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Why control sheep lice? Economic effects of lice on production

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Sheep lice are one of the three main parasite diseases of sheep in Australia. They have a significant economic impact on the sheep industry, both in lost production and costs of control (Sackett et al. 2006). The impact of lice is determined by how long the sheep have been infested and the number of lice that are present. Often there is little economic impact in the first year of an infestation, but if left untreated lice numbers can build to levels where significant losses may be experienced.

In summary, the effects that have been measured are:

• Fleece value	reduced by $3–$10
• Greasy fleece weight	reduced by 0.2–1.1 kg
• Clean fleece weight	reduced by 0.2–0.9 kg
• Fibre diameter	no effect
• Yield	reduced by 2.6–6%
• Colour	more yellow and less bright
• Fibre or staple length	slight reduction
• Staple strength	possible reduction
• Processing performance	reduced top yield and fibre length, increased carding loss and noil
• Body weight and reproduction	no effect
• Skin value	possible reduction

Fleece value

Wilkinson et al. (1982) in Western Australia found reductions in fleece value per head in a flock with 25-micron wool valued at 240c/kg clean ranging from $0.72 for light infestation to $1.92 for heavy infestation.

For different fibre diameter wools, this translates to the estimated losses shown below for light and heavy infestations at early 2012 clean wool prices.

18 µm wool @ 1200 c/kg	$3.60–$9.60 per head
20 µm wool @ 1100 c/kg	$3.30–$8.80 per head
22 µm wool @ 1050 c/kg	$3.15–$8.40 per head
24 µm wool @ 950 c/kg	$2.85–$7.60 per head

The above estimates assume that lice devalue different micron wools to equivalent degrees. Price penalties may, in fact, be higher for low micron, high value wools.

Niven and Pritchard (1985) reported a reduction in wool value per head of up to 30% from lice in Queensland. Elliott et al. (1986), who introduced a lousy sheep into a mob of sheep with 9 months wool in Tasmania, found reductions of fleece value of up to 31% and 38% in years 2 and 3 of the

infestation, but notably, no measurable loss at shearing in the first year. In the study of Cleland et al. (1989) at Minnipa in South Australia, two moderately infested sheep were introduced to a flock of 50 clean sheep. The lice were allowed to spread naturally and the sheep shorn at 20 weeks and 72 weeks after introduction of the infested animals. There was no measurable loss at the first shearing, but an average reduction in fleece value of 13% at the 72-week shearing.

Greasy fleece weight

Most studies show a reduction in greasy fleece weight from lice. Wilkinson et al. (1982) in a study repeated in 3 years found reductions of 0.2 to 0.9 kg (Table 1) and Niven and Pritchard (1985) found reductions of from 0.4 to 1.1 kg depending on level of infestation. Elliott et al. (1986) and Cleland et al. (1989) in the later years of their studies found reductions from 0.3 to 0.9 kg and 0.35 kg, respectively.

In studies in western Queensland, with spring shorn sheep and infestations commencing from one or a few lousy sheep in the mob—the most common scenario in industry—James et al. (2011) found a reduction of only 0.1 kg per head in the first year of infestation. Kettle and Lukies (1982a) in New Zealand found no significant effect on greasy fleece weight, but the mean yield was slightly lower in infested sheep. The New Zealand studies were conducted with Border Leicester x Romney cross ewes, not Merinos.

Table 1: Effect of lice on greasy fleece weight (kg), from Wilkinson et al. (1982).

Year	Level of louse infestation				
	No lice	Very light	Light	Medium	Heavy
1	5.1	No data	4.9	4.7	4.5
2	5.7	No data	5.8	5.5	5.6
3	4.5	3.6	4.1	No data	3.8

Clean fleece weight

Most studies where clean fleece weight has been measured show reductions resulting from lice. Wilkinson et al. (1982) found decreases of 0.3–0.8 kg (Table 2), Niven and Pritchard (1985) showed reductions of 0.3 to 0.9 kg, Cleland et al. (1989) a reduction of 0.7 kg and James et al. (2011) a reduction of 0.2 kg per head.

Table 2: Effect of lice on clean fleece weight (kg), from Wilkinson et al. (1982).

Year	Level of louse infestation				
	No lice	Very light	Light	Medium	Heavy
1	3.4	No data	3.1	3.0	2.8
2	3.9	No data	3.6	3.5	3.5
3	3.2	2.4	2.6	No data	2.4

Fibre diameter

Lice have no effect on fibre diameter (Wilkinson et al. 1982, Niven and Pritchard 1985, Cleland et al. 1989, James et al. 2011).

Table 3: Effect of lice on fibre diameter (µm), from Wilkinson et al. (1982).

Year	Level of louse infestation				
	No lice	Very light	Light	Medium	Heavy
1	24.9	No data	24.7	24.3	25.0
2	24.4	No data	24.7	25.5	25.5
3	24.6	25.0	24.9	No data	24.4

Yield

Niven and Pritchard (1985) found yields of 74% for sheep with light lice, 72% for sheep with medium lice and 68% for sheep with heavy lice infestations.

Reductions were generally about 4% to 5% in the study of Wilkinson et al. (1982). The decrease in the different groups can be calculated from Tables 1 and 2 above. Kettle and Lukies (1982a) found a reduction of 2.6% and reductions were 6% in the study of Cleland et al. (1989) and 3.3% in that of James et al. (2011).

Colour

Kettle and Lukies (1982b) objectively measured colour (yellowness and brightness) in 7 trials using a reflectance colourimeter. In 7 out of 7 trials wool from the louse-infested sheep was more yellow and in 6 out of 7 trials the wool was less bright. James et al. (2011) found that greasy wool from lousy sheep was significantly more yellow when scored subjectively, but there was no difference in objectively assessed scoured wool colour.

Fibre length

Wilkinson et al. (1982) found that mean fibre length of the top was reduced by louse infestation. Cleland et al. (1989) found no significant effect on the staple length measured in raw wool. James et al. (2011) found that there was a significant reduction in staple length in infested sheep in one year of their study, but the effect was small.

Staple strength

Sheep with low lice numbers produced significantly more sound fleece wool (3.0 versus 1.7 kg/head) and less cast wool (0.1 versus 0.4 kg/head) than moderately to heavily infested animals (Niven and Pritchard 1985). Tasmanian Department of Agriculture studies quoted by Hansford (1987) found staple strength was 41 N/Ktex in control sheep compared to 34 N/Ktex in infested sheep, but the authors noted that this was unlikely to be statistically significant. Cleland et al. (1989) and James et al. (2011) found no significant effect of lice on staple strength.

Processing performance

Lipson and Bacon-Hall (1976) and Wilkinson et al. (1982) report studies from the same group of sheep in which they found that louse infestation:

- Reduced top yield
- Reduced the mean fibre length of the top
- Increased carding loss
- Increased noil (short broken fibres removed during combing of the carded wool into top)

Lice had no effect on the fibre diameter of top wool or of the number of neps (knotted fibres).

Table 4: Effect of lice on wool processing performance, from Wilkinson et al. (1982).

	Level of louse infestation				
	No lice	Very light	Light	Medium	Heavy
Scouring yield (%)	66.8	68.6	63.0	62.0	62.6
Card loss (%)	9.8	10.9	12.3	12.4	13.3
Noil (%)	4.1	3.4	4.8	5.2	5.4
Top and noil yield (%)	60.5	61.4	55.7	53.7	53.3
Mean fibre length of top wool (cm)	8.3	7.4	7.7	7.7	7.2

Body weight and reproduction

Kettle and Pearce (1974), Wilkinson et al. (1982), Kettle and Lukies (1982a), Niven and Pritchard (1985) and James et al. (2011) all found that lice had no effect on body weight.

Kettle and Lukies (1982a) found that lice had no effect on lambing percentage or lamb growth rate. However, sheep with low weight gains because of poor nutrition or other stress may be more susceptible to lice and develop heavier infestations (James et al. 1998).

Skin value

Louse infestation can cause a disorder known as 'cockle' in sheepskins. Cockle appears as small lumps or nodules that, among other effects, do not allow dye to be taken up evenly during tanning, leaving the pelt with an unattractive appearance (Heath et al. 1995). This can lead to significant downgrading of high value skins. Although recognized as a significant problem in New Zealand, the economic importance of the problem in Australia is unclear.

References

Cleland, P.C., Dobson, K.J. and Meade, R.J. (1989). Rate of spread of sheep lice and their effects on wool quality. *Australian Veterinary Journal* 66, 298-299.

Elliott, J., Jones, A.L. and Pauley, J.R. (1986). The effect of body lice on wool production. *Australian Advances in Veterinary Science*. Australian Veterinary Association, pp 125-126.

Hansford, K. (1987). Report prepared for the Sheep Management Implications of Sale with Additional Measurement (SMISAM) Committee, 61pp.

Heath, A.C.G., Cooper, S.M., Cole, D.J.W. and Bishop, D.M. (1995). Evidence for the role of the sheep biting louse *Bovicola ovis* in producing cockle, a sheep pelt defect. *Veterinary Parasitology* 59, 53-58.

James, P.J., Horton, B.J., Campbell, N.J., Evans, D.E., Winkleman, J. and McPhie, R. (2011). Population dynamics and production effects of sheep lice (*Bovicola ovis* Schrank) in extensively grazed flocks. *Animal Production Science* 51, 753-762

James, P.J., Moon, R.D. and Brown, D.R. (1998). Seasonal dynamics and variations among sheep in densities of the sheep biting louse, *Bovicola ovis*. *International Journal for Parasitology* 28, 283-292.

Kettle, P.R. and Lukies, J.M. (1982a). Long term effects of sheep lice *Damalinia ovis* on body weight and wool production. *New Zealand Journal of Agricultural Research* 25, 531-534.

Kettle, P.R. and Lukies, J.M. (1982b). Effects of sheep lice *Damalinia ovis* on wool colour. *New Zealand Journal of Experimental Agriculture* 10, 15-17

Kettle, P.R. and Pearce, D.M. (1974). Effects of the sheep body louse *Damalinia ovis* on host weight gain and fleece value. *New Zealand Journal of Experimental Agriculture* 2, 219-221

Lipson, M. and Bacon-Hall, R.E. (1976). Some effects of various parasite populations in sheep on the processing performance of wool. *Wool Technology and Sheep Breeding* 23, 18-20.

Niven, D.R. and Pritchard, D.A. (1985). Effects of control of the sheep body louse (*Damalinia ovis*) on wool production and quality. *Australian Journal of Experimental Agriculture* 25, 27-31.

Sackett, D., Holmes, P., Abbott, K., Jephcott, S. and Barber, M. (2006). Assessing the economic cost of endemic disease on the profitability of Australian beef cattle and sheep producers. Project AHW.087 Report, Meat and Livestock Australia, North Sydney, 119 pp.

Wilkinson, F.C., de Chaneet, G.C. and Beetson, B.R. (1982). Growth of populations of lice, *Damalinia ovis*, on sheep and their effects on production and processing performance of wool. *Veterinary Parasitology* 9, 243-252.

Published: March 2013