



A farmer's perspective;

Responding to climate
change



Cindy Stevens and Simon Wallwork

Agriculture Science Degrees

3 kids - Jade, Darcy and Archie

3710 hectares at Corrigin

250 km east of Perth

3000 ha Crop

900 Breeding Ewes

200 Breeding Cows

Farming Story – broadly 3 stages

2003 – 2010;

1. forming business
2. steep learning curve and income volatility on the back of climate variability

2010 – 2016;

1. awareness of trends and changing climate and targeted adaptation
2. succession planning and increasing debt

2017 – present;

1. consolidation
2. increased enterprise diversity
3. identifying emerging risks and opportunities with climate change and decarbonisation

2003-2010

2003 – GSR 293mm



2004 –GSR 265mm
1000 hectares of wheat yielded 300kg/ha



2005 - GSR 317mm

1.46 t/ha

0.36 t/ha



2010

East block GSR 73mm
Barley yielded 100kg/ha

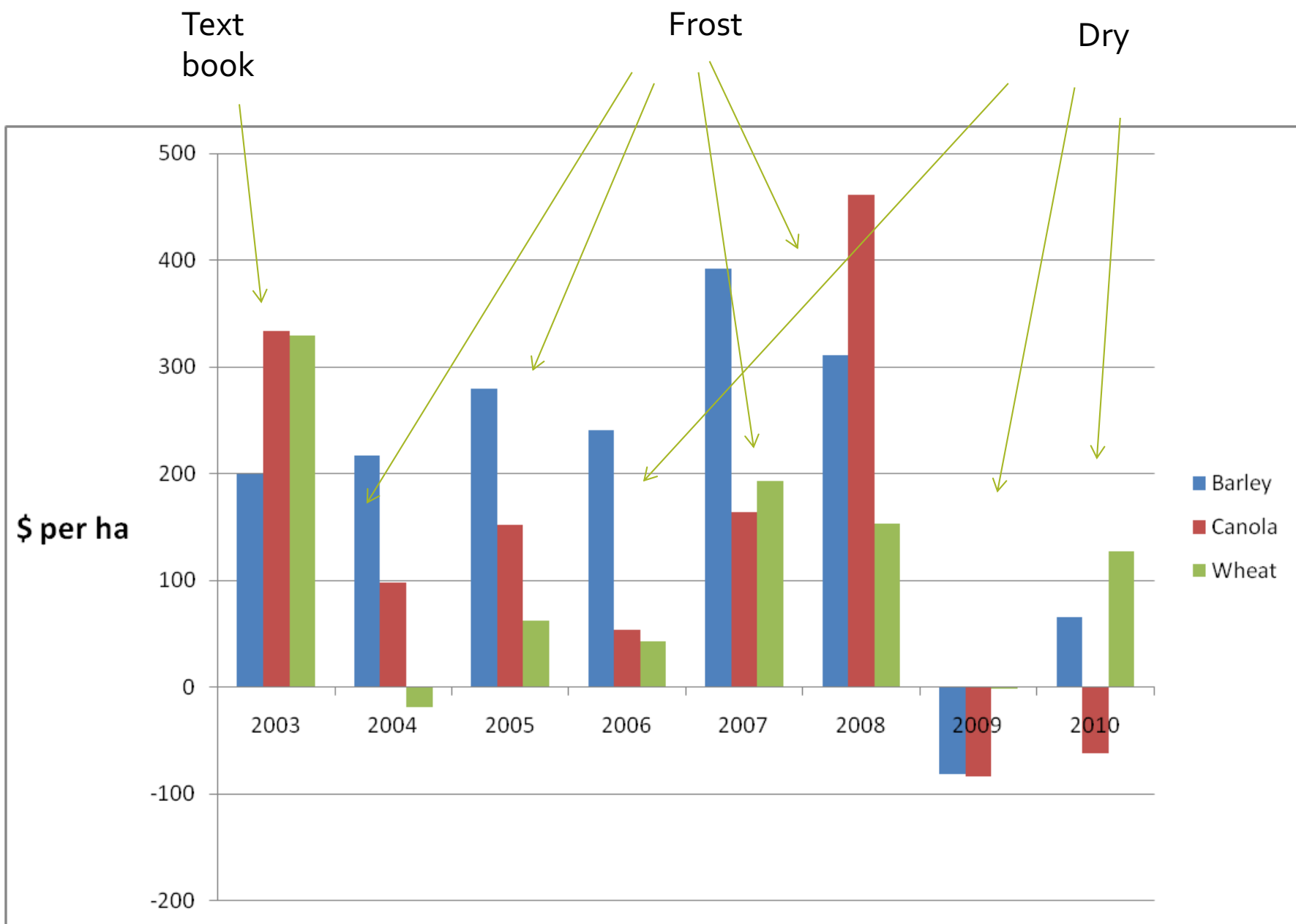


2010

Home GSR 106mm
sowed early April into moisture from summer rain
barley yielded 1 t/ha

Relinquished eastern block – not sustainable part of our business





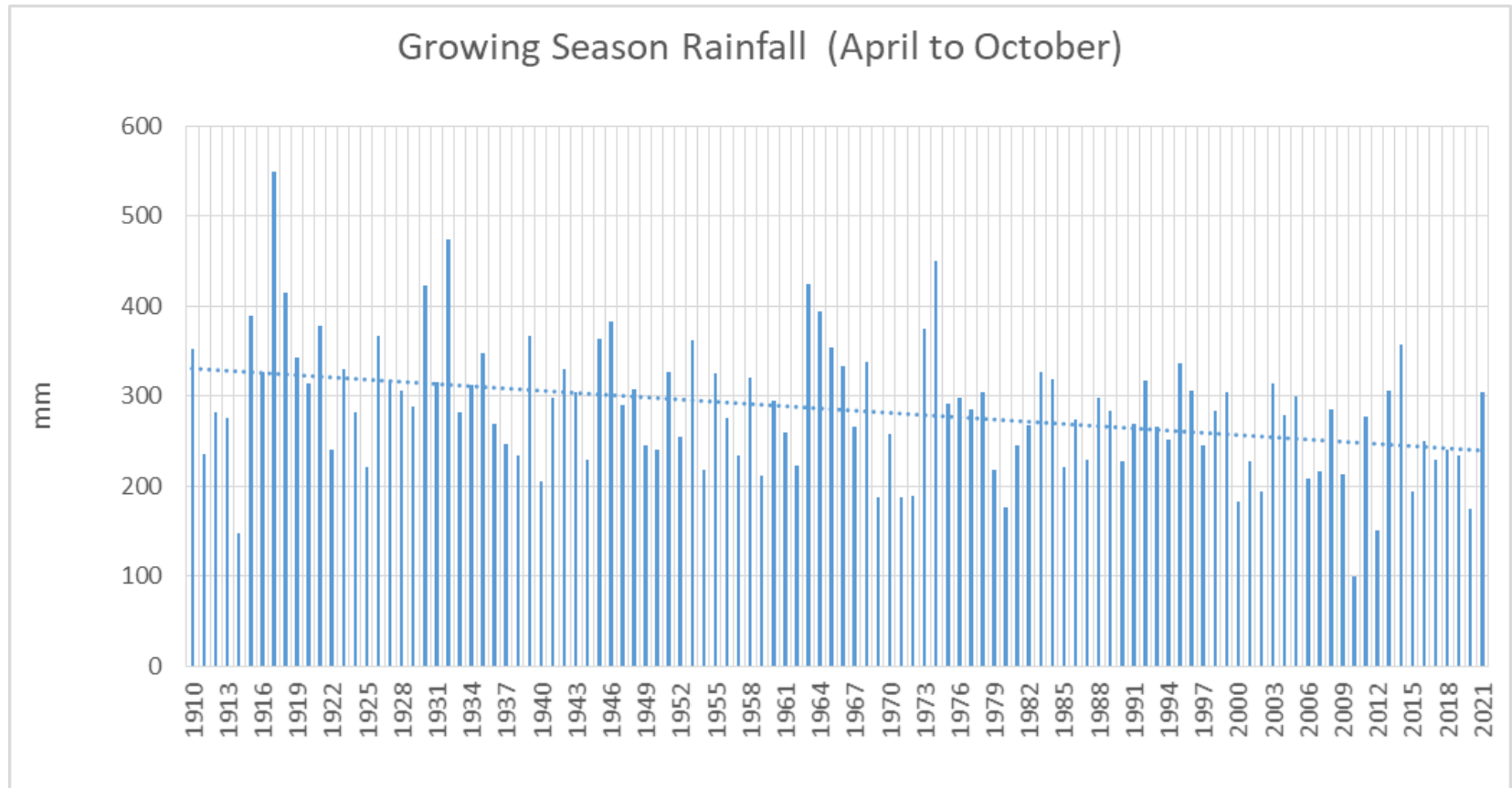
2010-2014

Climate Champion Program

AUSTRALIA



Corrigin

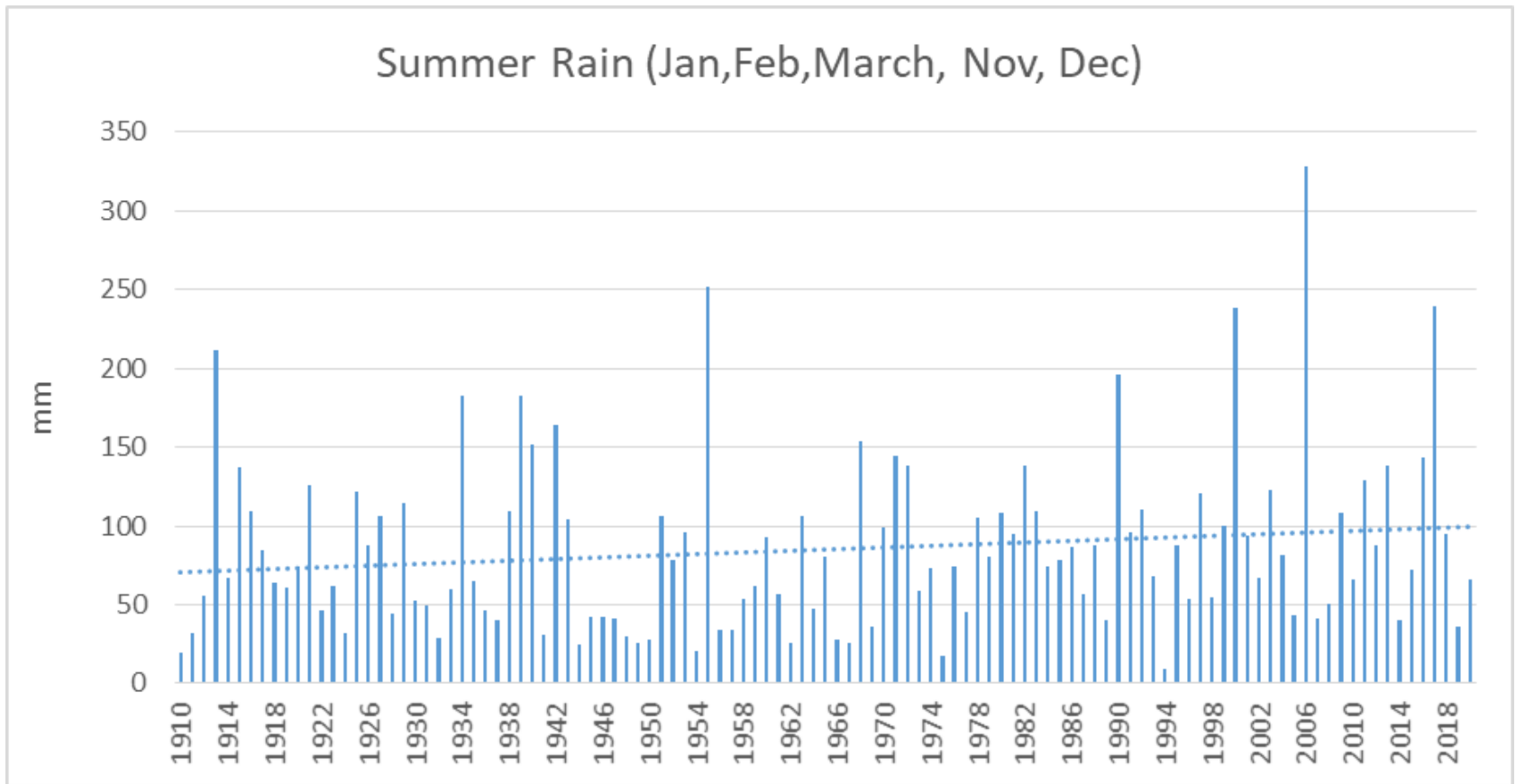


Source; Bureau of Meteorology

Corrigin Growing Season Rainfall – Lowest 5

Year	mm
2010	100.2
1914	147.5
2012	150.3
2020	174.2
1980	176.8

Corrigin



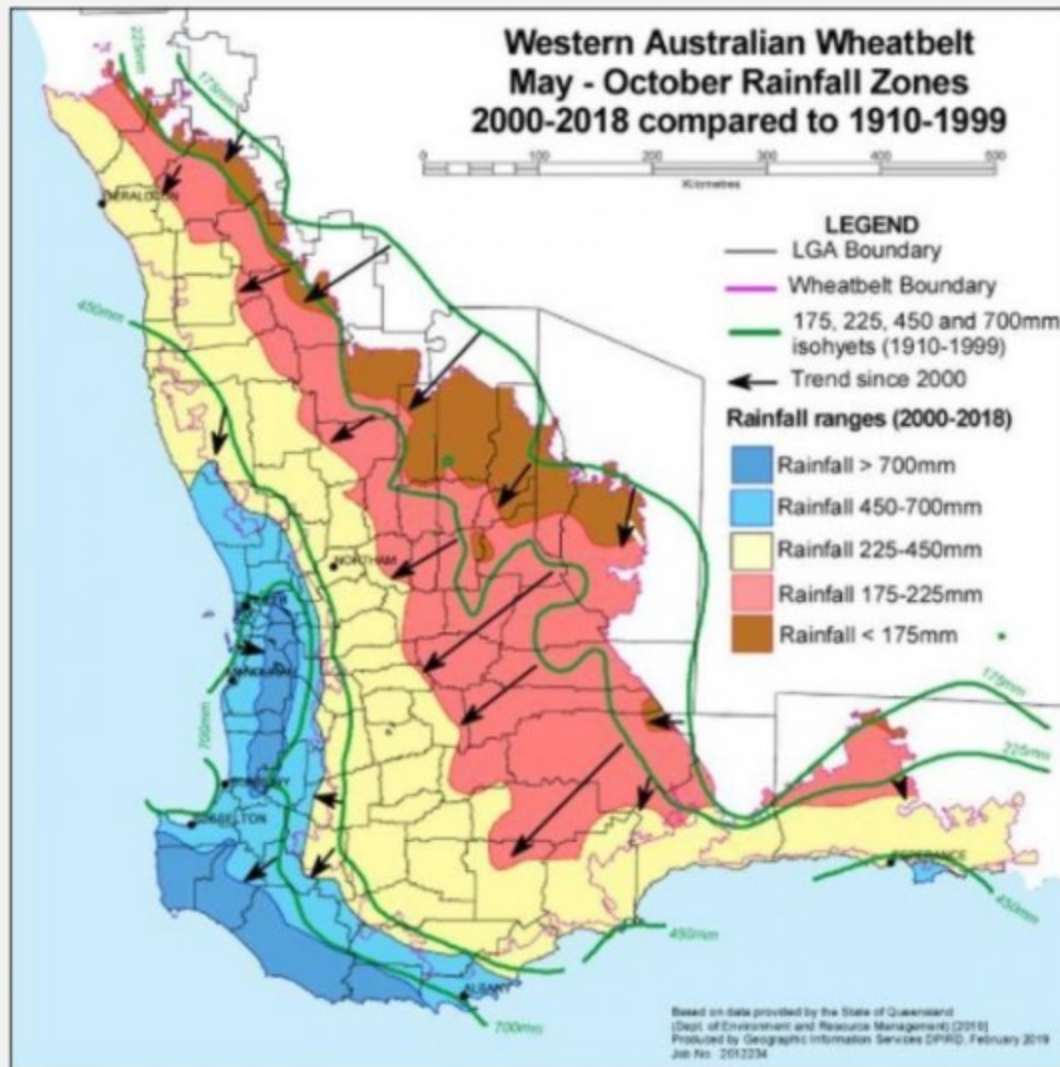
Source; Bureau of Meteorology

Average Corrigin Rainfall (mm)

	April to Oct	April to June
1910-1979	302	139
1980-1999	273	128
2000-2020	235	92
% Reduction from 1910-79 Av to 2000- 20 Av	22	34

Source; Bureau of Meteorology

Western Australian Wheatbelt May - October Rainfall Zones 2000-2018 compared to 1910-1999

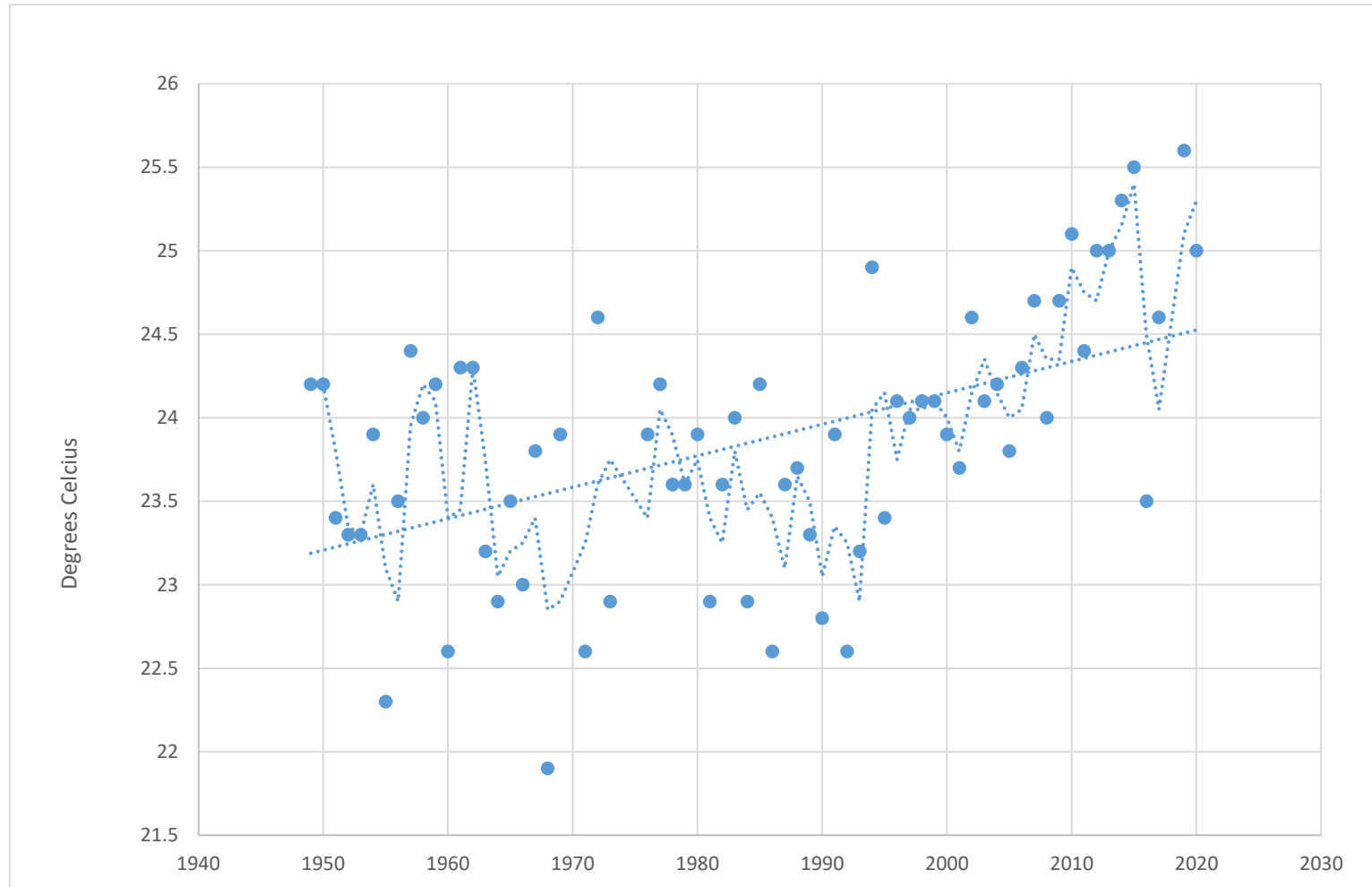


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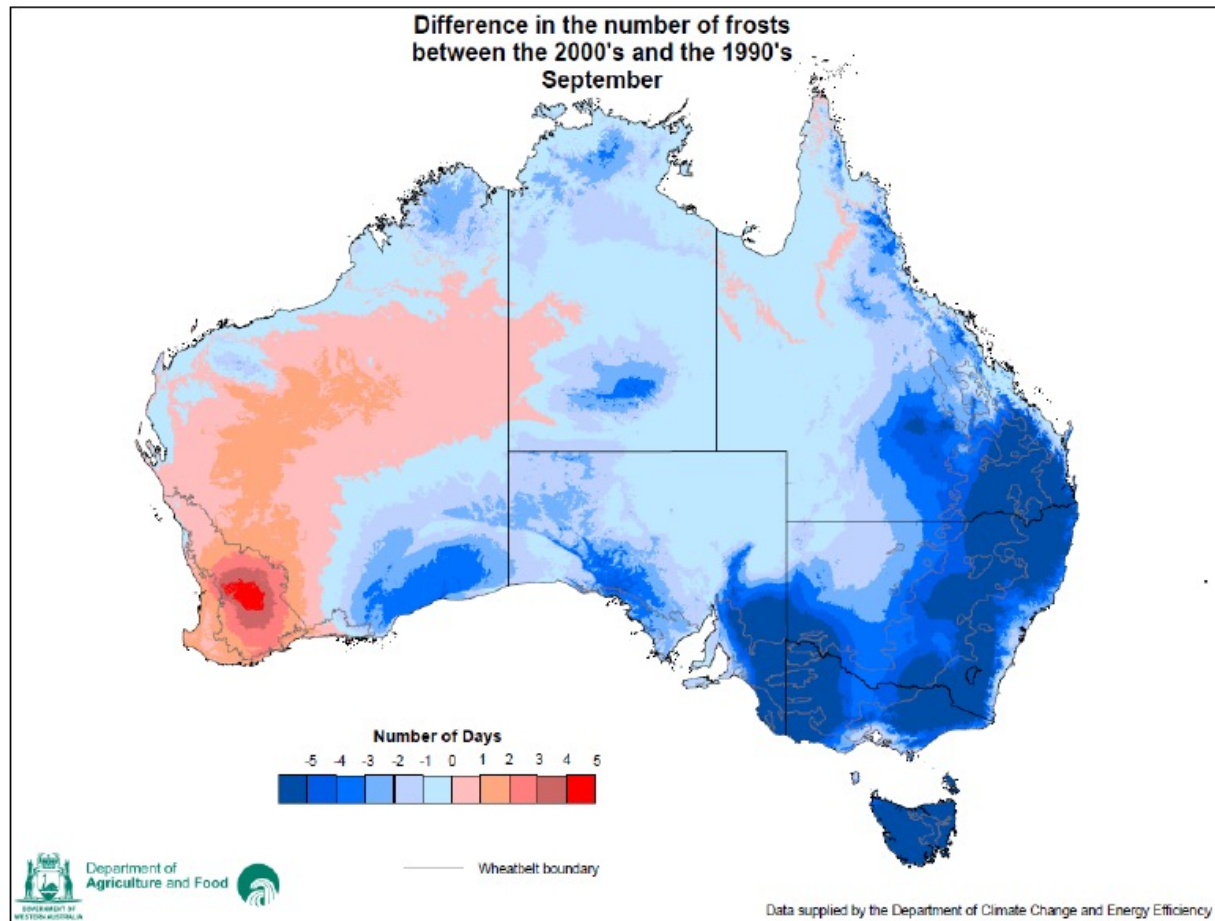
Department of
Primary Industries and
Regional Development

Corrigin Mean Monthly Average



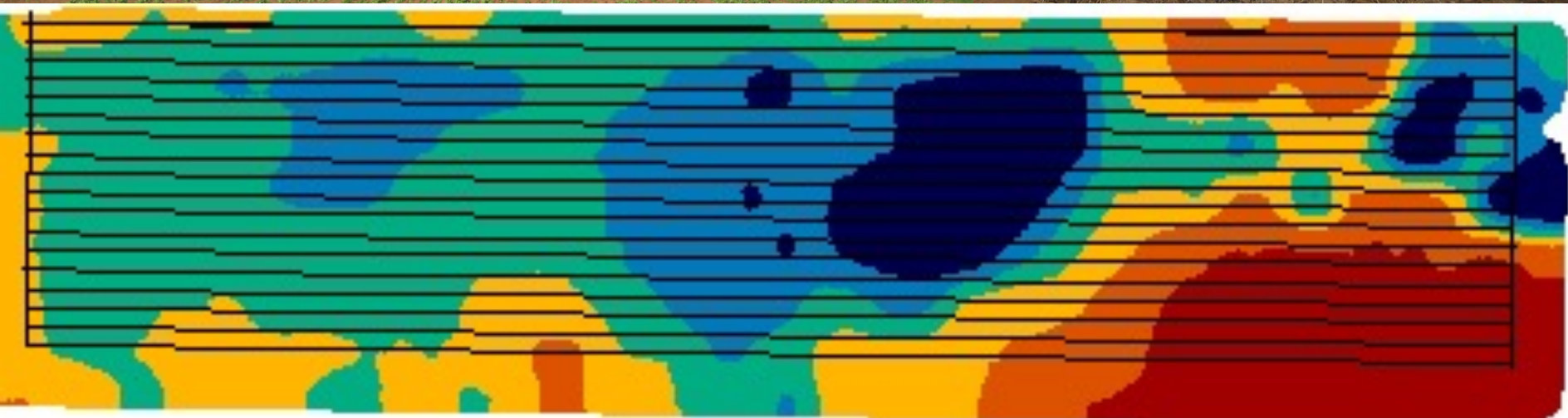
Source Bureau of Meteorology

Appendix 9. Difference in the frequency of September frosts in the 2000s compared to the 1990s
(Source: Department of Climate Change and Energy Efficiency)



2010 – 2016









Livestock & fodder





2017 – present

Shared management, strategy, simplification and consolidation

Reducing debt

Education

Enterprise diversity



2019 Climate Change - Lots of Questions !!

Are we part of the problem?

Are we as an industry being proactive? Live export all again?

Are we part of the solution?

What will consumers and markets want?

What are the risks? market access? finance?

What are the opportunities? Carbon Neutral? Carbon Farming? Energy Use Efficiency?

Can our industry have open and respectful conversations?

Can we put the trust back in the science?

AGZERO 2030



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An agriculture sector-led movement
progressing climate solutions



AGZERO 2030

1. Champion efforts in the WA ag sector to have net-zero greenhouse gas emissions (be carbon neutral) by 2030.
2. Share positive stories from WA ag.
3. Contribute to and promote good climate and ag policy.



Department of
Primary Industries and
Regional Development





AgZero2030 @AgZero2030 · Sep 25

Unknown

Replying to @WAFarmers @TonyYork_WA and 4 others

Great 2b with ag/rural champs focusing on positive responses 2

#ClimateChange risks & opportunities for WA ag. Thanks 2 speakers

@cbhgroup @rich_brake @SelectCarbon @NAB @GrainGrowersLtd

@BailiwickLegal @DPIRDWA; attendees in-person & online; & Jess, Mel, Simon & all 4 logistics.



Farm WEEKLY

NEWS PROPERTY CROPPING SHEEP CATTLE WEATHER CLASSIFIEDS SPECIAL FEATURES

NEWS AGRIBUSINESS POLITICS LIFE & STYLE PHOTOS AND VIDEO EVENTS OPINION HORSES

Climate change policy on the agenda

Bree Swift

13 Oct 2020, 9 a.m.

Agribusiness



WA Farmers president Rhys Turton said climate change needs a whole-world approach.



WAFARMERS members and industry stakeholders met to discuss and workshop a climate change policy for the organisation, based on its members' feedback late last month.

The West Australian

Great Southern Herald | Great Southern

Great Southern farmer joins mission to promote a zero-carbon agriculture future

Kellie Balaam | Great Southern Herald

Thu, 30 July 2020 10:01AM



Gnowangerup farmer Wayne Pech. Credit: Picture: supplied

Gnowangerup farmer Wayne Pech is taking on a 2030km over three months to promote a move to zero-carbon in WA by 2030.

Farmers are being encouraged to take part in the completing 2030 moves by the end of August, s



Sanderson Farms @farms_sanderson · Oct 17

Unknown

Good chat the other day on carbon :)



AgZero2030 @AgZero2030 · Oct 16

Who saw @GrainGrowersLtd's webinar yesterday about their recent report graingrowers.com.au/carbon-calculator... with @KondininGroup comparing 5 carbon calculators? Watch it here graingrowers.com.au/policy/webinar...

Great to hear thoughts from WA farmer John Sanderson, Ben White, & CSIRO's Maartje Sevenster.



GRAINGROWERS

Carbon Calculators webinar

Fiona McCredie, National Policy Manager | 16 October 2020



Risks and Opportunities

1. We want to be part of the solution
2. Canola and barley are key crops
 - Canola for the European ISCC (International Sustainability and Carbon Certification) \$10 / tonne premium
 - At least 50% malting - many of the key brewers, Lion, Heineken, Carlsberg etc. are targeting carbon neutrality
 - Markets with carbon neutral targets are Japan, Europe, China, South Korea
3. Livestock are an important part of our system
4. Signals from banks around sustainable frameworks for finance pricing

Types of Emissions

Scope 1: All emissions on-farm from agricultural activity

Scope 2: Emissions from the production of purchased electricity

Scope 3: All emissions associated with producing inputs such as fertilisers, herbicides, veterinary services etc.

Data required for carbon calculation

1. Stock numbers on hand (numbers x days on farm per year)
2. Liveweight at slaughter or disposal x age
3. Weight of each class of animal
4. Amount of wool produced per animal per year
5. Yield of each crop with area and harvested weight
6. Amount of fertiliser and herbicide applied per crop and pasture
7. Purchased livestock and purchased animal feed
8. Diesel use per enterprise
9. Electricity and other energy sources
10. Repairs, maintenance costs
11. Purchased services and travel



Richard Brake Consulting Pty Ltd

FARM BUSINESS REPORT



Hacienda de Trigo

2020 Season

FARM BUSINESS ACCOUNTS

Hacienda De Trigo

CARBON BALANCE

		01/01/2021	02/01/2020	Change
CO ₂ -Energy	t CO ₂ e	192.58	156.02	36.56
CO ₂ -Lime	t CO ₂ e			
CO ₂ - Urea Application	t CO ₂ e			
CH ₄ - Field Burning	t CO ₂ e			
CH ₄ - Energy	t CO ₂ e	0.28	0.22	0.05
N ₂ O - Fertiliser	t CO ₂ e	423.80	81.96	341.84
N ₂ O - Crop residues	t CO ₂ e	304.72	261.75	42.98
N ₂ O - Atmospheric deposition	t CO ₂ e	42.38	8.20	34.18
N ₂ O - Leaching and Runoff	t CO ₂ e	40.31	17.97	22.33
N ₂ O - Field Burning	t CO ₂ e			
N ₂ O - Energy	t CO ₂ e	0.55	0.45	0.10
Total Crop Emissions	t CO₂e	1,004.61	526.57	478.04
Scope 1 Emissions				
CO ₂ - Fuel	t CO ₂ e	4.02	4.59	-0.57
CO ₂ - Lime	t CO ₂ e			
CO ₂ - Urea	t CO ₂ e			
CH ₄ - Fuel	t CO ₂ e	0.01	0.01	0.00
CH ₄ - Enteric	t CO ₂ e	157.45	204.17	-46.72
CH ₄ - Manure Management	t CO ₂ e	0.03	0.04	-0.01
CH ₄ - Savannah Burning	t CO ₂ e			
N ₂ O - Fertiliser	t CO ₂ e			
N ₂ O - Urine and Dung	t CO ₂ e	10.94	12.98	-2.04
N ₂ O - Atmospheric Deposition	t CO ₂ e	1.09	1.30	-0.21
N ₂ O - Leaching and Runoff	t CO ₂ e	6.15		6.15
N ₂ O - Savannah Burning	t CO ₂ e			
N ₂ O - Fuel	t CO ₂ e	0.02	0.01	0.01
Scope 2 Emissions				
Electricity	t CO ₂ e			
Scope 3 Emissions				
Fertiliser	t CO ₂ e			
Purchased feed	t CO ₂ e			
Herbicides/pesticides	t CO ₂ e			
Electricity	t CO ₂ e			
Fuel	t CO ₂ e	0.21		0.21
Lime	t CO ₂ e			
Purchased livestock	t CO ₂ e	4.19		4.19
Livestock on agistment	t CO ₂ e			
Carbon Sequestration				
Carbon sequestration in trees	t CO ₂ e			
Total Sheep Emissions	t CO₂e	184.11	223.10	-38.99
Scope 1 Emissions				
CO ₂ - Fuel	t CO ₂ e	4.02	188.06	-184.04
CO ₂ - Lime	t CO ₂ e			
CO ₂ - Urea	t CO ₂ e			
CH ₄ - Fuel	t CO ₂ e	0.01	0.01	0.00
CH ₄ - Enteric	t CO ₂ e	249.30	271.82	-22.52
CH ₄ - Manure Management	t CO ₂ e	0.05	0.06	-0.01
CH ₄ - Savannah Burning	t CO ₂ e			
N ₂ O - Fertiliser	t CO ₂ e			
N ₂ O - Urine and Dung	t CO ₂ e	18.32	30.16	-11.84
N ₂ O - Atmospheric Deposition	t CO ₂ e	1.83	3.02	-1.19
N ₂ O - Leaching and Runoff	t CO ₂ e	10.30	16.97	-6.67
N ₂ O - Savannah Burning	t CO ₂ e			
N ₂ O - Fuel	t CO ₂ e	4.05	0.01	4.04
Scope 2 Emissions				
Electricity	t CO ₂ e			
Scope 3 Emissions				
Fertiliser	t CO ₂ e			
Purchased feed	t CO ₂ e			
Herbicides/pesticides	t CO ₂ e			
Electricity	t CO ₂ e			
Fuel	t CO ₂ e	0.21		0.21
Lime	t CO ₂ e			

FARM BUSINESS ACCOUNTS

Hacienda De Trigo

Purchased livestock	t CO ₂ e	38.61		38.61
Livestock on agistment	t CO ₂ e			
Carbon Sequestration				
Carbon sequestration in trees	t CO ₂ e			
Total Cattle Emissions	t CO₂e	326.69	510.11	-183.42
Scope 1 Emissions				
CO ₂ - Fuel	t CO ₂ e	200.62	348.67	-148.05
CO ₂ - Lime	t CO ₂ e			
CO ₂ - Urea	t CO ₂ e			
CH ₄ - Fuel	t CO ₂ e	0.29	0.24	0.05
CH ₄ - Enteric	t CO ₂ e	406.75	476.00	-69.25
CH ₄ - Manure Management	t CO ₂ e	0.09	0.11	-0.02
CH ₄ - Field Burning	t CO ₂ e			
CH ₄ - Savannah Burning	t CO ₂ e			
N ₂ O - Fertiliser	t CO ₂ e	423.80	81.96	341.84
N ₂ O - Urine and Dung	t CO ₂ e	29.25	43.15	-13.90
N ₂ O - Atmospheric Deposition	t CO ₂ e	45.31	12.51	32.80
N ₂ O - Leaching and Runoff	t CO ₂ e	56.76	34.94	21.82
N ₂ O - Field Burning	t CO ₂ e			
N ₂ O - Savannah Burning	t CO ₂ e			
N ₂ O - Fuel	t CO ₂ e	4.62	0.47	4.15
N ₂ O - Crop residues	t CO ₂ e	304.72	261.75	
Scope 2 Emissions				
Electricity	t CO ₂ e			
Scope 3 Emissions				
Fertiliser	t CO ₂ e			
Purchased feed	t CO ₂ e			
Herbicides/pesticides	t CO ₂ e			
Electricity	t CO ₂ e			
Fuel	t CO ₂ e	0.41		0.41
Lime	t CO ₂ e			
Purchased livestock	t CO ₂ e	42.80		42.80
Livestock on agistment	t CO ₂ e			
Carbon Sequestration				
Carbon sequestration in trees	t CO ₂ e			
Total Farm Emissions	t CO₂e	1,515.42	1,259.80	255.62
Scope 1 Emissions				
CO ₂ - Energy	t CO ₂ e	200.62	348.67	-148.05
CH ₄ - Enteric	t CO ₂ e	407.12	476.34	-69.22
N ₂ O - Fertiliser	t CO ₂ e	864.47	434.78	429.69
Scope 2 Emissions	t CO₂e			
Scope 3 Emissions	t CO₂e	43.21		43.21
Price per t CO₂e	\$	\$16.55	\$17.25	-\$0.70

FARM BUSINESS ACCOUNTS

Hacienda De Trigo

COST OF CARBON EMISSIONS

		Budget	01/01/2021	02/01/2020	Change
ACCU Spot Price as at balance date	\$/t CO ₂ e	\$20.00	\$16.55	\$15.50	\$1.05
Total Farm Emissions	t CO₂e		1,515.42	1,259.80	255.62
Cost to business			\$25,080.20	\$19,526.94	\$5,553.26

Impact on Crop Enterprise

Total Emissions	t CO ₂ e	1083.58	1,004.61	526.57	478.04
Total ACCU cost to crop enterprise		\$21,671.64	\$16,626.37	\$8,161.84	\$8,464.53
Emissions per tonne of grain produced	kgs CO ₂ -e/t	198.82	200.00		
	\$/t	\$3.98	\$3.31		

Impact on crop profitability

			Cost [\$]	Cost [\$/ha]
Wheat		\$2,338	\$2,018.15	\$6.96
Barley		\$14,831	\$9,982.30	\$9.07
Canola		\$3,551	\$4,003.66	\$3.10
Lupins		\$952	\$622.27	\$3.54
Oats				
Oaten Hay				
Field Peas				
Chick Peas				
Triticale				
Faba Beans				
Pasture				
Other Crop				

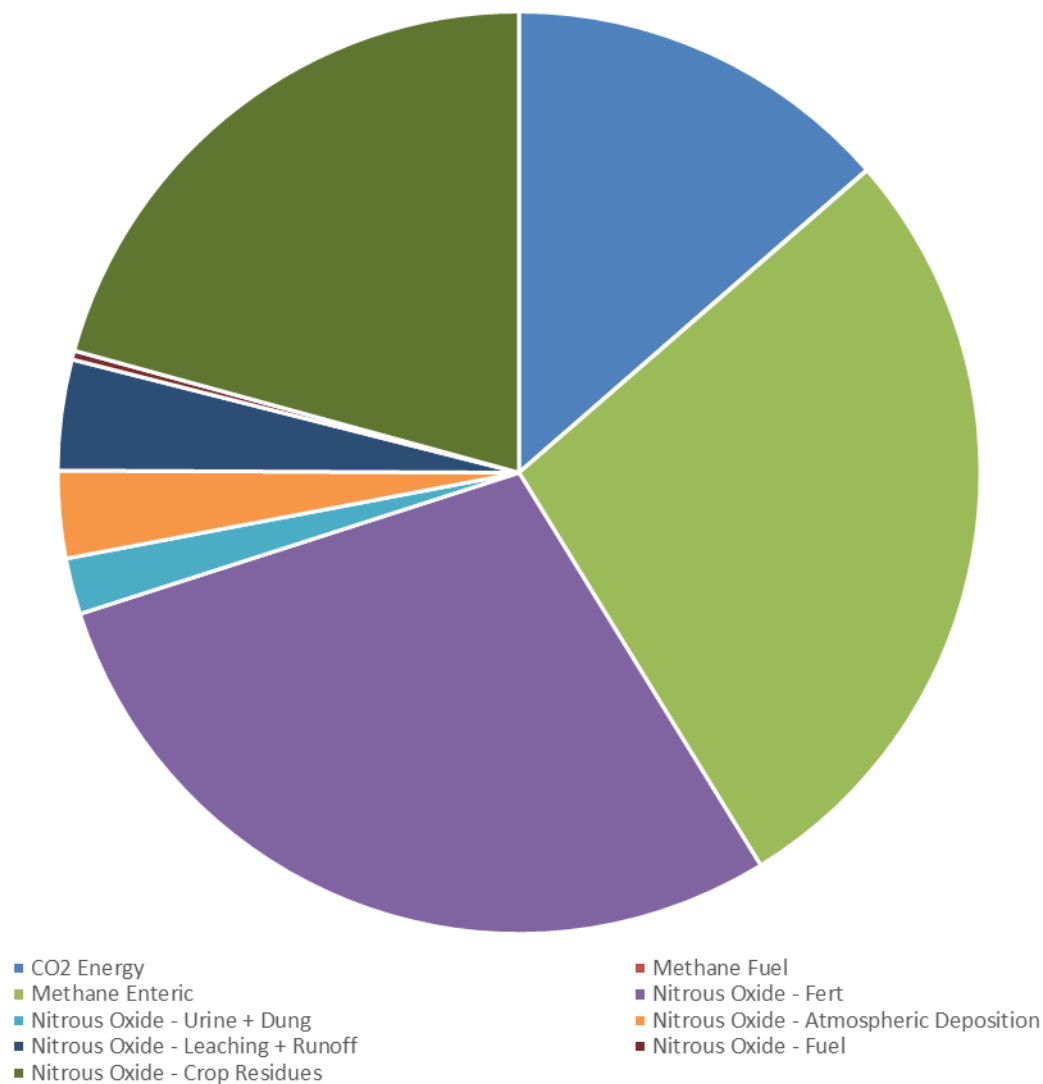
Impact on Sheep Enterprise

			01/01/2021	02/01/2020	
Total Emissions	t CO ₂ e	303.92	184.11	223.12	39.01
Emissions per kg turned off	kgs CO ₂ -e/kg	12.90	4.23	5.35	
	\$/kg	\$0.26	\$0.07	\$0.09	
ACCU Cost Impact total	\$	\$6,078	\$3,047.03	\$3,848.80	\$801.78
	\$/ha	\$18.53	\$8.39	\$19.24	
	\$/head	\$9.35	\$3.49	\$4.73	

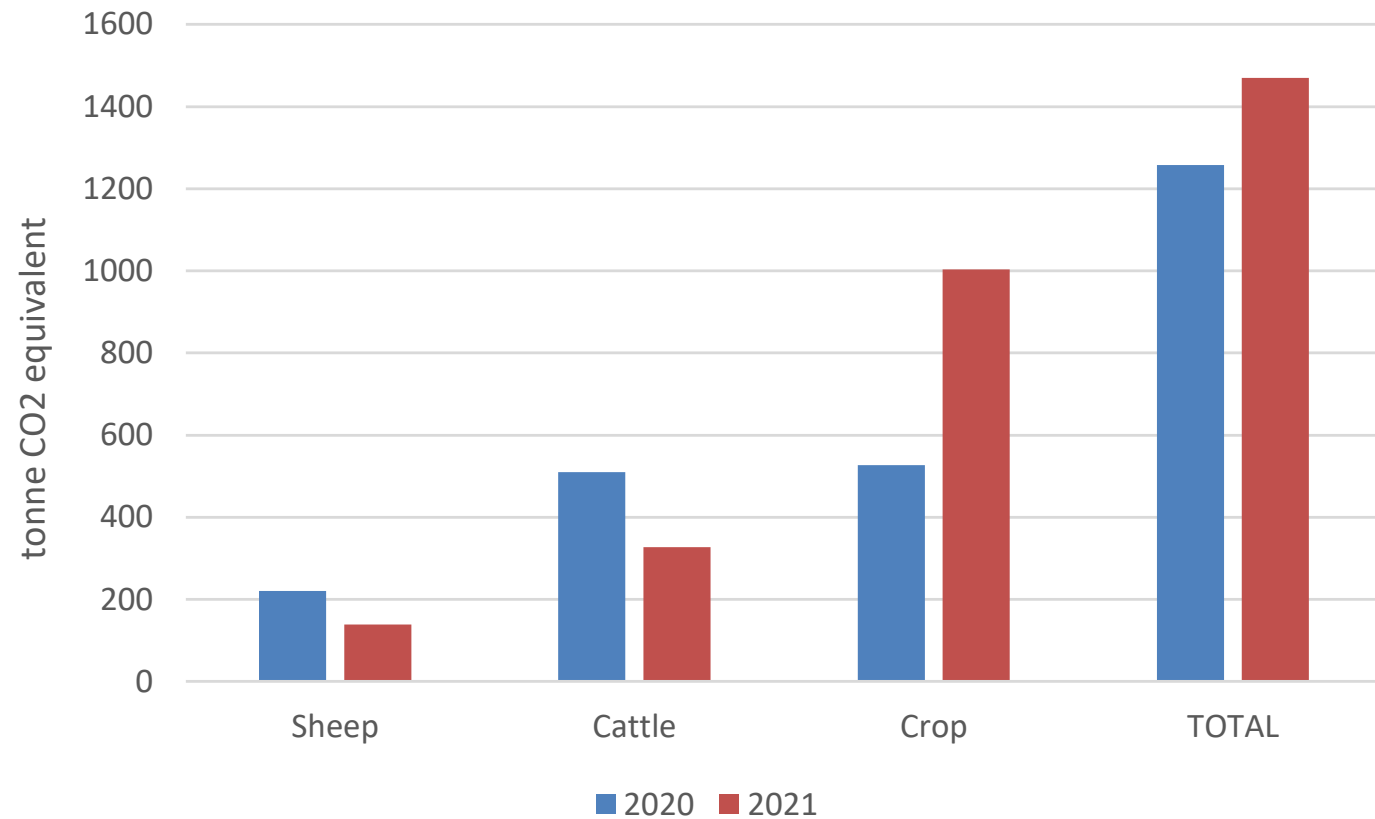
Impact on Cattle Enterprise

			01/01/2021	01/01/2020	
Total Emissions	t CO ₂ e	203.24	326.69	510.11	183.41
Emissions per kg turned off	kgs CO ₂ -e/kg	5.18	7.03	9.50	
	\$/kg	\$0.10	\$0.12	\$0.16	
ACCU Cost Impact total	\$	\$4,064.81	\$5,406.80	\$8,799.37	\$3,392.57
	\$/ha	\$18.56	\$22.81	\$38.94	
	\$/head	\$29.03	\$32.57	\$48.08	

2021 Emission t/CO2 Equivalen



Whole Farm Emissions



What metric is important?

Whole Farm?

1500 t/CO₂ equiv per annum = 200 hectares tree plant at 7.5 t/ha sequestered

Offsets

How to fund tree planting ?

\$1000/ha at least – 200 hectares = \$200,000

WA Land Restoration fund – cash advances in exchange for proportion of carbon credits (ACCUs) + co-benefit payment



Reducing emissions

Legumes

More efficient fertiliser application

Feed additives

Electrification

Renewables



Metric – per tonne or per hectare or paddock

Crop	2021	2020
Tonnes	6000	4835
kg CO2 equiv per tonne of grain	167	109
Cost \$/t of C offset at \$20/t CO2 equiva	\$ 3.35	\$ 2.18

Assuming only Scope 1 emission included.

Next steps for us and AgZero2030;

Opportunities for conservations with supply chain about emission's responsibility.

thanks

