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Sustainable development of VRD grazing lands

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Intensification, Grazing Distribution, Sustainable Development

Abstract

This project investigated the potential for pastoral intensification in the Victoria River District (VRD) of the NT to increase the profitability of the northern beef industry in the face of rising costs. The results suggested that intensification can increase a property's profitability without adverse effects on land condition or biodiversity in the short term. The keys to this are the use of sustainable pasture utilisation rates and appropriate development of paddocks and water points. Grazing management based on set pasture utilisation appeared to be the most profitable grazing system. The use of advanced technologies such as telemetry to manage water points can offer improvements in efficiency and cost savings. About half the properties in the VRD have the potential for intensification because they currently operate with pasture utilisation rates below the recommended 20%. Intensification of these properties could see an increase in cattle numbers in the VRD of about 154,000 AE, generating an additional annual gross margin of about $17m. The project identified a series of guidelines for the sustainable development of properties and also a number of recommendations for the protection of biodiversity under pastoral intensification.

Background

The beef industry in many parts of northern Australia has historically been an extensive, low input system, with relatively low outputs per unit land area. Properties are large and are made up of large paddocks with sparse water points. Consequently there has been little control over cattle grazing, resulting in poor distribution of grazing across the landscape. This has meant there are areas where considerable amounts of pasture go unused, while other areas near water points can be overgrazed. On some properties average stocking rates across the landscape have been kept relatively low because of the poor grazing distribution.

In recent years there has been increasing interest from producers in intensifying their production system in the face of a tightening cost-price squeeze where costs are increasing faster than prices received. The opportunity offered by intensifying the production system emerges from the creation of smaller paddocks and establishment of more water points that increase the landscape area and hence forage that are accessible to cattle. This effectively means there is an increase in pasture availability that should allow an increase in livestock numbers and greater livestock production without increasing grazing pressure on areas already being grazed.

Prior to this project our knowledge of the factors determining the optimal development and management of an intensified production system was poor. This project addressed the following the

key questions affecting property intensification in the Victoria River District (VRD) of the Northern Territory, one of the most productive beef producing areas in northern Australia:

- What is the optimum level of pasture utilisation in terms of balancing livestock production with the maintenance of good land condition?
- What are the optimum levels and configurations of infrastructure development (i.e. paddock size and number and spacing of water points) to achieve more uniform grazing distribution, and what are the effects on land condition and livestock production?
- Do other grazing management systems (e.g. cell grazing and wet season spelling) offer benefits in terms of increased livestock production and/or better land condition that are not possible with the current set stocked system used in commercial businesses?
- How will an intensified production system affect the maintenance of biodiversity on grazed lands, and if there are likely to be adverse effects what strategies are required to maintain biodiversity under an intensified system?
- Can innovative technology (for remotely managing water points, for example) be integrated into an intensively-developed commercial business to reduce or maintain the cost of production?
- What is the regional potential for property development in the VRD, and what are some of the implications?
- What are the economic and environmental trade-offs for different property development scenarios?

To address these questions a large commercial-scale study was carried out over four years on an area of approximately 320 km^2 (Wave Hill land system, with black cracking clay soils) on Pigeon Hole Station in the VRD. Most of the site was in 'C' land condition. The study included five annual pasture utilisation rates, six paddock configurations, four grazing management systems and ten biodiversity exclosures. This work was supplemented by a study of different pasture utilisation rates in small paddocks at Mt Sanford Station, which adjoins Pigeon Hole.

Objectives

Briefly, the overall project objectives were to:

1. Inform all producers in the VRD of locally-derived relationships between pasture utilisation and pasture and livestock performance.
2. Understand the key factors influencing sustainable grazing in the VRD, including optimal levels and systems of pasture utilisation, cattle grazing distribution patterns, the role of paddock design and water placement, and the impact of pastoral development on biodiversity conservation.
3. Identify management guidelines for sustainable and profitable pastoral development.
4. Inform north Australian beef producers of the relationship between grazing behaviour, land condition and animal production, and provide the information and decision support tools to improve financial and land management performance on their properties.

Results and Discussion

Overall, this study suggests more intensive development of the black soil pastures in the VRD is practically and economically feasible where annual pasture utilisation rates are currently less than 20%. Our analysis indicated that an intensified system can generate a return on invested capital of 8.7% compared with 5.4% for an undeveloped commercial system.

In the pasture utilisation studies at Mt Sanford and Pigeon Hole financial returns per unit land area increased with increasing utilisation rate (up to 47% and 32% annual pasture utilisation at Mt Sanford and Pigeon Hole, respectively). However, at Mt Sanford annual pasture utilisation rates of 20-25% were considered to be sustainable in the long term providing it is possible to achieve relatively uniform grazing distribution within paddocks. At this level of utilisation no adverse effects were observed on pasture productivity, ground cover or livestock production, whereas the combination of higher utilisation rates (36-43%) and a poor wet season appeared to degrade the land resource and reduced subsequent weaner production. At Pigeon Hole there were only subtle effects of the different utilisation rates, but above 19% utilisation several criteria related to minimum cover or pasture biomass targets were not met, or there was a weak trend of declining land condition.

Reducing paddock size was the most effective way of improving grazing distribution and increasing the use of pasture resources across the landscape. Establishing additional water points in large paddocks was less effective at improving grazing distribution, in part because cattle still had considerable choice in where they grazed. There were no differences in pasture condition amongst the paddock configurations and no systematic effect on livestock production. Although the smallest paddock (9 km^2) gave the highest return on invested capital (8.3%) compared with other paddock configurations (next best was 7.5%), this is considered an anomaly since the cost for reducing paddock size is disproportional for paddocks smaller than about 40 km^2. Consequently, to make most effective use of pasture resources in the VRD it is recommended that producers aim for a paddock size of 30-40 km^2 with two well-spaced water points. In larger paddocks waters should be about 5-6 km apart. It is important to note that reducing paddock size is not particularly effective at improving the uniformity of grazing within paddocks.

There were no marked differences in the performance of the different grazing management systems. The study suggested that wet season spelling might have the potential to marginally improve livestock production above that of set stocking due to slightly better weight gains, but this improvement in livestock performance did not flow through to improved economic performance because of the greater capital costs associated with the system. Notably, wet season spelling did not produce any improvement in pasture condition as had been expected based on reports from other studies. Set pasture utilisation at an annual rate of 20% was the best performing system in economic terms and appeared to have no adverse effects on land condition during the study. Despite greater total production, cell grazing was the least profitable system due to the added capital and operational costs. It also created additional work for staff and produced no pasture production benefits.

Within the five years of the study there was no obvious effect of different utilisation levels, or different grazing systems on the biodiversity within the paddocks. These results are consistent with other evidence that black-soil grasslands are one of the ecosystems in northern Australia most resilient to the impacts of grazing on biodiversity. However, changes in native plant and animal populations in response to changes in grazing regimes are likely to be gradual, only becoming evident over longer time periods than this grazing study, and particularly following a period of poor seasons. After five years there was some evidence that plant and animal composition in the exclosures was diverging from that in grazed lands and, in particular, the abundance of some grazing-sensitive species was starting to increase within the exclosures. The impacts on biodiversity are likely to become more pronounced if a high proportion of the land-type is subject to intensification, particularly over longer (decades) time scales. A number of recommendations are made in the report to protect biodiversity values in the context of broad-scale intensification.

Some newer technologies can offer substantial improvements in efficiency and cost-savings in an intensified production system, although they can require specific skills and some adaptation to incorporate successfully into the management system. These systems include telemetry for remotely managing water points, water medicators for providing dietary supplements, and in some circumstances electric fencing. Savings of ~$20,000+ per year were achieved using water point telemetry in the examples presented. An intensified production system also requires a reassessment of mustering techniques and facilities such as stock yards and laneways to maximise efficiency gains.

An economic and environmental analysis of six intensification scenarios suggested that installing more water points is likely to generate the greatest gains in return on capital with the smallest environmental trade-off. Scenarios involving wet season spelling and cell grazing showed no improvement in return on capital compared with current practice, but the former produced a substantial environmental benefit through improvements in pastures and soils. Some of these findings were not borne out by the field studies at Pigeon Hole, however.

Already a number of properties in northern Australia are moving towards intensifying their production system. It is likely this project increased the level of interest in property development in the northern beef industry. We expect the guidelines for the sustainable development of properties generated by this project will influence the nature of intensification on individual properties. It is estimated that about half the properties in the VRD have the potential for intensification. The rest appear to already have annual pasture utilisation rates in excess of the recommended 20%. It is possible that intensification of the properties with the potential for development could see an increase in cattle numbers in the VRD of about 154,000 AE, generating an additional annual gross margin of about $17m.

Finally, a note of caution is required because the long-term effects of intensification on land condition, potential livestock production and biodiversity are not known. Ecological change in rangelands can be slow and/or episodic and difficult to detect because of large environmental variation, and although this study detected no adverse effects over four years, this is a relatively short term in the context of changes in rangeland condition.

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