

REDUCED WATERLOGGING OF PASTURES – DERRINALLUM

Location: Derrinallum Victoria

Researchers:

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Funding:

Grain and Graze, National Landcare Program (NLP)

Acknowledgements:

Thanks to Darren and Michelle Evans for providing land for this trial.

Aim:

To quantify the effect of surface drainage on farm productivity, profitability and sustainability (both on and off farm).

The trial is designed specifically to monitor the effect of surface drainage;

- on pasture productivity and nutritive value;
- animal production;
- waterlogging severity and duration,
- trafficability and soil physical condition,
- monitoring of waterflows off the site.

Rainfall (mm): Annual Rainfall 2006: 390 mm
Trials site and design

The trial is being conducted on a “Grain & Graze” surface drainage demonstration paddock established on the property of Darren and Michelle Evans, Kurweeton Road Derrinallum. The 23 ha paddock had raised beds (2 m wide) and hump and hollow (25 m wide) drainage installed on approximately one third each of the paddock during the autumn of 2005, with the remaining one third of the paddock being left as an undrained control area. The paddock was sown to hybrid perennial ryegrass (*Lolium perenne* L. cv. Horizon) and white clover (*Trifolium repens* L. cv. winter white) in June 2005, with some areas requiring resowing in August 2005. In October 2005, the paddock was fenced along the boundaries between treatment areas to form six small paddocks: two in each drainage treatment – larger paddocks to the west of the north-south drain dissecting the paddock, and smaller paddocks to the east of this drain. The larger paddocks to the west of the drain, hereafter called “plots”, are used as the experimental areas for the trial, whilst the smaller paddocks to the east used as part of the grazing rotation, but no experimental observations are collected from them.

During January-February 2006 a road grader was used to form hydraulically isolated treatment catchments in each of the western side of the raised bed, control and hump & hollow treatment paddocks. Each of these catchments are 2.5 ha in size and have flumes and automated water measurement and sampling equipment installed to collect surface runoff water.

Further information about this trial can be found at
www.sfs.org.au

Summary Of Findings:

During 2006, a field trial designed to quantify the effect of two different surface drainage strategies of pasture (hump & hollow and raised beds) on farm productivity, profitability and sustainability was conducted on a commercial farm near Derrinallum as part of the Corangamite/Glenelg-Hopkins “Grain & Graze” program. Unfortunately, despite above average rainfall for January, February and April, severe drought conditions prevailed with total rainfall for the year being in decile 1. As a result of these rainfall deficiencies for winter and spring, no surface runoff or waterlogging of pastures occurred during 2006. Therefore, the effect of the hump & hollow and raised bed drainage treatments compared to the undrained control on surface runoff, pugging damage and trafficability could not be determined.

However, the effect of the two drainage treatments in a dry year on the pasture and animal productivity was determined. Significantly, the raised bed drainage treatment had lower pasture productivity growing only 4.81 t DM/ha for the year compared with 7.05 t DM/ha for the hump & hollow and 7.61 t DM/ha for the control. A large part of this lower DM yield on the raised beds is likely to be a result of a poor establishment of the autumn oversown Italian ryegrass on the raised beds. Despite having a satisfactory initial establishment, the ryegrass seedlings in this treatment suffered from serious moisture stress leading to a high mortality and an open pasture with more bare space. This was then reflected in lower animal production for the raised bed treatment. Lambs from all three treatments had similar liveweight at weaning in early November, but the raised beds was only able to be stocked at 4.3 ewes/ha over the spring period compared to 5.2 and 5.4 ewes/ha for the control and hump & hollow treatments respectively.

Marked differences in soil physical health were found between the topsoils of the different treatments. Most notable was the aeration porosity of the soils at field capacity (10 kPa). The control treatment had a porosity of only 6.5% at 10 kPa, indicating that this soil had lost most of its macro, or large pores due to treading. This value is well below the well recognized critical level of 10%, below which plant growth can be restricted through poor root aeration. In contrast the raised beds and hump & hollow had values of 15.7% and 11.5% respectively. The change in pore size distribution in the soils from these different treatments was also found to have a marked effect on the water holding capacity of these soils. The plant available water (PAW) of the top 10 cm of these soils was found to 28.5 mm for the control, but only 19.8 mm and 17.8 mm for the hump & hollow and raised beds respectively. This reduced water holding capacity may have contributed to the markedly poorer productivity of the pastures on the raised beds under the drought conditions of 2006.

Major management and experimental activities during 2006

- 12 April: Autumn fertiliser applied – 20 kg P/ha as triple superphosphate.
- 26 April: All of trial area oversown with “Crusader” Italian ryegrass (*Lolium multiflorum* Lam.) at 25 kg/ha seed with 80 kg/ha DAP due to very poor persistence of the “Horizon” hybrid ryegrass sown the previous autumn.
- 1 May: Installation of all experimental measurement and monitoring equipment completed. This included all pasture, soil, water and meteorological equipment – assessments commenced.
- 19 June: Western (experimental) paddocks sprayed by air with 1.5 L/ha of Agtryne MA (Terbutryn 275 g/L + MCPA 160 g/L) and 100 ml/ha of Fastac (Alpha-cypermethrin 100 g/L) for broadleaf weed (mainly thistles) and pasture pest (mainly black headed cockchafer) control.
- Early July: All western (experimental) paddocks crash grazed with commercial mob of sheep following herbicide application.
- 14 July: trial ewes weighed, conditions scored, vaccinated and drenched – allocated to and put on trial paddocks (36 ewes/treatment).
- 16 July: 100 kg/ha of Urea (47 kg N/ha) applied by air to western (experimental) paddocks.
- 28 July: Ewes on trial commenced lambing.
- 10 August: Stocking rates on each of the treatments adjusted by adding additional ewe lambs to some treatments. This was done in an attempt to bring standing pasture mass on all treatments back to a common level.
- 15 September: Lambs on trial marked. Stocking rates on the different treatments adjusted by removing some of the ewe lambs to bring stocking rates back in line with pasture growth.
- 8 November: Lambs weaned. Ewes weighed and condition scored. Lambs weighed and counted. Trial sheep removed from the treatments – animal monitoring for the season concludes.
- 5 December: Final pasture measurements for 2006 conducted.