Carbon Farming

People are talking about Carbon Farming – but what does it mean? It could be called Greenhouse Gas Farming, but that is just too hard to say. Carbon farming is all about capturing and storing carbon in the soil or vegetation and reducing the greenhouse gas emissions from farming practices. Most farm practices can be changed to reduce emissions or store carbon and most have been shown to improve farm productivity.

Why should farmers be interested?

Agriculture is responsible for 16% of all Australian greenhouse emissions. It is responsible for 58% of all the methane (CH_4) emissions and 86% of all the nitrous oxide (N_2O) emissions. These gases are important as they have high global warming potential. Global warming potential is a value that is used to compare different gases ability to trap heat in the atmosphere. It is based on the heat absorbing abilities of each gas compared to carbon dioxide (CO_2). Methane and nitrous oxide are the biggest concern for agriculture as they absorb heat well and they're long lived in the atmosphere. They are not the only gases that are problematic, there are fluorinated gases that are man-made and used in industries like refrigeration.

The global warming potential of methane is 25 and the warming potential of nitrous oxide is 298. Table 1 shows which farming practices produce which these gases.

Table 1. Farm practices and gas production

Farm Practice	**Gases produced**		
Fuel usage	CO_2		
Cultivation	CO_2		
Soil Organic Matter	CO_2		
Crop residue breakdown	CO_2		
N application			
Burning stubbles		N_2O	CH_4
Biological N fixation		N_2O	
Waterlogging			CH_4
Livestock emissions			CH_4
Manure management			CH_4

What can carbon farmers do?

Farmers are already adapting to climate change- dry seeding, minimum tillage, changing to crop varieties that are more drought tolerant. They are changing what they do to continue to be able to produce. The following strategies are just some of the mitigation techniques available to reduce or sequester carbon into the farming landscape and enhancing farm productivity.

One key activity is to understand your soil condition and the constraints that currently exist within the soil profile. Fertiliser application rates can be adjusted to suit soil needs which could mean a lower rate of fertiliser application over some soil types – saving money and reducing the potential of nitrous oxide emissions from excess nitrogen in the soil.

If the soil constraints are not economical to fix, these soils could be utilised for permanent pastures, forage shrubs, agroforestry plantations or revegetated with local native species. Perennial vegetation stores carbon both in the soil and the structure of the plants. Perennial vegetation on farms can help with shade and shelter of stock, income stream diversity and bringing biodiversity back into the landscape.

Soil compaction is a big issue for some soil types. Compaction can lead to anaerobic conditions in the soil which releases nitrous oxide. If the soil becomes waterlogged, bacteria in the soil will release methane with the result of reduced fertiliser efficiency.

Crop rotations are critical to the success of each season. Changing the rotation to include a legume which may not have a good profit margin itself, but will help the following crop, either with reduced fertiliser needed or reduced pest control, and potentially increase overall profitability. Summer cropping or summer active pastures can help reduce N_2O emissions in the event of summer rainfall events and reduce associated soil carbon losses which can be significant.

Changing the feed of your livestock is a great way of reducing emissions and improving productivity. Research has shown that improving the feed of ruminants can reduce methane emissions as the feed changes the mixture of micro-organisms in the stomach. Biserrula pastures and forage species have been shown to greatly reduce methane production. If animals are producing less methane they are utilising their feed for greater growth.

The future

Research continues into the best management practices to continue to produce our agricultural products in the face of a changing climate and to mitigate or sequester more carbon into farming systems. New varieties of crops are being developed, livestock genetics are being selected for low methane emissions, biofuels for machinery use, soil amendments and how they fit into cropping programs are all practices that are currently being studied. What is already clear is that carbon farming has a strong role to play in the future of our industry, helping make our farming practices more efficient and building resilience in our land.