DESERT KNOWLEDGE CRC

Rangeland Management Strategies for Improved Economics and Resource Sustainability Project

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Final Report

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CLMA Centralian Land Management Association

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The Desert Knowledge Cooperative Research Centre (DK-CRC) is an unincorporated joint venture with 27 partners whose mission is to develop and disseminate an understanding of sustainable living in remote desert environments, deliver enduring regional economies and livelihoods based on Desert Knowledge, and create the networks to market this knowledge in other desert lands.

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1.0 Executive Summary

The Central Australian Grazing Strategies Partnership (CAGSP) is a Desert Knowledge Cooperative Research Centre project, funded by the Department of Agriculture, Fisheries and Forestry through the National Landcare Program. Major project partners include the Centralian Land Management Association (CLMA), Northern Territory Department of Primary Industries and Fisheries (NTDPIFM), CSIRO, and pastoralists Steven and Rebecca Cadzow and the Cadzow family of Mt Riddock Station, Jim and Sue Murphy, former owner/managers of Idracowra Station, and the NTDPIFM team at Old Man Plains Research Station.

Over the past decade the ongoing cost-price squeeze has forced pastoralists everywhere to look at using their land more efficiently and sustainably. Pastoralists in central Australia, and indeed across rangeland Australia, must contend with numerous additional factors which affect their livelihoods. There has been widespread interest by the industry in spelling practices, which hold out the potential for increased or sustained production. However, more research is required in the semi-arid rangelands prior to the majority of pastoralists implementing any major changes to their current management systems.

Essentially, the CAGSP project aimed to increase this knowledge base and build capacity for pastoralists to implement new strategies on their own properties. The direction of the project was to document:

- *what could be implemented locally in central Australia*

  (by conducting three different producer-initiated grazing trials, driven by pastoralists in diverse landsystems),

- *what is currently implemented across rangeland Australia*

  (by building a national synthesis of expert opinion regarding spell grazing strategy management identifying the most appropriate implementation approach for each region for pastoralists to adapt and adopt, and by

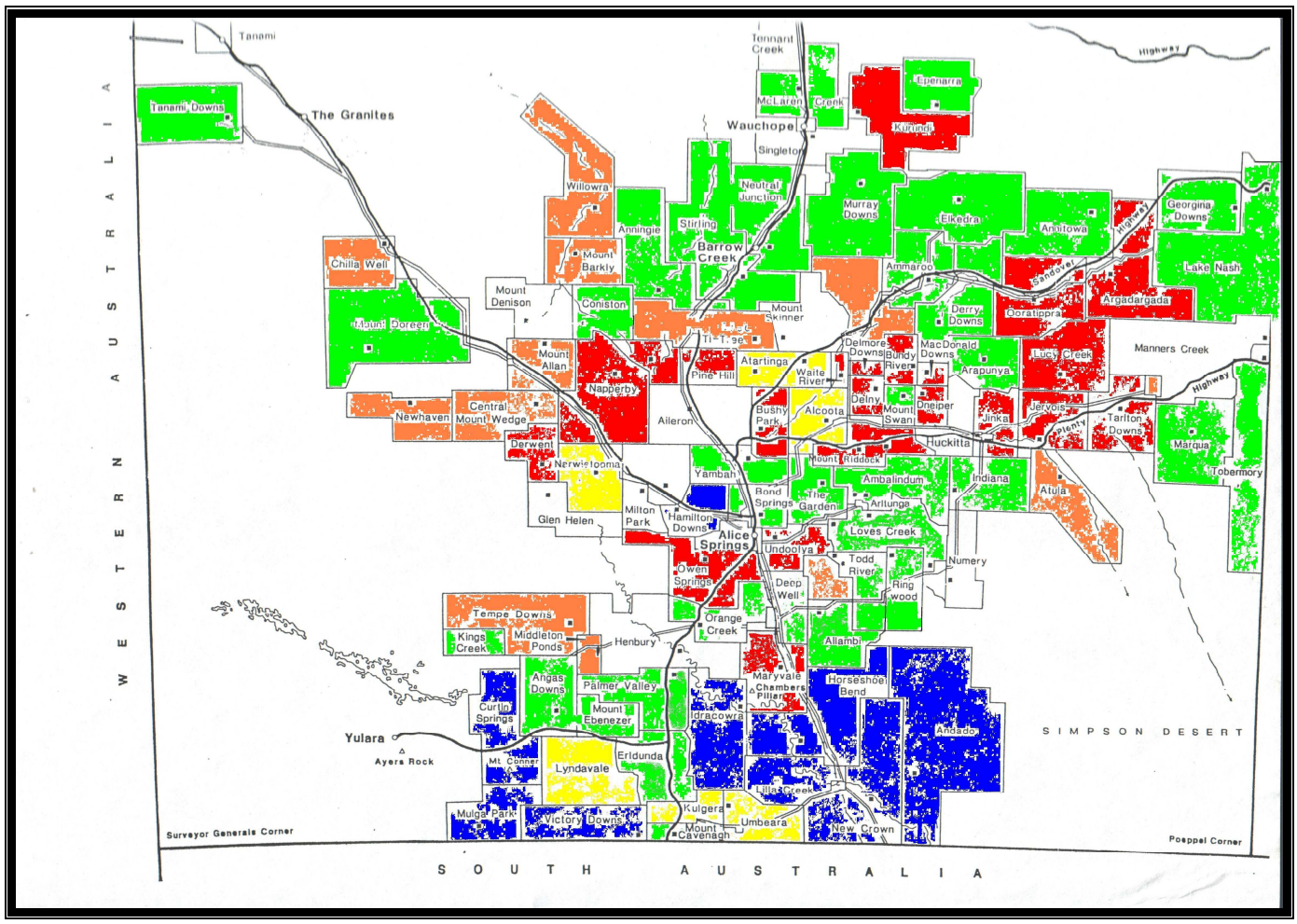
  building an anthology of actual producer perspectives or case studies highlighting properties who have successfully implemented some form of spell grazing and describe their methods and positive benefit),

- *how local pastoralists can implement spell grazing management themselves*

  (by developing a decision making tool, to assist pastoralists to identify potential methods based on individual property goals and requirements, which could be incorporated into the highly successful Central Australia Grazing Land Management Workshop).

In the difficult arid aseasonal environment that producers face in central Australia, it is important to initiate long term (between 5 to 10 years) on-ground trials working with innovative, well respected pastoral stations to capitalise on awareness, interest and adoption by other producers who see these lead properties as future drivers of the industry. Extension is very important to assist pastoralists to make informed decisions and save time and money when implementing new approaches. Successful field days and informal one on one discussions on-property with producers work. Imaginative ideas using media to showcase local and interstate case study participants interviewed in a television commercial showing innovative approaches and profitable land and livestock results should be explored. The pastoral audience reached by this latter concept would be far greater than the number of producers able to see successful local and interstate properties first hand. The old saying that “a picture tells a thousand words” is never more apt than in the rangeland pastoral industry.

The following map details the number of pastoral properties in central Australia directly exposed to the CAGSP project, through the obtaining of relevant industry information, extension actions, informal pastoral industry events and one on one discussions about the trials and overall project.



Overall Local Pastoral Property District Exposure through specific CAGSP activities

Legend: *Red – Mt Riddock "Rotational Grazing" Field Day Attendees*

Blue – Idracowra "Moving Water" Field Day Attendees

Yellow – CAGSP Case Study Participants

Green – CLMA members over the life of the CAGSP project (2005-2008)

Ochre – Aboriginal Land (restricted pastoralism)

White – Properties not directly made aware of this project

Key Messages Arising from the CAGSP Project

- Practical spelling and rotational grazing strategies vary from intensive cells with many small paddocks, high stocking rates and similarly large establishment costs to simple yet effective systems allowing producers to implement without major costs using existing infrastructure on a large or small scale.
- Pastoralists have increased initial implementation success when they employ simple spell grazing strategies, higher intensity systems require significantly more technical skill and a much higher degree of commitment to be successful in the long-term. The more complex the system, the greater the possibility that it is abandoned during unforeseen circumstances, dry times or financial hardship.
- It is imperative for pastoralists to research any potential grazing system, talk to others and start small. Continually monitoring the key inputs into the system (pasture and cattle) is a must, no successful grazing strategy includes a ‘set and forget’ clause.
- Work with the ‘innovators’ within the industry to obtain greatest uptake from pastoralists who see, and respect, the innovative properties as the future of grazing in their area.
- Pastoralists must also look at their country to determine pasture condition and thus timing of moves, rather than relying on the traditional method of solely assessing timing of moves by cattle condition.
- Projects monitoring pasture response to treatment or changes in landscape function should be undertaken over the long term (>10 years) to gather more accurate and timely data. The aseasonal nature of central Australian conditions means that a project running for three years could be initiated during a run of good seasons but is abandoned when dry times develop.

Recommendations

These recommendations target funding bodies and future project design:

- Projects monitoring pasture response to treatment or changes in landscape function should be undertaken over the long term (>10 years) to gather more accurate and timely data. The aseasonal nature of central Australian conditions means that a project running for three years could be initiated during a run of good seasons but is abandoned when dry times develop.
- Projects of this nature need to be more aware of timeframes, the time consuming installation of required infrastructure and the remaining period actually available for monitoring and collating of information for reporting purposes. This point is in addition to the protracted reaction of landscape function to changes in management, as observed in central Australia.
- Continue to work with innovative pastoralists on on-ground projects. On-ground research, in the form of trials and evaluating successful systems in use for some time, is the key to convincing most pastoralists to adapt and adopt new strategies. Pastoralists accept information readily if it has been trialled by another pastoralist over a long time and successfully endorsed by the industry.

These recommendations are targeted towards considering adopting spell grazing management:

- For pastoral properties in this area of the rangelands, it is imperative that some form of spelling be implemented to continue to manage grazing sustainably into the future. This will lead to consistent production rates in the long term, erase the effect of dry times and peaks and troughs of cattle condition, allow healthy pasture to regenerate when rains occur and lower maintenance and running costs.
- Any grazing strategies employed should maintain or increase the natural resource component of the property, balancing production with ecological sustainability.
- Pastoralists have increased success over the long term when they employ simple spell grazing strategies, for example two to four paddocks, rather than implementing costly intensive regimes. The more complex the system, the more likely it is to be abandoned during dry times or unforeseen circumstances.
- It is imperative for pastoralists to research any potential grazing system, talk to others and start small. Continually monitoring the key inputs into the system (pasture and cattle) is a must, no successful grazing strategy includes a ‘set and forget’ clause.
- Pastoralists must also look at their country to determine pasture condition and thus timing of moves, rather than relying on the traditional method of solely assessing timing of moves by cattle condition.
- Practical spelling and rotational grazing strategies vary from intensive cells with many small paddocks, high stocking rates and similarly large establishment costs to simple yet effective systems allowing producers to implement without major costs using existing infrastructure on a large or small scale. Each property has different management goals, resources available and time commitments. These need to be considered at all times when evaluating different regimes.

2.0 Summary of methodology and results to date for the grazing trials in Central Australia

2.1 ***Mt Riddock Station***: An 8 pdk rotation (approx. 3 wks/pdk) on a predominantly buffel grass pasture (total area is approx. 70km²) fattening Hereford steers prior to sale.

Owner/Managers: Steven and Rebecca Cadzow

There has been widespread interest by the industry in spelling practices, which hold out the potential for increased production without damage to natural resources or sustained production with recovery of the natural resources. The benefits of rotational grazing in the semi arid rangelands have been little documented and it is therefore difficult for managers to commit to these new grazing strategies. The trial at Mt Riddock Station, 200km north-east of Alice Springs, compares an eight paddock rotation, used primarily by steers, with a continuously grazed paddock. Both the treatment and control paddocks are dominated by the introduced perennial buffel grass (*Cenchrus ciliaris*). The study aimed to test the hypotheses that rotational grazing will; increase carrying capacity, result in more even utilisation of pasture, improve or maintain land condition, increase species diversity, reduce fire risk and frequency and increase average daily weight gain in steers. Given that the trial had only been operating for two years at the time of reporting there is little conclusive evidence to support these hypotheses. Early results suggest that rotational grazing has the potential to improve evenness of use across a pasture. Land condition did not improve under either treatment. Species diversity declined under rotational grazing whilst remaining stable under continuous grazing. Fire risk and steer performance were difficult to assess due to methodology used and the relatively short time period assessed. It is also difficult to draw sound conclusions within this trial as the paddocks differed by far more than just grazing duration and rest. Factors such as stocking rate and distance to water are likely to be large contributors to the results to date.

It is worth noting that the managers felt that the rotational grazing strategy was producing good results with regard to steer performance although they feel that it will take some years before the true impact on the pastures is understood. This is typically the case in central Australia where seasonal conditions can significantly influence the length of time before impacts on natural resources are understood. They find the rotational grazing strategy easy to implement and are very keen to continue with the existing strategy and to also extend it into further parts of the property. **[see Appendix 1a]**

2.2 ***Idracowra Station***: Using a waterpoint moving along a 32km pipeline at 1km/wk, bisecting a 600km² pdk, to spell country without additional fencing. Breeding herd of 600 hd of Santa Gertrudis/Droughtmaster cattle.

Former Owner/Managers: Jim and Sue Murphy

The trial at Idracowra Station, 180km south-south-west of Alice Springs, incorporated rest from grazing by moving a water point through the paddock. The hypothesis was that as pastures became remote from water they would be spelled from grazing without the need for fences. The moving water treatment was compared with continuously grazed watering points. Both the treatment and control paddocks are dominated by native pastures.

The study aimed to test the hypotheses that it is possible to train cattle to move around a paddock by shifting a water point. The study also aimed to test the hypotheses that rotational grazing will result in more even utilisation of pasture, maintain land condition and improve animal productivity. Unfortunately, only one year into the trial, Idracowra Station was sold and the trial was prematurely concluded. Whilst there is no data available to support the hypotheses, the author felt that there was anecdotal information of interest. The manager found that the majority

of the herd could manage to follow the watering point if it was only moved 500m at a time and that whilst cattle were grazing less favoured country immediately adjacent to the watering point, opportunistic observations noted that they were still walking in excess of 5km to access more favoured pastures. One of the most important elements to arise from this trial is the comparison of actual stocking rates with forage budget recommendations. While the manager felt that the cattle on the moving water pipeline were performing better than those in the continuously grazed system, this may have been attributable to the lower stocking rate of the treatment compared with the control.

The moving water principle still deserves to be trialled in central Australia but realistic and safe estimates of carrying capacity are required in order to accurately assess the economic return that such a system is likely to generate in the long term. **[see Appendix 1b]**

2.3 ***Old Man Plains Research Station***: 4 paddock rotation based on summer spelling of native annual pastures and cattle husbandry management, using Droughtmaster breeders.

Owner/Managers: Northern Territory Dept of Primary Industries, Fisheries and Mines (NTDPIFM) – Alice Springs.

The trial at Old Man Plains Research Station, 50km south west of Alice Springs, compares a four paddock rotation with a continuously grazed paddock, both used by breeder herds. Both the treatment and control paddocks are dominated by native pastures of mulga (*Acacia aneura*) over woollybutt (*Eragrostis eriopoda*) and kerosene grass (*Aristida holathera*) and oatgrass (*Enneapogon avenaceus*) pastures. The four paddock rotation was designed to allow herd management activities to be incorporated into paddock moves and was based on the Resource Consulting Services design.

The study aimed to test the hypotheses that rotational grazing will improve the quality and quantity of pasture available, improve land condition and therefore animal productivity and reduce risks associated with a variable climate. This report presents the methodology and data collected to date. Pasture data consists only of pre trial data. A summary of plant species diversity and rank abundance is provided. Cattle in the rotation performed slightly better than the control with regard to average cow weight and branding percent. Pregnancy status and branding percent were similar for both treatments. At the time of reporting, the trial had not been running for very long (approximately 16 months), so it was not possible to draw any recommendations on the grazing strategy itself. property. **[see Appendix 1c]**

2.4 Maintenance of Trials beyond the Central Australian Grazing Strategies Partnership Project

Assistance to maintain this component of the project was sourced from the Northern Territory Department of Primary Industries, Fisheries and Mines through natural resource management funding within the Northern Territory Regional Investment Strategy (NTRIS). This RIS funding will allow the NTDPIFM to conduct annual pasture monitoring at both remaining sites for the next three years. This will allow future grazing projects or trials to build on the already accumulated data obtained during the CAGSP project and following data obtained during the life of the NTRIS funding.

Researchers recognise that because of the nature of the central Australian ecosystem and its protracted landscape function processes, any definitive reaction to change cannot be measured in a small timeframe. Accumulating continual data from projects such as this can then show changes throughout time and give rise to questions and further research directions.

Both remaining stations, Mt Riddock and Old Man Plains Research Station, are keen to continue working with the NTDPIFM to allow researchers to attain this data. Other properties in the central Australian district have registered interest in the Idracowra Station “Moving Water” concept to potentially be involved in developing a similar system for further research purposes.

2.5 Best practice guidelines presented as a decision making tool for use in the

Central Australia Grazing Land Management Workshop

For pastoral properties in this area of the rangelands, it is imperative that some form of spelling be implemented to continue to manage grazing sustainably into the future. Employing this overall strategy will contribute to consistent production rates in the long term, erasing the effect of dry times and allowing healthy pasture to regenerate when rains occur.

It is also imperative for pastoralists to do their own research, learn from neighboring set-ups and speak to those innovative producers who have implemented some form on their own properties close to home and interstate.

This decision-making tool aims to assist pastoralists to be aware of the various spell grazing strategies available and individual input requirements, allowing producers to balance this information with their own management goals for their property. Any grazing strategies employed should maintain or increase the natural resource component of the property, squaring production with ecological sustainability.

With the experienced Grazing Land Management Officer to guide the pastoralist, a number of steps allow the producer to determine the balance required between what existing pasture and infrastructure strengths are available, what could be implemented based on this information and the amount of intensity the producers are prepared to commit to. The process will assist to balance pastoralist goals, potential spell grazing management alternatives and commitment requirements.

The main steps in this decision making process include:

- identifying the *carrying capacity* based on landsystem and land condition of each paddock on the property (using the manual method or recently developed GIS method);
- describing what resources are available – natural resource availability, current infrastructure resources and management commitment;
- using results to identify potential paddock cluster and spelling scenarios.

Before this decision making tool can be included into the workshop, the computer modelling and GIS mapping component are currently under review to increase simplicity and allow pastoralists to use the software application on a regular basis to monitor land condition on an individual paddock basis. This element will be of great assistance in its final form to record management goals and build spelling strategies around them.

3.0 The national perspective on what practical spelling and rotational grazing strategies are applicable in different environments across the Rangelands

3.1 Synthesis of trial data using modelling and expert panel insights

Practical spelling and rotational grazing strategies vary from intensive cells with many small paddocks, high stocking rates and similarly large establishment costs to simple yet effective systems allowing producers to implement without major costs using existing infrastructure on a large or small scale.

Aiming to simplify this discussion the term, "rotational grazing" will be defined less conventionally as:

"systems that include periods of resting of pastures from grazing (whether rigid systematic systems or more flexible opportunistic systems)". **[see Appendix 2]**

Grazing, to be sustainable on any scale, needs to include some form of spelling of country. This rest period can be timed, opportunistic after rains or deliberate when moving stock to other areas or to sell.

What does rest achieve?

Resting country, timed together with climatic events, allows pasture plants to profit from soil moisture to reproduce and seed, completing their life cycle as per annual grasses while perennial plants reproduce and restore energy stores constantly depleted by prior grazing. Overall, this leads, in part, retained or improved species composition, regeneration of decreaser species to compete with less-desirable increaser species and renewal of the nutrient and water cycles to assist in reducing erosion, increase the mineral cycle and aid the ecological repair of pasture condition.

How do pastoralists adopt a system?

While pastoral managers consider both scientific and anecdotal evidence before committing to extensive development and expensive infrastructure to implement a system, little research exists to guide them to adopt the best form of grazing for their own property. In the vastness of the rangelands, various climatic events, land types and pasture diversity, together with current property infrastructure and the producer's own management and production goals hardly allow for a homogeneous "one size fits all" system.

Results of original modelling concept

The specific objective of this part of the Central Australian Grazing Strategies Partnership project was to use computer models to achieve a more detailed perspective of rotational grazing systems across rangeland Australia. By drawing upon current research, trial and industry data, encapsulating detailed "climate, pasture productivity and land condition, grazing system, management decisions, animal performance and enterprise economics", a complete grazing business model would be developed.

While various computer models (GRASP, CSIRO's Enterprise Model, and GIS) existed to study individual relationships between climate, pasture productivity, stocking rates and business economics, the aim was to build on this combined data towards a higher focus on grazing management strategies. This was to allow a generic model to be comparable between the various regions dividing the Australian rangelands. Using this model it would be possible to identify likely over-grazing problems associated with various strategies in foreign rangeland

regions to avoid costly mistakes and disappointment before pastoralists implement them on-ground.

The modelling aspect of this project was, in fact, more difficult than envisaged. The second option attempted, a platform model linking all GIS, Enterprise and GRASP models involved, proved awkward and unachievable in the timeframe available. The main point immobilising progress was the differentiation between time steps, an aspect that was imperative to simulate the short grazing periods used in some grazing systems. The monthly or yearly time steps used in GRASP and Enterprise voided any comparability options pursued by researchers.

Problems attaining the ecological and livestock production data required from across rangeland Australia for input into the modelling component also attributed to the new direction taken by researchers. Original information was to be included from the Heytesbury-MLA Pigeon Hole Project in the Northern Territory, a rotational grazing project in the north eastern Goldfields region in Western Australia, data from the on-ground trials undertaken as part of the Central Australian Grazing Strategies Partnership and the MLA Grazing Systems Project in Queensland. With some of these projects still ongoing and others during the final stages of analysis, little definitive information could be accessed by researchers. Had the modelling aspect been successful in its development, the lack of wide ranging comparable on-ground data would have devalued and limited any conclusions.

Expert Opinion Panel Insights

Considering the impact of this futile exercise, CSIRO researchers decided that a better approach was to conduct interviews with a rangeland science panel of experts on the subject of understanding grazing systems in the rangelands.

Primarily, the aim of the exercise was "*to identify the key factors influencing the suitability and value of alternative rotational grazing systems for different regions of the rangeland*".

Methodology of the Expert Opinion Panel

Four rangeland grazing scientists from different areas and projects across Australia were interviewed using a prearranged number of topics. Answers were then tallied and results sent to the participants for final confirmation.

The scientists included:

- Dr Ron Hacker, Research Leader, Pastures and Rangelands, NSW DPI
- Dr John McIvor, Senior Principal Research Scientist, CSIRO Sustainable Ecosystems
- Associate Professor Brien Norton, Director for the Centre for the Management of Arid Environments, Kalgoorlie
- Dr Peter O'Reagain, Principal Scientist, QDPI

A table follows summarizing the key factors involved in decision making for each part of the rangeland analysed. These areas include Southern and Central Queensland, North Queensland and the Top End of Australia, Southern Western Australia and finally Western New South Wales. The Central Australian region is more empathetic with the last two areas mentioned, all three areas consist of low rainfall, high fragility rangeland conditions.

3.2 Summary of Regional Guidelines Affecting Four Australian Rangeland Areas

Key: H – High Influence

M – Medium Influence

L – Low Influence

AREA	Central and Southern Queensland Summer rainfall 500 to 800mm	North Queensland & Top End Summer rainfall 400mm to 1500mm	Southern Western Australia Winter rainfall 180 to 250mm *Highly Variable*	Western New South Wales Aseasonal rainfall <250mm to 400mm *Highly Variable*
Objectives of developing rotational grazing	to increase livestock production, by increasing land condition	to maintain favourable plant species composition and soil health to increase production	to maintain vegetation & soil condition, by better livestock distribution, through long periods of rest to aid nutrient & water cycling	to maintain rangeland condition and productivity
INFLUENCE OF: Climate	H – increased inter-annual rainfall variability; this increases the need for flexible management in any rotational system	H – very short growing season means that regular rotation systems are unsuitable (due to pasture response and inaccessible areas); therefore wet-season spelling is very important	H – high rainfall variability requires increased flexibility in any rotational grazing system	H – unpredictable rainfall makes any time-based grazing unadvisable H – requires high level of flexibility to adapt quickly to take advantage of weather impacts
INFLUENCE OF: Land and Vegetation	L – perennial grass pastures dominate, therefore can implement a more intensive system	L – rugged country may reduce control options to completely spell paddocks, thus increasing costs	H – management decisions to evaluate less resilient good country vs more resilient areas for capacity to return investment	H – very sensitive landtypes require careful management H – costs prohibitive for intensive systems, “tactical grazing” using existing set-ups more practical
INFLUENCE OF: Livestock Production and Management	L – all classes of stock suitable, but opinion divided on suitability of finishing bullocks H – more handling equates to quieter cattle, increased returns, turn-off	L – problems may occur with breeder properties rotating with calves, better planning required H – possible rankness of surplus pasture pre-consumption	M – combining herd class and pasture condition, together with spelling country	M – depending on production goals, but sustainable spelling in some form is necessary

AREA	Central and Southern Queensland Summer rainfall 500 to 800mm	North Queensland & Top End Summer rainfall 400mm to 1500mm	Southern Western Australia Winter rainfall 180 to 250mm *Highly Variable*	Western New South Wales Aseasonal rainfall <250mm to 400mm *Highly Variable*
INFLUENCE OF: Integration within Current Property Management	L – decisions based on whole of property, rather than an allotted area for an intensive system	M – development of options for cattle when paddocks are to be wet-season spelled	L – possible use of poorer country as a "haystack" option	L – few producers in this area have applied spelling consistently, failure rate may reflect on difficulty and complexity of introduced system
INFLUENCE OF: Water and other Infrastructure	H – development costs too expensive to accommodate the one larger mob of cattle vs a number of smaller herds, e.g. troughs and yards.	H – current lack of enough paddocks and water-point infrastructure to allow wet-season spelling; possible alternative to rest waterpoint areas by turning off supply and moving cattle to other parts of the paddock	L – current property infrastructure is adequate to immediately develop simple but effective rotational grazing systems	H – existing waterpoint infrastructure to be improved before complex plans are enacted H – primary focus on property planning and goals prior to installation to get "best bang for buck" in long term
MOST APPROPRIATE ROTATIONAL GRAZING SYSTEM FOR THIS AREA	*"Wet Season Spelling"* Why? decisions are based on ecological and management factors basic examples include a three paddock rotation allowing a different paddock to be spelled during each wet season, clusters of alternate red soil and black soil paddocks allow better movement of stock during this time if required	*"Wet Season Spelling"* Why? a "no-rules" approach generally applies, the more rules, the less likely the system is to be implemented or later deserted during dry times as increasing animal production is a goal, more research should be conducted to establish the financial and production benefits of spelling on a long term basis (>10years)	*"Tactical Grazing Management"* Why? fast management response to seasonal conditions to achieve ecological and production goals using existing property infrastructure decreases costs and increases ease and haste of application better control over livestock	*"Tactical Grazing Management"* Why? increased flexibility and decreased rigidity can accommodate the unpredictable rainfall and vegetation response of this region planning and grazing management must be reactive, and proactive to achieve individual paddock objectives

3.3 Disseminating information from the national perspective

Utilising the collaborative nature of the Central Australian Grazing Strategies Partnership, information from this project will be distributed through these channels. In addition to this, these findings by the CSIRO have been the result of discussions with eminent rangeland scientists from across Australia. This information gained from this part of the project will inturn be used in other collaborative reporting documents for the sharing of scientific information.

Currently there a growing number of interstate resources available to inform the interstate pastoralist of different spell grazing approaches suitable for that state or region or what has been successfully trialled in that area. For example, the “Tactical Grazing Management for Semi-Arid Rangelands offered in western New South Wales with accompanying literature, to high level pastoral involvement in research studies conducted by the Centre for the Management of Arid Environments in Kalgoorlie, Western Australia. This information from the project will be filtered through the Grazing Land Management (GLM) Workshop channels across Australia and more specifically through the Central Australia GLM Workshop to assist local producers to evaluate different strategies that could be implemented.

4.0 Extension supporting producers to develop spell grazing in central Australia

4.1 Project Events and Extension Activities Highlighting Project Exposure and Uptake

Throughout the duration of the Central Australian Grazing Strategies Partnership project three main events feature as being the most successful in increasing the awareness of the project by local and interstate pastoralists.

These included:

Project Launch at Old Man Plains Research Station – 3rd June 2005

Rotational Grazing Field Day at Mt Riddock – Tuesday 7th February 2006

Moving Water Field Day at Idracowra – Wednesday 25th October 2006

Who was invited?

At each trial property Field Day invitations were issued to all pastoralists, although specific pastoralists were targeted. Targeted pastoralists included those with the following:

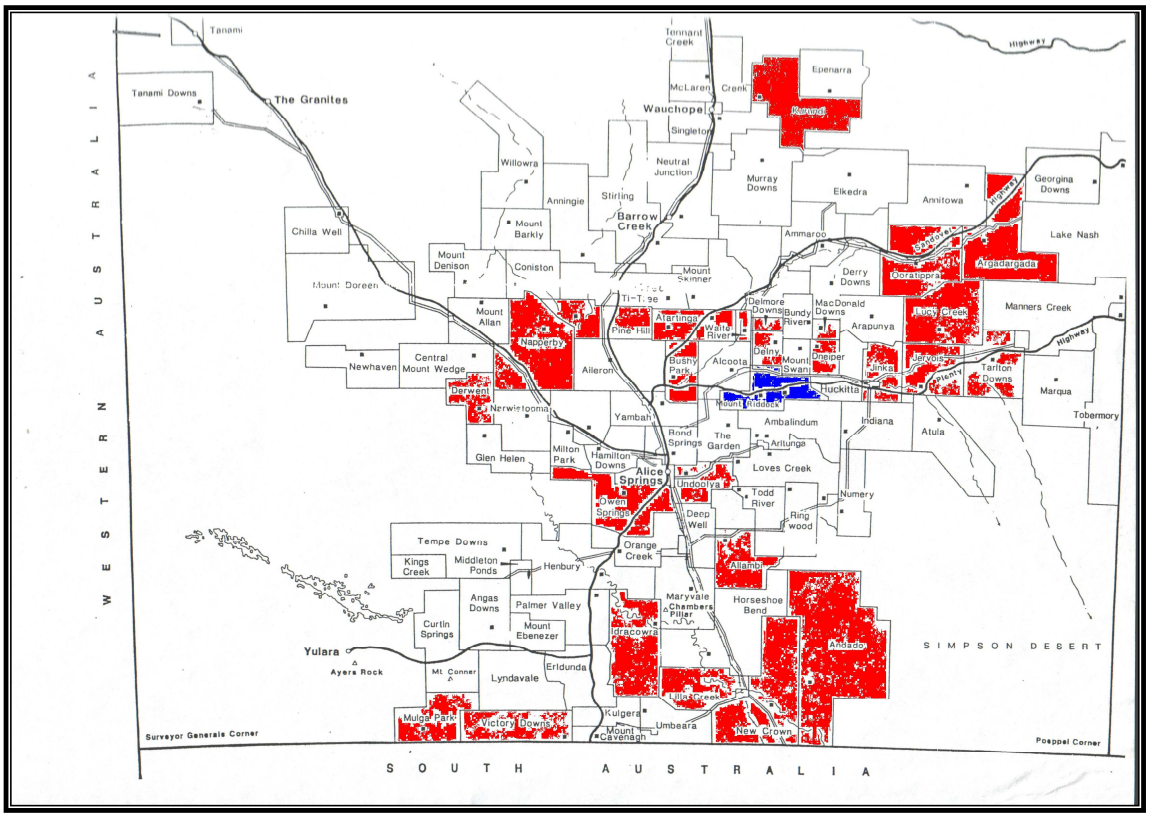
- similar landtypes, herd management goals, carrying capacities and proximity to the trial property involved and/or
- who were identified as being innovative key players in the central Australian pastoral industry in some capacity.

The former group encompassed neighbouring properties or properties within the same north or south region of Alice Springs who would be targeted due to their increased interest because of reduced travel time (a real factor in this vast region) and also increasing possibility of neighbouring pastoralists approaching the trial property directly to view the ongoing trial, cementing ongoing relationships between pastoral properties and interested neighbours.

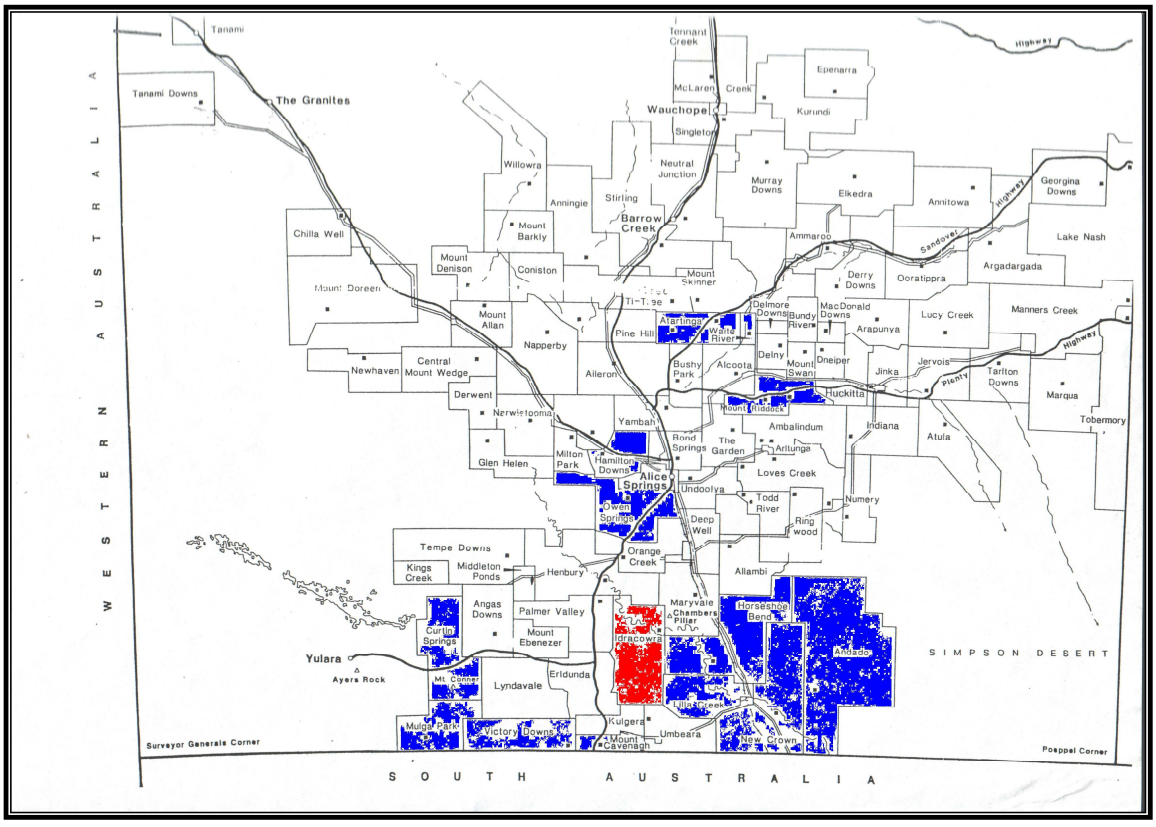
This latter group comprised of owners or manager of local properties recognised for their commitment to sustainable land management, different styles of management towards this goal and the high quality of cattle turned off from these establishments. Pastoralists with large holdings or numerous properties were also targeted to increase the possible level of implementation across all properties. Overall, this attendance strategy was implemented to encourage those with the capacity continue their interest in spell grazing strategies to stay up to date with recent events regarding news from the trials and possibly initiate some form within their own management on their own property.

In addition to this, invitations were issued to local government bodies involved in the trial or the central Australian pastoral region in general, and local livestock selling agents with strong ongoing relationships with their clients. As most producers learn the major of information in a day-to-day informal atmosphere, it is important for any pastoral client-based management, financial organisation or service provider, is also invited to these Field Days to impart informal suggestions or be able to direct to information sources if queried.

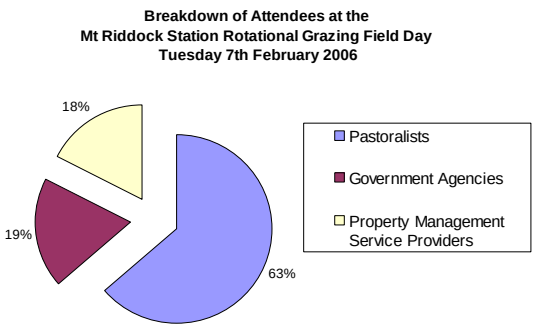
Summary of Central Australian pastoral properties attending each Field Day

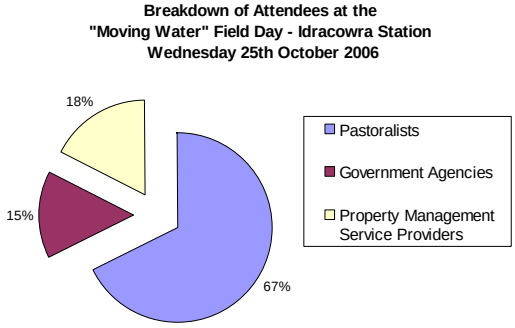


Pastoralists who attended the Mt Riddock Field Day are featured in red, while Mt Riddock itself is coloured blue.



Idracowra attracted more pastoralists from the southern region of Alice Springs, who share similar landtypes and property management goals. Idracowra is shown in red and properties attending in blue.





At each Field Day the number of pastoralists far outweighed government agencies and property management service providers, illustrating the high level of producer interest in the trials.

While the project launch at Old Man Plains Research Station engaged property owners during the development phases of the project, the huge success of the following Field Days at Mt Riddock and Idracowra lay with on-site, hands-on, peer to peer education – from pastoralist to pastoralist.

According to Arnott, Fell and Benson (2001) pastoralists have a tendency to see legitimate knowledge as that which has been proven by doing. At each property Field Day trial participants relayed their goals for their involvement in the project and trialling of each innovative spell grazing strategies, their successes and solutions solving problems that arose, and answered informal questions by interested pastoralists.

On many occasions pastoralists attend Field Days to eye what innovations, large or small, the host has made on his property, the condition of his livestock and country, and as a source of community outing to converse with friends in an informal situation. To focus attention on the trials themselves specialists from companies and government departments supporting trial infrastructure were invited to attend and display where possible. This enabled producers to view the trial, understand the infrastructure required and speak with suppliers to discuss implementation and price on the spot. Having appropriate information available increases uptake of the concept and potential for the concept to be adapted by pastoralists on their own properties.

4.2 Other key industry events where local producers were reached

Over the life of the project, the Project Officer attended many local pastoral industry meetings, social occasions, industry forums, cattle sales, the Alice Springs Show and grazing management courses to raise awareness of the project and where possible elaborate on trial news and recent monitoring events. The more important of these local events include:

Date:	Summary of Events:
February 7, 2006	Mt Riddock Rotational Grazing Field Day An overwhelming number of eighty-five landholders, interested government pastoral industry staff, land management organisations and stock and station agents were updated on the commencement of the “Mt Riddock” trial as part of the Central Australian Grazing Strategies Partnership. The half-day event was hailed as a great success by the many pastoralists who attended.
February 22	Santa Gertrudis Beef Cattle Assessment Day To increase the credibility and public knowledge of the project and the Project Officer, she “topped the assessment classes by scoring the highest points comparable to the over judges in commercial steers, heifers and bulls”. This outcome was positive publicity for CAGSP, demonstrating that the Project Officer has a practical pastoral background and credible experience in the beef industry.

March 15-22	Resource Consulting Services “Grazing for Profit” Workshop The rotational grazing basis behind the Old Man Plains Research Station trial, was better understood after completing an eight-day “Grazing for Profit” School. By outlining the introduction of this management strategy at Old Man Plains Research Station pastoralists have developed an interest in the on-going progress and are keen to monitor the success of this particular type of grazing.
August 26	Arid Zone Research Institute Open Day, Alice Springs, NT. As project partner, NT Dept Primary Industries, Fisheries and Mines, was holding the event, the CAGSP Project Officer discussed the trials occurring in the Alice Springs region and the initial results being drawn from them, with handouts available.
September 29-30	Central Australia Meat Profit Day, Alice Springs, NT. Conference Focus: “Beef – Buffel – Biodiversity” Meat Profit Days are a powerful combination of a field day, seminar, conference, trade show and expo. The target audience was focused upon the extensive pastoral rangelands of Central and Northern Australia, the key target for extension in this project. These two-day conferences focus on the worldwide and national issues facing the beef industry and attracting local and interstate participants and high profile speakers to increase the knowledge within and profile of the Australian pastoral industry.
March 11-14, 2007	Central Australian Grazing Land Management Workshop, Alice Springs, NT. Completion of this workshop provided both the opportunity to discover the level of interest and understanding of grazing management by pastoralists attending and to develop where results, strategies and peer-to-peer information from trial participants could be incorporated into the syllabus of the workshop. Working with the CA GLM Officer to present at future workshops will be an important form of extension.
July 16-19	Holistic Management (HM) Training Program, AZRI, Alice Springs HM is a practical, interactive training program and, being an integral component in the development of the “Moving Water” trial at Idracowra Station, completing the course gave the Project Officer a better understanding of the principles behind the final concept established. During the training CAGSP was discussed at great length and related to the local pastoralists attending.
August 2	Food – Fibre – Future Workshop, AZRI, Alice Springs. Focussing on strategies to address the dry conditions experienced by Central Australian pastoralists, this workshop was another opportunity to discuss the CAGSP trials, results, effects of the drought and on-property implementation with Central Australian pastoralists, bankers, government authorities and local stock and station agencies.
October 19	Remote Management Field Day at Napperby Station, via Alice Springs, NT. Incorporating grazing management into the remote monitoring of cattle technology on display, pastoralists were keen to discuss the theoretical implementation of various aspects of the project on their own properties.

Another major component of building awareness and uptake of the spell grazing strategies trialled in central Australia is to build relationships with interstate pastoralists, government bodies, research scientists and deliverers of pastoral information (journalists, NRM facilitators, other Landcare groups, and rural consultants). Events such as the Australian Rangeland Conference and Lake Eyre Basin Conference provided a research base and prominent opportunity to discuss the project with the innovative and proactive pastoralists who attend such eclectic rangeland events. A summary of key interstate events attended include:

Date:	Summary of Events:
February 13-16 2006	Desert Knowledge Cooperative Research Centre Wide Conference, Alice Springs. Under the theme of "Sustainable Livelihoods" the CAGSP project was related to delegates in a presentation to the Conference. Approaches from other interstate grazing projects (especially from Western Australia) showed interest and further communication is planned to keep them informed of the project's progress.
June 14-15	CSIRO Spatial Grazing Workshop, Rockhampton, QLD. This workshop presented both current and futuristic grazing projects being undertaken in Australia and overseas.
August 4-7	Australian Rangelands Society Conference, Renmark, SA. This is one of the key Rangeland gatherings in Australia, providing a forum for the free exchange of ideas between the many stakeholders and information about the day-to-day management of the land for production, conservation, mining, living or recreation. As many interstate pastoralists presented, the Project Officer was able to network with key participants to develop their involvement in the National Synthesis aspect of the project.
August 7-8	Lake Eyre Basin (LEB) Conference, Renmark SA. Following on from the Australian Rangelands Society Conference, the LEB Conference was attended by pastoralists, scientists and extension officers alike. As one of the project's trial properties, Mt Riddock is within the LEB and trial pastoralist, Rebecca Cadzow, was invited to present at the Conference. Rebecca elaborated on the CAGSP project amongst their family property's other well known Landcare Awards and goals of land condition, management and grazing strategies. Rebecca was extremely well received and has been contacted since by interstate pastoralists to expand upon and discuss their pastoral perspective on the trial's results and successes.
September 29-30	Central Australia Meat Profit Day, Alice Springs, NT -Conference Focus -"Beef – Buffel – Biodiversity" Meat Profit Days are a powerful combination of a field day, seminar, conference, trade show and expo. The target audience was focused upon the extensive pastoral rangelands of Central and Northern Australia, the key target for local and interstate extension in this project. The two-day conference focussed on the worldwide and national issues facing the beef industry and attracting local and interstate participants and high profile speakers to increase the knowledge within and profile of the Australian pastoral industry.
March 19-22 2007	North Australia Beef Research Council Update Conference, Townsville, QLD. The Conference was an opportunity for northern researchers, extension officers and producers to get the latest technical information from some of Australia's best researchers on both recently completed and ongoing research projects. An opportunity to visit another grazing project, undertaking management for variable rainfall, at Wambiana, Charters Towers, was very informative. It is a complex, long term project and tests the ability of different grazing strategies to cope with rainfall variability. It was an insightful and enthusiastic conference, where concepts of the CAGSP trial at Idracowra were brought up and debated by the largest pastoral company in Australia (AACo), who are now considering implementing the concept on their Barkly and Channel Country properties.

August 7-9	Pigeon Hole Pastoral Field Day, “Pigeon Hole” Station, VRD District, NT. “The Pigeon Hole Project 2002-2007” was a very well-known Meat & Livestock Australia and Heytesbury Beef joint project to evaluate grazing management systems in the VRD region of the NT. This Field Day was an invaluable opportunity to speak to pastoralists from across Australia and to discuss the project with other grazing management project leaders from rangeland Australia.

4.3 Major extension success for the CAGSP Project

Australian Agricultural Company (AACo) fact-finding mission to Idracowra Station

AACo, together with the NTDPIFM have been conducting similar trials to the CAGSP “Moving Water” trial at Idracowra. At Rockhampton Downs cattle grazing behaviour is manipulated by having only 1 of 5 watering points in a paddock operating at any one time to reduce grazing pressure and maximise utilisation of pasture. A contingent of key AACo staff, including the General Manager, Group Manager, Property Manager and Rangeland Officer personnel, flew to Idracowra to inspect the “Moving Water” trial on April 16, 2007. Key project participants from CLMA and NTDPIFM discussed the results so far gained from the study and Idracowra trial pastoralist, Jim Murphy, worked through the technicalities of implementing the system. The AACo delegation was very keen to reciprocate the invitation and invited a small party from the CLMA and NTDPIFM to fly to Rockhampton Downs later that week to discuss both projects with NTDPIFM Tennant Creek staff and other AACo Board Members and General Managers. The aims of both projects are similar but differ in the implementation and logistical strategies involved.

4.4 Sustaining and encouraging interest in spell grazing strategies beyond the CAGSP Project

While the end of the CAGSP project looms large, many avenues of information remain available to inform local pastoralists of the research achieved and spell grazing strategies able to be implemented in central Australia.

The major pastoral extension resource available in the region, the Central Australia Grazing Land Management (CAGLM) Workshop, will provide an on-going platform to disperse information and the development and fine-tuning of decision-making tools will assist pastoral participantst in devising home grown spell grazing systems will be available through this course. This CAGLM Workshop is funded by the National Landcare Program through a partnership between NTDPIFM and the Northern Territory Cattlemen’s Association with major support from major research organisations, government bodies and local natural resource management groups.

Desert Knowledge Cooperative Research Centre will also publish elements of this project as factsheets, working papers, best practice guidelines and other literature to encourage both local and interstate pastoralists to consider some form of spell grazing in their management philosophy. Extension tools also considered by DK CRC include television advertising, trial property update literature and producer tours of local and interstate properties who incorporate relevant spell grazing methods. These are currently subject to costings and capacity building analysis.

Pastoralists can also approach each of the project partners (the Centralian Land Management Association, NTDPIFM, CSIRO) for relevant information collected, analysed and developed by each organisation. Trial participants Steven and Rebecca Cadzow from Mt Riddock and the NTDPIFM team who manage the Old Man Plains Research Station are all very willing to explain their individual trials in more depth to those interested. Both properties will continue to play an important part in future grazing management research and encourage interested pastoralists to continue to seek information and develop their own spell grazing strategies.

5.0 Conclusions

In essence, there are several themes rising from this research project.

For pastoral properties in the rangelands, it is imperative that some form of spelling and/or conservative set stocking be implemented to continue to manage grazing sustainably into the future. Employing this overall goal may contribute to consistent production rates in the long term, erasing the effect of dry times and allowing healthy pasture to regenerate when rains occur.

Projects monitoring pasture response to treatment or changes in landscape function, like this CAGSP project, should be undertaken over the long term (>10 years) to gather more accurate data across a full range of seasonal conditions. The on-ground grazing trials were not able to record enough meaningful data in the time remaining after trial infrastructure was completed. Most pastoralists would agree that successful management strategies are successful because of the extended time period they have been employed for, allowing pastoralists to make changes where necessary. The building blocks (infrastructure, awareness and trial interest) have been set-up and initial data recorded for future projects to utilise. Also the aseasonal nature of central Australian conditions means that a project running for three years could be initiated and completed during a run of good seasons but is no longer operative when a dry period begins the next year. In this scenario, pastoralists investing in a similar system, based on this positive project, results could be faced with costly unforeseen economic, production and environmental consequences.

It is imperative for pastoralists to do their own research, learn from neighbouring set-ups and speak to those innovative producers who have implemented some form on their own properties close to home and interstate. Many pastoralists believe that their property is very different from their neighbour. Their own management goals, constraints, land condition, cattle breed, economical situation, or design of infrastructure ensure that no one grazing system fits all. It is too costly a commitment to employ a vigorous spelling regime that may work in the area but does not consider the individual constraints of another pastoralist.

On-ground research, in the form of trials and evaluating successful systems in use for some time, is the key to convincing most pastoralists to adapt and adopt new strategies. While the top level of innovative pastoralists research and trial new products, techniques or methods by themselves using their own funds. The keenness and motivation of this top level needs to be harnessed to feed new research into the lower levels of pastoral management. Pastoralists accept information readily if it has been trialled by another pastoralist over a long time and successfully endorsed by the industry. Working on the two different levels to pursue the common goal will increase the adoption of spell grazing management in central Australia.

6.0 References

Arnott A, Benson R and Fell R 2001, *Stories of learning and change - more than can be said: A study of northern Australian pastoralists learning processes*, Tropical Savannas CRC, Darwin.

7.0 Appendices

Appendix One Research Reports

1a Comparison of rotational grazing and continuous grazing on a buffel grass (*Cenchrus ciliaris*) dominated pasture: preliminary results from Mt Riddock Station.

1b Comparison of rotational grazing and continuous grazing on native pasture: preliminary results from Old Man Plains.

1c Comparison of rotational grazing and continuous grazing on native pasture using a moving water point: preliminary results from Idracowra Station.

Appendix 2
Rangeland Management Strategies for Improved Economics and Resource Sustainability – synthesis of trial data using modeling and expert panel insights.

Appendix 3
Case Studies

Appendix 4
Decision Making Tool (DRAFT)