Australian Grains Baseline and Mitigation Assessment Factsheet

The Grains Research and Development Corporation (GRDC) has a long history of investing in Research Development & Extension (RD&E) to help grain growers adapt to climate change, mitigate its impact and manage industry-wide emissions.

In 2020, GRDC commissioned CSIRO to establish a detailed and robust greenhouse gas (GHG) emissions baseline for the Australian grains sector and explore mitigation opportunities that maintain or increase production.

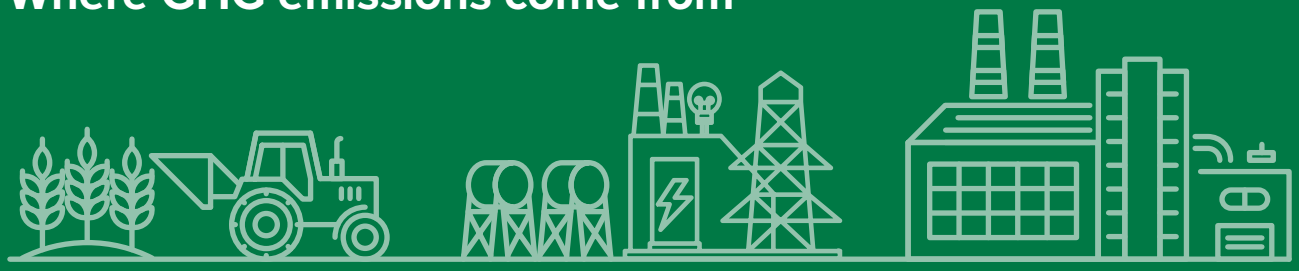
The Australian Grains Baseline and Mitigation Assessment provides the grains industry a realistic pathway towards reducing the greenhouse gas intensity of Australian grain production that could be achieved as part of a profitable grain growing business sector.

Australian Grains GHG Baseline

The GHG emissions baseline for the Australian grain sector uses the 2005 baseline for Nationally Determined Contributions under the Paris Agreement (COP 21)

- 2005 GHG gas emissions: **315 kg of CO2~e** per tonne of grain.
- On-farm emissions from Australian grain accounted for **1.7%** of all of Australia's national emissions reported in 2005-06.

Where GHG emissions come from

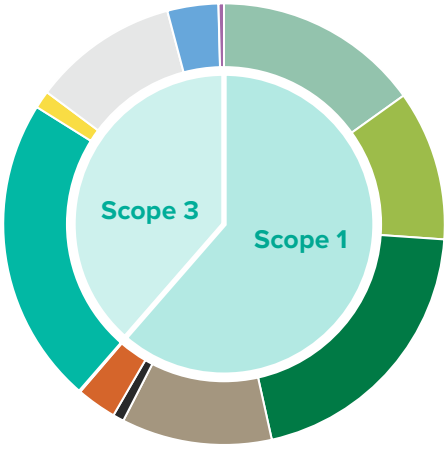


Scope 1 61.3%
emissions occur on-farm

Scope 2 0.1%
emissions are associated with the production of electricity that is used on farm

Scope 3 38.6%
emissions are associated with other activities outside of farm boundaries, such as the production of fertilisers

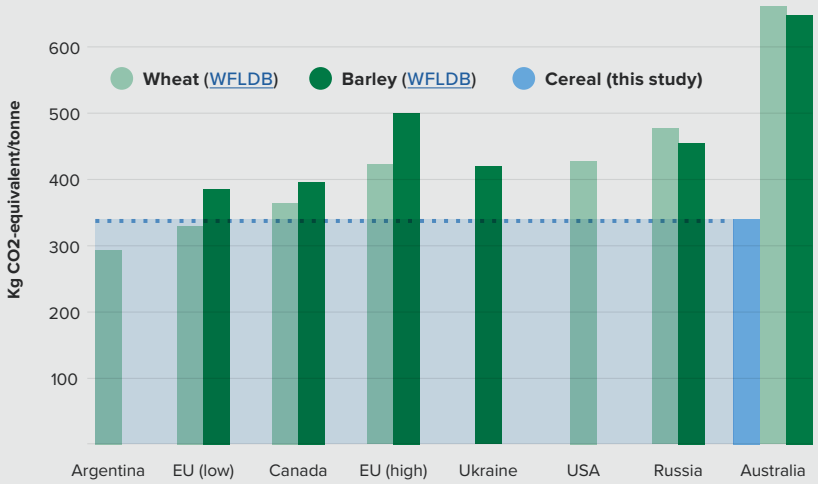
Breakdown of grain production GHG emissions by contribution



Scope 1		Scope 2		Scope 3	
15.1%	Fertilizer	0.1%	Storage	22.5%	Fertilizer
11.0%	Lime	0%	Irrigation	1.3%	Lime
20.4%	Residue			10.7%	Protection
11.0%	Operations			3.7%	Operations
0.8%	Irrigation			0.4%	Irrigation
2.9%	Soil carbon			0%	Storage
0%	Storage				

How we compare to other grain growing countries

Australia's national science agency, CSIRO found that the Australian grains industry produces grain with low emissions intensity (ie emissions per tonne of production). This study has demonstrated international comparisons have overestimated GHG emissions associated with Australian production by using emissions factors not representative of Australian conditions or farming practices.



Exploring mitigation opportunities

Six scenarios modelled by CSIRO to explore options for mitigating GHG emissions and the intensity of Australian grain production

1. Current Practice

Crop rotations and nitrogen application simulated for estimated 2015/16 farming practices.

2. Best practice nitrogen application

Fertiliser applied as close to best practice resulted in higher production than the baseline, but also increased total emissions due to increased fertiliser inputs. GHG emissions intensity per tonne of grain produced decreased.

3. Perfect nitrogen management

If nitrogen fertiliser could be supplied in such a way to exactly meet crop demand – a hypothetical situation today – then production can be increased even higher and GHG emissions intensity lowered further than Scenario 2. Total emissions would increase due to increased Scope 3 fertiliser inputs.

4. Optimised rotation

Simulation of a range current and hypothetical crop rotations indicated that GHG emissions intensity can be reduced while optimising revenue. The effect of rotations is not as large as the effect of nitrogen management and opportunities will vary from region to region.

5. Green fertiliser products

Green fertiliser products that are manufactured using renewable energy, such as green ammonia, have potential to reduce GHG emissions intensity. While more research is needed to understand implications for manufacturing and application, renewable fertilisers could reduce scope three emissions created in fertiliser manufacture by 50%.

6. Controlled Traffic Farming

Full adoption of Controlled Traffic Farming could feasibly reduce fuel usage by 5% and increase yield by 5-10%. Nitrous oxide and methane GHG emissions reductions are also possible per tonne of grain produced.

By 2030, it is unlikely that Australian grain can reduce its overall GHG emissions without reducing production using current farming systems and practices.

5.5% of the current area used for grain cultivation would need to be set aside for environmental plantings to offset the greenhouse gas emissions associated with Australian grain production. This would cost up to 10% of the current gross value of production.

Lowering the emissions intensity of Australian grain production provides global climate change mitigation without reducing Australian grain production.

A reduction in Australian grain production could result in a corresponding increase of grain production in countries with higher emissions intensity.

GHG emissions intensity of Australian grain production could feasibly be reduced by approximately 15% against the baseline by 2030.

With adoption of better nitrogen application, improved regional rotations and an expected 50% uptake of Controlled Traffic Farming GHG emissions intensity could be further reduced by 15%. Under this scenario on-farm emissions would remain almost the same, total emissions would increase but be offset by higher production.

Next steps

The report recommended three areas for RD&E to investigate reducing GHG emissions intensity in the Australian grain production system:

1. Farming system interventions
2. Reduction of scope 3 emissions
3. Adapting GHG accounting to be more fine grained

GRDC will invest in RD&E that supports a realistic trajectory towards reducing the GHG emissions intensity of Australian grain production through practices that can be integrated into a profitable grain production business.

These investments will methodically follow GRDC's core investment strategy and work towards our core purpose – creating enduring profitability for Australian grain growers.