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Sheep lice

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Summary

Sheep lice cost NSW sheep producers about \$123 million per year in treatment costs and lost production. Eradication of lice would save this money, and there would be the added benefit of producing wool with lower insecticide residues.

Sheep are prone to infestation by body lice, face lice and foot lice but only the body louse presents a serious problem. Many sheep body louse populations are resistant to pyrethroid or insect growth regulator lousicides. The continued use of these products against resistant lice populations is one reason that some flocks remain infested. In NSW the incidence of lice infestations has increased due to inadequate on-farm biosecurity, poor application of chemicals and in some instances, chemical resistance.

Life is easier for you and your sheep if your sheep don't have lice.

Sheep lice

Three species of lice infest sheep in NSW: the foot louse *Linognathus pedalis*, the face louse *Linognathus ovillus* and the sheep body louse *Bovicola ovis*. Face lice and foot lice rarely cause a major problem. However, the sheep body louse remains a common and costly pest to wool production.

The sheep body louse

Description

Adult sheep body lice are about 1.8 mm long and about 0.6 mm wide. They have a broad reddish head and a pale brown abdomen with slightly darker brown stripes. Most lice are usually found near the skin.

When environmental conditions are favourable, female lice lay two eggs every three days. The eggs are white, microscopic and are attached to the wool fibre usually within 6–12 mm of the skin. Immature lice (nymphs) hatch from the eggs after about 10 days at which time they are much smaller than the adults. There are three nymphal stages or instars, which occupy seven, five and nine days respectively. The third instar nymph moults to an adult louse.

Figure 1. Adult sheep body louse.



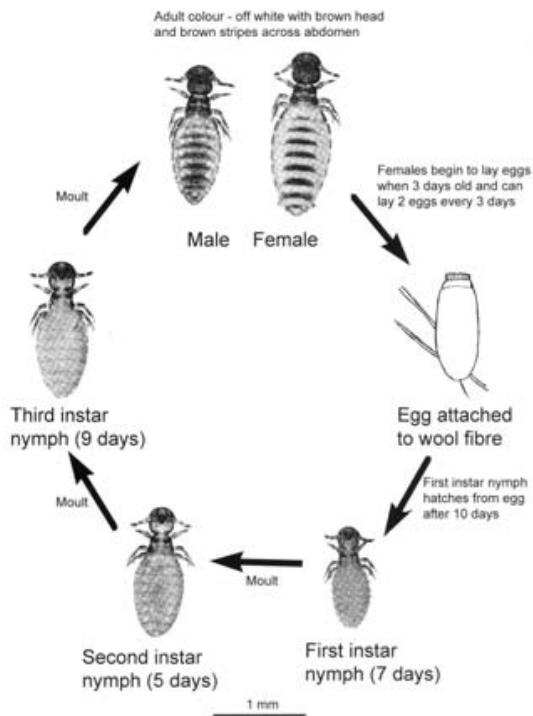


Figure 2. Life cycle of sheep body louse – egg to egg in 34 days.

Females reach egg laying maturity within four days of moulting. Lice spend their entire life on the skin or wool of sheep. The life cycle takes about 34 days at a minimum. Female lice live about 27 days and males about 48 days. However, there are reports of lice surviving for over 120 days.

Factors affecting lice survival

Lice prefer to live at 37°C and 70–90 per cent humidity. They are susceptible to extremes in temperature and humidity and move up and down the wool fibre to accommodate these changes. Above 39°C the number of eggs laid is reduced, and at 45°C no eggs are laid. On a hot day the fleece temperature on exposed parts of a sheep, with less than 25 mm of wool, may range from 45°C near the skin to 65°C at the wool tip. These temperatures are too hot for eggs and young lice to survive. Also lice and eggs do not survive extended periods of very low temperatures.

Adults and nymphs can drown and eggs fail to hatch after saturation with water for more than six hours. This can occur if the fleece becomes saturated following heavy rain or if sheep are immersed in water. Lice and their eggs do not survive for very long off the sheep. Survival of lice in wool on fences and in yards is very short. This is due to lack of food, exposure to sunlight and desiccation as well as temperature fluctuations between night and day.

Generally sheep lice do not survive or breed on other animals or humans. Under experimental conditions they have survived on goats for a short time but will not reproduce. Similarly, lice on other species of animals will not infest sheep.

Lice do not like light and move rapidly into the fleece when the wool is parted. Most lice live close to the skin and shearing can remove 30–50 per cent of the total population. After shearing many lice die due to exposure to heat or cold or rain. However, some lice survive in areas of longer wool left on the sheep.

The lice population builds slowly following shearing until sufficient length of wool – usually about three month's growth – is available to afford protection from the elements. However, it is unlikely that an infestation will be detected until the population growth enters the rapid increase phase about five months after shearing (James 1999). Lice numbers rise quickly at this time, unless conditions are particularly hot.

It takes 5–6 months for newly infested sheep to develop noticeable symptoms of an infestation. The first sign is likely to be sheep rubbing. When a sheep has developed a light infestation of lice – about one louse per 10 cm parting of the wool – there are already about 2000 lice present on the sheep (James and Moon 1999). It takes a further 2–3 months for severe wool derangement to occur. These times are approximate and may be longer when residual chemical is present in the wool, or if the sheep are shorn.

The time taken to show symptoms of lice infestation depends on the size of the population and the sensitivity of the sheep to irritation caused by lice. Lice numbers increase at a greater rate on sheep that have:

- a low immune system,
- are in poor condition, or
- are affected by disease.

These sheep can be targeted at the tail of a mob when inspecting for the presence of lice in a flock.

Lice transmission between sheep

Lice move from infested sheep to clean sheep when the sheep are in direct contact with each other. The warmth and shading of adjoining sheep allow the lice on one sheep to move up the wool fibres and across to another sheep. This occurs most commonly:

- in the joining paddock,
- in yards and races,
- in sheep camps, or

- during transport, where sheep are often packed tightly together.

Lice will also move along temperature gradients onto people handling infested stock. In sheltered areas in shearing sheds and yards lice may survive in greasy wool for a couple of days. To be completely safe, do not allow clean sheep into these areas for two weeks after infested sheep. Transmission through contact with infested wool on fences is unlikely. Birds do not transmit sheep lice.

How sheep get body lice

Resident lice

Lousy sheep that have been treated for the infestation a few weeks after shearing may show signs of further infestation 6–9 months later. This is often blamed on stray sheep from neighbours or stock routes. This may be true at times; in most cases the infestation persists because the treatment did not eradicate lice, although it reduced lice below detectable levels for some months.

Lice numbers remain low while the insecticide persists in the fleece. Numbers then increase alarmingly in the last few months of the wool growing season as residues decline especially if this coincides with cool weather. A similar situation may occur if lice are resistant to the insecticide applied after shearing. However, if resistance is the cause of a chronic infestation, population build-up is usually faster.

Introduced lice

Introduced sheep from any source should always be suspected of carrying lice. Isolate all suspect mobs of sheep until you have treated them or you are sure that they are free of lice through regular inspections over six months.

Rams purchased for breeding purposes, like any other purchased sheep, should be suspected of having lice. They are not cleared until successful treatment or a long period, say 6–10 months, of isolation and inspection has provided no evidence of a lice infestation.

Inspect any stray sheep for evidence of lice infestation. If the strays are found to be lousy, then the mob they are running with must also be considered lousy and an eradication program put in place. Notify the owner of the strays and make arrangements for their return to the owner's yards for treatment. Do not just tip them over the fence to reinfest your neighbour's flock.

Ewe to lamb transmission

Lambs pick up body lice very rapidly from their infested mothers. This must be considered when choosing a product to treat the ewes. Depending on

the product used it can take from 2–18 weeks after treatment for all lice to die. If lambs are born during this period, they may become infested and later reinfest the ewes when the chemical treatment has degraded. Furthermore, clean sheep may become infested if they are mixed with treated sheep during the period before all lice are dead.

It is preferable to avoid the situation of having lousy ewes with lambs at foot. This is because the treatment options are limited and management to prevent reinfestation is difficult.

How body lice affect sheep

Lice feed on dead skin, secretions and bacteria normally found at the surface of the skin. They do not suck blood. They do not eat the wool fibres but do cause a thickening of the skin.

Their presence irritates the sheep, causing the sheep to bite, scratch and rub on trees and fences. This damages the wool, causing breakage and coting of the fibres. Sheep infested with lice have a ragged appearance – often with tags of wool hanging from the fleece.

Newly infested sheep are very sensitive to lice. Others, which have had lice for long periods, can develop quite severe infestations but show few



Figure 3. (above and below) Sheep infested with lice. The difference is the reaction of the sheep to lice infestation – the sheep below have damaged fleeces.



signs.

Often lousy wool has a yellow colour due to a heavy suint and skin secretions and shearers claim it has a distinctive smell.

The costs of sheep lice infestation

There are two major costs of having lousy sheep.

Lost production

- Lousy sheep cut about 10 per cent less wool.
- Cotted wool is worth about 10 per cent less than non-cotted wool.
- Lice stress the animal through the discomfort of irritated skin – this will affect feed intake and produce ‘cockle’ damage to hides.
- Lousy sheep are more susceptible to flystrike.
- Lousy sheep may be denied access to saleyards, stock routes and agistment.
- There is an increased risk of infection from dipping sheep and the risk of losing sheep from dipping infections.

Treatment

- Cost of insecticide, labour and time away from other duties.
- Losses associated with dipping, such as arthritis, lumpy wool, dip stain.

Lost production

Production losses due to lice infestation include losses of fleece weight, staple strength, style, colour and yield. The price received for lice infested wool is reduced due to cotting, increased noil and decreased fibre length (hauteur) of processed wool.

Fleece weight is reduced by 0.2 kg to 0.9 kg of greasy wool and clean wool is reduced by 0.3 kg to 0.8 kg per sheep due to fibre shedding. Lice also irritate the skin while feeding which increases suint and skin secretions which, in turn, discolour the fleece. The irritation causes the sheep to eat less and to bite and rub the infested areas in an effort to alleviate the discomfort. Biting and rubbing causes derangement of the fleece which results in reduced fibre strength. Combined, these factors reduce the yield of clean wool, the quality of the fleece and the amount of meat produced by sheep.

Sheep vary in their response to a lice infestation. Merinos are more sensitive than British breeds and shedding sheep will have reduced meat production due to irritation and pose a risk to other breeds of sheep.

Some examples of production loss in wool sheep as at 16 December 2009 from AWEX market reports are given below.

Sheep in the Tablelands

Fine wool merinos producing 4 kg of 18 micron wool MF3E at 1142 c/kg for a \$45.68 per fleece.

Lousy sheep produce 3.6 kg of MF3E H₂C₂ at 977 c/kg for a \$35.17 fleece. A penalty of **\$10.51** per sheep.

Sheep in the Slopes

Medium wool merinos producing 6 kg of 20 micron wool MF4E at 943 c/kg for a \$56.58 per fleece.

Lousy sheep produce 5.4 kg of MF4E H₂C₂ at 848c/kg for a \$45.79 fleece. A penalty of **\$10.79** per sheep.

Sheep on the Plains

Medium wool merinos producing 7 kg of 23 micron wool MF5E at 850 c/kg for a \$59.50 per fleece.

Lousy sheep produce 6.3 kg of MF5E H₂C₂ at 755 c/kg for a \$47.56 fleece. A penalty of **\$11.94** per sheep.

Treatment

- It costs money, time and effort to muster sheep and treat them with one of the chemicals available for lice eradication – \$2–\$3 per sheep per year, accounting for fixed and variable costs.
- Attention to detail is needed to ensure effective treatment and to reduce the risk of sheep deaths due to treatment.
- Treatment may introduce chemical residues to the fleece.
- Treatment poses a potential Occupational Health and Safety risk to operators. Additional costs may be incurred in modifying treatment equipment, providing personal protective equipment, health checks, training for those involved in treatment and insurance for workers compensation.

Incorrect application of insecticides resulting in lice surviving treatment is the most common cause of failure to eradicate lice and facilitates the development of resistance.

How to find lice

If lice are suspected, examine sheep that show signs of wool derangement. Lice are often most numerous on sheep that are not doing well. If you need glasses to read, you will need glasses and good lighting to see lice. A policy of regular inspection of sheep for lice and recording the findings is best. Lice congregate in colonies and

may be missed if the wool is only opened at one or two places. Select at least 10 sheep showing some signs of fleece derangement or those sheep at the tail of the mob. Examine at least five sites on each side of at least 10 sheep.

Record your findings so that subsequent inspections can be compared. If no lice are seen, then either look at another 10 sheep or reinspect the flock in 3–4 weeks.

Lice in small numbers are extremely difficult to find on sheep. At least 400 to 500 lice per sheep must be present before they can be detected by routine inspection of unshorn sheep. Inspections can be carried out any time sheep are yarded and especially at crutching and shearing. The best time to see lice is during, or immediately after shearing. Pay particular attention to the neck folds and longer wool on the neck. In woolly sheep, lice can be found anywhere along the side, neck, back and rump.

It is important to remember that visual wool damage due to lice depends on:

- the number of lice,
- the sensitivity of sheep to lice, and
- the length of wool.

Wool damage is usually not obvious until there is at least three months growth of wool and a significant number of lice.

Early identification of the problem allows time to plan treatment strategies. A lice detection test is now available which detects lice protein in collections of washings from combs and cutters used to shear the sheep. As well as identifying lousy flocks the test is able to confirm freedom from lice. This will give woolgrowers greater confidence in choosing not to treat sheep on the suspicion that they may be lousy. The Lice Test kit is available from Industry & Investment NSW at EMAI by contacting Narelle Sales on (02) 4640 6433 or by email narelle.sales@industry.nsw.gov.au.

Remember, if one louse is found on one sheep in a mob, then the whole mob is considered lousy.

Biosecurity to keep lice out

Suspect all introduced sheep until they prove freedom from lice infestation. Inspect all stray sheep and return them to their place of origin with their owner's knowledge.

Maintain stock proof boundary fences with buffer zones and patrol the zones so that stray sheep can be identified and dealt with before infesting clean flocks.

Maintain stock proof internal fences with buffer zones and patrol the zones so that stray sheep can be identified and dealt with before infesting clean mobs.

Don't rely on chemicals to protect sheep from reinfestation. Segregate treated and untreated animals

Plan treatment and lambing carefully as lambs will become infested from their mothers and then can re-infest their mothers after treatment chemicals have broken down.

Ensure you have a clean muster and there are no stray lousy sheep.

Lice eradication

Opportunities to eliminate lice from individual sheep are 'off-shears' (0–24 h after shearing) or in 'short wool' (1–42 days after shearing).

Treatments applied at other times may reduce lice numbers to the extent that fleece damage is arrested but will not eliminate the infestation.

Long wool (>6 to 43 weeks after shearing) treatments should be followed up with 'off-shears' or 'short wool' treatments capable of eradicating the infestation.

Chemical options for sheep lice control

- Pyrethroids – cypermethrin, deltamethrin, alphasmethrin (pour-ons and spray-on)
- Organophosphates – temephos (dip), diazinon (spray-on, dip under APVMA permit)
- Benzoylphenyl urea (IGRs) – triflumuron (pour-on), diflubenzuron (dip and pour-on)
- Ivermectin (jetting fluid)
- Magnesium fluorosilicate/sulphur (dip) – approved for organics
- Spinosad (dip and pour-on) – approved for organics
- Imidacloprid (pour-on)

Whatever you use, consider residues and withholding periods (WHPs)

No matter what method or chemical is used, always follow label directions. The label is a legal document.

Reference

James, PJ and Moon, RD (1999) Spatial distribution and spread of sheep biting lice, *Bovicola ovis*, from point infestations. *Veterinary Parasitology* 81, 323–339.

Further Information

For further information consult your Livestock Health and Pest Authority veterinarian or ranger or Industry & Investment NSW Sheep & Wool Officer.

LICEBOSS™ – a decision support resource for sheep producers available from Australian Wool Innovation – www.liceboss.com.au

Table 1. Guidelines for diagnosing the presence of lice.

Symptoms	Possible causes
Lice found 0–3 months after shearing	Sheep were not treated Treatment failed due to poor application of insecticide Insecticide resistance
Lice found 3–6 months after shearing	No treatment but seasonal conditions limit build-up of lice Treatment failed due to poor application of insecticide Insecticide resistance
Lice found 6–9 months after shearing	Treatment failed to eradicate lice but suppressed numbers to a low level Lice population suppressed by blowfly treatments later in the year
a. Lice in most mobs on the property.	Treatment failed to eradicate lice but suppressed numbers to a low level Lice population suppressed by blowfly treatments later in the year
b. Lice in 1–2 mobs	Treatment failed to eradicate lice from these mobs but suppressed numbers to a low level Reinfestation from stray sheep

NB: Lice usually take three months on woolly sheep to produce clinical (obvious) signs of infestation.

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