

WALLABY PROOF FENCING

*A planning guide for
Tasmanian primary
producers*

Third Edition
April 2013

M. and H. L. Statham

Tasmanian Institute of Agricultural Research

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Wallaby-proof fencing

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M. and H. L. Statham



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Preface

Loss of pasture and crop production to wallabies in Tasmania can be considerable. This guide aims to provide practical information on wallaby proof fencing for Tasmanian land managers. It was produced as part of the Alternatives to 1080 Program on the request of John Dawson, the Project Manager.

Wallaby proof fencing designs have evolved over the last 20 years with information mainly spreading amongst small groups of farmers. We have combined information from 37 properties across Tasmania that have had recent experience with wallaby proof fencing, together with results from relevant Tasmanian and mainland Australian studies. The properties visited ranged from small hobby farms of 30 hectares to extensive grazing properties of several thousand hectares. They are, of course, only a selection of properties with wallaby proof fencing in Tasmania.

There is no “best” wallaby fence, the materials and design used will depend on the animal species involved, terrain, proportion of the browsing population which needs to be excluded and finances available. Wallaby proof fencing is a long-term option that usually needs to be integrated with other control methods such as shooting, poisoning and trapping, both at establishment and over time. Also it is important to realise that wallaby proof fencing is not suitable in all situations.

It is important to remember that wallaby proof fencing may limit movement and dispersal of other species like echidnas, devils, bettongs and potoroos. Planning of a fence should include consideration of these species wherever possible.

If you are planning a new wallaby proof fence or upgrading an existing one you should gather as much information as possible. We hope that this guide is a useful starting point.



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Introduction

Loss of agricultural and forest production to native and introduced wildlife in Tasmania is considerable. Most producers have only anecdotal records of losses due to wallaby and possum browsing because accurate records are time consuming to collect, but comments that were made indicate the extent of loss that some producers suffer.

We share a 12 km boundary with the Crown, which currently means a loss of production equivalent to about 125 breeding cows. The good thing is that if we wallaby proof fence the boundary and it is effective it will pay for itself quickly. – Steve Pilkington, Redpa

Wallaby numbers have exploded in the last 4-5 years. We are providing them with plenty of water and feed. – Leigh Hansson, Bruny Island

Game has got thicker as a response to good pasture. – Stuart Hirst, Tasman Peninsula

I thought we had a problem with wallabies but didn't realise the extent.
– Andrew Stewart, King Island

The reality is that wallabies are eating more pasture than sheep and cattle these days.
– Stuart Smith, Agronomist

Experimental information on pasture loss in Tasmania due to wallabies is also limited. However, four studies have been reported in scientific journals.

- In a three year trial, using an electric fence designed specifically to exclude wallabies, loss of production to wallaby browsing averaged 11% inside the fenced areas, compared with 83% in an adjacent similar area with a normal stock fence¹.
- In a later trial, where enclosure cages were used to exclude wallabies in farm paddocks, pasture loss in areas accessible to wallabies outside enclosures varied between 17% and 100% at nine different locations².



Experimental enclosure, Deddington



Trial enclosure, Ross

- With wallaby proof wire fences around 5 ha paddocks in the North East and South East of Tasmania over three years, an increase in carrying capacity of over 35% on dryland pastures was achieved when wallabies were excluded³.
- In a short-term, preliminary study of the effects of all wildlife on pasture growth at Elliot in North West Tasmania, pasture dry matter production was reduced by 21% under dryland and 34% under irrigation⁴.

When Grant Archer wanted to wallaby proof fence the family dairy farm at Mella in the late 1990s he used two exclusion cages to measure pasture loss to wildlife. Over a 12 month period he measured average losses of 6.2 tonnes per hectare in the 100 m pasture strip adjacent to the bush edge where he expected to produce 12 tonnes per hectare. With a 3 km bush edge he estimated that he would get a 200% return on the cost of a wallaby proof fence in the first year. These figures were sufficient to help him convince his parents to proceed with the fence.



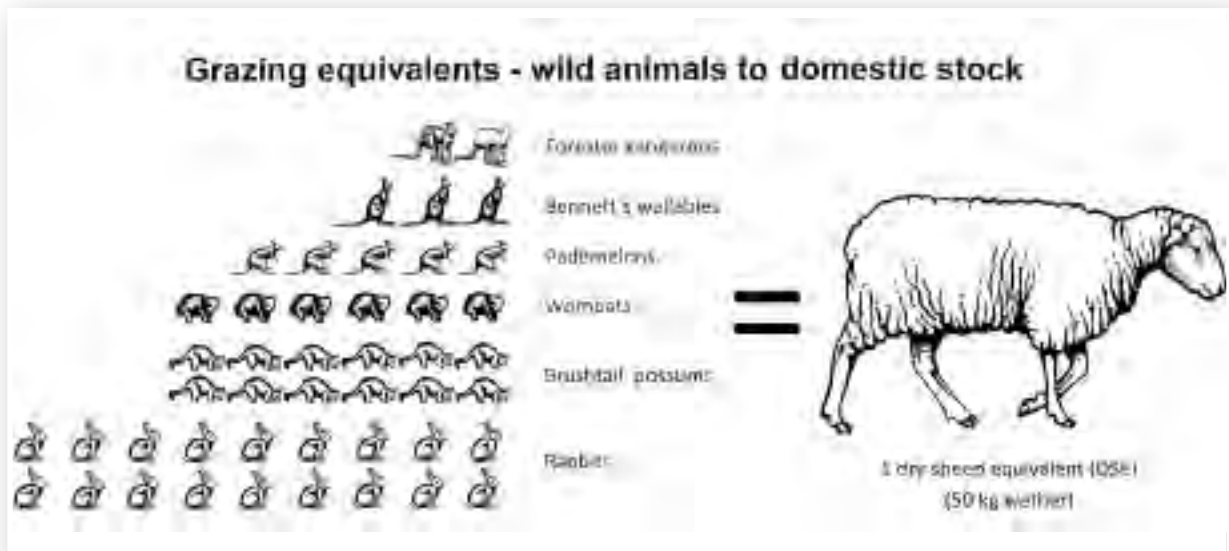
**Wallaby proof fence along bush edge, Triabunna
(James Fergusson)**

A trial on a large property at Ross in the central midlands, is measuring the impacts of browsing damage by native and introduced wildlife on pasture. Preliminary results indicate preferential selection of cocksfoot, ryegrass and subterranean clover by the combined populations of forester kangaroo, Bennett's wallaby, brushtail possum and fallow deer with damage concentrated near the bush edge and diminishing with distance into the pasture. In

winter pasture losses varied between 100% 25 m from the bush edge and 68% 800 m out into the paddock. However, the relative importance of each of the browsing species in causing the damage has not yet been determined⁵.

In other trials on 12 irrigated and dryland dairy pastures in northern Tasmania, pasture loss to pademelons near the paddock edge ranged from 12% to 100% with an average of 63% within 100 m of the bush edge⁶.

Loss of production does not relate directly to numbers of browsing animals present because the animals don't necessarily get all their food from the crop or pasture. However, animal surveys by spotlight counting or faecal pellet counts can help determine which browsing species are present and whether there are large numbers of them.



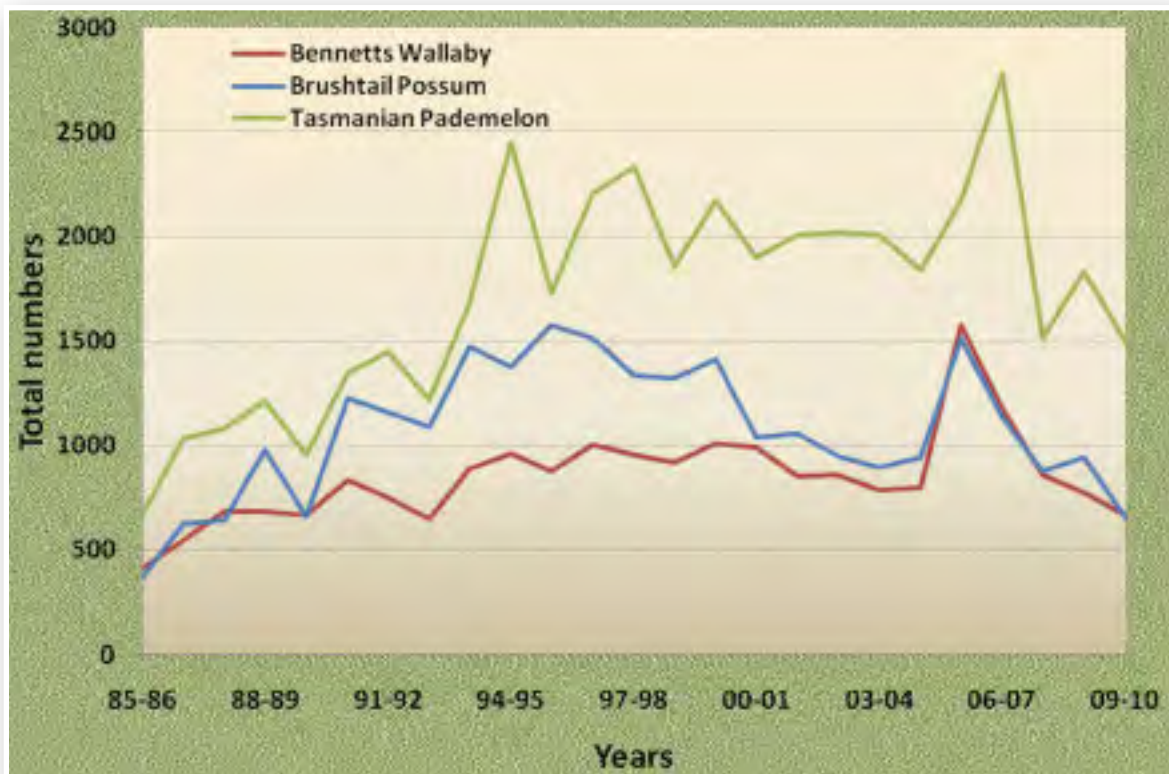
The grazing equivalents of Tasmanian native animals and rabbits compared with domestic stock have been calculated, based on data in the published literature and average weights of the different animal species⁷. Although the estimates assume that all the feed is derived from pasture, which is not usually the case, they are useful comparisons for estimating the possible maximum pasture losses to native animals and rabbits.

We were at the stage where we couldn't afford not to fence. Grass wouldn't germinate before the fence was built and we couldn't run 50 sheep in the paddock. Now we run 50 cows and 200 sheep. – Stewart Archer, Weymouth

We fenced a 20 ha paddock in November and now, two months later, the pasture inside the fence is a foot high and is being grazed by cattle. Outside the fence there is less grass than on a bowling green. – Leigh Hansson, Bruny Island



Wallaby proof fence effect, Gunns Plains (Colin Vercoe)



Statewide number of Bennett's wallaby, Tasmanian pademelon and brushtail possum counted in 130 roadside transects over the past 24 years (DPIPWE)

The three major native species which can become pests in Tasmania are Bennett's wallaby or kangaroo (*Macropus rufogriseus*); Tasmanian pademelon, rufous wallaby or wallaby (*Thylogale billardierii*); and brushtail possum (*Trichosurus vulpecula*). They are opportunists and numbers have increased dramatically in some locations and generally across the State over recent decades due to land clearing, pasture improvement and provision of water. The decline in 1080 usage and recent restrictions on land clearing, combined with further agricultural development and provision of water will almost certainly lead to further increases in population sizes of browsing species.

Annual spotlight counts by Department of Primary Industries and Water (DPIPWE), over 130 ten kilometre roadside transects since 1985, allow an assessment of the changes in population over time. The graph above shows the total Statewide number of Bennett's wallaby, Tasmanian pademelon and brushtail possum counted along these transects from 1985-86 to 2009-10. Since 1985, numbers have increased for all three species, especially pademelons. However, pademelon and possum numbers peaked in the mid 1990s and have declined slightly since then.

The levels of pasture and crop loss experienced in many areas of the State combined with increased production costs make it essential to address the problem. Wallaby proof fencing is one of several tools that a land manager can use to reduce this loss, however, it usually has to be integrated with other control methods such as shooting, poisoning and trapping.

The earliest designs for wallaby proof fencing involved multi-stranded wire fences with some of the wires electrified. These have been superseded by a variety of mesh fences, some of which can be very effective. Good fencing has the advantage that if it is well planned, constructed and maintained it can provide lasting protection, particularly in an agricultural setting. In this guide most of the information relates to fencing out wallabies - both the Tasmanian pademelon and Bennett's wallaby.

1

Animal Species Involved

It is important to understand which species are causing the major damage. Presence of faecal pellets and recent spotlighting or shooting history can be used to get an idea of which species are present. However, there is not necessarily a direct correlation between animal numbers counted or shot and damage incurred, as these counts are taken at one point in time but damage can occur at any time. The animals move between refuge habitat and pasture/crop at varying times, eating in both areas. Wallabies and possums can graze plants closer to the ground than sheep and cattle. This can result in changes in pasture composition due to perennial grasses and clovers being killed.

Bennett's Wallaby or Kangaroo (*Macropus rufogriseus*)

Bennett's wallaby occurs widely and commonly throughout mainland Tasmania and the Bass Strait islands. It is the larger of the two Tasmanian wallaby species. Adults stand approximately 1 m high and weigh up to 27 kg, with a head and body length of around 80 cm and tail length of 70 cm. They are brownish grey on the back, with a reddish neck, whitish belly and black ear tips, nose and paws. They are found in most vegetation types at all altitudes, but are most common in drier bush areas with an open understorey, especially at the bush – pasture interface.



Bennett's wallaby

Primarily grass eaters, Bennett's wallabies will also eat herbs, fungi, shrubs, seedlings and chew bark. They have adapted well to introduced grass, legume and some crop species. On the basis of relative energy needs, 2.8 Bennett's wallabies eat the same amount as a 50 kg wether, although this probably won't all have come from the pasture or crop area.

Bennett's wallabies usually come out to feed at dusk and can travel long distances into crop or pasture, moving over wide areas as they feed throughout the night. This can result in patchy damage across a paddock that is not always obvious. Five Bennett's wallabies radio tracked over a three month period at Kempton, southern Tasmania, had an average home range of 100 ha (range 34 - 164 ha), moving up to 1.7 km through forest to pasture and up to 0.5 km out into pasture⁸.

Individuals will invariably try to go under a fence rather than through or over it, unless pushed or stressed. If pushed they will leap at a fence but very rarely will they jump over. They can break the joints in some fencing mesh styles by trying to push through. In light soil, e.g. on King Island, they are able to dig under a fence to create an entry or exit point. From inspection it is often found that these holes have been made by wallabies trying to get out having come in via a breach point elsewhere. On heavier soils they will exploit slight undulations in the ground surface or use gaps at gullies, creek crossings etc or holes dug by wombats. Anecdotal evidence suggests that Bennett's wallabies are able to move through culverts under roads.

Tasmanian Pademelon, Rufous Wallaby or Wallaby (*Thylogale billardierii*)



Tasmanian pademelon

This species is common on mainland Tasmania and the Bass Strait islands, although only patchily distributed on King Island. It is a smaller more compact wallaby which rarely stands upright. Males are 50% larger than females and weigh up to 11 kg, with a head and body length of about 60 cm and tail length of 40 cm. The fur is dark brown with a reddish tinge. Pademelons tend to prefer wetter areas than Bennett's wallabies, with thicker undergrowth.

Pademelons mainly feed on herbs and grasses in their natural habitat but have readily adapted to non-native species such as clover, some crops and introduced grasses. Four and a half to five pademelons will eat as much as a 50 kg wether.

Pademelons shelter under cover by day and emerge to feed at dusk. They are commonly seen feeding close to cover. Four pademelons radiotracked in dry sclerophyll habitat at Kempton, southern Tasmania, over a three month period, had overlapping home ranges of approximately 150 ha (range 149 - 169 ha). They moved up to 2 km through bush to feed on pasture within 200 - 300 m of the bush edge⁹. In more typical habitat where animals are moving between bush with dense undergrowth and improved pasture, they usually stay closer to the bush edge.

Pademelons, like Bennett's wallabies, will also mostly breach a fence by going under it. However they can fit through surprisingly small holes, especially the young ones which can move through some mesh fences and through many gate meshes. Recent research has shown that pademelons will readily move through 350 mm pipe to gain access to pasture.

Brushtail Possum (*Trichosurus vulpecula*)

The brushtail possum (possum) is abundant and widespread throughout Tasmania and the Bass Strait islands. The largest of the possums, brushtails are about the size of a large cat. Males weigh up to 4.5 kg and are larger than females. They occur in two colour types, a dark-brown to black and a silvery-grey. Possums occur in most habitats including rural and urban areas. They are particularly abundant along the edge of native bush and improved agricultural lands and throughout cleared areas with suitable den sites. Preferred den sites include tree hollows, timber heaps, buildings or holes in the ground.

In their natural habitat possums eat mainly soft leaved herbs. They are opportunistic feeders that have adapted well to agricultural species such as clovers and fruit. Although it takes 12 possums to eat as much as a 50 kg wether, their effect on pasture can be major. Two reasons for this are that they can be more numerous than a landowner might realise due to their ability to hide by climbing and because they preferentially graze on clover.



Brushtail possum

Possoms happily travel on the ground and will go under fences where there is sufficient clearance. They easily fit through some mesh styles and are able to climb over most fences.

Common Wombat (*Vombatus ursinus*)



Common wombat

Another native species which needs to be considered is the common wombat (*Vombatus ursinus*). Wombats are widely distributed on mainland Tasmania and Flinders Island, especially in sandy coastal areas of the north and east coast, but are absent from King Island.

Although wombats eat mainly grass¹⁰, their low metabolic rate and generally low density mean that they usually don't cause much pasture loss. Six wombats will eat the same amount as a 50 kg wether.

Wombats are strong diggers and shelter underground by day in shared burrows. Because each wombat uses several burrows there will always be empty burrows in the area. Male wombats have a home range of 6 - 8 ha compared with 2.5 - 5 ha for females¹¹, so they tend not to move far in a night. A fence line is no impediment to them as they easily dig under it when moving between burrows.

Wombat holes under a fence create problems by developing access points for wallabies. This can result in a significant pasture loss and necessitate increased fence maintenance. It may be possible to install wombat gates in holes dug by wombats to allow them through but prevent wallaby access. (See Maintenance page 25)

Forester Kangaroo (*Macropus giganteus*)



Forester kangaroo

The forester kangaroo is the largest Tasmanian macropod species. It occurs in the northeast and some drier areas of central Tasmania below 1000 metres in altitude. Foresters have also been introduced to other areas in the State including Narawntapu and Maria Island National Parks. Males can reach over 70 kg in weight and have a head and body length of over 2 m and a tail of 1 m. Females are slightly smaller, but much lighter, weighing up to 40 kg. Colour varies from brownish grey to grey, darker on the back than the belly. They have relatively large ears. Foresters are more social than either Bennett's

wallabies or pademelons and are usually seen in family groups of three or four, but can occur in loosely associated mobs of more than 10.

Foresters are primarily grass eaters, and usually emerge to feed up to two hours before dark and will feed throughout the night, returning to cover after sunrise. On average, 1.4 forester kangaroos eat the same as a 50 kg wether. There are no estimates of home range in Tasmania, but on farmland in the ACT the same species had a range of about 120 ha¹².

Like the wallabies, foresters prefer to push under a fence, but will jump a normal height fence, even when under little pressure.

Non-native Species

In addition to the native species, rabbits and fallow deer can cause significant pasture damage.

The presence of rabbits can be identified by seeing them around dusk and by the dung hills produced by males. They can readily move through conventional and wallaby proof fences unless rabbit mesh is used. The diseases myxomatosis and rabbit hemorrhagic disease (calici virus) have been introduced to Australia as rabbit control agents and are still active in Tasmania when the population size and environmental conditions are suitable. Rabbits can be controlled without a permit from DPIPWE.

Where they occur throughout much of central and eastern Tasmania, fallow deer can cause significant damage to pasture and crops. They readily jump over normal fences. A permit from DPIPWE is required to cull deer.

2 Planning and Preparation

When planning a new fence or upgrading an old one it is necessary to have a relatively good idea of the extent and timing of the pasture or crop losses you are experiencing. Loss can be measured formally by the use of enclosure plots to see what grows in the absence of browsing. An enclosure plot is a small area of a pasture or crop that is partitioned off from browsing by a cage or enclosure that makes it inaccessible to animals (*see photos page 2 in Introduction*). Production inside the cage can then be compared with that occurring outside by actual measurement (*see Estimating Pasture Loss page 44*). Another less quantitative method is to compare the growth in one area with that in other parts of the same paddock or an area of similar soil type and pasture history where browsing doesn't occur. An understanding of the losses occurring will allow the potential return from fencing to be estimated.

Wallaby proof fence is equal to 4 bags of super per hectare around the outside of the paddock. – Stewart Archer, Weymouth

When we first came here 30 years ago we didn't notice any wallabies. Now they are a problem. Since I've put in wallaby proof fencing the contrast between both sides of the fence has become extreme. The pasture inside the fence is improving but outside the ground is mostly covered with buzzies. – Colin Vercoe, Gunns Plains

Now the grass is a foot high rather than nonexistent, we haven't changed the super or anything else. – Andrew Stewart, King Island

The cost of reestablishing pasture should also be included. Areas which have been browsed by wallabies and possums for several years will usually have little or no clover and be dominated by annual grasses. New pasture needs to be established to get the full grazing value from the area which has been protected.

It is important that what is being protected is valuable and warrants fencing. Therefore fencing needs to be done in conjunction with pasture improvement.

– Matt Dunbabin, Forestier Peninsula

You need to get a balance between effectiveness of the fence and costs.

– Tim Schmidt, Deloraine

Fence Location

Planning where the fence will be positioned and preparation of the fence line are critical to the later success of a fence in stopping wallaby movement. It is also important to consider your maintenance plan before construction. Circumstances will vary from property to property but the following main points should be considered:

- It may be necessary to avoid steep or rocky areas because of the difficulty in maintaining the fence close to the ground, so sometimes the property boundary may not be the most suitable line to follow with a wallaby proof fence.



Different dry creek crossing management techniques, **top** Weymouth (Stewart Archer); **bottom** Triabunna (James Fergusson)

- In general, a fence should be sited to minimise rough terrain such as watercourse crossings. If this is not possible, there are options like top hinged gates or break away sections to allow flood water through without destroying a section of fence.
- It is desirable to have access to both sides of the fence for maintenance, and planning should take this into account. Where possible keep the fence away from trees. Clearing vegetation away from the fence line will reduce effects of fire on the fence.

It's a good idea to clear back on the outside of the fence to make a firebreak.

– Andrew McCarthy, Pipers River

Accessibility is critical especially with current Occupational Health and Safety regulations, apart from the ability to protect fences when exposed to fire.

– Robbie Payne, King Island

- Planning where gates will be needed for access and stock movement is important.

- Patches of remnant vegetation should not be fenced with wallaby proof fencing. Even if wallabies are excluded at the time of fencing, the area will almost certainly contain some wallabies at times unless very diligently maintained. This will lead to browsing of plants inside the fence, including those species which the fence is trying to protect.

- Is there a need for a new fence? Sometimes an existing fence can be upgraded at a lower cost, for example by adding mesh to an old fence as Joe Blair has done at Mt Lloyd.



Old fence upgraded with wallaby wire, Mt Lloyd (Joe Blair)

- Avoid tight bends in the fenceline to reduce pressure from cornered wallabies trying to get out.

- Excluding wallabies from a farm paddock can sometimes allow regeneration of native tree and shrub species inside the paddock. For example, Donald Graham, on King Island, is delighted with the seedling eucalypts and melaleucas establishing in some of his cattle paddocks now they are fenced off from wallabies.



Recovery of eucalypts and melaleucas inside a paddock fenced off from wallabies, King Island (Donald Graham)

- Presence of wombats will require specific planning (*see Maintenance page 25*).
- The presence of a road through a property can provide a major wallaby access point as it may not be possible or desirable to fence across it, install a gate or fence both sides of the road. Planning a fence should include consideration of how to deal with these points.

I chose the fence site to minimise rough terrain, sacrificing some of the bush area because of steep gullies liable to flooding. – Bob Brown, Pipers River

Wallaby fences work best in heavy rocky soils that are difficult for wombats to dig in. – Matt Dunbabin, Forestier Peninsula

It's better not to have any sharp or right hand corners as wallabies are more inclined to dig if actually cornered. – Robbie Payne, King Island

Road Crossings

A modified cattle grid was trialled on King Island in a newly fenced area to simulate a road crossing¹³. The grid dimensions were:

- Width: 3.2 m
- Depth: 3 m
- Bar spacing: 125 mm
- Bar width: 50 mm (square tubing)

Wings of wallaby mesh supported by star pickets running along the sides of the grid were added to force wallabies to cross the width of the grid rather than move around the post.

After 6 months of use only 38% of wallabies which approached the grid actually crossed it, whereas all would have been expected to move through a simple opening. Bennett's wallaby was the predominant species in the area but the grid spacing should have been wide enough to prevent pademelons from crossing.



Trial wallaby grid, King Island (Nick Johannsohn)

This experimental grid was a light weight structure to test wallaby responses and would need to be more heavily built if it were to be used in a road crossing. It should be possible with good design to incorporate a means of blocking the grid to allow periodic shooting of the wallabies which learn to cross it, possibly in a manner similar to the one-way gates used by some landholders (see *Askin Morrison, Individual Producer Case Studies page 39*).

Neighbours

If possible, cooperate with neighbours when planning fencing, particularly if there is a common bush boundary. A continuous fence between two or more adjoining properties and neighbouring bush or plantation will be much more effective at keeping out wallabies. If neighbours erect a continuous fence, the need for fencing on an individual property is reduced because there is less need for fences on the sides of a property. Obviously, if only one bush edge is fenced animals will move around the end of the fence into neighbouring areas and create bigger problems there.

There can be problems where a farming property borders on a State Reserve, State Forest or private forest. Farmer concerns in such situations include the cost of construction and maintenance of the fence, as the full cost of fencing out wallabies that use both areas is usually met totally by the farmer.

Site Preparation

Site selection and preparation are probably the two most critical aspects of wallaby proof fencing. As wallabies will exploit any gap under a fence to create runways a level compact base will reduce later problems.

Most producers prefer to have a level base line prepared with a grader blade or excavator. This minimises low points where wallabies may squeeze under. Allowing the ground to compact for a year, and if possible establishing grass on the graded fence line, will minimise later digging by wallabies, particularly on lighter soils. It is advisable to fill low areas which may stand wet in winter to reduce later rusting of the lower wires.

In low lying areas that have been humped and hollowed for drainage, the hollows can be levelled out over 150 mm polypipe before fencing.



**Drainage of hump and hollow pasture, Roger River
(Don Turner)**

Preparation is most critical. If you do it properly at the beginning you will get a more effective result from your fencing effort. – Robbie Payne, King Island

Preparation is 99% of job. We used a grader to level off the ground and carted in a lot of gravel and laid it flat over depressions. – Bob Brown, Pipers River

Getting the line flat and even is important if you are going to get a good vermin proof fence. – Ian Dickenson, Blessington

Animal Control

It is usually necessary to reduce animal numbers during fencing or as soon as the fence is completed. In an unfenced area wallabies use the bush for refuge during the day and feed on pasture at night. Separating the animals from their primary food source will have four effects.

- There will be extreme animal pressure on the fence from hungry animals used to feeding on the pasture. This will result in animals digging under or pushing through the new fence.
- Where they can, animals will move onto neighbouring pasture to feed.
- The hungry animals may decimate the bush understorey in their need for food.
- There will be significant death of wallabies from starvation as the artificially high population, used to feeding on pasture, is reduced to the number a bush area can carry.

It is important both from humanitarian and practical grounds that the wallaby population is reduced by shooting or poisoning outside the fenced area during or immediately post fencing.

If there are large numbers of wallabies, poisoning should be carried out before fence construction. DPIW should think favourably on this idea for animal welfare reasons.

– Stewart Archer, Weymouth

You need to kill those wallabies used to getting into the paddock. Initially after putting up a new fence if we don't cull any animals we find dead and dying wallabies and wombats. – Matt Dunbabin, Forestier Peninsula

If a fence is to be completed over a number of years there is a need for a plan to control animals which come around the end of the fence, or through gaps, during the construction period. The photo taken at the end of William Downie's sturdy rabbit wire fence illustrates this point well.



Wallaby runway at wallaby fence end, Copping
(William Downie)

3

Materials and Construction

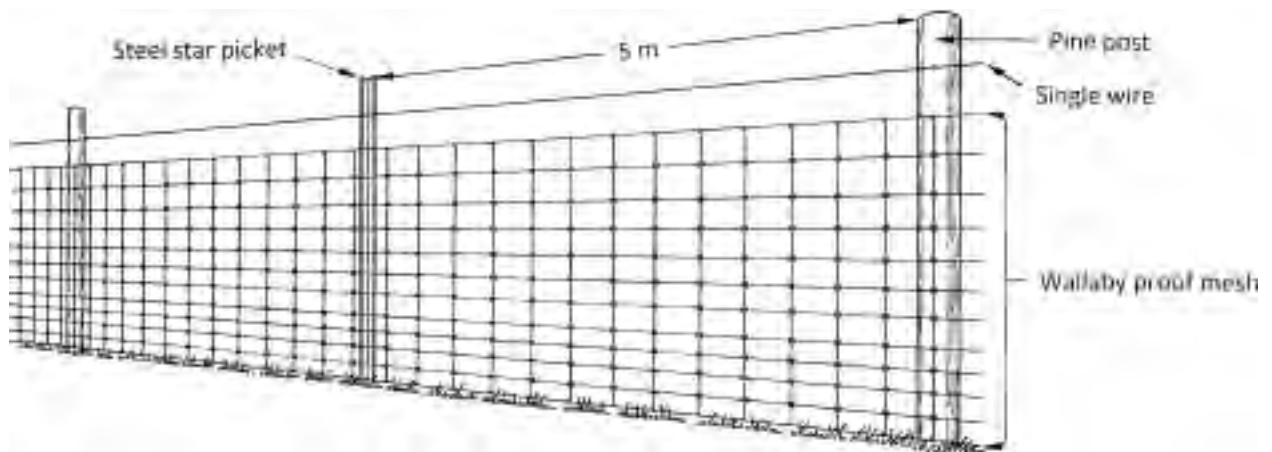
There are essentially three options for fencing: electric plain wire, mesh, and electric mesh.

Electric Plain Wire Fence

Early research was carried out with electrified plain wire fences, the most effective being a 10 wire alternating live and earth design¹. Although the design developed was effective, there were significant maintenance costs, largely because of bark and other debris shorting the wires. The bottom wire had to be an earth to prevent shorting by low vegetation near to the ground. Also with a height of 125 mm between the bottom live wire and the ground, wallabies could push under if wire tension was low. These fences have been largely superseded by mesh fences.



Electric plain wire fence, Pipers River (Brian Baxter)



Typical wallaby proof fence, posts are often either alternating pine and star posts or all star posts except for corners and ends.

Mesh Fence

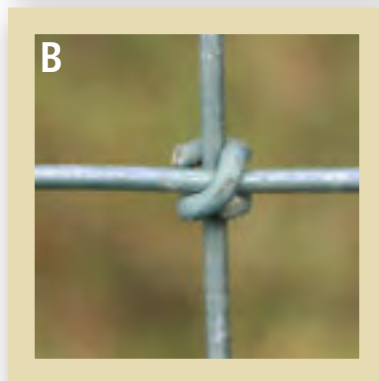
The essential requirements for an effective wallaby mesh are for close wire spacing at the bottom and a knot which won't slip when a wallaby tries to push through. The earliest mesh commercially available in Tasmania specifically for wallabies was essentially the bottom half of deer fencing. The mesh types available today have between 8 and 13 horizontal wires with a spacing of 50 - 75 mm at the bottom grading to 125 mm at the top and vertical wire spacing of 150 mm. They stand 840 - 900 mm high.

Although there is a lot of variation in design between different wallaby mesh fences, they typically have at least one single wire above the mesh for added height. Where cattle are grazed, an additional top wire is usually added. An electric outrigger into the paddock may also be included to contain the cattle.

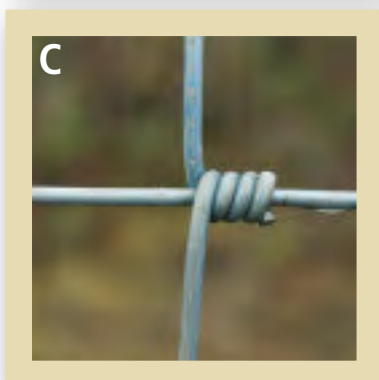
Wallaby meshes vary in knot design as well as wire diameter and spacing. Manufacturers either use a separate tie at each vertical and horizontal intersection (Photo A and B) or have individual vertical wires which are twisted in a hinge joint around the horizontal (Photo C).



Mesh with knot A is rigid and the knot does not move. The vertical wires, running the depth of the fence give good support, particularly when animals are trying to push under. It is more expensive than other mesh designs but the rigidity means that a wider post spacing can be used than with other mesh types.



Mesh with knot B has good vertical stability but has been found to slip under pressure from wallabies, creating bigger gaps and allowing easier wallaby access (*see photo page 18*).



Mesh with knot C has lower vertical stability. It is prone to concertina when animals are pushing under, especially when posts are widely spaced (*see photo page 18*). This problem, encountered by Steve Pilkington and others in early wallaby proof fences, can be remedied by adding droppers between the posts on existing fences. Like many other farmers, Steve now uses closer post spacing.



Mesh with knot B showing wires forced apart by wallabies (Geoff Dean)



Fence concertina in an early hinge joint mesh fence caused by animal pressure when posts are too widely spaced, Redpa (Steve Pilkington)

Pademelons will only go under or through a fence and even Bennett's wallabies rarely jump over a fence unless they are under pressure by being chased. The Bennett's wallabies on King Island are an exception, and they both dig under and try to jump between the top of the mesh and top plain wires. In this case a dropper is often used to give the fence more rigidity, otherwise a top electric wire is needed.

I've seen roos climb over a fence if it doesn't have the electric wire on top.
– Jamie Roebuck, King Island

The holes in some mesh types are not small enough to keep out small pademelons. To overcome this problem rabbit or other fine mesh can be attached to block out these animals as Steve Blanden has done.



**Netting used over mesh to exclude all wallabies, Gunns Plains
(Steve Blanden)**

Electric Mesh

In some cases an electrified mesh fence has been used to keep out wallabies. Electrifying the whole fence eliminates the chance of current leaking between live and earth wires which is a problem when alternating live and earth wires are used in a plain wire fence. The electrified mesh also tends to stop animals digging under because they get a shock when they touch any part of it. Mesh with fewer horizontals can also be used because stopping animal movement doesn't rely on wire spacing alone. However, a good mesh knot is still necessary because there have been cases of wires being forced apart by Bennett's wallabies when a mesh that has a simple joiner to connect horizontal and vertical wires is electrified.

James Fergusson, at Triabunna, has used electrified 6-70-30 sheep mesh in a five kilometre fence between native bush and pasture and found it most effective in stopping Bennett's wallabies, pademelons and possums. Foot netting was used below the mesh to minimise access by digging.

Care was taken to ensure that the vertical mesh wires were not in close proximity to the posts as small movements could lead to significant shorting. Electric offsets were used on fence corner stays to minimise possum movement. Costs were similar to those incurred with non-electrified wallaby meshes because James was able to use Hurricane sheep mesh as opposed to wallaby mesh.

James left a wide cleared strip on the outside of the fence for general maintenance and fire control. A steep gully was tackled with a tight single electric wire across the top of the gully to maintain tension and carry the charge, combined with non-electrified mesh through the gully, with a join that will be forced open by flood waters to release water and debris.

I saw problems with animals digging under a neighbour's fence and thought there should be a better way. You're always looking at different things. – James Fergusson, Triabunna



Electrified mesh fence with foot netting, Triabunna (James Fergusson)



Electric offsets at corner stays to deter possums, Triabunna (James Fergusson)

One problem with both electric wires and electric mesh is that echidnas are killed while trying to get through or under the fence. They only get part way through before they put up their spines in response to the electric charge and get stuck.

Fence Posts

Posts can be either wooden, steel or a mixture, depending on price and personal preference. Steel posts obviously don't burn in a bushfire, but they are less resistant to bending from cattle pushing against the fence. They are less durable in highly corrosive environments such as acid soils or coastal areas subject to salt spray. Wooden posts are not recommended in fire prone areas for two reasons, because they can be destroyed by fire and because galvanizing on wires against wooden posts can be burnt off by the intense heat of burning wood.

Post Spacing

The most effective fences usually have a post spacing of around five metres, particularly if cheaper mesh is used.

Wider spacing is less desirable in most situations because it:

- makes it easier for wallabies to dig under the fence, especially in lighter soils
- can result in a concertina effect developing in some mesh types.

In undulating country post spacing is usually adjusted to fit the lie of the land, rather than being at a set distance. This allows for gaps under the fence to be minimised, for example by putting a post at the bottom of low points.

Droppers

Droppers are not usually needed with mesh fencing as the mesh maintains vertical rigidity if posts are spaced appropriately. However, timber or polypropylene electric fence droppers can be used to reduce the concertina effect where posts have been placed too far apart or in other problem areas.



Poly dropper used to tension between widely spaced posts, King Island (Garry Sutton)

Additional Wires

Mesh fencing is generally 850 - 900 mm high, therefore fences usually have one or two plain wires above the mesh. In cattle areas the top wire is often electrified to minimise pressure on the fence. For the same reason an outrigger is often used to reduce cattle pressure.

In some areas a separate plain or barb wire is used at approximately 25 mm above the ground with the mesh bottom 25 mm above that. This configuration enables the bottom wire to be replaced if it corrodes whilst reducing the likelihood of corrosion in the mesh.

An electric outrigger, approximately 150 - 200 mm above the ground can be used to stop animals getting near the base of the fence.

Outriggers can be attached to a wooden fence post, directly to the mesh or as a separate line on short posts. Having an electric wire this close to the ground, however, increases maintenance requirements due to the regular herbicide spraying needed to prevent shorting out by grass and weed growth. As with an electric mesh fence, a low electric outrigger will kill echidnas trying to move under it.



Electric outrigger as separate line, Telita
(Revel Munro)



Electric outrigger attached to mesh, Telita
(Alan Davenport)



Electric outrigger across gate,
Scottsdale (Trevor Hall)

Fence Straining

Most producers recommend that a wallaby proof fence needs to be strained tightly. Many also recommend a single bottom wire strained tight for strength.

You need to get the fence as tight as possible. Straining the mesh between good end assemblies is vital. – Bob Brown, Pipers River

I'm particular, it's got to be good quality, with tight ends, pulled straight and pegged down. It's just a matter of common sense. – Michael Russell, Highclere

The minute your fence loses tension you have a problem. – Don Turner, Roger River

Problem Areas

As wallabies and wombats push or dig under a fence there is a need to ensure the bottom is as strong as possible. The bottom wires of a mesh fence can be bent and laid flat on the ground so that animals coming to the base of the fence can't get under. It is usually bent outwards because the perceived pressure on a fence is from animals coming into the paddock. Often, however, the pressure to get out is greater than the desire to get in, for example where wallabies enter around the end of a fence or through a breach point and are trying to escape in a hurry. Also, bending the mesh reduces its height, exposes more wires to rusting and increases the size of the gap in the mesh near ground level.



Rabbit netting attached to bottom of wallaby proof fence, Mt Lloyd (Joe Blair)

An alternative sometimes used, where money and time permit, is to attach rabbit mesh to the bottom of the fence, either by using “foot netting” or halving a roll of normal mesh. Burying the mesh in a shallow trench, or piling soil over it will increase its effectiveness.

Most landowners agreed that allowing pasture or low shrubs to grow up through the fence helps anchor it down and hence reduces the chance of animals digging under it. This would not be

appropriate in a fire prone area because the vegetation would be more likely to burn and a fire along the fence line would destroy the galvanized coating and shorten the fence life.

Low points where an animal could push under can be filled with soil or rock or held down with a metal peg, for example the cut off star post used by Bob Brown.

Creek crossings, drains and dry gullies subject to flash floods are all areas where extra planning is needed. The aim is to allow water through, particularly during heavy rain, but prevent access to wallabies. Some form of top hinged, swinging gate or a short length of sacrificial fence which can be washed away or knocked down is the most successful (*see page 11 Section 2 Planning and Preparation*).



Cut off star post, Pipers River (Bob Brown)

Smaller drains can be piped and a swinging mesh cover added to stop animals. These all need extra maintenance but are vital to the effectiveness of the main fence as a complete barrier.

Gateways are another area needing extra attention. The mesh on most commercial gates is large enough to allow small wallabies to move through them. Adding a finer mesh will overcome this problem. Animals are likely to push or dig under a gate if they possibly can. Wood or rock can be used to fill any gaps, but a more permanent solution is to firm with gravel or to concrete a sill.



**Free-swinging gates on culvert, Forestier Peninsula
(Matt Dunbabin)**

Gates need to be close to the ground. It is better to level and harden under a gate rather than add a skirt. Also you need to add fine mesh to gates where pademelons occur as small ones can fit through normal gate mesh. – Alan Gregory, Mt Hicks

Where the ground under a gate cannot be levelled an extension to one end of the gate and a tight wire can provide a frame for extra mesh to be added.



Concreted gate sill, Waverley Farm, Mathinna



Wire and mesh added at bottom of gate on sloping land, Gunns Plains (Colin Vercoe)

The fence is only as good as the weakest point. – Robbie Payne, King Island

4

Maintenance

Maintenance of wallaby fences is vital as wallabies manage to breach most fences by using unblocked entry points, finding holes dug by wombats or by making holes themselves.



Night time photo of Bennett's wallaby using a wombat hole under a wallaby proof fence, Mathinna

It is essential to include a regular check of your fence in your work schedule. In addition you may need to check almost daily when your fence is first built because of initially high pressure from excluded browsing animals. Extra checking may be needed at other times, for example, after storms and extreme weather events check for:

- fallen trees and branches on the fence
- debris in gullies and water courses
- other possible fence breaches.

If you are going to have a roo fence you have to go all round, block gates, creeks, roads and maintain them.

– Jamie Roebuck, King Island

We used to think that once the fence was up then we could forget about it but now we realise it is an ongoing thing. It's a constant job and we are always working on it.

– Andrew Stewart, King Island

A wallaby proof fence which separates bush from pasture will always be under pressure from wallabies. Pressure on the actual fence often comes from animals trying to get both in and out, rather than just trying to get in as would be expected. Wallabies don't necessarily use the same place to leave as they do to enter. They enter a paddock slowly and cautiously, finding any breach points such as fence ends, gullies and wombat holes. They will exploit low areas, gaps under a fence, dig in soft soil or push through if the mesh size is large enough. When returning to the bush, wallabies will often try to leave in a hurry, especially if disturbed. Under pressure they will run along the fence leaping at the fence or trying to get under.

Most maintenance involves blocking holes. This can be done with a wide variety of materials such as rocks, timber, scraps of weldmesh, and extra fencing mesh or netting attached and anchored down. Cut off star post pegs as used by Bob Brown at Pipers River are particularly effective in pegging down fence mesh (see photo in Problem Areas section page 23).

When mending a hole I placed the rocks on the post side of the wire so that if the mesh ever needs replacing it can be done without having to free it of rocks.
– Stewart Archer, Weymouth

I staple old hop poles onto the bottom of the mesh to block holes.
– Steve Blanden, Gunns Plains



Roofing screws in wooden posts used to block fence hole dug by wombats, Tasman Peninsula (Max Badham)

Wombats probably comprise the biggest threat to effectiveness of wallaby proof fencing in Tasmania. They are creatures of habit and tend to use the same path, digging under a fence for access and creating an entrance for wallabies.



Night time photo of wombats using their hole under a wallaby proof fence, Mathinna

Where wombats are present, simply blocking a hole in the fence line is rarely a long-term solution as they tend to dig a new hole, next to or, at least near, the one that has just been blocked.



Numerous successive wombat holes blocked with rocks, Forestier Peninsula (Matt Dunbabin)

One possibility is to install 'wombat gates' in holes currently being used by wombats.

A wombat gate needs to be simple, sturdy and vertically swinging. It must be light enough to enable a wombat to push through easily but sufficiently heavy to deter most wallabies.

In a recent trial the most effective wombat gate design for Tasmanian conditions was found to be a top hung weldmesh gate 35 - 40 cm square with a bottom weight of at least 3 kg. Lighter gates did not stop wallabies and wombats did not use a solid gate they couldn't see through but simply dug a new hole beside it.

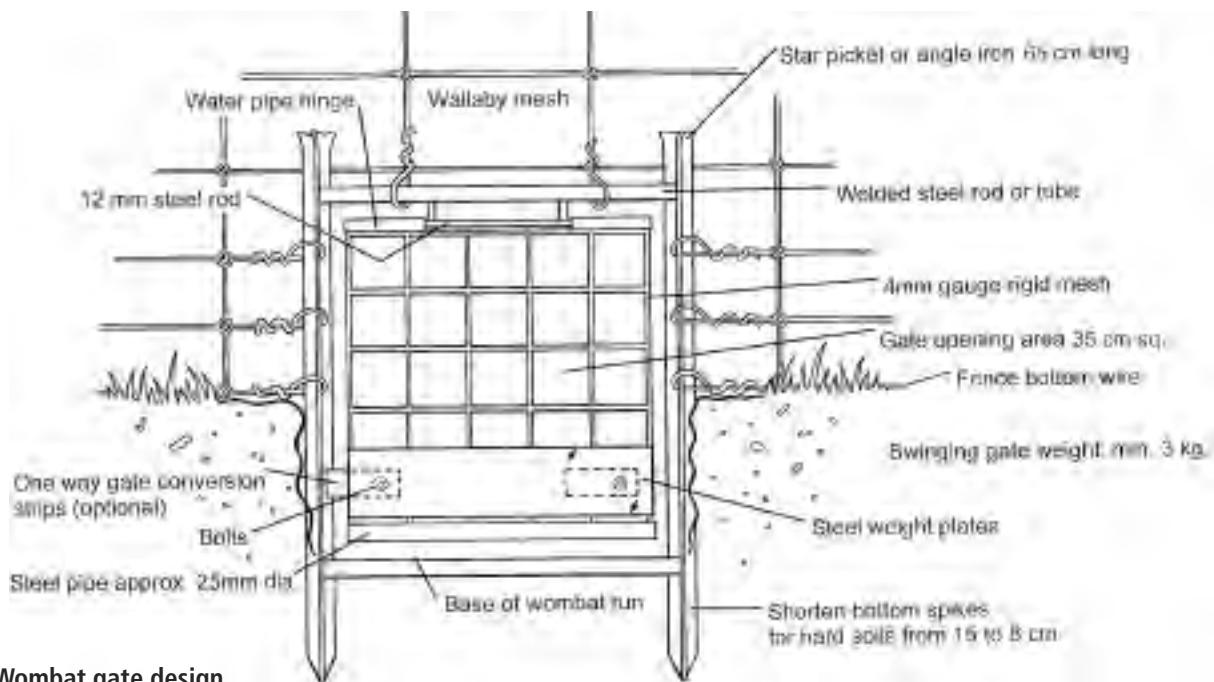


**Wombat gate under fence mesh,
Forestier Peninsula (Matt Dunbabin)**

The gates must be placed where wombats have existing runways, rather than where it is convenient to place them. Therefore they must be put in place after the fence has been constructed and when the wombats have dug under it. Usually a gate has to be cut into a wallaby proof fence to allow it to be fitted at the correct height, however in light soils they are sometimes placed below the mesh as Matt Dunbabin has done on the Tasman Peninsula.

Wombat gates can be made in a frame or have steel star posts as the uprights, providing an integral frame and gate support. Moveable locks can be added to change the free swinging gates so that they only move one way. Then if the gates are set in the afternoon so that they only open inwards any wallabies which have learned to get through will be caught inside the paddock and can be shot early the next morning.

Ongoing maintenance is necessary, particularly during winter, to ensure the gates are neither blocked from opening or stuck open.



Wombat gate design



**Effective wombat gate in fence, Mathinna
(Jim Davies)**

In highly erodible soils wallabies running along a fence either trying to get in or out can form tracks which sometimes develop into erosion gullies over time.



**Erosion in sandy soil started from wallaby pressure along
the inside of fence adjacent to reserve, King Island**

5

Fencing For Other Species

Brushtail Possum

Brushtail possums are more difficult to exclude than wallabies. They prefer to go through or under a fence if possible but can climb over most fences. A rabbit netting fence with an electric outrigger about half way up and 50 - 75 mm out from the mesh, or a “floppy top” on a rabbit netting fence can be effective. Often an electric outrigger is used on the top of the fence, but an animal getting a shock on top of the fence is as likely to jump in as stay out.

The “floppy fence” consists of a normal rabbit netting fence with another piece of netting above it and leaning out towards approaching animals. The top netting is held by heavy gauge fencing wire woven vertically through both nettings to act like a post. Care has to be taken at corners because if the floppy top is rigid, possums will climb over and corner posts or stays are usually the easiest placed to climb. The fence needs to be checked regularly to make sure the fence top hasn't been pushed down by stock or fallen tree branches.

Possums can move through trees so it may also be necessary to ensure that the crowns of trees either side of the fence aren't intertwined.



Typical floppy top possum fence, high tensile wire can be woven through the mesh as well as on posts for extra support.



Floppy top possum proof fence, Deddington (Carol Westmore)

Forester Kangaroo

Fencing for forester kangaroos is not considered in depth here; although where they occur foresters can cause significant pasture and crop losses. While foresters, like the smaller macropods, prefer to go under a fence they will leap at and over fences especially when under pressure. Because of their size a typical wallaby proof fence is not high enough to stop them. The fence pictured here has been successful, at least in the short term, in keeping foresters out of a small trial pasture plot¹⁴. It has sheep netting above commercial wallaby wire and uses 2.4 mm star posts.



Experimental trial fence for excluding forester kangaroos, Ross

Rabbit

If rabbits are a significant problem, a standard rabbit proof netting fence with the bottom 150 mm buried or flat on the ground is the only real option. Rabbit netting is 105 cm high, with a 4 cm mesh and 1.4 mm galvanised wire. To give the fence support three plain wires are also used, one at the top, the second near the middle of the mesh and the third about 6 cm above the ground. All gates also need to have rabbit netting attached and either fit closely to a sill rabbits can't dig under, or have a skirt of wire laying on the ground. A well constructed rabbit proof fence is also wallaby proof.

Deer

Fallow deer can really only be controlled by a two metre high deer fence. Ian Dickenson, at Blessington, found that he had to put an electric outrigger on both sides of a deer proof fence to stop stags trying to fight through the fence and getting hooked in the wire.



Deer fence, Blessington (Ian Dickenson)

6

Integrated Control

Fencing will usually need to be used in conjunction with other forms of control, both during establishment and regularly from then on, especially where high value crops need protection.

You need two or three control methods - wallaby proof fence, shooters and occasional poisoning.

1. Cull to acceptable level by poisoning or shooting
2. Fence
3. Shoot to maintain – Ralph Bottomley, Tasman Peninsula

Shooting

Shooting is a common supplementary control method which can take two forms:

- Shooting at night with the aid of a spotlight. This requires the landholder to have a crop protection permit and all shooters to have a gun licence, a wallaby hunting licence and a possum permit.
- Shooting during the day. This is often done with shotguns and the aid of dogs and all the hunters need to have a gun licence, wallaby hunting licence and a possum permit.

While most landowners visited considered that shooting was often necessary to control wallabies, many of them, especially the older ones, expressed the opinion that they did not like to shoot wallabies themselves. Most thought it a necessity that they would rather have done by recreational or professional shooters and that they would be happier if the carcasses and skins could be marketed.

The trick is to shoot the wallabies that dig under the fence as then they can't come back. The only other problem is that I get softer as I get older and now don't want to shoot wallabies, they are beautiful creatures. – Donald Graham, King Island

Shooting is difficult as you only take the edge off the population and it is too easy for the wallabies to find cover. – Alan Davenport, Telita

Animal gates or other holes in a fence can be incorporated into an integrated control program. Some landowners leave their gates open most of the time, especially if they are used by wombats, and others open them a few days before shooting to allow wallabies access to pasture. The gates can be free swinging, i.e. two-way, or just one-way depending on the design and method of hanging.



**Two-way gate, Tasman Peninsula
(Charlie Kingston)**

The shooters operate several times a year by blocking the holes in the middle of the night and placing themselves strategically to shoot at daybreak as the animals are trying to return to the bush.

Fence ends are one point where wallabies can gain access to pasture or crop areas. It may be possible to add a wallaby gate near the fence end with a wing extension at an approximate right angle to the fence. Wallabies may use the gate in preference to moving around the fence end.

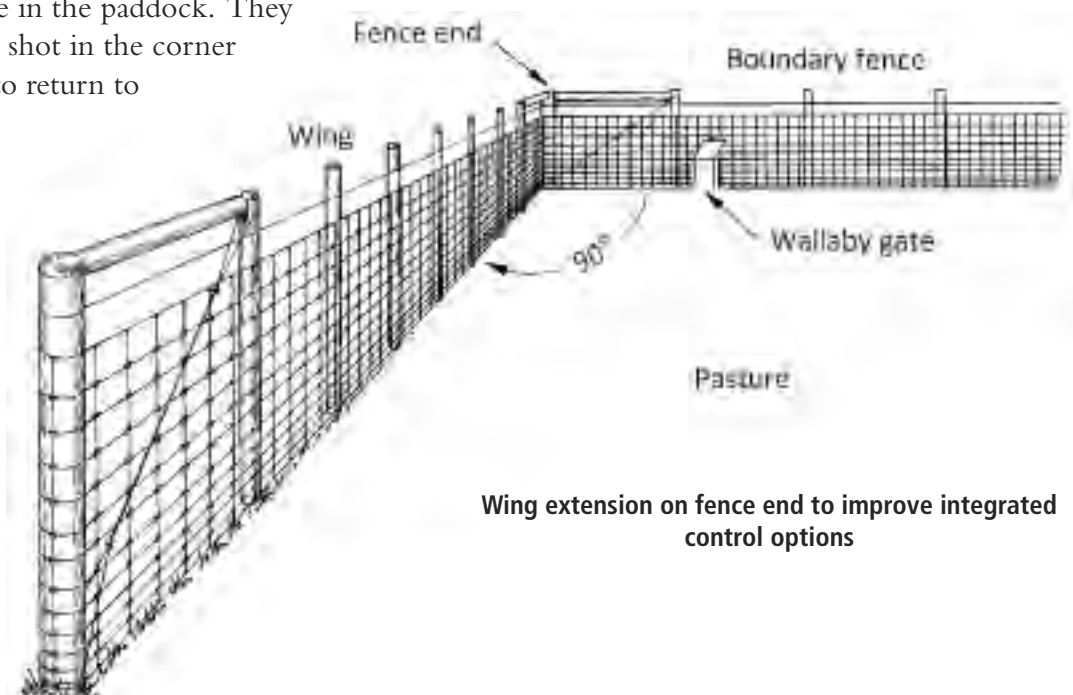
Periodically, the gate can be closed during the night or made one-way, while the wallabies are in the paddock. They can then be shot in the corner as they try to return to the bush.

Charlie Kingston has developed a free-swinging gate to allow wallabies to move into and out of his paddock. Holes in the side posts enable it to be lowered gradually as wallabies get accustomed to using it. It is left open most of the time but switched to one-way occasionally, by sliding a bolt near the base, allowing wallabies to enter the paddock but not get out on nights he plans to shoot. For a similar system on a larger scale see Askin Morrison's case study in Section 7 page 39.

In another example, Andrew Downie, at Glenelg, has adapted holes in an old rabbit wire fence for regular shooting groups to control wallaby numbers to a reasonable level without the expense of a new wallaby proof fence.



**One-way gate in old rabbit fence, Glenelg, Gretna
(Andrew Downie)**



Wing extension on fence end to improve integrated control options

Poisoning With 1080

1080 poisoning can be needed when wallaby or possum numbers get too high to control with shooting, or just before or after fence construction, both to prevent the animals excluded from pasture or crop from starving, and to reduce the pressure on the new fence.

There are strict protocols in place for actions prior to poisoning, including evidence of shooting and an inspection by an Authorised Inspector for evidence of damage. Unless a landholder is familiar with the 1080 poisoning process it is recommended that discussions be held with DPIPWE Wildlife Management Branch staff well before the need for 1080 is reached.

Trapping

Possums and pademelons can be successfully trapped in small cage traps and destroyed. This may be the most suitable method of control in some areas. Trapping must be carried out under a permit to trap issued by the DPIPWE, and following a code of practice which can be obtained from the DPIPWE.

Construction of specific fenced areas designed to allow occasional trapping and destruction of wallabies (particularly at the end of a wallaby proof fence) are considered to be traps and must be discussed with DPIPWE staff prior to construction.



7

Individual Producer Case Studies

Brian Baxter, Pipers River

Brian has a 700 ha property with cropping, cattle and sheep as his main enterprises. He started wallaby proof fencing the boundary, which mainly abuts State forest, in 1992 with a grant from Landcare. The first landowner in his area to attempt wallaby exclusion, Brian checked available information and constructed a 500 m length of 10 wire electric fence following the design from research trials mentioned in the introduction. This fence is still standing and operational (*see photo on page 16*). The subsequent 7.5 km of wallaby fencing, erected over several years, used hinge joint (Waratah Stocktite Longlife 8-80-15), initially double galvanized, now Longlife.

In locating his fence, Brian avoided permanent creeks as much as possible and used culverts in a couple of places. He initially turned the bottom of the mesh out at ground level but found that the second wire rusted out in wet areas after five years. He now has the bottom wire at ground level.



**Fence mended to replace rusted bottom wire,
Pipers River (Brian Baxter)**

The focus is now on maintenance. Where the fence has rusted, lifted, or the occasional wombat has made a hole, Brian uses a combination of pig mesh on the ground attached to the bottom of the fence, short old droppers, rocks, wood or whatever is available. He is considering adding an electrified outrigger to the outside of the fence, 150 mm out and 150 mm above ground, as he thinks this will reduce the amount of maintenance required.

Brian uses shooting in conjunction with his fencing. He says he shot 3,000 wallabies, approximately 500 of which were Bennett's wallabies, while building the fence. These days a regular shooter with dogs comes fortnightly except in summer. On average three or four pademelons are shot each trip compared with 20 before the fence. Brian has only seen two Bennett's wallabies inside the fence in the last 18 months. Possums are shot all the time.

Brian uses shooting in conjunction with his fencing. He says he shot 3,000 wallabies, approximately 500

Brian is very proud of his fences and is a wonderful ambassador for wallaby proof fencing and other ecological farming practices. He professes to be Landcare mad and made a conscious decision to retain a third of his property as native bush. In addition, all internal bush and creeks are fenced off from stock. He hopes the fencing and subsequent fertilising will enable him to double production.

If you want to remove 100% of wallabies then you have a battle. We're not wanting to exterminate them but to get a balance. To me we had a plague and we are now able to get things back to normal. – Brian Baxter, Pipers River

You don't know how much production you are losing until you put up the fence. In 70 acres we had no production in two years. Once the fence was up we got three grazings in the driest year ever. DPI figures said you could pay for a fence in one year's production, I wouldn't doubt that now. We now need to improve our pastures. We tried 20 years ago but had to give up. We have started fertilising again and are amazed by what is growing.

Once they see the difference people follow. – Brian Baxter, Pipers River

Peter Bowling, King Island

Today, Peter, Yvonne and son Rod raise 2,300 Grey cattle on coastal country at the south west tip of King Island. Peter's parents bought the first of Peter's farms by selling wallaby skins snared by his father and pegged out by his mother. Peter says there used to be a lot of pademelons when he was young but not now. He puts it down to an eye disease and clearing of scrubby country.

Today the problem they encounter is Bennett's wallabies moving in from adjacent Crown land. They started wallaby proof fencing in 1997 using a contractor. The contractor has now completed 24 km. Last year they did another 3.5 km and now have another 10 km to go. Prior to the fencing, Peter undertook research into the wires available and used New Zealand Hurricane Staylock 11-85-15. This was used with steel posts. Recently they changed to Waratah Stocktite Longlife 8-80-15 with pine posts. There is a live wire at the top for cattle and post spacing is 10 m. Eight-foot posts are used at the corners.



**Difference in pasture inside and outside a wallaby proof fence, King Island
(Peter Bowling)**

Peter says it is vital to prepare the fence line before construction.

The main thing is the foundation. Foundation is the number one tip, sometimes 12 months ahead, sometimes not. – Peter Bowling, King Island

Peter poisoned and shot during construction of his first fence and fertilised his pastures. He used 1080 in the late 90s as a last resort, saying that desperate times called for desperate measures. He says they estimated 12,000 wallabies were either poisoned or shot one year. Peter has regular shooters, and they have shot 2,000 Bennett's wallaby per year on the property in each of the last two years.

Peter checks his fence regularly and says maintenance is a big job.

His main problems are:

1. wallabies digging under the fence in all soil types;
2. fencing right down to the salt water level and rusting from sea spray;
3. wallabies gaining access from where his fence crosses a public road.



**Effect of salt spray on fence, King Island
(Peter Bowling)**

Despite these problems Peter has seen significant improvements in the quality of his pasture and has lifted his stocking rate. He hasn't actually worked out the figures as he has changed from sheep to all cattle over the same period. The dramatic pasture improvement can be seen in the photo of his fence line on the previous page.

Fencing has changed the pasture out of sight. The pasture by bush was just fog grass but now it is good pasture with fescue, cocksfoot and clovers. On the other side of the fence there is virtually no pasture at all. – Peter Bowling, King Island

David Dean, Preolenna

David manages a 95 ha property at Preolenna bordering on plantation and Crown land native bush. Enterprises on the red soils include cropping, cattle and an area of plantation.

The four kilometre fence, built in 2003, is located at the edge of the cultivated land. Part of the fence follows the property boundary, but part divides the farm paddocks from farm plantation. The ground was levelled with an excavator before construction and the fence design using eight wire mesh (Waratah Stocktite Longlife 8-80-15) was recommended by a local retailer. There is a barb on top and an offset electric wire for cattle control on the inside. The pine posts are at 10 m spacing.

Silage production inside the fence increased from 40 to 350 and then 800 bales over three seasons. – David Dean, Preolenna

David checks the fence weekly and mends holes with rocks and wood. Unfortunately there is movement of animals through the mesh. Very small pademelons or rabbits and possums seem to be moving through easily. In addition, there are several well-formed runways where larger pademelons appear to have been pushing themselves at the fence and forcing the mesh apart. Also, some of the animals getting into the paddock must have come around the ends of the fence.



Runway forced through fence, Preolenna (David Dean)

David says his fence would be improved by the use of a finer mesh. He would like to run rabbit netting around the bottom of the fence to stop rabbits and small pademelons.

Although David uses shooting as an additional control method, he still experiences browsing damage. Pademelon is the main browsing species. The farm plantation was harvested and replanted last year. Because it was outside the wallaby fence nearly all the young plants were browsed beyond recovery and needed replanting.

David is pleased with the increase in production he has achieved by fencing. He hopes to maintain this with regular fence maintenance and improvements in the future.

Guy Dobner, Tasman Peninsula

Guy's 800 ha property at Saltwater River supports sheep, beef and cropping with plantation leases to a timber company. Guy started fencing to exclude wallabies in 2006 and had completed the first three kilometres, at a cost of \$8,000 per kilometre, when we visited in April 2008. He used the production figures from DPIPW research to realise the potential of wallaby proof fencing. His long-term goal is to fence 25 - 30 km and to avoid traditional methods of control such as poisoning and shooting. He says that his fence line may need to be moved in places, presumably to overcome potential breach points. He has erosion problems to deal with on a hill site and may have to take off big bumps and follow contours.



**Fence bottom wires bent flat,
Tasman Peninsula (Guy Dobner)**

So far he has used Hurricane Plantation hinge joint (13-84-15) mesh. In one area a rabbit mesh footing had been added on the ground on the outside of the fence. In a newer fence the bottom three wires of mesh were bent out at ground level. A barb was strained tightly at ground level and an extra single wire was added to the latter fence to gain height. Both had a top barb and an electric outrigger into the paddock for cattle.



**Wallaby hole as animals force out,
Tasman Peninsula (Guy Dobner)**

Fences are checked monthly and holes are blocked in winter with reinforcing mesh after the rest of the fence has been held down by vegetation. He says the holes are mostly made by wombats. The photo shows where animals have forced their way out under the rabbit mesh footing.

Guy likes the idea of having bush and pasture. He doesn't put his stock in the bush any more. He has put considerable research into his fence designs, thinks there is still room for improvement, but says this will come from trial and error. He keeps an open mind and is receptive to ideas that will be effective and practical.

Poisoning and shooting treat the symptoms not the cause.

– Guy Dobner, Tasman Peninsula

Askin Morrison, Oatlands

Askin farms 5,900 ha at St Peters Pass, primarily sheep and cattle. His wallaby fence is for the protection of pasture and borders on what was originally native bush and is now plantation. Fencing is recent and ongoing with five to six kilometres completed so far.

Fence preparation is achieved by clearing the fence line of vegetation, removing leaning trees and smoothing with a dozer. Initial fences used Hurricane Staylock 11-85-15 but recent ones are Waratah Stocktite Longlife 8-80-15. On sandy soils a skirt of rabbit wire foot netting is used, but not on heavier rocky ground. A flap gate is used at permanent creek sites.

Askin says browsing damage is by Bennett's wallaby, pademelons and possums, but mostly pademelons. Wombats are also present and are constantly crossing the fence line. Askin has inserted a series of one-way gates that open into the paddock. These are made from a variety of materials and are spaced at roughly 100 m intervals along the fence. The gates are left permanently open so that wallabies and wombats can come and go freely. Shooting of wallabies inside the fence is carried out under a Game Management Plan. For the privilege of shooting deer, shooters are required to shoot wallabies at regular intervals. On the night of a shoot the gates are closed after midnight, by which time wallabies have come out to feed, trapping them inside the paddock. Then at dawn the shooters push wallabies towards the fence and shoot them.



One-way gate in wallaby fence, Oatlands
(Askin Morrison)

The fence is usually checked before a shoot and holes are blocked with rocks, netting or any other suitable material available.

To enable wombat movement and reduce the likelihood of wombats digging new holes through the fence the gate regime will need to continue to operate.

Askin is pleased with his fence and plans to do some each year as part of a long-term plan. He has integrated fencing with a Game Management Plan to protect his pasture.

Norm and Shirley Rattray, Goulds Country

Norm and Shirley graze beef cattle on their properties at Goulds Country, Goshen and Weldborough. They say they saw that the writing was on the wall with 1080 and realised that they needed to do some form of wallaby control if they wanted to develop their 180 ha Goshen property. The soil is sandy loam and the neighbouring Crown land is primarily Bennett's wallaby country, with wombats. They started wallaby proof fencing seven years ago and now have 4.3 km and no wallaby problem.

The ground was levelled with a tractor and blade before fencing and Hurricane Staylock 11-85-15 mesh was used, with the bottom wire right at ground level and star posts at 10 m spacing. There is a single electric wire on top running at 4,000 volts.

The pasture was developed at the time of fencing and initially Norm and Shirley used a mesh skirt on the ground on the outside of the fence in attempt to exclude wombats and wallabies. They found that animals were digging under the fence on their way out of the paddock, having come in at the open end of the fence before it had been finished. An offset electrified outrigger on the inside of the fence was added as a temporary measure and found to work. From then on the mesh skirt was replaced with an electric outrigger on the outside and some sections have an outrigger on both sides. Norm made the outrigger posts himself from reinforcing rod and has been very pleased with their price and effectiveness.

We now wish we had thought of the outrigger first.

– Shirley Rattray,
Goulds Country

We have an occasional wombat through from the side without an outrigger but where we have outriggers on both sides of the fence we have had no problems with wildlife digging under.

– Norm Rattray,
Goulds Country



**Low offset electrified outrigger, Goulds Country
(Shirley and Norm Rattray)**

A small creek was fenced by running the mesh and tensioned top outrigger across the top and adding extra mesh to the bottom to fill in the gap. The fence line is sprayed with roundup to prevent shorting. The fence is checked every couple of months and after power breaks or heavy rain.

We put less effort into maintenance than we ever did when poisoning with 1080.

– Shirley Rattray, Goulds Country



Boundary wallaby proof fence with low offset electric outrigger on outside of fence, Goulds Country (Norm and Shirley Rattray)

The photos were taken when we visited in February 2009 at the end of summer grazing. In November and early December the pasture inside the fence was a foot high compared with the bare ground outside.

Norm and Shirley are very pleased with their fence and would recommend wallaby proof fencing to anyone where conditions are suitable.

It pays for itself in no time. Every kilometre of fence you will gain approximately 10 acres of extra pasture.

You couldn't do without it if you want to keep farming.

– Norm Rattray, Goulds Country



Checklist

1. Try to assess whether you have a browsing problem and if so how severe it is.
2. Identify which species are causing damage to your pasture or crop. If possums, rabbits or deer are the major problem then it is of limited use to erect a wallaby proof fence.
3. Look at your finances. Can you afford to fence? Alternatively, can you afford not to fence? Is there government support available? How much can you afford to fence each year?
4. Talk with your neighbours. Can you work together in fencing or other wallaby control methods?
5. Look at wallaby proof fences in your area with problems similar to yours.
6. Plan where the fence is to go for ease of construction and maintenance. It should exclude major areas of wallaby refuge habitat and allow for access to both sides of the fence. Try to minimise possible breach points such as road and creek crossings, gullies and gates. Consider how to deal with potential breach points you can't avoid.
7. Can the fence be sited to improve the efficiency of ongoing shooting?
8. Plan ahead and where possible prepare a firm level base well before fencing time. The bottom wire of the fence needs to be close to the ground as wallabies prefer to dig or push under rather than jump or push through a fence.
9. If you have wombats then expect to have to plan gates and install them after fence construction.
10. Plan how to control animals fenced inside the area and how to reduce the overall population as you fence.
11. Decide on what proportion of the wallaby population you can live with. Some fence types exclude more animals than others.
12. Choose your fencing materials to suit your site, budget and level of exclusion you aim to achieve. Calculate materials required and buy ahead of time.
13. Maintenance is critical as wallabies soon find and use breaches in a fence. Include routine fence maintenance in your work program. You may need to check more often in the first few months. Include checks after extreme weather events.
14. Small patches of remnant vegetation should not be fenced off with wallaby proof fencing. Even if all the wallabies are removed from an area, some, especially small ones, will find their way in. Any browsing animals inside the fence will cause further damage to the remnant vegetation.

Costing Sheet

This costing sheet is provided as a checklist of materials and other costs likely to be incurred. In some situations there may be other items which haven't been included here. Because of variation in fence designs and prices of materials no attempt has been made to cost a particular fence. Current costs are in the order of \$8,000 to \$10,000 per kilometre. On the DPIPW website, attached to the electronic copy of this guide, there is a spreadsheet which can be used to calculate the time needed to recoup the extra cost of wallaby proof fencing for individual situations with cropping or pasture.

Plant and labour

| Preparation | | Hours | Price per hour | Total |
|-------------------------------|-----------|------------|----------------|-------|
| Clear vegetation and level | Machinery | | | |
| | Labour | | | |
| Fencing | Machinery | | | |
| | Labour | | | |
| Animal control during fencing | | | | |
| Total preparation cost | | | | |
| Maintenance | | Hours/week | | |
| | Machinery | | | |
| | Labour | | | |

Materials

| | | Number | Price | Total |
|---------------------|--|--------|-------|-------|
| Wooden posts | | | | |
| Strainers | | | | |
| Star posts | | | | |
| Gates | | | | |
| End assemblies | | | | |
| Wallaby wire | | | | |
| Plain wire | | | | |
| Barbed wire | | | | |
| Foot netting | | | | |
| Electric insulators | | | | |
| Outriggers | | | | |
| Gripples | | | | |
| Staples | | | | |
| Dropper clips | | | | |
| Ring fasteners | | | | |
| Other | | | | |
| | | | | |
| Total cost | | | | |
| Overall cost | | | | |

Estimating Pasture Loss

Pasture losses can be estimated or actually measured by cutting, drying and weighing samples. When stock are moved from a paddock several circular exclosures (approximately 1.5 m in diameter) made of weldmesh, with rabbit wire around the outside can be put in the paddock, spaced in from the fence. These prevent wallabies feeding on the area. Before the paddock is restocked, the difference in growth between the inside of the exclosure and the surrounding pasture can be measured. An estimate can be made with an MLA Pasture Ruler.

To get a more accurate measure of pasture loss a 50 cm x 50 cm area should be cut to ground level from inside each exclosure and a matching one from outside the exclosure. To ensure accuracy, a quadrat, (a square with an inside measurement of 50 cm made from either wood or steel) can be used to mark the area to be cut. Store the cut pasture immediately in a plastic bag, squeeze out all air and seal the top until weighing. Make sure the samples are kept out of the sun. A rough estimate of the loss can be calculated from weighing the samples as accurately as possible and using the formula at the bottom of the page.

Also try to estimate the relative proportions of grass and clover in the samples from inside and outside the exclosures as wallabies and possums preferentially graze clover.

For information on accurate sampling and measurement of pasture loss contact TIA Extensive Agriculture staff (*see contacts on page 45*).

| Height (cm) | Pasture quantity for a moderately dense pasture (Indicative estimates of kg green DM/ha) | Notes |
|-------------|--|---|
| 14 | 3000 | Surplus quantity – growth slows, no real additions to intake, quality declines |
| 12 | 2500 | |
| 10 | 2200 | |
| 8 | 1900 | Preferred range of DM/ha for animal and pasture production |
| 7 | 1700 | |
| 6 | 1600 | |
| 5 | 1400 | |
| 4 | 1200 | |
| 3 | 1000 | Too little quantity – retards regrowth, restricts intake and increases erosion hazard |
| 2 | 700 | |
| 1 | 400 | |

Figures are indicative only. Very dense, closely grazed pastures will have a higher (up to +25%) kg green DM/ha at the same height. Conversely, with lightly grazed open pastures, differences due to density are greater at heights above 6 cm.

Developed by MLA Southern Beef Program

$$\% \text{ Loss} = \frac{\text{Wt of sample from inside exclosure} - \text{Wt of sample from outside}}{\text{Wt of sample from inside exclosure}} \times 100$$

For more information

Before planning a fence it is a good idea to gather as much information as possible. This could include reading relevant literature; talking to neighbours with similar problems; attending organized field days or farmer discussion groups; consulting Government or private industry experts and costing materials.

Electronic copy of this guide

There is an electronic copy of this guide and a calculator which allows estimation of the time needed to recoup the extra cost of wallaby proof fencing on the TIA website (www.tia.tas.edu.au) and the DPIPWE website (www.dpipwe.tas.gov.au/browsingmanagement).

Estimating pasture

Loss For information and advice on establishing and sampling exclosures and quadrats for estimating pasture loss, or for MLA Pasture Rulers contact:

TIA Extensive Agriculture Centre at Mt Pleasant Laboratories, Launceston, phone 6336 5238.

The pasture ruler and other information on pasture quality can be found at www.mla.com.au

General information on wildlife browsing issues

Wildlife Management Branch, DPIPWE, 134 Macquarie Street, GPO Box 44, Hobart TAS 7001. Phone: 03 6233 6556. Fax: 03 6233 3477. Email: wildlife.enq@dpipwe.tas.gov.au

Rabbit control

Rabbits are classed as vermin and may be shot without permit. If poisoning with 1080 or pindone is necessary contact: Wild Animal Management section of Biosecurity and Product Integrity Division at:

DPIPWE Newtown Research Laboratories, Hobart, phone 03 6233 6833.

DPIPWE Stoney Rise, Devonport, phone 03 6421 7601.

Other general information

www.tia.tas.edu.au

www.dpipwe.tas.gov.au

www.dpipwe.farmpoint.tas.gov.au

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*If anyone told me six years ago that I'd be fencing
out wallabies I would have said they were mad.*

Now I realise it is essential.

– Trevor Hall, Scottsdale, March 2009