

Combatting chemical resistance

There's more than one tool in the fight against flystrike

Understanding chemical resistance and the role that an integrated pest management approach plays in flystrike management is crucial to woolgrowers' ability to effectively prevent and treat flystrike as they enter the high-risk fly season.

Woolgrowers are becoming increasingly concerned with chemical resistance in their fight to protect their flock's welfare and combat flystrike. Recent research conducted by AWI and NSW DPI found increased resistance to dicyclanil and cryomazine in blowfly samples which coincides with reports from woolgrowers of reduced protection periods from chemicals.

What is chemical resistance?

Long term use and over reliance on just one chemical group for any type of pest control almost always results in resistance, if good resistance management plans aren't in place. Some of the chemical groups that woolgrowers used to rely on for blowfly control are no longer as effective because blowflies have become resistant to them.

Shorter protection periods provided by chemicals than those advertised on the label are often interpreted to be chemical resistance, but there are many factors that influence the protection period achieved on-farm. It's also important to remember that the advertised protection periods were developed during trials which may not necessarily reflect individual, on-farm conditions. Factors that influence the effectiveness of chemicals can be grouped as:

1. how susceptible your sheep are to flystrike (susceptible sheep);
2. what the seasonal conditions are (environment); and
3. how you use chemicals, both in the past and now (chemicals).

By looking closely at each of these factors, you can work out what the fly challenge is likely to be this season and what you can do to better manage the flystrike risk.

1. SUSCEPTIBLE SHEEP

Some sheep are more susceptible to flystrike than others.

Sheep with breech wrinkles, or long wool and wool cover in the breech area as well as those that are very daggy or have urine stain, yellow wool, lumpy wool, dermatitis or fleece rot (among other characteristics) are more likely to be struck.

Some sheep may also be at greater risk of flystrike if their conformation or structure leads to their wool staying wetter for longer. For example, sheep with high and wide shoulder blades or a dipping back are more susceptible to fleece rot and body flystrike.

It can also be more difficult to apply chemicals effectively to susceptible types

of sheep to prevent flystrike. Large and thick dags, for example, inhibit the effective application of preventative chemicals to the breech.

Unclassed lambs and weaners are also more susceptible to flystrike as they tend to have more wool colour, dermatitis and fleece rot than mature sheep.

The timing of crutching and shearing can influence the susceptibility of a mob to flystrike, as can lambing. Crutching and shearing provide approximately six weeks protection from flystrike, so scheduling either of these activities at the start or during the fly season should be considered to reduce the susceptibility of sheep to flystrike. Placental material attached to the breech of ewes can be attractive to flies and timing lambing and lamb marking to fall outside of the fly season is important in reducing the risk of flystrike and assist wound healing.

2. ENVIRONMENT

Wet, warm and calm weather conditions, particularly over several days or more, favour blowfly reproduction and maggot growth. Some rainfall patterns (heavy or persistent rain) can also wash out chemicals from the wool.

You can't do much about the weather, but you do need to consider weather forecasts when timing the application of preventative chemicals and rule out possible chemical wash out due to rainfall before attributing reduced protection periods to chemical resistance.

3. CHEMICALS

There are different chemical groups with different active chemicals that can be used for preventing or treating flystrike. Some chemical groups can be used for both, while others can be used on open wounds or to control lice and others can't. The application method for different chemical formulations varies and different chemical formulations can be applied to different wool lengths.

The protection period for each chemical formulation will vary as well. It's important to always read the label and think about the chemical groups and actives you have used and want to use rather than just the brand name.

The type and frequency of chemical use in the past are important considerations in your planned chemical use this season to avoid or

Is chemical resistance a problem on my farm?

Before deciding that chemical resistance is a problem on your farm, ask yourself:

- Were the struck sheep more susceptible to flystrike because of heavy dags, urine stain, yellow wool, fleece rot, dermatitis, lumpy wool or other characteristics?
- Did dags make penetration of the chemical difficult?
- Was the wool length consistent with label instructions for application?
- Were there persistent or heavy rainfall events following treatment, resulting in chemical wash out or increased fly pressure?
- Were the struck sheep actually treated?
- Did you check the label instructions carefully before applying the chemical, paying particular attention to application method, dosage, patterns of coverage, recommended applicator and whether the treatment should be applied off-shears or to longer wool?
- Was the applicator calibrated and working properly, with no blockages or leaks?

If you answer 'yes' to any of the first four questions or 'no' to any of the last three questions, something other than chemical resistance may be reducing the protection period or the effectiveness of the chemical treatment.

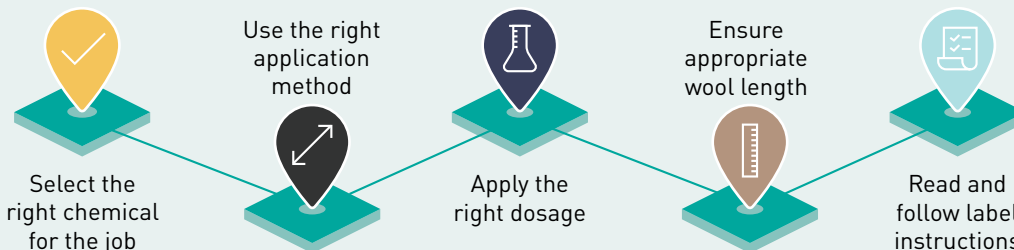
Chemicals can still be effective

Remember that if you think resistance is an issue on your property, this doesn't mean the chemicals have totally lost effectiveness. It most likely means that the period of protection may be less than that advertised on the label or what you previously expected. Protection periods may also vary between properties.

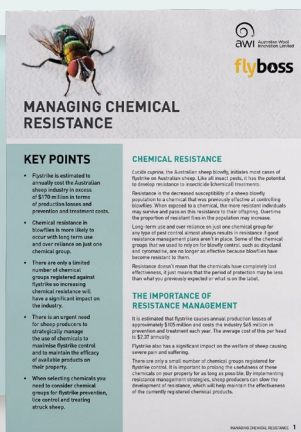
Even if you think your sheep are within the protection period of a chemical treatment, it is still important to continue to monitor your sheep for signs of flystrike and treat them accordingly if they do become struck.

It's also important not to wait until the very end of the protection period before you utilise other flystrike management tools, for example crutching and shearing, although attention must be paid to wool harvest intervals. Leaving yourself a buffer can relieve the pressure if unforeseen events delay other interventions, such as shearing or crutching.

EFFECTIVE CHEMICAL APPLICATION



Remember: Check withholding periods and intervals, keep records and attend chemical users' training.



What can I do to manage or prevent chemical resistance?

- Use a range of chemical and non-chemical tools – don't rely on one tool.
- Know chemical groups and rotate them where practical.
- Optimise the number and timing of chemical and non-chemical treatments.
- Follow the label directions and keep treatment records.
- Regularly monitor for flystrike and kill any maggots from struck sheep.

AWI has a factsheet **Managing chemical resistance**, which provides further guidance on each of the above points, available at www.wool.com/flystrikeresources.

manage chemical resistance. This means you need to:

- Consider the chemical group that was last applied (either earlier this season or at the end of the previous fly season) and where practical, avoid using a chemical from the same group next.
- Consider the chemical group that was last used to control lice and avoid using a chemical from the same group for the next preventative flystrike application in the same season.
- Consider the chemical groups that were last applied to prevent flystrike and avoid using these as a dressing to treat struck sheep this season.

Reduced protection periods may also be due to poor application techniques. Make sure you check the label carefully to ensure you are using the right chemical for the job, the correct dose and the correct application equipment and pattern. Paying attention to these details can help maximise the effectiveness of chemicals used to prevent and treat flystrike.

If you think the blowfly population on your farm may be resistant to chemicals, you should arrange a resistance test by contacting Narelle Sales, Elizabeth Macarthur Agricultural Institute on email.insectresistance@dpi.nsw.gov.au or (02) 4640 6446.

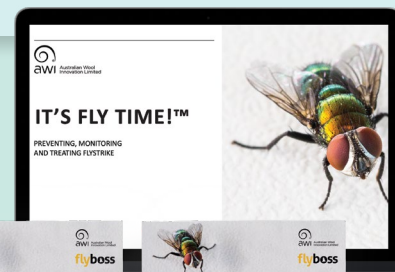
Other tools in the toolbox

Using a range of strategies and tools, rather than relying on one tool alone, will help you monitor, prevent and treat flystrike, as well as reduce the risk and manage the impact of chemical resistance on your property.

This means using a range of chemical and non-chemical options you can utilise include:

- Monitoring sheep for flystrike, environmental conditions and fly populations.
- Crutching and shearing.
- Managing scouring, dags and stain.
- Selecting paddocks that work against conditions favoured by flies.
- Reducing fly populations by killing maggots when treating struck sheep.
- Classing, selection and breeding activities that consider the susceptibility of sheep to flystrike.
- Breach modification and lamb marking following best practice.

A five-page AWI factsheet **It's Fly Time! Preventing and treating flystrike**, a three-page AWI factsheet **It's Fly Time! Recognising and monitoring flystrike** and a range of videos that address these tools are available at www.wool.com/flystrikeresources.



AWI is also piloting a workshop that looks at how you can combine these tools in a flystrike management plan and annual calendar of activities – see page 37. Workshops are scheduled to be available to woolgrowers from early 2022.

More information

- To help you manage flystrike on your property, AWI has a range of resources available that you can access online at www.wool.com/flystrikeresources
- You can also access further information from FlyBoss at www.flyboss.com.au

See overleaf for two related case studies →

Case study 1 – Non-mulesed sheep

PETER AND ANGELA SCHUSTER

Location: Central West NSW
 Property size: 5,500 ha
 Climate: Temperate
 Rainfall: 600 mm annual average
 Merino sheep: Self-replacing fine non-mulesed Merino flock
 Flock size: 10,000 sheep, joining 4,500 ewes to Merino rams
 Merino wool: Average 18-micron bright stylish wool

Rebalancing flystrike prevention tools in a non-mulesed enterprise

Peter and Angela Schuster operate a mixed farming and grazing operation across 5,500 ha south of Dubbo in Central West NSW, incorporating cropping, sheep and cattle enterprises in a 600 mm rainfall environment.

The Schusters' enterprise comprises 10,000 Merino sheep with about 4,500 Merino ewes to be joined in 2022. They have had to reconfigure their flystrike management approach since moving to non-mulesed in 2016.

Mulesing is one tool in the toolbox when it comes to controlling flystrike and chemicals are another. Taking one tool out of the toolbox doesn't mean solely relying on another but rather, for the Schusters, it increases the importance of rebalancing the remaining tools in an integrated approach to flystrike management.

Proactive approach to flystrike

An annual plan to ensure they can implement a range of preventative activities in a timely manner is critical to the Schuster's flystrike management approach.

This plan includes:

- annual shearing (double shearing for rams)
- annual crutching (double crutching for ewes but not lambs or wethers)
- careful attention to correct tail length when marking lambs
- the use of preventative chemicals at defined times of the year and depending on fly pressure
- rotation of the chemical groups used, including those used for lice control
- a tight five week lambing and marking in a low fly risk month; and
- culling struck animals.

"There is no silver bullet when it comes to flystrike management and chemicals definitely aren't the only tool. Shearing, crutching, paddock selection and worm management as well as selecting sheep that are more resistant to flystrike are just as important," Peter said.

Shearing and crutching are important preventative activities for the Schusters. "We're careful not to cut things too fine so that we still have a number of weeks of cover from a preventative chemical application up our sleeve leading into crutching or shearing

at high-risk times of the year so that if the contractor is held up, our sheep are still protected," Peter said.

"**Tail length** is absolutely critical in a non-mulesed operation," said Peter who went on to say, "Tails that are too short prevent the sheep from directing faeces and urine away from the breech leading to dags and urine stain which attract flies. A small portion of one age group of our sheep have tails that were docked too short at lamb marking. While not a problem for the wethers, this group of short tail ewes accounts for 90% of flystrike in the operation. The link is undeniable."

Chemicals are just one part of the solution. Preventative chemicals are applied as required from August/September.

"We don't push the envelope by running chemicals through to the expiry of the label protection period while high risk flystrike conditions prevail."

Regarding the **management of other parasites**, dags are not generally a problem in the area and dietary changes are managed carefully to minimise the risk.

The Schusters' operational calendar for their sheep enterprise

CLASS	JAN	FEB	MAR	APR	MAY
EWES	Crutch WEC	Join (5 weeks) Dicyclanil (breech) WEC	WEC	Scan WEC	Shear Lousicide (off- shears) Vaccinate WEC
WETHERS	Crutch WEC				Shear Lousicide (off- shears) Vaccinate
LAMBS	Crutch WEC				Shear Lousicide (off- shears) Vaccinate
RAMS	Vet check Drench Dicyclanil (body and breech)	Join			Shear Lousicide (off- shears) Vaccinate
OTHER	Irrigation	Irrigation	Irrigation Planting	Planting	Planting

WEC = Worm egg count testing, drench if required.



Peter Schuster
with daughters
Eliza and Jessica.

Lousicides that are also registered for fly control have been incorporated into their flystrike management plan to manage chemical group rotation with notable success.

"We consider the chemical group we may have used for lice control when planning which preventative chemical group we will apply early in the fly season," Peter said.

Breeding and selection to reduce the number of susceptible sheep is important. The Schusters look to introduce rams and retain ewes that have the following traits:

- white, bright wool with good staple length
- moderate skin development (body wrinkle); and
- broad backs with minimal breech wrinkle.

"Using an independent classer is very important as they can be more objective in their assessment of some traits," Peter said.

"Moving to non-mulesed has changed the way we look at our sheep and requires attention to particular traits that improve their ability to resist flystrike."

Monitoring is undertaken to ensure any fly struck sheep are identified and treated as quickly as possible. If a number of sheep in a mob become struck, the Schuster's work to identify the underlying cause of the flystrike.

The future

"We're constantly learning and refining our plan based on our experiences. We don't assume we have it right or apply a set and forget policy as that is sure to deliver a poor result. We're constantly reviewing what happened each season, and our plan, and looking at what we can do better next time," Peter said.

Market opportunities are starting to open up for the Schusters with increased demand for non-mulesed wool and accreditation opportunities. While this is not the motivating factor, the Schusters welcome the opportunity to present their wool to the market and take advantages of premiums

which may follow from being accredited as non-mulesed.

"In response to enquiry via our broker and their encouragement, our wool is currently marketed through the Authenticity integrity scheme and declared as non-mulesed via the National Wool Declaration (NWD). We will continue to monitor marketing opportunities as the non-mulesed sector expands and present our wool accordingly," Peter added.

KEY POINTS

- Be proactive rather than reactive.
- Get the tail length right.
- Use an independent classer.
- Use the full range of flystrike management tools.
- Don't set and forget.
- Select for traits that improve the sheep's ability to resist flystrike.

More information

View the full **case study** at www.wool.com/schuster.

	JUN	JUL	AUG	SEP	OCT	NOV	DEC
	Move to lambing paddocks	Lamb	Dicyclanil (breech) Class maiden ewes	Class (wet/dry)	Crutch Drench	Non-Dicyclanil (breech) Wean Condition score	
			WEC Dicyclanil (breech)		Drench		
		Lamb	Mark Dicyclanil (breech)		Vaccinate (booster) Dicyclanil (back)	Wean Drench	
		Dicyclanil (body and breech)			Purchase rams		Shear
	Planting					Irrigation Harvest	Irrigation Harvest

Case study 2 – Mulesed sheep

GRAHAM, HELEN, COL AND KAZ QUADE

Location:	Central West, NSW
Property size:	3000 hectares
Climate:	Temperate with hot summers and no dry season
Rainfall:	475 mm (annual mean)
Merino sheep:	Dual purpose, plain bodied, mulesed Merino ewe flock. Replacement ewes are sourced from one breeder and are joined to terminal rams
Merino wool:	Average 18 micron

Rethinking flystrike management

When Graham and Helen Quade joined Graham's parents, Col and Kaz, to farm together near Trundle, NSW, in 2010 it was as good a time as any to rethink how they would manage their flystrike risk.

"Harvest coincides with our key risk time for flystrike in spring and early summer, so we figured we should tweak things to make sure our sheep would be well protected if we got too busy," Graham said.

The Merino ewe flock of 2,000 head is crossed with terminal Border Leicester rams and the Quades purchase approximately 250-400 replacement, dual purpose Merino hogget ewes of a preferred bloodline each year, all of which have been mulesed.

"We look for replacement ewes with attributes that would reduce their risk of strike, like how they've been mulesed, their tail length, plain bodies and no conformation issues," Graham said.

"We really noticed that the ewes with tails that are too short, even if they are mulesed, are more likely to get struck because they generally have more stain which attracts flies," says Graham.

The Quades did their research to find a bloodline of productive plain bodied ewes with low wrinkle and bare breech, and with good fertility and conformation.

Proactive approach to flystrike

As the high-risk time for flystrike falls during harvesting, they choose to focus on actions they can take before this busy time of year.

"We really don't want to wait until we see flies to do something about them, so we try to time crutching, shearing and chemical applications to provide adequate protection while the other enterprises take up most of our attention," Graham said.

Ewes are crutched in early September which provides breech protection for about six weeks at the start of the fly season.

At crutching, the Quades check for lice and if they are observed, they apply ivermectin. This also provides about 12 weeks' protection against blowflies under low to moderate fly pressure. If there are no lice on sheep, the Quades apply dicyclanil to the backline and breech for a long period of protection over the harvest period.

By the time shearing comes around in mid-December, the wool harvest interval for dicyclanil has passed. The Quades will then apply imidacloprid for lice if needed. This has an added benefit of providing a further ten weeks protection from flystrike during summer.

Ewes are scanned in early January, and this is an opportunity for a final application of dicyclanil to the breech if it was not used at crutching in September, otherwise they use spinosad or ivermectin depending on seasonal conditions and fly pressure.

Lambs are marked in mid to late March. The Quades don't mules the lambs and use elastrator rings for tail docking and castration. They apply spinosad to protect lambs from any maggots that may infect the tail wound.

CONSIDERING CHEMICALS FOR OTHER PARASITES

The Quades check the Animal Health Statement that comes with the replacement ewes to understand what chemicals have been used to control both lice and flies.

"If they haven't had any flystrike protection applied, the new ewes will be given a hit of dicyclanil when we are scanning the old ewes and

applying it to their breech," Graham said.

MONITORING AND TREATMENT

The Quades increase monitoring of their flock mainly based on weather conditions. "Very warm, moist or humid weather, especially if there is little wind, really brings in the

flies. During these conditions, we step-up monitoring as much as possible," Graham said.

Struck sheep are removed from the mob and treated in the shearing shed by shearing around the strike and dressing the area with an application of diazinon.

"We've got into a pretty good habit of bagging all wool and maggots from struck sheep and cooking them in the sun to make sure these can't hatch into the next lot of flies," Graham said.

"We also keep a mobile hand piece run with a 12-volt battery in the vehicle to shear off wool and maggots if we spot a struck sheep in the paddock."

CONCERNS ABOUT CHEMICAL RESISTANCE

"We are trying to use appropriate practices as best we can and know that we will eventually have to rethink what chemicals we use for lice and blowfly prevention, and when we use them, because we may see a shortening in the protection period provided," Graham said.

"Before this happens, we will need to lay out all our options and work out the best combination of activities to provide protection from flystrike for our sheep, just like we did in 2010." B

KEY POINTS

- Don't wait for the first sign of flies or strike to do something.
- Time prevention activities to provide protection during high-risk periods or when you know you will be busy, such as harvest.
- When choosing chemicals, consider what is used for lice control and wool harvest intervals.
- Be prepared to revise your flystrike management plan on a regular basis.

More information

View the **full case study**, including the Quades' month-by-month operational calendar for their sheep enterprise, at www.wool.com/quade.



Graham Quade.