

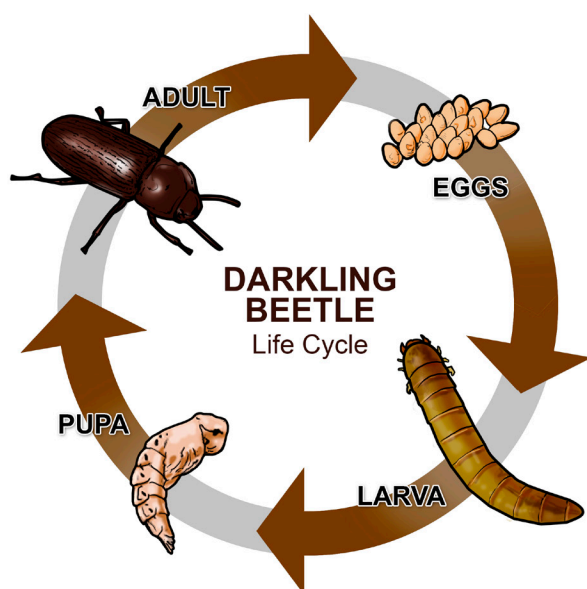


Darkling Beetle Protocol

Understanding Darkling Beetle Habits and Life Cycle

- Darkling beetles are an invasive species and a significant pest in the poultry industry.
- 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. They 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
	¼" 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



Importance of Darkling Beetle Control

- Darkling beetles are known vectors of disease pathogens. Some of these diseases include: avian influenza, salmonella, fowl pox and botulism. Disease can be spread from one flock to the next within a house.
- Uncontrolled beetle populations can increase feed conversion rates.

Inspection and IPM

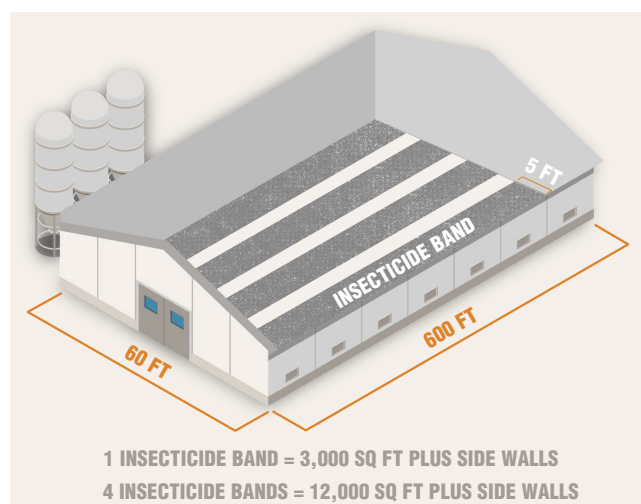
- Beetle eggs are laid in cracks and crevices of the poultry house, litter and under feed/water lines.
- Adult beetles are attracted to ammonia, light, feed and water. They tend to gather in areas of higher moisture with access to feed.
- Monitor beetle populations by using traps and/or looking under feed pans. Determine the economic threshold that is appropriate for your facility. Treat populations when the threshold is exceeded. Do not wait for population explosions, begin treatment when the population begins to noticeably increase.
- Important consideration points:
 - Clean up spilled feed, as it is a readily available food source for beetles.
 - Pick up dead birds daily, as beetles will start to consume the carcass.
 - Windrow to supplement beetle control.
 - Clean out poultry litter and replace shavings between flocks to reduce the beetle population.

Pre-Treatment

- Remove birds, lift water and feed lines prior to treatment.
- Till and/or manage litter prior to insecticide treatment unless you're spraying the windrows. Tilling after an insecticide application may create untreated gaps in the insecticide barrier.

Interior Control Measures

- Prior to any treatments, follow all label directions, restrictions, and PPE requirements.
- 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 one of two ways: Banded or Whole House. Whether it is a banded or whole house application, don't forget to calculate the side wall square footage. (Height up the wall times length of the wall).
 - Banded
 - 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 won't come into contact with the insecticide.
 - Whole House
 - 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.

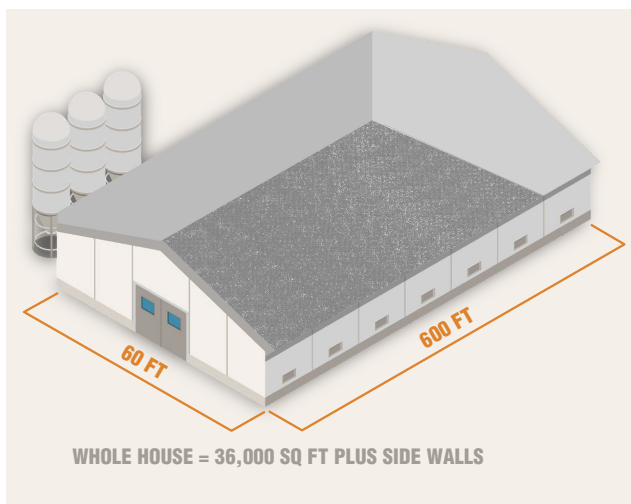


Exterior Control Measures

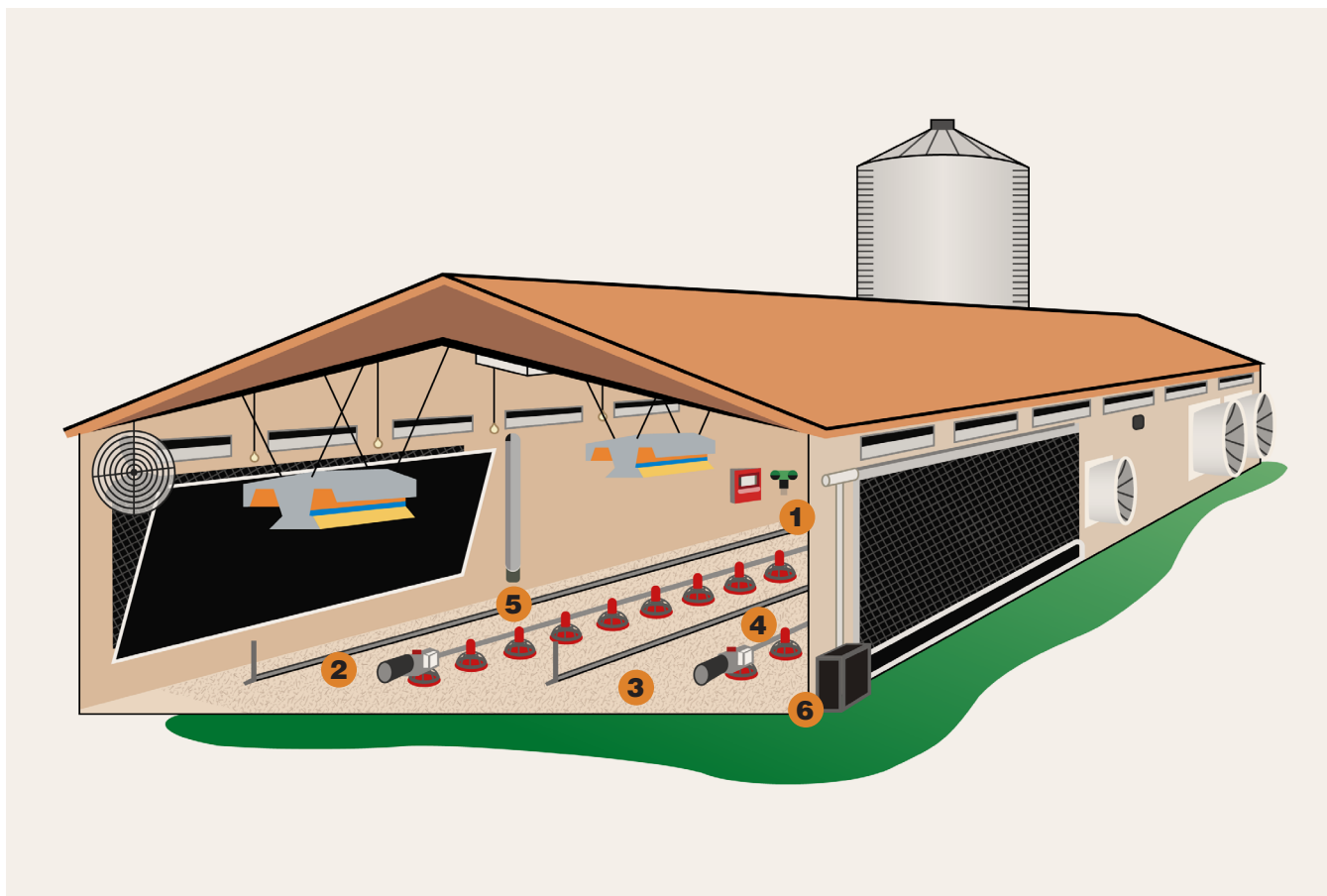
- Prior to any treatments, follow all label directions, restrictions, and PPE requirements.
- Adult beetles are flying insects, capable of flying between facilities. Exterior treatments are helpful in reducing migrating populations.
- Exterior treatments are recommended at least two times per year (spring 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.

Post-Treatment

- When inspecting after treatment, compare pre- and post-treatment counts to see if population is decreasing.
- Avoid unnecessarily disturbing the litter after insecticide applications. This includes dragging, tilling, caking out, etc.



PRODUCT	RATES	APPLICATION METHODS
Darlex	4fl. Oz in ½ to 2 gallons of water to treat 1,000sq 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.
Onslaught FastCap	1fl. 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	2-4fl. Oz per gallon (or sufficient water to cover 1,000sq 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
Nyguard IGR	4-12ml of concentrate per 1,500 sq ft	Tank mix with Onslaught FastCap or Darlex
Exponent	0.56lbs PBO or 8.94 fl. Oz. per 1,000 sq ft	Include in tank mix. Already premixed into Onslaught FastCap and Tobex



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/wall junctions

Tips and Tricks from the MGK Technical Department

- Insecticide resistance comes in many forms. Use a synergist, such as PBO, in your tank to combat resistance and improve product performance. Active ingredient rotation to a different mode of action is recommended to prevent resistance. Check active ingredient list in products to ensure proper rotation.
- Check your equipment for proper calibration prior to application. Refer to equipment manuals for calibration instructions and output rates.
- 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.
- For houses with longer grow out periods, 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.



ONSLAUGHT FASTCAP SPIDER SCORPION

- Premise insecticide for use in and around poultry facilities
- Dual-active, synergized formula; microencapsulated residual insecticide and knockdown agent for enhanced control
- Kills darkling beetles, bed bugs, biting flies, house flies, mosquitoes, fleas, ticks, spiders, and other listed pests



TOBEX MULTI MOA CONCENTRATE

- Premise insecticide for use in and around poultry facilities
- Synergized formula; microencapsulated residual insecticide, knockdown agent and NyGuard IGR for enhanced control
- Multiple MoA eliminates the need to mix multiple products
- Kills darkling beetles, house flies, mosquitoes and other listed pests



NYGUARD IGR CONCENTRATE

- Insect Growth Regulator provides long lasting residual activity
- Breaks insect's life cycle of over 50 pests and is effective at low concentrations
- Keeps insects in juvenile state, making them easier to kill
- Labeled for indoor and outdoor use
- Can be tank mixed with other residual insecticides to add another mode of action to improve product performance



EXPONENT INSECTICIDE SYNERGIST

- Increases killing power by making insects more susceptible to insecticides
- Use as a synergist to tank mix with other insecticides to enhance product effectiveness



DARLEX

- Premise insecticide for use in and around poultry facilities
- Contains clothianidin, a second generation neonicotinoid
- Tank mix with NyGuard IGR
- Controls adult and larvae darkling beetles
- Kills darkling beetles, bed bugs and nuisance ants



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