



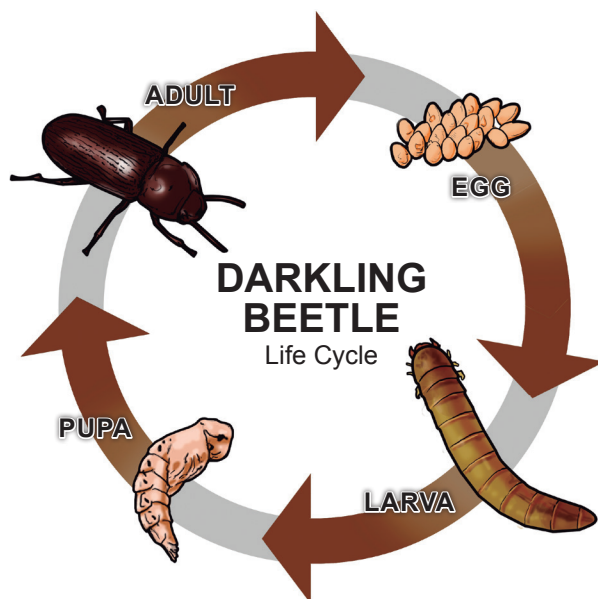
Darkling Beetles in Poultry Facilities Protocol

Importance of Darkling Beetle Control

- Darkling beetles are an invasive species and are known vectors of disease pathogens such as avian influenza, coccidiosis, fowl pox, botulism and *Salmonella*.
- Uncontrolled darkling beetle populations can increase feed conversion rates.
- Darkling beetles can damage the barn structure and insulation when pupating, which can increase heating costs.

Understanding Darkling Beetle Life Cycle and Habits

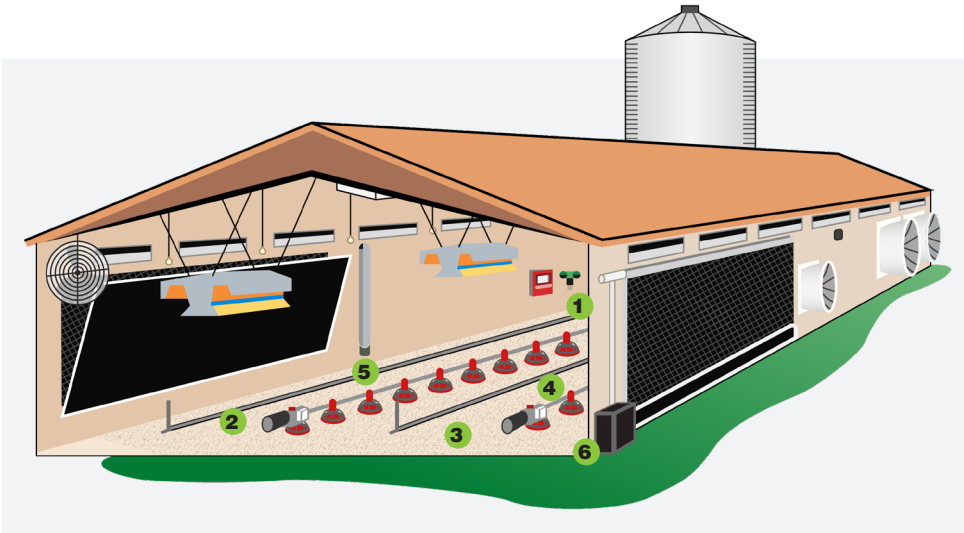
- Darkling beetles have four life stages: egg, larva, pupa and adult.
 - Life stages overlap, as new eggs are laid daily.
- Adults are very active, capable of flying up to a mile and can travel from barns to nearby farms and residential areas.
- During an extended downtime, when no food or water is present, beetle movement between facilities increases, as they are in search of food.
- The environment in modern poultry barns offer ideal conditions (warmth, food, and moisture) for darkling beetles to thrive.
- Beetle populations can expand quickly if there are no control measures in place.



DARKLING BEETLE <i>Alphitobius diaperinus</i>	IDENTIFICATION	IMMATURES	ADULTS
	1/4" inch long Dark reddish brown to black in color	Egg hatch 4-7 days Larval stage 35-65 days Pupal stage 5-10 days	Females lay 200-400 eggs on average Adults Live 3-12 months

Inspection and Integrated Pest Management

- Integrated pest management (IPM) involves the use of all types of control techniques, including non-chemical approaches, to keep darkling beetles out of poultry facilities.
- Darkling beetle eggs are commonly found in cracks and crevices throughout the poultry house, within the litter, and beneath feed and water lines. Clean up spilled feed, as it provides a readily available food source for darkling beetles.
- Adult darkling beetles are attracted to ammonia, light, feed and water. They typically congregate in areas with higher moisture levels and access to feed.
- Darkling beetles will feed on carcasses; remove dead birds daily to help reduce beetle populations.
- Monitor darkling beetle populations using traps and by inspecting beneath feed pans and other common harborage areas. Establish an economic threshold appropriate for your facility and begin treatment when populations exceed that threshold. Do not wait for a population explosion before initiating control measures.



Common Resting and Breeding Sites

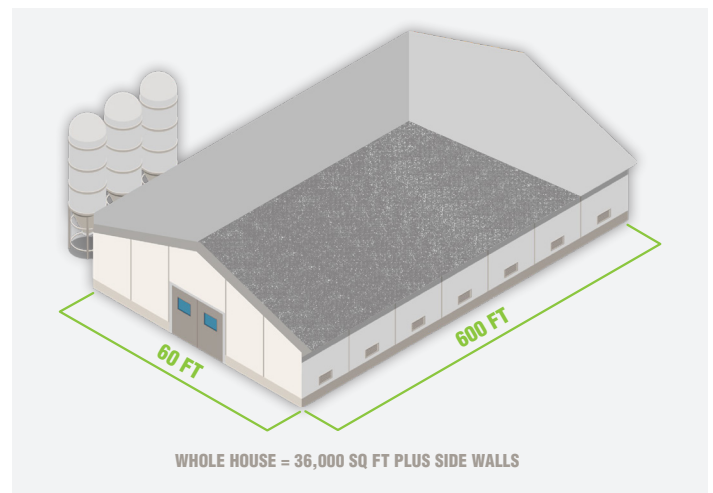
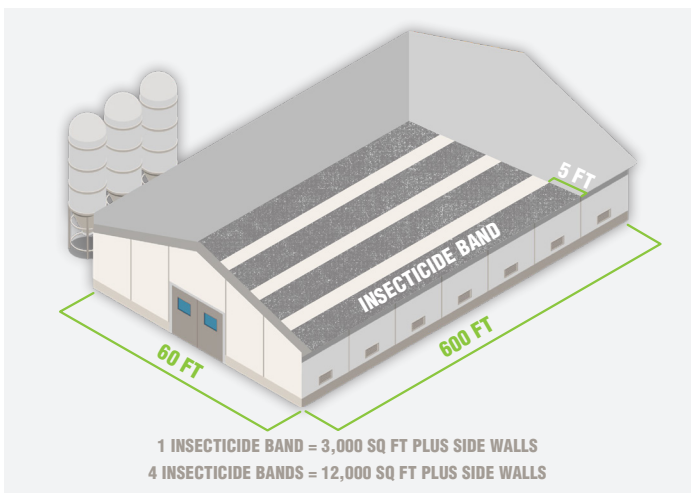
1. Dark corners
2. Under manure
3. Litter cake
4. Under feed lines
5. Water lines
6. Pupae found in litter, walls, outside facility, floor and wall junctions

Pre-Treatment

- Remove birds and raise water and feed lines prior to treatment.
- Till and/or manage litter prior to insecticide treatment unless you are spraying the windrows. Tilling after an insecticide application may create untreated gaps in the insecticide barrier.
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Interior Control Measures

- Apply insecticide as close to bird placement as possible for maximum residual effect throughout the grow out period.
- Depending on your specific requirements, poultry house treatments with liquid can be done as banded or whole house applications. Regardless of application, do not forget to calculate the side wall square footage. (Height up the wall times length of the wall).
 - Banded Application
 - You might save time and resources with a banded application focused under the feed lines, water lines and against the walls, but it could drive insect activity into areas where they will not come into contact with the insecticide.
 - Whole House Application
 - A whole house application may require additional passes and potentially a different spray nozzle configuration to ensure all litter and sidewalls are treated. The benefit to this treatment method is that it's more difficult for darkling beetles to find untreated harborage areas.





Exterior Control Measures

- Adult darkling beetles are flying insects, capable of flying between facilities. Exterior treatments are helpful in reducing migrating populations.
- Exterior treatments are recommended at least two times per year (spring and summer). If a significant infestation is present, additional applications may be required.
- Treat any litter on the exterior, as beetles will harbor in any accumulated litter.

Recommended Spray Equipment

- Backpack or hand sprayers – Commonly used for spot, crack and crevice and surface treatments around the premises. Users can opt for fan spray or pin stream. Do not apply insecticide to runoff.

- Cold foggers (ULV) – Generate fog by a mechanical action that breaks down the liquid while combining it with a high volume of air at low pressure. Users can calibrate the unit to produce droplets of the optimum size for the situation or product being used. The most effective droplet size is 5 – 15 microns.
- Power sprayers – Commonly used for band or general surface treatments.

Post-Treatment

- Compare pre- and post-treatment beetle counts to evaluate the effectiveness of the application and determine whether the population is decreasing.
- Avoid unnecessarily disturbing the litter after insecticide applications, including dragging, tilling, caking out and other litter management practices that may disrupt the insecticide barrier.

Tips and Tricks From the MGK Technical Department

- Clean out poultry litter and replace shavings between flocks to reduce the beetle population.
- Include a synergist like piperonyl butoxide (PBO) in your tank as a way to combat insecticide resistance and improve product performance.
- Do not tank mix litter amendments and insecticides. Litter amendments are very acidic and can have detrimental effects on insecticides if combined.
 - If using dry amendment, we recommend putting insecticide down first and allow it to dry completely before adding amendment.
 - If using liquid amendment, apply amendment first and allow to completely dry before adding insecticide.
- Active ingredient rotation to a different mode of action is recommended to prevent resistance.
- For houses with longer grow out periods, insect growth regulators (IGRs) and microencapsulated insecticides will provide a longer residual effect.
 - Microcaps are designed to slowly release the active ingredient over time, increasing residual.
 - IGRs target different life stages of the insect to help control future beetle populations.

PRODUCT	IRAC GROUP	ANIMALS PRESENT DURING APPLICATION	RATES	APPLICATION METHODS
BP-100 Plus™ Fogging Concentrate	3A; 7C	Poultry and Equine Only	1.46 fl. oz. per 1,000 cu. ft. (poultry present); Up to 6 fl. oz. per 1,000 cu. ft. (no animals present).	Spray roosts, walls, and nests or cages thoroughly. Pay special attention to treat areas where pests rest and can breed.
Darlex® Insecticide	4A	No	4 fl. oz. in ½ to 2 gallons of water to treat 1,000 sq. ft.	Spray on floors, getting under all the water and/or feed lines in the house. Continue applying along inside perimeter and 1-2 feet up onto the walls, support beams and wood surfaces. May also be used as a broadcast spray to treat the entire house.
NyGuard® IGR Concentrate	7C	Poultry Only	3-8 ml of concentrate per 1,500 sq. ft.	Apply as a spot, crack and crevice treatment, general surface broadcast treatment, or as ULV/fog. Tank mix with Onslaught FastCap or Darlex.
Onslaught® FastCap Spider & Scorpion Insecticide	3A	No	1 fl. oz. per gallon or 1 fl. oz. in sufficient water to cover 1,000 sq. ft.	Apply as coarse wet spray. Treat areas where beetles frequently occur, such as walls, supports, cages, cage framing, stalls, and around feeders.
Tobex® Multi MoA Concentrate	3A; 7C	No	2-4 fl. oz. per gallon (or sufficient water to cover 1,000 sq. ft.).	Can be used as crack and crevice, broadcast, or banded/spot treatment to areas where infestations frequently occur, such as walls, floors, stalls, around feeders, and support posts.



INSECT GROWTH REGULATORS



NyGuard® IGR Concentrate

- Insect growth regulator that keeps insects in juvenile state and provides residual activity
- Binds to organic and inorganic matter and is effective at low concentrations
- Can be tank mixed with adulticides to control immature and adult insects

OVER-ANIMAL INSECTICIDES



BP-100 Plus™ Fogging Concentrate

- Oil-based fogging concentrate promotes better adhesion to bird feathers
- Formulated with a 1:5 pyrethrins to piperonyl butoxide ratio to combat resistance and increase effectiveness
- Contains NyGuard® IGR for dual modes of action to control immature and adult insects

PREMISE SPRAYS



Darlex® Insecticide

- Formulated for poultry industry for lasting control
- Contains clothianidin, offering a rotational option for pyrethroid products
- Can be tank mixed with an insect growth regulator to control immature and adult insects



Onslaught® FastCap Spider & Scorpion Insecticide

- Formulated with a knockdown agent and microencapsulated residual insecticide for fast-acting and residual control
- Synergized with piperonyl butoxide (PBO) to combat metabolic resistance and increase effectiveness
- Can be tank mixed with an insect growth regulator to control immature and adult insects



Tobex® Multi MoA Concentrate

- Combines a knockdown agent with controlled-release technology for residual control
- Formulated with NyGuard® IGR for dual modes of action to control immature and adult insects
- Synergized with piperonyl butoxide (PBO) to combat metabolic resistance and increase effectiveness

Contact your local MGK or distributor sales representative for more information.

See the label for a full list of insects controlled, detailed instructions and proper PPE.

Toll Free: 800.645.6466 | **Tel:** 763.544.0341 | **Fax:** 763.544.6437

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