

Researchers develop genetic control mechanism for major livestock pest

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Researchers from North Carolina State University have developed a technique to control populations of the Australian sheep blowfly – a major livestock pest in Australia and New Zealand – by making female flies dependent upon a common antibiotic to survive.

Dr. Max Scott, professor of entomology at NC State, and his research team [genetically modified](#) lines of female Australian sheep blowflies (*Lucilia cuprina*) so that they required doses of [tetracycline](#) in order to live. Female blowflies that did not receive the antibiotic died in the late larval or pupal stages, before reaching adulthood. Several genetically modified lines lacking tetracycline showed 100 percent female deaths.

Scott says that the gene construct responsible for lethality in antibiotic-free diets is female-specific. Interestingly and unexpectedly, the genetically modified female larvae containing the tetracycline lethality genes also took on a crimson color due to overexpression of the linked red fluorescent protein "marker gene." This allows scientists to tell which larvae will be females and which will be males.

"Overexpression of the gene responsible for the reliance on tetracycline also seems to overexpress this [marker gene](#)," Scott says.

Since the females will die when not provided tetracycline in their diets, the males can be separated out in the larval stage. This is essential for a "male-only" genetic control program to reduce blowfly populations, Scott says, as fertile males would pass the lethality construct on to

female offspring, which would die in the absence of tetracycline. Male larval offspring, however, would still be dangerous to livestock.

In the [study](#), the researchers showed that the tetracycline gene construct also works in *Drosophila*, the fruit fly "lab rat" of the insect world that is a distant cousin of the sheep blowfly. This holds promise that the genetic system will function in the New World and Old World screwworm, two major livestock pests that are close relatives of the sheep blowfly. Scott is working with the U.S. Department of Agriculture to make "male-only" strains of the New World screwworm (*Cochliomyia hominivorax*).

"The New World screwworm is a devastating pest of livestock that was eradicated from North and Central America by releasing sterilized male and female flies," Scott says. However, a male-only strain offers several advantages, including potentially more efficient population suppression for the ongoing program. "Efficient genetic control systems have the potential to help eradicate some of the biggest problem pests across the globe," he said.

More information: "Transgenic sexing system for genetic control of the Australian sheep blow fly *Lucilia cuprina*" Fang Li, Holly Wantuch, Rebecca Linger, Esther Belikoff and Max Scott, North Carolina State University Published: June 2014 online in *Insect Biochemistry and Molecular Biology* [DOI: 10.1016/j.ibmb.2014.06.001](https://doi.org/10.1016/j.ibmb.2014.06.001)

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