



LITTER BEETLE

(Alphitobius diaperinus; Panzer)

This insect is also known as darkling beetle or lesser mealworm. Although known in broiler and brooder houses as a poultry pest since the mid-1950's, the number of affected facilities and the severity of the infestation has increased over the years. Its economic importance is made evident by the association with its role as a reservoir of several pathogens such as fungi (*Aspergillus*), bacteria (*Escherichia*, *Salmonella*, *Bacillus*, *Streptococcus*), viruses (*Marek*, *Gumboro*, *Fowlpox*, *NewCastle*, *Avian influenza*), coccidian oocysts (*Eimeria spp*), and worm cysticeroids (*Choanotaenia* and *Raillietina*).



The transmission of these pathogens occurs when chickens eat larvae and beetles infected with them (during the first 10 days of life broiler chicks can consume about 450 larvae/chick/day). The mycotoxin F-2, produced by the fungus *Fusarium roseum*, may persist in the lesser mealworm throughout metamorphosis. The persistence of this mycotoxin during the beetle's various developmental stages raises questions about the ability of other pathogens to do the same.

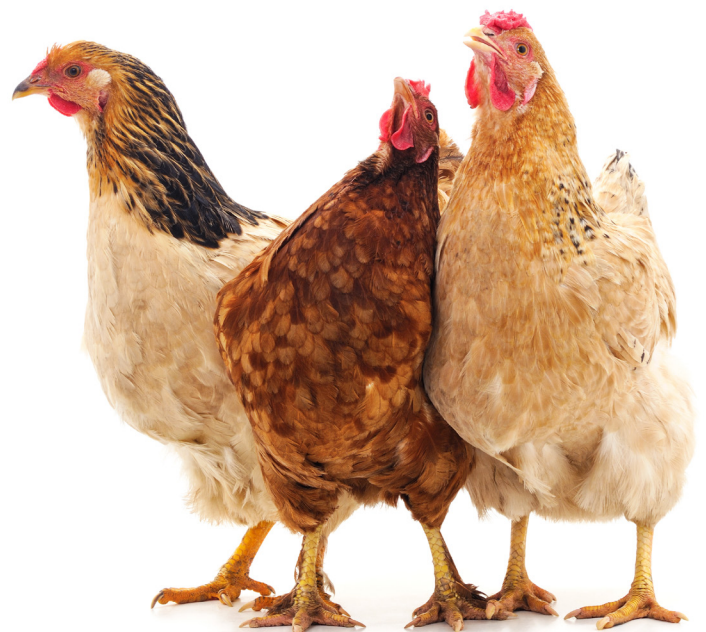
Other significant damage caused by the litter beetle includes tunnelling through insulation panels in poultry houses and pigsties; this results in loss of insulation capacity (up to 30%) and destruction of insulating material.

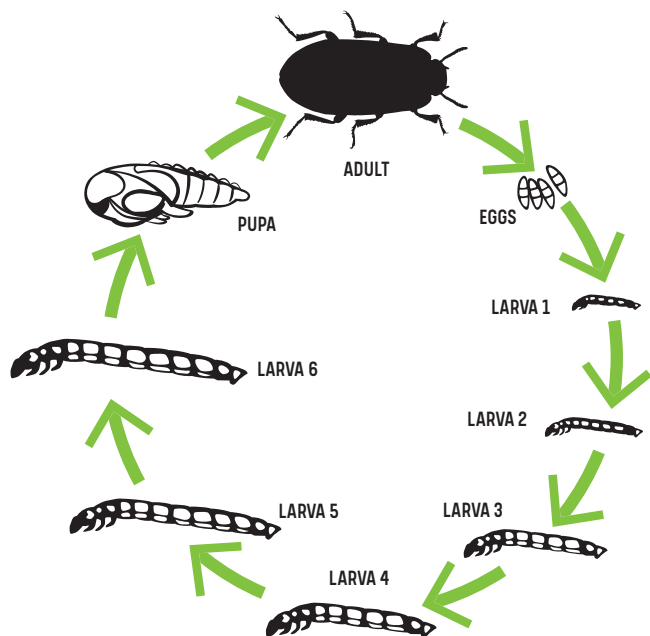
Complaints are also frequent near houses which are severely infested with this insect when infested litter or manure is removed and beetles invade neighbouring houses and buildings. Litter beetles are mainly a problem in poultry houses where the litter is not removed in the so-called all-in all-out system: a new bed is simply placed on top of the old one instead. Poultry houses with a dirt floor also harbour larvae which will bury into the ground. These larvae can be effectively controlled by a larvicide.

Biology

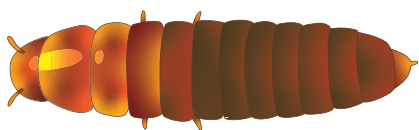
The adults we see represent only a fraction of the total beetle population, and hence the problem. An adult has reached the final stage in a series of many larval stages. If control measures are only directed against beetles it is difficult to get a handle on the problem. *(continued over page)*

Protect young chickens and their enclosures from the effects of litter beetle infestation





Adult beetles complete their life cycle in about 45 days at a temperature of 32°C. On average, about 71 days pass between egg layings. Eggs fail to hatch at temperatures below 21°C or above 37.7°C. Eggs are laid directly into poultry litter (darkling beetles can also be found breeding in manure under laying hen's cages). An entire life cycle can take place in the litter without the need of migration. Breeding conditions can be also found around buildings in places where litter is disposed of and has accumulated. From these places migration to poultry houses can occur.



The larvae (see above) (also called "worms") have distinct head and body segments, and three pairs of legs which enable them to move rapidly. They feed mainly on fungi found in litter; however, they feed readily on insects too. This includes cannibalism by large larvae and adults on smaller larvae and eggs if the population is overcrowded. Between each instar they shed their old skin and produce a new one made of chitin.

When fully grown the larva searches for a place to turn into a pupa. Pupation occurs in litter, manure, underlying soil or building insulation. The following conditions may cause the larvae to migrate: when the litter is removed, overcrowding of insects, cleaning of the house, when the flock is taken out, and temperature variations. Then the larvae migrate towards the upper parts of the house and start tunnelling into walls and insulation in order to pupate and complete their life cycle. They always search for dark places.

Nearly all of the larval dispersal takes place at night. The upward movement of larvae seeking pupation sites is related to the density of the population in the litter and limited suitable sites for pupation in the litter, manure, or soil beneath. Major migrations also take place when the flock and/or litter are taken out: this can easily be seen by the farmer. Constant movement also occurs during fattening time, but since movement takes place at night and not in great numbers it can remain unseen by the farmer. Larvae and adults crawl better on wood floors. Migration can occur at any time.

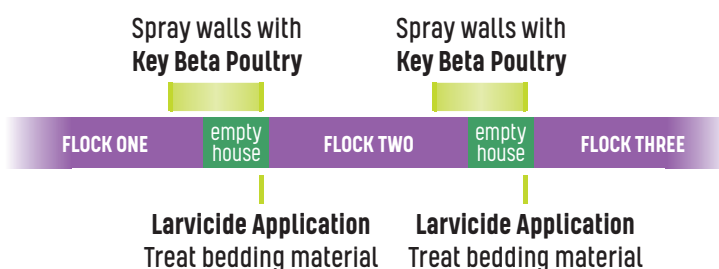
Some days later an adult litter beetle will emerge from the pupa leaving behind destroyed insulating material.

Litter Beetle Control

The control of these insects should be directed toward both the adults and the larvae. Adults should be controlled during their migratory movements toward pupation sites (ceilings) while they climb walls, for example. Larvae should be controlled in their breeding sites in the litter.

Key Industries Products

Key Industries have an insecticide particularly effective for litter beetle control: Key Beta. We recommend however a two pronged treatment approach. The principle of our litter beetle control program is to spray walls with residual insecticide (Key Beta) to control migrating larvae and adults prior to removing the flock and shortly after a new one has been introduced. Follow up with a larvicide sprayed onto the litter to kill larvae not treated with the adulticide in the previous treatment, as well as those emerging from eggs not controlled by the adulticide. Contact Key Industries for a recommended larvicide for your situation.



Key Beta Poultry

Key Beta Poultry is a highly concentrated form of beta cyfluthrin, with a very small particle size for optimum contact with insects. 90% of the active ingredient particles are smaller than 10 microns in diameter. Key Beta Poultry is suitable for treating shed ceilings, walls and floors and gives improved residual activity on porous surfaces such as unpainted brick, concrete block, timber and fibrous cement. Can be used confidently within animal facilities according to label directions without concern about residues. **Do NOT** apply to live birds, Key Beta Poultry is only to be applied to surfaces after poultry have been removed from the shed. It is a contact insecticide designed to be sprayed onto walls where litter beetle adults and larvae crawl. Key Beta Poultry also controls adult house flies and other occasional farm pests.



Dosage: 40mls per 10 Litres of water. Apply 5 Litres per 100m² on walls where beetles are likely to climb during their migration to pupation sites.

The maintenance rate for light infestations is 80mls per 50L and 1L spray solution per 10m²

