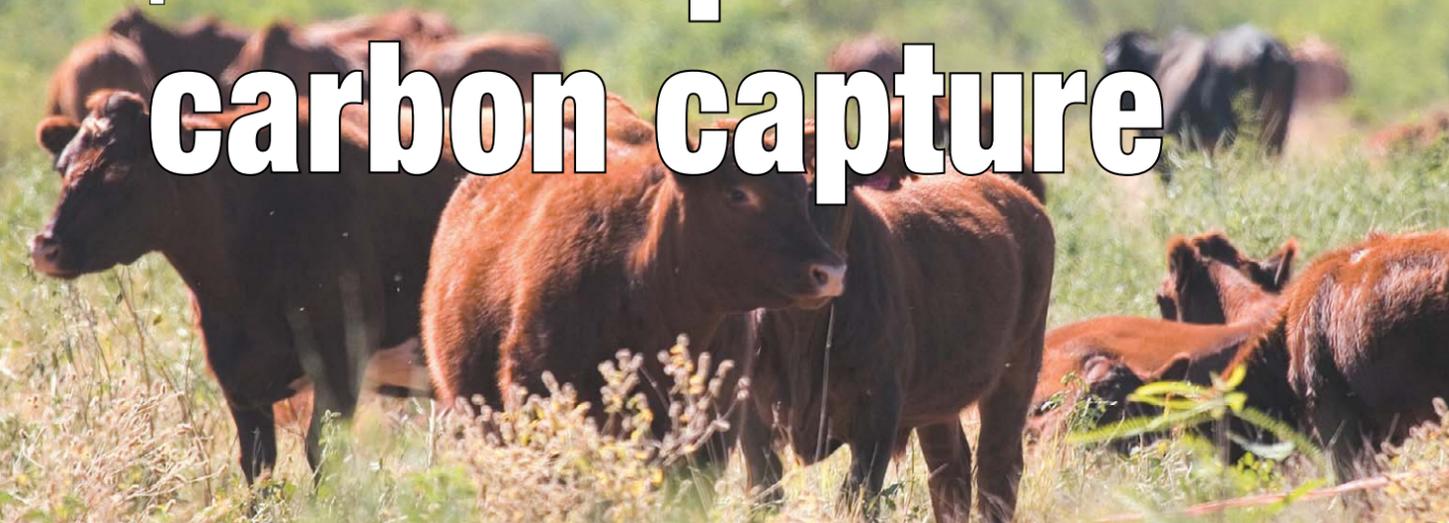


Pilbara cattle station regeneration has potential to capitalise on carbon capture



The most productive area on the station is the Cheela floodplain which supports perennial grasses and shrubs. Subdivision into 78 paddocks has produced a dramatic improvement in its pastoral condition over the last 10 years.

By Mark Alchin

Robust debate continues about the potential environmental and commercial benefits of carbon offset based enterprises on rural land in Australia. CSIRO conservatively estimates that rehabilitation and reforestation of Australia's overgrazed rangelands and broad adoption of controlled savanna burning could bio sequester and mitigate a total of 113 Mt CO₂-e (million tonnes of carbon dioxide equivalent) per year.

This tonnage of carbon is equivalent to taking more than 40 million vehicles off the road. If the policy settings are right, income from carbon offsets has the potential to bankroll broad-scale regeneration of degraded areas throughout the Australian rangelands. Aside from the potential atmospheric benefits of carbon offset based enterprises, an increase in the level of carbon stored in the soil and the vegetation may also increase livestock carrying capacity and thereby strengthen existing pastoral financial returns.

To increase the understanding of the specific opportunities and risks of carbon offset based enterprises in the Kimberley-Pilbara region researchers from the Department of Agriculture and Food, Western Australia, conducted a study on three cattle businesses.

The Carbon Capture Project sought to answer three questions:

- What is the average amount of greenhouse gas emissions that are produced each year by a pastoral business in the Kimberley-Pilbara?
- Can the emissions produced by the pastoral businesses be offset by improved grazing management and controlled savanna burning?
- Is it financially feasible for a pastoral business to trade carbon offsets in the voluntary carbon market?

Cheela Plains was one of the cattle businesses involved in the study. The 188,165-hectare property, more than 1200 kilometres northeast of Perth, is located in the iron-ore rich Pilbara region of WA. Cheela Plains has been owned and managed by Evan and

Robin Pensini since 2001. The Pensini family owned and managed the adjacent, much larger Wyloo Station between 1976 and 2001 and when it was sold Cheela Plains was excised and made an individual pastoral lease.

Like most pastoral businesses in the region, Cheela Plains continues to face increasing financial pressure due to variable seasons, declining terms of trade and the shortage of experienced labour. To meet these challenges, Evan and Robin radically redesigned the way the property was managed.

Rest-based grazing

They implemented a rest-based grazing regime, adopted low stress stock handling techniques, placed a greater emphasis on agistment cattle and became skilled in business management through involvement in a producer support network. These changes have resulted in a significant improvement in the condition of the land and the livestock carrying capacity of the pastoral lease.

Evidence of the ecological restoration of the pastoral lease is demonstrated by the re-colonisation of previously degraded areas by preferred perennial grasses and shrubs such as Barley Mitchell grass, Queensland bluegrass, Silky brown top, Roebourne Plains grass and Ruby saltbush.

Evan and Robin have always been looking for innovative ways to strengthen their business which is why they began to explore the potential development of a carbon offset-based enterprise on their property and became involved in the Carbon Capture Project.

Rainfall at Cheela Plains is highly variable and the annual average is 289 millimetres. Good seasons on the property usually occur when cyclonic activity during the summer period drives strong rain-bearing troughs inland. The business is likely to face greater seasonal risk as scientists predict that the rainfall may fall in shorter, more intense storms and temperatures may increase by 2.50°C due to climate change.

The most productive area on the property is the Cheela floodplain which encompasses more than 20,000ha. The floodplain has deep red cracking clays which support a diverse mix of palatable perennial grass and shrub species. Between 1976 and 1983 the floodplain was virtually de-stocked because it had become highly degraded as a result of high cattle numbers continuously grazing the area. A land survey by the government in 1978 reported that 66% of the property was in poor condition.

In 1999, Evan and Robin implemented a four-paddock rotation on the floodplain. After less than 12 months, they observed ecological, productivity and logistical benefits so they subdivided the floodplain further to create a total of 78 paddocks. In 2008, a subsequent government land survey reported that only 11% of the property was in poor condition.

This substantial improvement in land condition is largely attributed to the rest-based grazing system and the benefits were catalysed by a run of above-average seasons and the stabilisation of areas with buffel grass across the property.

Evan and Robin now generally run multiple large herds (greater than 1000 breeders in each) within the grazing system. In addition to commencing rest-based grazing, controlled mating was introduced. The investment in bulls was reduced as the breeders were concentrated into smaller areas. Stocking rate adjustments on the property are now relatively easy.

Fences are generally single wire electric. Evan and Robin practice low-stress stock handling techniques to train both their own cattle and the regular consignments of agistment cattle to 'respect' the fences.

Cattle water supply

Cheela Plains has an efficient stock water supply system by having one main bore which fills five 45,000-litre water tanks located on the top of a steep hill. The water is then reticulated out to the water-

Table 1: Average annual livestock methane and other greenhouse gas emissions of the pastoral businesses.

	Cheela Plains	Roebuck Plains	Mount Barnett
Livestock methane emissions (t CO ₂ -e)	3,490	31,828	2,889
Diesel emissions (t CO ₂ -e)	88	407	81
Petrol emissions (t CO ₂ -e)	0	47	0
Savanna burning (t CO ₂ -e) (inclusive of N ₂ O and CH ₄ only)	1,113	25,748	17,221
Total (t CO₂-e)	4,691	58,031	20,191
Total per head of cattle (t CO₂-e)	2.2	2.9	10.9

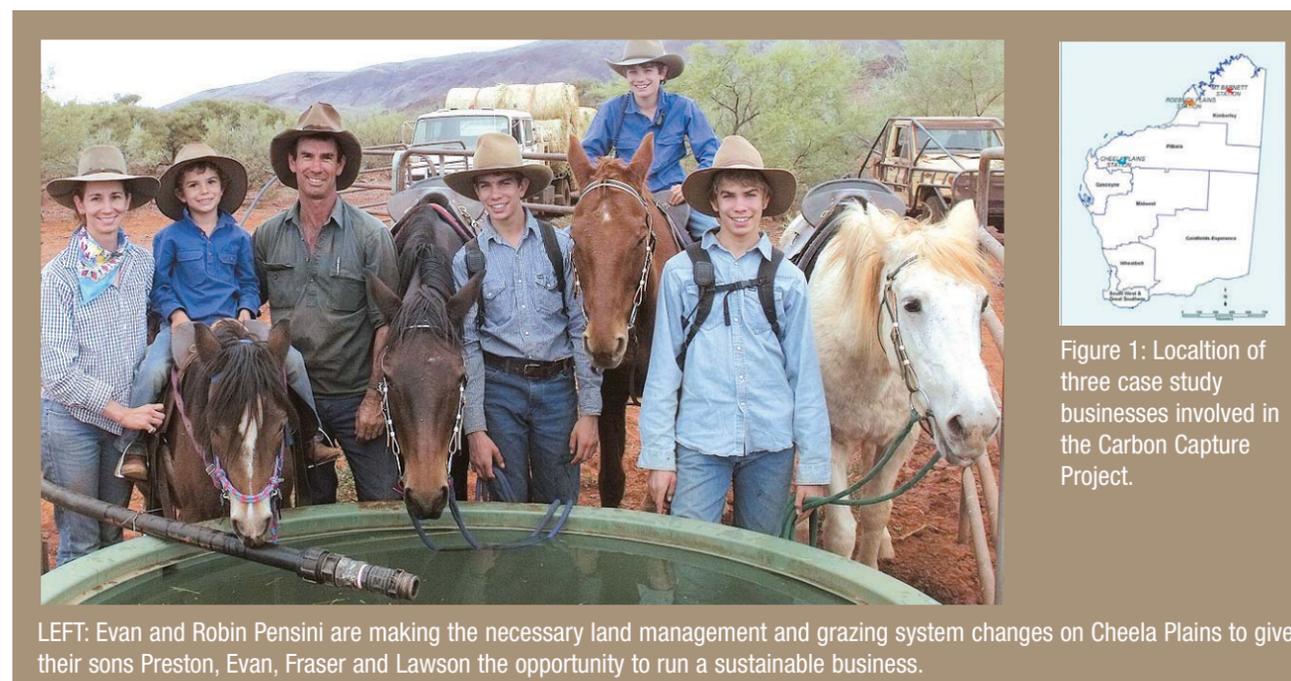
ing points using gravity. A urea medicator is used to improve rumen function.

Paddocks that are being rested have the water troughs turned off in order to limit the negative impacts of uncontrolled kangaroo grazing. Evan and Robin intend to continue to subdivide the paddocks on the floodplain in order to improve the evenness and level of grazing utilisation and to increase the length of the rest periods.

Agistment of cattle has proven to be a useful strategy to opportunistically capitalise on the variable feed supply on the property and it enables the Pensinis to maintain liquidity in their livestock numbers should seasonal conditions quickly deteriorate. They are also placing a greater emphasis on trading cattle in an effort to minimise seasonal risk.

Cheela Plains has a carrying capacity of approximately 2,690 breeders. Over the past five years, the property has generally run less than this number. The business has an average branding rate of 83% and a death rate of 3%. In the northeast of the property, there are large areas of rugged, spinifex hills and ranges which have limited potential for cattle production and are very difficult to access. Consequently, this area tends to burn more regularly than the grazed floodplain.

Table 1 provides a summary of the primary sources of greenhouse gas emissions produced by Cheela Plains and the other two pastoral businesses involved in the study. The results highlight the importance of research efforts focussed on reducing livestock



LEFT: Evan and Robin Pensini are making the necessary land management and grazing system changes on Cheela Plains to give their sons Preston, Evan, Fraser and Lawson the opportunity to run a sustainable business.



Figure 1: Location of three case study businesses involved in the Carbon Capture Project.

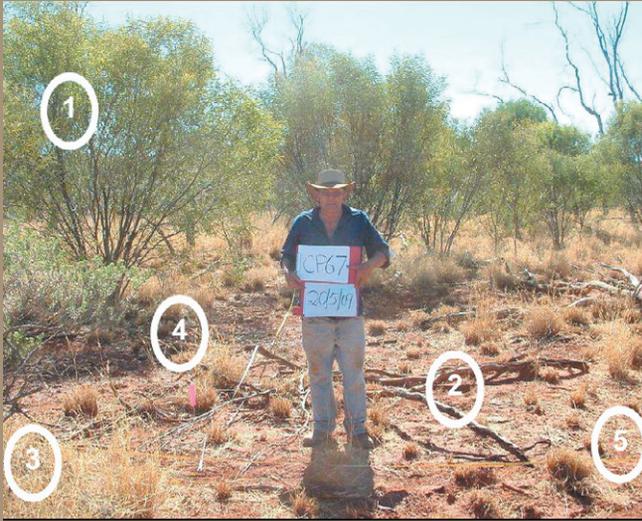


Figure 2: The five major carbon pools measured on Cheela Plains included 1: Woody plant carbon; 2: Fallen log branches; 3: Herbaceous material (grass and small shrubs); 4: Herbaceous surface litter (grass and leaf litter, faeces); and soil carbon.

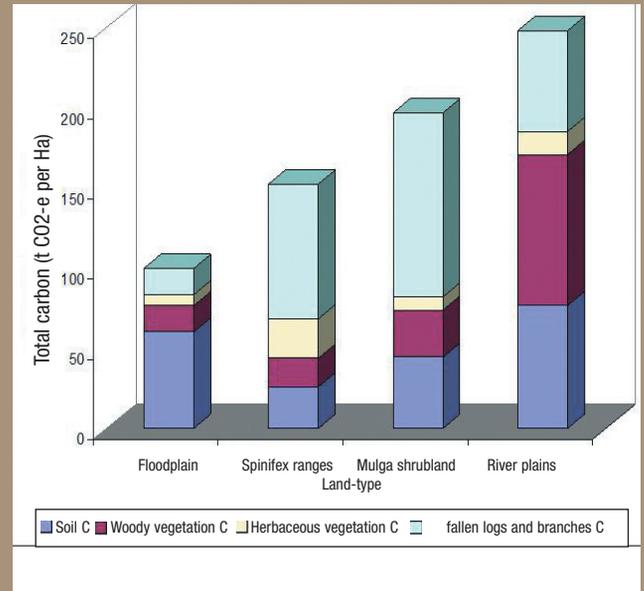


Figure 3: Level of carbon storage in different components of the rangeland.

methane emissions as it was a major contributor to the total of emissions produced on the properties.

A baseline carbon accounting survey was completed to evaluate whether Cheela Plains can increase the present levels of carbon that is stored in the soil and the vegetation on the property. The survey involved measurement of all five major pools of carbon at a total of 100 sites across the property, Figure 2.

There were significant differences in the amount of carbon stored in the different land-types on the property. This information is valuable because it identifies the relative importance of each of the carbon pools to the overall carbon balance on the property, Figure 3.

It can assist in making investment decisions about which management practices the business can adopt in order to either maintain or increase the existing carbon levels. For example, soil carbon is the largest pool on the floodplain and carbon levels could be increased in some of the larger paddocks where patch grazing still occurs by further subdivision of the paddocks in order to provide rest to the pasture, using mechanical intervention such as ripping and reseeding or building ponded pasture banks, and/or fully destocking the area for a wet season or two.

In comparison, a large amount of the carbon within the spinifex ranges is stored in fallen logs and branches. Evan and Robin could devise a plan to reduce the frequency of uncontrolled fires in the spinifex ranges to prevent the excessive combustion of the accumulated fallen logs and branches.

Changing carbon levels

The study used a carbon simulation model in order to assess how three different management scenarios would impact the present carbon levels on Cheela Plains between 2010 and 2040. The management scenarios were: full destock, set-stocking at 15% utilisation rate and rest-based grazing at 15% utilisation rate. The financial implications of these scenarios on the cattle business were evaluated.

For the foreseeable future any carbon offsets that are generated from enterprises which involve forest management, cropland management, grazing land management and controlled savanna burning in the rangelands will be limited to the voluntary market. This is due to the fact that they are not compliant with the reporting guidelines adopted by the Federal Government in the national green-

house gas accounts as a part of the Kyoto Protocol (i.e. Article 3.4 sinks). There are also a number of major policy hurdles which need to be crossed including the ownership of sequestered carbon on leasehold land. Nonetheless, as the carbon economy continues to mature, these issues are likely to be resolved in due course.

Due to the volatility and uncertainty in the voluntary carbon market, it is not recommended that cattle businesses in the rangelands develop enterprises which are based solely on the sale of carbon offsets. Rather, they should be focussed on redesigning their businesses in order to improve the overall efficiency of the underlying pastoral enterprise.

Actions involved in the redesign process may result in an increase in the level of carbon stored in the soil and vegetation, and the potential sale of the carbon credits could simply be a financial bonus to the business provided the offsets qualify for a relevant voluntary offset standard.

NEXT ISSUE:

The results from the simulation modelling and financial feasibility.

Find out more:

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For a copy of the full Final Report of the Carbon Capture Project go to: www.agric.wa.gov.au

The Carbon Capture Project was a joint initiative of the Department of Agriculture and Food, WA, the ChemCentre and Rangelands NRM and funded by the Caring for Our Country program.

Mark Alchin will be a keynote speaker at the RCS 20th Anniversary International Conference in Brisbane from July 20-22, 2010. Celebrating 20 years of Grazing for Profit in Australia, the conference theme is centered around the heroes of the future – the farmers and graziers who are responsible for food and fibre and the ongoing health of our people, systems and environment. RCS encourages family/business partner participation in the conference. To register or enquire, contact: RCS 1800 356 004, www.rcs.au.com