

# Alternative kale feeding

## Dispersed forage feeding to minimise negative impacts on soil and water quality

**Why:** To compare the environmental, farm management and economic impacts between harvesting greenfeed (kale) and feeding to stock in dispersed locations and the traditional method of grazing it in situ.

**Where:** Drystock farm (sheep, deer and cattle) in Waikari Valley, North Canterbury.

**Who:** Sarah O'Connell, Jon Manhire, Dave Lucock, Stuart Ford, Julie Lambie (The AgriBusiness Group), Scott Hassall (farmer), Dr David Scobie (AgResearch), Simon Thorne (Frame Grain & Seed) and Dr Dave Saville (retired biometrician).

### What:

- Baseline data of the soil physical properties were gathered for two paddocks that were identified to be sown in kale.
- At the time of sowing both paddocks were divided, with half to be grazed and the other half harvested to provide a direct comparison between the systems on the same soil types.
- Although there was no evidence of a difference in soil properties after the kale had been fed, modelling suggested that there were benefits, such as mitigating nitrate leaching.
- The farm management benefits exceeded expectations and drove efficiencies during and post the crop-feeding period for the farm in the project.

**Read more:** *Impacts of dispersed forage feeding:* [ourlandandwater.nz/RPF2022](http://ourlandandwater.nz/RPF2022)

Greenfeed crops can be an important winter feed source, but intensive grazing needs careful management. This project found environmental and management benefits to harvesting kale to feed out to livestock, but less difference to soil compaction or water infiltration than anticipated.

Feed shortages and winter grazing woes had Sarah O'Connell from The AgriBusiness Group contemplating what alternative tools could help farmers navigate winter.

Talking about feed shortages at a winter seminar, Sarah learned of an alternative method that local North Canterbury farmer Scott Hassall had adopted to feed harvested kale to his livestock last year. She approached him to learn more about what he was doing and proposed a project to compare whether his method had less environmental impacts than traditional grazing.

When pasture production is slow during cold winters or dry summers, greenfeed crops can be an important feed source to help fill the gap. But grazing greenfeed crops, such as kale, bring environmental and management challenges for farmers and new winter grazing rules have added to the load.

Intensive grazing needs careful management to protect paddocks from pugging and to mitigate water quality risks from nitrate leaching and sediment runoff. "It gets highlighted every winter when animals are in mud up to their knees and it always gets me thinking about how we can reduce the concentration of animals in a small area," Sarah says.



Harvested kale being deposited before loading to be fed to livestock

“What Scott was doing was doing exactly that. He was harvesting the greenfeed kale and feeding it to his stock in pasture-based paddocks, which meant there was minimal pugging, leaving nice clean paddocks without any surface damage.”

From his positive experiences the previous season, Scott was already sold on the idea of continuing to harvest his kale crop to feed his stock, so he was more than happy to be involved in the project.

### Management benefits

From Scott’s perspective, the major benefits sit with farm management. He praises being able to feed every class of stock on his property, which includes deer, cattle and sheep, as well as the total utilisation of harvested feed because everything gets chopped up small.

It takes about an hour every two days for Scott to harvest the kale. He says he would rather sit in the tractor than navigate break-feeding kale, and because he is feeding-out he still sees the stock every day.

“It takes a bit of preparation to break-feed crops and the stock always leave heaps of stalks behind, but when we harvest the kale we don’t have to worry about preparing marks for breaks. It gets chopped close to the ground and the whole plant gets chopped into bite-sized chunks that the stock clean up,” Scott says.

The cleanly harvested paddocks recover quickly, and Scott finds he is able to direct drill without any ground preparation work, which creates efficiencies that save him time and effort.

“Not having to do any cultivation is a huge benefit for me, and it’s such a relief to just get on with the next stage so easily.”

### Measured and modelled results

The big advantages Sarah found through the project were from an environmental perspective, especially for farmers needing to navigate the new regulatory landscape.

“It’s a tool that farmers and their support can consider when planning winter feed. Harvesting provides flexibility, it doesn’t need a consent, and it gives farmers options to consider paddocks with higher slopes,” she explains.

For the project they compared two paddocks with similar soil properties that were sown with kale. Each paddock was split in half. One side was grazed traditionally with deer and the other harvested, to allow a direct comparison between the systems on the same soil types.

To assess the soil before and afterwards, visual assessments and measurements of compaction and



water infiltration were taken on the paddocks, via measurement by a penetrometer and bulk density. There was no visual damage or pugging in the harvested areas, unlike the grazed areas. However, the measurements didn't show any statistically significant differences to the soil physical properties between the two areas.

Sarah wonders if it would have made a difference if they grazed cattle rather than deer, or if with more replicates a bigger study might produce a statistically significant result.

The team then used OverseerFM modelling to understand the nutrient losses of the project and potential nitrate losses if they were to implement alternative management practices on the paddocks (Table 1). This found a reduction in nitrate leaching, which is a huge benefit for farmers and waterways.

A financial analysis illustrated little difference in the cost of the systems when they are compared on a feed value basis. On a pure cost basis, the costs are higher in the harvesting system (\$721/ha) than in a grazed in situ system (\$593/ha).

### Equipment is the limiting factor

“By harvesting the crop, farmers don't need to have large numbers of animals grazing in a small area, which has numerous benefits for the environment,” says Sarah, “particularly around pugging and leaching, as well as public perception risks.

“When poor weather conditions are predicted, the method could also be utilised to keep stock off crops to reduce the incidence of pugging, surface run-off and undesirable grazing conditions.”

**Table 1: OverseerFM nitrogen block summary**

Scenario	Paddock 1 (imperfectly drained soil) (kg N/ha/yr)	Paddock 2 (well- drained soil) (kg N/ha/yr)
Base (grazed in situ)	25	17
Harvested	16	21
Harvest and grazed	20	16

But Sarah points out that a big consideration for farmers is the reliance on equipment availability. Farmers who have their own gear, like Scott, can utilise equipment that would otherwise be parked at that time of the season. He also had the luxury of having three tractors available, which meant he could leave various implements attached and switch tractors between jobs rather than changing implements each time.

Further work to explore the economics of utilising contractors would be helpful. There could be opportunities for farmers to form or join syndicates to provide access to equipment, suggests Sarah.

The project was short and Sarah would love to follow a system over several years to get a good understanding of the extensive impacts. However, the project has confirmed that feeding-out is a tool farmers have available to support winter feeding.

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*Samantha Tennent for the Our Land and Water National Science Challenge*



Residual of grazed and harvested areas