

Serrated Tussock Case Studies

Four Case Studies of Farmers Managing
Serrated Tussock in Grazing Systems



HELPING **PRODUCERS** TO MANAGE WEEDS IN GRAZING SYSTEMS

Contents:

	Page
Case Study 1 - Alan and Leanne Heath, “Athlone”, Mudgee, New South Wales	3 - 5
Case Study 2 - John and Rosemary King, “Avonside” and “Muniong”, Berridale, New South Wales	6 - 8
Case Study 3 - Duncan and Maxine Campbell, “Barwonleigh”, Inverleigh, Victoria	9 - 11
Case Study 4 - Murray and Barbara Stephenson, “Brooklyn”, Binda, New South Wales	12 - 14



Serrated tussock (*Nasella trichotoma*) is a perennial, tussock-forming grass that can live for more than 20 years and has a deep, fibrous root system. The plant generally grows during spring and early summer.

Serrated tussock seeds are easily spread by wind but can also be spread by humans or animals, on cultivation implements, in vehicle tyres, on slashing equipment, on firewood or by moving soil.

Serrated tussock has no agricultural value. The weed is unpalatable to livestock and can reduce the carrying capacity of grazing land more than any other pasture weed.

Case Study 1 - Athlone

Alan and Leanne Heath, “Athlone”, Mudgee, New South Wales

Athlone is a 1,460 ha mixed wool and cattle property located between Mudgee and Bathurst on the NSW central tablelands. First settled by the Heath family in the 1860s, Athlone is now managed by Alan and Leanne Heath.



The production system

The Heaths operate a wool enterprise, with a self-replacing Merino flock and wethers, and a self-replacing Shorthorn cattle breeding herd.

Lucerne and phalaris are grown on arable creek flats for hay and silage. Most of the remaining pasture is based on native perennial grasses, with annual legumes such as subterranean clover, and annual grasses. Superphosphate has been used periodically on pastures since the 1950s and arable paddocks have been extensively limed.

The property has been subdivided into smaller paddocks closer to the homestead and on the arable areas, with larger paddocks on steep country further from the house.

Grazing on the smaller paddocks is managed by flexible, rotational grazing. The larger paddocks are mainly set stocked for lengthy periods. Persistence of native grasses has not been a problem and stocking rate is routinely monitored to ensure good groundcover and persistence of perennial plants.

Serrated tussock

Serrated tussock first invaded Athlone 10 years ago from adjoining land - there are 19 neighbouring properties, as well as public roads and creeks that traverse the farm.

Despite a continuous, concerted effort to identify and kill new serrated tussock plants and prevent them from seeding, the weed is found across the entire property. However, the Heaths' planned and continuous surveillance and spot spraying program has prevented weed levels from impacting on pasture productivity.

Alan believes a “whole of community” effort is required across all farms and other lands in the area to prevent serrated tussock from reaching more damaging levels.

The incentive to act

For more than 30 years, Alan has been aware that serrated tussock could develop into a major problem on his property, if allowed to establish and spread.

He learned from farmers in badly infested districts, such as the NSW Southern Tablelands, that the weed could severely limit his pasture productivity and therefore reduce the profitability of his livestock enterprises.

Serrated tussock, left unchecked, smothers introduced and native pasture species. Native pastures are the backbone of Athlone and the potential impact of serrated tussock could have enormous adverse economic consequences as well as posing a risk to the natural resources, including biodiversity.

Serrated tussock can potentially become a monoculture, which Alan said would lead to ecological challenges as well as lost productivity. He said that the whole area could change to a barren monoculture of a non-Australian plant and the ramifications of that on many species dependent on native vegetation could be horrific.



Motivation for action was fuelled by knowledge gained from other farmers, NSW Department of Primary Industries (DPI) and various publications, such as the NSW DPI Agfacts series.

Alan set a goal 10 years ago that has not changed - to prevent the weed seeding and establishing throughout the property.

However, Alan is worried that this goal will eventually become impossible to achieve, unless the district adopts a concerted approach to control serrated tussock. Without this, weed infestations will continue to expand on properties with insufficient control programs, thus increasing the likelihood of more seeds entering neighbouring properties.

Another of Alan's goals is to encourage community participation. In Victoria, all farmers in a given catchment area are involved in an agreed control program that is supervised and supported by public investment.

Alan is a committee member of the Serrated Tussock Working Party for NSW and the ACT, which aims to foster a community approach to the weed's control.

Deliberation

Alan's network of friends and his understanding of the similarity of his environment to infested areas, alerted him to the potential impact of the weed, should it arrive on his property. With this knowledge, Alan ensured that his property was regularly checked by experienced weed inspectors.

When the weed did arrive, Alan implemented a program of thorough surveillance and spot spraying, and maintained a high level of groundcover with a perennial-based pasture.

His approach to control was aimed at total prevention of weed seeding, and to manage pasture so that it provided maximum competition to invading weeds.

Diversity in the approach

Alan has adopted an integrated serrated tussock control program involving careful surveillance, herbicide use, competitive pastures and appropriate grazing management.

Herbicides

Surveillance for new serrated tussock plants is undertaken regularly and carefully. Alan is also always looking for serrated tussock outbreaks when he

carries out other farm activities. Any new plants are treated immediately by spot spraying.

Spot spraying with glyphosate or flupropanate is used to kill plants when they are first identified, and to prevent seed set. Alan carries spot spraying equipment during the routine inspections and when doing other jobs such as mustering and inspecting livestock. Alan is particularly vigilant with spot spraying around laneways, fence lines and boundaries, including public lands.

Pastures

Alan believes competitive, perennial-based pastures are essential for profitability, as well to reduce the establishment of invading seed of serrated tussock. He aims to have almost 100% groundcover at all times.

Pastures are mainly native perennial grasses, with lucerne and phalaris on the arable areas.

The soils are relatively light and shallow, which limits farm production levels. Periodic superphosphate application - about every two to three years - is sufficient to maintain moderate soil fertility, support excellent persistence of native perennial grasses, and maintain a good level of subterranean clover. Lime has been used extensively on the arable country to boost pasture productivity and competitiveness.

Quarantine

Serrated tussock can also be introduced by humans and contaminated vehicles. Only recognised visitors who appreciate and take precautions to minimise the risks, eg, council weed control staff, are allowed to travel across the property.

Alan also recognises the risk of reintroduction of the seed via purchased livestock. To manage this risk, newly acquired animals are kept in designated quarantine areas for two weeks.

Diligence

Alan says that a key to success is continuous, careful monitoring and timely action. Spot spraying the weed as soon as it is found is particularly important. Boundaries are regularly patrolled and treated, as are creeks that run through the property.

Because serrated tussock can regenerate from “hard” seed, Alan said that it is important to continually monitor all areas, even where total control has been achieved. The possibility of weed seed set or re-invasion cannot be ruled out.

Keeping weeds out is an ongoing challenge, particularly with 19 adjoining farms and public lands. Some of these neighbours are hobby farms that are owned by absentee landholders. Alan works closely with many neighbours but with so many involved, frequent turnover, and some with little focus on weed management, it is difficult to achieve a uniform, high level of commitment to the control and elimination of the weed.

Alan is worried that serrated tussock will become increasingly difficult to control. He has seen properties and studied research where serrated tussock has more than halved productivity and has significantly degraded the environment. His program aims to avoid this situation, which he believes would almost be a certainty if the weed was left unmanaged.

Alan strongly believes that a longer term solution lies in a “community-owned” weed control program, where all stakeholders are involved, and advice, good leadership and supervision are provided.

Benefits and costs

Alan has been able to contain serrated tussock invasion of his property for 10 years. He feels he is able to prevent seeding and is eliminating new weeds. Despite dry conditions, his pastures are strong and perennial grasses provide excellent groundcover.

The benefits of Alan’s program are in maintaining, as well as improving, profitability; avoiding productivity losses; and protecting the value of his land.

Direct annual costs of the program, above normal farm practice, are not high, requiring a few litres of glyphosate and flupropanate. An estimated additional 250 hours work is required each year for surveillance and spot spraying.

Annual costs and benefits of weed management

Costs

Herbicides	\$200
Labour for monitoring and spraying (250 hrs @ \$30/hr)	\$7,500

Benefits

Avoided 50% loss of carrying capacity	\$50,000
Annual net benefit	\$42,300

Keys to success

Alan believes the key factors of a successful serrated tussock program include:

- Realistically assessing costs/losses if weed control is not undertaken.
- Formulating a realistic control program.
- Timely and thorough adherence to the program.
- A full understanding of the weed.
- Always being on the look-out for weeds that have been missed and new weed invasions.
- In the future, a coordinated, “whole of community” approach to serrated tussock control will be essential, otherwise individual farmers will be faced with ever increasing levels of weed infestations.

Summary

Alan Heath is managing serrated tussock at Athlone by:

- ✓ Using a combination of control strategies including careful property surveillance, prompt treatment of new infestations with spot spraying and competitive perennial pastures.
- ✓ Being especially careful to monitor likely new weed entry points and reduce the risk of seed entry where possible.

So far, Alan has kept serrated tussock to a level whereby spot spraying of all infestations, combined with competitive pastures, is feasible and there is no impact on his revenue. The management strategy requires a few litres of herbicide and around 250 hours of time each year. By avoiding a 50% loss of carrying capacity, the strategy gives a benefit of around \$50,000 each year.

Ongoing containment of serrated tussock into the future will require well coordinated, “whole of district” management of the weed, as the spread of the weed from one property is a source of new infestations for others in the district.

Top tips ✓

Alan’s recommendations to other people in this situation are:

- ✓ Eradicate the weed before it gets a grip on your property.
- ✓ Centre a control strategy around prevention of seeding.
- ✓ Use a combination of control options that are applicable to your situation.
- ✓ Undertake careful and regular property surveillance, to detect and quickly treat new infestations.
- ✓ Community-wide programs are the only ones that will work in the long run, so encourage your neighbours and public land managers to be active against serrated tussock and to work together in a coordinated program.

Case Study 2 - Avonside & Muniong

John and Rosemary King, “Avonside” and “Muniong”, Berridale, New South Wales

John King and his wife Rosemary run the properties Avonside and Muniong in conjunction with his son Simon and Simon’s wife Kristina. The properties are in the Varney’s Range between Berridale and Jindabyne, in the lee of the Snowy Mountains.



The production system

Avonside, which is 539 ha, was purchased by John’s father in 1932 and has been run by John since 1968. Muniong, which is 1,127 ha, was purchased in 2002 to accommodate Simon’s return to the farm in 1998 and to broaden the sheep breeding enterprise and Merino genetic base.

John is a dedicated, specialist Merino breeder. He established a Merino stud in 1990. A commercial Angus cattle breeding herd is run to complement the sheep operation.

Serrated tussock

Serrated tussock was first identified as a weed on Avonside in the 1950s when John was about to commence his farming career. At this time, little was known about the weed and it was easily mistaken for a range of native tussock grasses of similar appearance.

John believes that serrated tussock was established on Avonside from seeds transferred in dung or physically attached to livestock that were regularly moved through the property. Part of Avonside originally formed a larger property at

Dalgety, and it had been common practice to walk livestock annually from Dalgety to the summer leases in the Snowy Mountains. The Dalgety property is well known for having one of the first serious infestations of serrated tussock in the Monaro Plains.

While isolated serrated tussock plants have been found throughout the whole property, the infestation is largely confined to a number of large patches, mainly along the old stock routes and campsites.

The incentive to act

John King is regarded as an extremely conscientious and highly motivated person and someone who has a strong sense of moral responsibility. He always strives to implement best practice in all aspects of farm management.

John has a particularly strong commitment to controlling weeds, especially serrated tussock which not only affects personal productivity but that of others as well.

The potential enormity of the problem of serrated tussock was emphasised to him by John Munro, an experienced

valuer with the then State Bank of NSW. John had observed the productivity and economic impact of serrated tussock elsewhere in the Southern Tablelands. Sadly, John Munro’s predictions were prophetic and serrated tussock became a significant problem for the district.

As a consequence of these experiences, John’s overall goal for the control of serrated tussock at Avonside is to “never let a serrated tussock plant seed on the property”. However, he is quick to point out that eradication is all but impossible.

Deliberation

As a young, ambitious and conscientious farmer, John set his own goals for managing serrated tussock and has stuck to them throughout his farming life.

A desire to implement best farm practice farming and maximise efficiency encouraged John to seek out professional knowledge and guidance.

He became an active member of various working parties and steering groups who were similarly committed

to controlling serrated tussock both at a local and regional level. This involvement was not only beneficial to the broader farming community - it also allowed John to meet and share experiences with some key individuals working with and researching serrated tussock.

John King has been serious about controlling serrated tussock for the better part of the 50 years since it was first identified on his property. This positive identification, together with confirmation of the seriousness of the weed by a well respected and trusted source, was the catalyst for a lifetime commitment to addressing the problem.

Diversity in the approach

When John first started to control serrated tussock the range of control options were limited.

At that time the only known herbicide was 2,2-DPA, a wettable powder which was non selective at the high rates recommended. The initial strategy involved either chipping or spot spraying with 2,2-DPA to control individual plants or a planned pasture improvement program, especially in areas of heavier infestation.

Over time, John's approach has been modified as his understanding and exposure to the problem of serrated tussock increased, and as more detailed knowledge of the plant and its control became available.

Herbicides

The optimum time to identify and treat serrated tussock is during winter, when flupropanate works very effectively. Flupropanate is used to spot spray every live serrated tussock plant that John identifies in his careful monitoring. John values the residual nature of this herbicide.

While acknowledging that glyphosate has a useful role in helping prevent seed set, John is convinced that this is a sign of poor planning and implementation after "the horse has bolted". Instead, he aims to carefully monitor and treat

serrated tussock plants in winter using low rates of flupropanate.

Pastures and cropping

There were limited control options available in the early days, but fortunately John's pasture improvement program of conventional tillage, fodder cropping and sowing introduced pastures, such as Australian phalaris and sub clover, held the serrated tussock at bay. This approach is now recommended for serrated tussock control on arable land.

All perennial pastures are sown primarily to Australian phalaris due to its high levels of persistence and ability to compete actively with serrated tussock seedlings. Newer varieties of tall fescue are also included in the mix, together with plantain, but the mainstay remains Australian phalaris.

Pastures receive regular applications of fertiliser.

Grazing management

Due to the development of the Merino stud and the need to run small mobs of sheep in small paddocks it is not practical to rotationally graze pastures. However, John is conscious of the need to maintain adequate groundcover and to encourage the competitiveness of the perennial pasture base.

During dry periods, when the level of groundcover is declining, stock are moved and relocated to sacrifice paddocks for more intensive supplementary feeding. Sacrifice paddocks are subsequently integrated into a pasture renovation program.

Hand chipping

Chipping with a mattock is used to remove plants that are identified when a herbicide spray pack is not immediately at hand.

Diligence

To achieve an effective level of control John implements a simple monitoring strategy. He "religiously" covers "every square inch of the property" annually in his quest to spot spray every live tussock plant he finds.

In the initial program, from 1965 to 1980, this took around three months each year and required several 20 litre drums of herbicide. Today the same task can be achieved in less than a week using three litres of flupropanate. According to John, the job is neither difficult nor expensive – it just takes time.



Summary

John King has been at the forefront of the battle to control serrated tussock throughout his working life as a grazier in the Monaro/Snowy Mountains region of NSW. John has been actively fighting serrated tussock both in the paddocks of Avonside and as a proactive member of producer groups and regional advisory committees.

John's effective approach to managing serrated tussock involves determination and diligence over many years to prevent the weed from seeding anywhere on the property. He believes that the majority of the weed problem originates from your own property.

John's years of endeavour and commitment mean that the problem of serrated tussock is now well under control.

Annual control measures used to take months but now take less than one week a year and only three litres of herbicide. At a cost of \$590 per year, this control avoids a potential loss of carrying capacity and productivity worth around \$62,500 each year. This control has been achieved despite ongoing dry conditions and in the face of an escalating weed problem elsewhere in the district.

Top tips ✓

The King families' top tips for preventing the growth and spread of serrated tussock are:

- ✓ Always have a knapsack sprayer of flupropanate, and/or a mattock, in every farm vehicle, including quad bikes.
- ✓ Never take your eye off the ball - control serrated tussock when you find it.

To prevent the weed from growing and spreading, John adheres to a number of routine and reliable practices which are instrumental to his success.

In every vehicle on the property, including quad bikes and four wheel drives, there is always either a knapsack sprayer mixed up with flupropanate or a mattock. These are used every time a tussock plant is found. This policy ensures that each identified plant is removed and prevented from seeding. John is adamant that the best time to control serrated tussock is "when you find it".

Benefits and costs

At present, the property is largely free of serrated tussock. John said that if he had not undertaken his management strategy, all areas would now be affected by heavy infestations covering 25% or more of the land.

This level of infestation would be expected to halve his stocking rate, and reduce the remaining adult wool cut from 7 kg/head to 4.5 kg/head. The annual benefit of his weed management in preventing such an outcome, measured as the current value of wool production, is estimated to be \$62,500.

The benefit derived from managing serrated tussock over the past 50 years is significant in relation to the ongoing annual costs. The annual direct control costs for serrated tussock have been estimated by John at \$590, including herbicide (\$90) and time (\$500).

Annual costs and benefits of weed management

Costs

Herbicide	\$90
Labour for monitoring and spot spraying	\$500

Benefits

Avoided 50% loss of carrying capacity and 35% reduction in adult wool cut/head	\$62,500
Annual net benefit	\$61,900

Keys to success

John King suggests a number of factors have been instrumental in his successful control program:

- ➔ Receiving good advice at an early stage from a well respected and credible person about the potential impact of the weed.
- ➔ Heeding that advice by implementing an ongoing control program.
- ➔ Continually improving and modifying that program by taking into account changes in technical knowledge.
- ➔ Maintaining the control effort religiously from year-to-year.

John is confident that his current strategy to control serrated tussock will continue to be successful into the future. However, he has had enough experience of the weed to know that "you can never take your eye off the ball".

Fundamental to his confidence is the amount of time he has been managing it and his understanding of the plant's biology.

Over the past 25 years, his policy of never allowing a plant to seed means that the weed seed bank at Avonside is now very low and new infestations generally come from external sources.

Case Study 3 - Barwonleigh

Duncan and Maxine Campbell, "Barwonleigh", Inverleigh, Victoria

Duncan and Maxine Campbell own Barwonleigh, a 2,359 ha property near Geelong in Victoria. Barwonleigh has been in their family for 108 years.



The production system

Historically Barwonleigh was run as a fine wool grazing enterprise that typically stocked up to 20,000 Merino ewes.

Today the Campbells run 6,000 fine wool Merino ewes, 130 Angus cattle and a cropping rotation of wheat, barley and canola. In addition, Duncan and Maxine now lease 150 ha of their land to a free range piggery and a small area to a beef feedlot.

The key changes to the way the Campbells manage their farming business were made in response to an increasing serrated tussock infestation first found on their property over 15 years ago.

Serrated tussock

When Duncan and Maxine first found serrated tussock on Barwonleigh in the early 1990s, they were unaware of its significance, or the potential problem that it would become.

Barwonleigh is a north-facing property with a slope of approximately 30 m running from an old volcano down to river flats. Basalt rock barriers covered the majority of the property, catching

the blowing weed seed and allowing the serrated tussock to establish.

By 2000, around 85% of Barwonleigh had become highly infested with serrated tussock, forcing the Campbells to reassess their management options.

They embarked on a 10 year strategy to manage serrated tussock, and now, six years into that strategy, they have gained control of the weed and believe they will eventually eradicate it.

The incentive to act

Being fifth generation farmers themselves, Duncan and Maxine strive to make continual improvements to their property to ensure that they have a profitable and sustainable farming business to pass onto their own children. Controlling serrated tussock was vital if the farm was to survive.

The Campbell's relationship with their neighbours was also under threat as seed spread to their properties by wind. Stopping the seed from leaving the farm was a very early motivation to take action.

Duncan and Maxine were also under pressure from the State Government to actively manage their serrated tussock.

They wanted to eradicate the serrated tussock "to be free of its curse".

Deliberation

In their effort to deal with serrated tussock, Duncan and Maxine have tried a number of approaches, such as aerial spraying and aerial seeding, with mixed results.

In the late 1990s, the Campbells tried aerial spraying the serrated tussock. This method of control was unsuccessful as the chemical killed competing native grasses and left bare ground for the serrated tussock to re-establish. They also tried aerial seeding of competitive pastures, however this too proved unsuccessful.

Their real breakthrough came in 2001 when they developed a 10 year management plan for Barwonleigh. Together with local leading farmers, they formed a group to get some other ideas on how to manage the serrated tussock problem.



The Campbell's plan has since guided their decisions on how to control the weed.

One source of information on the management of serrated tussock was the NSW Department of Primary Industries as well as other landholders with infested land. Family friends have also been an important source of support and help for the family.

The key to their plan was to increase the arable area of Barwonleigh and consequently the options available for management.

Diversity in the approach

In order for the Campbells to control serrated tussock they realised that they would have to completely change the way their property had been managed. They implemented a three-phase management strategy of land preparation, cropping and pasture development.

Land preparation

The first phase was to prepare the non-arable land for cultivation.

Rocks were dug from the paddock with excavators and pushed into windrows with bulldozers. The land was then cultivated to encourage further germination of weeds.

Following weed germination, the land was sprayed with glyphosate, once in spring and then again before being sown to crops in autumn. Manure from the piggery and feedlot was a useful form of fertiliser.

Cropping

The second phase of the strategy involved a nine-year cropping cycle with a pre-sowing herbicide spray to kill any emerging serrated tussock seedlings.

Canola, wheat and barley are cropped in rotation three times to try to eliminate serrated tussock seeds. This cropping phase is also used to control any other weeds that may come up in the cropping phase.

Pastures

The third phase involved sowing a pasture mix of ryegrass, clovers, phalaris, cocksfoot and medics after the final year of the cropping cycle. These species have been chosen because of their ability to out-compete serrated tussock.

Duncan plans to manage the grazing of ewes on the pastures to ensure that the pastures remain competitive against the invasion of serrated tussock.

Other options trialled

The increased area of arable land on Barwonleigh has given the Campbells flexibility to trial a range of other weed management options.

- Pigs have proven useful in digging out and removing the serrated tussock as well as fertilising the soil.
- Tree corridors have been planted on all boundary fences to prevent the seed being blown to and from neighbours.
- Farm forestry (pine, sugar gum) is used to catch the spreading seed as well as shading out the serrated tussock – the weed still grows but does not seed as prolifically.
- Burning the serrated tussock while it is seeding is used to reduce the amount of seed set, which is a good temporary measure.
- Growing potatoes has given effective control but the return on the product varies.

Diligence

Duncan and Maxine feel that “diligence is a must.” They believe that sticking to their 10 year plan has got them to where they are today. They stress the importance of staying focused and remaining positive.

One of their techniques to ensure that they remain in control of serrated tussock on Barwonleigh is constant monitoring. Where new outbreaks are found, Maxine treats the area by spot spraying or other appropriate means.

The strict monitoring on Barwonleigh will continue, to make sure that management practices are the most effective for keeping serrated tussock out of crops and pastures.

Benefits and costs

The Campbells have estimated their direct costs of serrated tussock management to be about \$212,000 per annum, which includes the cost of removing the rocks, chemical spraying, and an additional 600 hours of labour each year.

These costs have been offset by an improvement in the overall productivity of Barwonleigh. Unchecked, Duncan estimated that serrated tussock would reduce the carrying capacity by around 20%. At \$6/DSE, this equates to an annual benefit of around \$60,000.

The increase in the area of arable land achieved through the removal of the rock barriers on Barwonleigh has increased the amount of land that can be cropped. The additional financial benefit obtained through their cropping enterprise is valued at around \$290,000 per year.

Taking these costs and benefits into account, the net benefit of the Campbells' serrated tussock strategy is estimated to be approximately \$140,000 per annum.

Annual costs and benefits of weed management

Costs

Rock removal, chemical control and additional labour \$212,000

Benefits

Avoided 20% loss of carrying capacity \$60,000

Increased financial benefit from cropping \$290,000

Annual net benefit \$138,000

Note: The annual costs will reduce significantly when the removal of rock on the planned area is complete. Net benefit will improve due to decreased costs and innovative farm management.

The Campbells know that, now they have serrated tussock under control, their farm asset has appreciated, and their diverse range of farm enterprises helps them better manage risk.

They have found that the experience of having to manage such a significant problem as serrated tussock has improved the communication between family members and ultimately the farm business by all having to work together.

On the less positive side, other costs the family continue to bear include the huge financial drain of clearing land and changing enterprises, and finding staff with the same commitment to work on the problem with them. The Campbells must also deal with the stress and anxiety created by:

- Working with such a rampant weed.
- Their lack of knowledge of working with a new enterprise.
- Not knowing if actions taken will work.
- The policing of new laws where landowners are now totally responsible for eradication of noxious weeds.
- Making such a huge ongoing commitment.

Keys to success

Duncan and Maxine consider the critical factors to their success in managing serrated tussock to be:

- Researching the weed and options for management.
- Constant monitoring.
- Being willing to try new ideas.
- Persevering with the problem and not giving up.
- Being in a financial position to be able to manage serrated tussock.

The greatest challenges faced by the Campbells have been keeping the property viable, borrowing money to manage serrated tussock, and taking on new ideas and management techniques.

Summary

Duncan and Maxine Campbell's 10 year strategy to manage serrated tussock at Barwonleigh includes:

- ✓ Converting rock barrier, tussock-infected country to cropping country by clearing rocks.
- ✓ A nine-year cropping cycle in arable areas before sowing to pasture.
- ✓ Leasing country to a free range piggery to lift soil fertility.
- ✓ A regular fertiliser program to maintain strong, competitive pastures.
- ✓ A tree planting program to stop seed from blowing off and around the property.
- ✓ Regular autumn/winter spraying of hot spots including aerial, boom and spot spraying.
- ✓ Constant monitoring and treatment of outbreaks.
- ✓ Trialling and re-evaluating all procedures used.

Six years into the strategy, Duncan and Maxine have reduced the area of infestation from 85% to less than 10%. Whilst their strategy is estimated to cost around \$210,000 a year, this is offset by an annual benefit in excess of \$350,000.

Top tips ✓

Duncan and Maxine's useful tips for other farmers with serrated tussock are:

- ✓ Take a long term approach with a continual focus on removing the weed.
- ✓ Develop and implement a 10 year management plan for serrated tussock control, beginning with the greatest gains first.
- ✓ Work with others, particularly neighbours who have the weed – someone who can offer support when the going gets tough.
- ✓ Change farm management to include cropping on the arable land.
- ✓ Keep at it! Don't give up!

Case Study 4 - Brooklyn

Murray and Barbara Stephenson, "Brooklyn", Binda, New South Wales

Murray and Barbara moved to Brooklyn, near Binda in the Crookwell region, about 25 years ago. The 340 ha property, of which 160 ha is arable, was originally used for wool production.



The production system

The Stephensons have more recently concentrated on prime lamb production because of low wool prices. They currently run 1,700 Merino and first-cross ewes and sell 1,700 lambs each year.

About 50% of the farm is sown with introduced pastures - clover, cocksfoot and ryegrass - with the balance being good quality native species, mainly microlaena. They believe this pasture mix is optimum for the area.

Serrated tussock

Serrated tussock was first noticed when the Stephensons bought Brooklyn 25 years ago, but it was not recognised as a problem weed until five years later. The weed spread rapidly and they realised it was a prolific seeder, with new infestations establishing downwind from existing stands, or on land where soil had been recently disturbed.

Due to their diligence, the property now has only isolated patches of serrated tussock.

The incentive to act

The greatest impact of the serrated tussock infestation was on Brooklyn's carrying capacity. Where the weed was not controlled in the past, Murray estimated there was a 40% reduction in the stocking rate, as the weed competed with both introduced and native pasture species.

Little information was available about control methods when serrated tussock was first recognised as a problem, so the Stephensons' approach was largely based on trial and error.

Once the Stephensons recognised serrated tussock was a problem, they quickly realised that it had the potential to rapidly spread and reduce their carrying capacity. They were concerned that their land would become useless for grazing, unless serrated tussock was controlled.

The main goals of their strategy were (and still are) stopping the spread of serrated tussock into new areas of the farm, and reducing the impact of existing infestations on carrying capacity.

Deliberation

When the Stephensons became aware of the problem posed by serrated tussock, it was clear to them that something had to be done to prevent the weed from further affecting farm productivity.

Once this goal had been set, action had to be taken to stop their farm being taken over by serrated tussock and becoming unviable.

The Stephensons initially took the path of maximum impact, ploughing the weed out of the worst affected areas and sowing introduced pastures, including clover, cocksfoot and ryegrass. They hoped that the introduced pastures would out-compete serrated tussock. Unfortunately, cultivation encouraged the weed to spread and the pasture species could not compete.

Murray and Barbara soon learnt that it was also necessary to treat the weeds with herbicide during the pasture establishment phase.

Serrated tussock also infests native pasture areas and in these areas, Murray and Barbara rely on herbicide to kill the weed. In the early years they had limited success, because it was not well understood how best to treat serrated tussock with herbicide.

Diversity in the approach

After initial trial and error, the Stephensons implemented two key phases of the control program. For the first 15 years, they undertook an intensive spot spraying and pasture improvement program, requiring about two weeks of full-time labour each year. This largely eradicated the bigger patches of serrated tussock and reduced the number of new seedlings.

For the past five years, Murray and Barbara have been able scale down their control program. Murray now spends only two days per year spot spraying any new seedlings, with a focus on those parts of the farm where the soil has been disturbed.

Their control strategy relies on herbicide treatment, complemented by competitive pastures. Cultivation is now used only to establish introduced pastures and not as a tool for serrated tussock control.

Herbicide

Application of flupropanate is the preferred method of control for serrated tussock. In Murray and Barbara's experience, this has been superior to glyphosate.

Murray and Barbara have learnt over time that the key to success with herbicide is timing the spraying to allow pastures to gain a competitive advantage over the sprayed weed. They spray serrated tussock when the pasture species (introduced or native) are dormant, and spot spray weeds to avoid chemical damage to surrounding pastures.

Murray uses a novel approach in his spray application for serrated tussock. He applies a metered dose to each tussock plant with a modified drench gun. Targeting the herbicide at the base of the plant minimises its effect on the surrounding pasture cover, helping to reduce the area of bare ground on which serrated tussock seed could germinate.

Pastures

Ensuring pastures retain their vigour is also important. For introduced pastures, fertiliser is applied according to soil test results, averaging about 125 kg/ha of single superphosphate annually.

About every five years, Murray excludes stock from areas of native pasture in late spring to allow the pastures to set seed.

Diligence

Vigilance and perseverance are important to the continued success of the Stephensons' weed control strategy. This means checking areas regularly and spot spraying when new tussocks are found. The Stephensons do this about three times per year over the whole property.

They concentrate on boundaries, where there is a higher risk of seed blowing in from neighbours, and on areas of the farm that have had recent soil disturbance.

Murray and Barbara have observed that serrated tussock is an opportunistic weed and a prolific seeder. New plants quickly grow in areas where the soil has been disturbed or exposed through over grazing.

Benefits and costs

The Stephensons are very pleased with the outcomes of their weed control strategy and recognise that much of their success has come from hard work.

The main impact of serrated tussock was the reduction in carrying capacity, which was up to 40% in some areas of Brooklyn. The control program has doubled the carrying capacity over the past 20 years, thereby improving farm profitability.



Summary

Murray and Barbara Stephenson have effectively managed serrated tussock at Brooklyn by:

- ✓ Taking action when the weed was first recognised as a problem.
- ✓ Vigilance and perseverance for continued success in weed control.
- ✓ Targeted spot spraying of serrated tussock plants, when pasture species are dormant.
- ✓ Encouraging competitive pastures and avoiding bare ground by taking care with spot spraying, fertilising based on soil test requirements, and spelling native pastures about every five years to allow them to set seed.

The carrying capacity of Brooklyn has doubled as a result of effective weed control combined with other pasture management strategies. It is estimated that weed management on Brooklyn cost \$7,595 over the past 20 years, and when combined with pasture improvement and enterprise change, the annual benefit exceeds \$46,000.

Top tips ✓

Murray and Barbara have the following tips for farmers managing serrated tussock:

- ✓ Talk to other farmers in the first instance, to see what they have done and achieved.
- ✓ Attack the weed when density is still low and before it goes to seed.
- ✓ Be vigilant, watch for new plants germinating, and act quickly.
- ✓ Spot spray with flupropanate, targeting the serrated tussock plant carefully to avoid killing the surrounding pasture.
- ✓ Avoid having areas of bare ground where serrated tussock can germinate.
- ✓ Be prepared to commit time and energy to an effective control strategy.

Their serrated tussock management is a labour intensive exercise but it would be more difficult and costly if labour had to be hired to carry out the work.

After 20 years, the Stephensons have only just achieved a situation that they believe is manageable, but the knowledge they have gained should help others control serrated tussock more quickly.

The key enterprise of the farm has shifted over this period from wool-focused sheep production to prime lambs. This has increased the financial returns per dry sheep equivalent (DSE), increasing the dollar value of benefits derived from controlling serrated tussock, and subsequently increasing carrying capacity.

Carrying capacity has increased from 3.5 DSE/ha 20 years ago to 7 DSE/ha, so the return from each hectare of the farm has essentially doubled. Based on an estimated gross margin of \$40/DSE, annual return has increased by around \$140/ha.

In addition, Murray indicated that the value of the farm has also increased, now that it is relatively free of serrated tussock.

There is also a benefit to the community from the control of serrated tussock on Brooklyn. Controlling the source of seed will reduce serrated tussock's ability to rapidly spread to other farms.

The primary costs of Murray's control strategy have been flupropanate and labour. As the areas affected by serrated tussock declined and vigorous pastures helped to protect against new germination, less spraying was necessary. In earlier years, Murray estimated herbicide costs at \$150 per year, with around \$600 for his own labour. The total cost over past 20 years is \$7,595.

Annual costs and benefits of weed management

Costs

Herbicide	\$150
Additional labour for monitoring and spraying	\$600

Benefits

50% increase in carrying capacity (extra 3.5 DSE/ha valued at \$40/DSE)	\$47,600
Annual net benefit	\$46,850

Note: that only part of this value can be attributed to serrated tussock control, as pasture improvement and the change from wool to prime lambs also boosted annual returns.

Keys to success

Murray and Barbara suggest that the critical elements of their success with serrated tussock have been:

- ➔ Applying herbicide to serrated tussock when pasture species are dormant.
- ➔ Controlling tussocks as soon as they are found. Don't take the attitude "there are only a few tussocks so I'll wait a year or so".

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AWI

www.wool.com.au
or 1800 070 099

MLA

www.mla.com.au
or 1800 023 100



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www.mla.com.au



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