# Wool Production and Carbon Farming

## Small wool enterprises of less than 50,000 hectares

## 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 small wool enterprises looking at GHG emissions reductions and sequestration activities.

## Scenario

| | |
|---|---|
| Bioregion: | Flinders Lofty Block and Broken Hill Complex |
| Approx. property sizes: | 48,000ha |
| Average Rainfall: | 200 to 250mm |
| Stock: | Merino/wool |
| Ave stock rates: | 7 to 9ha/animal |
| Stocking Rate as DSEs: | 5 to 7ha/DSE |
| Stock numbers: | 3,000 to 6500 (dependent on seasons). |

## 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 $CO_2^e$, modelling showed that these small sheep/wool holdings could expect no income from herd emission reduction activities after costs, until their wool clip exceeded 39 tonnes/year. At a Carbon price of $40/tonne the income would be between $500 and $6,500, depending on the season. This is on top of the wool price already received.

The modelling indicates that there is a gross margin return of between $48,000 and $220,000/year for wool production in these land systems.

The low potential carbon return from merino/wool 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 on this type of enterprise.

Further to this, when applying a herd emissions reduction activity on small herds such as these, administration costs generally outweigh the returns in most years.

**Emissions reduction per tonne of wool**

| Season type | Possible tonnes of $CO_2^e$ reduction/tonne wool from base line |
|---|---|
| Good | 2.5 tonnes |
| Fair | 6.5 t tonnes |
| Bad | 8.5 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 | $25 | $100 |
| Fair | $65 | $260 |
| Bad | $85 | $340 |

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

**Emissions reduction potential**

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

**Limiting factors to undertaking emission reduction activities**

- Small properties such as these would have to join an aggregation of several properties to achieve a minimum bid size (2000t $CO_2^e$/yr.) under the auction rules for the Emission Reduction Fund (ERF).
- Currently there is no sheep herd management method.

## Carbon Sequestration

In this scenario, a 17,000 hectare carbon sequestration block providing improved vegetation, was modelled on several properties and compared with wool production.

Sequestration was modelled on small merino wool enterprises based on natural regrowth of native vegetation with a small area of environmental works. (See the 'Carbon Farming' Fact Sheet for more information). For this case study, average carbon uptakes 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 $CO_2^e$ (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 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 animal control) and the sequence of good and bad seasons modelled. For example, 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 carbon base line.

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. For example, one enterprise showed nearly 80% of the income from carbon (at $10/t) would be taken up in the fencing set-up costs and project running costs (audits, paper work and feral animal management). This left a margin of less than 20%. In this case reducing production costs by 20% could result in a doubling of the profit margin.

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 was modelled at $44,200/yr.

| 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.*

| Wool production | 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**

- Rainfall is more reliable in the Flinders/Coonamona land systems than some other areas of the SA Arid Lands.
- Rapid responses by native vegetation to good rainfall years is possible.
- A lot of land is available, so large scale projects are possible.

**Limiting factors to sequestration**

- Opportunistic feral grazers (rabbits, goats and kangaroos) will be expensive to manage in the carbon sequestration area.
- Large seasonal variations can result in little or 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 diversification including carbon farming, small (<50,000ha) 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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Government of South Australia
South Australian Arid Lands Natural Resources Management Board