ear on mature cattle and calves. Remove tags when control drops off, at the end of fly season, or before slaughter.
	<i>pirimiphos-methyl</i> Dominador 20% insecticide ear tag 20% <i>pirimiphos methyl</i>	3A	Ready-to-use when purchased.	Attach 1 tag to the inside of each ear on mature cattle. Remove tags when control drops off or in the fall, whichever occurs first.
	<i>zeta-cypermethrin</i> PYthon Magnum 10% insecticide ear tag	3A	Ready-to-use when purchased.	Attach 1 tag to the inside of each ear on mature cattle. Remove tags when control drops off, at the end of fly or lice season, or before slaughter. During the horn fly season, 1 tag/animal can be used on cows. Calves can be tagged with 1 tag as needed.
	<i>zeta-cypermethrin + abamectin</i> Tri-Zap Insecticide Cattle Ear Tag	3A + 6	Use two tags per animal.	Tag all animals in herd (including calves) and replace as necessary.
Backrubbers and Facerubbers	<i>permethrin</i> Permethrin Rubbing Mixture	3A	10% or 11% EC in 1 gal of #2 diesel fuel or mineral oil or mix 118 ml 40% EC in 10 gal of diesel oil or suitable mineral oil.	Keep rubbing device charged. Daily forced use provides best results.
	<i>phosmet</i> Prolate/Lintox	1B		
	<i>stirofos + dichlorvos</i> Ravap 1% <i>stirofos</i> + 0.25% <i>dichlorvos</i> in oil	1B	Mix 5 oz 28.7% EC in 1 gal of #2 diesel fuel. Restricted Use pesticide.	Pour 1 gal of mixture/20 ft of cable. Keep rubbing device charged.
Injectable Pour-on Spot-on	<i>lambda-cyhalothrin</i> with <i>piperonyl butoxide</i> Aim-L Vetcap	3A		Apply only with a SmartVet Approved Vetcap Application Device according to label directions
	<i>cyfluthrin</i> Cylence 1% pour-on insecticide.	3A	Ready-to-use when purchased.	Apply pour-on along the top of the back and top of the head. For horn fly and face fly control apply 4 ml to animals weighing less than 400 lb, 8 ml to animals weighing 400–800 lb and 12 ml to animals weighing over 800 lb. Do not re-treat within 3 weeks following treatment. Double the dose for biting and sucking lice.
	<i>doramectin</i> Dectomax Pour-On	6	Ready-to-use when purchased.	Apply Pour-On along the top of the back and top of the head at the rate of 1 ml/22 lb of body weight. Provides 7 days of horn fly control and 42–77 days of louse suppression.
	<i>eprinomectin</i> Ivomec Eprinex pour-on for beef cattle. Contains 5 mg. <i>eprinomectin</i> /ml.	6	Ready-to-use when purchased.	Administer pour-on to cattle 8 weeks of age or older. Apply at the dose of 1 ml/22 lb body weight. Apply pour-on to the top of the animal along the backline from the withers to the tailhead.
	<i>gamma-cyhalothrin</i> StandGuard Pour-on 0.5%	3A	Ready-to-use when purchased.	For cattle weighing less than 600 lb, apply 10 ml (½ fl oz) product along backline. For cattle weighing more than 600 lb, apply 15 ml (½ fl oz) along backline.

■ BEEF CATTLE EXTERNAL PARASITE AND GRUB CONTROL

HORN FLIES

WAYS TO APPLY INSECTICIDES	INSECTICIDE	MOA	MIXING INSTRUCTIONS	APPLICATION INSTRUCTIONS AND RESTRICTIONS ^{1,2,3}
Injectable Pour-on Spot-on (continued)	<i>ivermectin</i> Ivomec pour-on, 5 mg <i>ivermectin</i> /ml	6	Ready-to-use when purchased.	Apply 1 ml/22 lb of body weight. Apply along the topline in a narrow strip extending from the withers to the tailhead.
	<i>lambda-cyhalothrin</i> Saber 1% pour-on insecticide	3A	Ready-to-use when purchased.	Apply to beef cattle and calves for lice and horn flies. Apply pour-on down the backline at 10 ml (½ fl oz)/animal for cattle weighing less than 600 lb or at a rate of 15 ml (½ fl oz)/animal for cattle weighing more than 600 lb. Repeat as needed but not more than every 2 weeks and not more than 4 applications within a 6 month period.
	<i>moxidectin</i> Moxidectin Cydectin Pour-on	6	Inject 1 mg/110 lb body weight	Use 22.7 mg/100 lb body weight (mites and lice).
	<i>permethrin</i> Atroban DeLice 1% pour on.	3A	Ready-to-use when purchased.	Apply 0.5 fl oz (15 cc)/100 lb body weight of animal up to a maximum of 5 fl oz for any 1 animal. Pour correct dose along back and down face.
	Brute Pour-on 10% <i>permethrin</i> Ultra-Boss Pour-on 5% <i>permethrin</i>			Apply 15 cc (10%) or 30 cc (5%)/1000 lb down mid-line of back. Repeat the application in 10–14 days for mites.
	<i>permethrin</i> 5% + <i>diflubenzuron</i> 3% Clean-up II Pour-on Insecticide with IGR	3A + 15	Ready-to-use when purchased.	Apply 3 ml per 100 lbs of body weight. Do not exceed 30 ml for one animal. Pour along the backline and down the face.
Bolus, Feed Additives	<i>diflubenzuron</i> <i>diflubenzuron</i> 8% ClariFly	15	Ready-to-use when purchased.	Mix according to label instructions and feed at rates stipulated based on cattle weights. Prevents emergence of horn flies, face flies, house flies, and stable flies from manure of treated cattle. Start feeding treated cattle early in the spring before flies appear and continue until cold weather restricts fly activity. Does not affect adult flies. No withdrawal; no milk withholding.
	<i>methoprene</i> Altosid 0.02% mineral mix or block Altosid IGR 1% Liquid-Feed-through	7A	Ready-to-use when purchased.	Feed free choice at ¼–½ lb/100 lb animal body weight monthly/animal. Mix in feed to achieve consumption rate of 1.13 mg/100 lb animal body weight/day.
	<i>tetrachlorvinphos</i> Rabon 7.76% granular oral laticide.	1B	Pre-mix or ready-to-use blocks and mineral feeds are available commercially.	Mix 7.76% oral larvicide with concentrate feed as directed on label. Feed ready-to-use block or mineral free choice so each animal will consume 70 mg/100 lb body weight daily. Begin feeding before flies appear in spring. Feed continuously until frost. Does not affect adult flies.

HORSE FLIES, DEER FLIES, MOSQUITOES, BLACK FLIES, EYE GNATS

WAYS TO APPLY INSECTICIDES	INSECTICIDE	MOA	MIXING INSTRUCTIONS	APPLICATION INSTRUCTIONS AND RESTRICTIONS ^{1,2,3}
Sprays	<i>dichlorvos</i> Vapona EC	1B	Mix 1 qt 21.8% EC in 6 gal of water. Restricted Use Pesticide	Apply 1–2 fl oz as a light mist-spray daily. Spray to cover all parts of the animal. Do not wet the skin. Do not apply more than 2 fl oz/animal each day.
	<i>permethrin</i> Permethrin II spray	3A	Mix 1 qt of 5.7% EC OR mix 1 pt of 10% EC or 11% EC in 100 gal water or mix 30–118 ml of 40% EC in 25 gal of water or apply 1% pour-on as an undiluted spray.	Spray animal thoroughly. Re-treat as needed but not more often than once every 14 days. To control lice or mites, a second treatment may be needed 10–21 days later.
	<i>pyrethrins</i> Pyrethrins—synergized	3A	Ready-to-use when purchased.	Apply 1–2 fl oz daily or as needed. Apply to wet hair not skin. Do not exceed 5 fl oz in any 14 day period.
Ear-Tags and Dust Bags (Self-Treatment)	<i>permethrin</i> Prozap Insectrin	3A	Ready-to-use when purchased.	Use in dust bags or apply up to 2 oz directly to animals. Re-treat 14–21 days later if needed for lice control.
Backrubbers and Facerubbers	<i>permethrin</i> Permethrin II	3A	Mix 1 qt 5.7% EC in 10 gal diesel fuel or mix 1 pt 10% or 11% EC in 1 gal of #2 diesel fuel or mineral oil or mix 118 ml 40% EC in 10 gal of diesel oil or suitable mineral oil.	Keep rubbing device charged. Daily forced use provides best results.
Pour-on Spot-on	<i>permethrin</i> Atroban DeLice 1% pour-on	3A	Ready-to-use when purchased.	Apply 0.5% fl oz (15 cc)/100 lb body weight of animal up to a maximum of 5 fl oz for any 1 animal. Pour correct dose along back and down face.
	Brute Pour-on 10% Ultra-Boss Pour-on 5%			Apply 15 cc (10%) or 30 cc (5%)/1000 lb down mid-line of back. Repeat the application in 10–14 days for mites.
	<i>permethrin</i> 5% + <i>diflubenzuron</i> 3% Clean-up II Pour-on Insecticide with IGR	+ 15	Apply 3 ml per 100 lbs of body weight. Do not exceed 30 ml for one animal. Pour along the backline and down the face.	

BEEF CATTLE EXTERNAL PARASITE AND GRUB CONTROL

HOUSE FLIES

WAYS TO APPLY INSECTICIDES	INSECTICIDE	MOA	MIXING INSTRUCTIONS	APPLICATION INSTRUCTIONS AND RESTRICTIONS ^{1,2,3}
Sprays	<i>dichlorvos</i> Vapona EC	1B	Mix 1 qt 21.8% EC in 6 gal of water. Restricted Use Pesticide	Apply 1–2 fl oz as a light mist-spray daily. Spray to cover all parts of the animal. Do not wet the skin. Do not apply more than 2 fl oz/animal each day.
	<i>permethrin</i> Permethrin II Atroban 11%	3A	Mix 1 qt of 5.7% EC OR mix 1 pt of 10% EC or 11% EC in 100 gal water or mix 30-118 ml of 40% EC in 25 gal of water or apply 1% pour-on as an undiluted spray.	Spray animal thoroughly. Re-treat as needed but not more often than once every 14 days. To control lice or mites, a second treatment may be needed 10-21 days later.
	<i>pyrethrins</i> Pyrethrins—synergized	3A	Ready-to-use when purchased.	Apply 1–2 fl oz daily or as needed. Apply to wet hair not skin. Do not exceed 5 fl oz in any 14 day period.
Ear-Tags and Dust Bags (Self-Treatment)	<i>diazinon</i> OPTimizer 21.4% insecticide ear tag 21.4% <i>diazinon</i>	1B	Ready-to-use when purchased.	Attach 1 tag to the inside of 1 or both ears of mature animals. Remove tags when control drops off, at the end of fly season, or before slaughter.
	Patriot 40% insecticide cattle ear tag			
	Warrior 40% insecticide ear tag (30% <i>diazinon</i> + 10% <i>chlorpyrifos</i>)			
	Max 40 ear tag			
	<i>lambda-cyhalothrin</i> Saber 10% insecticide ear tag 10% <i>lambda-cyhalothrin</i> + 13% <i>piperonyl butoxide</i>	3A	Ready-to-use when purchased.	Apply 1 tag to the inside of each ear on mature cattle or calves. Remove tags when control drops off, at the end of fly season, or before slaughter.
	Double Barrel/Double Barrel VP 20.8% insecticide ear tag 6.8% <i>lambda-cyhalothrin</i> + 14% <i>pirimiphos methyl</i>	3A + 1B	Ready-to-use when purchased.	Apply 1 tag to the inside of each ear on mature cattle or calves. Remove tags when control drops off, at the end of fly season, or before slaughter.
	<i>permethrin</i> Permethrin 10% Insecticide Ear Tag Gard Star Plus	3A	Ready-to-use when purchased.	Attach 1 tag to the inside of each ear on mature cattle and calves. Remove tags when control drops off, at the end of fly season, or before slaughter.
	<i>pirimiphos-methyl</i> Dominator 20% insecticide ear tag	1B	Ready-to-use when purchased.	Attach 1 tag to the inside of each ear on mature cattle. Remove tags when control drops off or in the fall, whichever occurs first.
<i>zeta-cypermethrin</i> PYthon Magnum 10% insecticide ear tag	3A	Ready-to-use when purchased.	Attach 1 tag to the inside of each ear on mature cattle. Remove tags when control drops off, at the end of fly or lice season, or before slaughter. During the horn fly season, 1 tag/animal can be used on cows. Calves can be tagged with 1 tag as needed.	

HOUSE FLIES

WAYS TO APPLY INSECTICIDES	INSECTICIDE	MOA	MIXING INSTRUCTIONS	APPLICATION INSTRUCTIONS AND RESTRICTIONS ^{1,2,3}
Pour-on Spot-on	<i>permethrin</i> Atroban DeLice 1.0% pour-on	3A	Ready-to-use when purchased.	Apply 0.5% fl oz (15 cc)/100 lb body weight of animal up to a maximum of 5 fl oz for any 1 animal. Pour correct dose along back and down face.
	Brute Pour-on 10% Ultra-Boss Pour-on 5%	3A	Ready-to-use when purchased.	Apply 15 cc (10%) or 30 cc (5%)/1000 lb down mid-line of back. Repeat the application in 10-14 days for mites.
	<i>permethrin</i> 5% + <i>diflubenzuron</i> 3% Clean-up II Pour-on Insecticide with IGR	3A + 15	Ready-to-use when purchased.	Apply 3 ml per 100 lbs of body weight. Do not exceed 30 ml for one animal. Pour along the backline and down the face.
Bolus, Feed Additives	<i>diflubenzuron</i> ClariFly (8%)	15	Mix according to instructions based on cattle weights.	Mix according to label instructions and feed at rates stipulated based on cattle weights. Prevents development of fly larvae in manure of treated cattle. Prevents emergence of horn flies, face flies, house flies, and stable flies from manure of treated cattle. Start feeding early in the spring before flies appear and continue until cold weather restricts fly activity. Does not affect adult flies. No withdrawal; no milk withholding.
	<i>tetrachlorvinphos</i> Rabon 7.76% granular oral laticide	1B	Pre-mix or ready-to-use blocks and mineral feeds are available commercially.	Mix 7.76% oral larvicide with concentrate feed as directed on label. Feed ready-to-use block or mineral free choice so each animal will consume 70 mg/100 lb body weight daily. Begin feeding before flies appear in spring. Feed continuously until frost. Does not affect adult flies.

MITES, SCABIES (Psoroptic, Chorioptic, Sarcoptic)

WAYS TO APPLY INSECTICIDES	INSECTICIDE	MOA	MIXING INSTRUCTIONS	APPLICATION INSTRUCTIONS AND RESTRICTIONS ^{1,2,3}
Sprays	<i>permethrin</i> Permethrin II	3A	Mix 1 qt of 5.7% EC OR mix 1 pt of 10% EC or 11% EC in 100 gal water or mix 30-118 ml of 40% EC in 25 gal of water or apply 1% pour-on as an undiluted spray.	Spray animal thoroughly. Re-treat as needed but not more often than once every 14 days. To control lice or mites, a second treatment may be needed 10–21 days later.
	<i>phosmet</i> Prolate/Lintox HD	1B	Mix 1 qt in 25–50 gal water (depending on target pest), and spray to run-off.	Apply as a coarse high pressure spray to thoroughly wet the skin and hair of the animal. Apply up to 1 gal/animal. Do not re-treat within 7 days. Follow label restrictions.
Injectables	<i>eprinomectin</i> 5% LongRange Injectable	6	Ready-to-use when purchased.	Inject 1 ml of LongRange/110 lb animal weight.
	<i>ivermectin</i> Ivomec 1% clear, ready-to-use sterile solution.	6	Ready-to-use when purchased.	Administer subcutaneously only 1 ml (10 mg <i>ivermectin</i>)/110 lb body weight. Restrain animals and inject under the loose skin in front of or behind the shoulder. A sterile, 16-gauge, 0.5–0.75" needle is suggested. Divide doses greater than 10 ml between 2 injection sites to reduce occasional transitory discomfort or site reaction. Waiting period between application and slaughter: 35 days.
	<i>doramectin</i> Dectomax Injectable			

■ BEEF CATTLE EXTERNAL PARASITE AND GRUB CONTROL

MITES, SCABIES (Psoroptic, Chorioptic, Sarcoptic)

WAYS TO APPLY INSECTICIDES	INSECTICIDE	MOA	MIXING INSTRUCTIONS	APPLICATION INSTRUCTIONS AND RESTRICTIONS ^{1,2,3}
Injectable Pour-on Spot-on	<i>cyfluthrin</i> Cylence 1% pour-on insecticide	3A	Ready-to-use when purchased.	Apply pour-on along the top of the back and top of the head. For horn fly and face fly control apply 4 ml to animals weighing less than 400 lb, 8 ml to animals weighing 400–800 lb and 12 ml to animals weighing over 800 lb. Do not re-treat within 3 weeks following treatment. Double the dose for biting and sucking lice.
	<i>doramectin</i> 0.5% Dectomax pour-on	6	Ready-to-use when purchased.	Apply 1 ml/22 lb body weight, along midline of the back between withers and tailhead. Safe for all beef cattle and replacement dairy heifers up to 20 months of age.
	<i>eprinomectin</i> Ivomec Eprinex pour-on for beef cattle.	6	Ready-to-use when purchased.	Administer pour-on to cattle 8 weeks of age or older. Apply at the dose of 1 ml/22 lb body weight. Apply pour-on to the top of the animal along the backline from the withers to the tailhead.
	Ivomec pour-on, ready-to-use. 5 mg <i>ivermectin</i> /ml.	6	Ready-to-use when purchased.	Apply 1 ml/22 lb of body weight. Apply along the topline in a narrow strip extending from the withers to the tailhead.
	<i>moxidectin</i> Cydectin 1% injectable	6	Ready-to-use when purchased.	Inject 1 mg/10 lb body weight.
	Cydectin Pour-on			Use 22.7 mg/100 lb body weight (mites and lice).
	<i>permethrin</i> Atroban DeLice 1% pour-on	3A	Ready-to-use when purchased.	Apply 0.5% fl oz (15 cc)/100 lb body weight of animal up to a maximum of 5 fl oz for any 1 animal. Pour correct dose along back and down face.
Brute Pour-on 10% Ultra-Boss Pour-on 5%	Apply 15 cc (10%) or 30 cc (5%)/1000 lb down mid-line of back. Repeat the application in 10–14 days for mites.			

STABLE FLIES

WAYS TO APPLY INSECTICIDES	INSECTICIDE	MOA	MIXING INSTRUCTIONS	APPLICATION INSTRUCTIONS AND RESTRICTIONS ^{1,2,3}
Sprays	<i>dichlorvos</i> Vapona EC	1B	Mix 1 qt 21.8% EC in 6 gal of water. Restricted Use Pesticide.	Apply 1–2 fl oz as a light mist-spray daily. Spray to cover all parts of the animal. Do not wet the skin. Do not apply more than 2 fl oz/animal each day.
	<i>permethrin</i> Permethrin II Atroban 11%	3A	Mix 1 qt of 5.7% EC OR mix 1 pt of 10% EC or 11% EC in 100 gal water or mix 30–118 ml of 40% EC in 25 gal of water or apply 1% pour-on as an undiluted spray.	Spray animal thoroughly. Re-treat as needed but not more often than once every 14 days. To control lice or mites, a second treatment may be needed 10–21 days later.
	Pyrethrins Pyrethrins—synergized		Ready-to-use when purchased.	Apply 1–2 fl oz daily or as needed. Apply to wet hair not skin. Do not exceed 5 fl oz in any 14 day period.

STABLE FLIES

WAYS TO APPLY INSECTICIDES	INSECTICIDE	MOA	MIXING INSTRUCTIONS	APPLICATION INSTRUCTIONS AND RESTRICTIONS ^{1,2,3}
Ear-Tags and Dust Bags (Self-Treatment)	<i>diazinon</i> OPTimizer 21.4% insecticide ear tag Patriot 40% insecticide cattle ear tag	1B	Ready-to-use when purchased.	Attach 1 tag to the inside of 1 or both ears of mature animals. Remove tags when control drops off, at the end of fly season, or before slaughter.
	Warrior 40% insecticide ear tag 30% <i>diazinon</i> + 10% <i>chlorpyrifos</i>			
	Max 40 ear tag			
	<i>lambda-cyhalothrin</i> Saber 10% insecticide ear tag 10% <i>lambda-cyhalothrin</i> + 13% <i>piperonyl butoxide</i>	3A	Ready-to-use when purchased.	Apply 1 tag to the inside of each ear on mature cattle or calves. Remove tags when control drops off, at the end of fly season, or before slaughter.
	Double Barrel/Double Barrel VP 20.8% insecticide ear tag 6.8% <i>lambda-cyhalothrin</i> + 14% <i>pirimiphos methyl</i>	3A + 1B	Ready-to-use when purchased.	Apply 1 tag to the inside of each ear on mature cattle or calves. Remove tags when control drops off, at the end of fly season, or before slaughter.
	<i>permethrin</i> Permethrin 10% Insecticide ear tag Gard Star Plus	3A	Ready-to-use when purchased.	Attach 1 tag to the inside of each ear on mature cattle and calves. Remove tags when control drops off, at the end of fly season, or before slaughter.
	<i>pirimiphos-methyl</i> Dominator 20% insecticide ear tag	1B	Ready-to-use when purchased.	Attach 1 tag to the inside of each ear on mature cattle. Remove tags when control drops off or in the fall, whichever occurs first.
<i>zeta-cypermethrin</i> PYthon 10% insecticide ear tag <i>zeta-cypermethrin</i> 10% + <i>piperonyl butoxide</i> 20%	3A	Ready-to-use when purchased.	Attach 1 tag to the inside of each ear on mature cattle. Remove tags when control drops off, at the end of fly or lice season, or before slaughter. During the horn fly season, 1 tag/ animal can be used on cows. Calves can be tagged with 1 tag as needed.	
Backrubbers and Facerubbers	<i>permethrin</i> Permethrin II	3A	Mix 1 qt 5.7% EC in 10 gal diesel fuel or mix 1 pt 10% or 11% EC in 1 gal of #2 diesel fuel or mineral oil or mix 118 ml 40% EC in 10 gal of diesel oil or suitable mineral oil.	Keep rubbing device charged. Daily forced use provides best results.
Pour-on Spot-on	<i>lambda-cyhalothrin</i> with <i>piperonyl butoxide</i> Vetcap AIM-L insecticide capsules	3A	Ready-to-use when purchased.	Apply only with a SmartVet Approved Vetcap Application Device according to label directions
	<i>lambda-cyhalothrin</i> Saber 1% pour-on insecticide	3A	Ready-to-use when purchased.	Apply to beef cattle and calves for lice and horn flies. Apply pour-on down the backline at 10 ml (½ fl oz)/animal for cattle weighing less than 600 lb or at a rate of 15 ml (½ fl oz)/animal for cattle weighing more than 600 lb. Repeat as needed but not more often than every 2 weeks and not more than 4 applications within a six-month period.
	<i>permethrin</i> Atroban DeLice 1% pour-on	3A	Ready-to-use when purchased.	Apply 0.5 fl oz (15 cc)/100 lb body weight of animal up to a maximum of 5 fl oz for any 1 animal. Pour correct dose along back and down face.
	Brute Pour-on 10% Ultra-Boss Pour-on 5%			Apply 15 cc (10%) or 30 cc (5%)/1000 lb down mid-line of back. Repeat the application in 10-14 days for mites.
	Clean-up II Pour-on Insecticide with IGR <i>permethrin</i> 5% + <i>diflubenzuron</i> 3%	3A/15	Apply 3 ml per 100 lbs of body weight. Do not exceed 30 ml for one animal. Pour along the backline and down the face.	

BEEF CATTLE EXTERNAL PARASITE AND GRUB CONTROL

TICKS

WAYS TO APPLY INSECTICIDES	INSECTICIDE	MOA	MIXING INSTRUCTIONS	APPLICATION INSTRUCTIONS AND RESTRICTIONS ^{1,2,3}
Sprays	<i>coumaphos</i> Co-Ral 6.15%	1B	Mix 5 fl oz/4 gal water.	Mix 2.5–5 fl oz in 4 gal water and spray to complete wetting. Wait at least 10 days between treatments.
	<i>permethrin</i> Permethrin II Atroban 11%	3A	Mix 1 qt of 5.7% EC OR mix 1 pt of 10% EC or 11% EC in 100 gal water or mix 30–118 ml of 40% EC in 25 gal of water or apply 1% pour-on as an undiluted spray.	Spray animal thoroughly. Re-treat as needed but not more often than once every 14 days. To control lice or mites, a second treatment may be needed 10–21 days later.
	Permethrin EC Spray		Mix 1 cup 42.5% EC in 100 gal water or mix 1 pt 40% EC in 100 gal water.	Apply 2 qt of high concentration spray/animal to control all labeled parasites. Repeat treatment as needed but not more than every 14 days.
	<i>phosmet</i> Prolate/Lintox Prolate/Lintox HD	1B	Mix 1 qt in 25–50 gal water (depending on target pest), and spray to run-off.	Apply as a coarse high pressure spray to thoroughly wet the skin and hair of the animal. Apply up to 1 gal/animal. Do not re-treat within 7 days. Follow label restrictions.
	<i>stirofos + dichlorvos</i> Ravap EC spray	1B	Mix 1 pt 28.7% EC in 10 gal water. Restricted Use Pesticide.	Apply as a coarse spray. Apply 0.5–1 gal spray/animal. Do not repeat application within 10 days.
Ear-Tags and Dust Bags (Self-Treatment)	<i>abamectin</i> XP820	6		
	<i>coumaphos</i> Corathon Insecticide Cattle Ear Tag 15% <i>coumaphos + 35% diazinon</i>	1B	Ready-to-use when purchased.	All mature animals in the herd should be tagged. For optimum control of horn flies, Gulf Coast ticks, and spinose ear ticks, and as an aid in the control of face flies, attach 1 tag to each ear (2/animal). Replace as necessary. Calves less than 3 months of age should not be tagged as ear damage may result. Remove tags at end of fly season or prior to slaughter.
	<i>cyfluthrin</i> Beta-cyfluthrin CyLence Ultra Insecticide Cattle Ear Tags 8%	3A	Ready-to-use when purchased.	All mature animals in the herd should be tagged. For optimum control of horn flies, coast ticks, and spinose ear ticks, and as an aid in the control of face flies, attach 1 tag to each ear (2/animal). Replace as necessary. Calves less than 3 months of age should not be tagged as ear damage may result. Remove tags at end of fly season or prior to slaughter.
	<i>diazinon</i> OPTimizer 21.4% insecticide ear tag	1B	Ready-to-use when purchased.	Attach 1 tag to the inside of each ear on mature cattle. Tags should be removed when control drops off, at the end of the fly season, or before slaughter.
	<i>diazinon</i> Patriot 40% insecticide cattle ear tag. <i>Warrior 40% insecticide ear tag 30% diazinon + 10% chlorpyrifos</i>	1B	Ready-to-use when purchased.	Attach 1 tag to the inside of 1 or both ears of mature animals. Remove tags when control drops off, at the end of fly season, or before slaughter.

TICKS

WAYS TO APPLY INSECTICIDES	INSECTICIDE	MOA	MIXING INSTRUCTIONS	APPLICATION INSTRUCTIONS AND RESTRICTIONS ^{1,2,3}
Ear-Tags and Dust Bags (Self-Treatment) (continued)	<i>lambda-cyhalothrin</i> Saber insecticide ear tag	3A	Ready-to-use when purchased.	Apply 1 tag to the inside of each ear on mature cattle or calves. Remove tags when control drops off, at the end of fly season, or before slaughter.
	<i>permethrin</i> Permethrin 10% Insecticide Ear Tag Gard Star Plus	3A	Ready-to-use when purchased.	Attach 1 tag to the inside of each ear on mature cattle and calves. Remove tags when control drops off, at the end of fly season, or before slaughter.
	Permethrin 0.25% dust	3A		Use in dust bags or apply up to 2 oz directly to animals. Re-treat 14–21 days later if needed for lice control.
	<i>pirimiphos-methyl</i> Dominator 20% insecticide ear tag 20% <i>pirimiphos methyl</i>	1B	Ready-to-use when purchased.	Attach 1 tag to the inside of each ear on mature cattle. Remove tags when control drops off or in the fall, whichever occurs first.
	<i>zeta-cypermethrin</i> PYthon Magnum 10% insecticide ear tag <i>zeta-cypermethrin</i> 10% + <i>piperonyl butoxide</i> 20%	3A	Ready-to-use when purchased.	Attach 1 tag to the inside of each ear on mature cattle. Remove tags when control drops off, at the end of fly or lice season, or before slaughter. During the horn fly season, 1 tag/animal can be used on cows. Calves can be tagged with 1 tag as needed.
	<i>zeta-cypermethrin</i> + <i>abamectin</i> Tri-Zap Insecticide Cattle Ear Tag	3A + 6	Use two tags per animal.	Tag all animals in herd (including calves) and replace as necessary.
Backrubbers and Facerubbers	<i>permethrin</i> Permethrin II	3A	Mix 1 qt 5.7% EC in 10 gal diesel fuel or mix 1 pt 10% or 11% EC in 1 gal of #2 diesel fuel or mineral oil or mix 118 ml 40% EC in 10 gal of diesel oil or suitable mineral oil.	Keep rubbing device charged. Daily forced use provides best results.
	<i>stirofos</i> + <i>dichlorvos</i> Ravap 1% <i>stirofos</i> + 0.25% <i>dichlorvos</i> in oil.	1B	Mix 5 oz 28.7% EC in 1 gal of #2 diesel fuel. Restricted Use Pesticide.	Pour 1 gal of mixture/20 ft of cable. Keep rubbing device charged.
Pour-on Spot-on	<i>permethrin</i> Atroban DeLice 1% pour on	3A	Ready-to-use when purchased.	Apply 0.5% fl oz (15 cc)/100 lb body weight of animal up to a maximum of 5 fl oz for any 1 animal. Pour correct dose along back and down face.
	Brute Pour-on 10% Ultra-Boss Pour-on 5%			Apply 15 cc (10%) or 30 cc (5%)/1000 lb down mid-line of back. Repeat the application in 10–14 days for mites.

1. Waiting periods refer to the time interval between the last application of the insecticide and slaughter of beef animals.
2. Do not treat calves under 6 months of age with insecticides unless specifically allowed on the insecticide label.
3. Do not treat Brahman cattle with organophosphate insecticides unless specifically allowed on the insecticide label.
4. Available from veterinarians.

DAIRY CATTLE EXTERNAL PARASITE AND CATTLE GRUB CONTROL

Nancy C. Hinkle, Veterinary Entomologist

Listed here are products for lactating and non-lactating dairy cattle. Read instructions carefully and determine if the product is suitable for both the target pest and the animal. Be sure to observe all precautions on insecticide labels to prevent injury to animals and humans and to prevent illegal insecticide residues in milk and milk by-products.

CATTLE GRUBS

WAYS TO APPLY INSECTICIDES	INSECTICIDE	MOA	MIXING INSTRUCTIONS	APPLICATION INSTRUCTIONS AND RESTRICTIONS
Pour-On	<i>doramectin</i> 0.5% Dectomax Pour-on	6	Ready-to-use when purchased.	Apply 1 ml/22 lb body wt along midline of back between withers and tailhead. Safe for all beef cattle and replacement dairy heifers up to 20 months of age.
	<i>eprinomectin</i> 0.5% Eprinex Pour-on	6	Ready-to-use when purchased.	Apply 1 ml/22 lb body wt along midline of the back between withers and tailback. Safe for all beef and dairy (including lactating) cattle. Applications of macrocyclic lactones will also control blood sucking lice (nymphs and adults). Lice eggs may hatch or untreated cattle may serve as source of reinfestation, requiring re-treatment.
	<i>ivermectin</i> 0.5% Ivomec Pour-on	6	Ready-to-use when purchased.	Apply 1 ml/22 lb body wt, along midline of the back between withers and tailhead. Safe for all beef cattle; cattle must not be treated within 48 days of slaughter for human consumption. Do not use in female dairy cattle of breeding age.
	<i>moxidectin</i> 0.5% Cydectin Pour-on	6	Ready-to-use when purchased.	Pour weight-determined dose evenly along animal's backline from withers to tailhead (basing dose on label weight table). No pre-slaughter or milk discard interval.

CATTLE LICE

WAYS TO APPLY INSECTICIDES	INSECTICIDE	MOA	MIXING INSTRUCTIONS	APPLICATION INSTRUCTIONS AND RESTRICTIONS
Sprays	<i>coumaphos</i> Coumaphos Co-Ral 6.15%	1B	Mix 1 qt in 50 gal water	Spray to complete wetting. Do not make treatments fewer than 10 days apart.
	<i>permethrin</i> Permethrin CDS 7.4%	3A	Mix 1 qt in 25 gal water	1–2 qt of coarse spray/animal over whole body surface. Thoroughly wet animal.
	<i>tetrachlorvinphos</i> 23% + <i>dichlorvos</i> 5.3% Ravap E.C.	1B	Dilute 2 oz in 3 gal water. Direct spray to cover thoroughly with up to 0.5 gal/animal. Restricted Use Pesticide	Repeat as necessary. No milk discard is required. Apply at least 20 minutes prior to milking, or spray after milking has been completed.
Dusts	<i>coumaphos</i> 1% Co-Ral Livestock Dust, ProZap Zipcide Dust	1B	Ready-to-use when purchased.	Using shaker can, apply no more than 2 oz/animal as a uniform coat to the head, shoulders, and back. Treat no more than 6 times/year. Wait 10 days between applications. No milk withholding.
	<i>permethrin</i> 0.25% Permethrin Fly & Louse Dust	3A	Ready-to-use when purchased.	Using shaker can, apply no more than 2 oz/animal over the head, neck, shoulders, back, and tailhead. Repeat as necessary.
	<i>zeta-cypermethrin</i> PYthon Dust 0.075%	3A	Ready-to-use when purchased.	Apply with dust bag or shaker.

CATTLE LICE

WAYS TO APPLY INSECTICIDES	INSECTICIDE	MOA	MIXING INSTRUCTIONS	APPLICATION INSTRUCTIONS AND RESTRICTIONS
Dust Bags (Self-Treatment)	<i>coumaphos</i> 1% Co-Ral Livestock Dust Prozap Insectrin Dust	1B	Ready-to-use when purchased.	Place contents in dust bag and suspend in area frequented by cattle to force daily use. For lactating dairy cattle, bags may be suspended in the exit through which cattle leave the milking barn. Suspend so that the bottom of the bag will hang 4–6" below the topline of the cattle. No milk withholding.
	<i>permethrin</i> Permethrin Fly & Louse Dust 0.25%	3A	Ready-to-use when purchased.	Place contents in dust bag and suspend in area frequented by cattle to force daily use. For lactating dairy cattle, bags may be suspended in the exit through which cattle leave the milking barn. Suspend so that the bottom of the bag will hang 4–6" below the topline of the cattle. No milk withholding.
	<i>zeta-cypermethrin</i> PYthon Dust 0.075%	3A	Ready-to-use when purchased.	Apply with dust bag or shaker.
Backrubbers and Facerubbers	<i>coumaphos</i> Co-Ral Fly and Tick Spray 6.15%	1B	Mix 4 qt in 13 gal oil.	Saturate the backrubber with mixture. Place in location to force daily use. Suspend at height to prevent straddling. No milk withholding.
	<i>tetrachlorvinphos</i> 23% + <i>dichlorvos</i> 5.3% Ravap E.C.	1B	Mix 1 gal in 25 gal oil. Restricted Use Pesticide	Can be used on lactating dairy cattle with no withholding. Dilute according to label instructions. Pour 1 gal/20 linear feet of backrubber. Recharge as needed.
Pour-On	<i>doramectin</i> Dectomax 0.5%	6	Ready-to-use when purchased.	Apply 1 ml/22 lb body wt along midline of back between withers and tailhead. Safe for all beef cattle and replacement dairy heifers to 20 months of age. Lice eggs may hatch or untreated cattle may serve as source of reinfestation, requiring re-treatment.
	<i>eprinomectin</i> Eprinex 0.5%	6	Ready-to-use when purchased.	Apply 1 ml/22 lb body wt along midline of the back between withers and tailback. Safe for all beef and dairy (including lactating) cattle. Lice eggs may hatch or untreated cattle may serve as source of reinfestation, requiring re-treatment.
	<i>ivermectin</i> Ivomec 0.5%	6	Ready-to-use when purchased.	Apply 1 ml/22 lb body wt, along midline of the back between withers and tailhead. Cattle must not be treated within 48 days of slaughter for human consumption. Do not use in female dairy cattle of breeding age. Lice eggs may hatch or untreated cattle may serve as source of reinfestation, requiring re-treatment.
	<i>moxidectin</i> Cydectin 0.5%	6	Ready-to-use when purchased.	Pour weight-determined dose evenly along animal's backline from withers to tailhead (basing dose on label weight table). Provides 7 days of activity against horn flies. No pre-slaughter or milk discard interval. Lice eggs may hatch or untreated cattle may serve as source of reinfestation, requiring re-treatment.
	<i>permethrin</i> Synergized DeLice 1% solution	3A	Ready-to-use when purchased.	Apply 0.5 fl oz (15 cc)/100 lb body weight of animal up to a maximum of 5 fl oz for any 1 animal. Pour-On: Pour correct dose along back and down face. Repeat pour-on treatments as needed, but not more than once every 14 days.

DAIRY CATTLE EXTERNAL PARASITE AND CATTLE GRUB CONTROL

FACE FLIES

WAYS TO APPLY INSECTICIDES	INSECTICIDE	MOA	MIXING INSTRUCTIONS	APPLICATION INSTRUCTIONS AND RESTRICTIONS
Sprays	<i>coumaphos</i> Co-Ral 6.15%	1B	Mix 5 fl oz/4 gal water	Mix 5 fl oz/4 gal water and spray to complete wetting. Do not make treatments fewer than 10 days apart.
	<i>dichlorvos</i> Prozap Beef and Dairy RTU	1B	Apply 1–2 oz/animal	Apply no more than 2 fl oz daily as a light mist-spray to cover all body parts, especially head, back, legs, and sides. Do not wet skin, only hair of animal. Do not apply to animals less than 6 months old.
	Vapona Insecticide Dairy Cattle Spray		Ready-to-use when purchased.	Use according to label; apply less than 2 oz/animal.
	<i>permethrin</i> Synergized DeLice 1% solution	3A	Ready-to-use when purchased.	Apply 0.5 fl oz (15 cc)/100 lb body weight of animal up to a maximum of 5 fl oz for any 1 animal. Ready-to-use spray: Use undiluted in a mist-sprayer to apply correct dose. Apply directly to neck, face, back, legs, and ears. Repeat spray and pour-on treatments as needed, but not more than once every 14 days.
			Mix 1 qt 5.7% EC in 25 gal water.	Apply 1–2 qt diluted spray thoroughly/animal as a high pressure spray. Re-treat as needed but no more than once every 14 days.
		0.5% EC Spray	Mix 1 qt 5.7% EC in 1.5 gal water.	Apply 1–2 oz diluted spray as a low pressure spray to face and shoulders of animal. Re-treat as needed but not more often than every 14 days.
		Permethrin CDS 7.4%	Mix 1 qt in 25 gal water	1–2 qt of coarse spray/animal over whole body surface. Thoroughly wet animal.
		10% Permethrin II Concentrate	Mix 1 qt in 200 gal water OR 8 oz in 50 gal water.	Spray from 0.5–1 gal to cover entire animal. Can be applied to lactating dairy cattle.
		Brute		
		Gard Star		
<i>pyrethrins + synergist</i> <i>piperonyl butoxide</i> Oil Solution or EC Spray <i>pyrethrins</i> 0.05-0.1% + <i>synergist</i> 0.5-1% <i>pyrethrins</i> 0.075% + <i>synergist</i> 0.75%	3A	Oil Solution is ready-to-use. EC spray, mix according to label instructions.	Oil Solution or EC Spray: Apply 1-2 fl oz as a fine mist-spray daily to all body parts, especially head and neck, with hand or automatic sprayer. Do not wetskin.	
		Mix according to label instructions.	Apply thoroughly as wetting spray. Repeat after 2–3 weeks if needed. Apply 1–2 qt as wet spray every 3–7 days if needed. Apply 1–2 qt as a wet spray every 2–3 days or apply 1–2 fl oz as a light mist-spray daily with hand or automatic sprayer.	
		EC Spray <i>pyrethrins</i> 0.025% + <i>synergist</i> 0.25% <i>pyrethrins</i> 0.05% + <i>synergist</i> 0.5% <i>pyrethrins</i> 0.1% + <i>synergist</i> 1%		
Dusts	<i>tetrachlorvinphos</i> 23% + <i>dichlorvos</i> 5.3% Ravap E.C.	1B	Dilute 2 oz in 3 gal Direct spray to cover thoroughly with up to 0.5 gal/animal. Restricted Use Pesticide	Repeat as necessary. No milk discard is required. Apply at least 20 minutes prior to milking, or spray after milking has been completed.
	<i>coumaphos</i> 1% Co-Ral Livestock Dust, ProZap Zipcide Dust	1B	Ready-to-use when purchased.	Using shaker can, apply no more than 1 oz/animal as a uniform coat to the head, shoulders, and back. Treat no more than 6 times/year. Wait 10 days between applications. No milk withholding.
	<i>permethrin</i> Permethrin 0.25% Dust	3A	Ready-to-use when purchased.	Apply up to 2 oz (5 Tbsp)/animal. Re-treat as needed but not more often than every 14 days.

FACE FLIES

WAYS TO APPLY INSECTICIDES	INSECTICIDE	MOA	MIXING INSTRUCTIONS	APPLICATION INSTRUCTIONS AND RESTRICTIONS
Dusts (continued)	<i>tetrachlorvinphos</i> Rabon 3% Dust	1B	Ready-to-use when purchased.	Apply 2 oz of dust/animal. Rub in lightly or apply in suspended self-treatment dust bags. Repeat as needed.
	<i>zeta-cypermethrin</i> PYthon Dust 0.075%	3A	Ready-to-use when purchased.	Apply with dust bag or shaker.
Feed Additives	<i>diflubenzuron</i> ClariFly 8%	15	Mix according to label instructions.	Feed at rates stipulated based on cattle weights. Prevents development of fly larvae in manure of treated cattle. Prevents emergence of horn flies, face flies, house flies, and stable flies from manure of treated cattle. Start feeding early in the spring before flies appear and continue until cold weather restricts fly activity. Does not affect adult flies. No withdrawal; no milk withholding.
	<i>methoprene</i> Altosid 0.02% feed mixture or mineral block IGR	7A	Ready-to-use when purchased.	Animals should consume 0.25–0.5 lb/100 lb body weight each month. Feed this oral insect growth regulator as free choice mineral or mixed in supplements for pasture cattle early in the spring before horn flies appear. May be used in lactating dairy animals.
	Altosid IGR 1% Liquid		Feed-through.	Mix in feed to achieve consumption rate of 1.13 mg/100 lb animal body weight/day.
	<i>tetrachlorvinphos</i> Rabon Oral Larvicide Feed Mixture	1B	Mix Rabon 7.76% Oral Larvicide Pre-mix in feed or mineral mixes. Also available in ready-to-use products.	Feed the appropriate larvicidal feed or mineral mix to milking cows to prevent the development of fly larvae in manure. Follow manufacturers' instructions to ensure adequate amounts are consumed.
Dust Bags (Self-Treatment)	<i>coumaphos</i> Co-Ral Livestock Dust, ProZap Zipcide Dust 1%	1B	Ready-to-use when purchased.	Place contents in dust bag and suspend in area frequented by cattle to force daily use. For lactating dairy cattle, bags may be suspended in the exit through which cattle leave the milking barn. Suspend so that the bottom of the bag will hang 4–6" below the topline of the cattle. No milk withholding.
	<i>permethrin</i> Permethrin 0.25% Dust	3A	Ready-to-use when purchased.	Apply 4–10 lb in self-treatment cotton cloth, doubled burlap bags or commercial dust bags. Suspend where animals will treat themselves daily, such as near mineral stations, salt blocks or in milking barn exit. Bags should hang 4–6" below topline of cattle. Protect bags from weather. Do not hang bags over feed, mineral or water troughs.
	<i>zeta-cypermethrin</i> PYthon Dust 0.075%	3A	Ready-to-use when purchased.	Apply with dust bag or shaker.
Backrubbers and Facerubbers	<i>coumaphos</i> Co-Ral Fly and Tick Spray 6.15%	1B	Mix 4 qt in 13 gal oil	Saturate the backrubber with mixture. Place in location to force daily use. Suspend at height to prevent straddling. No milk with holding.
	<i>permethrin</i> Synergized DeLice 1% solution	3A	Ready-to-use when purchased.	Back rubber use: Mix 1 pt/gal of #2 diesel fuel or mineral oil. Keep rubbing device charged. Results improved by daily forced use.
	<i>permethrin</i> 10%		Mix 1 pt in 10 gal diesel oil.	Keep rubbing device charged with 1 gal mixture/20 ft of cable. Cattle should be forced to use rubbing device daily.

DAIRY CATTLE EXTERNAL PARASITE AND CATTLE GRUB CONTROL

FACE FLIES

WAYS TO APPLY INSECTICIDES	INSECTICIDE	MOA	MIXING INSTRUCTIONS	APPLICATION INSTRUCTIONS AND RESTRICTIONS
Ear Tags	<i>beta-cyfluthrin</i> Cylence Ultra	3A	Ready-to-use when purchased.	Follow label instructions regarding number of tags/head; remove when effectiveness is diminished and at end of season. Can be used on lactating dairy animals.
	<i>permethrin</i> GardStar Plus	3A	Ready-to-use when purchased.	Follow label instructions regarding number of tags/head; remove when effectiveness is diminished and at end of season. Can be used on lactating dairy animals.
	<i>zeta-cypermethrin</i> PYthon, PYthon Magnum	3A	Ready-to-use when purchased.	Follow label instructions regarding number of tags/head; remove when effectiveness is diminished and at end of season. Can be used on lactating dairy animals.
	<i>zeta-cypermethrin + abamectin</i> Tri-Zap Insecticide Cattle Ear Tag	3A + 6	Use two tags per animal.	Tag all animals in herd (including calves) and replace as necessary.

HORN FLIES

WAYS TO APPLY INSECTICIDES	INSECTICIDE	MOA	MIXING INSTRUCTIONS	APPLICATION INSTRUCTIONS AND RESTRICTIONS
Sprays	<i>coumaphos</i> Coumaphos Co-Ral 6.15%	1B	Mix 2.5 fl oz/4 gal water	Mix 2.5 fl oz/4 gal water and spray to complete wetting. Do not make treatments fewer than 10 days apart.
	<i>dichlorvos</i> Prozap Beef and Dairy RTU	1B	Apply 1–2 oz/animal.	Apply no more than 2 fl oz daily as a light mist-spray to cover all body parts, especially head, back, legs, and sides. Do not wet skin, only hair of animal. Do not apply to animals less than 6 months old.
	1% Vapona Insecticide Dairy Cattle Spray, Prozap VIP		Ready-to-use when purchased.	
	<i>permethrin</i> Permethrin EC Spray Permethrin II Atroban 11%	3A	Mix 1 qt of 5.7% EC in 100 gal water OR Mix 1 pt of 10% EC or 11% EC in 100 gal water OR Mix 30–118 ml of 40% EC in 25 gal of water OR Apply 1% pour-on as an undiluted spray.	Spray animal thoroughly with 1 qt of coarse spray per animal. Re-treat as needed but not more than once every 14 days. To control lice or mites, a second treatment may be needed 10–21 days later.
	<i>permethrin</i> Synergized DeLice 1% solution	3A	Ready-to-use when purchased.	Ready-to-use spray: Use undiluted in a mist-sprayer to apply correct dose. Apply directly to neck, face, back, legs, and ears. Repeat spray and pour-on treatments as needed, but not more than once every 14 days.
	Permethrin 0.05% EC Spray		Mix 1 qt 5.7% EC in 25 gal water.	Apply 1–2 qt diluted spray thoroughly/animal as a high pressure spray. Re-treat as needed but no more than once every 14 days.
	Permethrin 0.5% EC Spray		Mix 1 qt 5.7% EC in 1.5 gal water.	Apply 1–2 oz diluted spray as a low pressure spray to face and shoulders of animal. Re-treat as needed but not more often than every 14 days.
	Permethrin CDS 7.4%		Mix 1 qt in 25 gal water.	Apply 1–2 qt of coarse spray/animal over whole body surface. Thoroughly wet animal.

HORN FLIES

WAYS TO APPLY INSECTICIDES	INSECTICIDE	MOA	MIXING INSTRUCTIONS	APPLICATION INSTRUCTIONS AND RESTRICTIONS
Sprays (continued)	<i>phosmet</i> Prolate/Lintox (11.75%)	1B	Mix with water according to label directions	For non-lactating dairy only. Spray cattle to control horn flies, lice, scabies mites, and ticks. Repeat no more frequently than every 7–10 days. Do not apply within 28 days of freshening. Cattle may be slaughtered 3 days after spraying.
	<i>pyrethrins + synergist piperonyl butoxide</i>	3A	Ready-to-use	Apply 1–2 fl oz as a fine mist-spray daily to all body parts, especially head and neck, with hand or automatic sprayer. Do not wet skin.
	Oil Solution or EC Spray <i>pyrethrins</i> 0.05–0.1% + <i>synergist</i> 0.5–1% <i>pyrethrins</i> 0.075% + <i>synergist</i> 0.75%		Oil Solution is ready-to-use when purchased. EC spray, mix according to label instructions.	Apply thoroughly as wetting spray. Repeat after 2–3 weeks if needed.
	EC Spray <i>pyrethrins</i> 0.025% + <i>synergist</i> 0.25% <i>pyrethrins</i> 0.05% + <i>synergist</i> 0.5% <i>pyrethrins</i> 0.1% + <i>synergist</i> 1%		Mix according to label instructions.	Apply 1–2 qt as wet spray every 3–7 days if needed. Apply 1–2 qt as a wet spray every 2–3 days or apply 1–2 fl oz as a light mist-spray daily with hand or automatic sprayer.
	<i>tetrachlorvinphos</i> 23% + <i>dichlorvos</i> 5.3% Ravap EC	1B	Dilute 2 oz in 3 gal. Direct spray to cover thoroughly with up to 0.5 gal/animal. Restricted Use Pesticide	Repeat as necessary. No milk discard is required. Apply at least 20 minutes prior to milking, or spray after milking has been completed.
Dusts	<i>coumaphos</i> 1% Co-Ral Livestock Dust, ProZap Zipcide Dust	1B	Ready-to-use when purchased.	Using shaker can, apply no more than 1 oz/animal as a uniform coat to the head, shoulders, and back. Treat no more than 6 times/year. Wait 10 days between applications. No milk withholding.
	<i>permethrin</i> Permethrin 0.25% Dust	3A	Ready-to-use when purchased.	Apply up to 2 oz (5 Tbsp)/animal. Re-treat as needed but not more often than every 14 days.
	<i>zeta-cypermethrin</i> PYthon Dust 0.075%	3A	Ready-to-use when purchased.	Apply with dust bag or shaker.
Feed Additives	<i>diflubenzuron</i> ClariFly 8%	15	Mix according to label instructions.	Feed at rates stipulated based on cattle weights. Prevents development of fly larvae in manure of treated cattle. Prevents emergence of horn flies, face flies, house flies, and stable flies from manure of treated cattle. Start feeding early in the spring before flies appear and continue until cold weather restricts fly activity. Does not affect adult flies. No withdrawal; no milk withholding.
	<i>methoprene</i> Methoprene Altosid 0.02% feed mixture or mineral block IGR	7A	Ready-to-use when purchased.	Animals should consume 0.25–0.5 lb/100 lb body weight each month. Feed this oral insect growth regulator as free choice mineral or mixed in supplements for pasture cattle early in the spring before horn flies appear. May be used in lactating dairy animals.
	Altosid IGR 1% Liquid		Feed-through.	Altosid IGR: Mix in feed to achieve consumption rate of 1.13 mg/100 lb animal body weight/day.
	<i>tetrachlorvinphos</i> Rabon Oral Larvicide Feed Mixture	1B	Mix Rabon 7.76% Oral Larvicide Pre-mix in feed or mineral mixes. It is also available in ready-to-use products.	Feed the appropriate larvicidal feed or mineral mix to milking cows to prevent the development of fly larvae in manure. Follow manufacturers' instructions to ensure adequate amounts are consumed.

DAIRY CATTLE EXTERNAL PARASITE AND CATTLE GRUB CONTROL

HORN FLIES

WAYS TO APPLY INSECTICIDES	INSECTICIDE	MOA	MIXING INSTRUCTIONS	APPLICATION INSTRUCTIONS AND RESTRICTIONS
Dust Bags (Self-Treatment)	<i>coumaphos</i> 1% Co-Ral Livestock Dust	1B	Ready-to-use when purchased.	Place contents in dust bag and suspend in area frequented by cattle to force daily use. For lactating dairy cattle, bags may be suspended in the exit through which cattle leave the milking barn. Suspend so that the bottom of the bag will hang 4–6" below the topline of the cattle. No milk withholding.
	<i>permethrin</i> Permethrin 0.25% Dust	3A	Ready-to-use when purchased.	Apply 4–10 lb in self-treatment cotton cloth, doubled burlap bags, or commercial dust bags. Suspend where animals will treat themselves daily, such as near mineral stations, salt blocks or in milking barn exit. Bags should hang 4–6" below topline of cattle. Protect bags from weather. Do not hang bags over feed, mineral, or water troughs.
Backrubbers and Facerubbers	<i>coumaphos</i> Co-Ral Fly and Tick Spray 6.15%	1B	Mix 4 qt in 13 gal oil.	Saturate the backrubber with mixture. Place in location to force daily use. Suspend at height to prevent straddling. No milk withholding.
	<i>permethrin</i> Synergized DeLice 1% solution	3A		Back rubber use: Keep rubbing device charged. Results improved by daily forced use.
	<i>Permethrin</i> 10%		Mix 1 pt in 10 gal diesel oil	Keep rubbing device charged with 1 gal mixture/20 ft of cable. Cattle should be forced to use rubbing device daily.
	<i>tetrachlorvinphos</i> 23% + <i>dichlorvos</i> 5.3% Ravap EC	1B	Mix 1 gal in 25 gal oil Restricted Use Pesticide	Can be used on lactating dairy cattle with no withholding. Dilute according to label instructions. Pour 1 gal/20 linear ft of backrubber. Recharge as needed.
Ear Tags	<i>beta-cyfluthrin</i> Cylence Ultra	3A	Ready-to-use when purchased.	Follow label instructions regarding number of tags/head; remove when effectiveness is diminished and at end of season. Can be used on lactating dairy animals.
	<i>diazinon</i> Optimizer, Patriot	1B	Ready-to-use when purchased.	Follow label instructions regarding number of tags/head; remove when effectiveness is diminished and at end of season. Beef and non-lactating animals only.
	<i>permethrin</i> GardStar Plus	3A	Ready-to-use when purchased.	Follow label instructions regarding number of tags/head; remove when effectiveness is diminished and at end of season. Can be used on lactating dairy animals
	<i>zeta-cypermethrin</i> PYthon, PYthon Magnum, Zeta Gard	3A	Ready-to-use when purchased.	Follow label instructions regarding number of tags/head; remove when effectiveness is diminished and at end of season. Can be used on lactating dairy animals.
	<i>zeta-cypermethrin + abamectin</i> Tri-Zap Insecticide Cattle Ear Tag	3A + 6	Use two tags per animal.	Tag all animals in herd (including calves) and replace as necessary.
Pour-On	<i>doramectin</i> Dectomax Pour-on 0.5%	6	Ready-to-use when purchased.	Apply 1 ml/22 lb body wt along midline of back between withers and tailhead. Safe for all beef cattle and replacement dairy heifers to 20 months of age. Applications of macrocyclic lactones will also control blood sucking lice (nymphs and adults). Lice eggs may hatch or untreated cattle may serve as source of reinfestation, requiring re-treatment.
	<i>eprinomectin</i> Eprinex Pour-on 0.5%	6	Ready-to-use when purchased.	Apply 1 ml/22 lb body wt along midline of the back between withers and tailback. Safe for all beef and dairy (including lactating) cattle. Applications of macrocyclic lactones will also control blood sucking lice (nymphs and adults). Lice eggs may hatch or untreated cattle may serve as source of reinfestation, requiring re-treatment.
	<i>moxidectin</i> Cydectin Pour-on 0.5%	6	Ready-to-use when purchased.	Pour weight-determined dose evenly along animal's backline from withers to tailhead (basing dose on label weight table). Provides 7 days of activity against horn flies. No pre-slaughter or milk discard interval. Applications of macrocyclic lactones will also control blood sucking lice (nymphs and adults). Lice eggs may hatch or untreated cattle may serve as source of reinfestation, requiring re-treatment.

HORSE FLIES

WAYS TO APPLY INSECTICIDES	INSECTICIDE	MOA	MIXING INSTRUCTIONS	APPLICATION INSTRUCTIONS AND RESTRICTIONS
Pour-On (continued)	<i>permethrin</i> Synergized DeLice 1% solution	3A	Ready-to-use when purchased.	Apply 0.5 fl oz (15 cc)/100 lb body weight of animal up to a maximum of 5 fl oz for any 1 animal. Pour-On: Pour correct dose a long back and down face. Repeat pour-on treatments as needed, but not more than once every 14 days.
	Ultra Boss 5%			Apply 3 ml/100 lb body weight up to a maximum of 30 ml/animal. Pour along back and down face.
Sprays	<i>dichlorvos</i> Prozap Beef and Dairy RTU	1B	Apply 1–2 oz/animal. Ready-to-use when purchased.	Apply no more than 2 fl oz daily as a light mist-spray to cover all body parts, especially head, back, legs and sides. Do not wet skin, only hair of animal. Do not apply to animals less than 6 months old.
	<i>permethrin</i> Synergized DeLice 1.0% solution	3A	Ready-to-use when purchased.	Apply 0.5 fl oz (15 cc)/100 lb body weight of animal up to a maximum of 5 fl oz for any 1 animal. Ready-to-use spray: Use undiluted in a mist-sprayer to apply correct dose. Apply directly to neck, face, back, legs, and ears. Repeat spray and pour-on treatments as needed, but not more than once every 14 days.
	Permethrin CDS 7.4% <i>Permethrin</i>			Ready-to-use for spot treatment or premise spray.
	<i>permethrin + synergist</i> piperonyl butoxide Oil Solution or EC Spray <i>permethrin</i> 0.05–0.1% + <i>synergist</i> 0.5–1% <i>permethrin</i> 0.075% + <i>synergist</i> 0.75%	3A	Oil Solution is ready-to-use when purchased. EC spray, mix according to label instructions.	Apply 1–2 fl oz as a fine mist-spray daily to all body parts, especially head and neck, with hand or automatic sprayer. Do not wet skin.
	EC Spray <i>permethrin</i> 0.025% + <i>synergist</i> 0.25% <i>permethrin</i> 0.05% + <i>synergist</i> 0.5% <i>permethrin</i> 0.1% + <i>synergist</i> 1%			Mix according to label instructions.
Backrubbers and Facerubbers	<i>permethrin</i> Synergized DeLice 1.0% solution	3A	Ready-to-use when purchased.	Back rubber use: Mix 1 pt/gal of #2 diesel fuel or mineral oil. Keep rubbing device charged. Results improved by daily forced use.
	Permethrin 1% Backrubber and Facerubber Oil Mixture			Mix 1 pt/gal #2 diesel or mineral oil.

DAIRY CATTLE EXTERNAL PARASITE AND CATTLE GRUB CONTROL

HOUSE FLIES

WAYS TO APPLY INSECTICIDES	INSECTICIDE	MOA	MIXING INSTRUCTIONS	APPLICATION INSTRUCTIONS AND RESTRICTIONS
Sprays	<i>dichlorvos</i> Prozap Beef and Dairy RTU	1B	Apply 1–2 oz/animal.	Apply no more than 2 fl oz daily as a light mist-spray to cover all body parts, especially head, back, legs and sides. Do not wet skin, only hair of animal. Do not apply to animals less than 6 months old.
	<i>permethrin</i> Synergized DeLice 1% solution	3A	Ready-to-use when purchased.	Ready-to-use spray: Use undiluted in a mist-sprayer to apply correct dose. Apply directly to neck, face, back, legs and ears. Repeat spray and pour-on treatments as needed, but not more than once every 14 days.
	Permethrin CDS 7.4% <i>Permethrin</i>		Ready-to-use for spot treatment or premise spray	Can be used as spot treatment on cattle or as premise spray.
	<i>pyrethrins + synergist</i> piperonyl butoxide Oil Solution or EC Spray <i>pyrethrins</i> 0.05–0.1% + <i>synergist</i> 0.5-1% <i>pyrethrins</i> 0.075% + <i>synergist</i> 0.75%	3A	Oil Solution is Ready-to-use when purchased. EC spray, mix according to label instructions.	Apply 1–2 fl oz as a fine mist-spray daily to all body parts, especially head and neck, with hand or automatic sprayer. Do not wet skin.
	EC Spray <i>pyrethrins</i> 0.025% + <i>synergist</i> 0.25% <i>pyrethrins</i> 0.05% + <i>synergist</i> 0.5% <i>pyrethrins</i> 0.1% + <i>synergist</i> 1%		Mix according to label instructions.	Apply thoroughly as wetting spray. Repeat after 2–3 weeks if needed. Apply 1–2 qt as wet spray every 3–7 days if needed. Apply 1–2 qt as a wet spray every 2–3 days or apply 1–2 fl oz as a light mist-spray daily with hand or automatic sprayer.
	<i>tetrachlorvinphos + dichlorvos</i> Ravap E.C. Livestock, Poultry & Premise Insecticide Spray	1B	1 gal in 200 gal water for lactating dairy cattle. Restricted Use Pesticide	Can be used on lactating dairy cattle, with no withholding. Dilute according to label instructions.
Feed Additives	<i>diflubenzuron</i> ClariFly 8%	15	Mix according to label instructions.	Feed at rates stipulated based on cattle weights. Prevents development of fly larvae in manure of treated cattle. Prevents emergence of horn flies, face flies, house flies, and stable flies from manure of treated cattle. Start feeding early in the spring before flies appear and continue until cold weather restricts fly activity. Does not affect adult flies. No withdrawal; no milk withholding.
	<i>tetrachlorvinphos</i> Rabon Oral Larvicide Feed Mixture	1B	Mix Rabon 7.76% Oral Larvicide Pre-mix in feed or mineral mixes. It is also available in ready-to-use products.	Feed the appropriate larvicidal feed or mineral mix to milking cows to prevent the development of fly larvae in manure. Follow manufacturers' instructions to ensure adequate amounts are consumed.
Backrubbers and Facerubbers	<i>permethrin</i> Synergized DeLice 1% solution	3A	Ready-to-use when purchased.	Back rubber use: Mix 1 pint/gal of #2 diesel fuel or mineral oil. Keep rubbing device charged. Results improved by daily forced use.
	Permethrin 10%		Mix 1 pt in 10 gal diesel oil.	Keep rubbing device charged with 1 gal mixture/20 ft of cable. Cattle should be forced to use rubbing device daily.
Ear Tags	<i>zeta-cypermethrin</i> PYthon Magnum Insecticide Cattle Ear Tag	3A	Ready-to-use when purchased.	Apply 1 tag/head to the front or back of 1 ear on each animal to control most strains of horn flies and to aid in the control of face flies, stable flies, and house flies for up to 4 months.

MOSQUITOES

WAYS TO APPLY INSECTICIDES	INSECTICIDE	MOA	MIXING INSTRUCTIONS	APPLICATION INSTRUCTIONS AND RESTRICTIONS
Sprays	<i>dichlorvos</i> Prozap Beef and Dairy RTU	1B	Apply 1–2 oz/animal.	Apply no more than 2 fl oz daily as a light mist-spray to cover all body parts, especially head, back, legs, and sides. Do not wet skin, only hair of animal. Do not apply to animals less than 6 months old.
	Vapona Insecticide Dairy Cattle Spray		Ready-to-use when purchased.	
	<i>permethrin</i> Synergized DeLice 1% solution	3A	Ready-to-use when purchased.	Apply 0.5 fl oz (15 cc)/100 lb body weight of animal up to a maximum of 5 fl oz for any 1 animal. Use undiluted in a mist-sprayer to apply correct dose. Apply directly to neck, face, back, legs, and ears. Repeat spray and pour-on treatments as needed, but not more than once every 14 days.
	Permethrin CDS 7.4% Permethrin		Ready-to-use for spot treatment or premise spray.	
	<i>permethrin + synergist piperonyl butoxide</i> Oil Solution or EC Spray <i>permethrin</i> 0.05–0.1% + <i>synergist</i> 0.5–1% <i>permethrin</i> 0.075% + <i>synergist</i> 0.75%	3A	Oil Solution is ready-to-use when purchased. EC spray, mix according to label instructions.	Apply 1–2 fl oz as a fine mist-spray daily to all body parts, especially head and neck, with hand or automatic sprayer. Do not wet skin.
	EC Spray <i>permethrin</i> 0.025% + <i>synergist</i> 0.25% <i>permethrin</i> 0.05% + <i>synergist</i> 0.5% <i>permethrin</i> 0.1% + <i>synergist</i> 1%	3A	Mix according to label instructions.	Apply thoroughly as wetting spray. Repeat after 2–3 weeks if needed. Apply 1–2 qt as wet spray every 3–7 days if needed. Apply 1–2 qt as a wet spray every 2–3 days or apply 1–2 fl oz as a light mist-spray daily with hand or automatic sprayer.
	<i>tetrachlorvinphos + dichlorvos</i> Ravap E.C. Livestock, Poultry & Premise Insecticide Spray	1B	1 gal in 200 gal water for lactating dairy cattle. Restricted Use Pesticide	Can be used on lactating dairy cattle, with no withholding. Dilute according to label instructions.
Dusts	<i>permethrin</i> Permethrin 0.25% Dust	3A	Ready-to-use when purchased.	Apply up to 2 oz (5 Tbsp)/animal. For lice, a second treatment may be needed 14–21 days later. Re-treat as needed but not more often than every 14 days.
Dust Bags (Self-Treatment)	<i>permethrin</i> Permethrin 0.25% Dust	3A	Ready-to-use when purchased.	Apply 4–10 lb in self-treatment cotton cloth, doubled burlap bags or commercial dust bags. Suspend where animals will treat themselves daily, such as near mineral stations, salt blocks or in milking barn exit. Bags should hang 4–6" below topline of cattle. Protect bags from weather. Do not hang bags over feed, mineral or water troughs.
Backrubbers and Facerubbers	<i>permethrin</i> Synergized DeLice 1% solution	3A	Ready-to-use when purchased.	Back rubber use: Mix 1 pt/gal of #2 diesel fuel or mineral oil. Keep rubbing device charged. Results improved by daily forced use.
	Permethrin 10%		Mix 1 pt 10 gal diesel oil.	Keep rubbing device charged with 1 gal mixture/20 ft of cable. Cattle should be forced to use rubbing device daily.
	<i>tetrachlorvinphos + dichlorvos</i> Ravap E.C. Livestock, Poultry & Premise Insecticide Spray	1B	Diluted in oil for backrubber. Restricted Use Pesticide	Can be used on lactating dairy cattle, with no withholding. Dilute according to label instructions.
Pour-On	<i>permethrin</i> Synergized DeLice 1% solution	3A	Ready-to-use when purchased.	Apply 0.5 fl oz (15 cc)/100 lb body weight of animal up to a maximum of 5 fl oz for any 1 animal. Pour-On: Pour correct dose along back and down face. Repeat pour-on treatments as needed, but not more than once every 14 days.

DAIRY CATTLE EXTERNAL PARASITE AND CATTLE GRUB CONTROL

MITES (Chorioptic)

WAYS TO APPLY INSECTICIDES	INSECTICIDE	MOA	MIXING INSTRUCTIONS	APPLICATION INSTRUCTIONS AND RESTRICTIONS
Pour-On	<i>doramectin</i> Dectomax 0.5%	6	Ready-to-use when purchased.	Apply 1 ml/22 lb body wt along midline of back between withers and tailhead. Safe for all beef cattle, and replacement dairy heifers to 20 months of age.
	<i>eprinomectin</i> Eprinex 0.5%	6	Ready-to-use when purchased.	Apply 1 ml/22 lb body wt along midline of the back between withers and tailback. Safe for all beef and dairy (including lactating) cattle.
	<i>ivermectin</i> Ivomec 0.5%	6	Ready-to-use when purchased.	Apply 1 ml/22 lb body wt, along midline of the back between withers and tailhead. Safe for all beef cattle; cattle must not be treated within 48 days of slaughter for human consumption. Do not use in female dairy cattle of breeding age.
	<i>moxidectin</i> Cydectin 0.5%	6	Ready-to-use when purchased.	Pour weight-determined dose evenly along animal's backline from withers to tailhead (basing dose on label weight table). No pre-slaughter or milk discard interval.

STABLE FLIES

WAYS TO APPLY INSECTICIDES	INSECTICIDE	MOA	MIXING INSTRUCTIONS	APPLICATION INSTRUCTIONS AND RESTRICTIONS
Sprays	<i>dichlorvos</i> Prozap Beef and Dairy RTU	1B	Apply 1–2 oz/animal.	Apply no more than 2 fl oz daily as a light mist-spray to cover all body parts, especially head, back, legs, and sides. Do not wet skin, only hair of animal. Do not apply to animals less than 6 months old.
	Vapona Concentrate Insecticide		Dilute one gal in 50 gal water. Restricted Use Pesticide.	Apply no more than 2 fl ozs daily as a light mist-spray to cover all body parts, especially head, back, legs, and sides. Do not wet skin, only hair of animal. Do not apply to animals less than 6 months old.
	<i>permethrin</i> Synergized DeLice 1% solution	3A	Ready-to-use when purchased.	Use undiluted in a mist-sprayer to apply correct dose. Apply directly to neck, face, back, legs, and ears. Repeat spray treatments as needed, but not more than once every 14 days.
	EC Spray 11%		Mix 1 pt 11% EC in 25 gal water.	Apply 1–2 qt diluted spray thoroughly/animal as a high pressure spray. Re-treat as needed but no more than once every 14 days.
	Permethrin CDS 7.4% Permethrin		Ready-to-use for spot treatment or premise spray.	Can be used as spot treatment on cattle or as premise spray.
	<i>permethrin + synergist piperonyl butoxide</i> Oil Solution or EC Spray <i>permethrin</i> 0.05–0.1% + <i>synergist</i> 0.5–1% <i>permethrin</i> 0.075% + <i>synergist</i> 0.75%	3A	Oil Solution is ready-to-use when purchased. EC spray, mix according to label instructions.	Apply 1–2 fl oz as a fine mist-spray daily to all body parts, especially head and neck, with hand or automatic sprayer. Do not wet skin.
	EC Spray <i>permethrin</i> 0.025% + <i>synergist</i> 0.25% <i>permethrin</i> 0.05% + <i>synergist</i> 0.5% <i>permethrin</i> 0.1% + <i>synergist</i> 1%		Mix according to label instructions.	Apply thoroughly as wetting spray. Repeat after 2–3 weeks if needed. Apply 1–2 qt as wet spray every 3–7 days if needed. Apply 1–2 qt as a wet spray every 2–3 days or apply 1–2 fl oz as a light mist-spray daily with hand or automatic sprayer.
	<i>tetrachlorvinphos + dichlorvos</i> Ravap E.C. Livestock, Poultry & Premise Insecticide Spray	1B	1 gal in 200 gal water for lactating dairy. Restricted Use Pesticide	Can be used on lactating dairy cattle, with no withholding. Dilute according to label instructions.

STABLE FLIES

WAYS TO APPLY INSECTICIDES	INSECTICIDE	MOA	MIXING INSTRUCTIONS	APPLICATION INSTRUCTIONS AND RESTRICTIONS
Dusts	<i>zeta-cypermethrin</i> PYthon Dust 0.075%	3A	Ready-to-use when purchased.	Apply with dust bag or shaker.
Feed Additives	<i>tetrachlorvinphos</i> Rabon Oral Larvicide Feed Mixture	1B	Mix Rabon 7.76% Oral Larvicide Pre-mix in feed or mineral mixes. It is also available in ready-to-use products.	Feed the appropriate larvicidal feed or mineral mix to milking cows to prevent the development of fly larvae in manure. Follow manufacturers' instructions to ensure adequate amounts are consumed.
Dust Bags (Self-Treatment)	<i>zeta-cypermethrin</i> PYthon Dust 0.075%	3A	Ready-to-use when purchased.	Apply with dust bag or shaker.
Backrubbers and Facerubbers	<i>permethrin</i> Synergized DeLice 1% solution	3A	Ready-to-use when purchased.	Back rubber use: Mix 1 pt/gal of #2 diesel fuel or mineral oil. Keep rubbing device charged. Results improved by daily forced use.
	<i>permethrin</i> 10% PY, ME		Mix 1 pt in 10 gal diesel oil.	Keep rubbing device charged with 1 gal mixture/20 ft of cable. Cattle should be forced to use rubbing device daily.
Ear Tags	<i>beta-cyfluthrin</i> Cylence Ultra	3A	Ready-to-use when purchased.	Follow label instructions regarding number of tags/head; remove when effectiveness is diminished and at end of season. Can be used on lactating dairy animals.
	<i>permethrin</i> GardStar Plus			
	<i>zeta-cypermethrin</i> PYthon, PYthon Magnum			

TICKS

WAYS TO APPLY INSECTICIDES	INSECTICIDE	MOA	MIXING INSTRUCTIONS	APPLICATION INSTRUCTIONS AND RESTRICTIONS
Sprays	<i>coumaphos</i> Coumaphos Co-Ral 11.6%	1B	Mix 2.5 fl oz/4 gal water.	Mix 1.25 fl oz/4 gal water and spray to complete wetting. Make treatments no fewer than 10 days apart.
	<i>permethrin</i> EC Spray 0.05%	3A	Mix 1 qt 5.7% EC in 25 gal water.	Apply 1–2 qt diluted spray thoroughly/animal as a high pressure spray. Re-treat as needed but no more than once every 14 days.
	Permethrin CDS 7.4%		Mix 1 qt in 25 gal water.	1–2 qt of coarse spray/animal over whole body surface. Thoroughly wet animal.
	<i>tetrachlorvinphos</i> 23% + <i>dichlorvos</i> 5.3% Ravap E.C.	1B	Dilute 2 oz in 3 gal Direct spray to cover thoroughly with up to 0.5 gal/animal. Restricted Use Pesticide	Repeat as necessary. No milk discard is required. Apply at least 20 minutes prior to milking or spray after milking has been completed.

DAIRY CATTLE EXTERNAL PARASITE AND CATTLE GRUB CONTROL

TICKS

WAYS TO APPLY INSECTICIDES	INSECTICIDE	MOA	MIXING INSTRUCTIONS	APPLICATION INSTRUCTIONS AND RESTRICTIONS
Dusts	<i>coumaphos</i> Co-Ral Livestock Dust, ProZap Zipcide Dust 1%	1B	Ready-to-use when purchased.	Using shaker can, apply no more than 1 oz/animal as a uniform coat to the head, shoulders, and back. Treat no more than 6 times/year. Wait 10 days between applications. No milk withholding.
	<i>zeta-cypermethrin</i> PYthon Dust 0.075% <i>zeta-cypermethrin</i>	3A	Ready-to-use when purchased.	Apply with dust bag or shaker.
Dust Bags Self-Treatment	<i>zeta-cypermethrin</i> PYthon Dust 0.075%	3A	Ready-to-use when purchased.	Apply with dust bag or shaker.
Backrubber and Facerubbers	<i>coumaphos</i> 6.15% Co-Ral Fly and Tick Spray	1B	Mix 4 qt in 13 gal oil.	Saturate the backrubber with mixture. Place in location to force daily use. Suspend at height to prevent straddling. No milk with holding.
	<i>tetrachlorvinphos</i> 23% + <i>dichlorvos</i> 5.3% Ravap E.C.	1B	Mix 1 gal in 25 gal oil. Restricted Use Pesticide	Can be used on lactating dairy cattle with no withholding. Dilute according to label instructions. Pour 1 gal/20 linear feet of backrubber. Recharge as needed.
Ear Tags	<i>abamectin</i> XP820	6	Ready-to-use when purchased.	Follow label instructions.
	<i>beta-cyfluthrin</i> Cylence Ultra	3A	Ready-to-use when purchased.	Follow label instructions regarding number of tags/head; remove when effectiveness is diminished and at end of season. Can be used on lactating dairy animals.
	<i>permethrin</i> GardStar Plus		Ready-to-use when purchased.	
	<i>zeta-cypermethrin</i> PYthon, PYthon Magnum		Ready-to-use when purchased.	
	<i>zeta-cypermethrin</i> + <i>abamectin</i> Tri-Zap Insecticide Cattle Ear Tag	3A + 6	Use two tags per animal.	Tag all animals in herd (including calves) and replace as necessary.
Pour-On	<i>permethrin</i> Synergized DeLice 1.0% solution	3A	Ready-to-use when purchased.	Apply 0.5 fl oz (15 cc)/100 lb body weight of animal up to a maximum of 5 fl oz for any 1 animal. Pour-On: Pour correct dose along back and down face. Repeat pour-on treatments as needed, but not more than once every 14 days.

CATTLE EAR TAGS

Nancy C. Hinkle, Veterinary Entomologist

TAG NAME	ACTIVE INGREDIENT	CHEMICAL CLASS	BEEF	LACTATING DAIRY
Corathon	<i>Coumaphos + Diazinon</i>	Organophosphate	YES	YES
CyGuard	<i>Beta-cyfluthrin</i>	Pyrethroid	YES	YES
Cylence Ultra	<i>Beta-cyfluthrin</i>	Pyrethroid	YES	YES
Dominator	<i>Pirimiphos methyl</i>	Organophosphate	YES	NO
Double Barrel VP	<i>Lambda-cyhalothrin + Pirimiphosmethyl</i>	Pyrethroid + Organophosphate	YES	NO
GardStar Plus	<i>Permethrin</i>	Pyrethroid	YES	YES
Max 40	<i>Diazinon</i>	Organophosphate	YES	NO
OPTimizer	<i>Diazinon</i>	Organophosphate	YES	NO
Patriot	<i>Diazinon</i>	Organophosphate	YES	NO
PYthon	<i>Zeta-cypermethrin</i>	Pyrethroid	YES	YES
PYthon Magnum	<i>Zeta-cypermethrin</i>	Pyrethroid	YES	YES
Saber Extra	<i>Lambda-cyhalothrin</i>	Pyrethroid	YES	NO
Tri-Zap	<i>Zeta-cypermethrin + abamectin</i>	Pyrethroid + Macrocytic lactone	YES	YES
Warrior	<i>Diazinon + Chlorpyrifos</i>	Organophosphate	YES	NO
XP820	<i>Abamectin</i>	Macrocytic lactone	YES	YES

Ear tags are generally effective against horn flies; they aid in control of face flies, stable flies, house flies, and ear ticks. Remove tags when control declines, at the end of fly season, or before slaughter.

SWINE: EXTERNAL PARASITE CONTROL¹

Nancy C. Hinkle, Veterinary Entomologist

HOG LICE CONTROL¹

INSECTICIDE	FORMULATION	FINAL STRENGTH IN WATER	MIXING INSTRUCTIONS	AMOUNT PER MATURE ANIMAL	DAYS FROM LAST APPLICATION UNTIL SLAUGHTER	APPLICATION ^{2,3} INSTRUCTIONS & RESTRICTIONS
SPRAYS^{4,5}						
<i>coumaphos</i> Co-Ral	6.15%	0.06%	Mix 2 qt/50 gal water (or 5 oz/4 gal water)	Wet to point of runoff. Treat no more than 6 times/year. Do not make applications less than 10 days apart.	0	Do not treat sick, convalescent, or stressed animals. Do not spray animals for 10 days before or after shipping or weaning, or after exposure to contagious or infectious diseases. Do not spray in a confined, non-ventilated area. Do not apply in conjunction with oral drenches or other internal medications, or with pyrethrins or their synergists, or with other organophosphates or cholinesterase inhibiting drugs, pesticides, or chemicals.
Co-Ral Emulsifiable Livestock Insecticide (Restricted Use)	11.6%	0.06%	Mix 1 qt/50 gal water (or 2.5 oz/4 gal water)			
<i>permethrin</i>	42.5% EC	0.108%	Mix 8 oz of 42.5% EC in 25 gal water.	Spray animals thoroughly (approximately 1 pt/animal).	5	Spray entire animal thoroughly. Pay special attention to ears and hard to spray areas. Make a second application 14 days later if needed.
GardStar 40% EC			60–118 ml-25 gal water (treats 50–100).			Thoroughly wet and dip animals including ears. Allow 5 days between last treatment and slaughter. For mange, spray pen floors, sides, and bedding. Repeat at 14 days.
Tengard SFR One Shot			Mix 4 fl. oz. in 25 gal water			
Atroban, Ectiban, Gardstar, Permethrin SP, ME	11% EC 10% EC 11% EC 40% EC 42.5% EC	0.025–0.054%	Mix 1 pt of 11% EC OR mix 1 qt of 5.7% EC OR mix 1 cup 10% EC OR mix 60-118 ml of 40% EC OR mix 4 oz of 42.5% EC in 25 gal water.	Wet thoroughly (approximately 1 pt/animal).		Spray entire animal thoroughly. Pay special attention to ears and hard-to-spray areas. Make a second application 14 days later if needed.
Swine Guard	10%	Ready-to-use.	No mixing.	3 cc/100 lb		Apply across back of head and ears, then apply down midline of neck over shoulders.
<i>phosmet</i> Prolate/Lintox-HD	11.75% EC	0.06%	Mix 1 qt of 11.6% EC in 25 gal water.	Wet to point of runoff. Wet thoroughly to skin.	1	Single application should be effective. Should a second application be needed, it may be made 14 days following the first treatment. Do not treat suckling pigs.

HOG LICE CONTROL¹

INSECTICIDE	FORMULATION	FINAL STRENGTH IN WATER	MIXING INSTRUCTIONS	AMOUNT PER MATURE ANIMAL	DAYS FROM LAST APPLICATION UNTIL SLAUGHTER	APPLICATION ^{2,3} INSTRUCTIONS & RESTRICTIONS
DIPS⁵						
<i>permethrin</i>	40% EC	0.025-0.05%	Mix 60-118 ml in 25 gal water.	Immerse entire animal.	5	Dip animals including ears. Spray pen floors, sides, and bedding. Repeat at 14 days.
Permethrin II	10% EC		Mix 1 qt in 100 gal water.	Dip animals.		
DUSTS⁵						
<i>permethrin</i> Insectrin	0.25% D	Ready-to-use	No mixing required.	Dust thoroughly.	5	Apply up to 1 oz (2 ½ Tbsp)/animal. Pay particular attention to ears and other hard-to-reach areas. Re-treat 14 days later if needed.
<i>coumaphos</i> Co-Ral 1% Livestock Dust		Ready-to-Use		Apply not more than 1 oz. per head to head, shoulders, and back using a shaker can.		Do not treat sick, convalescent, or stressed animals. Do not make applications less than 10 days apart.
INJECTABLE⁵						
<i>doramectin</i> Dectomax injectable	1%		Ready-to-use when purchased.	Inject 1 ml/75 lb	24	Intramuscular injection.
<i>ivermectin</i> Ivomec	1%	Ready-to-use when purchased.	No mixing required	1 ml/75 lb body weight. (300 mcg of <i>ivermectin</i> /kilogram of body weight)	18	Inject subcutaneously. Follow label instructions.

CONTROL OF HOG MANGE MITES

INSECTICIDE	FORMULATION	FINAL STRENGTH IN WATER	MIXING INSTRUCTIONS	AMOUNT PER MATURE ANIMAL	DAYS FROM LAST APPLICATION UNTIL SLAUGHTER	APPLICATION ^{2,3} INSTRUCTIONS & RESTRICTIONS
<i>permethrin</i> 10% pour on	To control mange mites, lice and fleas. Apply 3 ml/100 lb body weight.					Pour-on ⁵
<i>phosmet</i> Prolate/Lintox HD	11.75% D	Mix 1 gal. per 100 gal. water			1	Do not retreat for 14 days. Pour-on ⁵
<i>doramectin</i> Dectomax Injectable						Injectable
<i>ivermectin</i> Ivomec Injection						Injectable
<i>phosmet</i> Prolate/Lintox HD						Spray or backrubber application
<i>sulfur</i> Yellow Jacket Wettable Dusting Sulfur II						Dust product liberally onto animal.

SWINE: EXTERNAL PARASITE CONTROL

HOUSE FLY MAGGOT CONTROL

INSECTICIDE	FORMULATION	FINAL STRENGTH IN WATER	MIXING INSTRUCTIONS	AMOUNT PER MATURE ANIMAL	DAYS FROM LAST APPLICATION UNTIL SLAUGHTER	APPLICATION ^{2,3} INSTRUCTIONS & RESTRICTIONS
LARVICIDE SPRAYS						
<i>cyromazine</i> Neporex 2SG			Mix 1 lb/gal of water.			Spray manure where fly larvae are found.
<i>diflubenzuron</i> Dimilin 2L			Mix 5 fl oz in 10 gal water.			Apply as a directed spray in spot treatments at a volume of 1 qt of spray solution to 10 sq ft of surface area where maggots are developing.
<i>pyriproxyfen</i> Archer Nylar Insect Growth Regulator 1.3%			Mix 1 fl oz in 1 gal water.			Wet surfaces where larvae are found; may repeat 14 days afterward.
NyGuard IGR 10%			Mix 4 ml in sufficient water to cover 1500 sq ft.			Apply to maggot habitats at rate of 4 ml/1,500 sq ft.
Pyri-Shield EC 1.3%			Mix 1 fl oz in 1 gal water.			Apply to 1500 sq ft of surface area.

CONTROL OF BLOWFLIES, MOSQUITOES, FLEAS AND TICKS^{4,5}

INSECTICIDE	FORMULATION	FINAL STRENGTH IN WATER	MIXING INSTRUCTIONS	AMOUNT PER MATURE ANIMAL	DAYS FROM LAST APPLICATION UNTIL SLAUGHTER	APPLICATION ^{2,3} INSTRUCTIONS & RESTRICTIONS
<i>phosmet</i> Prolate/Lintox-HD	1% RTU		No mixing required.			Apply 1–2 ounces of this product per animal as a mist spray daily with hand or automatic sprayer. Apply as to wet hair.
<i>permethrin</i> Permethrin II	10% EC	0.025%	Mix 1 qt of 10% EC in 100 gal of water.	Spray, paint or dip to apply 1 pt/hog, especially around ears.	5	Do not reapply product for 2 weeks.

CONTROL OF TICKS^{4,5}

INSECTICIDE	FORMULATION	FINAL STRENGTH IN WATER	MIXING INSTRUCTIONS	AMOUNT PER MATURE ANIMAL	DAYS FROM LAST APPLICATION UNTIL SLAUGHTER	APPLICATION ^{2,3} INSTRUCTIONS & RESTRICTIONS
<i>coumaphos</i> Co-Ral	6.15%	0.06%	Mix 2 qt/50 gal water (or 5 oz/4 gal water).	Wet to point of runoff. Treat no more than 6 times/year. Do not make applications less than 10 days apart.	0	Do not treat sick, convalescent, or stressed animals. Do not spray animals for 10 days before or after shipping or weaning, or after exposure to contagious or infectious diseases. Do not spray in a confined, non-ventilated area. Do not apply in conjunction with oral drenches or other internal medications, or with pyrethrins or their synergists, or with other organophosphates or cholinesterase inhibiting drugs, pesticides, or chemicals.
Co-Ral Dust						Apply using shaker can.
<i>phosmet</i> Prolate/Lintox-HD	11.75% D	Mix 1 gal in 100 gal water		Repeat in 10–14 days or as needed.	1	Do not treat sick, convalescent, or stressed animals.

1. Insecticides recommended for hog lice control will aid in the control of ticks, mange mites, and flies on swine.
2. When applying insecticides, do not contaminate feed or drinking water.
3. Do not treat animals less than 3 months old with insecticides unless specifically allowed on the insecticide label.
4. Limit spray applications in winter to warm, calm days when temperatures are above freezing.
5. Do not treat sick, convalescent, or stressed animals.

HORSES: EXTERNAL PARASITE CONTROL

Nancy C. Hinkle, Veterinary Entomologist

Insecticide preparations that contain a combination of ingredients are available for use on horses. Included in the insecticide preparation may be insecticides, synergists, repellants, and carriers.

EXTERNAL PARASITES	INSECTICIDE ¹	MOA	MIXING INSTRUCTIONS	APPLICATION INSTRUCTIONS & USE RESTRICTIONS
Flies: biting midges, black flies, deer flies, face flies, gnats, horn flies, horse flies, lice, mosquitoes, punkies, ticks, wound-infesting larvae (screwworms)	<i>coumaphos</i> Co-Ral 11.6%	1B	Fly control: Mix 2.5 fl oz in 4 gal water and spray to complete wetting.	Do not use on horses intended for slaughter. Apply specified dosage in 4 gallons of water for complete wetting. Repeat as necessary, but not less than 10 days apart.
	<i>cypermethrin</i> Bite Free, Tri-Tec 14, 0.15% Endure, Opti-Force Fly Spray	3A	Fly control: Ready-to-use when purchased.	Mist-spray or wipe-on: Apply as a spray or wipe horse's entire body while brushing against the lay of the coat to ensure adequate coverage. Apply liberally. Reapply every 5–7 days.
	<i>permethrin</i> EC Insectrin 5.7%	3A	Fly, mange, tick, and lice control: Mix 1 pt of 5.7% EC in 12.5 gal of water. Lice control: Mix 1 pt of 5.7% EC in 25 gal of water. Fly and ear tick control: Mix 1 pt of 5.7% EC in 1.25 gal of water.	Spray 1–2 qt/animal over whole body surface. For mange, lice, and scabies control, thoroughly soak animal and apply a second treatment 14 days later. Spray until animal is thoroughly treated. A second application is recommended 14 days later. Spray mist: Apply 1–2 oz/animal. Spot treat back, face, legs, and ears. Do not use on horses intended for human consumption.
	EC Atroban, Permethrin II 10–11%	3A	Fly and lice control: Mix 1 pt of EC in 25 or 50 gal water (1 oz in 6 qt of water).	Spray: Use high concentrations for stable flies and face flies. Apply directly to animals at 1–2 qt/animal. Light rates are for horn fly control only. Repeat as needed but not more often than once every 2 weeks. Do not contaminate feed or water.
	Buzz Off II, Hard Hitter, 0.4–1% ready-to-use spray or wipe-on	3A	Fly, lice, and tick control: Ready-to-use when purchased. No mixing required.	Spray or wipe-on: Apply as needed. Do not soak hair or skin. Pay particular attention to legs, shoulders and neck. Do not get in animal's eyes. Do not treat horses intended for human consumption.
	Permethrin 25% WP	3A	Fly, lice, tick, and mite control: Mix 6 oz (21 level Tbsp) of 25% WP in 19 gal water.	Spray: Spray to run off or use 1 gal spray mix/head. Do not spray feed or water.
	GardStar SP, ME 40% EC	3A	Fly, mite, tick, and lice control: Mix 7.5 ml in 1 pt of water (0.64%). Fly, mite, tick, and lice control: Mix 5–12.5 ml in 2 gal water (0.026–0.067%).	Spray: Apply as a low pressure spray. Apply 1–2 fl oz (30–60 ml) spray/animal. Spot treat back, face, legs, tail, and ears. Dip wash: Thoroughly wet animal to skin with sponge or rag. Let drip dry. Do not wet the animal's face.
	Brute 10%	3A		Pour-on or wipe: Apply 3–6 ml/200 lb body weight, up to 30 ml max. Do not treat foals under 12 weeks of age.
	Ultra Boss Pour-on 5%	3A	Ready-to-use when purchased.	Apply 3 ml/100 lb body weight of animal up to a maximum of 30 ml/animal. Pour along back and down face. Do not saddle animal for 6 hours after application.
	Clean-up Pour-on Insecticide with IGR <i>permethrin</i> 5% + <i>diflubenzuron</i> 5%	3A + 15	Ready-to-use when purchased for fly and lice control.	Ready-to-use for fly and lice control. Follow label directions as wipe-on or undiluted RTU spray.

EXTERNAL PARASITES	INSECTICIDE ¹	MOA	MIXING INSTRUCTIONS	APPLICATION INSTRUCTIONS & USE RESTRICTIONS
Flies: biting midges, black flies, deer flies, face flies, gnats, horn flies, horse flies, lice, mosquitoes, punkies, ticks, wound-infesting larvae (screwworms) (continued)	<i>pyrethrins + synergist</i> Spray and wipe-on.	3A	Fly control: 0.05–0.2% plus synergist mist-spray. Ready-to-use when purchased. No mixing required.	Spray or wipe-on: Apply mist-spray or wipe-on to wet the ends of the hair but not enough to wet the hide (1–4 fl oz/animal). Direct application will kill ticks. Repeat as needed.
	Repel-X EC <i>pyrethrins 0.4% + synergist</i>		Fly and tick control: Mix 1 pt of 0.4% EC in enough water to make 1 gal of mixture. For horse flies, deer flies (Tabanids), stable flies, and ticks, mix 1 pt of 0.4% EC in 2 qt of water.	Spray or sponge-on: Apply heavily to wet animal every 3–4 days or as needed to control flies and ticks. Do not use on animals intended for human consumption. Avoid getting into animal's eyes.
	Swat <i>pyrethrins 0.36% + synergist</i> spray Repel-X <i>pyrethrins 0.05% + synergist 0.5% + permethrin 0.1% to 0.5%</i>		Fly, lice, tick and flea control: Ready-to-use when purchased. No mixing required.	Spray or wipe-on: Apply to wet hair but not skin of animal. Remove excess dirt and dust before treating. Repeat as needed. Do not treat horses intended for human consumption
	Wipe II <i>pyrethrins 0.1% + synergist</i>		Fly, gnat and mosquito control: Ready-to-use when purchased. No mixing required.	Spray or wipe-on: Apply to wet hair but not the skin. Remove excess dirt and dust before treating. Repeat as needed.
	<i>pyrethrins 0.2% + synergist</i> Wipe-on Swat ointment		Fly, gnat and mosquito control: Ready-to-use when purchased. No mixing required.	Wipe-on: Apply as a wipe-on to wet hair but not the skin. Remove excess dust and dirt before treating. Repeat as needed. Ointment: To treat superficial wounds, abrasions, sores, and scratches, apply enough ointment to cover the wound. Apply directly to the wound and use daily.
	<i>resmethrin 0.554% + butoxypolypropylene glycol 11.0%</i> Fly Repellent	3A	Fly and tick control: Apply by spray or wipe-on. Mix 4 oz of concentrate in 28 oz of water to make 1 qt.	As a wipe-on: Dampen a soft cloth and rub over hair after cleaning debris from animal. Apply spray mist to horse's coat. Pay particular attention to legs, shoulders, and neck while avoiding eyes. Do not use on horses intended for slaughter.
	<i>zeta-cypermethrin</i> PYthon Dust 0.075%	3A	Ready-to-use when purchased.	Can be applied by shaker can, dusting glove, or mechanical dust applicator. Apply up to 2 oz (6 Tbsp) evenly into hair. Repeat as needed, but not more than once every 3 days.
Flies: face flies, horn flies	<i>tetrachlorvinphos 0.475–2.468%</i> Horse Feed Supplement Rabon, Equitrol, Vita-Plus with Equitrol, Drive with Equitrol	1B	Manure breeding flies: Ready-to-use feed supplement. Each horse must consume 70 mg <i>tetrachlorvinphos</i> /100 lb of body weight daily.	Feed additive: Follow feeding instructions on the label. Each horse must consume sufficient quantities if adequate control is to be achieved. Do not feed to horses intended for slaughter. This product must be supplemented with other fly control products.
	<i>diflubenzuron</i> SimpliFly 0.24%	15	Manure breeding flies: Ready-to-use feed supplement. Each horse must consume 6.8 mg <i>diflubenzuron</i> /100 lb. body weight daily.	Feed additive: Follow feeding instructions on the label. Each horse must consume sufficient quantities if adequate control is to be achieved. Do not feed to horses intended for slaughter. This product must be supplemented with other fly control products.
	Dimilin 2L		Mix 5 fl oz in 10 gal water.	Apply as a directed spray in spot treatments at a volume of 1 qt of spray solution to 10 sq ft of surface area where maggots are developing.

HORSES: EXTERNAL PARASITE CONTROL

EXTERNAL PARASITES	INSECTICIDE ¹	MOA	MIXING INSTRUCTIONS	APPLICATION INSTRUCTIONS & USE RESTRICTIONS
Flies: face flies, horn flies (continued)	<i>cyromazine</i> Solitude IGR 2.12%	17	1 scoop 300 mg/horse/day.	Feed additive: Follow feeding instructions on the label. Each horse must consume sufficient quantities if adequate control is to be achieved. Do not feed to horses intended for slaughter.
	Neporex 2SG		Ready-to-use granular.	Scatter 1 lb/200 sq ft to wet areas where maggots develop.
	<i>pyriproxyfen</i> Archer Nylar Insect Growth Regulator 1.3%	7C	Mix 1 fl oz in 1 gal water.	Wet surfaces where larvae are found; may repeat 14 days afterward.
	NyGuard IGR 10%		Mix 4 ml in sufficient water to cover 1,500 sq ft.	Apply to maggot habitats at rate of 4 ml/1,500 sq ft.
Pyri-Shield EC 1.3%	Mix 1 fl oz in 1 gal water.		Apply to 1,500 sq ft of surface area.	
Mange	<i>permethrin</i> Purina Hard Hitter, Stable Spray, Insectrin 5.7% EC	3A	Mix 1 pt of 5.7% EC in 12.5 gal water.	Fly, mange, tick, and lice control: Spray 1–2 qt/animal over whole body surface. For mange, lice, and scabies control, thoroughly soak animal and apply a second treatment 14 days later. No waiting period between application and slaughter.
Bots	<i>ivermectin</i> Eqvalan, Zimectrin	6	1.87% oral paste. Ready-to-use when purchased. No mixing required.	Follow directions on pre-filled syringe. Do not treat horses less than 4 months of age. Do not treat horses intended for food purposes.
	<i>moxidectin</i> 2%	6	Ready-to-use when purchased.	Follow directions on pre-filled syringe. Do not treat horses less than 6 months of age or those intended for food purposes.

FLY CONTROL IN HORSE FACILITIES: RESIDUAL (CONTACT) SPRAYS¹ AND BAITS

Nancy C. Hinkle, Veterinary Entomologist

INSECTICIDE	MOA	MIXING INSTRUCTIONS	METHODS OF APPLICATION AND SAFETY REGULATIONS
<i>cyantraniliprole</i> Zyrox Fly Granular bait	28	Ready-to-use when purchased.	Apply in bait station, inaccessible to children, pets, and food animals. Use 2 lb bait/1000 sq ft/yr.
<i>cyfluthrin</i> Countdown 24.3% EC, 20% WP	3A	Mix 9.5 grams or 19 grams of 20% WP OR mix 16 ml of 24.3% EC in sufficient water to cover 1000 sq ft.	Direct as a coarse, wetting spray to surfaces in horse operations where flies congregate, including ceilings, walls, fences, posts and manure. Apply to point of runoff (1 gal/500–1000 sq ft). Do not contaminate feed or drinking water. Do not apply as a space spray. Do not apply directly to animals. Repeat as needed. For baited solutions add 1 lb of sugar/gal of spray. Remove animals before spraying and return them when spray dries.
<i>beta-cyfluthrin</i> Tempo 11.8% SC, 24.3% EC, 20% WP	3A	Mix 8-16 milliliters of 11.8% Tempo SC Ultra Premise Spray in sufficient water to cover 1000 sq ft.	
<i>deltamethrin</i> Annihilator Polyzone 0.02%	3A	Ready-to-use when purchased.	Apply thoroughly to surfaces until wet. Repeat as necessary, but not more than once/week. Do not spray animals or humans, or apply to animal feed or watering equipment.
<i>gamma-cyhalothrin</i> StandGuard 5.9%	3A	Mix 0.16 fl oz (5 ml)/gal of water.	Spray 1 gal of diluted spray to treat 500–1000 sq ft of fly resting surfaces.
<i>imidacloprid</i> QuickBayt Spot Spray 10%	4A	Mixed at the rate of 1 lb/gal water to treat 1000 sq ft of fly resting areas.	Product can be sprayed on virtually any surface (out of reach of animals) where flies rest or congregate, indoors, or outdoors. Examples include posts, beams, ceilings, railings, door frames, windows, and stable walls. Residual activity of up to 6 weeks indoors and 2 weeks outdoors.
<i>lambda-cyhalothrin</i> Grenade ER Insecticide 9.7% Demand CS 9.7%	3A	Mix 0.2–0.4 oz (6–12 ml)/gal water.	Make a directed application to fly-resting surfaces and allow to dry before reintroduction of animals. Do not apply when animals are present
<i>permethrin</i> Atroban, Insectrin, Overkill, Permethrin 5.7% EC, 11% EC or 25% WP	3A	5.7% EC is ready-to-use as a mist-spray OR mix 1 qt 5.7% EC in 12.5 gal of water OR mix 6 oz 25% WP in 11 gal of water OR mix 1 pt 11% EC in 10 gal water.	Apply as a residual surface spray to fly resting areas. Do not spray manure or litter. Do not apply directly to horses. Apply 5.7% EC un diluted at 4 oz/1000 sq ft of surface area or apply diluted WP and EC mixtures at 1 gal/750 sq ft. Do not apply more often than once every 2 weeks.
<i>tetrachlorvinphos</i> 23% + <i>dichlorvos</i> 5.3% Ravap EC	1B	Mix 1 or 2 gal EC in 25 gal water.	Direct a coarse, wetting spray to surfaces when flies congregate, to include ceilings, walls, fences, posts, and floor. Apply to point of runoff (1 gal/500–1000 sq ft) Do not contaminate feed or drinking water. Do not apply as a space spray. Repeat as permitted by label. Do not apply directly to animals. Remove animals before spraying and return them after spray dries. Restricted Use Pesticide.

1. Residual sprays can be applied as spot sprays to control maggots in manure accumulations.

FLY CONTROL IN HORSE FACILITIES

INSECTICIDE	MOA	MIXING INSTRUCTIONS	METHODS OF APPLICATION AND SAFETY REGULATIONS
SPACE SPRAYS¹; FOGS OR MISTS			
<i>permethrin</i> 5.7% EC	3A	Mix 1 pt 5.7% EC in 6.25 gal diesel or mineral oil	Apply fog at 4 fl oz/1000 cu ft of air space in confined facility. Repeat as needed.
<i>permethrin</i> 0.5% + <i>tetramethrin</i> 0.2% Indoor Fogger	3A	Ready-to-use when purchased.	Remove animals from area. Turn off all ignition sources (flames, pilot lights, etc). 1 fogger treats 6000 cu ft.
<i>pyrethrins</i> 0.1-0.75% + <i>synergist</i> 0.5-3.75%	3A	Ready-to-use when purchased.	Apply fogs or spray mists at 1 fl oz/1000 cu ft as fine atomized spray. Repeat as needed.
<i>spinosad</i> 44.2% Elector PSP	5	Mix 2 fl oz (60 ml) in 10 gal water to treat 5000–10000 sq ft. Use sufficient water in a directed spray to contact flies and their resting surfaces.	
BAITS			
<i>cyantraniliprole</i> Zyrox Fly Granular bait	28	Ready-to-use when purchased.	Apply in bait station, inaccessible to children, pets, and food animals. Use 2 lb bait/1000 sq ft/year.
<i>dimetofuran</i> QuickStrike Scatter Bait 0.5%	4A	Ready-to-use when purchased.	Use as a scatter bait outdoors around animal agricultural facilities; do not place in areas where bait might be accessible to children or animals. Use in bait stations inside poultry and live-stock facilities, placing bait stations so they will be inaccessible to children and animals. Bait is effective only against adult house flies. Follow label directions.
imidacloprid QuickBayt 0.5%	4A	Ready-to-use when purchased.	Scatter bait directly from container onto dry level surfaces so individual granules lie near each other without forming piles. Or place in any commercial bait station. Or mix 1.5 oz bait with 1 fl oz warm water and stir to create a paste; apply with brush to surfaces where flies rest. Bait should be inaccessible to food-producing animals, children, and pets.
<i>methomyl</i> Golden Malrin 1% Fly Bait	1A	Ready-to-use when purchased.	Scatter on floors, walkways, etc. throughout operation but away from animals. Apply lightly (about ¼ lb/500–1000 sq ft) until flies are suppressed. Wear rubber gloves when applying baits. Do not allow workers on treated floors without shoes. Do not allow animals to come in contact with baits.
<i>nithiazine</i> 1% QuickStrike Fly Abatement Strip	4	Ready-to-use when purchased.	Place in areas where flies congregate and feed. Do not expose to sunlight or moisture. Follow label directions.
<i>thiamethoxam</i> Agita 10 WG	4A	Dissolve 8 oz in 60 fl oz water	Follow label directions for spraying adult fly resting sites.

1. Space sprays are designed to kill adult flies that are present when the fog or mist is applied. There is little or no residual insecticide deposit remaining after the application unless synthetic pyrethroids are applied. Fogs or mists must come in contact with the fly. These materials are especially effective in enclosed areas where air movement is minimal. Heavy mists can offer some adult house fly kill in open areas.

SHEEP AND GOATS: EXTERNAL PARASITE CONTROL¹

Nancy C. Hinkle, Veterinary Entomologist

INSECTICIDE	FORMULATION	FINAL STRENGTH IN WATER	MIXING INSTRUCTIONS	AMOUNT PER MATURE ANIMAL	DAYS FROM LAST APPLICATION UNTIL SLAUGHTER	APPLICATION INSTRUCTIONS & RESTRICTIONS
NASAL BOTS						
<i>ivermectin</i> Ivomec Sheep Drench	0.08% <i>Ivermectin</i>			Administer orally at a dose of 3 ml/26 lb body wt. Delivers 0.2 mg <i>ivermectin</i> /1 kg body wt.	11	For nasal bots: Ready-to-use solution is specifically formulated for use in sheep only. May cause severe reactions in other animals. Do not treat sheep within 11 days of slaughter.
LICE, KEDS, TICKS, HORN FLIES, HOUSE FLIES AND STABLE FLIES						
<i>permethrin</i> Permethrin Prozap Pour-on Xtra	1% <i>permethrin</i>					Pour along back, applying 0.25 fl oz/50 lb body weight of animal, up to maximum of 3 fl oz/animal. For optimal control, all animals in flock should be treated after shearing.
<i>permethrin</i> * Gardstar	40% EC	0.013–0.05% high pressure spray	Mix 30–118 ml in 25 gal of water.	Apply 1–2 qt of coarse spray/animal over the entire body.	0	Repeat application in 10–14 days for mites and lice. Do not apply to milk goats.
		0.5% low pressure spray (hand pump sprayer)	Mix 118 ml in 2.5 gal of water.	Apply 1.5 fl oz of spray to midline from face to tailhead to point of runoff, but do not let runoff occur.		Repeat application in 10–14 days for mites and lice. Do not apply to milk goats.
Atroban 11%, Permethrin II 10%	10% EC 11% EC	0.05% spray	Mix 1 pt of 11% EC in 25 gal water OR mix 8 oz of 10% EC in 25 gal water.	Apply 1–2 qt of coarse spray/animal to thoroughly wet the animal.		Repeat the application in 10–14 days for mites. Do not apply to milk goats.
Atroban 42.5% EC	42.5% EC	0.054% spray	Mix 1 pt of 42.5% EC in 100 gal of water.	Apply sufficient spray (Approximately 2 qt/ animal) to thoroughly wet animals to ensure complete coverage.		Repeat the application as needed but not more often than once every 2 weeks. Do not apply to milk goats.
Atroban DeLice, Permethrin, Synergized DeLice	1% Solution	No mixing required. Ready-to-use when purchased.	Pour along back. Apply 0.25 fl oz (7.5 cc)/50 lb body weight of animal, up to a maximum of 3 fl oz for any 1 animal.			Do not treat goats. For optimum control, all animals in the flock should be treated after shearing. Repeat treatment as needed, but not more often than once every 14 days. For optimum control, 2 treatments at a 14 day interval are recommended. Do not apply to milk goats.
<i>permethrin</i> Boss	5% Pour-On Solution	No mixing required. Ready-to-use when purchased.	Pour-On. No mixing required.	Pour along the back. Apply 1.5 ml/50 lb of body weight of animal up to a maximum of 18 ml for any 1 animal.	0	Repeat treatment as needed, but not more often than once every 2 weeks. For optimum lice control, 2 treatments at 14 day intervals are recommended. Do not apply to milk goats.
Ultra Boss 5.0%	Pour-on RTU			Apply 1.5 ml/50 lb body weight of animal up to a maximum of 18 ml/animal. Pour along back and down face.		
Permethrin	Spray			Follow label instructions.		Use as needed, according to label directions.
<i>zeta-cypermethrin</i> PYthon Dust 0.075%				Apply up to 2 oz (6 Tbsp) of dust/animal.		For control of keds, lice, ticks, and flies. Repeat as necessary, but not more often than once in 3 days.

1. Do not treat sick, convalescent or stressed animals. Do not spray in a confined, non-ventilated area.

OP—organophosphate, PY—pyrethroid.

POULTRY: FLY CONTROL

Nancy C. Hinkle, Veterinary Entomologist

IMPORTANT: Effective, economical fly control depends on producer management. Check fly-breeding areas (manure, around feed bins, etc.) weekly and maintain an integrated pest management program (IPM) to ensure long term fly control.

INSECTICIDE	MOA	MIXING INSTRUCTIONS	APPLICATION METHODS & SAFETY RESTRICTIONS ¹
RESIDUAL AND BAIT SPRAYS			
Residual and bait sprays are used when a residual insecticide deposit is needed for adult fly control. Apply to surfaces in poultry operations where flies rest and feed. NOTE: Use of residual sprays promotes insecticide resistance. Use of synthetic pyrethroid (SP) insecticides virtually eliminates the implementation of a dump fly (<i>Hydrotaea aenescens</i>) biological control program.			
<i>cyantraniliprole</i> Zyrox Fly Granular bait	28	Ready-to-use when purchased.	Apply in bait station, inaccessible to children, pets, and food animals. Use 0.2–0.4 lb bait/1000 sq ft/yr.
<i>permethrin</i> Atroban, Insectrin, Permethrin 5.7% EC, 10% EC or 25% WP	3A	5.7% EC is ready-to-use as a mist-spray OR mix 1 qt 5.7% EC in 12 1/2 gal of water OR mix 6 oz 25% WP in 11 gal of water OR mix 1 qt 10% EC in 25 gal of water.	Apply as a residual surface spray to fly resting areas (walls, ceilings, etc.). Do not spray manure or litter. Do not apply directly to poultry. Do not apply in egg storage areas. Apply 5.7% EC undiluted at 4 oz/1000 sq ft of surface area or apply diluted WP and EC mixtures at 1 gal/750 sq ft. Don't apply more than once every 2 weeks.
<i>Beauveria bassiana</i> HF 23 balEnce 1.12% ES (5.6x10 ⁹ cfu/ml)		Follow label instructions for dilution instructions.	Apply at a rate of 1.5–2 fl oz/5000 sq ft of floor area. Apply to floors, walls, posts, and manure areas where the greatest number of pests are located. Equipment must not be used with a filter or screen smaller than 50 microns. Re-treat every 2–7 days while pests persist.
<i>beta-cyfluthrin</i> Tempo 11.8% SC, 24.3% EC, 20% WP	3A	Mix 8–16 milliliters of 11.8% Tempo SC Ultra Premise Spray in sufficient water to cover 1000 sq ft.	
<i>bifenthrin</i> Actishield	3A	Mix 0.33–1 oz with 1 gal water; apply/1000 sq ft	For adult fly control in and around animal facilities, spray application should target areas where flies will rest.
<i>chlorpyrifos</i> Durashield	1B	Restricted use pesticide for use by certified applicators	Apply according to label directions to contact adult flies.
<i>cyfluthrin</i> Optashield CS	3A	Mix 1–2 fl oz with 1 gal water	Apply 1 gal/1000 sq ft.
<i>dichlorvos</i> Vapona	1B	Restricted Use Pesticide	Follow label instructions.
<i>imidacloprid</i> QuickBayt Spot Spray 10%	4A	Mix at the rate of 1 lb/gal of water to treat 1000 sq ft of fly resting areas.	Product can be sprayed on virtually any surface (out of reach of animals) where flies rest or congregate, indoors or outdoors. Examples include posts, beams, ceilings, railings, door frames, windows, and walls. Residual activity of up to 6 weeks indoors and 2 weeks outdoors.
<i>lambda-cyhalothrin</i> 9.7% Grenade ER Insecticide Demand CS	3A	Mix 0.2–0.4 oz (6–12 ml)/gal water.	Make a directed application to fly-resting surfaces and allow to dry before reintroduction of animals. Do not apply when animals are present

INSECTICIDE	MOA	MIXING INSTRUCTIONS	APPLICATION METHODS & SAFETY RESTRICTIONS ¹
RESIDUAL AND BAIT SPRAYS (continued)			
Residual and bait sprays are used when a residual insecticide deposit is needed for adult fly control. Apply to surfaces in poultry operations where flies rest and feed. NOTE: Use of residual sprays promotes insecticide resistance. Use of synthetic pyrethroid (SP) insecticides virtually eliminates the implementation of a dump fly (<i>Hydrotaea aenescens</i>) biological control program.			
<i>tetrachlorvinphos</i> 23% + <i>dichlorvos</i> 5.3% Ravap EC	1B	1% spray. Mix 1 gal EC in 25 gal of water (12 Tbsp/gal). Restricted Use Pesticide.	Direct spray to inside and outside surfaces of poultry buildings where flies congregate and feed to include floors, manure, walls, ceilings, grass, etc. Apply thoroughly to point of runoff (about 1 gal/500–1000 sq ft). To make bait spray, add 1 cup sugar or syrup/gal of spray. Do not contaminate eggs, feed or water. Keep spray away from birds.
<i>spinosad</i> Elector 2.46% spinosyn	5	Dilute 10 oz in 5 gal water to give 0.04% <i>spinosad</i> .	Remove all animals from facility. Spray fly-resting surfaces to point of runoff, using approx. 1 gal/500–1000 sq ft. Repeat as needed, but not more often than once/week. Spray in early morning when flies are resting. Do not use in poultry facilities when animals are present; allow surfaces to dry completely before readmitting animals.
<i>spinosad</i> Elector PSP 44.2% spinosyn	5	Mix 2 fl oz (60 ml) in 10 gal of water to treat 5000–10000 sq ft.	Use sufficient water in a directed spray to contact flies and their resting surfaces. Do not apply where birds are present. Follow label directions.
CONTACT SPRAYS			
These sprays are also called space sprays and are only effective for very short periods. They kill flies directly contacted by the spray. Several types of mist, aerosol, and ULV (ultra-low volume) equipment are sold for applying these sprays. Be sure that insecticides bear full label instructions for use in poultry houses to avoid violation of federal and state laws.			
<i>dichlorvos</i> + <i>tetrachlorvinphos</i> Ravap EC	1B	Restricted Use Pesticide.	Apply as a light mist-spray when adult flies are present. Direct space spray throughout fly infested area.
<i>pyrethrins</i> Clear Zone	3A	Ready-to-use when purchased.	Apply 1–3 sec/1000 cu ft.
<i>pyrethrins</i> 0.3–5% + <i>piperonyl butoxide</i> 1.5–25% NP, ME	3A	Ready-to-use when purchased, dilute oil sprays. Aerosols, ULV concentrates, and concentrates for dilution are available.	Apply fog or mist-sprays when adult flies are present to obtain temporary adult fly suppression. Advantage is safety when used around animals and food products. Pyrethrin knockdown sprays are essential for emergency fly control. Aerosol, dilute mist, or ULV cold fog equipment should be available for use when needed.

POULTRY: FLY CONTROL

INSECTICIDE	MOA	MIXING INSTRUCTIONS	APPLICATION METHODS & SAFETY RESTRICTIONS ¹
LARVICIDE (MAGGOT) SPRAYS AND FEED THROUGH LARVICIDES			
Another way to control flies is to destroy the immature fly (maggot). Heavy use of a given insecticide could result in flies developing resistance to the insecticide. To kill adult flies, use fly traps and apply baits, residual sprays, bait sprays, and contact sprays either alone or in combination.			
<i>Beauveria bassiana</i> balEnce Biological Fly Spray	Biological	15 oz container diluted in 6–8 gal water. Treats up to 50000 sq ft.	Apply spray to manure. Repeat treatment as recommended on label.
<i>cyromazine</i> Larvadex 1% Premix, HE	17	5 parts/million in total diet of commercial layers or hatching egg layers. Mix 1 lb of 1% premix/2000 lb of feed.	Administer treated feed as daily ration as needed to control house flies. Treated feed must not be fed to layers for a minimum of 3 days (72 hours) before slaughter for food.
Neporex 2SG		Ready-to-use when purchased.	Scatter directly and evenly on wet fly larval development sites (manure). Wear gloves. To spray, mix 1 lb in 1 gal of water and spray 200 sq ft. Do not apply directly to birds or feed. Do not use in conjunction with other <i>cyromazine</i> products.
Larvadex 2SL		Mix 32 fl oz/5 gal water.	Apply 1 gal/100 sq ft of maggot breeding area.
<i>diflubenzuron</i> Dimilin 2L	15	Restricted Use Pesticide.	Apply spray in spot treatments to maggot developmental sites in manure
<i>novaluron</i> Tekko 10 IGR 9.3%	15	Mix 2-3 oz in 1 gal water	Apply as a coarse spot, crack, or crevice spray at a rate of 1.5–3 oz/1000 sq ft. Product is stable, not volatile and may be used while facility is in operation so long as exposed feed and water sources are covered. Do not spray into the air or over water sources. Allow at least 1 day between application and slaughter of animals.
<i>pyriproxyfen</i> Archer Nylar Insect Growth Regulator 1.3%	7C	Mix 1 fl oz in 1 gal water.	Wet surfaces where larvae are found; may repeat 14 days afterward.
NyGuard IGR 10%		Mix 4 ml in sufficient water to cover 1000 sq ft.	Apply to litter at rate of 4 ml/1000 sq ft.
Pyri-Shield EC 1.3%		Mix 1 fl oz in 1 gal water.	Apply to 1500 sq ft of surface area.
<i>dichlorvos</i> + <i>tetrachlorvinphos</i> Ravap EC	1B	1% spray. Mix 1 gal EC in 25 gal of water. Restricted Use Pesticide.	Under cages, broadcast treatment as a coarse low-pressure spray at a rate of 1 gal/100 sq ft of manure.
Vapona or DDVP <i>dichlorvos</i> 2 lb ai/gal 21.8% EC	1B	0.5% spray. Mix 3 1/3 cups EC in 10 gal of water. Restricted Use Pesticide.	Apply enough spray to penetrate manure (until thoroughly wet). Since Vapona has such a short residual, heavy treatment is required for larval kill. Once control is established, Vapona is an economical spot spray. Observe same methods of application and safety restrictions as for Ravap above.

INSECTICIDE	MOA	MIXING INSTRUCTIONS	APPLICATION METHODS & SAFETY RESTRICTIONS ¹
BAITS			
In some operations, baits can be used to control adult house flies. These materials can be bought ready-to-use.			
<i>cyantraniliprole</i> Zyrox Fly Granular bait	28	Ready-to-use when purchased.	Apply in bait station, inaccessible to children, pets, and food animals. Use 2 lb bait/1000 sq ft/year. Apply using granular spreader at a rate of 3.2–6.4 oz/1000 sq ft. Reapply every 7 days. Do not apply where children or pets are present, or when it is raining. Keep out of reach of food-producing animals. Do not apply more than 2 lb/1000 sq ft/calendar year when using outdoors as a broadcast spreader.
<i>Beauveria bassiana</i> balEnce Biological Fly Bait	Biological		Use in bait stations at least 4 ft above ground at the rate of 0.25 lb/50 sq ft. Do not use within reach of children or animals. Replace every 5–7 days.
<i>dinotefuran</i> QuikStrike Scatter Bait 0.50%	4A	Ready-to-use when purchased.	Use as a scatter bait outdoors around animal agricultural facilities; do not place in areas where bait might be accessible to children or animals. Use in bait stations inside poultry and livestock facilities, placing bait stations so they will be inaccessible to children and animals. Bait is effective only against adult house flies. Follow label directions.
<i>imidacloprid</i> QuickBayt 0.5%	4A	Ready-to-use when purchased.	Scatter bait directly from container onto dry level surfaces so individual granules lie near each other without forming piles. Or place in any commercial bait station. Or mix 1.5 oz bait with 1 fl oz warm water and stir to create a paste; apply with brush to surfaces where flies rest. Bait should be inaccessible to food-producing animals, children, and pets.
QuickBayt Fly Strip		Ready-to-use when purchased.	Use in buildings where animals are kept and where flies are a nuisance.
QuickBayt Spot Spray		Mix 16 oz in 1 gal water.	Treat 1000 sq ft of adult fly resting surface in areas inaccessible to food animals.
<i>methomyl</i> Golden Malrin	1A	Ready-to-use bait.	Scatter on floors, walkways, etc., throughout house. Apply heavy (about ½–2 lb/1000 sq ft) until flies are suppressed. Wear rubber gloves when applying baits. Do not allow workers on treated floors without shoes. Keep pets out of house. Do not contaminate eggs, feed, or water. Keep baits away from birds.
<i>nithiazine</i> QuikStrike 1.0% fly abatement strips	4	Ready-to-use strip.	Hang 1 strip/100 sq ft or 300 sq ft depending on fly population in enclosed areas that are protected from rain.
<i>thiamethoxam</i> Agita 10 WG	4A	Mix 8 oz per/60 fl oz water.	Treat adult fly resting sites; keep out of reach of animals and children. Follow label directions.

POULTRY EXTERNAL PARASITE CONTROL

Nancy C. Hinkle, Veterinary Entomologist

BEDBUGS, CHICKEN LICE, FLEAS, FOWL TICKS, AND MITES FOR DIRECT TREATMENT TO BIRDS OR POULTRY FACILITY

INSECTICIDE	MOA	MIXING INSTRUCTIONS	APPLICATION METHODS & SAFETY RESTRICTIONS ¹
DUSTS²			
<i>permethrin</i> Insectrin, Permethrin 0.25% Dust	3A	Ready-to-use dust.	Apply 1 lb/100 birds. Ensure thorough treatment of vent for northern fowl mite control.
<i>sulfur</i> Yellow Jacket Wettable Dusting Sulfur II	Inorganic	Ready-to-use dust.	Dust liberally on birds and rub into plumage, concentrating on area around vent
<i>tetrachlorvinphos</i> Beetle Shield	1B	Ready-to-use-dust.	Dust birds with 1 lb/600 birds. For environmental application, use 0.5 lb per 100 sq ft. Dust should reach skin. Treat cracks and crevices where pests may hide.
SPRAYS³			
<i>permethrin</i> Ectiban, Permethrin 5.7% EC	3A	Mix 1 qt 5.7% EC OR 1 pt 11% EC in 25 gal water.	Apply 1 gal diluted spray to 100 hens using high pressure. Apply to vent area for best results. A second application may be needed 4 weeks later.
23% <i>stirofos</i> + 5.7% <i>dichlorvos</i> Ravap 28.3% EC	1B	Mix 2 qt EC in 24 gal water. Restricted Use Pesticide.	Apply 1 gal/100 birds. Apply directly to birds. Spray vent and fluff areas from below using high pressure (100 psi and up) sprays. Wet feathers around vent area for effective control. Do not spray birds more often than once every 14 days. For floor birds, apply 1–2 gal of spray/1000 sq ft of litter. Spray birds lightly.
<i>spinosad</i> Elector PSP 44.2% <i>spinosad</i>	5	Mix 3 fl oz Elector PSP in 10 gal water.	Apply 100 gal of coarse spray/100 Elector PSP to birds to ensure adequate coverage, directed toward the vent area.
<i>sulfur</i> Yellow Jacket Wettable Dusting Sulfur II	Inorganic	Mix 25–50 lb/100 gal water.	Spray 200–250 lb/20000 sq ft to all interior services, forcing into cracks and crevices. Do not spray birds.

BEDBUGS, CHICKEN MITES, FLEAS AND FOWL MITES FOR TREATMENT OF POULTRY FACILITY ONLY (Not For Direct Application To Birds)

INSECTICIDE	MOA	MIXING INSTRUCTIONS	APPLICATION METHODS & SAFETY RESTRICTIONS ¹
<i>pyrethrins</i> 1–2% + <i>piperonyl butoxide</i> + 3% <i>bicycloheptane dicarboximide</i> Surekill SK 100	3A	Concentrate designed for undiluted use in mechanical sprayers that give particles of aerosol size.	Apply at a rate of 3 fl oz/1000 cu ft undiluted, using a ULV spraying device. Remove feed, water, and live animals before application. Apply to all areas where insects take shelter. Allow product to thoroughly dry before re-entry.
<i>sulfur</i> Yellow Jacket Flowable Sulfur	Inorganic	Mix 1–2 gal/100 gal water; apply 20 gal/20,000 sq ft.	Remove poultry before spraying.
<i>tetrachlorvinphos</i> + (23.0%) <i>dichlorvos</i> 5.3% Ravap (23%)	1B	1.25% or 2.5% spray or 1.25% roost paint. Mix 1 gal EC in 12.5 gal of water to make 2.5% mixture or mix 1 gal EC in 25 gal of water to make 1.25% mixture. Restricted Use Pesticide.	Apply roost paint at the rate of 1 pt of finished mixture/100 ft of roost area with brush or spray OR apply 1 gal of spray/100–150 sq ft for fowl ticks or 1 gal of spray/500–1000 sq ft for other parasites.

1. Do not contaminate feed, water, or feeding and watering equipment.
2. Dust birds thoroughly, especially under the wings and around the vent. Provide thorough ventilation while dusting.
3. Penetration of feathers around vent is essential for northern fowl mite control. Apply directed sprays using 100–125 psi. Provide thorough ventilation while spraying. Force sprays into cracks and crevices when treating for chicken red mites, bedbugs, fleas, and fowl ticks.

POULTRY HOUSE PEST CONTROL

Nancy C. Hinkle, Veterinary Entomologist

LITTER BEETLES—Darkling Beetles (black bugs, black poultry bugs, lesser mealworms) and Hide Beetles

INSECTICIDE ¹	MOA	MIXING INSTRUCTIONS	APPLICATION INSTRUCTIONS AND SAFETY RESTRICTIONS ²
<i>Beauveria bassiana</i> HF 23 FBP23 ES 0.46% (1.1x10 ¹⁰ cfu/ml)		Apply at a rate of 1.5–2 fl oz to treat 5000 sq ft.	Do not use equipment with a filter or screen smaller than 50 microns. Apply treatment to walls, floors and posts where the greatest number of pests are located. Re-treat between flocks as needed. No restriction on maximum amount that can be applied within a 1-year period.
FBP23 LBT Bait 0.137% (6.5.1x10 ⁹ cfu/ml)		Apply at a rate of 1 oz/sq ft using a drop spreader or hand shaker.	Apply before birds are placed in houses. Cover or remove water sources. If beetle numbers are high at flock start, re-treatment may be done in 4-week intervals. Only apply to poultry or livestock manure that is to be composted. Avoid using in areas where foraging honey bees are present.
<i>bifenthrin</i> Actishield 7.9% Talstar Professional Insecticide 7.9%	3A	Apply at rate of 0.33–1 fl oz/1000 sq ft.	Apply to litter surface when birds not present.
<i>chlorpyrifos</i>	1B	Restricted use pesticide.	Treat litter with 2 to 5 fl oz per 1000 sq. ft in adequate water to provide good coverage.
<i>clothianidin</i> Darlex	4A	Mix 80 oz in 10–40 gal to treat 20,000 sq ft.	For whole-house broadcast spray or band application under feeders along water lines, and along walls.
<i>cyfluthrin</i> Optashield CS 6%	3A	Apply at rate of 1–2 oz/1000 sq ft.	Remove all animals from facility. Do not apply to feedstuffs or watering equipment.
Tempo SC Ultra 11.8% WP, SP		Mix 16 ml in 1 gal water.	Apply as a general surface and/or a crack and crevice spray. Do not make applications when birds are present. Do not make applications to feed, water and feeding and watering equipment.
Tempo 1% Dust		Ready-to-use when purchased.	Remove all animals from facility. Apply dust using hand or power dusters or other suitable equipment. Apply uniformly at 0.5–1 lb/1000 sq ft. Do not apply to feedstuffs or watering equipment. Repeat treatment as necessary.
Tempo 20 WP Insecticide		Add 9.5 g (1 scoopful) Tempo 20 WP to adequate water to cover 1000 sq ft. (based on label chart)	Remove all animals from facility. Based on label chart, spray adequate material to adequately cover area but not allow dripping or run-off to occur. Do not apply to feedstuffs or watering equipment. Do not re-apply more frequently than every 10 days.
<i>deltamethrin</i> Annihilator PolyZone	3A	0.75 oz per gal water/1000 sq ft	Spray under feed and water lines, and along walls. Do not apply when birds are present.
<i>esfenvalerate</i> Onslaught	3A	Mix 0.8 oz product in 1 gal water.	Apply 1 gal of mixture to treat 1000 sq ft. Do not apply when birds are present.
<i>gamma-cyhalothrin</i> 5.9% Optimate CS	3A	Mix 0.65 fl oz. (20 ml)/gal of water. Spray 1 gal of diluted spray to treat 500–1000 sq ft.	Apply to floor area, with particular attention to areas under feed and water lines. Do not apply when birds are present.
<i>imidacloprid</i> Credo SC 42.8%	4A	Apply at rate of 3 fl oz/1000 sq ft.	Do not apply when birds are present. Cover or remove exposed feed and water. Allow to dry before restocking birds.
Dominion 4L		Mix 3 fl oz/0.5–2 gal water and apply to 1000 sq ft of litter.	Apply between flocks following sanitation procedures; do not apply when birds are present.
Adonis 4F 40.4%		Mix 3 fl oz/2 gal water; treat 1000 sq ft.	
Imidashot DF		2.25 oz/1000 sq ft	Apply to floor area, with particular attention to areas under feed and water lines. Do not apply when birds are present
<i>lambda-cyhalothrin</i> 9.7% Grenade ER Insecticide Demand CS	3A	Mix 0.8 oz (24 ml)/gallon water.	Apply to walls and floors at cleanout, before reintroduction of animals. Pay attention to areas where beetles frequently occur (under feed lines, along walls). Do not apply when birds are present.

POULTRY HOUSE PEST CONTROL

LITTER BEETLES—Darkling Beetles (black bugs, black poultry bugs, lesser mealworms) and Hide Beetles

INSECTICIDE ¹	MOA	MIXING INSTRUCTIONS	APPLICATION INSTRUCTIONS AND SAFETY RESTRICTIONS ²
<i>orthoboric acid</i> Borid 99% BorActin 99%	8D	Ready-to-use when purchased.	Remove birds. Apply dust uniformly to floor of poultry house or old litter with a fertilizer or seed spreader, at the rate of 1–2 lb/100 sq ft in bands along feeder lines. Cover with fresh shavings.
<i>permethrin</i> Tengard SFR 36.8%	2A	Apply at rate of 4 fl oz in 12.5 gal water. Spray 1 gal/750 sq ft.	Do not apply when birds are present.
<i>pyrethrins</i> Riptide ULV 5%	3A	Ready-to-use when purchased.	Apply undiluted at 0.25–1 fl oz/1000 cu ft for knockdown of accessible insects; provides no residual.
<i>pyriproxyfen</i> Archer Insect Growth Regulator 1.3%	7C	Mix 1 fl oz in 1 gal water.	Wet surfaces where larvae are found; water volume may be increased to enhance litter penetration.
NyGuard IGR 10%		Mix 4 ml in sufficient water to wet surface being treated.	Wet area where larvae are found.
Pyri-Shield EC 1.3%		Mix 1 oz in 1 gal.	Apply 1 gal/1000 sq ft where larvae are found.
<i>spinosad</i> 44.2% Elector PSP	5	Mix 2 fl oz (60 ml) in 10 gal of water to treat 5000 sq ft.	Use sufficient water to ensure thorough coverage, treating litter along feed and water lines, walls, and support beams. Reapply after each grow-out.
<i>tetrachlorvinphos</i> Rabon Beetle Shield 6% dust	1B	Ready-to-use when purchased.	Use 4 oz/100 sq ft, applied using plunger or rotary type duster
<i>tetrachlorvinphos + dichlorvos</i> Ravap EC 23% <i>tetrachlorvinphos</i> + 5.3% <i>dichlorvos</i>	1B	1 gal in 25 gal water (for extreme infestations dilute 1 gal in 12.5 gal water) Restricted Use Pesticide.	Apply 1 gal of spray/500–1000 sq ft to cover walls, floors, and other sites where beetles congregate.
<i>thiamethoxam</i> Agita 10 WG	4A	Mix 2 oz in 32 fl oz water.	Apply 2 fl oz to shavings under each feeder (do not broadcast).
<i>zeta-cypermethrin</i> ZetaGard LBT	3A	Ready-to-use dust	Use a drop spreader to make band applications under feedlines and along walls; 50 lb/20,000 sq ft broiler house.

MOTHS IN FEED (webbing clogging auger and feed lines)

INSECTICIDE ¹	MOA	MIXING INSTRUCTIONS	APPLICATION INSTRUCTIONS AND SAFETY RESTRICTIONS ²
Diatomaceous earth DE	Inorganic	Ready-to-use when purchased.	Mix 4–6 lb of DE/ton of feed and run through lines monthly to prevent caterpillars from spinning webbing. Existing webbing must be removed by hand; DE does not affect silk webbing.

1. Abbreviations used: CR—carbamate; NP—natural pyrethrum; OP—organophosphate; INO—inorganic; SP—synthetic pyrethroid.
2. Do not contaminate feed, water or feeding and watering equipment.

HONEY BEE DISEASE AND PEST CONTROL

Keith S. Delaplane, Extension Entomologist

PEST	MATERIAL AND FORMULATION	RATE	REMARKS AND PRECAUTIONS
American foulbrood (AFB)	<i>oxytetracycline</i> , <i>tylosin</i> , <i>lincomycin</i> Effective 1 Jan 2017, the antibiotics <i>oxytetracycline</i> , (Terramycin), <i>tylosin</i> , (Tylan) and <i>lincomycin</i> , (Lincomix) are available for treating symptoms of AFB, but only under a Veterinary Feed Directive (VFD) prescribed by a licensed veterinarian.	Allowable rates and dosages are by veterinary prescription or by written Veterinary Feed Directive (VFD) instructions obtained from a licensed veterinarian.	Antibiotics are not effective against this disease and serve only to mask symptoms. If symptoms are restricted to one comb, it may be possible to eliminate the disease by removing, burning, and burying the affected comb and requeening the colony with stock genetically selected for AFB-resistant hygienic behavior. If symptoms recur (very probable), then the colony must be burned. Kill the colony by wrapping it completely in a large plastic trash sack and allowing it to suffocate in the heat of the day. Dig a pit and burn all bees, combs, and frames. Bottom boards, supers, and lids can be salvaged by scorching their interiors with a torch. As a general practice, do not feed bees honey from unknown sources and exercise caution when purchasing used equipment. The disease is highly communicable by contact, whether by contaminated food, equipment, or drifting bees.
European foulbrood (EFB)	Same as for American foulbrood.	Same as for American foulbrood.	These drugs are for preventing and treating disease. Treat in February and September and never within 4 weeks of a marketable nectar flow. Help infected colonies by adding unsealed brood and feeding 1:1 sugar syrup. Use hygienic-selected bee stock.
Chalkbrood	None		Keep hives well-ventilated. Prop lid slightly to exhaust warm, damp air. Lean hive forward to drain rain water from interior. Use bee stock selected for hygienic behavior.
Nosema	fumidil-B	Product is expected to be released October 2019. Please read product label for mixing and application instructions.	Feed medicated syrup in spring and fall and never immediately before a marketable nectar flow. Keep hives well-ventilated. Prop lid slightly to exhaust warm, damp air. Lean hive forward to drain rain water from interior.
Small hive beetles	For treatment inside colonies: Adult beetles can be trapped and drowned in vegetable oil with any of the numerous in-hive adult beetle traps available by bee suppliers. Some beekeepers report success at trapping adults with sheets of micro-fiber cloth laid on top of brood combs. These cloths are widely used in the automobile detailing industry. Beetles—and a small number of bees—get entangled and die in the fibers. In-hive trapping should be done in conjunction with soil nematodes to optimize beetle control.		
	<i>permethrin</i> GardStar 40% EC	For treatment outside colonies: Mix 5 millimeters GardStar concentrate with 1 gallon water. Thoroughly wet ground in an area 18–24 in wide in front of each hive (1 gal/6 hives).	Product is designed to kill immature beetles when they leave hive in order to pupate in the soil. Product is highly toxic to bees. Avoid direct spray onto hive surfaces. Apply in late evening after bees become inactive. For pre-placement cleanup of new apiary site, apply thoroughly to ground surface 24–48 hours prior to hive placement.
	<i>Heterohabditis indica</i> predatory soil nematodes (Southeastern Insectaries, Perry, GA)	For treatment outside colonies: Mix 1 million infective juveniles in 2 gallons water per colony. Strain out gelatin globules and trickle solution on ground in front of hive. Treat ground under hive if screen bottoms are used.	Management: Predatory nematodes have been shown to effectively kill SHB pupae in soil in front of hives.
Tracheal mites (This mite is now rarely seen in Georgia, and treatments are not recommended).	menthol	one 1.8 oz packet per colony	Do not use on hives containing marketable honey. Enclose 1.8 oz menthol in a 7-inch square plastic (or other porous) screen packet. Treat colonies in fall and early spring and only when daytime highs range from 60–90° F. If daytime high is > 80° F, place packet on bottom board. If daytime high is 60–79° F, place packet on top bars. Replace menthol as needed. Remove all menthol 10–12 weeks after first treatment and at least 1 month before nectar flows. Vegetable oil in the medicated extender patty described below helps control AFB, EFB and tracheal mites.
	oil patties	Mix patties with 2 parts sugar and 1 part vegetable cooking shortening. Each patty should be 0.5 lb.	Place oil patty on top bars of brood frames. Treatments applied February through April are most effective.

HONEY BEE DISEASE AND PEST CONTROL

PEST	MATERIAL AND FORMULATION	RATE	REMARKS AND PRECAUTIONS
Varroa mites	Population growth of mites can be limited by use of genetically-selected mite resistant stock, screened bottom boards, and spring-time drone brood trapping. For the latter, a drawn comb of drone cells is inserted in the hive in early spring. Bees fill it with drone pupae, and once the brood is capped, the beekeeper removes the frame, freezes it (killing mites along with the brood), then returns it to the hive so the bees can eat the brood and recover some of their nutrient investment. Because mites significantly prefer drone brood, a large fraction of the mite population will be removed and killed with this procedure. Any of the mite treatments below will be more effective at times of year when brood area is naturally low. It is especially important to treat in late summer/early autumn in order to protect the bees destined to form the overwintering cluster.		
	<i>fluvalinate</i> Apistan (This product is now largely ineffective due to evolved mite resistance)	1 strip for each 5 combs of bees in each brood chamber	Do not use on hives containing marketable honey. Hang one strip between frames 3 and 4, and another strip between frames 7 and 8. Leave strips in hive for 42–56 days. Apistan treatments are usually most effective when used in early fall.
	<i>coumaphos</i> CheckMite+ Strip (This product is now widely ineffective due to evolved mite resistance)	1 strip for each 5 combs of bees in each brood chamber	Remove honey supers before application of CheckMite+ Strips and do not replace until 14 days after the strips are removed. Hang the strips within two combs of the edge of the bee cluster. If two deep supers are used for the brood nest, hang CheckMite+ Strips in alternate corners of the cluster, in the top and bottom super. Treat all infested colonies within yard. The treatment is most effective when brood rearing is lowest. Do not treat when surplus honey is being produced. Leave the strips in the hive for at least 42 days (six weeks), but do not leave strips in hive for more than 45 days. Do not treat more than twice a year for varroa mites.
	<i>thymol</i> Apiguard	1 tray per colony, repeated after 2 weeks	Open the hive. Peel back the foil lid of the Apiguard tray leaving one corner of the lid attached to the tray. Place the open tray centrally on top of the brood frames, gel side up. Ensure that there is a free space of at least 0.5-inch between the top of the tray and the hive cover board, for example, by placing an empty super on top of the brood box. Close the hive. After two weeks replace the first tray with a new one, according to the same instruction. Leave the product in the colony until the tray is empty. Remove the product when installing the supers on the colony. The efficacy of Apiguard is maximized if the product is used in late summer after the honey harvest (when the amount of the brood present is diminishing). However, in the case of severe infestations, Apiguard can also be used during springtime, when temperatures are above 60° F. Efficacy will vary between colonies due to the nature of the application. Therefore, Apiguard should be used as one treatment among others within an Integrated Pest Management program, and mite fall regularly monitored. If further significant mite fall is observed during the following winter or spring, use an additional secondary winter or spring treatment for varroa.
	<i>thymol</i> ApiLife VAR	1 treatment consists of 3 wafers over 2–32 days	Applications can be made in any season (spring, summer, fall, winter) in which all applicable restrictions, precautions and directions for use can be followed. Do not use when surplus honey supers are in place. Use when average daily temperatures are between 59–69° F. Do not use ApiLife VAR at temperatures above 90° F. Two treatments per year may be made. A treatment (3 tablets) consists of the following: Take one tablet and break into four equal pieces. Place pieces on the top corners of the hive body. Avoid placing pieces directly above the brood nest. After 7–10 days, replace with a fresh tablet broken into pieces as above. Repeat procedure again 7–10 days later and leave last tablet for 12 days. After 12 days, remove residuals from the colony. To prevent the bees from gnawing the tablet either enclose each piece of tablet in an envelope of screen wire (8 mesh/ inch) or place the uncovered pieces above a sheet of metal screen that prevents bees from contacting it. Remove ApiLife VAR tablets from hive at least 1 month (30 days) prior to harvesting the honey.
	<i>formic acid</i> Mite-Away Quick Strips	2 strips	Optimal treatment season is spring or fall corresponding to optimal temperature windows described below. Outside daytime temperature highs should be between 50–92° F. Temperatures > 95° F during the first three days of treatment can cause excessive brood mortality and absconding. Remove strips from pouch. For hives with single brood chambers lay two strips across the top bars of the frames of the brood chambers, staggering them so they lay flat and across the full width of the hive body, with approximately 2 inches between strips and 4 inches between the ends of the brood chamber and the outer edges of the strips. For hives with two brood chambers place the strips as described above on the frame top bars of the lower hive body, so the strips are in-between the brood chambers. Put on honey supers if a honey flow is anticipated. The active ingredient dissipates after 3 days; however, do not disturb the colony for 7 days to allow it to recover from manipulation. Spent strips need not be removed after use.

PEST	MATERIAL AND FORMULATION	RATE	REMARKS AND PRECAUTIONS
<p>Varroa mites (continued)</p>	<p><i>oxalic acid</i></p>	<p>Solution method Dissolve 35 g of Oxalic Acid Dihydrate in 1 liter of 1:1 sugar: water (weight:volume). Smoke bees down from the top bars. With a syringe or an applicator, trickle 5 ml of this solution directly onto the bees in each occupied bee space in each brood box. The maximum dose is 50 ml per colony whether bees are in nucs, single, or multiple brood chambers. Under certain unfavorable conditions (e.g., weak colonies, unfavorable overwintering conditions), this application method may cause some bee mortality or overwintering bee loss.</p> <p>Vaporizer method Apply only to outdoor colonies with a restricted lower hive entrance. Seal all upper hive entrances and cracks with tape to avoid escape of Oxalic Acid vapor. Smoke bees up from the bottom board. Place 1.0 g Oxalic Acid Dihydrate powder into vaporizer. Follow the vaporizer manufacturer's directions for use. Insert the vaporizer apparatus through the bottom entrance. Apply heat until all Oxalic Acid has sublimated.</p> <p>Spraying package bees Ensure bees are clustered before applying oxalic acid (for example, store in cool dark location 24 hours before application). Spray broodless package bees with a 1:1 sugar:water solution at least 2 hours before spraying with oxalic acid. This allows bees to fill honey stomachs with sugar water reducing ingestion of oxalic acid. Mix a 2.8% oxalic acid solution by dissolving 35 g of Oxalic Acid Dihydrate in 1 liter of 1:1 sugar: water (weight:volume). Evenly apply 3.0 mL of 2.8% oxalic acid solution per 1,000 bees using a pump sprayer or battery powered sprayer (for example, a typical 2 lb package contains approximately 7,000 bees which requires 21 mL of solution). Apply solution evenly on both sides of the package. Store bees in a cool darkened room for 72 hours before hiving.</p>	<p>Product is extremely hazardous. Observe all labeled instructions for protective clothing and handling practices.</p>
<p>Wax moths</p>	<p>PDB crystals</p>	<p>Stack stored supers, cover stack and make air-tight with newspaper or duct tape. At intervals equal to the height of 5 deep supers or 10 shallow supers, insert 6 tablespoons of PDB. Put crystals on a small piece of cardboard placed on top bars of frames. Replace crystals as they evaporate. Air-out supers before using on live bee hives.</p>	<p>Wax moths are secondary scavengers. Wax moths in living colonies indicate an underlying problem. Check for queenlessness, disease, or mites. Protect stored combs by:</p> <ol style="list-style-type: none"> (1) storing them on top of strong colonies, (2) freezing combs and supers, then stacking them and taping shut all cracks to exclude moths, (3) stacking combs so they are constantly exposed to air and daylight, (4) operating an electronic "bug zapper" in the super storage room to kill adult moths, (5) using PDB crystals.