Wool Production and Carbon Farming

Large wool enterprises greater than 150,000 ha

Background

As Australia seeks ways to reduce Greenhouse Gas (GHG) emissions there are potential opportunities for pastoralists to participate in the Australian and global carbon market.

As part of a broader on-property diversification theme, the SA Arid Lands Carbon Farming Project was funded by the Australian Government to explore the potential for carbon farming in the arid rangelands of South Australia.

The *Rangelands Enterprise Diversification Decision Support* tool (REDDS) was developed to enable comparative analysis of pastoral enterprises. In 2016 twelve pastoral properties used the tool to explore the viability of carbon farming. Feasibility studies were undertaken on properties representing beef, meat sheep or wool sheep herds in each of the main land systems.

This case study outlines the results of the feasibility studies on large wool enterprises looking at GHG emissions reductions and sequestration activities.

Scenario

Bioregion:	Stony Plains / Gawler Ranges
Approx. property sizes:	180,000ha+
Ave Rainfall:	200 mm
Stock:	Merino/wool
Ave stock rates:	18ha to 30 ha/animal
Stocking Rate as DSEs:	9 to 22ha/DSE
Stock numbers:	6,000 to 18,000

Emissions Reductions

Greenhouse Gas emissions reductions were modelled using REDDS based on a herd emissions reduction method that resulted in quicker growth and turn off of stock. Results from REDDS were converted to tonnes of CO_2^e and $ per animal to enable comparison with income from wool for the property.

Summary: Emission reduction

At a carbon price of $10/tonne CO_2^e, this model showed that a large sheep/wool holding in the Stony Plains and Gawler Bio-Regions could expect potential income from herd emission activities of around $9,000/year after costs. At a carbon price of $40/tonne the income would be around $60,000/yr., depending on the season. This is extra to the income from their wool clip.

By comparison, the same modelling showed that wool production would bring between $546,800 and $680,000/year after costs (Gross Margin) at 2015 prices.

The low potential carbon return from wool/sheep is to be expected given that wool sheep are kept for up to 8 years, so quick grow out and sale/killing times are not an emissions reduction option for this type of enterprise.

Even with the larger flocks on these properties, emissions reductions of 2000t CO_2^e/ year was not achieved. This is the minimum size bid required to take part in the ERF carbon auctions.

Emissions reduction per tonne of wool

Season type	Possible tonnes of CO_2^e reduction/tonne wool from base line
Good	13 tonnes
Fair	17 tonnes
Bad	18 tonnes

The range of possible emissions reductions in a wool herd

Emissions reduction income

Season type	Extra income $/tonne of wool @ $10/t CO_2^e	Extra income $/tonne of wool @ $40/t CO_2^e
Good	$130	$520
Fair	$170	$680
Bad	$180	$720

Likely income per tonne of wool (greasy) from running an emissions reduction project with a carbon price of $10 and $40/tonne CO_2^e.

Emissions reduction potential

- Methods for sheep herd management for emissions reduction are likely to be available soon.
- Emission reduction methods are likely to increase herd productivity and have environmental co-benefits.
- Carbon companies are interested in aggregating emission reductions in the rangelands.

Limiting factors to undertaking emission reduction activities

- The small potential return may not warrant the effort required when wool prices out-compete the potential returns from carbon credits.
- Lack of a specific method for undertaking a sheep herd emission reduction management project.
- Large herds are required to give economies of scale.

Carbon Sequestration

Sequestration was modelled on larger wool enterprises properties based on natural regrowth of native vegetation with a small area of environmental works. (see the 'Carbon Farming' Fact Sheet for more information). In this scenario a 17,000 hectare carbon sequestration block was modelled on several properties and compared with wool production.

For this model, average carbon uptakes in this country were deemed to be 0.16 tonnes to 0.21 tonne/ha/year, depending on the season.

The cost of setting up and running the Sequestration project was estimated at $6.67/tonne CO2e (this varied from $4.85 to $8.00). As well as management and reporting costs, the initial set up cost of $344,000, (mainly for fencing) was spread over 25 years.

Summary: Sequestration

The numbers in the tables are indicative and will vary depending on factors such as the local micro climate, the carbon base line the project starts from, set up and management costs (fencing and feral control) and the sequence of good and bad seasons we modelled. For example, in our modelling it became apparent that if landholders had a run of bad years, or an event such as a fire, the best time to start a sequestration project was soon after these types of event, as they would be starting from a lower base line

The modelling took into consideration loss of productivity from destocking. While the carbon price influenced the modelling, reducing the cost of producing the carbon can make the profit margin higher even if the carbon price is low.

Viability of carbon farming is influenced by the structure of the pastoral business (debt levels, over-heads etc.) as well as the relative price of other commodities. For example, if wool prices drop, carbon becomes comparatively more viable. Alternatively, if carbon sequestration costs can be reduced, carbon farming also becomes more viable against other products.

Carbon sequestration income

As the carbon price increases the gross margin increases. Another way to increase this margin is to reduce costs. If the 17000ha block were to be used for wool production the return on it would be $44,200/yr. compared to an average of $19,300/yr. for carbon. (at $10/tonne).

Ave. Carbon Sequestrated on 17,000 ha	Possible Gross Margin @$10/tonne	Possible Gross Margin @ $40/tonne
2800 tonnes	$19,300	$93,300

Carbon sequestered and gross margins.

Average Income/ wool/ha	Carbon Income/ha @ $10/ tonne	Carbon Income/ha @ $40/tonne
$2.60/ha	$1.13/ha	$5.47/ha

Wool production vs carbon sequestration

Sequestration positives

- Rapid response by native vegetation to good rainfall years is possible.
- A lot of land is available, so large scale projects are possible in the SA Arid Lands.

Limiting factors to sequestration

- Rainfall is slightly less reliable in the Stony Plains / Gawler Ranges Bio-Regions than in some other areas of the region.
- Opportunistic feral grazers (rabbits, goats and kangaroos) will be expensive to manage in the carbon sequestration areas.
- Large seasonal variations can result in little of no vegetation growth in some years.
- Currently no sequestration methods have been trialled in these land systems or rainfall regions.
- Planting or cultivating vegetation is not allowed on pastoral properties so projects are restricted to natural or human induced regrowth methods.
- It is not clear if a lessee is able to own the sequestered carbon on a pastoral leasehold property.

Where to From Here?

Before considering any diversification including carbon farming, larger (>150,000ha) wool producers in the SA Arid Lands region need to have a good understanding of their *current* cost of production. This will enable them to objectively analyse the financial return of any potential carbon activities.

Work on analysing the base-line emissions for herds or carbon in their landscape could be undertaken in advance, by landholders, in preparation to take advantage of future carbon market opportunities. Comprehensive records of livestock and land management activities will be needed to develop carbon projects in the future and landholders can commence keeping these records now.

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