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Department of Agriculture and Food

Factsheet

Sheep lice – resistance to insect growth regulators

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Background

The sheep and wool industry rely heavily on the use of the insect growth regulator (IGR) group of chemicals for treating lice. IGRs became commercially available in 1992 and it is estimated that currently their use accounts for 80% of the market for short wool lice treatments, with off-shears backliners accounting for over 80% of this sector.

The combination of high usage and backliner application, where concentration of chemical diminishes from the point of application, increases the risk of resistance developing.

Currently, there is no practical commercially available test to confirm IGR resistance in the field. However, as part of the research undertaken collaboratively by Queensland and New South Wales Department of Primary Industries, strains of lice with reduced susceptibility to IGRs have been identified. Over the last two years there have been an increasing number of reports of suspect resistance, i.e. other major causes have been eliminated and lice detected within 6 months after treatment.

Impact of IGR resistance

Increased lice incidence

With resistance emerging, there will be greater difficulty in eradicating lice resulting in more flocks with lice. This will pose greater risks for neighbouring properties and when sheep are introduced.

More long wool treatments

With an increase in lice treatment failure off-shears or in short wool, there is likely to be a greater need for long wool treatments. With a continued infestation being detected early, some growers are re-treating six months after shearing. Thus, there is a possibility that more than one long wool treatment will be necessary to minimise wool damage prior to the next shearing.

Wool and meat residues

With the increased likelihood of long wool treatments being used, there is a greater risk of residues in wool at the next shearing especially Alphacypermethrin (e.g. Vanquish). Extinosad (nil wool WHP) is the only long wool treatment that does not cause major concerns with residues. Export Slaughter Intervals (ESIs) for registered long wool treatments are relatively short (0 to 14 days) and should not be a concern when selling treated stock for slaughter or export.

Reduced productivity

If lice are not eradicated at shearing there will be some production losses at the next shearing. This may range from 5 to 25% of wool value depending on how quickly the lice population re-establishes after treatment failure. Treatment to reduce or prevent wool losses will cost about $1/head, allowing for the cost of chemical and labour costs.

Causes of a continued infestation

Before concluding that resistance is present on a property, it is essential to eliminate all other possible causes of lice being present.

The two main causes of a continued louse infestation are;

- Treatment failure due to causes other than resistance to the pesticide.
- Re-infestation from other sheep (purchased, agisted or strays).

Clues to identify the cause of a continued infestation

When investigating the possible cause of a continued louse infestation, it is helpful to gather as much information as possible particularly when rubbing was first seen and mob details (i.e. which mobs and proportion of mob affected). For example, if the problem is due to treatment failure rather than reinfestation then most treated mobs will be affected with a high number of animals affected. A re-infestation problem will usually become apparent about 6-8 months after shearing as a few months is needed for lice numbers to build up and visibly affect animals that have already received a treatment.

Treatment failure due to incorrect dose rate or poor equipment will have a similar effect on all mobs under-dosed. Whereas an incomplete muster or failure to apply the treatment correctly to every animal will result in a few animals severely infested, well before signs of lice are seen in the others.

A new infestation due to purchase of sheep with lice, agisted sheep or strays, will usually not be obvious until 8-10 months after shearing unless the reinfestation occurred very soon after shearing.

Table 1: Quick checklist to help identify cause of a continued infestation

Possible cause	Time of detection			Mobs affected		Animals rubbing when first noticed	
	< 6mths wool	5-8 mths wool	> 8 mths wool	Only 1-2	Most	Only a few	At least 10%
New infestation			✓	✓		✓	
Poor application to some sheep	✓	✓		✓		✓	
Poor application technique to all sheep		✓	✓		✓	✓	
Resistance to chemical	✓	✓			✓		✓

The table above provides an overview of possible causes of a continued infestation. This is only a guide and there may be exceptions.

With regard to **treatment failure** the following factors should be considered when trying to help identify the cause;

- Poor application
  - Quality of shearing – any wool left will harbour lice, reducing chemical effectiveness
  - Skin/wool abnormalities such as dermo, will interfere with efficacy
  - Equipment – must be in good working order and calibrated correctly
  - Dose rate must be checked carefully. For backliners, weigh sheep and dose to the largest in the mob.
  - Plunge and shower dips must wet all sheep to the skin.
  - Mustering and/or split treatments – all sheep must be treated at the same time.
  - If ewes are treated with an IGR close to lambing, lambs may transfer lice back to the ewes.
- Chemical problem
  - Formulation – unlikely but chemical company obliged to investigate.
  - Resistance – if a breakdown is noticed within 3-6 months after treatment across all mobs and other possible causes are eliminated, then resistance may be present.

Action if resistance suspected

Farmers who have used IGRs for several consecutive years, should consider using a different chemical group and if possible a different application method. There is some evidence of cross-resistance between triflumuron (e.g. Zapp etc) and diflubenzuron (e.g. Magnum etc), so if lice are resistant to one chemical, they will also be resistant to the other. Consideration should also be given when selecting a chemical for flystrike prevention as use to control lice may influence the development of resistance to flies and vice versa.

Alternatives for short wool treatment

Producers who have relied on IGR chemicals for lice treatment, will need to use alternative chemicals to eradicate lice (see Table 2 below). Unlike the IGRs, all have a relatively rapid killing effect.

Correct dipping with an effective chemical is more likely to eradicate lice than off-shears backliner treatment and less likely to cause or increase resistance of lice to the chemical. This is due to a better distribution of chemical over the body being achieved thus exposing more lice to a lethal dose.

Long wool treatment

Where a long wool treatment is needed prior to the next shearing, the recommended options are handjetting with spinosad (e.g. Extinosad) or ivermectin (e.g. Paramax).

Avoiding the development of resistance

Most cases where resistance has been found have used the same or similar product for several consecutive years. Producers are urged to rotate chemical groups annually or bianually (See Table 2).

More information:

Farmnote 50/2003 Sheep lice - cost effective management to minimise wool residues

Table 2. Summary of non-IGR registered off-shears and short wool lice treatments

Application method	Chemical group	Chemical products*	ESI+	Operator Safety
Off-shears backliner	Organophosphate	Eureka Gold	21 days	Moderate risk
Short wool dip (up to 6wks after shearing)	Organophosphate	Di-Jet, Diazinon, etc	21 days	High risk
	Spinosad	Extinosad	Nil	Low risk
	Magnesium fluorosilicate	Flockmaster II, etc	#	Low risk

** Not all registered products are listed. Inclusion does not mean endorsement. Omission is not intentional.*

+ ESI is defined as Export Slaughter Interval

 # Seek advice from manufacturer.

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