Information Sheet 2
Roller Wiping

With appropriate grazing management, roller wiping can provide a competitive advantage to desirable pasture species

African lovegrass (ALG, *Eragrostis curvula*) is a major threat to low input native pastures in the Bega Valley. Overgrazing, bare ground and poor pasture competition, particularly during drought, are primary causes of ALG invasion. ALG invasion can cause significant losses to productivity, profitability, pasture composition and pasture diversity (see Information Sheet 1).

In recent years landholders in the Bega Valley have adopted roller/rota wiping and carpet wiping (hereafter referred to as roller wiping) to manage ALG invasions.

What is roller wiping?

Roller Wiping involves using a ground or hydraulic driven carpeted drum roller towed by a vehicle (4-wheel bike, ATV or light tractor). The roller/s are wetted periodically with glyphosate while being towed over the pasture.

The method takes advantage of the lower palatability of ALG relative to other pasture species. Livestock are managed to

Single roller wiper, Bega Valley

ensure that desirable pasture species are shorter than ALG at the time of roller wiping. The roller is set at a height that reduces herbicide contact with the desirable species. The roller, held on a towing frame or 3-point linkage, is pulled at approximately walking speed, though faster speeds are possible in light infestations.

In this information sheet we outline key criteria for successful roller wiping based on landholder experience and recent economic analyses.

Why roller wiping?

Many landholders have had variable success with spot and boom spraying. Both methods *can* create conditions suitable for re-invasion by ALG or invasion by other weeds.

The aim of roller wiping is not complete eradication, but rather the management of ALG to enable carrying capacities to be restored or maintained

Roller wiping can be a low risk strategy ideal for light to medium infestations but also applicable in dense ALG stands, if there is an adequate soil seed bank of desirable species or over sowing is planned. With appropriate grazing management roller wiping provides a competitive advantage to other pasture species, with chemical applied directly to the adult ALG plants and minimal off-target damage. However, unlike spraying with fluproponate, roller wiping has no impact on germinating ALG seedlings and therefore grazing management to maximise the competitive ability of the other perennial pasture species is crucial to success.

The aim of roller wiping is not complete eradication, but rather the management of ALG to enable carrying capacities to be restored (if a dense infestation) or maintained (if a light infestation).

Double roller wiper, Bega Valley

Costs of roller wiping

Knowing the costs involved is the starting point for deciding whether to control ALG, and for making choices about how to do it. Contractors reported charges of $39-$48/ha in light infestations, and $67-$83 in heavy infestations (as at May 2014). Density of ALG influences the amount of chemical used and running time.

Tables 1 & 2 show estimates for farmers doing it themselves (as at May 2014). On all farms, it costs significantly more to control

The annualised capital cost of a roller wiper has a large influence on total costs of control. The purchase price and area wiped are major factors influencing per hectare costs of roller wiping

Notes to Tables 1 & 2

1. A heavy infestation is greater than 66% pasture cover. A light infestation is less than 33% pasture cover.

2. Vehicle speed is 7kms per hour for light infestation and 4kms per hour for heavy infestation.

3. On Farm 3, roller wiping is done in both directions, influencing family labour cost in particular.

4. The towing vehicle significantly affects costs. Farm 1 uses a light tractor because much of the country is steeper, and rocks and wombat holes are encountered. Farm 2 uses a quad bike, and Farm 3 uses a side-by-side ATV. Fuel costs and R&M vary with the type of roller and towing vehicle.

5. Cost of buying roller wipers vary greatly. Farm 1 has a double roller with hydraulics. Farm 3 bought one for $1,000 and modified it (the labour involved was not costed).

6. The annualised capital costs will be greater if less than 100ha are wiped, because they will be spread over a smaller area.

7. On some farms the towing vehicle may already be completely written off, however consider whether costs of replacement should be considered in the future.

a heavy infestation (Table 2) than a light one (Table 1) – all the direct costs increase as well as family labour cost.

Table 1. Estimated roller wiping costs per hectare for one application when controlling 100 hectares on three case study farms - LIGHT INFESTATION

	Farm 1	Farm 2	Farm 3
Direct costs			
Mixed chemical cost	$6.04	$6.04	$8.74
Fuel cost	$2.06	$0.74	$1.49
Repairs & maintenance	$3.33	$1.19	$2.38
Hired labour	$11.18	$0.00	$0.00
Sub-total	***$22.61***	***$7.97***	***$12.61***
Indirect costs			
Family labour cost	$0.00	$9.50	$19.00
Annualised capital cost - roller wiper	$9.03	$5.64	$1.24
Annualised Capital cost - vehicle	$24.88	$1.93	$6.94
Sub-total	***$33.90***	***$17.07***	***$27.17***
TOTAL	**$56.51**	**$25.04**	**$39.78**

Table 2. Estimated roller wiping costs per hectare for one application when controlling 100 hectares on three case study farms - HEAVY INFESTATION

	Farm 1	Farm 2	Farm 3
Direct costs			
Mixed chemical cost	$26.42	$26.42	$38.25
Fuel cost	$3.61	$1.30	$2.60
Repairs & maintenance	$5.83	$2.08	$4.17
Hired labour	$19.56	$0.00	$0.00
Sub-total	***$55.42***	***$29.80***	***$45.02***
Indirect costs			
Family labour cost	$0.00	$16.63	$33.25
Annualised Capital cost - roller wiper	$9.03	$5.64	$1.24
Annualised Capital cost - vehicle	$24.88	$1.93	$6.94
Sub-total	***$33.90***	***$24.19***	***$41.42***
TOTAL	**$89.33**	**$53.99**	**$86.44**

For further information on the economics of controlling ALG see:

Crosthwaite, J. and J. Dorrough (2014) Economics of controlling African Lovegrass (*Eragrostis curvula*) in native pasture in the Far South Coast of NSW.

Available from the Far South Coast Farmers Network.

http://www.fscla.org.au

Notes to Table 3

1. When there is no active control in place ALG covers >66% of pasture and reduces carrying capacity by 50%.
2. This pasture is assumed to carry 6dse/ha in the absence of ALG.
3. Cattle gross margin = $25/dse
4. One third of the 100ha pasture is roller wiped each year at a cost of $40/hectare. See the previous section for how they might vary from this figure.
5. The estimated net gain or loss is the difference between a situation without control and one with regular roller wiping.

Roller wiping is more likely to be profitable in those pastures where removal of African love grass results in a large increase in stocking rate.

Roller wiping can avoid losses

Is roller wiping on pasture with low density (<33%) of ALG worthwhile? One approach is to compare the possible economic difference between two farms, one now roller wiping regularly, and the other who has not controlled ALG. This is examined for two 100ha paddocks in Table 3.

Without roller wiping ALG densities are assumed to have increased and are now reducing carrying capacity by 50% (from 40 to 20 cows per hectare). On the farm using roller wiping they have managed to maintain their carrying capacity and prevent ALG from dominating the pasture. This is a 'steady state' analysis - it looks to the future and compares the costs and incomes from the two different management approaches.

Table 3. Comparing roller wiping with no control on 100 ha of native pasture - annual 'steady state' estimate.

	No Control	Roller wiped	Net Gain/ (Loss)
Cows carried (1 cow=15dse)	20	40	20
Net Income from stock	$7,500	$15,000	
Cost of ALG control	$0	-$1,320	
Net Cash Flow before tax	$7,500	$13,680	$6,180

Key Points

1. At low densities of ALG, the income from extra stock carried is estimated to exceed the annual cost of Roller Wiping.

2. Roller wiping is estimated to be profitable if the difference in stocking rate exceeds approximately 60 dse/ 100ha (i.e. 4 cows at 15 dse/hd). Readers can judge if this would be possible on native pastures with lower potential carrying capacity.

3. Results may change if the ALG density is already high, and there are higher early costs in bringing a pasture back to optimum productivity - this requires a discounted cash flow analysis (see next section).

In most circumstances acting early is clearly going to be more profitable than delaying action.

Notes to Table 4

1. This analysis uses a development budget that is run over 10 years. Control costs and stocking rates vary over this time.
2. For dense infestations, 100ha is wiped in the first two years and 33 ha per year thereafter.
3. Contractor costs are assumed to be $70/ha in a dense infestation and $40/ha in a light infestation. If acting late, then the higher cost is incurred until lovegrass densities are reduced.
4. Cattle gross margin = $25/dse
5. Extra cattle have to be 'purchased' at $500 a head as carrying capacity increases, but their value is included as salvage value (at full price) at the end of 10 years.
6. Pastures are assumed to potentially run 6dse/ha in the absence of ALG. A heavy ALG infestation covers >66% of ground cover and reduces carrying capacity by 50%.
7. When acting early, ALG densities are light (<33%) and not yet affecting carrying capacity. In the absence of control, ALG densities increase over the 10 years resulting in a gradual decline in potential carrying capacity.

Is roller wiping profitable?

What if ALG is already dominant, can roller wiping be used to bring it back under control?

Below two farms are compared and the economic outcome assessed over 10 years.

On the first farm ALG dominates the pasture and roller wiping is used to gradually increase carrying capacity ("Acting late"). This is compared to no active control.

On the second farm roller wiping is adopted *before* ALG becomes dominant and prevents ALG from ever reducing cattle numbers ("Acting early"). This is compared to a situation with no control and ALG is allowed to spread and gradually reduces cattle carrying capacity over 10 years.

Table 4 shows the annuities for these options. The annuity is a measure of profitability; it shows the net income that could be expected to be received each year, if the ups and downs in costs and income were evened out.

Table 4. Profitability of controlling ALG on 100 hectares of native pasture using a contractor - estimated annuities

	No Control	Roller Wiping	Benefit
Acting late (dense ALG)	$7,500	$8,336	$836
Acting early (light ALG)	$11,883	$13,680	$1,797

Key Points

1. Farmers who start roller wiping early, when ALG infestations are light, are estimated to be better off by $1,797 per year, or $17.97 per hectare, by comparison to doing nothing.
2. Starting roller wiping late, when ALG is already dense, may still be worthwhile but estimated net income is just $836 per year, or $8.36 per hectare.
3. Under these assumptions farmers who leave control late are expected to be $961 per year worse off ($1,797 - $836), or $9.61 per hectare, compared to those who start control early. This result may understate the difference. If acting late, then the higher cost of control is incurred until ALG densities are reduced.

Roller Wiping FAQ's

I don't have a roller wiper...should I buy one or use a contractor? Contractors can be cost-effective and may suit some operations. Contractor costs for roller wiping per hectare vary and can be less or more than that of owning and operating a roller wiper. There are many factors that need to be considered – the size of the farm, amount of lovegrass on the farm, availability of time and access to a tractor or other machinery for pulling the wiper. Hiring a roller wiper or using a contractor may be worth considering prior to purchasing.

Should I buy a new double roller wiper? Double rollers are thought to provide more consistent application. However, the purchase of a new wiper can be expensive, especially a hydraulically driven double wiper. The annualised capital costs of the machinery should be factored into assessments of the most profitable strategy (compare farms 1 and 2 in Tables 1 &2 above). You need to assess your own situation – if you have a large area to wipe every year (eg. >200ha) and on very steep country then a larger wiper might be warranted. Lighter rollers can be pulled by smaller machinery and are well suited to light infestations and undulating land. Single wipers can also be highly effective. In either case, re-application in successive years is essential.

I have a single roller, should I travel in two directions each time? With a single roller travel in both directions may increase the amount and effectiveness of applied chemical and perhaps increase the mortality rate of ALG. However, travelling in two directions is both time consuming and more costly and this must be taken into consideration (compare costs between farms 2 & 3 in Tables 1 & 2 above). Ensuring that the paddock receives additional roller wiping within 12 months of the first application will increase the effectiveness of single passes. Later applications could be in alternate directions. Landholders in the Bega Valley have achieved good outcomes with single passes if there is consistent re-application in following years.

Should I burn the dead ALG? Dry dead leaf litter is evident after roller wiping. These areas are often invaded by Black (or Spear) thistles (*Cirsium vulgare*) and other short-term weeds. However, the litter is typically quick to decay. The litter provides valuable ground cover, increasing stored soil moisture, which may favour re-establishing pasture. Burning will create bare ground and possibly lead to a pulse of nutrients. This can provide more opportunities for pasture species to establish but it may also favour re-establishment by ALG.

Should I slash before I roller wipe? In dense ALG stands, livestock may not adequately trample and remove some of the standing ALG dead litter. In these cases you need to decide whether it is worth using other strategies to increase the green leaf area of ALG prior to roller wiping. Options available include slashing or burning. The later is cheap, but carries risks. The former is very costly ($100-$150/ha for dense lovegrass) and so could make roller wiping unprofitable. In many cases it may be more profitable to roller wipe and obtain a less than desired reduction in ALG in the first year than it will be to slash.

I have a lot of ALG, should I roller wipe it all each year? Although ALG has low palatability and a lower carrying capacity than most desirable pasture species, it still provides forage for livestock. On properties dominated by ALG it may be one of the only pasture species. Developing a roller wiping program should consider the impact that killing lovegrass plants will have on carrying capacity. Unless you are willing to reduce stocking rates a more prudent approach would be to only roller wipe 1/4 to 1/3 of the infested area in any one year but with an aim to cover all infested areas at least 3 times over a period of 7-9 years.

Once AGL has invaded, is it economic to bring it under control? A heavy infestation increases first year control costs, and several years will pass before income from livestock can reach pre-infestation levels. In many circumstances roller wiping is expected to be profitable, but this will depend on the ability to recover stocking rates, frequency of application required to maintain the higher stocking rates and the costs of roller wiping. Consistent application and keeping costs low may be crucial to success.

Estimating your costs

	Example	notes	My Costs	notes
Area wiped/yr	100ha			
Coverage				
Vehicle speed	7km/hr	Light infestation		
Roller width (m)	3m			
Area covered/hr	2.1ha/hr	(7,000mx3m)/10,000m		
Number passes	1	Single direction		
Ha/day	12.6	6hr x 2.1		
Chemical				
Glyphosate 450 (L)	3.5 L	$7.50/L		
Additives (eg. wetter)	0.3 L	$1.80/L		
Water	16 L			
Cost/20L mixed drum	$26.80	(7.5x3.5)+(1.8x0.3)		
Drums used day	3	20 L mixed drum		
A. Chemical cost/ha	*$6.40*	*(26.80 x 3)/12.6 ha*		
Fuel/hr	3L/hr (small tractor)	$1.30/L x 3=$3.90/hr		
B. $ Fuel/ha	*$1.86 / ha*	*$3.90/2.1ha*		
Labour	$20/hr	Hired labour		
C. Labour/ha	*$9.5*	*$20/2.1ha*		
R&M/ha		Repairs & maintenance		
D. Roller wiper	*$0.45/ha*	*$1/hr use*		
E. Tractor	*$1.90/ha*	*$4/hr use*		
Sub total 1.	***$20.11***	***A+B+C+D+E***		
Capital costs	To estimate annualised cost see: http://en.wikipedia.org/wiki/Equivalent_annual_cost			
Roller wiper	**$5,000**	purchase cost		
Expected life	12yrs			
Annualised cost	$564	@ 5% interest rate		
F. Cost/ha	*$5.64*	*100ha wiped/yr*		
Towing vehicle	**18,000**	purchase cost		
% use for RW	40%			
Expected life	15yrs			
Annualised cost	$694	Payment @ 5%		
G. Cost/ha	*$6.94*	*100ha wiped /yr*		
Sub total 2	***$12.58***	***F+G***		
TOTAL (1+2)	**$32.69**	**cost/ha**		

Roller Wiping: Key Criteria For Success

Planning

Timing: ALG is a summer active species and though drought tolerant growth rates will decline during dry conditions. Roller wiping will be most successful when ALG is actively growing.

Grazing management: Use high stocking rates shortly before roller wiping to reduce height of palatable pasture species and to trample as much standing ALG dry matter as possible. Allow 1-3 weeks after grazing (depending on growing conditions) for ALG re-growth before roller wiping.

In some seasons there may be opportunities to roller wipe without the need for prior heavy grazing e.g.. after extended dry periods desirable pasture may be short and rainfall can stimulate rapid ALG growth, providing an ideal time for roller wiping.

Method

Correct chemical and correct rates: Glyphosate should be used, not fluproponate. Some landholders have reported greater success with inclusion of spray oils and wetters. Varying rates have been trailed. Rates of 1 part glyphosate 450 to 3 parts water down to 1 part glyphosate 450 to 6 parts water have found to be successful in different situations. Lower rates are likely to be most successful when ALG is at it's most active stage of growth and there is minimal old or dead material. You may need to trial a range of rates in your situation. Ensure carpet on roller is always adequately wetted but not dripping.

Ensure correct height: Setting the wiper to the correct height is crucial to both avoid loss of desired pasture species and ensure optimal application to ALG plants. Roller wiper heights will need to be adjusted based on prior grazing management.

Speed of travel: Speed of travel impacts on the rate of application and coverage. Your aim should be to maximise coverage on each plant without over-application. Travel should be slower in dense stands.

Follow up

Re-application: Roller wiping will not kill 100% of plants. Any one application may reduce adult population densities by 60-80%. The key to success is re-application within 12 months and then a third application within a further 36 months. Further applications may be required at regular intervals.

Grazing management: Grazing management post-roller wiping is crucial to success. Stocking rates and frequency of grazing should be based around increasing the persistence of the desired pasture species. The aim is to manage the pasture so that it effectively competes with ALG seedlings and is able to re-establish in areas where ALG has been killed.

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