

Managing darkling beetle in poultry sheds

A field study conducted in south-east Queensland in 2004/05 has confirmed that the application of spinosad (the active ingredient in Elector® PSP) as a whole-floor or under feed-line treatment provides effective control of darkling beetle in poultry sheds.

Background

The darkling beetle or lesser mealworm, *Alphitobius diaperinus* (Panzer), is a common insect pest found in poultry sheds. It poses a significant risk to farm bio-security and food safety by acting as a vector for a number of avian pathogens and parasites. Darkling beetles are often found in large populations in the litter bedding material in broiler sheds. Adult beetles and larvae tunnel into compacted earthen floors or insulation. Large populations often occur under feed pans. Darkling beetle populations rise during spring and peak during summer when conditions most favour their development, fecundity and survival.



Poultry producers implement a range of management practices to help to minimise the build-up and carry-over of populations of darkling beetles and other insect pests. These include litter replacement and the use of insecticides. One of the most commonly-used insecticides registered for the control of darkling beetle contains the active ingredient, cyfluthrin, which belongs to the synthetic pyrethroid (SP) class of compounds. Many darkling beetle populations have developed resistance to SP compounds, meaning the use of products containing cyfluthrin may be ineffective.¹



Queensland field study

This study examined various application methods and concentrations for the control of darkling beetle using spinosad (Elector PSP), a revolutionary new insecticide which is registered for the control of darkling beetle and nuisance flies in and around poultry sheds. The study was conducted between September 2004 and August 2005 on a poultry farm located in south-east Queensland. The five sheds, each measuring 121 m x 13.7 m, were positioned parallel to each other and were separated by 20 metres of vacant land. Each shed was divided into brooder and grow-out areas of roughly equal size. Three feed lines ran the length of each shed, stopping 1.8 m from either end.

At the end of each batch, the broiler house was cleaned out and treated with an insecticide. The current industry-standard insecticide (cyfluthrin, a synthetic pyrethroid) was applied at the commencement of the first batch. Spinosad (Elector PSP) was applied at the start of the next four batches using the application rates and methods outlined in Table 1. Each treatment was applied by a contract spray operator using a boom spray mainly to the floor and side walls of the houses. Litter samples were collected from each broiler house every week throughout five batch periods.

Table 1: Treatment, application rate and method²

Treatment group	Application rate	Method
Water	10 L / 100m ²	Whole floor area
Dilute spinosad solution (250 ppm)	30 L / 100m ²	Whole floor area
Dilute spinosad solution (720 ppm)	10 L / 100m ²	Litter surface ^a
Dilute spinosad solution (720 ppm)	10 L / 100m ²	Whole floor area
Dilute spinosad solution (1,440 ppm)	10 L / 100m ²	Under feed lines only ^b

^aHalf the litter was spread over the entire floor. The treatment was then applied, and the remaining litter spread evenly over the top of the treated litter. ^bSpray was applied as a two-metre wide band under the three feed lines, giving a treated surface area of about quarter of the total floor area.

Note: This study used different dilution and application rates to those listed on the registered Australian label for Elector PSP. Elector PSP is registered for the control of darkling beetle when applied at 800 ppm @ 1 L/12 m² (light infestations) or 1600 ppm @ 1 L/12 m² (heavy infestations). Do not apply more than three applications of Elector PSP to any one shed in any one year. Always refer to the label directions before use.



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Discussion

This study demonstrated that repeated applications of spinosad are effective in reducing populations of darkling beetle (Figures 1 and 2). The control group clearly showed the natural cycle of darkling beetle, with the population peaking over spring and then declining in autumn. The application of spinosad to the whole floor area (720 ppm @ 10 L/100 m²) or under the feed lines (1,440 ppm @ 10 L/100 m²) provided the most effective and consistent control of darkling beetle, reducing pest numbers by 25–50% after each application.

The whole floor treatment was slightly better than the feed line treatment. By comparison, the application of spinosad as a litter treatment (720 ppm in water @ at 10 L/100 m²) or as a low-dosage floor treatment (250 ppm @ 30 L/100 m²) was ineffective in controlling darkling beetle. Susceptibility studies have shown there was no change in the susceptibility of darkling beetles to spinosad (Elector PSP) after four consecutive treatments.³ Note, however, that the recommended program involves a maximum of three applications of Elector PSP to any one shed within a 12 month period.

Figure 1: Total live *A. diaperinus* (larvae, pupae, adults) following treatment with spinosad over four batches as a whole-floor treatment (720 ppm @ 10 L/100 m²)

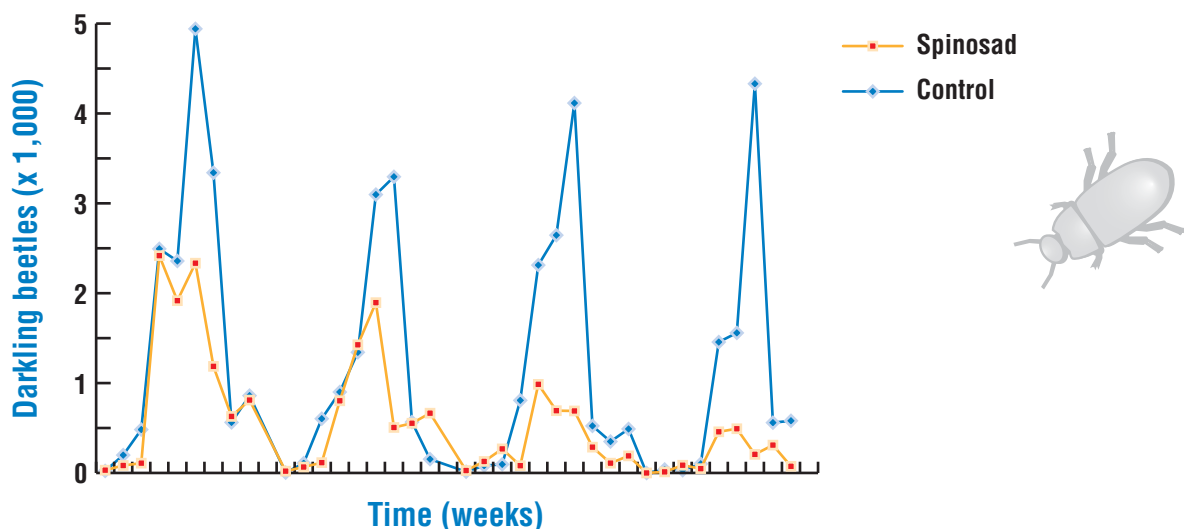
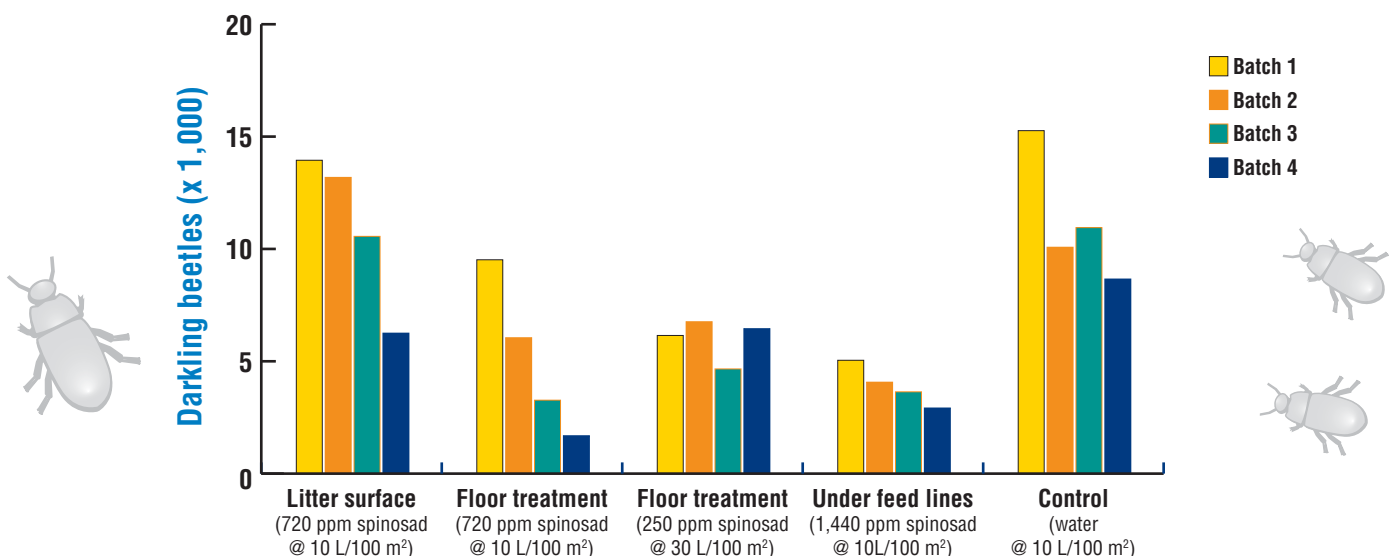


Figure 2: Total live *A. diaperinus* (larvae, pupae, adults) following treatment with spinosad over four batches²



For more information contact Elanco on 1800 226 324.

References: ¹Lambkin, T. & Rice, S.J. (2006) Baseline responses of *Alphitobius diaperinus* to cyfluthrin and detection of strong resistance in field populations in eastern Australia. *Journal of Economic Entomology* 99:3, 908-913. ²T9CAL0452 ³Lambkin, T. per comm. *Elanco®, Elector® and the diagonal colour bar are trademarks of Eli Lilly and Company. ©Elector is a trademark for Elanco's brand of spinosad. WORDSMITH27127

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