



## Welcome to PWNNews



I welcome you as a reader of this new newsletter and as someone interested in managing trees on farms.

Trees enhance the beauty of our New Zealand countryside and add much to the farm environment and to animal welfare. Many farmers now grow tree blocks for timber, but in this newsletter we aim to focus primarily on poplars and willows, those deciduous trees that we plant to protect the land and supply shelter, shade and supplementary feed.

Since 2001 a farmer-led group has been working in the lower North Island on using these trees for boosting summer-autumn feed for stock, and another group looked at using them to resolve dairy effluent problems. The two teams have now joined forces in a new project that builds on the findings of these completed projects, to add relevant new findings for farmers.

The severe flooding that occurred in several regions during the past year showed how valuable poplars and willows are for preventing damage to land during such events, but they also demonstrated the need to prevent these trees from becoming too large and dangerous. During storms they block roads and tracks, fall on buildings and fences, and can cause injury and death. In the next two years we therefore intend to develop tree management planning guidelines for farmers and landowners, to help them manage these valuable assets on the farm.

I hope you will find *PWNNews* content of high interest and good value.

**Peter Gawith, Project Leader, Gladstone, Wairarapa**

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## About the new project

**From Project Manager Grant Douglas, AgResearch, Palmerston North**

This new SFF project is an exciting mix of activities centred in the lower North Island and Otago, but of relevance to several other New Zealand regions. It builds on the findings of the Tree Fodder and Dairy Effluent projects, which ended in June 2004 and which were funded predominantly by MAF's Sustainable Farming Fund.

With this new project we aim to add some new dimensions to using willow and poplar trees on farms and lifestyle blocks. The main components in this new 3-year project are:

**Planting and Management Plan (PMP):** This will encompass most aspects of poplar and willow on farms for various uses. Much of this information is widely dispersed and this project will collate it, and add relevant new findings.

**Special-purpose tree-pasture systems:** We intend to define appropriate management for systems where the trees are cut (coppice blocks and pollard blocks), and for where tree-pasture blocks are grazed or browsed (browse blocks).

**Environmental effects:** We will determine the effect of willows on water and nutrient patterns in an established browse block.

**Controlling parasites in lambs and boosting hogget mating:** We intend to investigate the potential of willows in a tree-pasture system for naturally controlling parasites, followed by determining the effect of willow in the diet on reproductive performance of female hoggets. This work is co-funded by Meat and Wool New Zealand.



*Grant Douglas*

**Economic analyses:** An analysis of cost-benefits for browse and pollard/coppice tree block systems will be undertaken in a whole-farm context. We intend to cover the range of tree options currently available for sheep/beef and dairy farms, for environmental management (soil conservation, nutrient/water control) and fodder supply.

**Demonstration trials:** These will comprise existing trees of various ages and established browse and pollard blocks on farms, and new plantings.

**Disseminating information:** In addition to *PWN*ews being produced every six months, we will be using a range of dissemination methods e.g. newspaper, TV, radio, field days, and a dedicated project website.

I hope you find this newsletter of interest and snippets of relevance to your business. If you have any queries or suggestions regarding the project and its content, please contact any of the project team members. We would also like to hear of farmer experiences in this aspect of farm management, and please send us contact details for anyone you know who would like to receive future issues of *PWN*ews.

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## **The Planting and Management Plan**

**From Dave Cameron, Greater Wellington Regional Council, Masterton; Peter Gawith, farmer, Homebush, Wairarapa; Ian McIvor, HortResearch, Palmerston North; Grant Douglas, AgResearch, Palmerston North**

Information covering many aspects of poplar and willow planting on farms is widely available. Topics covered include erosion control, fodder use (e.g. [www.hortresearch.co.nz/projects/fodder](http://www.hortresearch.co.nz/projects/fodder)), timber, shade and shelter, effluent management (e.g. [www.hortresearch.co.nz/projects/dairy\\_effluent](http://www.hortresearch.co.nz/projects/dairy_effluent)), riparian planting and aesthetics. However management and maintenance of this resource from planting onwards is critical for their successful use in all these different ways, and it is apparent that the long-term sustainability of poplars and willows requires a management regime, along the lines of those already in place for growing *Pinus radiata*. Accordingly we aim to develop a Planting and Management Plan (PMP) in conjunction with Regional Council

participants in the project, and we will involve other relevant specialists and farmers when appropriate.

Components of the PMP will include:

- Management of existing trees planted for soil conservation.
- Management of existing trees planted for fodder.
- Tree selection and planting densities for landform units.
- Tree replacement programmes.
- Management of effluent through tree use.
- Safety protocols approved by OSH.

Activities in the first three of these components are outlined here, and those in the remaining components will be profiled in the next issue of *PWN*ews.

### **Management of existing trees planted for soil conservation**

Landscapes throughout New Zealand contain millions of poplars and willows planted for erosion control. These trees are up to fifty years old in some cases, and most have received little or no management in that time, except for the sporadic pruning during times of drought.



This component of the programme will focus on the management of existing trees planted for soil conservation to ensure that hill slope stability is maintained, but ensuring that pasture production is not severely compromised by large, densely planted trees.

Guidelines will be produced to assist landowners and land managers by:

- Recommending planting densities for a range of age classes.
- Providing options for pruning, by focusing on tree form and potential timber production.
- Proposing thinning regimes that optimise land stability but minimise pasture production loss.

### **Management of existing trees planted for fodder**

Poplars and willows have been used extensively to supply supplementary fodder during times of drought and feed shortage. The management of trees for fodder has been driven to a large extent by individual landowners, and a range of approaches have therefore been used. The fodder resource provided by poplars and willows is considerable, however there are new ways of managing the plantings to maximise the production of useable fodder. Guidelines will be produced to assist landowners and land managers to develop pruning options for fodder production from poplars and willows of different ages.

### **Tree selection and planting densities for landform units**

Tree selection and planting densities need to vary according to the type of landform unit that is being planted. Selection between poplars and willows can be critical, as can the selection of clones from within each species. Planting densities and species selection will vary between land subject to shallow slipping and land subject to deeper slump and earth flow movements.

Guidelines will be produced to assist landowners and land managers in the following areas:

- Planting densities for a range of landforms based on the National Land Resource Inventory.
- Site planting recommendations for poplars and willows.

An important part of the plan will focus on management for intermediate-aged and older trees, and ways to reduce their impact on understorey pasture production, and supply fodder, without unduly compromising their effectiveness for soil conservation (for plantings on hillsides).

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## **Progress on Wairarapa Farms**

**From Tom Barry, Peter Kemp, Carolina Diaz Lira and Eileen McWilliam, Riverside Farm, Massey University; Peter Cameron, Greater Wellington Regional Council, Masterton; Jeff Ravenwood, Fernglen, Homewood Road, Wairarapa**

### **Browse blocks for controlling internal parasites in weaned lambs**

Following winter and early spring grazing in 2004, the browse blocks (5.5 ha) on Massey University's Riverside Farm near Masterton were closed in early October. The grazing experiment began on 9 December 2004, involving six groups each comprising 30 lambs. Individual groups will graze either a pasture control area, a browse block only (full access), pasture for three weeks; or a browse block with restricted access for one week. Each of these options will be applied with and without anthelmintic drenching. All groups are being offered 4 kg of dry matter per day as weekly breaks in a rotational grazing system. The experiment will run for 16 weeks.

After 8 weeks the lambs will return to regrowth and will graze exactly the same areas as in the earlier part of the rotation. Measurements being made include liveweight change, faecal egg count and dag score. All lambs will be slaughtered at the end of the experiment to determine carcass weight and parasite burdens in the abomasum and intestines. The experiment will show us whether grazing willow browse blocks can be used to reduce anthelmintic drenching in weaned lambs, whilst also maintaining good lamb growth rates.

### **Fernglen Farm trial**

The 1.6 ha browse block at Fernglen Farm, on the coast southeast of Masterton, was closed from grazing in early October 2004 and grazing with lambs re-commenced on 2 December. Groups of 100 weaned lambs grazed either the browse block or a control pasture until 21 December.



*Fernglen browse block trial*

The initial mean liveweight of the lambs was 29.5kg. Over the three-week grazing period however, their liveweight gain was 125g/day for the browse block and 296 g/day for control pasture. This indicates that we need to develop management regimes to control the understorey growth in the browse blocks more effectively.

Farmer Jeff Ravenwood also had ten yearling bulls grazing with the lambs in the browse block, to help control the grass understorey. The browse block has now been closed again until ewes will graze it during mating. We will keep you updated on this progress in future issues of *PWNews*.

## Otago work underway

**From John Labes, Clutha Agricultural Development Board, Balclutha; Murray Harris, Land and Forest Consultants Ltd, Dunedin; Bruce Monaghan, Otago Regional Council, Alexandra; Barrie Wills, Central Environmental Services, Alexandra**

### Willow coppice block established for effluent absorption

To further develop the use of willows for effluent absorption a tree block was established on a sloping heavy soil on the property of Grant Paterson at Wharetoa near Clydevale in South Otago. The sharemilkers there are the Sharpin brothers who are milking 1400 cows on this 500 ha property. Over 100ha is not suitable for drainage or conventional effluent irrigation. The Otago project team also includes engineering consultant, John Scandrett.

The area was planted on 28-29 September 2004 with around 4500 small cuttings, all Kinuyanagi willow (*Salix kinuyanagi*) sourced from Canterbury, Winton and Barnego. Follow-up work in this quarter has seen release spraying with herbicides “Roundup” and “Buster” and a K-line irrigation system was designed by John Scandrett, Invercargill, and installed. A protocol for effluent spraying was developed, and the site is sprayed with dairy shed effluent every three weeks with variable application times – up to 7 hours K-line spraying at 3mm/hour. After each irrigation event the water quality in the stream is sampled at sites above and below the treated area, with analysis undertaken by Otago Regional Council staff. The water quality issue at these at-risk sites is causing increasing concern to the Otago Regional Council, and all parties involved are committed to seeking a solution.



*Rooted cuttings in rows at Clydevale, South Otago*

The annual conference of the NZ Association of Resource Managers included a field day visit on a neighbouring property at which the aims of this project were explained. As the Parliamentary Commissioner for the Environment, Dr Morgan Williams, was in attendance it was an excellent opportunity to explain the concept and the commitment of South Otago and Southland farmers to find practical answers to the issues. A meeting of the CADB Dairy Advisory Group visited the site in early November accompanied by Fiona Duncan of SFF, giving group members an appreciation of the scale of the problem and they are now eagerly awaiting another visit at harvest time.

The shape of the site and the unavailability of a small forage harvester lead to the decision to harvest the trees by direct cow grazing with subsequent tidy up by the farm mower. The project is now established with enthusiasm evident from all participants, including Fonterra, which was represented in the planting team by their local field agent. The area will be strip-grazed when the plants have grown to an adequate size.

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## Managing poplars for fodder in Otago

**From Barrie Wills, Central Environmental Services, Alexandra; John Prebble, farmer, Palmerston; Murray Harris, Land and Forest Consultants Ltd, Dunedin**

Throughout much of summer/early autumn in Otago, drought is an annual farming problem though it varies in severity. Using forage conserved for winter use is only an option under extreme circumstances, so providing alternative quality forage for stock in summer is a high priority. On some Otago farms poplar and willow trees are already grown to supply a good source of fodder in

dry summers, so we are now trying to determine methods (based on silvicultural management or plant varietal differences) that might extend the usefulness of tree fodder during persistent late summer/autumn drought periods.

A trial block was originally set up on John Prebble's property near Dunback in 1989. *Flevo* poplar was planted using about 500 short wands planted at 5 x 5m spacing. During a drought in 1998 30 steers were successfully fed for 33 days by pollarding these trees, and in the late summer of 2002 another drought developed, so the poplars were again pollarded to feed stock, using about half the original regrowth.



*John Prebble's pollarded poplars at Dunback, near Palmerston in North Otago*

Observations indicate that the pollarded *Flevo* poplar trees retain their leaves longer during drought than adjacent non-pollarded trees, so altering the silvicultural management is an option that should extend leaf retention. *Kawa* poplar has a later leafing habit, usually extending the retention period by a fortnight or more beyond that of *Flevo*, therefore its use in fodder blocks may be justified. However little is known about its growth under pollarding, nor has other hybrid material been considered. Observations this year indicated that *Kawa* came into leaf about 3 weeks later than *Flevo* and has the potential to hold leaves a lot longer into the autumn.

### **Management methods**

The following treatments were applied on 9 November 2004 to selected trees within the *Flevo* block that was pollarded in March 2002:

1. Pollard regrowth trimmed leaving only stems over 20mm diameter
2. Pollard regrowth trimmed leaving only stems less than 20mm diameter
3. Control treatment – no trimming of pollarded trees

In each case, two groups of three trees were randomly selected and marked for a total of six trees per treatment. After trimming, the number of remaining branches and the mean branch length were determined for each tree.

Material trimmed off three trees each from the pollarded treatments was weighed fresh to estimate the current biomass on the trees. Sub-samples were then taken to measure individual branch length/base diameter, stem and leaf biomass, and the water content and dry matter yield were determined by oven drying (12 hrs minimum at 50°C).

Adjacent semi-mature trees from the 1998 pollarding were cut to a bare coppice. In this case two groups, each of two trees, were chain-sawed to a similar height to the existing pollarded trees (a total of four trees), and an additional tree was square-cut below the old pollard joint as a possible option to the existing multi-joint cutting regime, and a single *Kawa* tree was treated similarly. These treatments/measurements will be repeated in early March 2005.

For spring 2005 a new planting area is planned, which will include additional poplar clones such as *Kawa* and others that may have potential to extend the leaf retention period into autumn.



*John Prebble with a pollarded tree*

branches remaining per tree in the first treatment, however their total biomass was similar to that of the more numerous smaller diameter branches in Treatment 2. The latter were about 25% shorter in length than the large branches.

The extent of leaf senescence and leaf drop will be assessed several times during April 2005 when this is mostly occurring. A single harvest of all trees will be considered at that time, using fresh biomass to determine differences but, depending on the season, we may instead rank tree leaf retention and leave them for a further season until fully harvesting them.

### **Results to Date**

Total tree biomass in an untrimmed state is currently about 15.5 kg (wet). After selective trimming for large diameter branches there were approximately 5.6x fewer

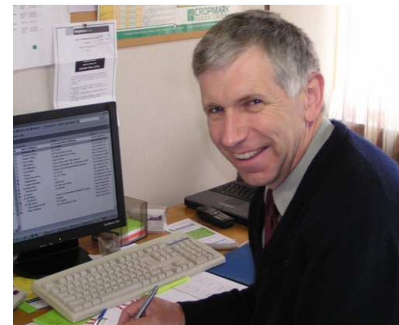
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## **Economic analysis: progress report**

### **From John Stantiall, Wilson & Keeling Ltd, Palmerston North**

The Otago sites of John Prebble and Dick & Tim Sharpin were visited on 13-14 December 2004 to collect data for the financial analysis, and gain an understanding of how the trees fit into the farming system.

Murray Harris and John Labes kindly provided transport for me, and were also able to provide further background about the project. The Riverside Farm site will be visited during the current summer. A draft economic model is under development with each of the farmers involved, and this should be available to a wider audience for comments and feedback later this year.



*John Stantiall*

A range of economic models will be necessary to reflect the way that fodder trees are used in different systems, and for a range of complementary purposes, such as erosion control, dairy effluent disposal and drying out boggy areas. The economic analysis will become a focal point for discussing the impacts of fodder trees in the farming system, as it identifies and attempts to reflect the relationship of the many variables involved.

### **FEEDBACK**

We are keen to hear from farmers and other people living or working on the land about their experiences with managing poplars and willows for soil conservation, shelter and shade and using them for supplementary fodder.

If you have had some experience with poplar and willow tree management and can offer some positive suggestions that we could include in the practical guidelines, then please contact one of the team listed on the back page and give us the details. You will be consulted before any of your information is published naming you as the information source.

## Eileen McWilliam graduates PhD

After three years of research at Riverside Farm Eileen McWilliam was awarded a PhD in Ruminant Nutrition from Massey University at a graduation ceremony held in Palmerston North on 26 November 2004.

“It was a special day for me,” reports Eileen, “with my family from Oregon, USA, my husband Alistair, and our New Zealand family and friends present to celebrate the achievement. The following day my family hosted a party at home to thank all of the many people who have played a significant role in the success of my research programme.”



*Eileen with Prof Tom Barry*

Eileen’s most immediate future plans are to continue her involvement in ruminant nutrition, lecturing at Massey University and co-supervising post-graduate students conducting research at Riverside Farm near Masterton. Currently she is working with Dipti Pitta and Carolina Diaz Lira with their research on willow fodder blocks. Eileen is also planning to develop a ruminant nutrition consultancy, perhaps with a special emphasis in providing nutritional solutions to farmers in dryland regions. Dryland animal production is her special interest as she and Alistair farm sheep and beef near Gladstone, Wairarapa. They are also looking forward to the arrival of their first child in early March, so

Eileen expects the next few years will be fairly busy ones.

**We thank the following organisations for funding this work:**  
**MAF’s Sustainable Farming Fund**  
**Meat and Wool New Zealand, Massey University**  
**Greater Wellington Regional Council and Hawke’s Bay Regional Council**

### Want to know more?

If you are interested in this project and its results and would like someone else to receive future issues of *PWNNews*, please contact any of the following:

**Project Leader: Mr Peter Gawith, Longbush, Gladstone, RD4, Masterton.**  
Ph/Fax 06 372 7743. Email: [gawith.p@xtra.co.nz](mailto:gawith.p@xtra.co.nz)

**Project Manager: Dr Grant Douglas, AgResearch, Private Bag 11008, Palmerston North.**  
Ph 06 351 8072. Fax 06 351 8032. Email: [grant.douglas@agresearch.co.nz](mailto:grant.douglas@agresearch.co.nz)

**Communications Manager: Dr Deric Charlton, Greenfields Communications,**  
17 Cremorne Avenue, Palmerston North. Ph 06 356 9799. Email: [dericpat@ihug.co.nz](mailto:dericpat@ihug.co.nz)

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