

SPOT THE DIFFERENCE!

BLOWFLIES MIGHT ALL LOOK SIMILAR, BUT THEIR DIFFERENCES ARE IMPORTANT

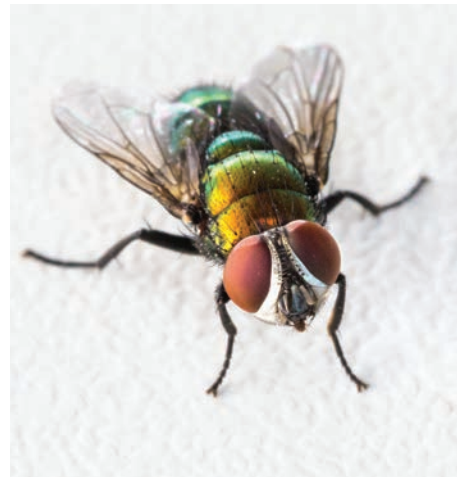
Flystrike researchers are again seeking woolgrowers' help this season in sourcing maggot samples from across Australia. The maggots will be used to examine the genetic differences between blowflies from different regions of the country.

KEY POINTS

- Research into the genetic variation within the Australian sheep blowfly *Lucilia cuprina* could help in prolonging the effectiveness of flystrike insecticides and assist the development of a vaccine for effective and sustainable flystrike control.
- Researchers are seeking samples of maggots during the current flystrike season (late 2020 and early 2021), especially from SA, eastern WA, northern NSW and southern Qld.
- An analysis of blowfly samples collected from previous seasons indicated a high level of blowfly migration within and between Vic, SA and NSW, but identified significant genetic differences between the blowfly populations of Tas, WA, Qld and those from Vic/SA/NSW.
- Researchers identified a high proportion of *Lucilia sericata* (common green bottle fly) compared to *Lucilia cuprina* on some Tasmanian properties and will take a closer look at the importance of this fly in causing flystrike.

An ongoing project with the University of Melbourne (UOM), funded by AWI, is analysing regional genetic differences in Australian sheep blowfly DNA. The project is already providing insights into how blowflies move between sheep-growing regions.

Improved understanding of blowfly genetic differences and their behaviour will inform chemical treatment and resistance



management strategies, potentially prolonging the effectiveness of insecticides currently in use for blowfly control. The project's findings are also contributing to work by CSIRO and UOM to develop a potential flystrike vaccine.

INSECTICIDE RESISTANCE

Using their understanding of the blowfly (*Lucilia cuprina*) genome in conjunction with data previously collected from field survey samples of sheep blowflies, the UOM researchers have compiled a 'blowfly resistance database'. The database features blowfly genes which are known to be associated with resistance mechanisms for several insecticide classes used for both prevention of flystrike or as a wound treatment. By searching through the genetic code of the fly, the researchers are trying to identify mutations that might enable flies to resist insecticide treatments.

"The focus of the project this year will be on maggots recovered from struck sheep and so will contribute significantly to the insecticide resistance research," said Dr Trent Perry, one of the UOM research team leaders. "The greater the number of samples received for analysis, the more likely it will be that we will be able to detect mutations that might lead to resistance issues emerging in the future."

An analysis of blowfly samples received from Vic, SA and southern NSW last season indicated a high level of blowfly migration within and between these regions of Australia, suggesting that they may be able to be treated

as a single population. The researchers also identified significant genetic differences between the blowfly populations of Tas, WA, Qld and the Vic/SA/NSW blowfly population.

Analysis of samples collected in the current season, during late 2020 and early 2021, should provide a better picture of these differences between blowfly populations and allow the researchers to more clearly establish the patterns of blowfly migration between different regions.

The results from this research will deliver important insights into how insecticide resistance may spread within and between sheep blowfly populations, providing valuable information to enhance area-wide resistance management plans for controlling outbreaks of insecticide resistance.

LUCILIA SERICATA

Blowfly sample collections from Tasmania have compelled the researchers to take a closer look at a closely related species of the Australian sheep blowfly, *Lucilia sericata* (the common green bottle fly).

While *L. sericata* is also known to cause flystrike and is the major sheep blowfly in many other countries, it has been reported to be a less common cause of flystrike in Australia compared to *L. cuprina*.

An analysis of samples collected in the first year of the project identified a high proportion of *L. sericata* relative to *L. cuprina* flies on some Tasmanian properties. After incorporating this genetic data into their

analysis, the researchers discovered that there may be a low level of interbreeding occurring between these two fly species.

Further investigations will determine the importance of *L. sericata* as a cause of flystrike in Australia and what impact this might have on the development of insecticide resistance and for research into the flystrike vaccine.

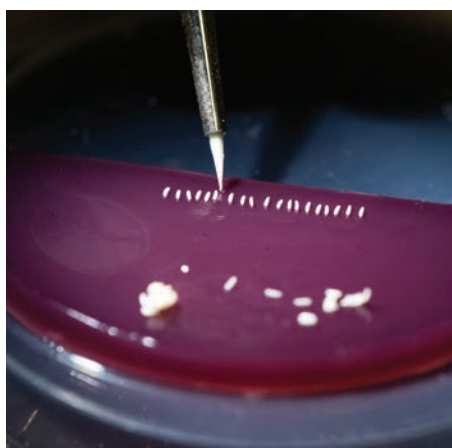
VACCINE DEVELOPMENT

Another core component of this AWI-funded project is to gain a more detailed insight into the factors that allow the maggots to parasitise and survive on live sheep. The researchers have been working to understand what the key proteins are that enable the sheep blowfly to be highly successful at initiating a strike but also avoid rejection by the host (sheep) immune defences.

This research, integrated with their improved understanding of the genomic differences in the blowfly between regions, is expected to also inform the development of a vaccine to protect sheep against flystrike. It will ensure that only those proteins that are found in all the sheep blowfly populations across the country are selected as potential vaccine candidates.

"If a vaccine is successfully developed, this research will enable us to be confident that it will be effective against flystrike in sheep from all regions of Australia," said Associate Professor Vern Bowles of UOM.

Dr Clare Anstead examining young blowfly maggots in her laboratory at the University of Melbourne.



WE WANT YOUR MAGGOTS!



As part of the final year of this AWI-funded project, University of Melbourne researchers are seeking woolgrowers

from across Australia who are willing to collect blowfly maggots on their property for use in their research.

A critical element of this research project is obtaining a wide-ranging set of blowfly population samples, ensuring researchers capture as much of the genetic variation present in Australian sheep blowfly populations as possible. Blowfly collections during the fly seasons of early 2019 and 2019/20 are already providing very useful genetic information.

"We are now gearing up for the final maggot collection of 2020/21 and are keen to ensure we receive a broad



Locations from which maggot samples have been provided in previous years to researchers.

range of samples from different regions," said Dr Clare Anstead of UOM.

"Whilst we are keen to receive more maggots from locations that have already provided samples (see the red and blue dots in the map), we would particularly love samples from South Australia, eastern WA, northern NSW and southern Queensland, as they are unrepresented in our database."

MAGGOT COLLECTION PROCESS

The University of Melbourne has collection kits ready to send to woolgrowers. After you have received the kit, if you then get a struck sheep all you need to do is simply:

- 1. Collect maggots from a struck sheep into one empty tube.** Preferably maggots from only one sheep per tube. If you are having significant fly problems this season, you can be sent more tubes. Fill in the form with collection details.
- 2. Fill tube containing maggot sample with the provided liquid buffer and screw sample tube lid**

on tightly to prevent leaks.

If you are not able to post back within a few days of collection, store in a fridge or cool place.

- 3. Post samples back to us in the reply-paid envelope.** If you have collected multiple samples at a time, these can be posted back in the same envelope.

For more information or to request a blowfly maggot collection kit, contact the University's Blowfly Collection Team at:

blowfly-collection@unimelb.edu.au
or (03) 8344 2362



Researchers from the University of Melbourne's Blowfly Collection Team are grateful for woolgrowers' support in supplying their maggots for the project. Pictured in order are Associate Professor Vern Bowles, Dr Clare Anstead, Kon Eliades, Dr Shilpa Kapoor, Dr Trent Perry and Tinna Yang.