



RESISTANCE MANAGEMENT STRATEGY FOR THE AUSTRALIAN SHEEP BLOWFLY (*LUCILIA CUPRINA*)

KEY POINTS

- *Lucilia cuprina*, the Australian sheep blowfly, initiates most cases of flystrike on Australian sheep.
- Flystrike is estimated to annually cost the Australian sheep industry in excess of \$173 million in terms of production losses and prevention and treatment costs.
- Current control of flystrike relies heavily on insecticide treatments.
- *L. cuprina* has demonstrated a capacity to develop insecticide resistance to a variety of insecticide groups, reducing their effectiveness.
- There are only a limited number of insecticides registered against flystrike so increasing insecticide resistance will have a significant impact on the industry.
- There is an urgent need for sheep producers to strategically manage the use of insecticides to maximise flystrike control and to maintain the efficacy of available products on their property.

LUCILIA CUPRINA AND INSECTICIDE RESISTANCE

Lucilia cuprina, the Australian sheep blowfly, initiates most cases of flystrike on Australian sheep. Like all insect pests, it has the potential to develop resistance to insecticide treatments. Some Australian sheep producers have reported shorter protection periods than claimed on the label of the flystrike products they have used.

On investigation, some of these cases are the result of improper application or heavy rain following insecticide application, however in a number of cases the presence of resistance has been confirmed.

This is a timely reminder for sheep producers to implement resistance management strategies to maintain flystrike protection for their flocks and slow the development of resistance within their local fly populations.

HOW DOES RESISTANCE OCCUR?

Resistance is the decreased susceptibility of a pest population to a pesticide that was previously effective at controlling the pest. Pests evolve resistance to pesticides by a process of natural selection. When exposed to a pesticide, the most resistant individuals survive and pass on resistance to their offspring.

With repeated exposure to the pesticide, particularly at inadequate levels, the resistant pests are favoured and their proportion in the population may increase. Eventually, there can be enough resistant pests in a population that the pest is controlled for only short periods or, ultimately, not at all.

WHY MANAGE SHEEP BLOWFLY RESISTANCE?

There are only a small number of chemical groups registered for flystrike control (see Table 1). It is important to prolong the useful life of these insecticides on your property for as long as possible.

Without access to effective preventative insecticide treatments to control flystrike, sheep producers would be reliant on continual surveillance of flocks followed by manually clipping and dressing of wounds.

Without effective treatments, struck sheep can suffer significant stress, production loss and possibly death. By implementing resistance management strategies, sheep producers can slow the development of resistance, which will help increase the effective life of registered insecticide products.

RESISTANCE MANAGEMENT STRATEGY SUMMARY

1. Use an integrated approach to reduce reliance on insecticides.
2. Know your chemical groups.
3. Rotate chemical groups where practical.
4. Minimise the number of treatments applied in a season.
5. Consider treatments for other parasites, particularly lice treatments.
6. Apply insecticides carefully and strictly as specified on the label.
7. Monitor for flystrike frequently.
8. Collect and kill all maggots from fly struck sheep.

RESISTANCE MANAGEMENT STRATEGY

Use insecticides strategically; you can slow the development of resistance by following these steps.

1. USE AN INTEGRATED APPROACH TO REDUCE RELIANCE ON INSECTICIDES

- Breed for resistance to flystrike.
- Shear or crutch at times that maximise protection against flystrike.
- Dock tails to the correct length.
- Manage scouring.
- Use breech modification if required, until sheep are genetically resistant to flystrike.

2. KNOW YOUR CHEMICAL GROUPS

- Insecticides used for flystrike control fall into different groups or chemical families; see Table 1 below.
- Flies resistant to one insecticide in a particular chemical group are likely to be resistant to other insecticides in the same group.
- Different flystrike products may contain the same chemical or a related chemical from the same chemical group. When looking for alternatives, change to a different chemical group, don't just change insecticide brands.
- Use the FlyBoss Fly and Lice Products Tool to search for flystrike products, determine their chemical group and make your selection. (www.flyboss.com.au/tools/products.php).

Chemical Group	Chemical Active	Application method ¹			
		Spray-on	Jetting	Dipping	Dressing
Insect Growth Regulator (IGR)	Cyromazine	Yes	Yes	Yes	Yes
	Dicyclanil	Yes	No	No	No
Neonicotinoid	Imidacloprid	Yes	No	No	No
Spinosyn	Spinosad	No	Yes	No	Yes
Macrocyclic Lactone (ML)	Ivermectin	No	Yes	No	Yes
Synthetic Pyrethroid (SP)	Alpha-cypermethrin ²	Yes	No	No	No
Organophosphate (OP)	Diazinon, Propetamphos & Chlorfenvinphos	No	No	No	Yes

Table 1. Chemical groups and actives available for flystrike control and their application methods

¹ Always follow label directions

² Registered for prevention of body strike only

3. ROTATE CHEMICAL GROUPS WHERE PRACTICAL

Insecticide choice should be tailored to your particular location and management.

- Consider rotating insecticide products from different chemical groups to slow the development of resistance.
- Use a different chemical group for treating struck sheep to that used for flystrike prevention.
- Successive treatments within the fly season should generally be different chemical groups.
- Choose a product with the appropriate protection period and time of application.
 - A product that provides a shorter period of protection may be sufficient in some instances, for example, when sale of sheep or lambs for slaughter is imminent; when sheep are soon to be crutched or shorn; when close monitoring of sheep is not possible for a short period because of other farm tasks or holidays.
 - The Flyboss Fly and Lice Products Tool can help you select a chemical group that will provide the length of protection that is required.

4. MINIMISE THE NUMBER OF INSECTICIDE TREATMENTS APPLIED IN A SEASON

- Optimise the timing of treatment to provide full protection during high risk periods.
- Utilise other management strategies, such as shearing and crutching, to minimise the length of time flies may be exposed to inadequate levels of insecticides on the sheep. However, ensure that you abide by wool harvesting intervals so that there are no unacceptable chemical residues in the wool.

5. CONSIDER TREATMENTS FOR OTHER PARASITES, PARTICULARLY LICE TREATMENTS

- Exposure to insecticides used for treatment of other parasites (particularly lice) can contribute to resistance selection in blowflies, and vice versa.
- Where possible, use a different chemical group to treat flies and lice.
- Aim to eradicate lice and avoid the need for lice treatments.

6. APPLY INSECTICIDES CAREFULLY AND STRICTLY AS SPECIFIED ON THE LABEL

- Shorter protection periods are often due to poor application, not resistance. Be sure to apply insecticides carefully according to the label instructions.
- Poor application can expose flies to sub-lethal levels of insecticides; this can contribute to an increase in resistance.

7. MONITOR FOR FLYSTRIKE FREQUENTLY

- Check every 2–3 days during high risk periods to identify struck sheep early.
- Treat sheep and kill maggots before they become larger and are harder to kill.
- Record when strike occurs in relation to preventive treatments.
- Notify the product manufacturer if you suspect resistance.

8. COLLECT AND KILL ALL MAGGOTS FROM FLY STRUCK SHEEP

- Place maggots and shorn wool into a sealed plastic bag and leave in the sun so the maggots are killed.



FREQUENTLY ASKED QUESTIONS

Q. ARE SHORTER PROTECTION PERIODS ALWAYS BECAUSE OF RESISTANCE?

A. In cases where flystrikes are occurring earlier than expected based on the protection period on the product label, you should first rule out other causes of reduced protection:

- The individual sheep did not receive a treatment—it was not yarded for treatment; it was yarded, but missed treatment; it strayed from another untreated mob.
- Treatment was applied, but incorrectly—incorrect dose; wrong position; incorrect applicator.
- Wool length was too short at application time—check the label before use, some treatments require application after at least six (6) weeks or more wool growth.
- Soiled or lumpy wool—check the product label for details concerning specific wool conditions.
- Seasonal rainfall has been excessive and washed some chemical out of the treated area.

Q. CAN RESISTANCE INCREASE IF FLIES ARE EXPOSED TO CHEMICALS ON CROPS, PASTURES OR OTHER ANIMALS?

A. While the potential exists if the same chemical group has been used, no evidence for this has been seen. Also, the flies would generally have limited exposure in these situations.

Q. WHY IS IT IMPORTANT TO DESTROY MAGGOTS ON STRUCK SHEEP?

A. Maggots removed from the sheep are often not killed by the treatment. This is particularly so when some resistance is already present. If maggots are not collected or destroyed the most resistant ones can burrow into the soil, complete development and contribute to the next generation of flies.

Q. IF FLIES ARE RESISTANT TO ONE CHEMICAL, WILL ANOTHER CHEMICAL KILL THEM?

A. This depends on whether the chemicals are within the same chemical group. There is usually cross-resistance between chemicals of the same group; however, changing to a different chemical group should be effective.

Q. CAN I MIX INSECTICIDES?

A. Apply insecticides strictly according to label directions. Do not mix two or more insecticide products as they will not have been tested for efficacy or safety, it is unnecessarily expensive and is likely to leave excessive residues in wool.

CONTRIBUTORS

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USEFUL RESOURCES

For flystrike control information visit the FlyBoss website www.flyboss.com.au/

Insecticide resistance www.flyboss.com.au/treatment/insecticide-resistance.php

Breeding and selection pages www.flyboss.com.au/breeding-and-selection.php

Treatment pages www.flyboss.com.au/treatment.php

Management options www.flyboss.com.au/management.php

Lice and flystrike products tool www.flyboss.com.au/tools/products.php

Flystrike decision support tools, customised to your location www.flybosstools.org.au/

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