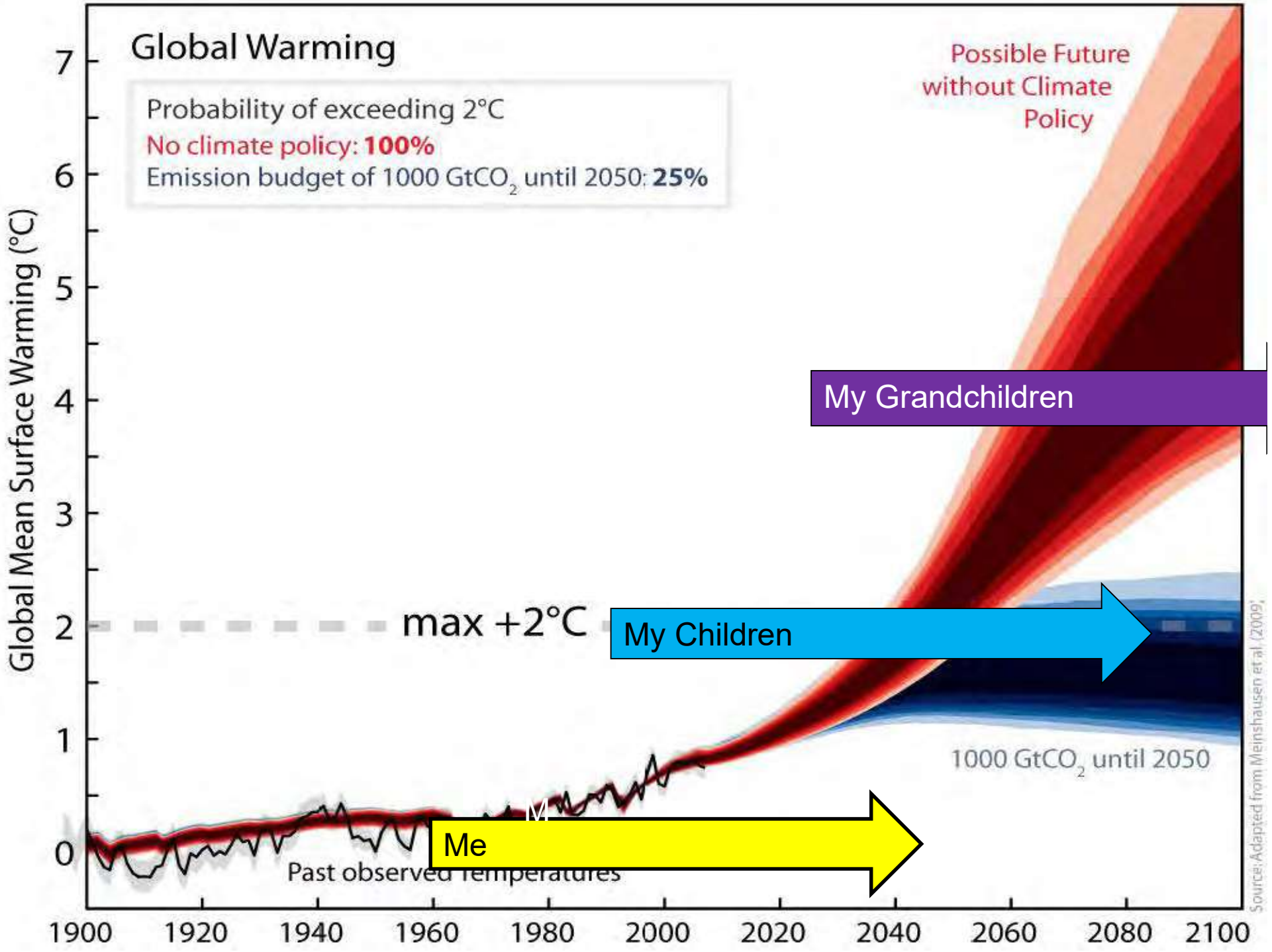
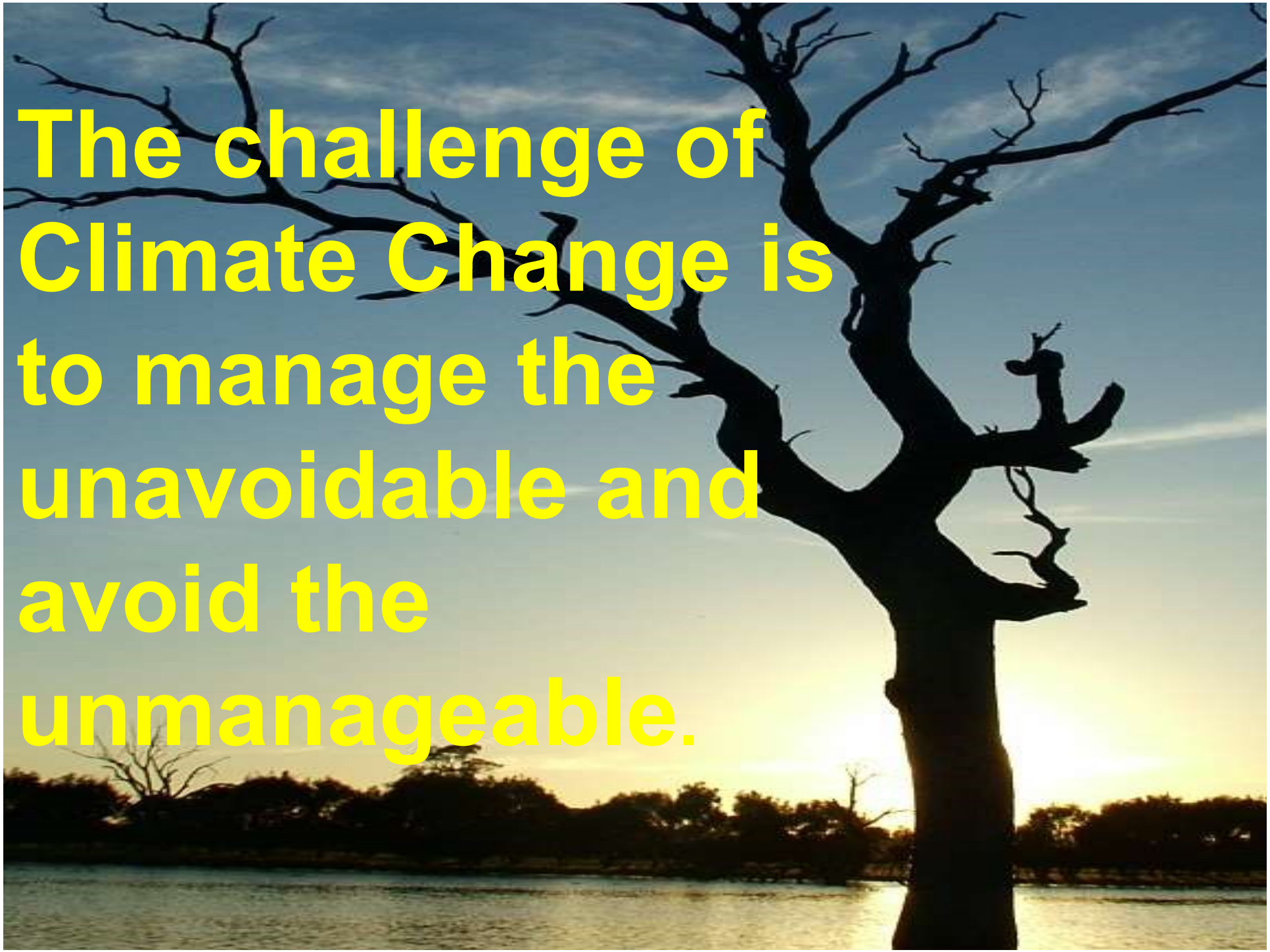
Unravelling the puzzle at Jigsaw Farms

ACIAR/ Crawford Fund. Canberra.23 March,2021

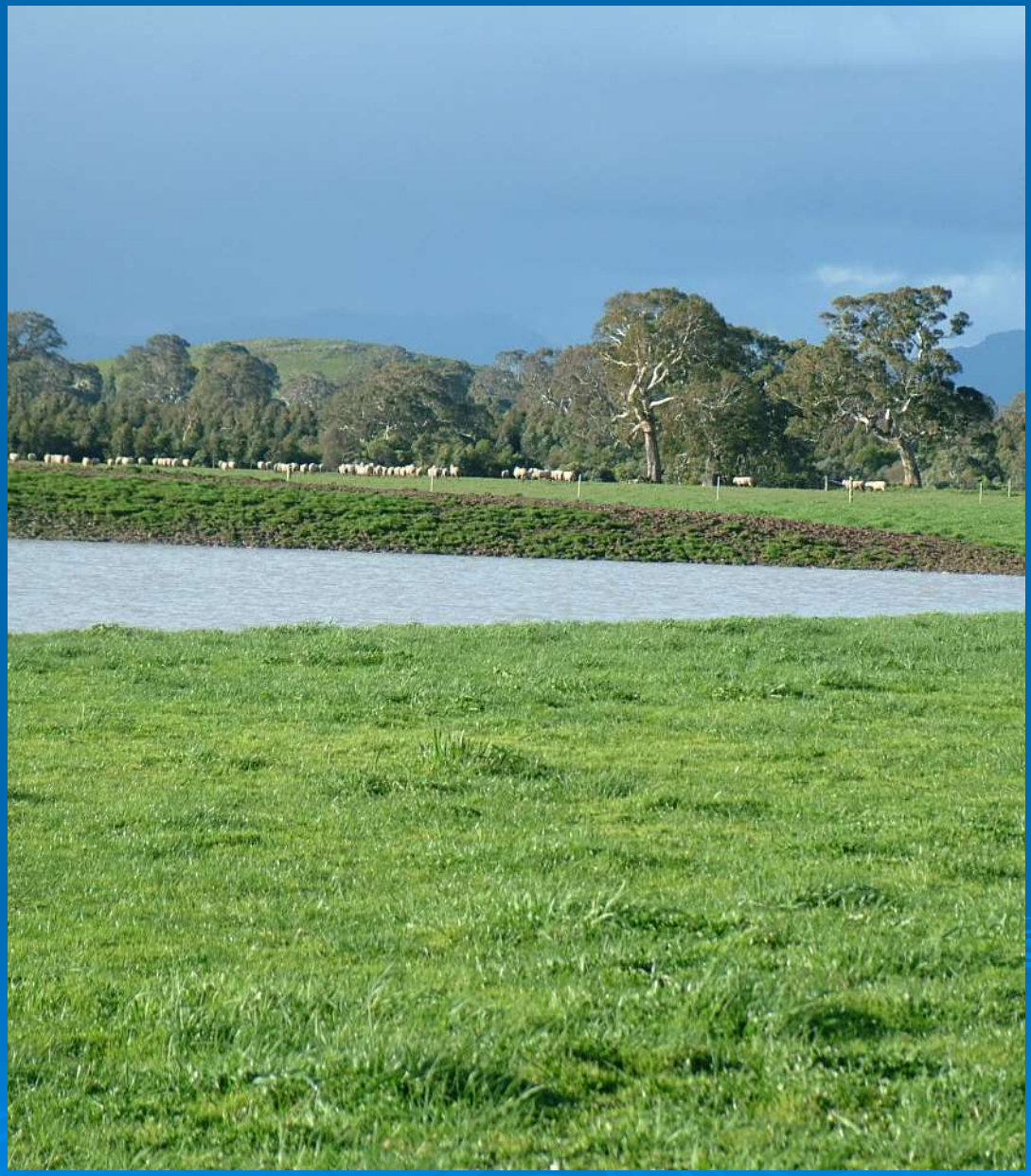

Global Warming
Probability of exceeding 2°C
No climate policy: 100%
Emission budget of 1000 GtCO2 until 2050: 25%
Possible Future without Climate Policy
My Grandchildren
My Children
Me
max +2°C
1000 GtCO2 until 2050
Past observed temperatures
Global Mean Surface Warming (°C)
0
1
2
3
4
5
6
7
1900
1920
1940
1960
1980
2000
2020
2040
2060
2080
2100
Source: Adapted from Meinshausen et al. (2009)

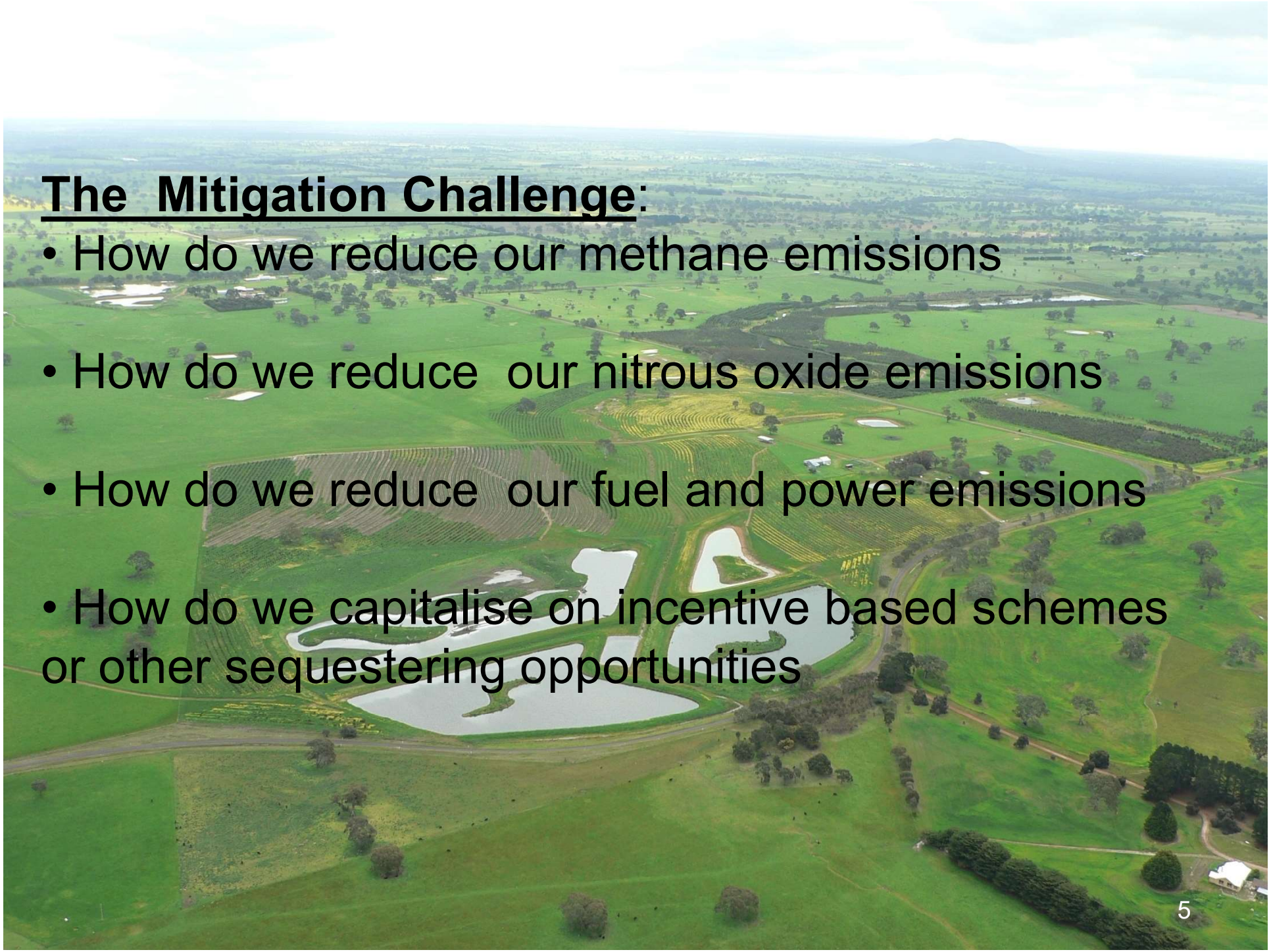

The challenge of
Climate Change is
to manage the
unavoidable and
avoid the
unmanageable.

The Adaptation Challenge:

How do we design a grazing system that is more resilient and climate responsive?

What will we do in 2030 to 2050 as we have shorter growing seasons and perhaps reduced gross margins in the southern grazing zones?





The Mitigation Challenge:

- How do we reduce our methane emissions
- How do we reduce our nitrous oxide emissions
- How do we reduce our fuel and power emissions
- How do we capitalise on incentive based schemes or other sequestering opportunities

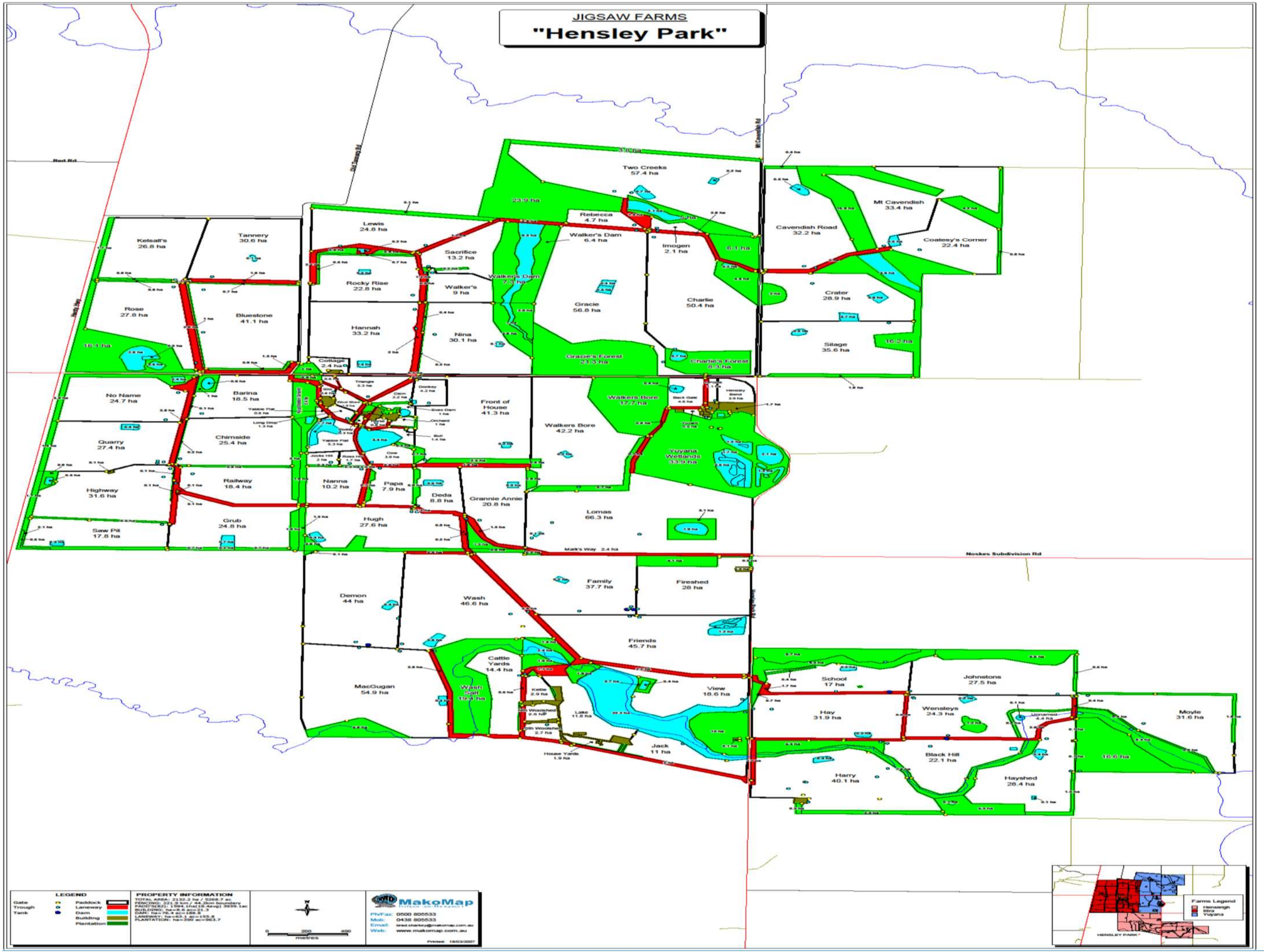
RMIT Fresh Food Carbon League Table (2016)

1kg of Greenhouse Gas Emissions

- 1 kg of Lentils
- 1.2 kg of Peanuts
- 800mls of Milk
- 290g of Salmon
- 290g of Eggs(about 5 small eggs)
- 270g of Chicken
- 244g of Kangaroo
- 212g of Rabbit
- 131 g of Australian Pork
- 44 g of Australian Beef
- 57g of Australian Lamb

THE JIGSAW FARMS STORY IN ONE SLIDE!

- Doubled the food and fibre that is produced per annum since 1996
- Carbon neutral since 2011
- Financial net return of 10 % + for 18 of last 25 years of ownership
- High Input and High Output Production system
- Sustainable environmental indicators are all positive
- 48 bird species in 1996 now have 164 species
- 653 Hectares of trees planted lots of co benefits for the farm
- High reproductive rates for stock therefore lower methane output
- Critical role that feedlot plays in reducing future methane emissions
- Carbon store in soil increased through perennial pastures
- 100% ground cover rule
- Water efficiency reflected by minimal evaporation(deep water storage) and maximum flow to water courses off farm.
- Family farm, be it at scale family. Succession under way


JIGSAW FARMS
"Hensley Park"
Two Creeks 57.4 ha
Mt Cavendish 33.4 ha
Cavendish Road 32.2 ha
Coatesy's Corner 22.4 ha
Rebecca 4.7 ha
Walker's Dam 6.4 ha
Imogen 2.1 ha
Lewis 24.8 ha
Kelsall's 26.8 ha
Tannery 30.6 ha
Sacrifice 13.2 ha
Rocky Rise 22.8 ha
Walker's 9 ha
Gracie 56.8 ha
Charlie 50.4 ha
Crater 28.9 ha
Silage 35.6 ha
Rose 27.8 ha
Bluestone 41.1 ha
Hannah 33.2 ha
Nina 30.1 ha
Gracie's Forest 21.3 ha
Charlie's Forest 8.3 ha
Cottage 2.4 ha
No Name 24.7 ha
Barina 18.5 ha
Front of House 41.3 ha
Walkers Bore 17.7 ha
Walkers Bore 42.2 ha
Yuyana Wetlands 33.9 ha
Quarry 27.4 ha
Chimside 25.4 ha
Highway 31.6 ha
Railway 18.4 ha
Nanna 10.2 ha
Papa 7.9 ha
Deda 8.8 ha
Grannie Annie 20.8 ha
Lomas 66.3 ha
Saw Pit 17.8 ha
Grub 24.8 ha
Hugh 27.6 ha
Mark's Way 2.4 ha
Noskes Subdivision Rd
Demon 44 ha
Wash 46.6 ha
Family 37.7 ha
Fireshed 28 ha
Friends 45.7 ha
MacGugan 54.9 ha
Cattle Yards 14.4 ha
Wash Salt 19.4 ha
Kettle 2.9 ha
Lake 11.8 ha
View 18.6 ha
Jack 11 ha
House Yards 1.9 ha
School 17 ha
Johnstons 27.5 ha
Hay 31.9 ha
Wensleys 24.3 ha
Moyle 31.6 ha
Harry 40.1 ha
Black Hill 22.1 ha
Hayshed 28.4 ha
LEGEND
Gate
Trough
Tank
Paddock
Laneway
Dam
Building
Plantation
PROPERTY INFORMATION
TOTAL AREA: 2132.2 ha / 5268.7 ac
FENCING: 221.9 km / 44.2km boundary
PADD'S(82): 1594.1ha(19.4avg) 3939.1ac
BUILDING: ha=8.6 ac=21.3
DAM: ha=76.4 ac=188.8
LANEWAY: ha=63.1 ac=155.8
PLANTATION: ha=390 ac=963.7
0 200 400
metres
MakoMap
Ph/Fax: 0500 805533
Mob: 0438 805533
Email: brad.sharkey@makomap.com.au
Web: www.makomap.com.au
Printed: 18/03/2007
Farms Legend
HENSLEY PARK


2005 Enterprise breakdown
•Agro forestry 10%
•Carbon/Reveg Plantings 15%
•Merino 25%
•Prime Lamb 25%
•Beef 25%
2019 Enterprise breakdown
• Agroforestry 9%
• Carbon/Reveg Plantings 10%
• Merino to Merino 40%
• Terminal Rams over X breds 20%
• cross breeding beef 10 %
2030 enterprise breakdown?
• 10% Agroforestry
• 10%Carbon/Reveg Plantings
• 50% Dual Purpose Merinos
• 10% to 20% Beef
• 10 to 20% Valve releases…
Beef/wethers/goats/trading?

Average Emissions from Western Victorian Farms

- Dairy 9.5 t C02e/ha or 9 t C02e/t milk solids
- Beef 4.5 t C02e/ha or 22.6 t C02e/t carcase
- Sheep 3.5 t C02e/ha or 18.4 t C02e wool(CFW)
- Grains .15 t C02e/ha or .1 tC02e/t grain
- Jigsaw Livestock 3.8 C02e/ha (2015)

	Carbon emissions (t CO2e)			
Year	Livestock	Trees	Soil	C Balance
2000	-2,336	0	85	-2251
2001	-4,099	5	207	-3888
2002	-3,971	37	91	-3843
2003	-4,082	189	114	-3779
2004	-3,934	426	48	-3461
2005	-7,692	868	41	-6782
2006	-8,520	1177	49	-7293
2007	-8,320	2326	119	-5876
2008	-4,548	3716	205	-626
2009	-4,092	3609	284	-200
2010	-4,438	5101	257	920
2011	-5,559	5104	616	161
2012	-4,674	4733	683	742
2013	-4,428	4907	903	1382
2014	-4,926	4805	983	862
2015	-5,234	4651	845	262
2016	-5,234	4464	1011	241
2017	-5,234	4261	1131	157
2018	-5,234	4056	1111	-68
2019	-5,234	3854	1192	-188
2020	-5,234	3657	1208	-369
2021	-5,234	3468	1288	-479
2022	-5,234	3287	1227	-721
2023	-5,234	3116	1085	-1034
2024	-5,234	2954	1065	-1215
2025	-5,234	2802	1263	-1169

Soil Carbon. Perennial pastures. In general we sit between 4% and 5% and moving up. Lots of good reasons to do so regardless of carbon.

Trees. Half high value sawlogs and half permanent revegetation in shelter and wildlife coridors. Permanence is the key.

MORE LAMBS MORE OFTEN FINDINGS

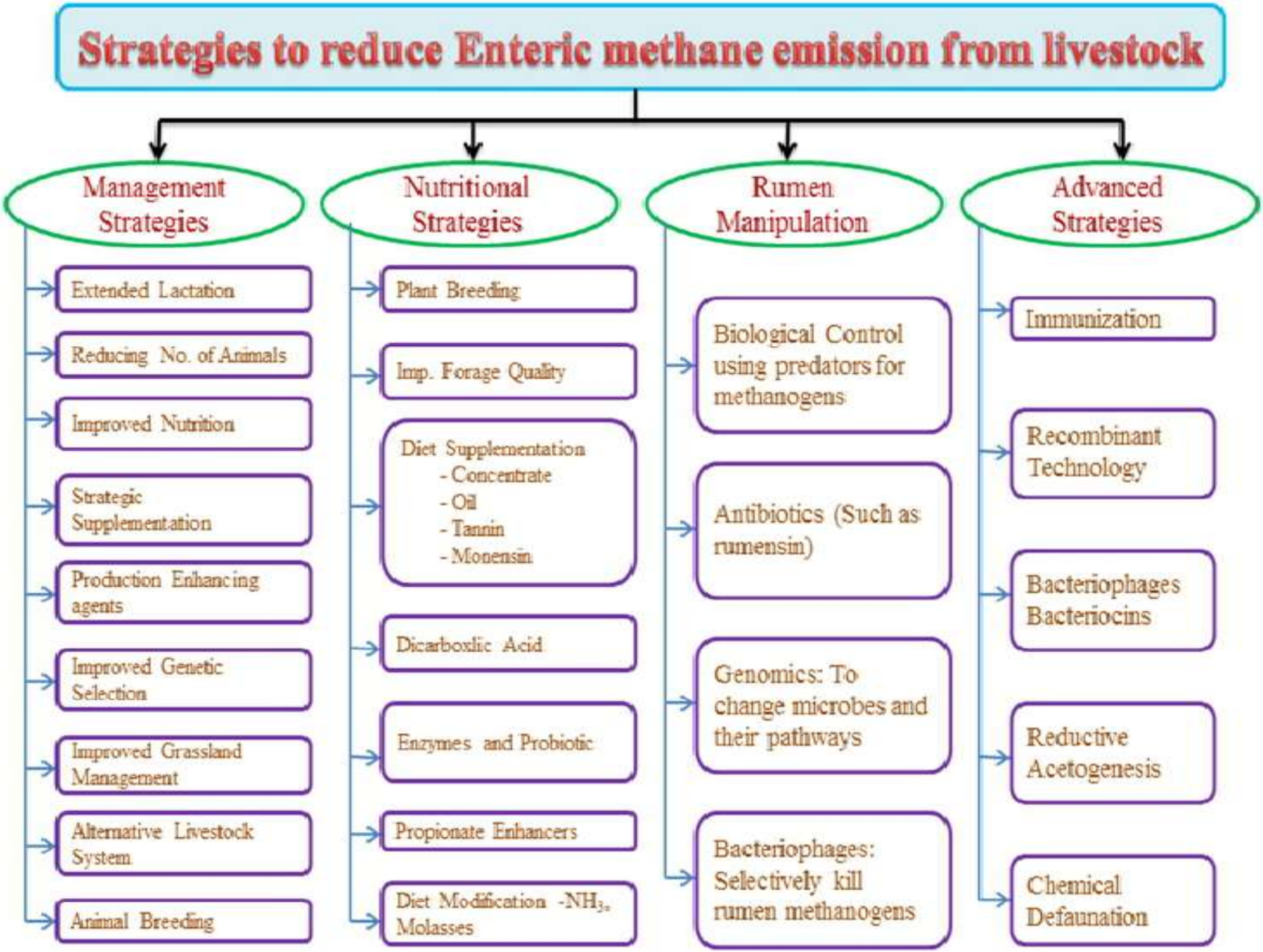
1. NOT ENOUGH FLEX IN OUR SYSTEM
2. TOO MANY SIMILIAR TYPE ANIMALS
3. JUNE/JULY FEED CRISIS
4. MAKING DECISIONS TOO LATE
5. NOT ACCEPTING WEATHER TRENDS(LATE AUTUMN BREAKS)
6. NOT CAPITALISING ON SCALE
7. GEOGRAPHICALLY PUTTING ALL EGGS IN ONE BASKET
8. NEED TO PROTECT PASTURES
9. FEEDLOT WORKS WELL SO NEED TO EXPAND IT

GHG emissions avoidance.

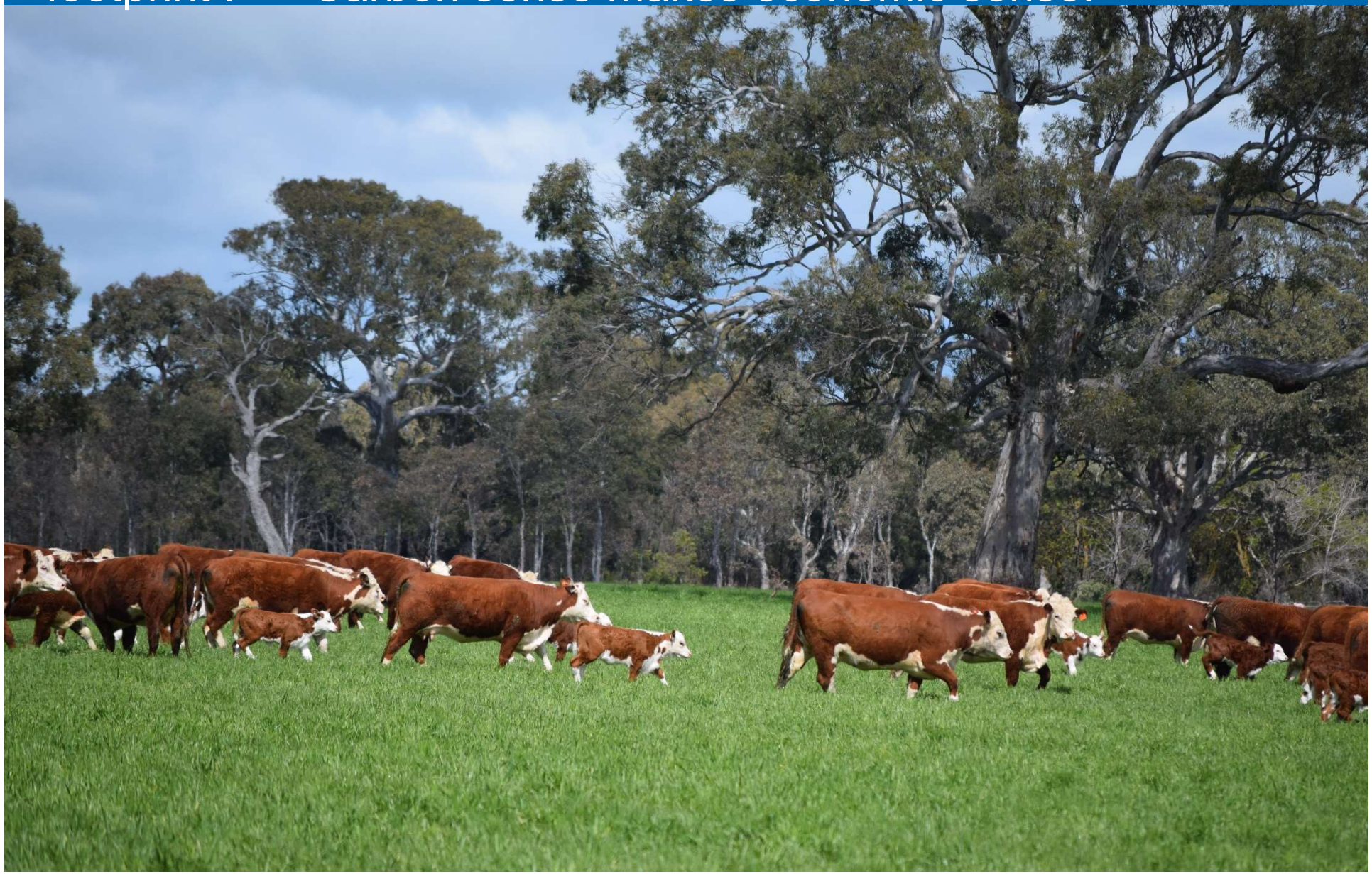
Change the rumen behaviour. Use of inhibitors. Such as Red Asparagopis seaweed. CSIRO and James Cook Uni are commercialise now.

Hopefully, next year we are going to start some experimental feeding focusing on feed conversion to weight gain basis at first. Then start to try to get a handle on methane. Not easy at farm level.


Merino Ewe Breeding objectives
High index for PWT
High index for EMD
High index for PFAT
While still having 18-19 micron wool


Strategies to reduce Enteric methane emission from livestock
Management Strategies
Extended Lactation
Reducing No. of Animals
Improved Nutrition
Strategic Supplementation
Production Enhancing agents
Improved Genetic Selection
Improved Grassland Management
Alternative Livestock System
Animal Breeding
Nutritional Strategies
Plant Breeding
Imp. Forage Quality
Diet Supplementation
- Concentrate
- Oil
- Tannin
- Monensin
Dicarboxlic Acid
Enzymes and Probiotic
Propionate Enhancers
Diet Modification -NH3, Molasses
Rumen Manipulation
Biological Control using predators for methanogens
Antibiotics (Such as rumensin)
Genomics: To change microbes and their pathways
Bacteriophages: Selectively kill rumen methanogens
Advanced Strategies
Immunization
Recombinant Technology
Bacteriophages Bacteriocins
Reductive Acetogenesis
Chemical Defaunation

Cross breeding cattle operation. 12% free lunch. Drop in Carbon footprint . Carbon sense makes economic sense!




JIGSAW
AALMS
1061
LANDMARK
JIGSAW
AAALMS
1062
LANDMARK
JIGSAW
AALMS
1063
LANDMARK
JIGSAW
LMS
1064
LANDMARK
JIGSAW
LMS
1065
LANDMARK
BUILDER


JIGSAW FARMS

Take Home Messages

1. Climate Change is real and humans are a large part of the problem. Ruminant animals are tricky!
2. Climate Variability is real and will get more extreme in the future .
3. Mitigation is essential : agriculture and regional Australia have big opportunities in this space.
4. At the local farm level Adaptation should be a focus for farmers who want to manage the risks of CC – be they physical or policy driven.
5. Australian Farmers are well placed to be successful producers of food and fibre in what we will be at times full of Climate Challenges ..but only if we devise more flexible, energy efficient and resilient systems. Doing more of the same just wont work!