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Future Drought Fund

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CARBON FOOTPRINT & FEASIBILITY EXTENSTION PROJECT: A CASE STUDY

Prepared for Ag Excellence Alliance

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Paroo Pastoral Company: Buckleboo

Located 200km west of Port Augusta on the Eyre Peninsula, you'll find a family owned Australian Dorper lamb operation in Buckleboo. Paroo Pastoral Company runs their 4000 breeding ewes, breeding and finishing operation across over 100,000 ha of native pastures.

Buckleboo has an average annual rainfall of 295mm, hot and dry summers and mild temperatures in the winter. Soils are characterised by red-brown sandy loam.

Goals for sustainability

Paroo Pastoral Company are working towards reducing their emissions by focusing on:

- improvements in overall flock efficiency, and
- reducing inputs.

Even simple things such as using the vehicles less through use of water point telemetry will reduce fuel use. Paroo is also aiming to improve reproductive efficiency by moving to a set joining date rather than joining continuously and introducing the scanning of ewes. Currently the farm holds on to lambs for 8-10 months, but the aim is to reduce this to 5-6 months over the next few years using better sire and dam genetics.

Carbon Footprint

A carbon footprint allows producers to calculate their current GHG emissions and helps them understand the main drivers of emissions. Carbon accounting is completed through modelled calculations based on farm inputs, to estimate emissions and carbon storage. Emissions are defined into three scopes: Scope 1: (direct GHG emissions from an enterprise), Scope 2: (GHG emissions from purchased electricity), and Scope 3: (emissions associated with purchased inputs and transport).

A carbon footprint examines the combined impact of total emissions produced across a property, and is also commonly reported as 'emissions intensity', which is the emissions per unit of product (e.g. kg of CO_2-e per kg of liveweight). This is a measure to contextualise efficiency of production with GHG emissions.

"We are reducing our emissions by focusing on improvements in overall flock efficiency and pastoral improvements."

James Wright

Paroo Pastoral Company runs their Dorper lamb operation across 100,000 ha in Buckleboo

Farm details for Paroo Pastoral Company - Buckleboo

Region overview					
State		**Region**		**Electricity source**	
South Australia		Eyre Peninsula		State Grid	
Native vegetation					
Species/type of tree		**Soil type**	**Annual rainfall (mm)**	**Area of trees (ha)**	**Age of trees (yrs)**
Environmental Plantings		Loamy sand	295	0	0
Sheep data					
Number of head	**Number of sales**	**Average live weight of lambs sold (kg)**	**Lambing rate (%)**	**Average wool shorn (kg/hd)**	**Wool yield (kg/yr)**
9502	4410	45	113	0	0
Purchased inputs					
N fertiliser (t N)	**N manure/ compost (t N)**	**Lime (t)**	**Herbicide/ pesticide (L)**		**Other fertiliser (t)**
0	0	0	10200		196

Emissions Summary

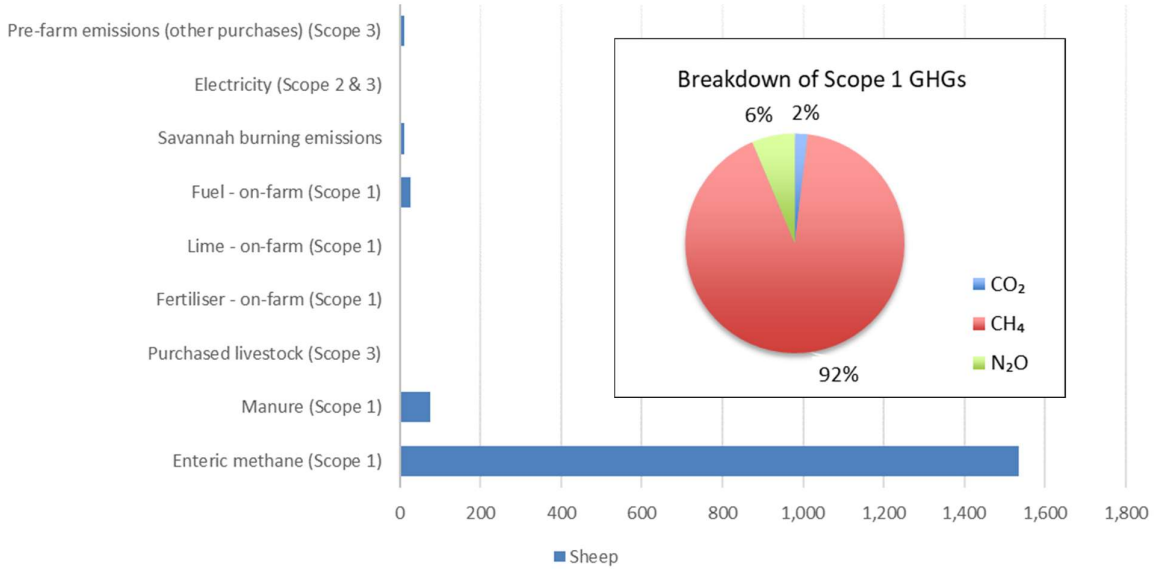
The emissions intensity for sheep meat (for a stable flock) was in the mid-range for dorper production. Purchased inputs were low for the given time period, reducing the emissions profile. This is reflective of an efficient production system with strong turnoff weights and sound reproductive efficiency. As dorpers don't produce wool, there is only one product that 'carries' all the GHG emissions and for this reason, marking and growth rate performance must be better in dorpers to provide similar results to dual purpose flocks. No carbon storage in tree plantings was attributed to the enterprise.

Emissions summary for Paroo Pastoral Company: Buckleboo

	Tonnes CO_2 equivalent (CO_2-e)		
	Sheep		Total
Scope 1 & 2 emissions	1,746		1,746
Scope 3 emissions	11		11
Total Emissions	**1,757**		**1,757**
Carbon sequestration (tree plantings)	0		0
Net Emissions	**1,757**		**1,757**
Emissions Intensity		**Regional average[1]**	**Regional average[2]**
Sheep meat (kg CO_2-e / kg LW)	8.6	6.9-8.2	6.2-7.5
Wool (kg CO_2-e / kg greasy)	n/a	23.7-30.0	n/a

[1] *Regional average for Merino wool (Wiedemann et al., 2016a),*
[2] *Regional average for crossbred lamb production (Wiedemann et al., 2016b)*

A hotspot analysis of Scope 1, 2 & 3 emissions for sheep production



Paroo Pastoral Company's Dorper flock represents an efficient production system with good turnoff weights and exceptional reproductive efficiency

Opportunities to reduce net emissions

The following management activities have the potential to reduce net GHG emissions:

"By improving their pastures combined with their carbon project, Paroo Pastoral Company are experiencing a net positive change at Buckleboo station."
IAE

- Continued improvements in flock productivity.
- Improving pasture quality or supplementary feeding to increase liveweight gains from weaning to sale.
- Regeneration of native vegetation was not assessed, but likely significant for this region. Future work assessing carbon sequestration from native revegetation and planting trees can reduce net carbon emissions, while providing additional benefits to biodiversity and soil erosion control.
- Management practices that increase soil organic carbon offer opportunities to reduce net carbon emissions and increase productivity, profitability, and sustainability, but this is difficult to measure in pastoral regions at the present time.

James's experience

James advised the Carbon Accounting Tool was easy to understand. He could see how lambing rate improvements and reducing sale age impacts the emissions profile. James advised "once you can see what you are saving in carbon emissions, the next step is to see the dollars at the end based on the current and future price of carbon."

Prior to the workshop, James admits the enterprise had "no idea how much carbon we were emitting", but now they know and can start to manage that with their decisions moving forward. For example, adding in a feedlot to produce heavier, younger lambs, improving genetics and turnoff weights.

"We're improving pasture quality or supplementary feeding to increase liveweight gains from weaning to sale."
James Wright

The farm has experienced management changes on pasture with rotational grazing. Currently, there are a lot of 'spelling' of herbages and grass that were previously overgrazed, now allowed to set seed. Adding in fences and watering points has assisted this. In terms of gaps in the carbon accounting, James points to the fact trees and shrubs under 2 metres aren't properly accounted for. There is potentially a significant amount of carbon in saltbush and blue bush waiting for a methodology to allow this to be accounted for.

Wiedemann S, Yan M-J, Henry BK, Murphy CM (2016a) Resource Use and Greenhouse Gas Emissions from Three Wool Production Regions in Australia. J Clean Prod 122:121–132l

Wiedemann, S. G., Yan, M.-J., & Murphy, C. M. (2016b). Resource Use and Environmental Impacts from Australian Export Lamb Production: A Life Cycle Assessment. Animal Production Science, 56(7), 1070–1080