

Excerpts from the Quarterly Report to SFF Apr-Jun 2006

Updating economic models and economic analyses for tree-pasture systems

Presented by John Stantiall

Brief feed back from a field day held at Ennor farm (60 participants) in Hawke's Bay in April (see PWNNews No. 4) indicated that the results from the economic models were in line with figures that some farmers had completed themselves. In general, the fully-costed models barely break even financially when considering tree fodder as the only benefit. However, if the cost of labour is excluded, then the fodder trees just break even. If other factors such as shade, shelter, erosion control and added aesthetic value were to be included, then the total return on the investment in trees is likely to be positive.

This feedback was very important because the model needs to align with farmer experience, and also be able to provide the analysis for a range of scenarios such as whether or not to include labour costs or establishment costs, or include other benefits.

Further updating of forage yield data in the model will be conducted in consultation with researchers. This is likely to involve using summary data for yields for a range of situations e.g. by variety, district, tree age, number of years growth etc. The dairy model will also be updated.

2005/06 Riverside Farm grazing trial

Presented by Professor Tom Barry

The grazing experiment on Riverside Farm commenced on 19 January 2006 with 3 groups each of 115 hoggets. The groups are pasture control undrenched, pasture control regularly drenched, and browse block undrenched.

From 19 January to 15 May 2006, all hoggets were weighed at 2 week intervals and FEC done at the same time for 15 animals in each group. All groups were fed at the same herbage DM allowance, which was 4 kg DM/animal/day at the start of the Experiment and increased to 5 kg DM/animal/day by the end of the Experiment. All groups were fed in weekly breaks. Teaser rams (2/group) ran with the hoggets from 11 April to 28 April, and entire rams ran with the groups from 28 April to 15 May. All groups were joined into one group on 15 May 2006 and managed on pasture. Rams were removed at this time. Only one cycle of mating was considered because all the browse blocks had been utilised by 15 May.

On average, hoggets grazing browse blocks grew slightly faster than hoggets grazing conventional pasture (97 vs. 85 g/day). After one cycle of mating with entire rams, more hoggets were marked in the group grazing browse blocks (72%) than pasture blocks (36 and 51%). This was statistically significant and remained so when corrected for the small difference in liveweight.

Dag score increased with time in all groups. However, the increase was less for hoggets grazing browse blocks (0.46) than for hoggets grazing pastures (0.67). Preliminary information from ram marking indicates that mating hoggets on browse blocks may have increased reproductive performance. Further more conclusive data will be available at scanning (early July), lambing (September/October) and weaning (January 2007).

Pruning young poplars

Sarah Hurst, Ian McIvor, Carlo van den Dijssel, Steve Green (HortResearch), Lindsay Fung (Horizons Regional Council), Grant Douglas and Lex Foote (AgResearch)

Since the 1950's over six million poplars have been planted throughout New Zealand, with planting reaching a peak during the 1970's in response to government incentives for soil conservation. Unfortunately many of these trees received little or no silviculture. Thinning and pruning could have produced uniform trees with clean, knot-free timber and better wind resistance, and also an increase in light to the pasture understorey.

Pruning is not required for those poplars which have significant *Populus nigra* (Lombardy) parentage. Producing new narrow crowned varieties is one of the aims of the current poplar breeding programme at HortResearch. However many useful varieties are moderately spreading to broad-crowned if left untended. Owners of these trees are faced with expensive clearing operations when tracks and fences are damaged and blocked by falling trees and branches.

While most current poplar plantings are largely unmanaged and therefore unusable as a timber source, there is renewed interest in using poplars for timber, and a number of landowners have established small woodlots in recent years. Poplar wood is very pliable, odourless, and has an attractive light grain. The basic density of poplar wood is classified as low to medium, with densities of 300-400 kg/m³ depending on the variety.

The wood has been used for fencing, gates, stockyards and truck decks, panelling, furniture, veneers, and to make fibreboard and pulp and paper (in mixes with *Pinus radiata*). 'Blackheart', also known as 'bacterial wetwood', is a zone of infection that can affect the heartwood or the heartwood-sapwood transition zone, particularly in the old hybrid black poplars such as 'I 78' and 'I 214'.

Wetwood differs from normal wood in appearance and in chemical and physical properties and is more difficult to dry. However new clones such as 'Kawa' are less susceptible than the older varieties.



Age 7 Kawa in a Fan Nelder trial (4-11 m spacings) in Gisborne. Mean height 14.5 m, dbh 18 cm.

A study has been conducted to quantify some of the benefits of pruning young Veronese poplars at AgResearch's Ballantrae Hill Country Research Station near Woodville. The study trees were planted in 1995 at 160 stems per hectare for erosion control on an unstable hillslope. In March 2002 we pruned trees in one block to approximately 5 m, removing about 30% of the canopy. We measured the effect of pruning on the understorey light environment, pasture growth and tree water use. As part of the project relationships were also determined between branch diameter and leaf area and weight. This allows calculation of the mass of leaves removed from a tree during pruning, which has relevance for fodder use.

Light environment and pasture production

Simulations using hemispherical canopy photos showed that the percentage of total radiation reaching the understorey pasture increased from 61% to 72% after pruning (see photos). Mean annual pasture production under trees was 10-15% lower than in the open, but there were no consistent differences between the pruned and unpruned sites. However, because of the increase in transmitted radiation to the ground surface, we expect that more intense monitoring would show an increase in pasture growth under pruned trees.



Open pasture
93% of total radiation



Under trees before pruning
61% of total radiation



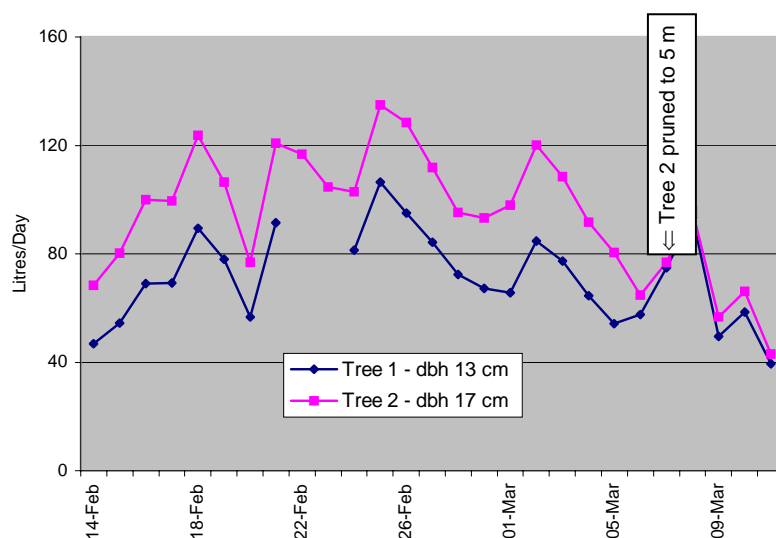
Under trees after pruning
72% of total radiation

Tree water-use

Sensors were installed in two trees to measure water use before and after pruning. In February “Tree 2” (height 12 m, dbh 17 cm) used an average of 110 litres of water per day from the soil (equivalent to 1.7 mm/day at 8x8 m tree spacing). This was reduced by 28% following pruning (see graph below), resulting in a water use similar to the smaller, unpruned “Tree 1” (height 11 m, dbh 13 cm). There was no measurable effect of pruning on soil water content in what was an above average rainfall year (665 mm fell from November-April). However, on a drier site the reduction in tree water use may reduce competition for water and improve summer pasture production.

Recommendations

Your poplars should be pruned to a single leader during the first two years. After that, pruning of the side branches up to 50% of the height of the tree is beneficial every 2 or 3 years. This will result in about one third of the foliage being removed, which ensures that the growth rate of the tree is maintained in the next growing season. In this study, pruning increased the quantity of light reaching the pasture understorey, which is desirable in most silvopastoral systems. It also reduced tree water use, improved the appearance of the trees, and will help to produce clean knot free timber that is easier to harvest. Pruning is best done in late summer, to reduce re-growth of epicormic shoots and to avoid the main flight period of wood-boring beetles. Conducted at this time it will also provide a fodder source for livestock. After pruning some root dieback is expected, which may affect soil strength negatively in the short term. However the real benefits of silviculture – improved pasture growth and timber properties, and a manageable, useful tree after 20 years – far outweigh any short-term disadvantages. Anecdotal observations collected after the lower North Island storm of February 2004 also suggest that pruned trees and narrow-crowned varieties were less prone to wind damage.



Poor establishment and/or site selection, droughts, wind damage, slips, stock and possum damage, and sleeves that fail to split are the most notable causes of poor growth and fatalities in our trial plots. A stroll around trees while pruning every couple of years can help detect some of these dangers, and while they cannot always be avoided, at least it helps to learn something for future plantings. A farmer-led group, funded by the MAF Sustainable Farming Fund, is currently working on a planting and management plan for poplars and willows on farms. This plan will give guidelines on optimal tree management and planting patterns, and will also cover options for dealing with old trees. Information about this project will be covered in a future article.

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