



Storing more carbon

Strategies to reduce greenhouse gas emissions

Fact sheet 6 of 6

Carbon dioxide (CO₂) is the most commonly produced greenhouse gas and can be generated in a variety of ways, including the burning of fossil fuels to produce heat, electricity and fuel and plant decay. It can also be released by animals and plants through respiration.

Capturing carbon and storing it in plants and trees – known as carbon sequestration – can help reduce the overall greenhouse gas emissions emitted from a dairy farm.

The term, carbon sequestration interventions, refers to the strategies that are used to reduce on-farm carbon dioxide emissions such as:

- Environmental planting.
- Shelter belts.
- Timber plantations.

These options are available now and involve an upfront capital investment and a payback period of multiple years.

Environmental planting

This includes plantings of native species on areas that aren't suitable or ideal for production, such as gullies, slopes or wetlands adjacent to rivers or other waterways.

Environmental planting is suitable for all dairy farming systems. As well as sequestering (storing) carbon, environmental planting provides livestock with shelter and protection from the weather. Other co-benefits can include reduced erosion, improved water quality and increased biodiversity leading to a reduction in pests and an increase in pollination. Animal welfare benefits associated with environmental planting could benefit farm operations and market access.

KEY POINTS

Carbon dioxide can be removed from the atmosphere and stored in the soil or organic material on-farm – such as trees and plants

Plants, including trees, crops and pasture, absorb carbon dioxide through photosynthesis and store it in the soil where it is converted to oxygen or used as a food source for micro-organisms

Soils with higher levels of stored carbon are more productive

To calculate a farm's net greenhouse gas emissions, subtract the carbon stored in the soil or plants from the farm's total greenhouse gas emissions

Carbon storage – or sequestration – interventions include environmental plantings, shelter belts and timber plantations

The ability to increase soil carbon through pastures is limited as most soils in Australian dairying regions are at or near equilibrium carbon levels

An environmental planting of mixed Eucalyptus in the temperate winter wet zone of New South Wales delivered on-farm carbon sequestration rates of 5.6 and 11 tonnes CO₂e/hectare/year.

As well as the capital costs of environmental planting, there are costs associated with the loss of productive land. This may be minimized if most of the planting occurred in less productive areas that were difficult to graze.

Shelter belts

Shelter belts are trees, shrubs or other vegetation planted to protect livestock from the weather, usually located along the boundary of paddocks.

Shelter belts are suitable for all dairy farming systems and deliver similar co-benefits to environmental plantings, such as climate, animal welfare and soil health benefits.

There is also the potential for environmental plantings to qualify for Australian carbon credit units. The feasibility of this option may be limited by requirements to qualify for credits in terms of the commitment and scale required.

Costs associated with shelter belts include the loss of productive land (as shelter belts are necessarily in or on the edge of grazing paddocks) and the cost of fencing. They are more expensive to fence than environmental plantings and timber plantations, as they are long and narrow.

There are no specific on-farm examples of the rates of carbon sequestration from shelter belts, but research has proven narrow plantings have higher sequestration rates than blocks due to less competition from surrounding trees.

Timber plantations

These involve clearing and fencing an area of a property cleared to specifically grow trees for timber production, such as radiata pine, blue or spotted gums.

An 11-hectare *Pinus radiata* timber plantation in Tasmania averaged 23.8 tonnes of CO₂e sequestered per hectare per year.

The costs associated with timber plantations tend to be lower than other plantings as plantations are fenced in blocks requiring less fencing than long, thin shelter belts. Maintaining timber plantings requires additional financial and time investment over the plantation's lifetime.

Tackling greenhouse gas emissions using a timber plantation intervention isn't as straight forward as the other options. Barriers to adoption include the complexity of entering a new industry – timber – and difficulties accessing markets. The location of the farm relative to a timber mill and the ability to pursue on-farm value-adding as part of the dairy business should also be considered when weighing-up the potential of timber plantations.

It is possible to sell timber from the plantation with a proportion of the wood products 'considered sequestered.' The result of this action would be determined by the individual plantation – considering the site and timber specifications – but generally it would equate to more revenue and less sequestration across the 10-year time frame of this analysis.

Timber plantations do not deliver the same level of biodiversity improvements as shelter belts and environmental plantings because plantations require specific timber varieties to be grown for the market.

Calculating the value of emission reduction strategies

- A review commissioned by Dairy Australia has estimated the costs and effectiveness of different greenhouse gas emission reduction strategies across the Australian dairy farm industry as a whole, based on the most recent information available.
- Each strategy was analysed for its ability to reduce the total greenhouse gas emissions (mitigation potential). The cost of this action was calculated per tonne of carbon dioxide equivalent or CO₂e.
- Combining the mitigation potential and the cost of the reduction paints a picture of the value for money that each strategy could deliver.
- This information will be used to guide research and investment decisions.
- This fact sheet and others in the series provide a summary of the information from research most relevant to individual farmers. They provide a useful starting point for farm businesses looking to understand their options. Farm businesses will need to do further analysis to figure out which option(s) are appropriate for their own business.

However, well-planned plantations may provide co-benefits such as shelter and shade and this could increase the total benefit farmers derived from timber plantations.

Knowledge gaps

Quantifying the value from the benefit of environmental plantings and shelter belts is difficult. This is because the benefit derived from these interventions varies depending on a range of farm characteristics, such as location, farming system and typography.

Soil carbon intervention is also an option that could require more exploration. Its potential is limited because most Australian dairying soils are already at or near equilibrium carbon levels. Also, in the areas where soil carbon can be increased it is a slow process – taking 10 to 25 years for increases in soil carbon to become detectable using traditional sampling and analytical methods. It is considered an expensive option for mitigating greenhouse gas because of the long-time frame.

FURTHER INFORMATION

This fact sheet is one of a series:

- 1 Reducing dairy's greenhouse gas emissions
- 2 Reducing rumen emissions
- 3 Reducing manure emissions
- 4 Reducing nitrous oxide emissions
- 5 Reducing fossil fuel emissions

6 Storing more carbon.

You can find these on the Dairy Australia [website](#).