

Shelter impacts on pasture production at Formosa in Spring 2017

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Summary

Pasture productivity was measured across a 25 ha paddock on the leeward side of a *Pinus radiata* shelter belt. The trees occupied approximately 1 ha of the paddock (4%), but the shelter effect resulted in increased pasture production on the remaining 24 ha by around 15% overall, effectively increasing the pasture production to the equivalent of a 29 ha paddock. The impact of shelter on gross margin is likely to be around \$63/ha, or \$1500 in total across the paddock, and this is in addition to any benefits for stock survival, carbon and forest products.

Introduction

We have established a series of experiments in Tasmania to explore the impacts of shelter belts on adjacent agricultural production. One of these sites is on the Formosa property, near Cressy in the northern midlands. During the spring of 2017, stock were excluded from the paddock, and pasture growth was measured and mapped across the paddock using a GrassMaster Pro pasture meter.

Paddock and pasture

The paddock is 500 m square, with a belt of radiata pine on the western edge. The paddock was sown with a **cocksfoot and clover mix** in the autumn of 2015, and the pasture at the time of the study was 2 years old and relatively uniform. The paddock is flat and level and has minimal variation in soils (based on an EM38 map).

Shelter belt

The radiata pine shelter belt is planted in a 5-row configuration, and is oriented directly north/south. It was planted in 2001 (currently it is 17 years old), and currently the trees are around 15 m tall, and 24 cm diameter at breast height. There is around 250 m³/ha of wood in the stand. The porosity of the belt is around 30%.

Pasture measurements

The paddock was grazed down to a relatively uniform starting point in the autumn and winter of 2017, and stock were excluded from the paddock in mid August. The pasture was allowed to grow for around 7 weeks until early October, and the pasture biomass was assessed on October 3rd, 2017. A total of 7 transects were established across the paddock to assess pasture productivity in relation to distance from the tree belt. Measurements were taken every 10 m along each transect. Each assessment point was taken as the average of 8 cardinal points around a central point.

Fig. 1 - The 17-year old, unmanaged, multi-row Pine shelterbelt viewed from the South. The net paddock area is around 25 ha (500 x 500 m) with the belt occupying around 1 ha on the western edge. Photo credit: Arthur Lyons, Private Forests Tasmania



Wind

The wind at the site for spring 2017 was measured directly in an open part of the paddock, where an automatic weather station has been set up and continuously monitoring since 2016. The results from the wind monitoring clearly show that the vast majority of the wind comes from the NW and NNW (50% of all wind), another 9% of the wind originated from the north, and 6% from the SE. All other directions contributed to 5% or less of the total wind over this time period.

Shelter impact on pasture biomass

Pasture biomass was around 30% higher on the western (sheltered) half of the paddock (3.3 t/ha) compared to the eastern (unsheltered) half of the paddock (2.6 t/ha). While pasture production was lower within the first 10 m adjacent to the tree belt, the shelter was observed to increase pasture productivity compared to the open paddock from 1.5 to around 12 tree heights (~22 to ~180 m)

Value of shelter

In this case, the shelter lifted overall production of the 24 ha of pasture by around 15%. This would increase commensurately the amount of hay that could be cut from the paddock, and/or the stock that can be carried. If the gross margin of the grazing enterprise is \$420/ha, and the increase of 15% productivity translated directly into gross margin, this would be increased by 15%, or around \$63/ha, or an additional \$1,512 over the 24 ha of the pasture. This effect is in addition to the shelter benefits that the trees provide directly for stock survival. It is also in addition to the direct returns that will be gained from the harvest and sale of the timber from the plantation, and the income that could be obtained by selling the carbon credits associated with the net carbon increase from changing land use from pasture to trees.

Conclusions

The shelter belt at Formosa has conveyed a substantial benefit to the pasture production across the paddock, with 30% more pasture in the sheltered half of the paddock. One hectare of trees effectively increase the production of pasture from the paddock to the equivalent of a 29 ha unsheltered paddock. If this translated directly to the gross margin, it would have increased the net returns to the farmer from the paddock by around \$1500. This is in addition to other benefits that the trees can provide, including timber production, carbon, biodiversity and amenity.

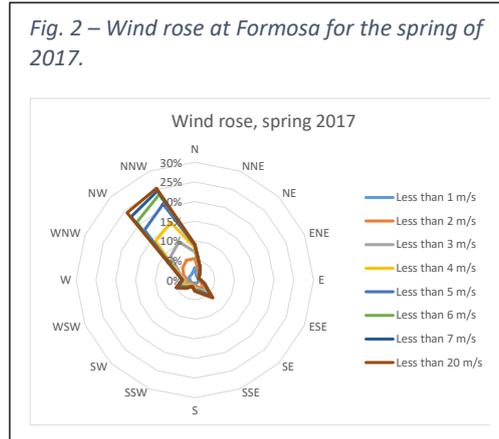


Fig. 3 – Map of pasture biomass in October 2017, after 7 weeks of stock exclusion. The western half of the paddock had 30% more pasture biomass than the eastern half of the paddock.

