

# Shade from trees inhibits pasture growth

A trial designed to test whether pasture production would increase in a shaded environment showed the opposite.

## Creating a diverse and sustainable dairy farming and forestry landscape

**Participants:** Waikato dairy farm planted with Paulownia trees

**Project team:** Regan McCorquindale (LIC FarmWise), Graham Smith (Miraka Farm) and Gina Lucci (AgResearch)

**Report:** Creating a diverse and sustainable dairy farming and forestry landscape ([ourlandandwater.nz/RPF2020](https://ourlandandwater.nz/RPF2020))

## Technical information

**Project aim:** To assess the impact of trees in dairy paddocks on pasture production and cow behaviour.

- Pasture production was measured using a rising plate meter in December 2020 and March 2021.
- The hypothesis that pasture production would increase in shaded areas was not proved.
- Cows spent more time under shade, where available, in the afternoon.

Waikato dairy farmer Graham Smith has been growing Paulownia trees on his farm for 30 years. He reckons he could just about survive on the income from timber alone now without relying on the returns from his 80 cows.

“My son is coming back here soon to take over the farm. I’m going to live off the timber and he’s going to live off the dairying,” Graham says.

While Graham was planting trees, Regan McCorquindale, LIC FarmWise consultant, was growing up on a neighbouring farm and saw what was happening on the Smith family property, called Miraka Farm.

“I’d always known he’d been growing these funny looking trees. I started to learn more about them when I had a pasture measuring business and Graham was one of my clients,” Regan recalls.

He really started to take notice during the drought of summer 2019 when about the only grass growing in the district seemed to be under the trees in Graham’s paddocks. “All the pasture under the trees was still growing, whereas everything else was more like cardboard, just absolutely dead.”

It occurred to him that growing more trees on farms could help make them summer-safe, so with Our Land and Water Rural Professionals Fund support, Regan set up a trial to put some real numbers behind that theory. He also wanted to compare cow behaviour under shade and away from shade.

However, the trial in fact showed unshaded pasture grew better than shaded. Pasture monitoring was done in December 2020 and then again in March 2021. The December pasture samples showed a greater percentage of ryegrass in the ‘no shade’ trial site (see Figure 1) and that pattern continued in March (see Figure 2).

The data collected shows the clover percentage was higher in December in the shade. Crude protein level is the only valuable metric under a ‘shade’ paddock that has more advantageous results compared to the ‘no shade’ paddocks. All the other metrics were similar, or in favour of the ‘no shade’ paddocks.

## Dense planting

Graham says the trial results confirmed what experience had already told him – that trees in the trial block were planted too densely to allow pasture to thrive.

“I could see it myself before they did the trial that I was having trouble with the pasture, so my plans for this summer are to thin the trees down from about 100 trees/ha to 50 and let more sunlight in to rectify the problem,” he says.



*Farmer Graham Smith prunes a Paulownia tree. Although not part of this research, he says his small dairy herd enjoys eating the leaves. The trees will eventually be coppiced and the timber milled and sold*

Regan agrees that thinning the trees to let in more light will be helpful. Graham is sure of the value of trees, but is still working out exactly where the sweet spot is for the ratio of trees to pasture. “You’ve got to stay flexible and roll with the punches. I’m still learning and so is everybody else,” he says.

“You get to the stage where you say, ‘Am I in trees or dairy?’, but I want to keep the blend because I think diversification is the name of the game,” says Graham. “You don’t want to have everything tied up down one track. I think that’s a smarter move than being tied into one form of farming.”

### Cow behaviour

The second part of the project assessed cow behaviour in shaded vs unshaded environments.

The cows were split into two herds and fitted with Cow Manager ear tags, HOBOW cow collars and GPS pedometers.

The cows with access to shade moved faster than those who were more protected by shade from the trees during the afternoon (see Figure 3). The activity collars also showed that the cows in the no shade paddocks spent more time lying down than those in the shaded trial area.

### Next steps

The summer and autumn of 2021 received a lot more rain than has been typical in recent years. A trial over multiple years would capture greater variation in weather conditions and give more reliable results. The optimal number of stems per hectare that offer shade to cows and allow an increase in pasture production through drier summers is still to be found.

– Tony Benny for Our Land and Water National Science Challenge (CC BY-4.0)

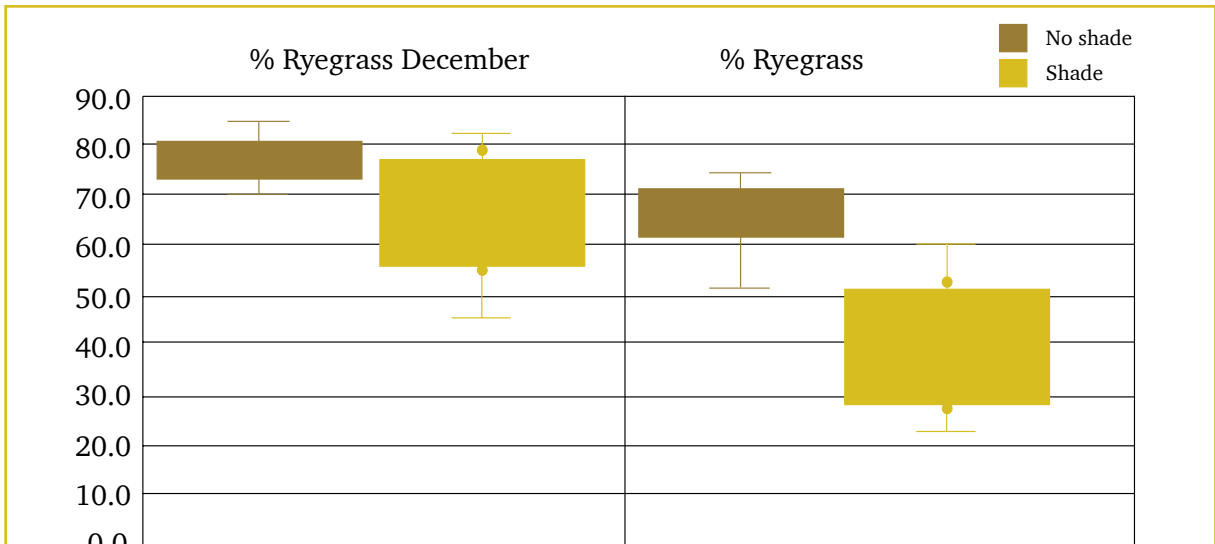


Figure 1: Percentage of ryegrass in pasture samples, December 2020

Figure 2: Percentage of ryegrass in pasture samples, March 2021

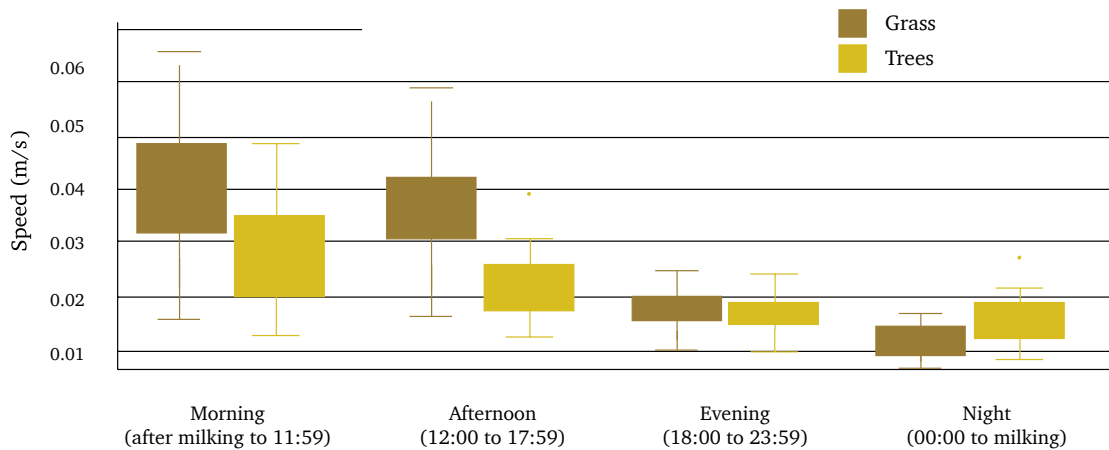


Figure 3: Dairy cow speed while grazing