LIVESTOCK GRAZING BEHAVIOUR IN LARGE MALLEE PADDOCKS.

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WHY WAS THE PROJECT DONE?

The integration of cropping and grazing remains a major management challenge in the Mallee. Technology such as portable fencing systems and virtual fencing potentially offer a solution to improve grazing management in large Mallee paddocks with high soil variability. However, to effectively design and deploy these innovative grazing techniques, the grazing behaviour of livestock in these paddocks needs to be understood and quantified.

ABOUT THE PROJECT

A flock of two-year-old merino ewes (approximately 200) grazed a 107 ha paddock near Nandaly during summer (barley stubble) and then again in winter grazing (vetch) in 2015. Prior to the commencement of grazing, 25 animals within the flock were fitted with UNE Tracker II GPS collars (Figure 1). Livestock monitoring was supported with on-ground assessment of vegetative soil cover and feed quantity over both grazing periods. At the conclusion of each grazing period, the collars were removed and the data downloaded from the GPS devices. Data was then analysed for the purpose of quantifying variable grazing pressure.

KEY MESSAGES

- For the first time sheep grazing behaviour in a Mallee paddock was monitored and mapped using GPS tracking collars
- Sheep grazed the entire stubble paddock as they sought out spilt grain during the summer fallow, but they preferred to graze on sandy soil types first
- While grazing a vetch pasture in the same paddock, livestock spent 50% of the time grazing only 25% of the paddock and 25% of the paddock was not utilised

- At least $4000 profit was foregone from the paddock through the under-utilisation of the vetch pasture
- Within-paddock fencing technology in large Mallee paddocks has the potential to capture this potential profit by improving feed utilisation

BACKGROUND

Livestock are an integral component of Mallee farming systems. However, the integration of cropping and grazing remains a major management challenge, as paddock sizes tend to be large to benefit efficient cropping practices. Furthermore, Mallee paddocks are also characterised by extreme soil variability and these variable soil types support different levels of feed availability and have different susceptibilities to soil erosion. As a result, farmers report that they are not able to utilise all of the feed on offer within a paddock without reducing groundcover below critical levels. In situations in which farmers are forced to extract maximum productivity, soil erosion often results on the most vulnerable soil types such as sand dunes.

Advances in technology such as portable fencing systems and virtual fencing potentially offer a solution to the issue of grazing large Mallee paddocks with high soil variability. However, to effectively design and deploy these innovative grazing techniques, the grazing behaviour of livestock in these paddocks needs to be understood and quantified. This project has begun to address this knowledge gap by quantifying livestock (sheep) grazing habits in a large Mallee paddock with variable soil types.

METHODOLOGY

A flock of two-year-old merino ewes (approximately 200) was monitored over a summer and winter grazing period during 2015 using Global Positioning System (GPS) tracking collars. Prior to the commencement of grazing, 25 animals within the flock were fitted with UNE Tracker II GPS collars. Livestock monitoring data was supported with on-ground assessment of vegetative soil cover and feed quantity over both grazing periods.

The project was undertaken in a 107 ha paddock near Nandaly in the Victorian Mallee which had a range of soils (deep sands to clay loams) commonly associated with Mallee paddocks. The summer grazing period commenced on 14 January 2015 and concluded on 24 February 2015. The paddock was sown to barley in 2014, and livestock grazed the stubble and grain from lodged heads and grain spilt during harvest. No green plants (volunteer barley or summer weeds) were present when the livestock were introduced into the paddock. The paddock was sown to a vetch pasture in autumn and the flock was re-introduced into the paddock on 28 July 2015. The sheep grazed the paddock until 17 September 2015.

At the conclusion of each grazing period, the collars were removed and the data downloaded from the GPS devices. Data was then analysed for the purpose of quantifying variable grazing pressure. Speed thresholds from behavioural modelling techniques were developed to identify when the sheep were grazing, travelling or camping.

RESULTS

Summer grazing

Utilisation of paddock zones (light, moderate and heavy soil types) was compared at 5-day intervals over the summer grazing period (Figure 1). Initially the sheep spent most of their time grazing the lighter soil types in the paddock before moving on to the other zones. This may suggest preferences for certain zones or soil types before feed became limiting and utilisation of other areas became necessary. By the end of the summer period, paddock utilisation was relatively even.

During summer, grazing speeds and distance travelled were very high as the sheep constantly searched for spilt grain. The amount of spilt grain declined from around 80 kg/ha when the sheep were introduced, to approximately 20 kg/ha when they were removed 40 days later. Very little green pick was available during the grazing period and as a result ewes lost condition over this time. There also appeared to be a change in animal behaviour, with an approximate 5% decrease in daily time spent grazing when spilt grain levels dropped to around 40 kg/ha. There may be some value in using this type of data (assuming it could be delivered in real-time) for managing livestock in stubbles where the feed value of spilt grain is difficult to determine.

There was a very slight decline in groundcover over the summer grazing period, but on average, groundcover levels remained well above critical levels of 50%. There were already some parts of the paddock at 50% when the sheep were introduced and in an ideal system, grazing would have been avoided in these zones to reduce the risk of erosion.

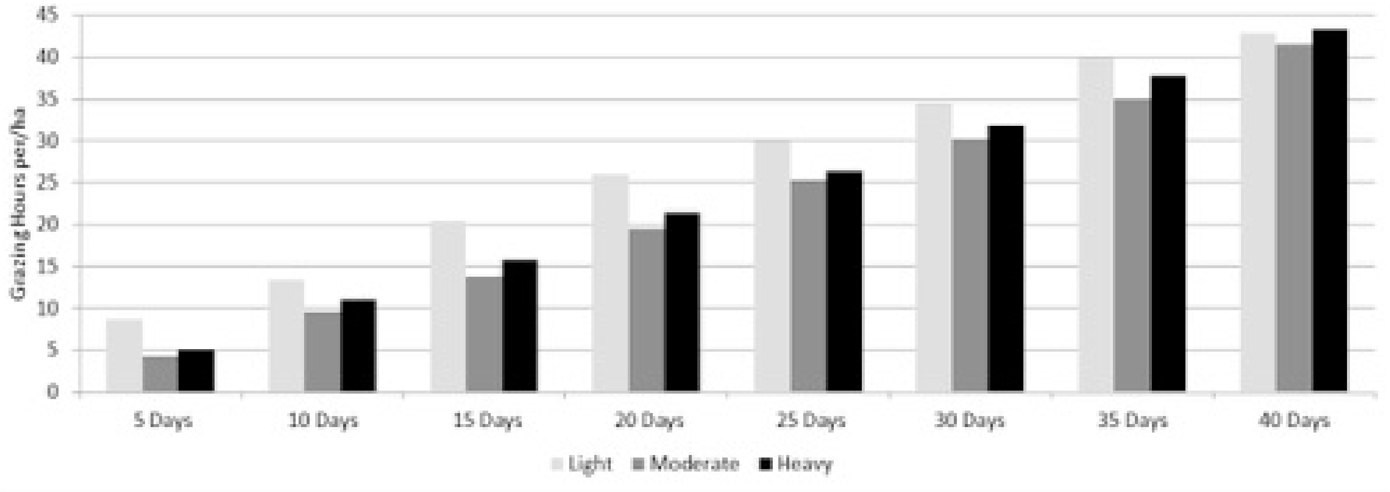

Figure 1: *Cumulative utilisation of the three soil type zones (light, moderate, heavy) over the summer grazing period.*

Winter grazing

Grazing intensity was much more spatially variable on the sown vetch pasture in winter than on the cereal stubble in summer. Figure 2 shows that the sheep concentrated grazing on the western end of the paddock during the first 10 days after which paddock utilisation by the livestock slowly increased over time. However, during any 10-day period, livestock spent 50% of the time grazing only 25% of the paddock and a further 25% was not utilised.

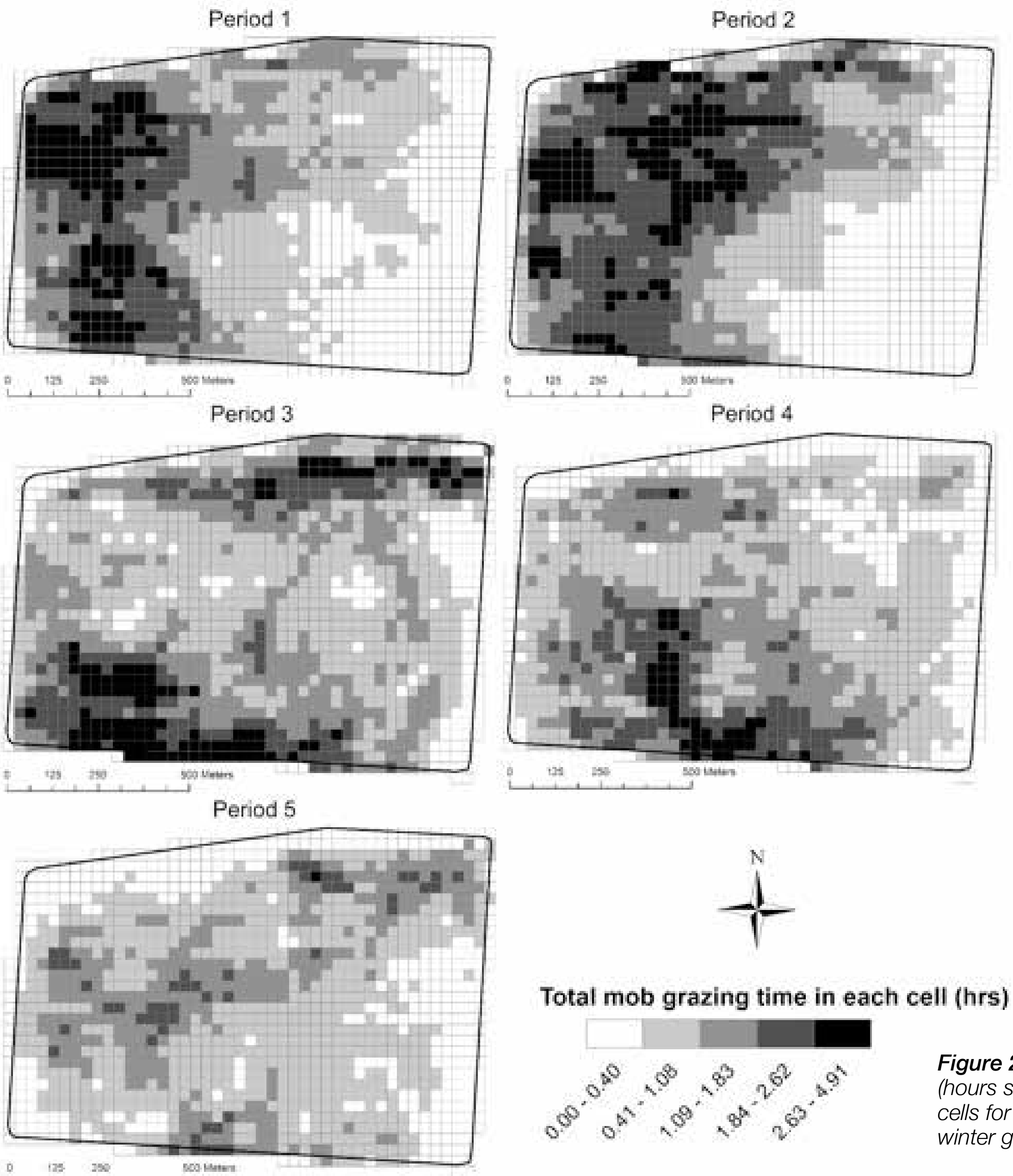

Figure 2: *Grazing residency index (hours spent grazing) in 30x30 m cells for 10 day intervals over the winter grazing period.*

Spatially variable grazing led to under-utilisation of pasture on the eastern end of the paddock. Figure 3 shows vetch dry matter accumulation at two of the 29 monitoring locations. On the western edge (site 12), dry matter did not accumulate between the first four monitoring dates, probably because grazing intensity matched pasture growth rate. However, on the eastern end of the paddock (site 16) dry matter accumulated at a consistent rate and when the sheep were removed, approximately 2.5 t/ha vetch still remained. This represents a significant under-utilisation of the feed base with a subsequent loss of potential income from either increased stocking rates or harvest of the excess feed for fodder.

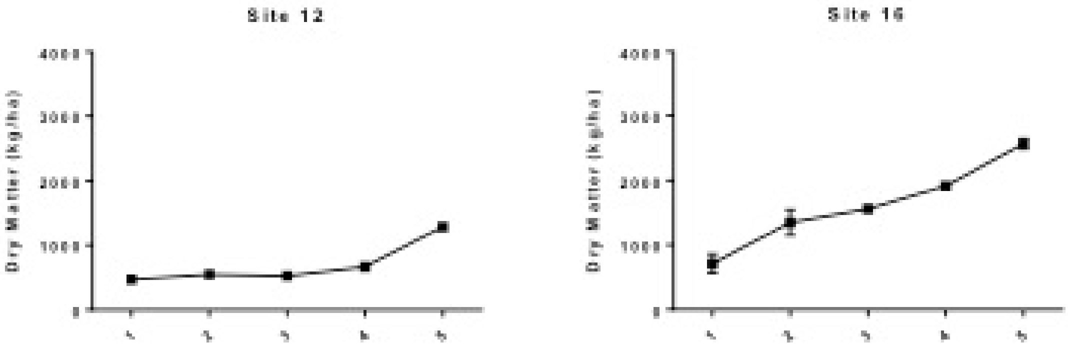

Figure 3: *Dry matter accumulation of vetch over the grazing period at monitoring site 12 and 16 which are located on the respective western and eastern ends of the paddock.*

Implications for commercial practice

Farmers already recognise that livestock graze large Mallee paddocks unevenly, however this project has began to put some hard numbers on the extent of the variability in spatial utilisation of a paddock. During summer, when feed was limited, the paddock was fully utilised but means that large areas were very lightly grazed, with animals travelling long distances across the field.

This contrasted with the winter grazing period in which sheep concentrated 50% of grazing on 25% of the paddock. A further 25% of the paddock was left unutilised which represents a significant economic opportunity foregone that could be addressed using cost-effective within-paddock fencing or virtual fencing. Two hundred ewes with lambs at foot grazed the paddock, or 5.6 Dry Sheep Equivalent (DSE) per hectare. However, as grazing occurred on only 75% of the area, the stocking pressure on the utilised part of the paddock was 7.3 DSE/ha. It is logical that, with improved grazing management an additional 65 ewes with lambs could have been fed. Alternatively, a quarter of the paddock could have been cut for hay. If 1.5 t/ha of vetch hay were cut from 25% of the paddock, an additional $150/ha of profit would have been made on a quarter of the paddock or the equivalent of approximately $4000 additional profit.

Currently there is no easy solution to overcoming the problem of uneven grazing by livestock in large paddocks. Management actions such as moving water points, increasing mob sizes and rotating sheep in and out of paddocks regularly are likely to improve paddock utilisation but will not fully resolve the issue. Rapid fencing systems such as portable electric fencing have been used effectively by some Mallee farmers, but require resources to erect and dismantle. The development of such new technologies as virtual fencing could drastically improve the utilisation of large Mallee paddocks and the data from this project can start making an economic case for investing in more flexible fencing technologies.

FURTHER INFORMATION

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SOIL ACIDITY - CROP YIELD IMPACTS AND MANAGEMENT IN CENTRAL WESTERN NSW.

John Small
Central West Farming Systems

Key Words: ph, acidification, lime, management

GRDC Project: CWF00119 Soil acidity and pH management for central west farming districts.

KEY MESSAGES

- Soil acidification is a natural process accelerated by high crop yields, fertilizer use and potentially direct drilling and stubble retention. It is an unseen cost of doing business.
- To maintain a good soil pH profile producers should aim for a pH(CaCl) above 5.0 in the 0-10cm of topsoil or 5.5 if subsoil acidity issues are present. The target in the 10-30cm zone is greater than pH (CaCl) 4.8.
- Retesting during 2015 of historic soil pH datasets confirms soil profiles continue to acidify.
- Left unmanaged sub soil acidification is likely to occur in most Central West NSW soils.
- Liming needs to be thought of as a farm input, like checking and changing the oil in the tractor, (maintaining capital) rather than buying urea (dollars returned per dollar invested).
- Cost in managing soil pH are easier to quantify than returns.

BACKGROUND

Soil acidification is the natural process accelerated by agriculture. Most produce (grain, meat, fibre) is alkaline and harvesting it causes an increase in acidity. Agriculturally generated sub surface soil acidity is a threat to the sustainability of intensive cropping in low rainfall districts. Preventing sub surface acidity is the preferable option, as the cost of attempting amelioration after sub surface acidification has occurred is time consuming, expensive and most likely cost prohibitive. The vast majority of research on ph management, liming response and economics has been conducted in the medium and high rainfall grain production zones in eastern Australia or in Western Australia.