

# Meat Sheep Production and Carbon Farming

## Meat sheep enterprises of less than 20,000 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 meat sheep enterprises looking at GHG emissions reductions and sequestration activities.



### Scenario

Bioregion: Flinders Lofty Block  
 Approx. property sizes: 13,000ha  
 Ave Rainfall: 200 mm  
 Stock: Meat Sheep  
 Ave stock rates: 10 ha/animal  
 Stocking Rate as DSEs: 6ha/DSE  
 Stock numbers: 1000 to 1500

### 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<sub>2</sub><sup>e</sup> and \$ per animal to enable comparison with income from meat for the property.

### Summary: Emission reduction

At a carbon price of \$10/tonne CO<sub>2</sub><sup>e</sup>, this modelling showed that a small meat sheep holding in the Flinders Ranges land system could expect potential income from herd emission reduction activities between \$1,100 and \$2,850/year. With a carbon price of \$40/tonne the income would be between \$4,400 and \$11,400/yr. Project costs of \$2,000/year need to be subtracted to calculate the gross margin.

The same modelling showed that meat sheep production would bring between \$60,000 and \$160,000/yr., after costs (Gross Margin) at 2015 prices with an average of \$99,000.

The small scale of this property results in unviable returns from an emission reduction project, even though meat sheep production is able to produce better emissions reduction rates/animal/year than wool sheep.

This enterprise could only produce maximum emission reductions of around 190 tonnes CO<sub>2</sub><sup>e</sup> /year well below the 2000 tonne CO<sub>2</sub><sup>e</sup> /yr., threshold required to enter the ERF auction process.

### Emissions reduction per animal

Season type	Possible t CO <sub>2</sub> <sup>e</sup> reduction/animal from base line
Good	110gms
Fair	110gms
Bad	190gms

*The range of possible emissions reductions modelled in a meat sheep/herd*

### Emissions reduction income

Season type	Carbon Income \$/animal@ \$10/t CO <sub>2</sub> <sup>e</sup>	Carbon Income \$/animal @ \$40/t CO <sub>2</sub> <sup>e</sup>
Good	\$1.10	\$4.40
Fair	\$1.10	\$4.40
Bad	\$1.90	\$7.60

*Income for carbon at \$10 and \$40/tonne carbon price. At \$10/tonne the running costs outweighed income.*

### Emissions reduction potential

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

### Limiting factors to undertaking emission reduction activities

- An aggregation of many properties would be needed to achieve a minimum bid size under the auction rules for the Emission Reduction Fund (ERF).
- Currently there is no sheep herd management method for emissions reductions.

### Carbon Sequestration

In this scenario, a 7,000 hectare block was compared with running a small herd of meat sheep. Sequestration modelling was undertaken on only 7,000ha as this property only totalled 13,000ha. Modelling was based on a natural regrowth of native vegetation with 50% destocking and a small area of environmental works. Average carbon uptakes in this country was 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<sub>2</sub><sup>e</sup> (this varied from \$4.85 to \$8.00). Management and reporting costs were scaled down to a realistic amount for this size enterprise. The initial set up costs of \$150,000, (mainly for fencing) was spread over 25 years. Due to the presence of goats in the area and the rugged terrain, good fencing would be required therefore the project set up costs may be under estimated for this case study.

#### Summary: Sequestration

The numbers in the tables are indicative and will vary depending on factors such as the local micro climate, the base line the project starts from, set up and management costs (fencing and feral control) and 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.

In this model (a small property) the carbon price had a more dramatic effect on the outcome than in larger sheep properties. Modelling took into consideration loss of productivity from destocking.

This case study demonstrates how the viability of carbon farming can depend on the structure of the individual pastoral business (debt levels, over-heads, other enterprises etc.) as well as the relative price of other commodities.

Carbon sequestration on this property may also have provided co-benefits for both their tourism enterprise and the productivity of the remainder of their meat-sheep herd. Increased vegetation cover in the landscape may increase the tourist potential of the landscape while improvements to soil condition and water retention will improve productivity of the remaining sheep herd.

An alternative to expensive fencing for this project could be a management approach with all water sources fenced as goat traps and instigating regular mustering and shooting programs. This approach would have the added advantage of decreasing setup costs while increasing cash flow (from goats) for the overall enterprise.

### Carbon Sequestration Income

As the carbon price increases the gross margin increases. Another way to increase this margin is to reduce costs. If the 7000ha block were to be used for meat sheep production the return on it would be \$19,320/yr. vs \$3380/yr. for carbon (at \$10/ tonne CO<sub>2</sub><sup>e</sup>).

Ave. Carbon Sequestered on 7,000ha / year	Possible Gross Margin @ \$10/tCO <sub>2</sub> <sup>e</sup>	Possible Gross Margin @ \$40/tCO <sub>2</sub> <sup>e</sup>
1152 tonnes	\$3380	\$38,000

*Carbon sequestered and gross margins*

Average Income/ha meat sheep.	Carbon Income/ha @ \$10/t CO <sub>2</sub> <sup>e</sup>	Carbon Income/ha @ \$40/t CO <sub>2</sub> <sup>e</sup>
\$2.76/ha	\$0.48 /ha	\$5.42/ha

*Meat sheep production v's carbon sequestration.*

### Sequestration positives

- Rapid responses of native vegetation to good rainfall years is possible.
- This land has suffered historical over grazing so has a low carbon baseline.

### Limiting factors to sequestration

- Opportunistic feral grazers (rabbits, goats and kangaroos) are a serious problem in this area.
- Seasonal variations can result in little vegetation growth in some years.
- Planting 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?

The business structure of this enterprise means that a carbon sequestration project could be viable and result in a range of other business co-benefits. In order to enter the ERF reverse auction, an aggregation of properties would be required to achieve the minimum bid size of 2000t CO<sub>2</sub><sup>e</sup>/yr.

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**Government of South Australia**

South Australian Arid Lands Natural Resources Management Board