Are We Carbon Emitters

OR

Carbon Storers?

A *producers perspective*

*on a whole farm audit*

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Climate Champions Program
National Greenhouse Gas Inventory 2009 (Kyoto Protocol account)

In comparison:
Agriculture component of national emissions in other countries
NZ 50%, EU 10%, US 5.5%
National Greenhouse Gas Inventory 2008 (Kyoto Protocol account) - Agriculture
Why do an Audit

A management tool to flag areas of inefficiency or at least to show areas where efficiency gains may be achieved and would be cost effective.
The Drivers

• Reduced input costs
• Increased profits
• Market access
• Reduced or eliminated carbon tax
• Can be done as a whole farm audit
• Greater benefit if done on an enterprise basis
• Should be benchmarked against production
The audit process

- Petrol
- Diesel
- LPG
- Electricity
- Nitrogenous fertilizers
- Stubble retention / burning
- Soil disturbance
- Domestic electricity
- Private house & Personal use of motor vehicles
Emissions in CO2 Equivalents

- Pumping - diesel: 35.5%
- Farm equipment - diesel: 6.9%
- LPG: 5.4%
- Pumping - electric: 7.0%
- Domestic electricity: 2.0%
- Crop burning: 0.6%
- Soil disturbance: 0.4%
- Fertiliser use: 0.4%
Emissions relative % CO$_2$e

42.3% Nitrogen Fertilizer  
35.4% Diesel Powered Bore  
7.0% Farm Equipment  
6.9% Soil Disturbance  
5.4% Burning Stubble  
2.0% Electric Recycle Pump  
0.6% LPG for Grain Dryer  
0.4% Domestic Electricity

All Emissions calculated using AGO default values
What the audit didn’t show

- At the time soils were not considered a sink
- No credit for carbon stored in grain
- Wheat, Barley, Corn etc is approximately 45% carbon
- If I was allowed credit for carbon stored in grain, I would be a carbon storer not emitter.
What did the audit tell us?

- No surprises with fuel use
- Burning crop residues not a big contributor
- Nitrogen fertilizers are our main source of emissions
N$_2$O Emissions
Nitrogen

- Nitrogen that is added to soil for crop growth loses a small percentage as N₂O when it is transformed into a plant available form due to biological processes in the soil.

- If more is applied than the crop requires, then further N₂O losses in de-nitrification cycle
Why Increase Organic Carbon

Increased Organic carbon gives

- Improved structure
- Increased water holding capacity
- Better root development
- Improved drainage in wet conditions
Question

How do we put more Carbon into the soil?

Answers

- Grow something in it
- If it has a green bit on top then you are pumping Carbon into the soil
Do you have to increase inputs to increase soil C?

Despite what might seem reasonable logic, increasing C inputs does not necessarily lead to increased soil C levels.
The question should be...

How do we keep the carbon in the soil?
Soils

Carbon
All soils worldwide have seen a reduction in carbon levels

Why?
- Tillage
- Fallow
- New improved pastures and crops
- Soil nutrition
Carbon : Nitrogen Ratio

• Correct title should be
  
  Carbon : Nitrogen : Phosphorus : Sulfur

  10,000 : 833 : 200 : 143

• Humus, the form that carbon should be in for max benefit has the above ratio

• We talk about Nitrogen tie up, maybe it is a deficiency of something else

• One ton of carbon ties up $190 worth of Nitrogen, Phosphorus & Sulfur
More C with stubble incorporation

![Graph showing the comparison between stubble incorporated and stubble burnt over the months from June 2004 to May 2005. The red line represents stubble incorporated, and the blue line represents stubble burnt. The graph illustrates a general increase in the C content for stubble incorporated from June to November, followed by a decrease in December, and a slight increase from January to May. In contrast, the blue line shows a more erratic pattern, with a peak in November and a decrease from December to May.](image-url)
L.C.A.  CORN

5 % total emissions pre-farm

35 % total emissions on-farm

60 % total emissions post-farm

36 % total emissions packaging
Stubble management

- When **stubble incorporated** primary tillage pass required 36 % available horsepower

- When **stubble burnt** primary tillage pass required 56 % available horsepower

- When **stubble removed** we had difficulty in getting the machine in the ground and when we did we couldn’t pull it
Engine load ripping the beds

- 30% reduction in power requirements

Stubble burnt (ave 56%)

Stubble incorporated (ave 36%)

Percent of maximum engine load vs. Time (2 second intervals)
CO$_2$ emitted

Cumulative CO$_2$-C flux (t/ha)

- stubble burnt (OM input 6 t/ha/y)
- incorporated (OM input 16 t/ha/y)

Estimated total CO$_2$ emitted
- 16.7 t/ha/y
- 13.7 t/ha/y

2004-2005
Carbon Trading / Credits

- For credits for carbon stored in either trees or the soil you are required to **maintain these carbon stocks for 100 years** after the last credit is claimed.
- **Trees take in CO₂** during the day and through photosynthesis store the carbon and release oxygen.
- At night trees switch over to respiration mode and **release CO₂**.
- The forests of southern Europe became a net source of CO₂ in the 2003 drought.
Soils lose carbon through biological activity. The rate of this activity is governed by soil temperature. With rising temperatures and increased moisture stress, there is a good chance that the carbon that you have been paid to store may not be there in the future. Approach carbon credits / storing with great caution and check the fine print on the contract. There may be some opportunity to claim carbon credits in the domestic market if you can show that you have reduced your emissions while maintaining production.
At this stage it appears that you will **not be able to claim credits** for reduced emissions as a result of reduction of an enterprise due to climate or market forces.
“Being greenhouse friendly is not about being green but rather staying out of the red”
Manners please!

“Don’t complain about our farmers with your mouth full”

Murrumbidgee Valley Stakeholders Group
The take home message

Efficient agriculture is Profitable agriculture is Greenhouse friendly agriculture