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# The Paddock Challenge: comparing business as usual with recommended stocking rates

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**Abstract**

Cattle producers love a challenge. Will getting their stocking rates right provide production stability and allow for land condition improvement on a commercial property in Central Australia? The Paddock Challenge is a component of the Rain Ready Rangelands Project funded by the Australian Government Future Drought Fund, with the philosophy that learning through doing is the key to adoption. It aims to work with commercial producers to adopt, demonstrate and test the learnings from the Quality Graze project under their unique circumstances, and to use data to drive stocking rate and development decisions. Two pastoral stations, 400km southwest and 300km northwest of Alice Springs, Australia (Fig. 1), are collaborating with the Northern Territory Department of Agriculture and Fisheries to test the Quality Graze recommendations and compare their grazing management to a 'Challenge' paddock where a strategy adapted from Quality Graze is being applied. Comparisons and benchmarking are at the whole paddock or water-point scale, depending on station infrastructure. The first year of the challenge involved working with producers to explore their current management, collecting baseline data on pastures, animal performance, landscape use, nutrition, and health. Station data were used to inform bioeconomic modelling of the economic impacts of different stocking and management strategies. The project collaborated with producers to develop strategies aimed at enhancing the rain responsiveness of their landscapes, thereby reducing the impact of climate variability on land condition and animal production and build the climate resilience of their businesses.

## Introduction

The north Australian beef cattle industry has historically been slow to adopt new research and tools (Bell and Sangster 2023). With a "learning-by-doing" and "seeing-is-believing" philosophies mind set, and with producers and researchers learning together and from each other, the Paddock Challenge project was developed as a platform for the commercial adoption of the stocking rate management recommendations from the Quality Graze project at Old Man Plains Research Station (OMP) located near Alice Springs, Australia. The Quality Graze project, a long-term grazing trial on OMP, has shown that applying stocking rates based on the long-term carrying capacity (LTCC) led to land condition improvement while producing consistently high animal performance and production stability (Materne *et al.* 2021). Furthermore, improvements in land condition increased the carrying capacity of the station.

Paddock Challenge aimed to help the participating producers develop and adopt alternatives to their existing grazing strategies that would maintain or enhance land condition while improving herd performance and business profitability. It involved exploring factors linking stocking rate, pasture utilisation, individual animal performance, total production, and profitability.

The stations' motivation for involvement was to build business resilience and stability, with the challenges of the recent dry period between 2018 and 2020 still fresh in their minds. While they can't prevent such events, the properties involved aimed to be better equipped to manage them and strengthen their operations.

**Methods**

The Paddock Challenge involved two properties (Mulga Park and Mt Denison) each providing two paddocks for comparing baseline pasture condition, and production and herd performance against an alternative grazing strategy developed during the project. The "**Business-as-usual"** paddock was unmodified and represented standard station practices; while the "**Challenge"** paddock was stocked based on a recommended strategy using LTCC, informed by GRASP modelling (McKeon et al. 1990), forage budgeting, and seasonal analysis, and adjusted collaboratively by producers and researchers.

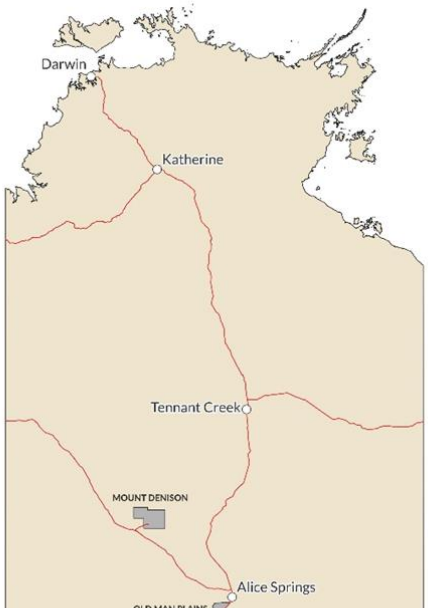


Figure 1. Location of the Paddock Challenge stations and Old Man Plains Research Station (OMP)

Pasture and herd performance were monitored using a BACI design (before, after, control, impact) with spatial gradient analyses (distance-to-water as a proxy for stocking intensity). Representative pasture monitoring sites were strategically located along a transect with distance (500m, 1km, 2km, 4km and 6km) from a watering point in each paddock. Quantitative (quadrat based-BOTANAL (Tothill et al. 1992) and drone footage) and subjective (visual point-based assessment/photo point) data was gathered from each site on pasture yield and species composition, ground cover, grass basal area, defoliation, cattle activity and biocrust samples. Paddock pasture growth and utilisation were modelled following Cowley and Walsh (2023). Animal equivalents (AE) were calculated from paddock stock records and animal performance where possible (McLean and Blakeley 2014, McLennan et al. 2020). Watered area was determined using site infrastructure data, including natural and semi-permanent sources.

Pasture utilisation was modelled assuming cattle spent all their time within a 4 km radius of waters to identify potential stocking rate effects on herd performance and grazing distribution. Diet quality was assessed monthly via NIRS analysis of dung samples. Animal health monitoring focused on five common production diseases to identify discrepancies in performance. Cattle landscape use was tracked with Global Navigation Satellite System (GNSS) collars.

Baseline pasture data informed the pasture modelling for LTCC estimates while baseline individual animal performance data identified non-performing animals to inform the culling program to improve herd efficiency and match stock numbers to the LTCC.

Economic analysis, following the methodology of Holmes et al. (2017), assessed each property production system. Baseline data and animal performance were reviewed, and tailored scenarios were explored with station owners. Comparisons included results from the Quality Graze trials at OMP. Economic modelling and the stations' baseline data were used to model the financial impact of adopting change, and to provide options to navigate the transition

to the new grazing system. The central modelling question was: Can we get more (land condition improvement, animal performance, kilograms of beef, profit) from less (fewer cattle)?

**Results**

Both stations have highlighted the value of data collection and benchmarking of their herds and business performance. Data collection enabled a snapshot of where their business currently stands and the gaps in which they can invest their efforts for the greatest return. The importance of robust, high-quality data cannot be overstated. Reliable data are the foundation for building accurate models, generating meaningful insights, and delivering outcomes that truly reflect the complexities of the systems we study.

Mulga Park plans to collect and collate additional past and present data, making it easily accessible through farm management software, to support management decisions. These include planning and matching stocking rates to LTCC to prepare for inevitable dry periods, implementing a structured weaner and heifer management program, developing targeted work plans to create a more efficient herd, and investigating strategies for managing water points with high fluoride levels.

Mt Denison is interested in adapting their stock numbers to improve herd performance and develop resilience to climate variability. They anticipate building a more efficient herd through genetics allowed by infrastructure developments, identifying indicator grass species for land condition, and continuing with some components of the project data collection such as weights and pregnancy testing.

**Discussion**

The Paddock Challenge project aimed to collect a variety of on-station data to identify the effect of stocking rate on land condition and herd performance, and ultimately better understand the logistic and economic complexity of adopting science based grazing land management recommendations.

Economic modelling provided the producers with a pathway to adopt new management and the benefits forward and highlighted the long-term production and financial benefits of matching stocking rates to LTCC.

Figure 2. “Paddock Walk” with producer group

Figure 3. Development of a 10-year plan

Establishing trust through long-term engagement is crucial when working with pastoralists. By presenting them with ideas and tangible results they can observe and relate to, we fostered an environment where new concepts were more readily understood and adopted. Two-way communication facilitated knowledge transfer between producers and researchers and was critical in the development of the strategy trialled in the Challenge paddock and developing plans for the next decade (Fig. 3). This subsequently encourages the uptake of recommended changes.

Continual re-enforcement of animal nutritional needs and its relation to pasture utilisation and the safe LTCC through the participants attending various courses and events helped them to gain an understanding of the science behind the 'Paddock Challenge'. This knowledge along with the baseline data collection highlighted the importance of good land condition and how the utilisation rate of these pastures through stocking rate management can improve herd performance and business stability and profitability in an extremely variable climate.

Results were extended to the wider industry through "Paddock Walks" (Fig. 2) that provide a group learning platform that was made up of personally invited neighbouring producers. Although one-on-one extension activities are resource-demanding, the findings from the Paddock Challenge are transferable to the wider industry. The benefits to the industry include an improved understanding of LTCC and safe utilisation rates of various land types, potential animal performance and landscape use, as well as enhanced and tested carrying capacity methodology. There is also a better understanding of the link between utilisation and animal performance. Additionally, the findings provide insights into other factors that affect individual animal performance, such as water quality, production diseases, and seasonal dietary needs that require supplementation.

## Conclusion

Sustainable stocking rate is not necessarily about reducing total production, but about reducing the number of animals to get the same or more production from fewer animals. Economic modelling reinforced this concept and helped allay pastoralists' concerns that reducing animal numbers would reduce profit. Establishing trust through long-term engagement is crucial when working with pastoralists. By presenting them with ideas and tangible results they can observe and relate to, we foster an environment where new concepts are more readily understood and adopted.

Change is not easy, nor the ability to implement infrastructure change, particularly with the perceived business risks and worries about reduced herd production from reduced stock numbers. The difficulty in implementing and adopting science-based recommendations on a commercial property proved challenging and faced significant unforeseen challenges such as extensive wildfires that required flexibility. However, the Paddock Challenge project highlighted the advantages of 'learning-by-doing', which will ultimately lead to adoption. Change in station management and the adoption of a new grazing strategy requires a holistic approach that encompasses the entire station's LTCC, infrastructure, production system and business circumstances.

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