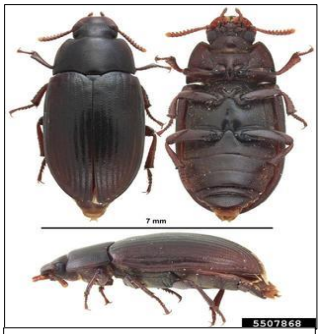
January 2018

Darkling Beetle

Alphitobius diaperinus



Darkling beetle adult
Photo credit: Patrick Marquez (invasives.org)

Most common insect pest affecting poultry production in Canada, causing significant economic losses. Severe infestations are estimated to result in annual losses of up to 25% of the insulation in a poultry house, potentially **increasing energy costs by up to 60%**.

Darkling beetles can carry more than 60 **poultry diseases** including:

- Newcastle disease, avian influenza, *Salmonella* spp., *E. coli*
- Parasites such as coccidiosis, round worm and poultry tapeworm

They reduce **feed quality and volume** and cause **structural damage** to poultry barns. While it is unlikely beetles can be eradicated from a farm, a tactical approach such as integrated pest management (IPM) is the most effective way to keep pest populations to acceptable levels.

Insect Biology and Life Stages - Darkling beetles are decomposers and like moist environments. They are not winter-hardy, so will die if exposed to cold temperatures, however they are capable of supercooling, which prevents their bodies from freezing. They can thrive in poultry barns where there is ample decaying organic matter and moist conditions, particularly under water lines - 90% humidity is optimal for larval survival. Even after a good barn cleanout, beetles can move from one barn or bay to another via the attic or other corridors within the structure.

Life cycle - Note that the length of each life stage is affected by temperature and humidity

Eggs →

Non-mobile
1.5 mm cylindrical, off-white in colour,
Females **lay eggs in damp litter**

→ **Larvae** →

Mobile
1.5-11 mm long, tan or light brown in colour
Segmented with three pairs of legs.
Larvae climb up walls and burrow into insulation to pupate resulting in **structural damage**
Also known as **lesser mealworms**

→ **Pupae** →

Non-mobile
Takes 7-11 days for beetles to emerge

→ **Adults**

Mobile: walk and fly
6 mm long, oval-shaped, light to dark brown or black
Live for 60-400 days
Produce 200-2,000 eggs

Darkling beetle larva

Ongoing management is needed to avoid heavy infestations. This requires a good understanding of the insect's lifecycle and behaviour, along with an **IPM program** that combines management methods, including chemical, cultural, physical, and biological control methods.

Darkling beetles mixed in litter

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Monitoring and Management of **Darkling Beetle**

Prevention: ***Cultural and physical management***

- Minimize litter moisture by preventing and repairing leaks in water lines
- Limit feed spills and clean up spills immediately
- Remove litter between flocks
- Improve ventilation to reduce humidity
- Use physical barriers, such as resin, caulking, or metal flashing, to disrupt migration of larvae in the walls and prevent chewing damage from beetles
- Remove and compost manure and mortalities ASAP
- Avoid sharing of equipment between neighbours and barns to prevent spread

Intervention:

Chemical control

The label is a legal document and contains details of appropriate use for each product.

- Apply insecticide between flocks, after cleaning and disinfection, and before new litter is added. Most insecticides are best used in empty barns, but some can be used while birds are present.

Beetles can develop resistance to insecticides. To prevent this:

- Use a different insecticide ***(rotate between product groups)*** every flock cycle if possible
- To achieve best results and limit the risk of resistance, ***always follow label instructions*** and apply the label rate of insecticide
- ***Monitor after any treatment*** to evaluate efficacy

- Spread Diatomaceous earth (DE) or Boric acid registered insecticides in places where beetles will walk, such as cracks in posts and cement; apply before adding new litter. It must remain dry to be effective. DE affects the beetle's waxy outer shell, causing it to dry out resulting in death. Additional applications of these products can be made to litter while the flock is in the barn.

Biological control

- The bio-insecticide *Beauveria bassiana* is a fungus that can kill all life stages of the pest.

Cultural control

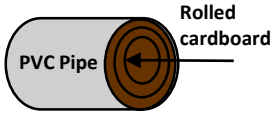
- Use a high-pressure hot wash system to flush beetles out of cracks in walls and floors.

Observation:

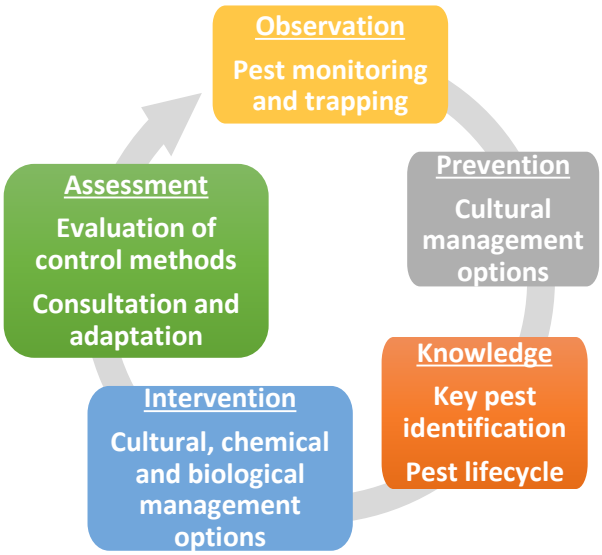
Monitoring **-** Conduct **weekly inspections** for beetles using a flashlight. Look in litter and dark areas of barns, particularly around equipment, feeders and within insulation.

Trapping **-** A simple trap can be made by filling a 5 cm diameter, 25-30 cm long PVC pipe with rolled corrugated cardboard and placing in litter. The cardboard layers provide a hiding place for beetles and larvae.

Place **at least three traps** along the centerline of each house and **check every 1-2 weeks**.



Darkling beetle trap



For more information:

To review products registered for darkling beetles in poultry in Canada consult the **Pest Management Regulatory Agency searchable label database:** pr-rp.hc-sc.gc.ca/ls-re/index-eng.php

Ontario Ministry of Agriculture: omafra.gov.on.ca/english/livestock/poultry/facts/16-053.htm

Canadian Poultry: canadianpoultrymag.com/production/manure-management/darkling-beetle-control-2224