

3D weed management

African Lovegrass Case Studies

Four Case Studies of Farmers Managing
African Lovegrass in Grazing Systems



HELPING PRODUCERS TO MANAGE WEEDS IN GRAZING SYSTEMS



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African lovegrass (*Eragrostis curvula*) is a highly persistent summer growing, perennial tussock grass that competes directly with spring, summer and autumn growing pastures and crops for moisture, sunlight and nutrients.

African lovegrass seed can be spread short distances by wind and is also dispersed by animals, machinery, vehicles and in hay.

When maintained in the leafy, early vegetative stage, African lovegrass can be a useful nutritious plant which is palatable to livestock. However, due to its capacity for very high growth rates during spring this palatability can quickly decline as the plant matures.

Case Study 1 - Billilingra

David and Judy Goggin, "Billilingra", Bredbo, New South Wales

David Goggin, his brother Will and their wives Judy and Anne run a mixed grazing operation, which is best known for its Poll Hereford stud, Billilingra.



The production system

The Goggins run 250 Poll Hereford cows and 1,800 Merino ewes. 400 of the Merino ewes are joined to South African Merino Mutton (SAMM) rams on their 4,400 ha property.

Soils on the property are predominantly light sandy loams of low fertility and low water holding capacity. Billilingra has 50 ha of alluvial river flats along the Murrumbidgee River with 28 ha of irrigated pastures.

Billilingra has been in family ownership for 52 years and the brothers have been involved in its management since the mid-1970s. As the farm is located in a drier part of the district, the Goggins have come to appreciate the importance of rainfall to a sustainable and productive farming operation. Frequent droughts have been interspersed with occasionally good but only short-lived growing seasons. Coupled with very cold winters, this has placed considerable strain on both the land and its resources.

African lovegrass

When David began running the farm in 1973 he knew nothing about African lovegrass. His main priority at the time was trying to lift productivity

and generate extra farm income to accommodate his and his brother's return to the farm. His main weed focus was serrated tussock.

On Billilingra, African lovegrass is believed to have spread by livestock being moved from Michelago near Canberra via Colinton to the Snowy Mountains lease country. Billilingra has extensive double river frontage to the Murrumbidgee River and stock were watered there along the way. There were already dense stands of African lovegrass at Colinton.

The Goggins first became aware of African lovegrass in the mid-1970s but are certain it had been present for some time.

At that time, most research was being directed into control of serrated tussock. It was only in the mid to late 1980s that African lovegrass attracted the attention of Dr Malcolm Campbell from the NSW Department Primary Industries at Orange. Some of his original research on herbicide control options and methodology for African lovegrass was undertaken jointly with the Bredbo Landcare Group, of which David and Will were active members.

David and Will tried to control the weeds during the 1970s by chipping individual African lovegrass plants and spot spraying serrated tussock over 4,046 ha, but the African lovegrass was spreading at rapid rate. The catalyst for its real explosion on Billilingra came "with a run of dry years" in the late 1970s.

Today, the African lovegrass situation at Billilingra can be described as a heavy infestation (more than 25% ground cover) over 60% of the property.

According to David, two factors have largely contributed to the explosion of African Lovegrass over the past 20 years:

- ➔ Seasonal conditions that reduced pasture growth and vigour, favouring the spread of African lovegrass.
- ➔ Reduced fertiliser applications in the past 10 years in response to challenging economic circumstances.

Over 40% of the 4,400 ha property has been sown to introduced pastures over the past 30 years and many of these are now dominated by African lovegrass.

Case Study 1 - Bredbo, New South Wales

The incentive to act

David and Will Goggin are highly regarded throughout the district for their farm management. They are respected and admired for their personal integrity and community consciousness. These personal traits have been the basis for their desire to control both serrated tussock and African lovegrass - a sense of "doing the right thing".

The direct impact of these weeds, in terms of productivity losses and control costs, has also been a strong motivator.

The Goggins have redirected their fight against African lovegrass to a controlled management strategy based upon utilisation as they feel eradication is no longer feasible. Their eradication strategy continues unabated against serrated tussock.

Diversity in the approach

Over the past 30 years, David and Will have adopted various control and management practices, most of which have regrettably had limited success against this weed, which is well adapted to their farm's environment.

They have decided that the best approach is to learn how to operate with the plant as a dominant pasture species in most paddocks.

Grazing management

To better utilise the rapid spring and summer growth of the African lovegrass and keep the plant green and leafy for as long as possible, David and Will apply a strategy of high density grazing to specific paddocks.

Grazed paddocks are maintained at a high stocking rate (65-75 DSE ha) for 6-8 weeks from about mid-October to December. They are usually stocked with a combination of both cattle and sheep.

This approach is constrained by the cost of fencing and, most importantly, watering points.

Failure to increase the grazing pressure during peak growth periods for African lovegrass allows it to become more dominant the following year.

Pastures and cropping

Major limitations of African lovegrass as a forage plant are its poor winter growth and susceptibility to frost.

In order to address their worsening winter feed gap, David and Will plant forage cereals such as grazing oats or winter wheat for two to three years. This helps to reduce the seed burden of African lovegrass before sowing to an introduced perennial pasture.

The first crop of each rotation is established using conventional cultivation due to the physical difficulty of direct drilling through the thick mat of African lovegrass. Subsequent crops and the pasture phase may be direct drilled.

Determining which paddocks are used for cropping and sowing to pasture is based on the level of weed infestation and the overall level of forage production. Most pastures are sown to a 'shotgun' mix of phalaris, fescue, cocksfoot and lucerne.

David is "forever trying to find something which is persistent and competitive" and is prepared to forego some production for this. He has found that lucerne seems to "hang on longer" and, being a perennial legume, appears able to improve the overall quality of the pasture, including that of the African lovegrass which is then utilised more effectively.

While this approach is designed to suppress the African lovegrass, it is not uncommon for the weed to re-invade after two to three years and dominate the sown perennial pasture within five to six years.

In earlier times, those areas of the paddock which could not be cropped, such as rocky knolls, gullies and fencelines, were sprayed to prevent re-invasion. David said that this was an "absolute waste of time" due to the high level of seed reserves in the soil.

Use of supplements

To better utilise the poor quality feed, David and Will offer a variety of supplements to their animals during winter. Supplements are now regarded as "a big and vital part of today's operation".

For practical and logistical reasons, sheep are provided with urea-based mineral blocks.

With the exception of the stud animals, cattle are fed a commercial dry mineral lick known locally as "McCosker Brew" containing various minerals and nutrients. This has been very effective in increasing the utilisation of low quality pasture and roughage through winter at low cost.

David said he ran one mob of heifers all winter solely on African lovegrass with McCosker Brew and they came out "looking pretty good".

Herbicides

Herbicides, including both flupropanate and glyphosate, are used on individual isolated plants in cleaner and more productive country, especially along the river flats and irrigated land. However, spot spraying is generally limited due to the size of the problem.

Particularly dense stands of African lovegrass, where plants are large and occupy 100% groundcover, are sometimes sprayed with glyphosate using a boom. They are sprayed when the weed is green to reduce the bulk and vigour and to allow desirable species to grow in the absence of competition. Damage to non-target species is minimal as the large bulk of African lovegrass absorbs all of the herbicide. Annual species are especially responsive, particularly in higher fertility situations.

Burning

Dense infestations are burnt during autumn or late winter to reduce the bulk of the standing dry feed and encourage growth of other pasture species.

Case Study 1 - Bredbo, New South Wales

Burning is used in spring to allow stock easier access to the actively growing green matter, which has much higher feed quality. Stocking rates can be increased with the higher growth rates of the African lovegrass.

Benefits and costs

The Goggins' primary management costs for African lovegrass have been identified as feed supplements for sheep to allow them to graze the weed and the cost of planting the forage crops for the cattle.

Feeding supplements to the sheep allows David and Will to derive grazing value from the African lovegrass during winter. These supplements cost an estimated \$3,000 per year. In spite of this, his sheep numbers have fallen by around 33%. This decline in carrying capacity has led to a current annual loss in wool income of around \$56,000 and loss in sheep sales income of \$35,000. The total impact of African lovegrass on the sheep enterprise is a loss of around \$94,000 per year.

The cattle enterprise has been maintained over time due to the use of the forage crop to increase feed availability. The forage crop costs of \$20,000 per year protect the cattle enterprise from a decline in carrying capacity estimated to be worth \$56,000 per year. Therefore, their net benefit from maintaining this enterprise is currently around \$36,000 per year.

Annual costs and benefits of weed management

Costs

Supplementary feed for sheep	\$3,000
Decreased sheep carrying capacity (lost wool and sheep sales)	\$94,000
Forage crops for cattle	\$20,000

Benefits

Avoided loss of cattle carrying capacity	\$56,000
Annual net loss	-(\$61,000)

Keys to success

Success cannot be defined in terms of eradication or the extent of weed control. For the Goggins, success lies in accepting African lovegrass as part of their production system and learning to make best use of it.

A management system was developed to take advantage of the physical characteristics of African lovegrass which enable it to thrive in this environment.

David Goggin concedes that if they had their time over they would "certainly do things differently" with regard to African lovegrass.

David firmly believes that it is essential to "go hard early". He said that if African lovegrass is not eradicated when there are still only a few isolated plants, it will quickly get a foothold and be impossible to eliminate. It can quickly invade and dominate pastures.

David's other regret relates to using a hoe to chip individual plants in the early stages of invasion. This was driven by a desire to "do the right thing" and a lack of understanding of both the weed and suitable alternative control measures.

He now thinks that this probably achieved little and may have enhanced its spread due to the physical disturbance of the ground, which possibly encouraged more seedlings to establish. If he had his time over, David would be more inclined to use a herbicide such as fluropropanate but little was known about the weed at the time.

The future now requires fine tuning of the production system which focuses upon management of African lovegrass as a forage species. David is especially interested in alternative systems of grazing management and supplementary feeding.

Summary

David and Will Goggin have been managing two weeds, African lovegrass and serrated tussock, on their Bredbo property, Billilingra, for over thirty years.

Despite their efforts, eradication of African lovegrass has become impossible and they are now managing it to make the best use of it for grazing.

Managing African lovegrass requires:

- ✓ Maximising use of its active growth periods during spring and summer when "you only need a sniff of moisture and you have instant green feed".
- ✓ Improving utilisation of the dry feed in winter through the use of appropriate supplements.

Their situation with African lovegrass highlights the invasive threat of this weed, the importance of treating it early and the need for a different management approach if it is already well established.

Top tips ✓

David's advice to someone else in this situation would be:

- ✓ "Go hard early" to eradicate plants.
- ✓ "Use chemical eradication" at early stage invasion, spot spraying before it becomes well established.
- ✓ Seek as much information as possible to make informed decisions.
- ✓ When the situation is much past the isolated scattered plant stage it is too late to eradicate; change your mind set and learn how to live with it.

Case Study 2 - Emu Park & Albert Park

Shaun and Maria Beasley, "Emu Park" and "Albert Park", Bairnsdale, Victoria

Shaun Beasley and his wife Maria own two properties near Bairnsdale in the Gippsland region of eastern Victoria. They have owned Albert Park since the 1980s and Emu Park since 1993.



The production system

The two properties have a total area of 2,350 ha - 1,700 ha at their home property, Emu Park, and 650 ha at Albert Park, 27 km away.

Shaun is a specialist Merino breeder and currently runs a total of 20,000 dry sheep equivalents (DSEs) over the two properties. His goal is to increase production substantially.

Emu Park and Albert Park are run jointly and integrated into the overall sheep operation but they have two distinct management systems. Emu Park is primarily used for breeding and Albert Park is dedicated to running wethers and has a small area of cropping.

African lovegrass

While African lovegrass is present on both properties, the weed situation is quite distinct for each property and requires different management approaches.

At Emu Park, African lovegrass is currently under control but is at risk of taking over the pasture. The weed has been present at Albert Park for a longer period and is more widespread.

Shaun first experienced African lovegrass when he bought Albert Park in the mid-1980s. He knew nothing about the weed and was only moved to identify the plant when he noticed that "stock weren't eating it."

At the time of purchase, African lovegrass was already well established throughout much of Albert Park, as scattered, mature plants. It was particularly common in paddocks adjacent to roads and on the poorer, sandy soil types. A significant seed bank would have built up in the lighter textured soils.

The African lovegrass infestation has been exacerbated by a combination of drought, and associated decrease in groundcover, together with summer rainfall events, which favour the weed's growth relative to most other pasture species.

Armed with this experience, when Shaun acquired Emu Park in 1993 he undertook a ruthless eradication campaign, which has been more effective than his Albert Park efforts. This is due in part to a smaller initial weed problem at Emu Park, together with a more concerted program from the outset. Nevertheless, while the situation

at Emu Park is described by Shaun as "manageable", it is still at "tipping point" and could easily degenerate.

The East Gippsland environment is well suited to the spread of African lovegrass. Soils at both Emu Park and Albert Park have a sandy loam texture with low water holding capacity. Rainfall is naturally quite high (> 600mm) but tends to be irregular and falls predominantly in summer.

The incentive to act

Shaun and Maria have set a simple management goal for both properties - to maximise productivity and profitability of the sheep breeding enterprise, with a focus on wool production per hectare.

Shaun is committed to addressing any factor which inhibits this goal or impacts upon the economic bottom line, especially those factors over which he has direct management control.

African lovegrass represents one such factor that Shaun believes is capable of both reducing pasture productivity and the profitability of his farm.

Driven by a strong desire to maximise the productivity of his farm, Shaun said that the low palatability of African lovegrass when compared to other pasture species was the main catalyst for an ongoing commitment to controlling the weed.

Albert Park carries about 10 DSE/ha. Shaun estimates that, despite a concerted control program, African lovegrass has reduced productivity on Albert Park by 5%. Without his commitment of 20 to 30 labour days per year for spot spraying, Shaun believes that the loss of production would 'easily have doubled' to a 10% decline in stocking rate. The same labour commitment at Emu Park has further reduced the impact on carrying capacity but Shaun feels that it is nevertheless equally as vulnerable.

While economics and profitability are major drivers, Shaun acknowledges that he is also motivated by a strong sense of personal and professional pride. This affects all aspects of his farm management, especially weeds.

Deliberation

The control strategy adopted by Shaun for African lovegrass is one that he describes as the "fire brigade" approach. That is, "when disaster strikes, do something about it."

In saying this, Shaun is quick to point out that the emphasis is to "find out what it is; how to get rid of it; and then do something about it." In Shaun's situation, this has meant adopting a proactive approach to eliminating the weed.

Shaun feels that in the 1980s, very little was known about controlling the weed in Victoria and it was more a matter of trial and error. The management procedures that were known involved adopting a policy of selective removal, by spot spraying using the herbicide flupropanate.

Diversity in the approach

Since the discovery of African lovegrass on the properties during the 1980s, Shaun has investigated a range of possible control options. He trialled several strategies, many of which were unproven due to the limited knowledge of the weed in those earlier years. Since that time, more has been learnt about the biology of the weed and suitable control practices.

Shaun's control program has, to date, focused on a careful spot spraying program, complemented by growing competitive pastures species.

Herbicides

Shaun has implemented a regular spot spraying program for African lovegrass on Albert Park for over 20 years. The weed has been conscientiously sprayed every year, often requiring around 20-30 days labour and 150-200 litres of herbicide.

The choice of herbicide has represented the only change in the control of African lovegrass on Albert Park during the past 20 years. Shaun prefers glyphosate for spot spraying and has more recently used the higher strength formulation.

Based on past experience, Shaun prefers not to use flupropanate because of the residual effect that restricts pasture growth for several years after treatment. He also found that two or three years later, the African lovegrass situation had not improved.

Despite his meticulous approach to spot spraying for weed control, Shaun believes that the situation with African lovegrass today is "probably worse" than it was when he started trying to control it. The lack of meaningful progress, after 20 years of management, does not sit well with Shaun, who takes pride in his professional accomplishments.

Pastures and cropping

Kikuyu has been planted on lighter sandy ridges and in those areas of paddocks that are vulnerable to invasion

by African lovegrass. Kikuyu has been found to provide adequate and effective competition to African lovegrass at Emu Park.

Throughout the remainder of the property, where soil types are slightly heavier, perennial pastures are sown to a pasture mix, with control of African lovegrass top of mind. Shaun chooses a base of phalaris with other species, such as tall fescue, that can respond to summer rain.

Shaun is convinced of the necessity to enhance the vigour and productivity of sown pastures, through regular fertiliser application. As a result, the whole property receives 125 kg/ha of superphosphate annually.

In a bid to increase the impact of his weed control efforts, Shaun is investigating a number of alternative management options at Albert Park, including cropping. He is considering growing spring-sown cereal crops, such as barley, and dual purpose winter wheat, before sowing improved perennial pastures.

Like all farming decisions, the first consideration with these crops is to increase farm productivity, with an added weed control benefit.

Grazing management

A further management change that Shaun is contemplating at Albert Park is to implement a planned rotational grazing program for the wethers over summer.

This strategy, which is supported by positive trial results from the Victorian Department of Primary Industries (DPI), is designed to maintain higher levels of groundcover over summer and autumn, on lighter textured soils, as stocking rates are increased.

The down side to this management option is, in Shaun's opinion, the need to maintain consistently high stocking rates during spring and summer, to prevent the plant from seeding.

Summary

Shaun has managed African lovegrass by regular and conscientious spot spraying and encouraging competitive pastures.

For the past 13 years, this has kept African lovegrass under control at Emu Park. The situation at Albert Park highlights the fact that early detection and treatment is critical to success. On that farm, where the level of initial infestation was higher, 20 years of treatment has been less successful.

Top tips ✓

Shaun's suggestions to other farmers include:

- ✓ Accept responsibility for the weeds on your own property – it's all about self help.
- ✓ Learn to identify all of the weeds on your property, especially African lovegrass.
- ✓ Implement control measures immediately – don't wait or procrastinate.
- ✓ Recognise that high fertility and vigorous perennial pastures are your best defence.
- ✓ Pay careful attention to those areas of the property with poorer soils, low fertility and bare ground – these are a haven for African lovegrass.
- ✓ When spot spraying, glyphosate is a useful and practical alternative to flupropanate.
- ✓ Seek expert knowledge and technical assistance to develop your strategy to implement more effective control practices. This provides much needed confidence in decision making.

Even imposing a short rest from grazing as part of a rotational grazing plan will allow the African lovegrass to produce viable seed, which may compound the weed problem.

Diligence

An ongoing need to be vigilant is paramount at Emu Park. Shaun is only too aware of the potential risk posed by African lovegrass, from his own personal experiences at Albert Park. He is determined to avoid a similar problem at Emu Park.

The greatest threat comes from the 16 km of public roads that surround and traverse Emu Park and the property's extensive creek frontage. These support further incursions of African lovegrass and represent a major threat of seed spread.

Shaun is proactive in encouraging the local authorities to control the roadside infestations through a regular spraying program.

Benefits and costs

The control costs for African lovegrass are relatively high, particularly for labour. Shaun estimated his annual control cost at \$8,600, including \$1,400 for herbicide costs and \$7,200 for labour, based on 30 days at \$30 per hour.

The benefits of Shaun's strategy are reflected in the farm carrying capacity. Shaun has indicated that, had management of African lovegrass not been implemented, the carrying capacity across the two properties would have declined by an additional 5%. Based on this, it is estimated that the value derived from efforts to control African lovegrass on the two properties over the past 20 years are worth \$24,800 each year.

This value represents income that Shaun is earning on carrying capacity, that may not have been available had the weed not been managed.

Annual costs and benefits of weed management

Costs

Chemicals	\$1,400
Labour (30 days @ \$30/hr)	\$7,200

Benefits

Avoided 5% loss of carrying capacity	\$24,800
Annual net benefit	\$16,200

Keys to success

The weed situations at Emu Park and Albert Park highlight the importance of early action to control African lovegrass.

As each property has been subjected to a similar weed management approach over a considerable period of time, the major difference can be attributed to the initial level of infestation. If African lovegrass is allowed to "get away" and create a seed bank in the soil (as was the case at Albert Park, before the Beasleys bought it), it is very difficult to eradicate. This is especially the case when the environment and soil type favour the weed's growth, and where it can actively compete with existing pasture species.

Shaun is in two minds about the African lovegrass situation on his two properties. At Emu Park he is confident that a combination of removal of individual plants, together with a planned program of pasture development and fertiliser application, will enable him to keep the weed under control. Nevertheless, he still describes the situation as being "on a knife's edge".

Conversely, at Albert Park, "the jury is still out." Despite an ongoing commitment to controlling African lovegrass, over 20 years the situation has not improved and may get worse.

Shaun feels that a number of planned alternative management strategies including cropping, pasture renovation and more intensive grazing management, may well determine the future situation with this weed.

Case Study 3 - Filmore and Gumbara

Robert and Joanne Duff, "Filmore" and "Gumbara", Tenterfield, New South Wales

Robert and Joanne Duff manage two properties just east of Tenterfield – Filmore, a home block of 140 ha, and Gumbara, with 210 ha. These properties were bought by Robert's family 10 years ago.



The production system

The cattle enterprise that they run across these two properties is managed with a flexible balance of breeding, trading and finishing, taking advantage of prices and seasonal pasture growth.

Typically they run 100 breeders and 200 dry cattle, turning off about 80 head as weaners or vealers, depending on price. Each year they grow out 100-150 head, buying in some of these.

Gumbara has primarily native pastures while Filmore is dominated by African lovegrass. Historically these pastures were fertilised with 110kg/ha of single superphosphate but now fertilisers are applied as required after soil testing. The soils are acid with high aluminium levels so Robert is trialling a natural fertiliser product with the aim of adjusting the pH balance and replacing required nutrients.

A mix of rotational grazing in summer and set stocking in winter is used to manage African lovegrass and ease the winter feeding.

African lovegrass

African lovegrass is common in parts of the Tenterfield district.

The summer-growing African lovegrass is now so dense on 80% of Filmore that it has become the dominant pasture. It was widely established when the Duff's bought the farm 10 years ago.

Low levels of African lovegrass are found on Gumbara and Robert is trying to prevent it from establishing there.

Robert's main concern with African lovegrass is its low winter productivity. Its prolific summer growth produces an abundance of feed but it is of very little value in winter. Its dense growth in spring and autumn inhibits the growth of other winter grasses, significantly reducing carrying capacity.

Robert claimed that he "could run 500 cattle in summer and only 50 in winter."

The incentive to act

Robert's goals for the farm combine immediate and longer term views. He aims to get as much production as possible from the farms while improving the farm for the next generation. He hopes to leave the farm productive, viable and in better condition than when they found it.

Robert is actively involved in Landcare. The Duffs have planted trees along many fencelines to provide shelter belts and shade on what had been a heavily cleared farm. Envirofund grants have assisted with erosion control works and control of Coolatai grass (*Hyparrhenia hirta*) along the highway.

Robert and his family have accepted that eradicating African lovegrass at Filmore is not feasible and they are finding ways to better manage and use it.

Deliberation

Initially Robert set about eradicating African lovegrass at Filmore by spraying then establishing new pastures, which was expensive and had little success.

Robert tried to learn as much as he could about control and management of African lovegrass. He was surprised to find that there was little information available through the "normal channels".

As a result, Robert's system has been developed largely by trial and error and through discussions with other farmers.

Robert's Landcare group has trialled a range of solutions, helped by having "a great Coordinator".

NSW Department of Primary Industries (NSW DPI) trials on acid soils were conducted at Filmore to try to understand whether acidity influenced African lovegrass. The trials concluded that liming appeared to have a little effect.

In the past many farmers in the district burnt African lovegrass to control it, but when used alone, fire tended to create a monoculture of African lovegrass as it responded best to the fire compared to other species. Filmore had been cultivated and left fallow for some time by the previous owner and this seems to have helped the African lovegrass to establish more densely.

The Duffs have drawn on ideas from cropping rotations in western areas. The local Landmark agronomist has helped them to trial alternative approaches.

While there was information available on how to kill African lovegrass, Robert was frustrated by the lack of information about longer term control programs.

Eventually Robert accepted that eradication of African lovegrass was not a feasible option at Filmore. He now aims to reduce its dominance and manage it to maintain palatability and feed value for as long as possible.

At Gumbara, Robert still aims to prevent it from entering, and to contain and eradicate existing plants. While he is not completely confident that this is possible in the longer term, Robert is keen to prevent or at least delay African lovegrass from taking over that farm.

Diversity in the approach

Robert's African lovegrass strategies are different for each farm to suit the different level of infestation and the feasible goals.

Herbicides

At Gumbara the goal is to contain African lovegrass, prevent new incursions and eradicate, if feasible.

Robert spot sprays to kill plants and stop seed set. Initially a mix of flupropanate and glyphosate was used but Robert now uses only glyphosate, as he was concerned about the potential risk of residues in cattle from flupropanate.

Quarantine

Quarantines are established to reduce seed movement.

Cattle are not moved between the farms during summer when African lovegrass is seeding. Cattle are usually bred at Gumbara and finished and sold from Filmore. Generally only breeders are moved back to Gumbara from Filmore.

Grazing management

At Filmore the goal is to manage African lovegrass to get the most grazing value from it.

During summer, cattle are moved in mobs of 100 head to crash graze small paddocks (divided by electric fencing) for 7-10 days. They rotate back into these paddocks after about a month. While this is too long in a good season to keep African lovegrass short, to bring the cattle in any earlier would require increased stock numbers during summer.

Calving is timed to best match the growth periods of African lovegrass – calve in spring and sell in autumn.

Pastures are slashed once per season, during summer and autumn on 60% of Filmore, to supplement the crash grazing and keep the grass short and actively growing. The slashed grass is left as mulch.

During winter, cattle are supplementary feed with a molasses/protein meal mix to improve nutrition and encourage cattle to feed on the hayed-off African lovegrass.

Feed oats are grown on small areas of 20-25 ha with African lovegrass excluded by herbicides and cultivation. After the oat rotation of 4-5 years the area is planted to a competitive, summer growing, subtropical pasture. Robert is currently trialling Rhodes and Premier Digit grasses.

Fertiliser options are being trialled to enhance winter clover and grass growth. More nitrogen is needed to meet the demand for the breakdown of mulch.

Interestingly, Robert has observed that cattle will intensively graze some patches of African lovegrass while leaving other patches less grazed. Cattle return to re-graze these preferred patches while avoiding areas where the grass has grown tall. There's no clear explanation for this selective grazing behaviour.

Diligence

Robert aims to keep the African lovegrass short. As soon as it flowers, its feed value declines dramatically.

The timing of spot spraying is critical to reach it before seed is set.

In peak periods, Robert found it difficult to balance the workloads of spot spraying, slashing and contracting work he does for other farmers. To be sure that everything happens on time, he has employed casual labour to spot spray.

While mulching is working well to maintain feed value, there is a high build up of mulch that is slow to breakdown, making it difficult to slash. Robert has tried spraying it with a microbe mix to accelerate the mulch breakdown but this wasn't very successful, perhaps due to the dry seasons.

Robert is considering spray topping in a paddock where the mulch is very thick, which has been done on other farms in the district. To avoid the risk of herbicide resistance, he won't do this for more than two to three years.

During peak growth periods, African lovegrass is high in protein and a good grazing feed. Robert might try to bale the grass and store it as silage to gain multiple benefits of keeping the grass growing, avoiding the build up of mulch from slashing and providing a cheap winter feed. There is a relatively small window when the grass could be baled to optimise protein levels.

Robert is considering better adapting his grazing enterprise to match the growth patterns of African lovegrass, moving out of breeding completely and operating a backgrounding enterprise or finishing cattle bought in from elsewhere.

Benefits and costs

The main costs of African lovegrass are the low winter productivity and loss of winter clover growth. Robert offsets this by slashing to maintain palatability and feeding protein supplements during winter.

There are a range of benefits from mulching and crash grazing at Filmore, including:

- ➔ Feed value is retained for longer; cattle are making better use of it and doing better.
- ➔ Reduced shading allows clover and softer grasses to re-establish.
- ➔ Better pasture utilisation - without management, Robert imagines cattle would graze on only a few areas of the paddocks that they keep short.
- ➔ Soil humus is building up.

Without a weed management strategy, Robert estimates that his carrying capacity would be 70% of what it is now. Using his current stock figures, for cattle breeding, trading and fattening and using NSW DPI farm budgets this equates to an annual value of approximately \$23,000.

At Gumbara, the benefits aren't yet evident – rather by preventing African lovegrass, the benefit is in avoiding the potential impact if it established widely.

Annual costs and benefits of weed management

Costs

Slashing 60% of Filmore (fuel, time, machinery)	\$4,000
Supplementary feed (8 bags/wk for 4 mths @ \$40/bag)	\$5,120
Spot spraying at Gumbara (\$3,000 labour, \$2,400 chemicals, \$500 fuel)	\$5,900
Benefits	

Avoided 30% loss of carrying capacity	\$23,000
Annual net benefit	\$7,980

Keys to success

Robert considers the key indicator of success is the productivity they achieve to the market. So far this has been difficult to determine as they've had a run of dry years. He does feel that the carrying capacity has been better than without the management strategy and that they are learning to use African lovegrass better.

The critical parts of their approach are to constantly try new things, keep African lovegrass short to maintain productivity and carefully time operations.

Flexibility in their cattle enterprise has also enabled the Duffs to take advantage of the market while matching the seasonality of their pasture.

Robert will continue to refine and improve his strategy and try different things.

He hopes that more information will become available about the grazing management of African lovegrass, as well as a more competitive pasture species.

In the longer term he feels that African lovegrass will also take over Gumbara, despite his current efforts – he hopes that by then they'll have a good system for managing it.

Summary

Robert Duff uses different strategies to manage African lovegrass on his two Tenterfield properties, according to the level of infestation on each farm.

At Gumbara, he uses a containment strategy to prevent African lovegrass from establishing, which involves regular monitoring and spot spraying before seed set.

At Filmore, African lovegrass is now the dominant pasture and Robert is learning to manage it rather than eradicate it. He uses a combination of crash grazing and slashing to keep the grass short and palatable. A small area is cropped to fodder oats for 3-4 years followed by planting summer-active grasses that he hopes will be able to compete with African lovegrass.

Top tips ✓

To others facing an African lovegrass challenge, Robert suggests:

- ✓ Sit down and work out a program of management that best suits you. Match the program to your country (particularly land capability) and your equipment.
- ✓ There are so many different things you can try, the key thing is: keep it short and manageable – don't let it get into tussocks. Once tussocky, African lovegrass is very hard to manage and stock won't go into it at all.
- ✓ Where not yet established, get in early and do what you can to prevent the incursion from taking hold. Use spot spraying and don't move cattle from African lovegrass infested areas to clean country when it is in seed.

Case Study 4 - Greenmount

Kerry and Susie Pfeiffer, "Greenmount", Cadelo, New South Wales

Kerry and Susie Pfeiffer have been farming at Cadelo since 1975, when they took over the management of the 450 ha family property, "Greenmount".



The production system

Kerry operates an intensive feedlot operation and a beef breeding operation. He turns off 1,500 steers over a six month period, sourcing these from all over south-eastern Australia. The steers are marketed locally.

Until 2000, Kerry and Susie had run a "typical south coast vealer operation" of 300 breeders. Despite substantial productivity improvements, they were struggling to make ends meet and realised that their existing farming system and scale were simply too small to generate sufficient income into the future. Like many people in the picturesque Bega Valley, this realisation was driven by a rapid escalation of land values, which focused their attention on the importance of return on capital from their farming operation. Faced with this challenging situation, Kerry commenced a feedlot operation.

African lovegrass

In the 1950s, a demonstration area of African lovegrass was established on a hillside "in viewing distance" of the Greenmount homestead. It had been planted on a degraded slope to demonstrate its role in erosion control and persistence in the light, coarse textured, granite soils that are typical of the Bega Valley.

The predictions about its growth habit and high levels of persistence have been proven to be sadly prophetic, as African lovegrass is now regarded as one of the most widespread and invasive weeds in the Bega Valley.

The environment is well suited to the spread of African lovegrass, with light sandy loam soils of low water holding capacity and a high, but extremely variable, summer rainfall pattern that encourages the weed's growth habit.

African lovegrass has steadily invaded Greenmount since 1975. From the initial scattered plants, it is now a significant pasture species throughout 95% of the property. As a guide, Kerry estimates that it occupies more than 25% of groundcover on 40% of the property, while a further 55% of the property has a level of infestation described as moderate and in the range of 1-25% groundcover.

Despite this, Kerry is quick to point out that it is being actively managed in such a way that it contributes meaningfully to the annual feed supply. Furthermore, under the management regime, he is

able to maintain it in the green leafy stage for much of the year and so produce feed of high quality throughout the summer.

The incentive to act

Kerry's attitude and approach to managing African lovegrass is consistent with that of his overall management goals for Greenmount. He is motivated by a commitment to increasing production, profitability and the environmental sustainability of his grazing operation.

While acknowledging the relative importance of African lovegrass as a pasture weed, he ranks it below other weeds on the property in terms of its impact on production. Kerry regards weeds such as blackberry, bracken fern, eucalypt regrowth and sweet briar as "the big production weeds", which, if not controlled, would reduce farm output substantially.

The other driving force of decision making at Greenmount is the environmental sustainability of farming.

As a professional farmer who has been actively involved in Landcare and natural resource management for many years,

Case Study 4 - Cadelo, New South Wales

Kerry has a strong belief in the need to produce a "clean" product. This is reflected in his attitude to herbicides, which are used sparingly and only "when absolutely essential". He believes African lovegrass can be managed effectively without herbicides.

Kerry is especially cautious about the more residual, soil-active herbicides such as flupropanate. While recognising the importance of this herbicide for the control of noxious perennial grass weeds such as serrated tussock, Chilean needle grass and African lovegrass, he stressed the need to adopt alternative management approaches where possible.

Deliberation

When Kerry and Susie took over the management of Greenmount, 85% of the property was covered in blackberries and there was little infrastructure or fencing. Although African lovegrass was present when they first started farming, its presence was minimal and its priority was quite low, especially as it was initially promoted as a valuable grass.

From 1975 until the mid-1980s, African lovegrass gradually spread and colonised pastures until it became well established throughout most of the property. During this time, Kerry concedes that he was aware of the problem but that he didn't have the financial capacity to do anything.

In the late 1980s, some paddocks were sprayed but this was a "disaster" according to Kerry because the herbicide killed most pasture species and almost killed the phalaris.

This led Kerry to investigate and adopt an alternative approach that did not depend on herbicides. Kerry was keen to implement a strategy that would also improve farm productivity.

Over the years, he has explored various control options that have not worked or were environmentally unsustainable, including the use of herbicides, burning and slashing.

Kerry used aerial photographs to plan weed management, and took into account topography and erosion control when sub-dividing paddocks.

Diversity in the approach

After an ongoing process of trial and error, the solution that Kerry has developed for the management of African lovegrass involves grazing management, pasture management and use of supplements.

This approach to management has been developed in response to his experience that animals "cannot live off African lovegrass when it is left ungrazed", due to its low feed quality and palatability.

Grazing management

The fundamental key to managing African lovegrass on Greenmount is grazing pressure "through sub division and more strategic grazing".

Over many years, Kerry has been subdividing the property, with a goal to have all paddocks at approximately 24 ha, or "enough to run 50 cows".

In spring, he needs to be able to apply higher grazing pressure in order to keep African lovegrass green and short for as long as possible into the summer. This not only increases feed quality and animal performance, but helps to reduce the bulk of poor quality dry matter at the end of the weed's growing season.

Kerry highlights the need for alternate periods of heavy grazing and resting paddocks, as a means of achieving higher levels of pasture utilisation coupled with long-term persistence. This involves stocking with the equivalent of 30 dry sheep equivalents (DSEs) per ha until such time that pastures are reduced to 1,500 kg dry matter per ha. Paddocks are re-grazed at a target of 3,000 kg dry matter per ha, which is necessary to prevent African lovegrass from "getting away".

Pastures

The invasion of African lovegrass throughout most of Greenmount can be contrasted with the situation on a small area of the property that is still very "clean". This area was sown almost 20 years ago to an introduced perennial pasture mix of phalaris, cocksfoot and clovers, and was irrigated up until 1997.

The clean state of this pasture, in the face of weed invasion elsewhere, is testament to the role of fertility, competition and pasture vigour in controlling, or at least suppressing, African lovegrass.

Clovers will be introduced throughout the property in order to increase the nitrogen content of pastures and to improve feed quality. This will increase productivity and better manage African lovegrass. Increasing the nitrogen, and hence protein, content of African lovegrass has been demonstrated to substantially increase its nutritive value, palatability and consumption by livestock.



Summary

Reluctant to use herbicides, Kerry believes that "active management" is the key to addressing African lovegrass at Greenmount. This involves:

- ✓ Introducing a planned program of higher density (30 DSE/ha), short duration grazing over late spring and summer, in order to maintain feed quality and palatability. This is achieved through subdivision into smaller paddocks of 20-24 ha and a flexible rotational grazing policy that allows for adequate rest.
- ✓ Strategic use of feed supplements in late summer and autumn, in order to better utilise the bulk of dry African lovegrass at the end of the growing season.
- ✓ Applying fertiliser and introducing sub clover in autumn, in order to improve fertility and help fill the winter feed gap.

Top tips ✓

What do Kerry and Susie recommend or suggest for someone else in this situation?

- ✓ Get on top of the weed before it gets away.
- ✓ Move away from an extensive system of grazing management towards a more intensive one.
- ✓ Increase utilisation of African lovegrass, through paddock subdivision and supplementary feeding.
- ✓ Good management of African lovegrass is consistent with good pasture management.
- ✓ "You can't be in the green if you're in the red", therefore you must first address fundamental issues of farm productivity and profitability.

During winter, when the African lovegrass becomes frosted and all but dormant, the growth of sub clover helps to fill the winter feed gap. Kerry has observed grazed, frosted clumps of African lovegrass being invaded by clover plants growing through the middle of the hayed off tussock. This is a win-win situation for production, weed control and weed utilisation.

Use of supplements

According to Kerry, one of the greatest challenges associated with managing African lovegrass at Greenmount is "to knock down and keep knocked down the dry sward of African lovegrass at the end of the growing season".

After trying several approaches, Kerry has found supplementary feeding to be the most successful means of encouraging livestock to utilise this roughage as a food source. Self feeders provide cattle with manufactured pellets that contain 14% crude protein and various essential minerals and nutrients.

The dry African lovegrass has also been used as a source of roughage during droughts and in feeding pellets for backgrounding steers.

Benefits and costs

According to Kerry, one of the main benefits of the extra revenue generated from his new beef feedlot enterprise will be his capacity to substantially increase his expenditure on fertiliser over the whole property. This will not only increase production but will also improve pasture vigour and competitiveness against weed invasion.

Fencing costs for paddock subdivision have been significant. It is estimated that fences cost around \$13,000/km and each year, Kerry has been upgrading 5-8 km of the farm's fences.

The extra benefits to the breeder herd of better pastures are significant. The additional weight gain per animal can mean that animals weighing 250 kg can increase to 350 kg, due to the better utilisation of pasture. Across the herd, revenue can increase by \$30,000 if selling 125 cows. Lifting weaning rates can also add \$17,000 per year.

Annual costs and benefits of weed management

Costs

5km fencing @ \$13,000/km	\$65,000
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Benefits

Increased cattle weight gains	\$30,000
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Increased weaning rates	\$17,000
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Annual net loss	-(\$18,000)
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Keys to success

Kerry's firm belief is that "if you want to have a future in agriculture, then you must start finding solutions".

The key to ongoing success is to lift profitability across the farm. The intensification of production using the feedlot has allowed for increased investment in managing pastures, so they too can maximise production. Kerry believes that the keys to success are a firm decision, commitment and finding ways to convert "what is effectively useless to something that is reasonably productive".

Kerry will continue to use his present system of managing African lovegrass at Greenmount into the future. There will be further changes, with a view to increasing overall farm productivity, which should also benefit the management of African lovegrass. The additional farm income being generated from the beef feedlot operation will sufficiently improve farm profitability, to allow extra expenditure on fencing and fertiliser.

Kerry's key message is: "It is easy to say it is too hard – everyone has weed problems and people have to get over inertia. Doing nothing is not an option."

Other publications from AWI and MLA:

3D Weed Management: African lovegrass

**Tips & Tools: Weed removers, pasture improvers
– Effective weed control**

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