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CARBON TRADING: AN INCENTIVE TO CHANGE RANGELAND GRAZING MANAGEMENT?

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INTRODUCTION

With climate change firmly on the global agenda, carbon trading is emerging as a growth industry. In Australia the rangelands has been identified as one of the country's largest carbon sinks. Increasing carbon sequestration is the key to the ability to trade carbon. Improved grazing management practices may be able to increase the rate of carbon sequestration in the soil and above ground biomass in arid rangeland areas. Grazing management systems which stimulate increased plant growth through rest and intensive grazing such as cell grazing or rotational grazing may be the answer. The potential income from carbon trading could provide an incentive for land managers to adopt these grazing management practices which require additional infrastructure than traditional set stocking. Improved grazing management not only provides the potential for more sustainable land use but also higher productivity and profitability for pastoral enterprises.

Increases in carbon sequestration due to implementing grazing management systems such as cell grazing can be attributed to increases in above ground biomass and increased soil organic matter. In the Pilbara, Cheela Plains Station, Paraburdoo (25°58'S, 117°00'E) has been operating a cell grazing system for the last 10 years on 22,000 ha of alluvial plain. The 1977 Ashburton River Catchment survey described the Cheela Plain as 'seriously degraded' (Payne *et al.* 1988). Photo monitoring shows there has been a vast improvement in pasture condition and a significant increase in the biomass over the last ten years on the area of the Cheela Plain which is under the cell grazing management. The carrying capacity of the Plain has also increased dramatically. It was hypothesised that the levels of carbon both in the soil and ground litter would be greater inside the cell than outside the cell.

METHODS

Paired soil and ground litter samples were collected from sites on either side of the boundary fence between the cell and set stocked 'outside' paddocks. Eleven sites around the boundary of the cell were sampled in July 2007. At each site three replicate soil samples and one bulk density sample were collected. Soil samples were taken from between perennial grass tussocks. One sample of ground litter was collected one each side of the fence. Perennial grass and shrubs biomass was not included in the sampling, so the results do not reflect all the Carbon pools present.

The soils were analysed for Organic Carbon using the Walkley Black method. Bulk density measurements of the soils were used to convert Organic Carbon % to tonnes per hectare Carbon in the top 10 cm (and to CO2eq t/ha). Litter sample include the dry plant material lying on the soil surface. These samples were dried and results converted to dry matter t/ha and then Carbon t/ha (Carbon = dry matter x 0.47).

RESULTS

There was more soil carbon on the cell grazed side of the fence compared to the set stocked area at 9 of the 11 sampling sites. At 10 of the 11 sites there was more surface litter on the cell grazed side of the fence. On average there was 0.51 t/ha more carbon in the top 10 cm of soil under the cell grazing as compared to set stocking. There was also an average 0.22 t/ha more carbon in the litter under cell grazing. The combined average increase of soil and litter Carbon was 0.72 t/ha.

Each tonne of carbon is equal to 3.66 tonnes of Carbon Dioxide Equivalents (CO_2eq). Using this conversion there is on average an additional 2.7 t/ha CO_2eq under the cell grazing system in the soil and ground litter. The annual rate of carbon sequestration is difficult to determine as there have been constant changes to the set up and management of the cell system over the last 10 years.

CONCLUSIONS

Soil carbon comparisons between the cell grazed area and the set stocked area outside the cell give an indication of the potential increases that may be possible by adopting such grazing management systems. While the levels of carbon sequestration per hectare are relatively low (an average of 2.7t CO_2 eq/ha) when compared to agro forestry (approximately 10 t CO_2 eq/ha) the 90 million ha the Rangelands in WA alone means that it is a large pool.

This work was designed as a pilot study to determine if carbon could be sequestered in the range lands under more intensive grazing systems. Care should be taken in the use of these results given the limited scale of the testing. Further work which would be required to extrapolate these results to other areas is currently being planned. These results challenge the notion that the rangelands should be destocked to turn them into a net carbon sink.

Carbon sequestration and trading represent an exciting new possibility for the rangelands and have the potential to have a significant impact on pastoral enterprises.

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