

Darkling beetles and their economic impact on production

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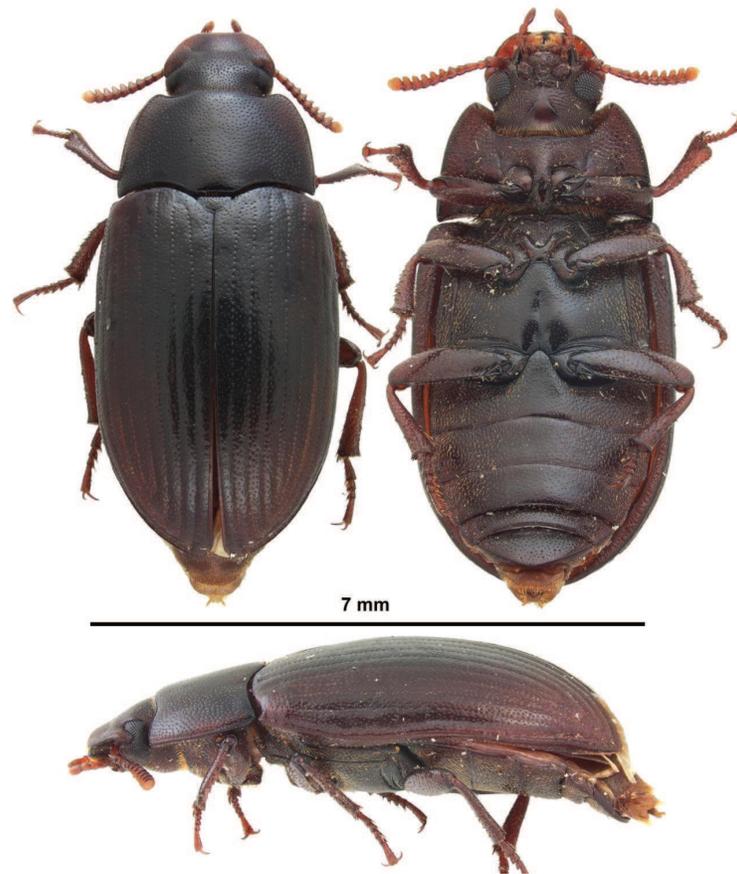
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DACULA, Ga. — The darkling beetle (*Alphitobius diaperinus*) is a common insect found in meat bird production and to a lesser extent in deep pit layer houses. The natural habitat for this insect is flour, meal and grain products. Because of its tropical origin, this insect is well suited for the warm and humid conditions found in poultry production houses.

The beetles' preferred habitat is beneath feed lines and feeder pans where spilled feed is mixed with the litter, thus providing ideal conditions for these beetles to thrive. Darkling beetles have few natural enemies (other than mice) in poultry houses and few pathogens have a negative impact on this pest. The life cycle takes from 40 to 100 days depending on temperature, with adults living from two to 12 months and producing 200 to 2,000 eggs during this time period.

Since the beetles' preferred habitat is near feeders, birds commonly consume beetle larvae and adults when the opportunity presents itself. In fact, given a choice between beetle larvae and feed, chicks or poults will first consume all larvae or adult beetles before eating feed. The birds' aversion to feed for something moving provides a significant avenue for flock exposure to disease pathogens, both bacterial and viral, and endoparasites (coccidia, tapeworms and round worms).

The risk for disease transmission is a very real concern. Beginning flocks with large numbers of beetles present increases the likelihood of beetle consumption. Broilers as young as 25 days old have necroses with a history of tapeworms. These findings are significant because common poultry tapeworm species require an insect intermediate host; and because high percentages of the flock being infested indicate that birds are consuming



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Darkling beetle: Pictured are multiple views of the darkling beetle (lesser mealworm).

beetles and larvae.

Because chicks and poults are exposed to these disease organisms when their immune systems are immature, beetle control becomes very important for flock health, food safety, and return on investment. A frequent comment from service personnel whenever they encounter birds with beetles in the crop at necropsy is that these "bug eating flocks" quite often are some of the poorest performing flocks of those siblings placed the same day with the same processing schedule.

There can be many explanations for sub-par performance, but specific causes are difficult to reproduce in controlled research settings. From a poultry industry perspective, our interests are the combined

issues of the growing facility and what results from this possible "perfect storm" of exposure to disease organisms.

Each house/facility presents its own unique environmental levels of moisture, temperature, and air movement as well as bacteria, viruses, and potential pathogens. While houses on the same farm may be similar in nature, exposure (or potential exposure) to these challenges may be quite different from one house to another due to the residual level of pathogens in the house at placement.

Pathogen exposure is a numbers game. Higher accumulation of challenges at the start of a flock is additive risk in greater pathogen transmission with potential clinical

disease in the birds. Add darkling beetles to vector these disease organisms, and we have a recipe for continuous problems.

To manage this risk, houses should be as free as possible from potential disease organisms, and darkling beetle populations reduced to the lowest possible level, especially at placement. Service managers observed that brooding flocks without exposure to beetles are less likely to actively search and eat beetles as the flock ages.

Control programs

Reducing darkling beetle populations in a poultry house must be viewed as a long term treatment program. Because flock growout periods vary, the length of time between treatments can be as short as five weeks or as long as nine weeks. Long growouts coupled with the beetle's prolific reproductive potential and their relatively long life makes urgent treatments less productive if a complete control program is not in place.

As a general rule it will take a minimum of three flock/treatment cycles to significantly reduce adult beetles. When a control program is started, adults and larvae can be partially eliminated with pesticides; however, the eggs and pupae will not be controlled with current materials. An effective program must also reduce the number of eggs laid and control the larvae that are hatching from existing eggs in the litter.

Since the beetle life cycle exceeds a flock lifetime, unless the material used for control has tremendous residual activity, beetle larvae produced from eggs will pupate and

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