final report

Producer demonstration site

Project code:	**B.NBP.0484** **B.NBP.0485**
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Date published:	**July 2010**
ISBN:	**9781741913972**

PUBLISHED BY
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Demonstrating land condition recovery strategies on the western Darling Downs

Meat & Livestock Australia acknowledges the matching funds provided by the Australian Government to support the research and development detailed in this publication.

Abstract

Six demonstration sites were established in the Brigalow Jimbour floodplain catchment to trial strategies for improving land condition on degraded, 'C' condition paddocks. Five of the six paddocks were old cultivation and all had ongoing problems with broadleaf weeds, patchiness in pasture composition and soil surface condition. All co-operators based their recovery strategies around the principles of wet season spelling and good stubble retention over the dry season. The quickest return to 'A' land condition occurred using a combination of broadleaf herbicides and wet season spelling. In this demonstration pasture basal area increased from 0.9% to 4.2% within three years. Where Perennial, Productive and Palatable (3P) species comprised less than 30% of the pasture (based on frequency per 100 quadrats), re-sowing was found to be the quickest means of improving pasture condition. From an economic point of view, a quick return on investment to recover pasture was dependant on a quick return to optimal land condition. Maintenance of the improved pasture condition will depend on persisting with strategic wet season spelling and stubble retention. Final soil tests revealed that all paddocks were highly nitrogen deficient and some deficient in other key nutrients for plant growth. Further improvements in paddock productivity could be made my correcting these nutrient deficiencies with fertilisers or legumes.

Executive summary

Grazing enterprises in the Brigalow Jimbour floodplain catchment typically comprise a mix of grazing and farming. Cropping phases have unintentionally provided a spelling rotation for native and sown pastures when seasonal conditions are good. Unfortunately, these spelling periods do not necessarily occur at a time of year when it is most beneficial to perennial pastures. Additionally, periods of below-average rainfall can result in perennial pastures not spelled at all as it is too dry to plant crops. 2005-2007 were three of the driest years in the district's history and the catchment received its first significant rain in winter 2007. This rain, plus follow up in spring, stimulated a huge germination of broadleaf weeds in paddocks left denuded as a result of plant death and persistent grazing pressure during the dry years. Landholders in the district were concerned about how to recover condition effectively without a large capital outlay and in a way that allowed for some cash flow to compensate for the previous dry years.

Pasture management workshops were organised in late 2007 to establish a common understanding among landholders about pasture ecology and the historical management practices that had contributed to land condition decline in the district. As a result of the workshops, six demonstration sites were established in the Brigalow Jimbour floodplain catchment to trial strategies for improving land condition on degraded, 'C' condition paddocks (using the 'ABCD' condition categories). Five of the six paddocks were old cultivation and all had ongoing problems with broadleaf weeds, patchiness in pasture composition and soil surface condition. Strategies to address these problems included using broadleaf herbicides, re-sowing pasture, ripping the soil surface and splitting paddocks with a fence. All strategies were underpinned by the proven principles of wet season spelling and maintaining a minimum level of grass stubble throughout the dry season.

The quickest pasture recovery time was found to occur when paddocks had broadleaf weeds suppressed early in the wet season and were then given an entire wet season spell. A return to 'A' condition from 'C' land condition was achieved within three years of applying this strategy with average summer rainfalls. The most improved paddock experienced a change from 0.9% to 4.2% pasture basal area over the project period. This was also the best strategy from an economic point of view with a benefit-cost ratio of 1.91:1, which indicates for every dollar invested, $1.91 was generated. Costs were minimised in this demonstration by only treating the worst affected area of the paddock. The slowest returning strategy had a high capital outlay and the least improvement in land condition after three years. Paddocks that were returned to A land condition within three years performed the best economically, regardless of strategy and capital outlay. This effect was accelerated with increasing summer rainfall.

Where 3P species still comprised approximately 30% of the pasture and soil surface condition was good, a combination of broadleaf herbicides and wet season spelling gave a quicker improvement in condition than re-sowing pastures. The financial benefit of re-sowing pastures is largely governed by achieving a quick return to A land condition. Two of the demonstrations in this project re-sowed pasture, however one returned to A land condition within three years while the other achieved only B land condition within the three years of the project and had higher costs per hectare. The benefit-cost paybacks for these two demonstrations were 1.70:1 and 1.08:1, respectively.

An important consideration with re-sowing pastures is also the ability to sustain the improved land condition in the longer term. For both of the strategies implemented, there are issues with how best to maintain land condition in the long term. The paddock which returned quickly to A condition is now dominated by Rhodes grass and is already showing signs of nitrogen deficiency. The risks with this paddock are (1) that with another extended period of dry conditions the Rhodes could die out and once again provide opportunity for broadleaf weeds to encroach and drop the long-term carrying capacity, and (2) with the paddock already showing signs of nitrogen

deficiency, pasture yield, liveweight gain and carrying capacity will decline over time without regular fertilising or establishment of a legume. For the second re-sow option, the short-lived perennial silk sorghum was a dominant coloniser in the heavy soils of the paddock. In future years it is likely that the silk sorghum will die out and also provide opportunity for broadleaf weeds to encroach if there has not been adequate density of 3P grass species to seed and spread to the bare areas.

These projects have demonstrated that, if 3P grass species are still present, strategic wet season spelling, stubble retention and weed suppression can be used effectively to return pastures to optimal condition within a relatively short period of time. The rate of return will be accelerated if the rainfall is favourable. For landholders to maintain optimal land condition, wet season spelling needs to become a major component of grazing management and carrying capacities need to be reviewed to accommodate declining soil nutrient availability and/or changes in 3P grass density. Beef production levels that could once be sustained on newly developed country will now likely require the addition of a legume or frequent applications of fertiliser.

Contents

1 Background

Grazing enterprises on the Western Downs have typically used a combination of forage sources including sown pasture, forage crop, crop residue, native pasture and/or supplementary grain feeding in the paddock. Cropping phases have unintentionally provided a spelling rotation of sorts for paddocks of native and sown pastures when seasonal conditions are good. Unfortunately, these spelling periods do not necessarily occur at a time of year when it is most beneficial to perennial pastures. For example, oats crops are available during the winter months and forage sorghum may not be available till later in the growing season. Additionally, long periods of below average rainfall may result in perennial pastures not spelled at all if it is too dry to plant crops.

The Brigalow Jimbour floodplain catchment received its first significant rain in winter 2007 after three of the driest years in history. This rain, plus follow up in spring, stimulated a huge germination of broadleaf weeds in paddocks left denuded as a result of plant death and persistent grazing pressure during the dry years. The worst affected country was old cultivation which had the added problem of chronically low soil nutrient and organic matter levels.

With news that a La Nina weather pattern was developing, there was opportunity to demonstrate and test land condition recovery options. Based on recommendations from northern grazing trials such as Ecograze and Wambiana, it was agreed that the key principles to be applied in these land condition recovery demonstrations were wet season spelling and ensuring paddocks come out of a dry spell with good grass stubble.

An immediate overarching concern for many of these landholders was how to address these issues effectively in a way that generated some cash flow in the short term to help compensate for the previous dry years. In the longer term, producers were concerned with how to sustainably optimise property carrying capacity to offset high land prices, small property size and declining productivity of sown pastures.

2 Project objectives

1. Evaluate and document the effectiveness of strategies for land condition recovery and enhancement on six properties in the Jinghi and Jimbour Uplands sub-catchments of the Western Downs.

2. In consultation with producers, develop district recommendations for best practice recovery regimes and long-term sustainable grazing strategies.

3 Methodology

3.1 Issue identification

3.1.1 Overview

Time was spent at the start of the project to establish a common understanding about the historical management practices that had contributed to the poor condition of land in the district. Although most landholders believed weather was the dominant contributor, further examination was needed to differentiate between elements that they could control (eg grazing management) and those that could not control (eg rainfall). Strategies to recover land condition had to focus on elements they could control, based on an understanding of the impact of climate variability and the responses they could potentially achieve.

3.1.2 Pasture workshops

With support of the local landcare group, two training workshops were convened in mid-2007 at both Jinghi and Bell to:

- Review current best information on grazing management;
- Review historical rainfall patterns;
- Demonstrate field techniques for monitoring land, pasture and forage condition;
- Identify common problems in local pastures;
- Generate a local list of grazing management rules (see Appendix 1); and
- Gauge interest in setting up demonstration paddocks for land condition recovery.

The first workshop was aimed at generating a common understanding amongst participants of basic pasture ecology and response to grazing and weather at different times of the year. Data was presented from major grazing trials such as "Wambiana" and Ecograze and key findings summarised into what was believed to be generic best practice grazing management principles, regardless of location. The three most important principles were summarised as:

- Wet season spelling;
- Maintain a minimum level of grass stubble throughout the dry season; and
- Maintain a minimum level of ground cover at all times.

The second workshop discussed these concepts in more detail, provided field demonstrations and discussion about local issues and potential solutions to problems. Key land condition issues were documented and participants were asked to indicate their interest in testing some strategies to recover land condition on their own properties.

Figure 1 and 2 - Pasture workshops 2007

3.2 Demonstration paddocks

3.2.1 Overview

Without the rigour of controlled paddock size, land type, grazing or timing of treatments, the data collated from demonstration paddocks cannot be statistically compared and defended. Each situation in each demonstration paddock was unique and the strategy result isolated to the set of circumstances each paddock was exposed to for the duration of the project. What they did provide is a commercial case study and talking point for local landholders to monitor the success or otherwise of applying alternative grazing land management strategies in their district.

3.2.2 Paddock selection

The criteria to select paddocks for the demonstration project included:

- Overall the paddock must be in C land condition (assessed using Stocktake monitoring criteria);
- Landholder keen to be involved and prepared to spell paddocks at the appropriate times; and
- Condition problems must be considered common to those experienced by others in the district and identified during the pasture workshops.

3.2.3 Grazing exclosure

In each demonstration paddock a small, non-grazed and non-treated area, called an exclosure, was set aside to provide participants and observers with a visual comparison of the effect of the modified paddock management. Each exclosure was 9m x 9m in size and consisted of four steel corner stays, star pickets, wire mesh and barbed wire. These exclosures fully excluded livestock and native mammals from grazing the contained pasture. A rain gauge was fixed to the inner side of each exclosure.

Figure 3 and 4 - Grazing exclosures

3.3 Monitoring

3.3.1 Overview

Basic monitoring was used in these projects to document and illustrate broad landscape changes as a result of implementing recovery strategies. In terms of land condition, three years is a short time to measure large changes unless management or weather conditions change significantly. Rainfall was also measured to explain some of the variation in response to management change.

3.3.2 Grazing practices

Participants were surveyed at the start of the project about historical paddock management and how the paddock had been managed over the last three years. At the end of the project a verbal survey was done to see whether these management regimes had changed. These responses were used to validate the relevance of some best practice management recommendations for the district.

3.3.3 Land condition monitoring

At the start and end of the project all demonstration paddocks had soil surface condition, pasture condition, pasture basal area, and fixed point photographs recorded as a basic means for monitoring changes in land condition.

Both soil surface and pasture condition were recorded based on Stocktake monitoring criteria. A rating from one to four was given to soil surface condition based on the level of disturbance. For example, where erosion was evident a rating of three or above may have been given for this aspect. Pasture condition was rated from one to four based on whether it was dominated by 3P pasture species, if they were healthy and had good density. Pastures dominated by broadleaf weeds and with only a few sparse 3P grass species were given a high rating of three or above. Ground cover was also noted in this process; however it is not regarded as a stable indicator of land condition over time. Pasture basal area and species frequency was measured using a five point frame recording 1000 points in each paddock. Healthy pastures in rangeland environments tend to have basal areas above two percent. As rainfall increases this number increases as well. It was thought that four percent or better could be achievable for healthy pastures in this district.

Figure 2 - Measuring pasture basal area 2010

3.3.4 Rainfall

Landholders were asked to record monthly rainfall at the sites over the project period.

3.3.5 Stocking rate

Landholders were asked to record the number, class and period of time livestock were in the demonstration paddock during the period of the project. These figures were used to check spelling periods and to complete the economic analysis.

3.4 Economics

3.4.1 Data collation

In order to evaluate the costs and benefits of grazing practice change, cost of production data was collected and modelled with and without the proposed practice change. This enabled the comparison of costs and benefits of changing from the pre-existing production to the changed system, thereby determining profitability effects.

Five case study grazing operations were used in order to investigate the economic implications on production systems. Each enterprise was visited and actual data collected where available.

Information such as type of enterprise, product, net cost per kilogram sold, stocking rates, treatment costs and benefits were collected. Additionally, discussion was also held on an applicable discount rate in seeking to provide an indication of the grazier's perceived opportunity cost of capital. Due to variation in the perceived cost of capital, and its resultant influence on the time value of money, each individual case study should be viewed in its own right. Thus, the analysis undertaken emphasises the cost-benefit of the specific treatment undertaken and direct case study comparison should be avoided due to the fact that independent individual investments are assessed, *not* selection from possible investment alternatives.

Estimates of the pre-existing production methods were also collected and are used here to estimate pre-treatment benefits. For example, a chemical treatment may have resulted in an increase in palatable species within the case study paddock leading to an increase in stocking rate and thus the productive capacity of the land area. By accounting for the level of investment outlay and through assessing productive benefit, whilst accounting for lags across the investment window, economic assessment can be made. Each investment has been assessed for the three year period between 2007 and 2009.

Where data limitations were apparent, estimates have been used for the purpose of the analysis and appropriate annotation added in the case study notes and results discussion. It should be noted that such estimates are based on grazier and extension officer expectations and serve as necessary data estimates for analytical purposes.

Partial budgets estimate the effect on whole farm operating profit of a proposed change affecting only part of the operation. Partial budgeting techniques were used in assessing the potential of each case study investment seeking to improve land condition and thus increase property carrying capacity. Marginal net gains were evaluated using investment analysis. A discounted cash flow (DCF) technique was used, including routine investment appraisal techniques and terminology, including:

- Capital investment - The total amount of capital expenditure for the investment. In this case, this is the amount of net capital additional to "routine" (pre-treatment) herd management expenditures in producing and finishing cattle.
- Benefit-cost ratio - The ratio of project benefits relative to costs across time, indicative of the effectiveness of value for money for the investment.

3.4.2 Assessment of investment

Whilst all investments inherently have some risk attached to them, broad comment can be made on their expected outcomes. In relation to investments that improve the potential productivity of grazing operations:

- Investments with known positive production outcome effects and low capital costs are low risk, generally easy to implement and provide good return on investment, given the relatively small effect on cash flows from such investment. Inherently, such investments are more likely to be adopted.
- Appropriate product selection (in terms of per unit margins) and marketing aspects of production are fundamental in maintaining a profitable production system. Such production systems inherently maximise profitability. Extensive production systems are reliant on the maintenance of pasture productivity in order to maintain economic sustainability and any long term decline in pasture productivity will necessarily act as an impediment to profitability and form a limiting constraint upon the production system.
- Pasture recovery techniques carry with them an increased capital cost, with increased risk from utilisation of such capital. In this regard, traditional methods may be seen as a more conservative, risk mitigation strategy. However, where production falls to such low levels as to be economically unsustainable, costs of production adjustments may be

required to offset such productivity decrease. The increases in capital outlays from the adopted productive strategy must be balanced by the expected net production benefits from that strategy. The implications for increased production are discussed further in this report.

It should be noted that an individual grazier may choose to undertake investment for reasons other than pure financial benefit, but the nature of this report focuses exclusively on the expected economic benefit accrued from such capital investments.

3.5 Communication

3.5.1 Overview

The land condition issues addressed in this project were regarded as common in the district and a key component of this project was allowing neighbours and community members alike to track the progress of the different recovery strategies and contribute to problem solving as the project progressed.

3.5.2 Bus tours and field day

After the initial pasture workshops, six major extension activities were organised over a two year period, three in the Bell area and three in the Jinghi area. These activities included:

- Start-of-project bus tour around all demonstration sites;
- Mid-project field day at two of the three properties in each district found to be having the greatest progress; and an
- End-of-project bus tour around all demonstration sites.

3.5.3 Media

Both print and radio media were used to publicise the bus tours and field days. This media was additional to printed flyers and invitations mailed to all graziers in the Jinghi and Jimbour Uplands sub-catchments.

3.5.4 Publications

Publications summarising the key findings and principles of the project were distributed to all graziers in the Brigalow Jimbour floodplain catchment on completion of the project. This material was intended to reinforce the key findings from the project and provide a personal technical reference resource for future pasture management issues.

4 Results and discussion

4.1 Issue identification

4.1.1 Land condition issues

Based on feedback from the pasture workshops and follow-up discussions with landholders the key land condition issues were:

- Broadleaf weeds and annual grasses dominating pasture composition, particularly in old cultivation country;
- Patchiness of pasture condition throughout paddocks;
- Poor water infiltration and perceived low organic matter and nutrient levels in the soil surface; and

- Couch grass encroaching over range country in the upper reaches of the catchment.

The primary options for controlling weeds were to:

- Spray broadleaf herbicide in existing pasture and manage grazing to allow 3P species to seed and spread; or
- Completely remove all existing pasture via cultivation and herbicides and re-sow new pasture once weeds were under control.

Slashing was used in combination with herbicide application on the existing pastures to maximise the coverage of herbicide on weeds by removing the upper canopy. This also provided ground mulch on the soil surface and stimulated old grass plants to reshoot.

Strategies to address patchiness in the pasture included:

- Isolating treatment to only the worst affected areas and then spelling the whole paddock;
- Encouraging grazing in less preferred areas of the paddock by repositioning waters, fencing land types and burning rank grass; and
- Re-sowing the whole paddock to new pasture as a means of evening out pasture composition and density.

Ripping was used as a short-term strategy to improve organic ground cover and soil surface condition. Breaking the hard soil surface allowed water to permeate into the soil surface and boost plant growth and organic ground cover. If wet season spelling is continued into the future this cover will facilitate improved water infiltration and pasture growth.

Couch grass encroaching was primarily an issue on undulating country in the Bell district. None of the co-operators decided to specifically target this issue.

4.2 Case studies

4.2.1 Case study one – "Talmoi" (Jinghi sub-catchment)

Land type

Cleared brigalow, belah and softwood scrub on a brown cracking clay.

Historical management

This paddock had been continuously, conventionally farmed until 2003 when it was sown to a mixture of Rhodes, bambatsi, premier digitaria, floren blue, creeping blue and lucerne. Marginal germination and poor follow-up rainfall resulted in the subsequent death of a significant proportion of established plants over the following three years. Rhodes grass suffered the most in the dry conditions.

Land condition problems

Although this paddock had an overall land condition rating of C, there were areas that were still in fair condition, particularly along the contour lines and lower margins of the paddock. The worst affected area of the paddock was the along the top contour which was dominated by broadleaf weeds.

Recovery strategy

1. Slash the weeds along the top contour in late spring - provide ground mulch and open up the canopy for small grass plants to access
2. Scarify the soil surface - to improve short-term water infiltration and stimulate weed germination

3. Follow up spray with a residual broadleaf herbicide - kill existing and newly germinated weeds
4. Spell over the subsequent wet seasons

Rainfall

Long term average = 653.8mm
07/08 = 738mm
08/09 = 776.5mm
09/10 = 502mm

Land condition change

	2007	2010	Observations
Land condition	C	A	Overall the paddock was in C land condition in 2007 due to the very low density and health of 3P pasture species. Liverseed grass, soft roly poly, New Zealand spinach, mayne's pest, daisy burr and mueller's saltbush were the major contributors. Soil condition was still good and the pasture on the lower slopes of the paddock was in fair condition. Average ground cover was >50% but dominated by broadleaf weeds. By 2010 pasture was dominated by healthy 3P grass tussocks and many new seedlings were establishing. Average ground cover was better than 80%. In 2007 bambatsi and Queensland blue appeared to be the only 3P grass species amongst a carpet of broadleaf weeds. By 2010 the diversity of 3P pasture species had increased markedly with creeping blue, premier digitaria and floren blue all being recorded in the basal area count in addition to bambatsi and Queensland blue.
Pasture basal area	0.9%	4.2%	
Soil nutrient status 2010	Depth = 60cm Very low nitrogen Low / marginal phosphorus, zinc & potassium		

Paddock photos

Figure 5 – Nov 07 after slashing

Figure 6 – Nov 07 bambatsi regenerating

Figure 7 - May 08 after herbicide application

Figure 8 – May 08 bambatsi seeding

Figure 9 and 10 – Feb 09 health and density of grass tussocks improving

Figure 11 and 12 - Diversity of 3P grasses improving and dense population of healthy plants

4.2.2 Case study two – "Ivory Creek" (Jinghi sub-catchment)

Land type

Loamy alluvial flat of cleared poplar box on a hard setting sodic duplex soil changing to a deep yellow-brown sand with narrow-leaved ironbark, rough-barked apple and cypress along the upper slopes of the paddock boundary.

Historical management

This demonstration paddock had been continuously and conventionally farmed until 2002, when it was returned back to pasture by spreading Rhodes grass. A creek bounds the north-eastern side of the paddock and provides the only water to livestock in the paddock. Stock could only graze the paddock when the creek was holding water. Kangaroos living in the dense timber in the hills of the neighbouring paddock have significantly increased the grazing pressure in the paddock. Old fences were ineffective at preventing stock from entering the paddock even if they were locked out. When gates were open cattle preferentially grazed this paddock over neighbouring paddocks.

Land condition problems

Paddock dominated by broadleaf weeds and annual grasses. Common species include: slender chloris, pigweed, liverseed grass, daisy burr, fairy grass, peppercress, euphorbia species, mueller's saltbush, and mayne's pest. Sheet erosion of soil near the creek had rendered the soil surface hard, gravelly and relatively impermeable to water infiltration. This part of the paddock was in poorest condition.

Recovery strategy

1. Split paddock in half via a fence and secure perimeter fences from stock
2. Cultivate, fertilise and sow one half of the paddock to a light soil pasture mix (Rhodes, premier digitaria, creeping blue)
3. Use offset discs to break up the soil surface in the worst parts of the remaining half of the paddock
4. Spell both halves over the subsequent wet seasons

Rainfall

Long term average = 653.8mm
07/08 = 610.5mm
08/09 = 689mm
09/10 = 407mm

Land condition change

	2007	2010	Observations
Land condition - re-sow	C	A	Re-sowing pasture has resulted in a quick improvement in land condition in this section of the paddock; however, without fertiliser or a legume it will probably quickly revert back to B land condition. The Rhodes grass is already showing obvious signs of nitrogen deficiency and thus the health and density of the pasture will almost certainly decline without attention. Almost 100% of the plants recorded in the basal area assessment in 2010 were Rhodes grass. Dominance of Rhodes will be a problem if the property has to endure another period of below-average rainfall years. It is likely that some plants will die out and provide opportunity for more broadleaf weeds to start encroaching in the paddock again.
Pasture basal area - re-sow	3%	5.3%	
Land condition - spell	C	B	With spelling there has been a marked improvement in the composition, health and density of Queensland bluegrass, in particular, on the upper slopes of the paddock. Where there had been prior erosion of soil along the alluvial flat this recovery is still slow, although the bulk yield and ground cover provided by annual grasses and broadleaf weeds appears to have increased strikingly where the offset discs have been used, although this effect on the soil surface has already almost disappeared with the soil surface sealing over within twelve months. With continued wet season spelling it is anticipated that this slow recovery will continue as ground cover, pasture basal area and soil organic matter levels increase and water infiltration improves.
Pasture basal area - spell	3%	4.5%	
Soil nutrient status 2010	Depth = 60cm Very low nitrogen Low / marginal organic carbon, phosphorus, zinc & potassium Very high chloride levels below 10cm		

Photos

Figure 13 and 14 – Nov 07 paddock dominated by small annuals and cottonbush; hard-setting soil

Figure 15 – Jan 08 spell

Figure 16 – Jan 08 spell: upper contour recovering

Figure 13 – May 09 spell

Figure 18 – May 09 exclosure

Figure 19 - May 10 spell

Figure 20 – May 10 Qld blue in upper contours

Figure 19 - Jan 08 preparing to sow grass

Figure 20 – Surface sealing on cultivated soil

Figure 21 and 22 – May 09 new established pasture, density and ground cover improving

Figure 23 and 24 - May 10 established pasture, good density and ground cover

4.2.3 Case study three “Diamondy” (Jinghi sub-catchment)

Land type

Three dominant land types: mountain coolibah ridge on clay; poplar box and moreton bay ash on alluvial sandy loam; and undulating eucalypt forest on shallow gravelly sand.

Historical management

Historically, the paddock has been continuously set-stocked with breeders which have preferentially grazed the ridge. Most paddocks on "Diamondy" are burnt every few years to improve feed quality and control eucalypt regrowth. This practice has not occurred in recent years due to poor soil moisture levels.

Land condition problems

On initial inspection the ridge was sparsely comprised of broadleaf weeds, such as maynes pest, annual grasses and wiregrass. There had also been die-back of old trees along the ridge. A mixture of land types has resulted in patchiness in grazing across the paddock with breeders spending a large proportion of their time grazing along the ridge. A water trough is positioned along the ridge attracting animals to spend more time grazing this area. It is also likely that the clay soil along the ridge has higher phosphorus levels than the lighter land types surrounding enticing selective grazing of this land type over the others in the paddock.

Recovery strategy

1. Spell paddock over wet season
2. Burn rank grass along the alluvial flats and eucalypt forest to improve grazing distribution

Rainfall

Long term average = 653.8mm
07/08 = 715.75mm
08/09 = 532.5mm
09/10 = 536.5mm

Land condition change

	2007	2010	Observations
Land condition	C	C	After three years of regular wet season spelling during the project the broadleaf weeds were declining in frequency and perennial grass species were starting to take over in terms of both frequency and contribution to pasture yield. Unfortunately, wiregrass species were still the most common perennial grass species in the pasture. Because of the low palatability of wiregrass and preference of the stock to graze this part of the paddock, long-term carrying capacity could not yet be increased Without substantially more palatable feed, the ridge was still considered to be in C land condition and the long-term carrying capacity still less than half of what its long-term potential is. Moving from an annual dominant pasture to a more perennial dominant pasture is the first step in stabilising the land condition so that ecosystem functions such as water and nutrient cycling can start to function at an optimal level again. The pasture basal area declined in this demonstration; however, this result may have been skewed by taking a new sampling track. This track finished a close to the water trough where there was little pasture of any description remaining. Lack of time prevented this data being re-collected along a less heavily utilised track. The strategy to use burning to improve grazing distribution in the
Pasture basal area	2.7%	1.7%	

			paddock could not be used due to unfavourable weather conditions at “Diamondy” over the period of the project.
Soil nutrients	Not tested		

Photos


Figure 25 and 26 – Nov 07 looking across and into the pasture


Figure 27 and 28 – Jan 08 small increase in pasture yield


Figure 24 and 30 – May 09 dry summer saw a small improvement in pasture yield and limited seed set


Figure 31 and 32- May 10 grass density and yield improving but wiregrass and annuals still dominant

4.2.4 Case study four "Wilga Park" (Jimbour Uplands sub-catchment)

Land type
Half of the paddock is cleared mountain coolibah on a heavy black cracking clay along a basalt ridge, while the other half consists of cleared vine scrub on a red loam around the sloping margins of the paddock.

Historical management
The paddock had been continuously amd conventionally farmed until 2002. Pasture was sown into the paddock in 2002, including green panic, katambora Rhodes, purple pigeon, and lucerne. The paddock normally has been spelled each summer for three to four months; however weaners had been fed in this paddock for the past couple of years with lick and cottonseed. In August 2007 the paddock was sprayed out with round-up, chisel-ploughed twice in preparation for planting. Following this, silk sorghum was planted with an air-seeder and subsequently buffel and a mixture of premier digitaria, fine cut Rhodes and bisset creeping blue grass was spread over the cultivated country using a seabrook seeder and chains. The silk sorghum was sown primarily as a risk aversion tactic to ensure that some cover and feed could be grown in the paddock if summer rain did not eventuate.

Land condition
Paddock dominated by broadleaf weeds such as mintweed, mayne's pest, turnip weed, wild mustard, peppercress and bogan flea. Couch encroaching on the hill slopes.

Recovery strategy
1. Spray, plough and sow paddock to pasture species (including a cover crop of silk sorghum)
2. Re-sow paddock to introduced pasture species
3. Wet season spell

Rainfall
Long term average = 660.7mm
07/08 = 544.25mm
08/09 = 538.5mm
09/10 = 528.5mm

Land condition change

	2007	2010	Observations
Land condition	C	B	Re-sowing pasture in this paddock was a quick and effective means of controlling weeds and thus resulted in an immediate improvement in composition from annual weeds to perennial grasses. On the heavy clay soil this composition was dominated by the short-lived perennial silk sorghum and purple pigeon grass. It is for this reason that the overall condition rating in 2010 was B instead of A. In 2010 silk sorghum and liverseed grass comprised 52% of the pasture basal area on the heavy soil. Death of these species would significantly decrease yield and density of the pasture. On the lighter soil on the lower margins of the paddock buffel was the dominant species. Here it was very dense and in good health, however, the area was not large enough to warrant an assessment of the entire paddock as A land condition.
Pasture basal area	0.8%	2.7%	
Soil nutrient status 2010	Heavy black clay depth = 40cm Very low nitrogen Low / marginal phosphorus Red loam depth = 60cm Very low nitrogen Low / marginal phosphorus Very high chloride levels below 10cm. Changes from red loam to white clay.		

Photos

Figure 33 and 34 - Nov 07 freshly sown paddock

Figure 35 and 36 – Jan 08 silk sorghum and purple pigeon grass establishing

Figure 37 – May 09 recently grazed

Figure 38 – May 09 lucerne establishing

Figure 39 and 40- May 10 good plant density and health; silk dominating composition on clay

Figure 41 and 42 - May 10 distinct change from silk to buffel where land type changes

4.2.4 Case study five “Symsdale” (Jimbour Uplands sub-catchment)

Land type

Undulating cleared brigalow softwood scrub on a brown cracking clay soil.

Historical management

This paddock was originally covered by brigalow suckers, woody weeds and native pasture. In 2000 the paddock was ploughed and contoured with green panic and Rhodes grass sown along the contour lines. The paddock was then cropped with oats, wheat or sorghum. Problems with erosion and grain yields prompted a change back to pasture. In spring 2007 the paddock was

scarified twice and then buffel seed was spread on the surface. Monitoring on "Symsdale" did not commence until early 2008.

Land condition problems

Paddock dominated by broadleaf weeds and annual grasses.

Recovery strategy

1. Slash broadleaf weeds prior to seeding to open up canopy for grass seedlings
2. Use a residual broadleaf herbicide to control broadleaf weeds over wet season
3. Wet season spell

Rainfall

Long term average = 660.7mm
07/08 = 555.5mm
08/09 = 770.5mm
09/10 = 408.5mm

Land condition changes

	2007	2010	Observations
Land condition	C	B	In 2008 this paddock was dominated by soft roly poly, mintweed, liverseed grass and sporadic, small buffel plants. Slashing and spraying broadleaf herbicide saw buffel start to gain a competitive edge over the weeds by the end of 2009. Good rain and spelling in the 08/09 summer resulted in a massive accumulation of buffel seed and germination of new seedlings. By 2010, buffel grass was providing the bulk of pasture yield in the paddock, however, because of the large area previously occupied by weeds, the density of the grass was still not at a level to rate the paddock overall as A land condition. It is anticipated that with spelling and vigilant grazing management to allow the rest of the buffel seed to germinate and establish in the bare patches, this paddock should return to A land condition by 2011.
Pasture basal area	-	2.3%	
Soil nutrient status 2010	Depth = 60cm Very low nitrogen Low / marginal phosphorus Plant limiting chloride levels below 10cm and very high below 30cm		

Photos

Figure 5 – Mar 08 paddock dominated by mintweed and soft roly poly

Figure 45 – May 09 after spray and spell

Figure 46 – May 09 unsprayed (left) vs sprayed

Figure 47 – May 09 herbicide applied

Figure 48 – Herbicide not applied

Figure 49 – May 10 pasture dominated by buffel

Figure 50 – Bare areas where herbicide not applied

4.2.5 Case study six “Strath-Vale” (Jimbour Uplands sub-catchment)

Land type

Cleared basaltic, flat-topped hill with a shallow, stony brown clay loam bounded by steep eucalypt-covered slopes.

Historical management

Continuously and conventionally grain cropped until 1987. Native pasture had gradually re-established since that time. This paddock has been continuously grazing by breeders with numbers dropping in the previous three years due to drought.

Land condition problems

Broadleaf weeds dominating pasture in the old cultivation country. Couch grass is encroaching over the western side of the paddock. Limited spelling opportunities if no forage crop or grain crop residual available in other paddocks throughout the year.

Recovery problems

1. Apply broadleaf herbicide on worst affected areas to reduce weed competition with grass
2. Wet season spell
3. Split paddock in half via a fence

Rainfall

Long term average = 660.7mm
07/08 = 564mm
08/09 = 766mm
09/10 = 520mm

Land condition changes

<table>
<tr><th></th><th>2007</th><th>2010</th><th>Observations</th></tr>
<tr><td>Land condition</td><td>C</td><td>C</td><td rowspan="2">C land condition does not do justice to the improvement in basal area and ground considering the considerable constraints to plant growth such as the shallow depth and rockiness of the soil. It was still rated as C land condition because the pasture was not dominated by 3P species. Although the frequency and yield of Queensland blue had noticeably improved, pitted blue, wiregrass and annual grasses dominated the pasture composition. Herbicide application was effective at reducing competition from broadleaf weeds such as mayne's pest and the various asteraceae species noted at the start of the project. Spelling alone has made a big impact on the paddock pasture yield. The fence was only completed towards the end of 2008 resulting in only two full wet season spells in the paddock. The grazing exclosure, which had three wet season spells, had better species composition and yield than the rest of the paddock at the end of the project. It is believed that this trend will be seen in the rest of the paddock with subsequent wet season spells.</td></tr>
<tr><td>Pasture basal area</td><td>2.1%</td><td>3.0%</td></tr>
<tr><td>Soil nutrient status 2010</td><td colspan="3">Depth = 30cm
Very low nitrogen
Low/marginal sulphur</td></tr>
</table>

Photos

Figure 51 and 52- Nov 07 small annual forbs dominate pasture composition

Figure 53 and 54 - Jan 08 spell and some rain has improved bulk yield and allowed some seed set

Figure 55 and 56– May 09 grass now apparent in pasture after spraying broadleaf weeds and spelling

Figure 57 and 58 - May 10 grasses providing bulk of yield but only a small proportion 3P species

4.3 Economics

Findings from this demonstration indicate that, from an economic point of view, the best option for recovering land condition is the one which has minimal capital outlay, quick return to optimum productivity and long lasting results. Those that were returned to A land condition within three years performed the best economically, regardless of strategy and capital outlay, demonstrating the financial importance of maintaining land in as good condition as possible through wet and dry years to sustain optimum carrying capacity. All recovery strategies, except one, had a positive benefit-cost within three years. All strategies were positive within four years. See Appendix 2 for full analyses.

The best benefit-cost ratio for all the demonstrations was 1.91:1, which indicates that for every dollar of investment undertaken, $1.91 was generated. This result was achieved by a combination of slashing, ripping and spraying broadleaf herbicide on the worst affected area early in the wet season followed by three years of wet season spelling. Instead of slashing, ripping and spraying the whole paddock, the landholder focused on just treating the worst affected area to keep costs to a minimum. In contrast, a negative benefit-cost result occurred at one site when, after three years, the paddock overall was still in C condition, although there had been some improvement in pasture condition, albeit slow. The strategy employed had a high capital outlay tied up in building a paddock-dividing fence. It is worth noting that even though this was the least impressive return the strategy would likely have given a positive result within four years.

The financial benefit of re-sowing pastures is largely governed by achieving a quick return to A land condition. Two of the demonstrations in this project re-sowed pasture, however, one returned to A land condition within three years and the other only achieved a B land condition rating within the three years and had higher costs per hectare. The benefit-cost paybacks for these two sites were 1.70:1 and 1.08:1 respectively.

It is reasonable to surmise that such investments, whilst dependent upon good seasons, can be successful. This is encouraging especially given the initial poor pasture condition at each site and the associated low productivity.

Economic analyses show that the benefit: cost ratio varied greatly across sites and was sensitive to changes in price received, rate of response and input costs. Another factor driving the variability across sites of results was the varying discount rates applied in order to assess the investments on an individual basis. Application of the same discount rate used throughout the analysis would allow fairer comparison in this regard. Also notable was the wide range of

treatment options available and the differences in these costs across enterprises. For example, treatment costs varied from $100 to $200 per hectare.

In summary, the case studies generated positive net returns within four years of the investment being made. Such returns are obviously dependent upon maintenance of the selling prices applied and noted within the individual analyses, with the initial investment ultimately being a sunk cost. Importantly, for individual enterprises, there is a clear need for detailed, individual analysis, accounting for risk factors and individual circumstances, prior to any on-ground investment.

4.4 Monitoring and evaluation

4.4.1 Grazing practices

At the start of the project, co-operators were surveyed to capture their knowledge of historical grazing management in the district and personal opinions on what has contributed to land condition decline. This was followed up with a verbal survey of the same questions at the end of the project. A collection of their responses is listed in Appendix 3.

The initial survey indicated that, while landholders recognised the effect of historical management decisions, rainfall was cited as the overarching contributor to decline of land condition and also as the primary solution for improving land condition. This attitude changed at the end of the project with co-operators identifying management decisions such as spelling, lightening off stock numbers, rotational grazing and re-seeding of pastures, in conjunction with rainfall, as the factors that could recover poor condition land. Although subtle, this represents an important change in mindset. Rather than simply identifying seasonal conditions as the primary source of land condition problems, the landholders now acknowledge the importance of management decisions, such as the timing of spelling and stocking rates, for land condition. Co-operators made comment on how much wet season spelling had improved pasture condition even where rainfall had been below the long-term average.

Other positive management actions adopted by co-operators since commencement of the project include:

- Incorporating some sort of rotational grazing and wet season spelling;
- Sowing old cultivation to a leucaena / grass mix to improve long-term feed quality and soil nitrogen levels;
- Selecting and sowing single grass species instead of shotgun mixtures; and
- Fertilising as a routine part of pasture sowing and maintenance.

4.5 Communication

4.5.1 Bus tours and field day

Eleven group activities were organised as a part of the Jinghi and Jimbour Uplands PDS projects. These included:

- Four training workshops in 2007 (two at Jinghi and two at Bell)
- Two bus tours around demonstration sites in 2008 (Jinghi and Bell)
- Two field days at demonstration sites in 2009 (Jinghi and Bell)
- One economics information morning for PDS co-operators in 2009
- Two bus tours around demonstration sites in 2010 (Jinghi and Bell)

Flyers and invitations for these events were mailed to all grazing land managers listed on the Brigalow Jimbour floodplain group mailing list. The local landcare officer followed up followed up

the invitations with a reminder phone call to neighbours early in the project. A sample of the flyers and advertising can be found in Appendix 5. Relevant specialist speakers were invited to participate in all of these events to provide technical insight into some aspect of the project. A list of invited speakers is provided in Appendix 4.

4.5.2 Media

In addition to posting flyers, both print and radio media were used to publicise the bus tours. Over the period of the project advertisements, articles and interviews were done for:

- Dalby Herald Newspaper;
- Jandowae Magazine;
- Frontier Magazine (2 articles); and
- ABC radio southern Queensland.

5 Success in achieving objectives

1. Evaluate and document the effectiveness of six grazing land management strategies for land condition recovery and enhancement on six properties in the Jinghi and Jimbour Uplands sub-catchments of the Western Downs.
- Six case studies were completed and evaluated as a result of these two PDS projects. A standardised set of data was collected from all sites.

2. In consultation with producers, develop district recommendations for best practice recovery regimes and long-term sustainable grazing strategies.
- A set of grazing management rules of thumb for the district were developed as a result of these two PDS projects. These, along with conclusions and recommendations about the applied recovery strategies are documented at the end of this report. These have also been summarised in a promotional booklet which has been posted to all graziers in the Brigalow Jimbour floodplain catchment.

6 Impact on meat and livestock industry – now & in five years time

6.1 Short-term impact

6.1.1 Wet season spelling

This project has demonstrated the success of spelling pastures after effective rainfall to improve pasture health and productivity. Feedback from participants indicates that this has been their most important observation and they are likely to adjust their grazing management to incorporate this practice in the future.

6.1.2 Spelling as a preferred option over sowing new pasture

When the project started many of the landholders felt that the primary way to improve the productivity of degraded pastures was to replace them with new pastures by re-sowing the paddock with seed. This project has demonstrated that even if weeds are dominating a paddock, as long as there is still a core population of 3P pasture species then paddocks can be recovered with minimal capital outlay by strategic wet season spelling and control of broadleaf weeds.

6.1.3 Increased use of broadleaf herbicides to suppress weed competition

Lack of experience and good advice about herbicide use in pastures has meant that many landholders have shied away from using herbicides as a weed management tool. This project has demonstrated the effectiveness of this technique in conjunction with spelling to recover land condition in old cultivation country. It is anticipated that this practice will be more widely used in the district as a result of the project.

6.2 Long-term impact

6.2.1 Maintain and improve land condition into the long-term

The economic analyses done in this project highlighted that when investing in land condition recovery strategies, a quick financial payback is highly dependant on a quick return to A land condition and optimum carrying capacity. It is believed that these demonstration projects have reinforced the importance and simplicity of maintaining land condition via wet season spelling and stocking country to match land and climatic conditions as a better alternative to repetitive re-sowing and rehabilitation of pastures.

7 Conclusions and recommendations

7.1 Conclusions

7.1.1 Pasture recovery time

Optimum pasture recovery time was found to occur when paddocks had broadleaf weeds suppressed early in the wet season and then given an entire wet season spell. In this project a return to A from C land condition could be achieved within three years following this strategy and with average wet season rainfall. If 3P species still comprise approximately 30% of the pasture (as measured by frequency) and soil surface condition is still good, a combination of broadleaf herbicides and wet season spelling can give a quicker improvement in condition than re-sowing pastures.

7.1.2 Spelling

Regardless of quantity and quality of rain, spelling after rainfall events during the growing months is beneficial to pasture health. The more rain and longer the spell after rain, the quicker the recovery from poor pasture condition.

7.1.3 Broadleaf herbicides

Where topography and terrain is favourable, broadleaf herbicides provide a quick and unobtrusive means of suppressing competition from weeds early in the wet season. In the first year of recovery this was believed to be critical to rebuild the health of the existing 3P pasture species and maximise seed production for new plants in the following year. Used early in the wet season residual herbicides provided ongoing weed control through the summer months. If used late in the summer or autumn landholders should be cautious that residual broadleaf herbicides do not kill winter germinating medics.

7.1.4 Re-sowing pastures

Where 3P pasture species comprise less than 30% of the plant population, re-sowing pasture was found to be the quickest means of improving pasture condition. Re-sowing provides opportunity for landholders to correct soil nutrient deficiencies, deplete weed seed banks and build sub-soil moisture prior to planting. It also provides a chance to select the best suited plant

species for the location and incorporate legumes to provide for ongoing nitrogen replenishment. Doing this right from the start minimises the need to rehabilitate poor condition pastures in the future.

7.1.5 Slashing weeds

Slashing old, rank broadleaf weeds early in the wet season was found to be an effective means of improving ground cover and providing small grass plants with a competitive edge in old cultivation country. The strategy improved the efficiency of broadleaf herbicides by opening up the canopy and providing better coverage of newly germinated weeds.

7.1.6 Return on investment

A quick return on investment was dependant on a quick return to optimal land condition, regardless of strategy used. From an economic point of view, the best strategies tested were those that facilitated the biggest improvement in the health and density of 3P plant species so that the optimal paddock capacity could be achieved in as short a time as possible. Options were also made more viable if costs could be limited by restricting the treatment area to a smaller portion of the paddock.

7.2 Recommendations

7.2.1 Economic threshold for fertiliser application in established pastures

It has been standard practice for graziers and pasture agronomists alike in this district to avoid fertilising established sown pastures due to a perception that it is not economically viable and the physical difficulty in application. All soil nutrient analyses from the demonstration sites indicated chronically low nitrogen levels and other deficiencies in plant nutrients such as phosphorous, zinc and sulphur. Sowing legumes can mitigate these problems to a certain degree; however, it is not always an option due to lack of suitable species, land type limitations or a desire to not disturb healthy established pastures.

If regular fertiliser application can enable producers to sustain optimum carrying capacities and liveweight gain on premium grazing land, it seems that it would be worth revisiting the process of calculating the economic threshold for fertiliser use in today's dollars. Paddock strip tests with different types, rates and methods of fertiliser application accompanied with some economic analysis would provide a starting point to deciding if there is value in researching this practice further. In a region which relies heavily on sown pastures for beef production, declining fertility levels will have a significant effect on productivity levels in the future.

7.2.2 Accredited workshop on sown pasture management for commercial agronomists

Few commercial agronomists have knowledge or training in perennial sown pasture management. With commercial agronomists providing the bulk of advice to producers about pasture management, it is important that they improve their understanding of perennial pasture systems, their biology and nutrient requirements. In particular, this needs to focus on species selection (less emphasis on shot-gun seed mixes and more on selecting the right species for the right conditions), appropriate fertiliser regimes (perennial pasture requirements are very different to those of annual grain crops), herbicide application (understanding pasture plant biology so that the right herbicide can be used in the right situation) and grazing management. In the cropping industry accredited technical courses on crop growth and management are provided to agronomists. For example, Pulse Australia provides a two day accredited course on chick pea biology and management. A similar accredited course on sown pasture biology and

management would be valuable for the grazing industry and improve the quality of information provided to landholders.

7.2.3 Accredited spray management workshop for graziers

The effectiveness of herbicides can be significantly improved by applying them in suitable weather conditions and by using the right chemical mix and spray equipment. Using chemicals in pasture and fodder cropping situations requires a different level of understanding to spraying chemical on grain crops. For example, adjusting the type of nozzle used and the time of day the chemical is sprayed could improve the effectiveness of the spray markedly. Accredited spray management workshops are available to croppers to improve their knowledge and skills in this area. Similar workshops would be advantageous for graziers to improve their confidence in using herbicides in pastures.

7.2.4 Near Infra-Red Spectroscopy (NIRS) calibration for southern Queensland

There is a level of uncertainty amongst graziers about what and when to supplement stock during the colder months in southern Queensland. The region is in a transitional zone between tropical and temperate weather patterns and pasture systems. Occasional wet winters can see cattle achieving good weight gains when their intake is supplemented by naturalised medics, winter herbage and forage crops such as oats. With many graziers in the region finishing cattle on-farm, or backgrounding cattle for feedlots, a quantitative understanding about changes in dietary intake over a range of land types and wet and dry years in the region would help to achieve a consistently high plane of nutrition year in, year out, via feed year planning.

8 Bibliography

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9 Appendices

9.1 Appendix 1 - Grazing management rules of thumb

9.1.1 "Spell in the wet"

Minimum period paddocks should be spelled during the wet season if in **GOOD** condition:

- Spell at least until pastures are in **phase 2** of growth. Not calendar based, determined by rainfall (generally around 4-6 weeks but depends on weather).

  Phase 1 = early new growth;

  Phase 2 = vegetative growth before seeding

  Phase 3 = plant seeding;

  Phase 4 = plant mature and haying off

Minimum period paddocks should be spelled during the wet season if in **POOR** condition:

- Spell until pastures have seeded (**phase 3** – at least).

Other comments:

- It can be unrealistic for graziers to destock to allow all paddocks to be spelled every growing season.
- Consider trying to rotate your grazing so that different paddocks to be spelled, at least for part of the growing season in different years.
- Forage crops may provide opportunity to spell pasture paddocks for a couple of months.
- Having a smaller core breeding herd allows more flexibility to adjust stock numbers based on seasons. It is easier to off-load 'temporary' stock than those which you invested many years into breeding.
- Big breeders are your most feed-demanding animals. A 550kg breeder eats about 60% more on average than a 450kg steer. They need a lot more room!
- Consider restocking with smaller animals initially, such as weaners, at the rate you would have normally stocked with fully grown animals. They have a much lower intake demand initially. This will gradually increase with time, but hopefully by next growing season you will have more feed on hand to meet their increased feed demands.

9.1.2 "Leave stubble in the dry"

Dry season (cooler months)

- Aim come out of the dry season with some good grass stubble left in the paddock and a minimum of 50% ground cover.
- Estimate feed on hand in April / May and do a forage budget to calculate the number of stock that the paddock can sustainably carry until you would normally expect a break in the season.
- December has the highest probability of receiving two inches in less than two weeks for this district, make sure you have enough feed to get you through until then.

Other comments:
If there isn't enough feed to get you through and still leave stubble consider either:

- Reducing stock numbers so that you maintain good grass stubble and ground cover throughout the dry; or
- Buying supplements early (end of growing season) before they are in short supply and expensive. Make sure you know what to feed. If there is still good dry feed left in the

paddock you may only need a protein-based supplement, if there is no dry feed left you will need to supplement energy as well via such things as hay, grain or whole cottonseed.

- Decide which classes of animals will most likely need to reach their production targets and identify what feed will most economically do the job.
- Preg-testing cows to see if there are any dry animals that can be off-loaded (remember that big breeders are your most feed demanding animals).

When the dry season keeps going:

- If there has been little or no rain by January, it will likely be worth reducing stock numbers early rather than late.
- Generally a late start to the wet season means less bulk of feed will be grown before the following dry.
- If other regions have had some rain, there is usually some 'mud money' around early in the year and there may be opportunity to off-load some dry stock while prices are at a premium.

9.1.3 When is sowing pasture a better option than spelling pasture?

As a general rule, if good 3P (perennial, palatable productive) grasses don't comprise at least 30% of the pasture, recovery will take a long time by spelling only. In this case, you might want to consider re-sowing pasture. A good way to check this is to make a square wire frame (quadrat eg 50x50cm) and place it a number of times in the paddock (eg 100 times in a line across the paddock every few paces) . If you don't find a good 3P grass plant in at least 30% of the quadrats it might be worth considering re-seeding the pasture.

9.2 Appendix 2 – PDS Economic Analysis by Mark Best (DEEDI Economist)

9.2.1 Introduction

The following report is written in support of the Meat & Livestock Australia (MLA) project code B.NBP, demonstrating and testing land condition recovery strategies for the Jinghi Jinghi and Jimbour Uplands sub-catchments within the Darling Downs. This project sought to report on the application of pasture recovery strategies and assess the effects of such practice change. Paddocks within individual cattle grazing operations were selected for use as case studies. Various different management techniques including spelling, as well as chemical and mechanical treatments were applied to these paddocks; broadly with a view to increasing the population of desirable plant species. Among several effects of such improvement in overall land condition include productive increases.

However, each technique applied necessarily incurred outlays, including capital investment. This report documents and analyses these individual grazier investment decisions from an economic viewpoint. Information on the costs and benefits of the assessed change is used in order to evaluate the potential effectiveness of such an investment. A partial budgeting approach assessing each individual investment in practice change has been used and a discounted cash flow analysis conducted. The aim of this report is to assess on the effectiveness of each case study investment within the analysis.

9.2.2 Report approach

This report uses grazier supplied data and the investment associated with each land management strategy is assessed in terms of expected costs and benefits. Net present value and cost-benefit ratio estimates are calculated. By use of applied assessment techniques, the report evaluates practice change from pre-existing grazing paddocks, thorough the investment; to the expected beneficial use of higher productive capacity paddocks.

9.2.3 Methodology and Assessment Criteria

In order to evaluate the costs and benefits of grazing practice change, cost of production data was collected and modelled with and without the proposed practice change. This enabled the comparison of costs and benefits of changing from the pre-existing production to the changed system, thereby determining profitability effects.

Five case study grazing operations farms were used in order to investigate the economic implications on production systems. Each enterprise was visited and actual data collected where available. Information such as type of enterprise, product, net cost per kilogram sold, stocking rates, treatment costs and benefits were collected. Additionally, discussion was also held on an applicable discount rate in seeking to provide an indication of the grazier's perceived opportunity cost of capital. Due to variation in the perceived cost of capital, and its resultant influence on the time value of money, each individual case study should be viewed in its own right. Thus, the analysis undertaken emphasises the cost-benefit of the specific treatment undertaken and direct case study comparison should be avoided due to the fact that independent individual investments are assessed, *not* selection from possible investment alternatives.

Estimates of the pre-existing production methods were also collected and are used here to estimate pre-treatment benefits. For example, a chemical treatment may have resulted in an increase in palatable species within the case study paddock leading to an increase in stocking rate and thus the productive capacity of the land area. By accounting for the level of investment outlay, and through assessing productive benefit, whilst accounting for lags across the investment window, economic assessment can be made. Each investment case study was initially assessed over a three year period between 2007 and 2009.

Where data limitations were apparent, estimates have been used for the purpose of the analysis and appropriate annotation added in the case study notes and results discussion. It should be noted that such estimates are based on grazier and extension officer expectations and serve as necessary data estimates for analytical purposes.

Partial budgets estimate the effect on whole farm operating profit of a proposed change affecting only part of the operation. Partial budgeting techniques were used in assessing the potential of each case study investment seeking to improve land condition and thus increase carrying property carrying capacity. Marginal net gains were evaluated using a standard investment analysis. A standard discounted cash flow (DCF) technique was used, including routine investment appraisal techniques and terminology, including:

- Capital investment – the total amount of capital expenditure for the investment. In this case, this is the amount of net capital additional to "routine" (pre-treatment) herd management expenditures in producing and finishing cattle.
- Benefit-cost ratio – the ratio of project benefits relative to costs across time, indicative of the effectiveness of value for money for the investment.
- Net Present Value (NPV) – determining the present day value of an investment stream over the investment time period and at the quoted discount rate. The NPV is the Lump Sum Present Value Equivalent of the incremental net cash flow stream over the term of the investment. The cash flow stream includes the initial investment, any ongoing management costs as well as the incremental benefits returned from the investment. *The NPV result is commonly used to determine whether a proposed investment is likely to be viable.* An investment is said to be viable if the NPV is positive at the quoted discount rate across the investment period.

9.2.4 Assessment of investment

Whilst all investments inherently have some risk attached to them, broad comment can be made on their expected outcomes. In relation to investments that improve the potential productivity of grazing operations:

- Investments with known positive production outcome effects and low capital costs are low risk, generally easy to implement and provide good return on investment, given the relatively small effect on cash flows from such investment. Inherently, such investments are more likely to be adopted.
- Appropriate product selection (in terms of per unit margins) and marketing aspects of production are fundamental in maintaining a profitable production system. Such production systems inherently maximise profitability. Extensive production systems are reliant on the maintenance of pasture productivity in order to maintain economic sustainability and any long term decline in pasture productivity will necessarily act as an impediment to profitability and form a limiting constraint upon the production system.
- Pasture recovery techniques carry with them an increased capital cost, with increased risk from utilisation of such capital. In this regard, traditional methods may be seen as a more conservative, risk mitigation strategy. However, where production falls to such low levels as to be economically unsustainable, costs of production adjustments may be required to offset such productivity decrease. The increases in capital outlays from the adopted productive strategy must be balanced by the expected net production benefits from that strategy. The implications for increased production are discussed further in this report.

Of course, it should be noted that an individual grazier may choose to undertake investment for reasons other than pure financial benefit, but the nature of this report focuses exclusively on the expected economic benefit accrued from such capital investments.

9.2.5 Case study 1 – "Talmoi"

Case study one is based on a paddock area of 50 hectares and is located in the Jinghi Jinghi sub-catchment of the Darling Downs. The primary negative production issue facing the case study paddock was poor pasture composition due to the die out of Rhodes grass. The selected managerial treatment included slashing, chemical spraying with broadleaf herbicide and spelling to allow pasture growth and seeding. Additionally, paddock treatment also included ripping a small section of approximately 3 hectares. Paddock treatments and costings are outlined in Table 1.

Table 1: Case study one variable treatment costs

Paddock area 50 ha
Variable costs $/ha

Operation	% of area treated	Total cost ($)	Notes
Ripping		$400	
Grass seeding		$2,964	
First spray	50%	$556	28/01/2007
Labour (1st spray)	50%	$154	
Second spray	100%	$1,112	15/09/2007
Labour (2nd spray)	100%	$309	
Total development cost		$5,494	
Equating to		$109.89	/ha

It can be seen from table 1 that total development was $5,494, equivalent to $110 per hectare. The case study paddock was used for backgrounding cattle. Pre-treatment expected live weight was 0.7 kilograms per head per day. Stock movements are outlined at Table 2. It can be seen that post-treatment daily live weight gains were often in excess of pre-treatment averages. A per kilogram price of $1.80 per kilogram was used for the analysis.

Table 2[1]: Case study one stock movements and live cattle weights

Stock in	No in	Weight in (kg)	Stock out	No out	Weight out (kg)	Weight gain (kg)	Days on
1/10/2007	30	260	22/01/2008	30	356	96	113
19/07/2008	37	320	7/08/2008	37	370	50	19
8/09/2008	46	275	5/10/2008	46	350	75	27
5/11/2008	22	300	1/12/2008	22	340	40	26
5/03/2009	53	250	4/05/2009	53	300	50	60
1/06/2009	37	270	15/08/2009	37	340	70	75
4/09/2009	25	300	20/11/2009	23	348	48	77

Results

Case study 1 returned a positive net present value of $4,310, indicating that the manager is financially better off by this amount across the investment period by choosing to undertake the

[1] Some additional production data was collected on stock movements for the year 2010 however these are *not* included for the purpose of the analysis.

investment. The case study returned a benefit-cost ratio of 1.91:1, indicating that for each dollar of investment undertaken, $1.91 was generated.

9.2.6 Case study 2 – "Ivory Creek"

Case study two is a paddock of 72 hectares and is located in the Jinghi Jinghi sub-catchment of the Darling Downs. Production issues to be addressed included poor pasture composition, poor water infiltration and low organic soil matter. The selected managerial treatment included fencing the paddock into two smaller sections, and the cultivation, chemical spraying of herbicide, the planting with a mixture of Rhodes grass, digitaria and creeping blue grass species, and the addition of fertiliser to one half of the paddock with sulphate of ammonia. Ripping and spelling have also been used.

The length of fence required was 645 metres, at a cost of $1.80 per metre constructed including labour. Details of fencing costs are included in Table 3.

Table 3: Case study two fencing cost details

Fencing costs	**Length / Qty**		**Cost**	**Unit**	**Total cost ($)**	**Notes**
Fence	644.8			m		total length
Posts	64	@	$8	/post	$516	one post/10 m, rammed
Wire	4	rolls @	$80	/roll	$320	
Labour	16	hours @	$20	/hour	$320	2 people, 2 days
Total					$1,156	
Machinery, sowing, etc.					$6,478	
Total development cost					$7,634	
equating to					$106.31	/ha

Paddock treatment costs including the use of machinery were estimated at $6,478 in total. Coupled with the fencing cost of $1,156 leads to a paddock treatment cost for the *total* area of $106 per hectare.

Further cultivation and sowing of the unsown paddock portion (of 49 hectares in area) remains an option for additional development, (which would add to per hectare total treated costing). An additional future production issue may include a requirement to continue fertilisation in order to maintain and continue higher stocking rates.

Currently the paddock is use for a breeding herd. Additional costs include the cost of supplementation for three months during winter, currently feeding out a round bale of hay every two days, in addition to feeding out a loose lick of one tonne every two weeks, at a cost of $460 per tonne. Initially around 25 breeders were carried on the paddock. Currently there are 55 breeders, with a goal of getting to 60. Weaner steers are turned off at twelve months at around 380 kilogram live weight. Weaner values are $760 per animal and fat cows sell at $650 per head.

Results

Applying a discount rate of 6 per cent, case study results indicate a positive net present value of $5,315 and benefit-cost ratio of 1.70:1. A primary reason for this result is the assumptions lying behind long term carrying capacity. Whole paddock in the start situation was calculated at 9.39 adult equivalents (AE) and in the current situation, following detailed pasture assessment, of 20.1 AE (J. Alexander, pers. comm.). The resultant increase in carrying capacity thus allows higher levels of production, particularly feeder steers.

9.2.7 Case study 3 - "Wilga Park"

Case study 3 is based on an old cultivation paddock 38.5 hectares in area and is located in the Jimbour Uplands sub-catchment of the Darling Downs. The primary negative production issue facing the case study paddock was poor pasture composition including broadleaf weeds and couch. The selected managerial recovery strategy included the use of wet season spelling, the sowing of silk sorghum and the sowing of buffel and purple pigeon grass to provide ground cover. Paddock treatments and costing are outlined at Table 4.

Table 4: Case study three variable paddock treatment costs

Total paddock area	38.5 ha
Planted area	30.4
Variable costs	$/ha

Operation	Qty		Cost	Unit	Total cost ($)	Notes
Spray roundup		@	$9.88	/ha	$380	Treating whole area
Labour	4	hours @	$20.00	/hr	$80	
Chisel plough #1			$29.64	/ha	$900	
Chisel plough #2			$29.64	/ha	$900	
Labour	20	hours @	$20.00	/hr	$400	
Planting		@	$29.64	/ha	$900	
Silk sorghum seed	2.5	kg/ha @	$4.00	/kg	$300	
Buffel seed	2.5	kg/ha @	$10.00	/kg	$750	
Labour	10	hours @	$20.00	/hr	$200	
2,4-D		@	$9.88	/ha	$300	
Labour	4	hours @	$20.00	/hr	$80	
Total development cost					$5,190	
Equating to					$134.94	/ha

It can be seen that per hectare development cost is $135 per hectare. Pre-treatment weight gains were estimated at 0.3 kilograms per head per day on average. Stock movements and live weights following treatments are outlined at Table 5.

Table 5[2]: Case study 3 stock movements and live cattle weights

Stock in	No in	Weight in (kg)	Stock out	No out	Weight out (kg)	Weight gain (kg)	Days on
23/04/2008	44	650	30/04/2008	44	650	0	7
2/05/2008	152	400	7/05/2008	152	400	0	5
13/06/2008	42	220	15/07/2008	42	240	20	32
13/06/2008	77	220	30/08/2008	77	265	45	78
20/06/2008	11	350	15/07/2008	11	370	20	25
1/10/2008	12	260	9/01/2009	12	290	30	100
20/11/2008	44	250	9/01/2009	44	290	40	50
8/06/2009	54	250	19/08/2009	54	285	35	72
15/09/2009	36	250	7/12/2009	36	290	40	83

Results

Assessed only between 2007 and 2009 (applying a strict three year investment period), case study 3 results in negative net present value and benefit-cost ratio, indicating that the investment has a longer payback period. Were a four year assessment to be conducted (ie full 2010 net benefits be included by averaging the two proceeding years results), then the investment yields a small positive net present value and benefit-cost ratio of 1.08:1, indicating that the investment is economically worthwhile within a *four* year timeframe.

9.2.8 Case study four – "Symsdale"

Case study 4 is a former cultivation paddock of 41 hectares located in the Jimbour Uplands sub-catchment of the Darling Downs. The primary negative production issue facing the case study paddock was poor pasture composition due to the Rhodes grass die out. The selected managerial recovery strategy included slashing and application of broadleaf herbicide. Future development plans may include ripping and the use of Leucaena.

Table 7: Case study four paddock cost estimates

Total paddock area 40.5ha

Variable costs $/ha

Operation	Qty		Amount ($)	Unit	Total cost ($)	Notes
Spraying		@	$49.40	/ha	$2,000	7 grams Ally, 500ml 2,4-D, November 07
Labour	4	hours @	$20.00	/hr	$80	
Slashing					$500	All up costing, including 16 hours of labour, March 08
Spraying		@	$98.80	/ha	$4,000	Twice as much cost-wise, October 08
	4	hours @	$20.00	/hr	$80	
Total development cost					$6,660	
equating to					$164.50	/ha

Stock movements and estimated weight gains are shown in Table 8.

[2] Additional live weight data for the 2010 production year was collected, but not used for the initial economic analysis. Steers entering 15/09/2009 were supplemented with cottonseed in October and November 2009. This additional cost *has* been included in analysis.

Table 8: Case study 4 stock movements and live cattle weights

Stock in	No in	Weight in (kg)	Stock out	No out	Estimated daily weight gain (kg/head/day)
6/08/2008	162	220	29/08/2008	162	0.5
6/09/2008	160	220	11/09/2008	160	0.4
7/01/2009	160	350	2/02/2009	160	0.7
13/05/2009	160	400	15/05/2009	160	0.7
1/06/2009	86	400	5/06/2009	86	0.5
8/02/2010	72	450	27/02/2010	72	0.9
8/02/2010	81	450	5/03/2010	81	0.9

A per price of $1.85 per kilogram was applied for this case study.

Results

Initial modelling returns a negative net present value for the investment over its first three years of operation. A couple of the reasons for this situation is the lower estimated weight gains achieved compared to pre-treatment average (of 0.7 kilograms per head per day), as well as the demanding discount rate of 10 per cent applied to the case study. However, if the production year 2010 were assigned the same net benefit realised in the previous production year, then the case study returns a net present value of $ 1,402 and a benefit-cost ratio of 1.17:1.

9.2.9 Case study 5 – “Strath-Vale”

Case study 5 is based on a paddock area of 20 hectares located within the Jimbour Uplands sub-catchment of the Darling Downs. Issues affecting this paddock included poor pasture composition including broadleaf weeds, poor water infiltration and run down through the continuous grazing of the paddock. Strategies to be implemented included paddock fencing, use of wet season spelling, application of broadleaf herbicide and rotation of cattle off the paddock to reduce stock pressure.

Initial herd numbers were 24 breeders, with the goal of increasing herd numbers by an additional 10 breeders within the medium term. However, this plan has been compromised by seasonal conditions.

An estimation of the cost of paddock treatment is included at Table 9.

Table 9: Case study 5 paddock treatment costs

Paddock area 20.2ha
Variable costs $/ha

Fencing costs	Length / Qty			Unit		Total cost ($)	Notes
Fence				930	M		Total length
Strainer posts	11	@	$12	/post	M	132	
Labour	56	hours @	$20	/hour		1,120	Est at 60 hrs/km
Materials						2,570	Steel posts & wire
Operation							
Spraying, 2,4-D application						$200	Est amounts
Labour	2	hours @	$20	/hour		$40	
Total development cost						$4,062	
equating to						$200.67	/ha

It can be seen that the estimated treated cost is $201 per hectare. The lack of significant production from the case study paddock means that analysis results in a current negative situation for the case study, a situation that should be expected to be alleviated by production increases in the future. For example- in the absence of further expenditures- net production of $2,750 generated annually in both the 2011 and 2012 production years, would see the investment break even at the discount rate of 7 per cent.

9.2.10 Discussion

Broadly, results indicate positive net present value results for all case studies, indicating that the operator is financially better off for having undertaken the investment after a time period of three to four years following initial investment. It can be seen that some case studies indicated a negative return on investment for a strict three year assessment period. However, modelling expected net benefits accounting for the full 2010 production year allows further net benefits to be assigned and overall positive results to be generated.

It may reasonably be surmised that such investments as briefly outlined and assessed- whilst dependent upon good seasons- may be successful especially when compared to a situation of limited production due to poor pasture quality is.

The results show that the results are highly variable and sensitive to changes in both the price received and yield (indicative of the sensitivities of the cattle growth rates as well as the cost of treatments for the paddocks in each of the paddocks for treatment). Another factor driving the variety of results includes the varying discount rates applied in order to assess the investments on an individual basis. Application of the same discount rate used throughout the analysis would allow more even comparison in this regard. It can also be noted the wide range of treatment options available and the difference in their costs to the individual grazier. It can be broadly noted for example, that treatment costs varied from $100 to $200 per hectares.

So in summary, the assessed case studies broadly generated positive net returns within four years of the investment being made, with positive net present values and benefit-cost ratios calculated. Such returns are obviously dependent upon maintenance of the selling prices applied and noted within the individual analyses, with the initial investment ultimately being a sunk cost. However, in assessing investment decisions, the need for detailed, individual analysis, accounting for risk factors and individual circumstances is apparent. Users of this

document are duly advised to conduct full sensitivity testing of estimated results before proceeding with investment decisions.

10 Appendix 3 – Responses to grazing practice survey

10.1.1 Start of Project Survey 2007/08

Historically, what has contributed to declining land condition in the district?

- Lack of rainfall
- Lack of summer rainfall
- Lack of follow-up rain
- Longer periods of hot weather
- Not destocking paddocks early enough, particularly graziers with breeders
- Economic forces of trying to run too many cattle on places that are too small
- Basing cattle numbers on old stocking rates (not relevant to last 10 years rainfall)
- Old cultivation country running out of condition
- Overstocking
- Unable to wet season spell after dry period due to economic reasons
- Age and attitude of landholders, only seems to be young people going forward

What action do you believe is required to recover the condition of land in poor condition in this district?

- Lighten off when you get rain
- Rip and reseed old cultivation
- Chemical control of weeds in old cultivation
- More rotational grazing and spelling
- Spell for summer (when it grows)
- Knocking back the weeds
- Deep ripping if country bare and water running off (eg Yeoman's plough to break up clay pan)
- Catch soil moisture again
- Destock
- Rain
- Drop grass seed if now grass and deep ripping the paddock
- Look at fodder cropping options as a means of spelling
- Spelling
- Value of land too high for low value animals

10.1.2 End of Project Review

At the end of the project participants were asked again what action they thought was required to recover land condition in the district. Their responses were:

- Wet season spelling
- Re-seed and fertilise pastures
- Rotational grazing with larger numbers of cattle for short periods and then spelling until good growth occurs
- Wet or summer spelling is important
- Degraded pasture should be shut up and let seed every summer and grazed in winter to reduce weeds until it improves
- If there's not much grass left to seed it might have to be reseeded if possible
- Lighten off stock numbers

- Rotate grass paddocks if you can
- Spelling when you get some rain
- Stocking lightly
- Reseed pasture and control the weeds or spell pasture over the summer growing period and let reseed naturally

10.2 Appendix 4 – Co-operators, specialist speakers and project contributors

10.2.1 Co-operators

- Greg and Megan Warren, “Talmoi”
- Trish Atkinson and Max Barlow, “Ivory Creek”
- Tim Bassingthwaighte, “Diamondy”
- Boxer and Wendy Caldwell, “Wilga Park”
- Wayne and Cathy McClelland, “Symsdale”
- Garry, Jan and Val McNamara, “Strath-Vale”

10.2.2 Coordination assistance, field monitoring and fencing

- Nevin Olm (formerly Brigalow Jimbour Floodplain Group coordinator)
- Roger Sneath (DEEDI senior beef extension officer)

10.2.3 Training workshops

- Col Paton (DEEDI principal grazing land management extension officer)

10.2.4 Bus tours

2008 Bus Tour:

- Mark Silburn (DERM hydrologist)
- Andrew Biggs (DERM soil scientist)
- Dr Sid Cook (QMDC land management officer and ex-local agronomist)
- Bruce Winter (DEEDI oats plant breeder)

2010 Bus Tour:

- Dave McRae (DERM climatologist)
- David Lawrence (DEEDI pasture agronomist)
- Brian Johnson (DEEDI pasture technical officer)
- Edwina Sivell and Peter Leggett (DEEDI biosecurity officers)

10.2.5 Economist

- Mark Best (DEEDI)

10.2.6 Mapping

- Katie Cameron (Brigalow Jimbour Floodplain Group)

10.2.7 Field data collection

- Roger Sneath
- Ken Buckley
- Cass Johnston
- Edwina Sivell

10.2.8 Publishing and graphic design

- Heather Lees (DEEDI)

10.3 Appendix 5 - Project advertising

10.3.1 Bus tour flyer 2008

Queensland the Smart State

Land condition recovery project

Bus tour of 'Producer Demonstration Sites'

Seem to be growing more weeds than grass?
Wondering where to start to get your paddocks thrifty again?

The bus tour provides an opportunity to visit local MLA Producer Demonstration Sites (PDS) focusing on a range of different strategies for recovering land condition and paddock carrying capacity. Soil and pasture specialists will be available to discuss the pros and cons of different recovery strategies.

Guest speakers

Sid Cook; QMDC Grazing Land Management Coordinator (Bell and Jinghi)
Sid has previously worked as a Research Scientist with CSIRO Division of Tropical Crops and Pastures, working on the ecological aspects of pasture establishment and landscape management. Sid also has experience as an agronomist, working with Landmark at Roma and Dalby. Sid holds a PhD from the University of New England, for his research into the role of plant nutrition and grazing management in the degradation of improved pastures.

Mark Silburn; NRW Senior Hydrologist (Bell only)
Mark trained as an Agricultural Engineer (with Ted McVeigh from Bell). Mark has studied many aspects of soil water balance (where rainfall goes to), runoff, soil erosion and water quality in dryland and irrigated cropping and in pastures, in central and southern Queensland. In recent times, Mark has gone underground, measuring water movement below the root zone (deep drainage) and studying how it get to groundwater, and where the groundwater goes.

Bruce Winter; DPI&F Forage Oat Plant Breeder (Bell only)
Bruce is based at Leslie Research Centre in Toowoomba where he currently works on an MLA funded project to breed and release commercial cultivars of forage oats with good resistance to leaf rust, high forage yield, good recovery from grazing and late maturity. Recent releases include Volta, and the new varieties Genie and Qantom. Bruce has previously worked as a plant breeder in the public and private sector with a number of crops including grain and forage sorghum, sunflower and wheat.

Andrew Biggs; NRW Senior Soils Scientist (Jinghi only)
Andrew has played an integral part in soil surveying, evaluating and mapping land resource areas in Cape York, eastern and central Darling Downs and parts of the Maranoa, Balonne and Border Rivers. His current work (in conjunction with Mark Silburn and others) involves understanding water and salt balances in our landscapes, and how they change with land use.

When and where?

Bell, Thursday 22 May
Bus departs Ensor Park, Bell 8.45 am
Visiting *Wilga Park, Symsdale* and *Strathvale*
Bus returns Ensor Park, Bell 4:00pm

Jinghi, Friday 23 May
Bus departs Jinghi Hall 8.45 am
Visiting *Talmoi, Ivory Creek* and *Diamandy*
Bus returns Jinghi Hall 4.00 pm

Seats are strictly limited! RSVP by Thursday 15 May

Nevin Olm Phone: 4665 2206 Email: nevinolm@bigpond.com; or
Jill Alexander Phone: 4669 0807 Email: jillian.alexander@dpi.qld.gov.au

mla · Condamine Alliance · Queensland Government

10.3.2 Advertisement Dalby Herald Newspaper May 2008

Land condition recovery project

Bus tour of 'Producer Demonstration Sites'

Seem to be growing more weeds than grass?
Wondering where to start to get your paddocks thrifty again?

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Guest speakers

- Sid Cook; QMDC Grazing Land Management Coordinator (Bell and Jinghi)
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Bus returns Jinghi Hall 4.00 pm

Seats are limited! RSVP by Thursday 15 May to Nevin Olm Phone: 4665 2206 Email: nevinolm@bigpond.com; or Jill Alexander Phone: 4669 0807 Email: jillian.alexander@dpi.qld.gov.au

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10.3.3 Bus tour flyer 2010

Department of Employment, Economic Development and Innovation

Land Condition Recovery Project

Final bus tour of producer demonstration sites

What strategies were most effective in recovering land condition given the seasonal conditions?

The bus tour provides an opportunity to visit local MLA producer demonstration sites (PDS) focusing on a range of different strategies for recovering land condition and paddock carrying capacity.

Guest speakers

Dave McRae; DERM Climatologist

Dave McRae's work with the Queensland Government's Queensland Climate Change Centre of Excellence has focused on communicating climate science to community and industry groups especially in regard to adapting to our highly variable and changing climate. Dave's presentation will focus on what has happened with the climate of the Darling Downs since local records began, what the projections for the future include and what adaptation strategies may exist for the different industries and communities of the Darling Downs.

David Lawrence; Agri-Science Queensland, Extension Officer

David has worked as an Extension Officer in mixed farming systems at Emerald, Roma and across the Darling Downs. His focus has been on participatory research, development and extension that has farmers and scientists learning together. David leads the Sown Pasture group in Toowoomba and is part of a review of sown pasture rundown for MLA. His recent work has been on soil health, the effects of land management on soil carbon levels in mixed farming areas, and the potential for pastures to lift carbon and improve our soils.

Peter Leggett, Edwina Sivell and Peter Oberhardt; Biosecurity Queensland, Stock Inspectors

Each day two of the three stock inspectors will be joining us to discuss any biosecurity issues with participants. Peter Leggett can provide support in tracing and identifying livestock using the NLIS database. Edwina Sivell will provide information about animal welfare and livestock transport requirements, and Peter Oberhardt can provide advice on animal health and disease management.

When and where?

Bell, Friday 19 March 2010

Bus departs Ensor Park, Bell 8:45 am
Visits – *Wilga Park, Symsdale* and *Strath-vale*
Bus returns Ensor Park, Bell 4:00 pm

Jinghi, Monday 22 March 2010

Bus departs Jinghi Hall 8:45 am
Visits – *Talmoi, Ivory Creek* and *Diamondy*
Bus returns Jinghi Hall 3.30 pm

Lunch and smoko sponsored by MLA

Seats are limited! RSVP by Monday 15 May 2010

Dalby DEEDI office – Phone: 4669 0800 or email: jillian.alexander@deedi.qld.gov.au

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Condamine Alliance

Queensland Government