

Transitioning away from animals as food

Essential for
a habitable
planet

Paul Mahony
24 November 2022



KEY TOPICS

Inefficiency of animal-based food production

Land clearing including loss of carbon sequestration

Non-CO₂ warming agents

Other issues:

- Biodiversity loss
- Invasive grass species
- Marine ecosystems
- Direct political pressure
- The farmed animal sector's links to environmental groups
- The farmed animal sector's marketing and PR utilising states' education systems

INTRODUCTION

Animal agriculture
is a major
contributor to
climate change.

Causes include:

- Land clearing
- Methane
- Nitrous oxide



Its impacts are understated in official reporting figures because relevant material is either:

- a) omitted
- b) classified under alternative headings
- c) included on the basis of dangerously conservative calculations

Examples:

- Omitted: Foregone carbon sequestration
- Classified elsewhere: Livestock related land clearing, which is classified as *“land use, land use change and forestry” (LULUCF)*
- Calculations: “Global Warming Potential” (GWP) time horizon of 100 years

Comments on all the above to follow.

*"... farms should shift toward **plant-based foods** ... By transforming our energy and food systems, we can enjoy low-cost power and **healthy, satisfying diets** without ruining the environment."*

Why do prominent campaigners ignore the message?

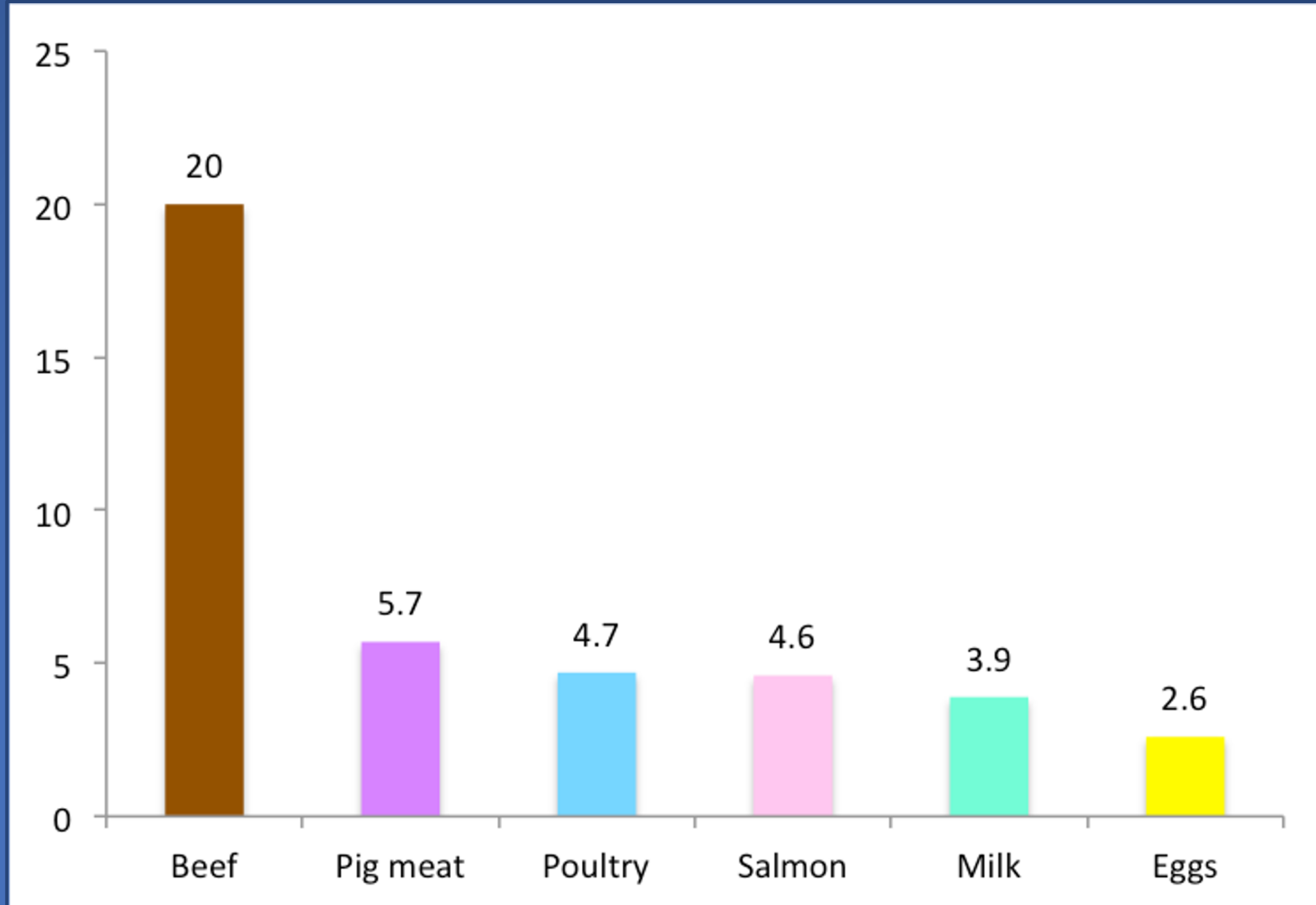


Jeffrey D. Sachs, 15 April 2019.

Professor of Sustainable Development and Professor of Health Policy and Management at Columbia University, Director of Columbia's Center for Sustainable Development and Director of the UN Sustainable Development Solutions Network.

INEFFICIENCY

Protein Conversion Ratios





Share of farmland

83%

Share of protein

37%

18%

Share of calories

Animal farming is a grossly and inherently inefficient source of nutrition, causing us to use far more resources, including land, than would otherwise be required.

In what other sector of society or the economy would that level of inefficiency be acceptable to those in power or those who control mainstream media?



High levels of productivity are normally considered essential.

LAND USE

AMOUNT OF FARMLAND THAT COULD BE RELEASED IF THE WORLD TRANSITIONED TO AN ANIMAL-FREE DIET

Land area the size of Africa



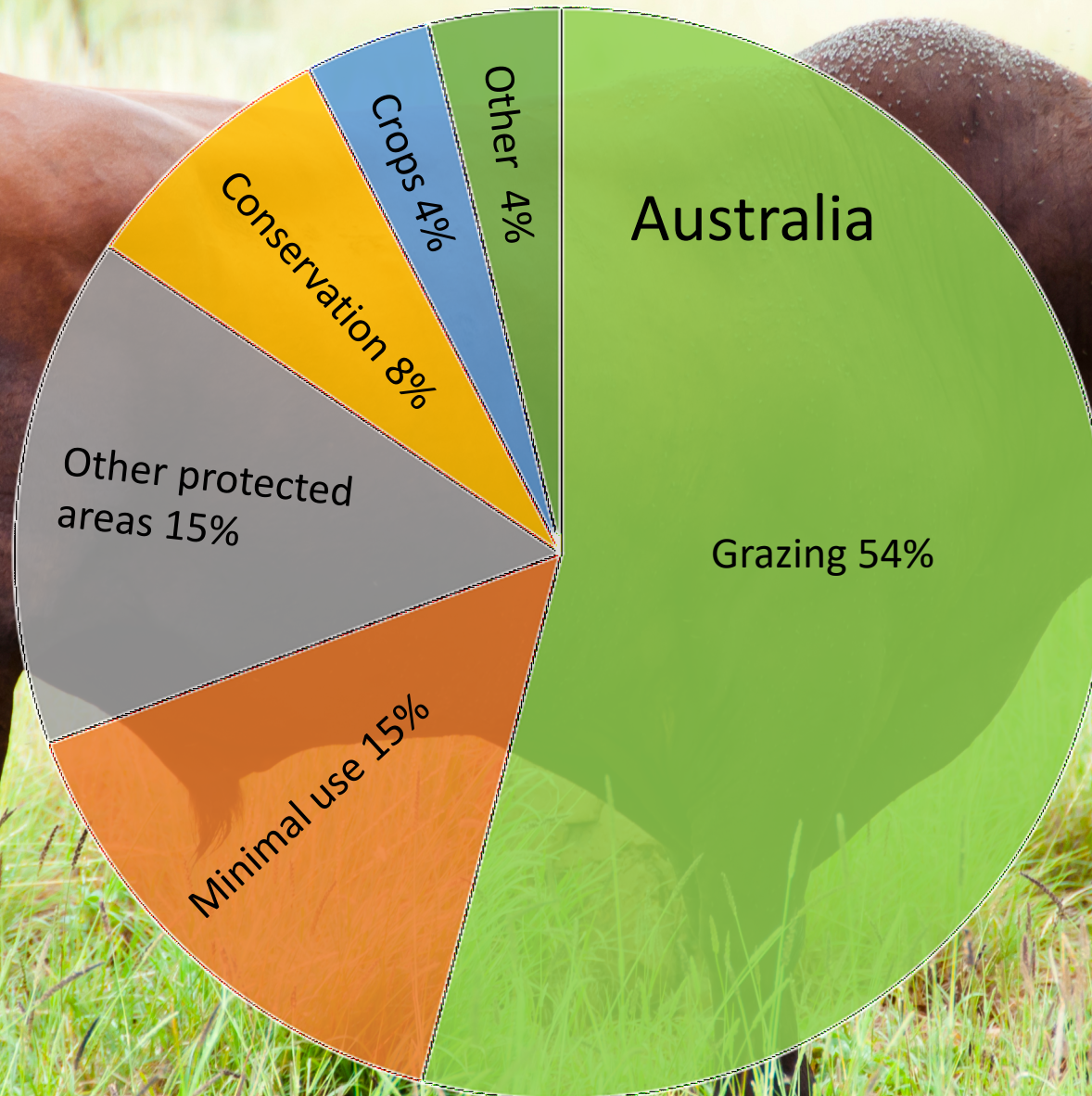
Equal to four times the contiguous United States



Or four times Australia



Grazing of livestock is responsible for 54% of Australia's land use

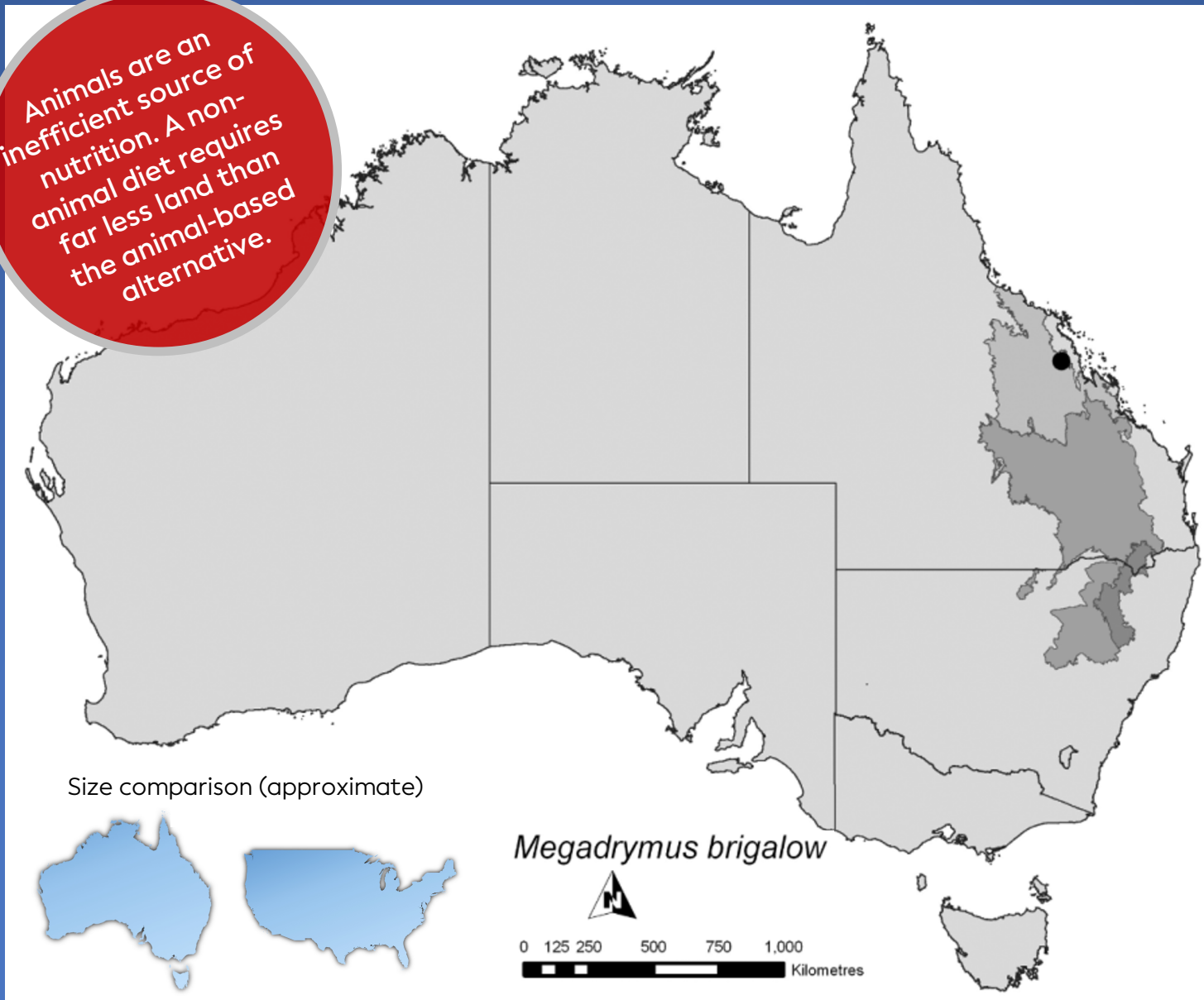


Urban usage is less than 0.18%.

EXAMPLE: BRIGALOW BELT, QUEENSLAND AND NEW SOUTH WALES

Forest cover has been reduced from 130,000 square kilometres to 10,000 square kilometres in 60 years through land clearing.

Animals are an inefficient source of nutrition. A non-animal diet requires far less land than the animal-based alternative.



It is officially recognised as a threatened ecological community with “enormous biodiversity value”.

Clearing has been mainly for cattle grazing

Prepared by Paul Mahony.
Sources: 1. University of Queensland, UQ News, “Australia’s Brigalow forests almost gone in 60 years”; 2. Dr Rod Fensham, University of Queensland, ABC RN Breakfast, 15th September 2017. Smaller maps: Skvoor, Shutterstock ID 14934739 and 14934727

Main image: Cassis, Gerasimos, & Symonds, Celia L. (2014, December 31). FIGURE 2 in *Megadrymus brigalow* n. sp. (Insecta: Hemiptera: Heteroptera: Rhyparochromidae: Drymini), a diminutive new species of seed bug from semi-evergreen vine thicket of the Queensland Brigalow Belt. Zootaxa. Zenodo. <http://doi.org/10.5281/zenodo.224611>

BRIGALOW BELT, QUEENSLAND AND NSW

Dr Rod Fensham from the University of Queensland on why it had been cleared so extensively.

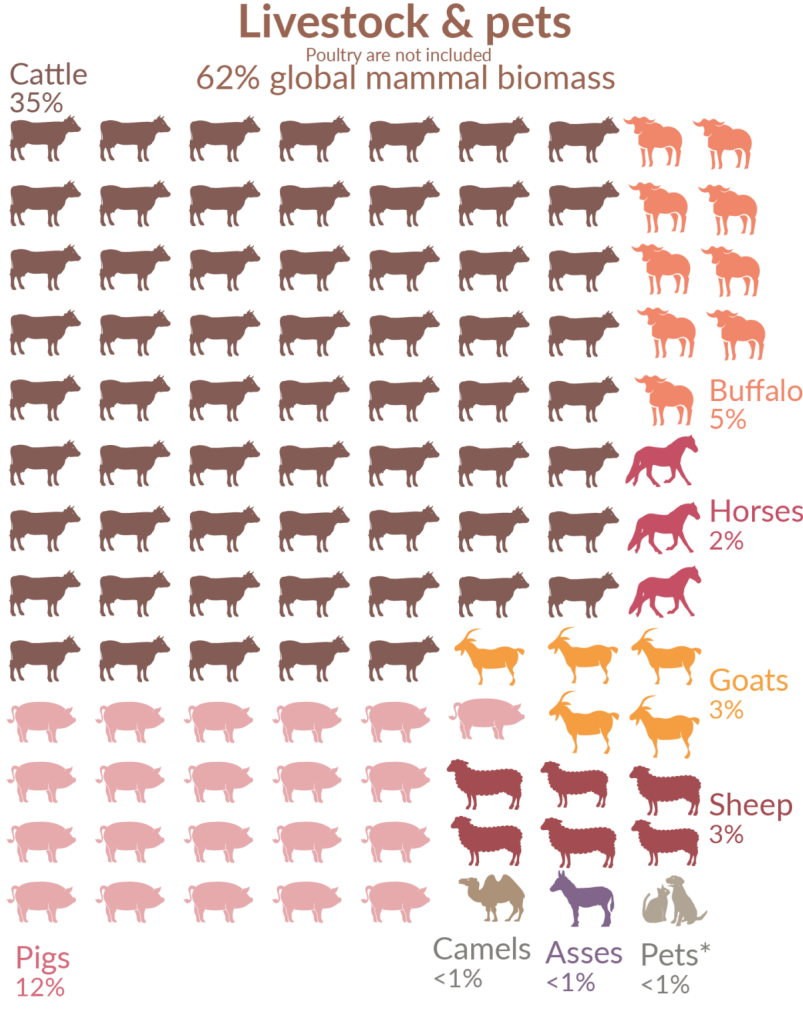
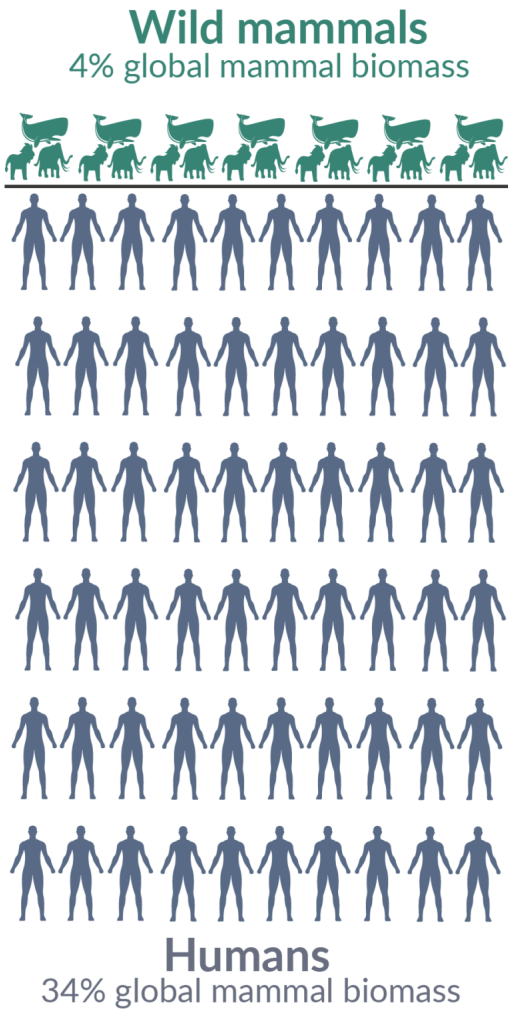
*“Because . . . it yields productive pasture for **cattle production**.”*

*“. . . the remnants . . . get filled up with the exotic grasses that grow on the **cattle pastures**, and that . . . makes them really flammable and fires chew away at the little remnants bit by bit . . .”*

Distribution of mammals on Earth

Our World
in Data

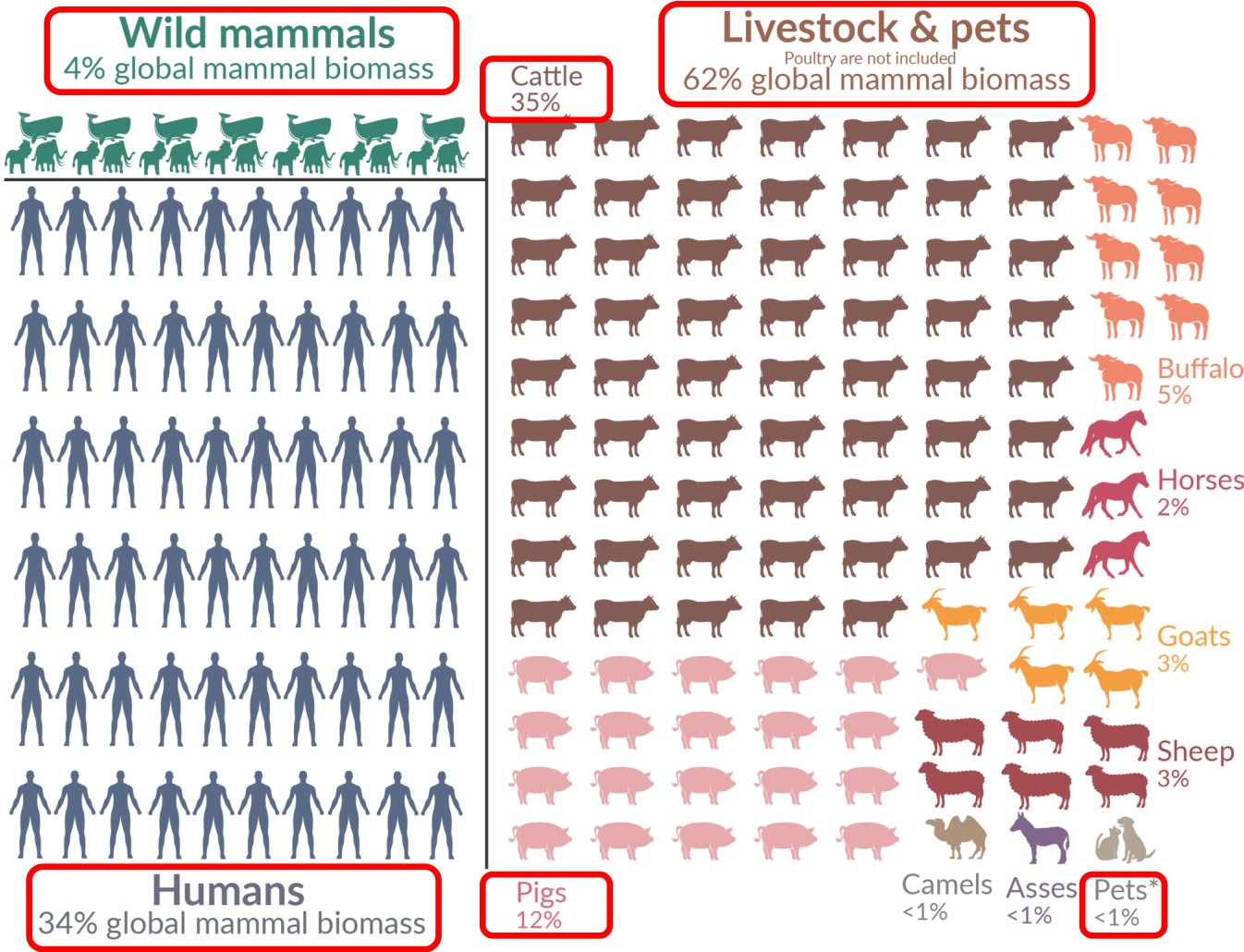
Mammal biomass is shown for the year 2015.  or  or  = 1 million tonnes carbon (C)



Distribution of mammals on Earth

Our World
in Data

Mammal biomass is shown for the year 2015.  or  or  = 1 million tonnes carbon (C)



*Bar-On et al. (2018) provide estimates of livestock only, without estimates of mammalian pets (e.g. cats and dogs).
Pets have been added as an additional category based on calculations from estimates of the number of pets globally and average biomass.
Data source: Bar-On et al. (2018). The biomass distribution on Earth. Images sourced from the Noun Project.
OurWorldinData.org – Research and data to make progress against the world's largest problems. Licensed under CC-BY by the author Hannah Ritchie.

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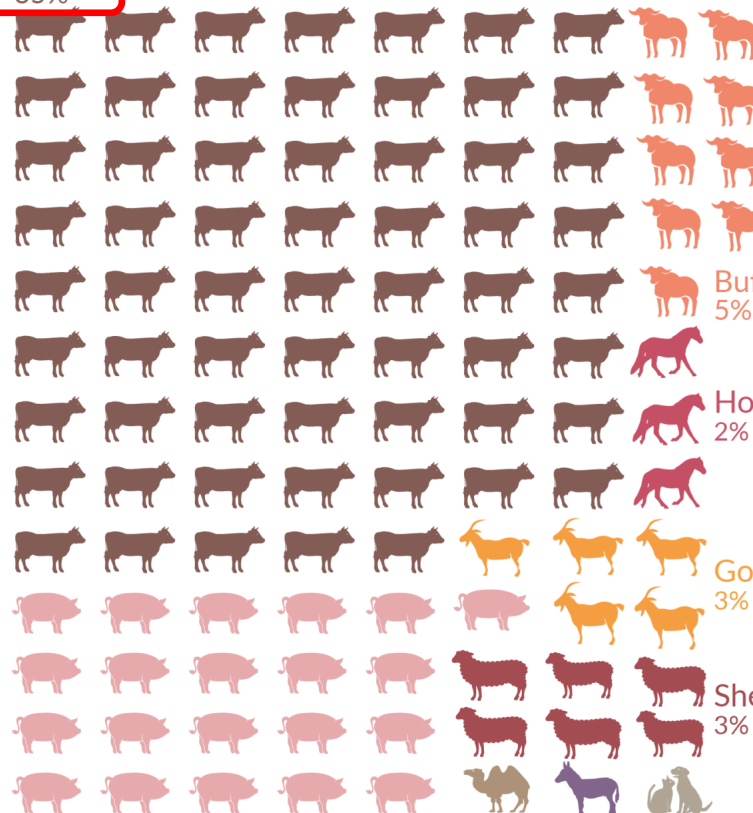
Wild mammals
4% global mammal biomass



Humans
34% global mammal biomass

Livestock & pets
Poultry are not included
62% global mammal biomass

Cattle
35%



Buffalo
5%

Horses
2%

Goats
3%

Sheep
3%

Camels
<1%

Asses
<1%

Pets*
<1%

Pigs
12%

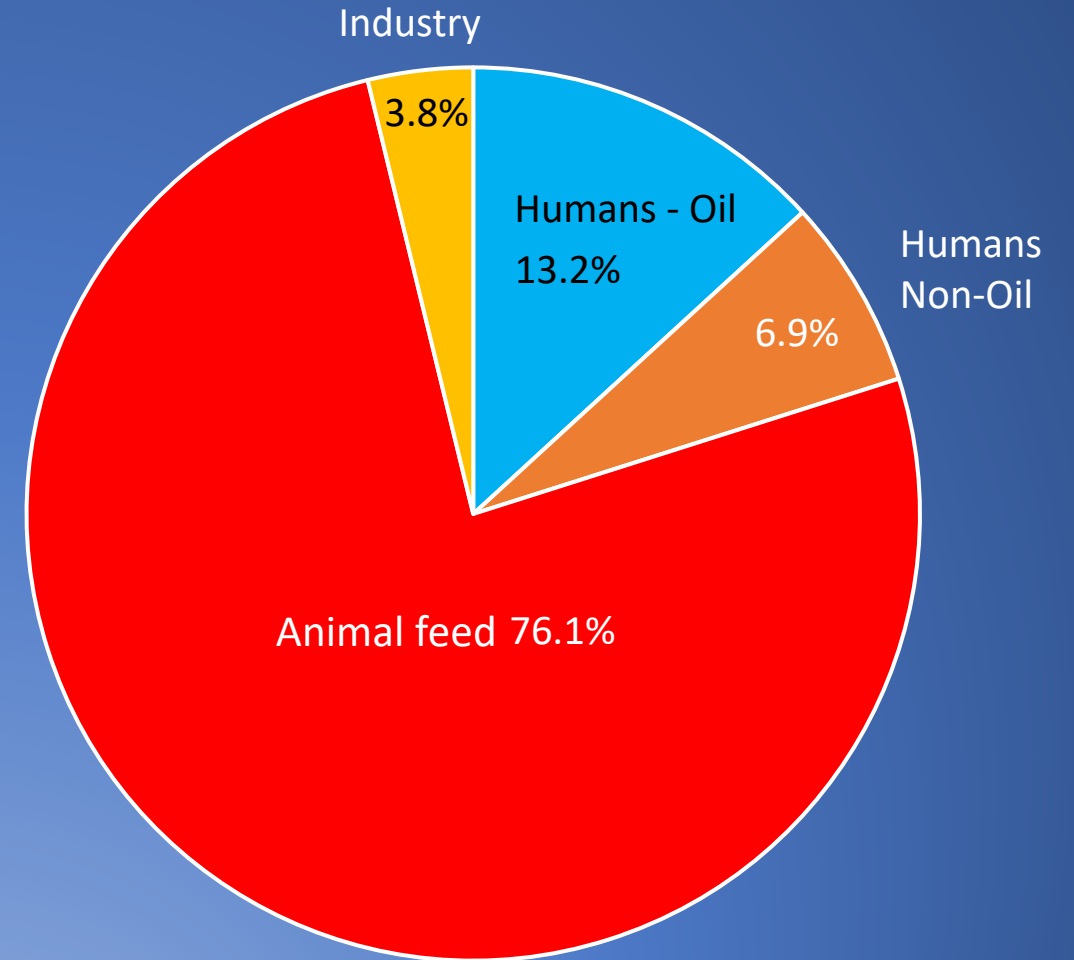
The growing human population is causing a critical problem for wild mammals and other species.

The massive farmed animal population is a huge part of the problem.

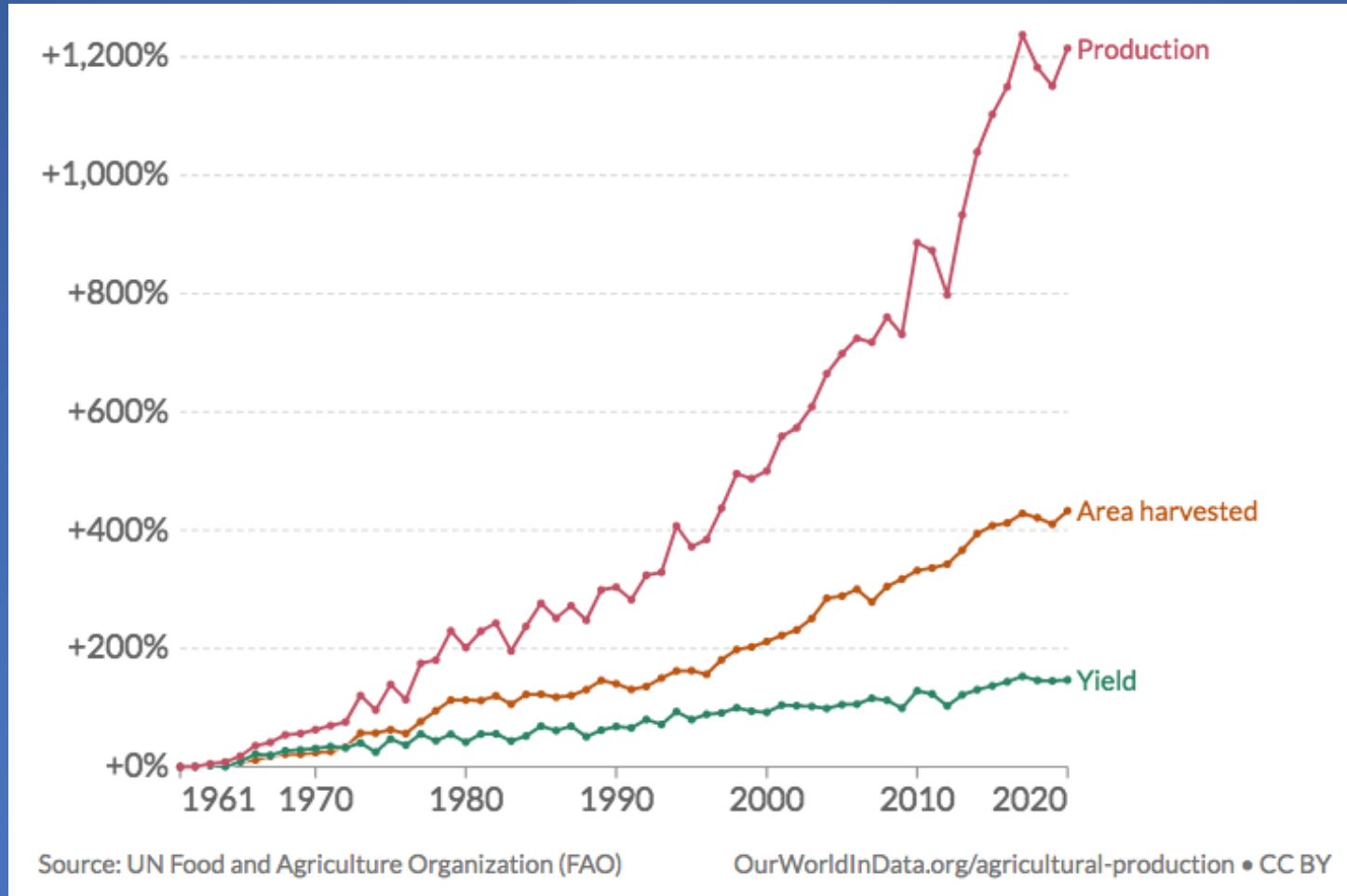
That aspect could be largely overcome if we were to replace the grossly and inherently inefficient system of animal agriculture with a plant-based system.

*Bar-On et al. (2018) provide estimates of livestock only, without estimates of mammalian pets (e.g. cats and dogs).
Pets have been added as an additional category based on calculations from estimates of the number of pets globally and average biomass.
Data source: Bar-On et al. (2018). The biomass distribution on Earth. Images sourced from the Noun Project.
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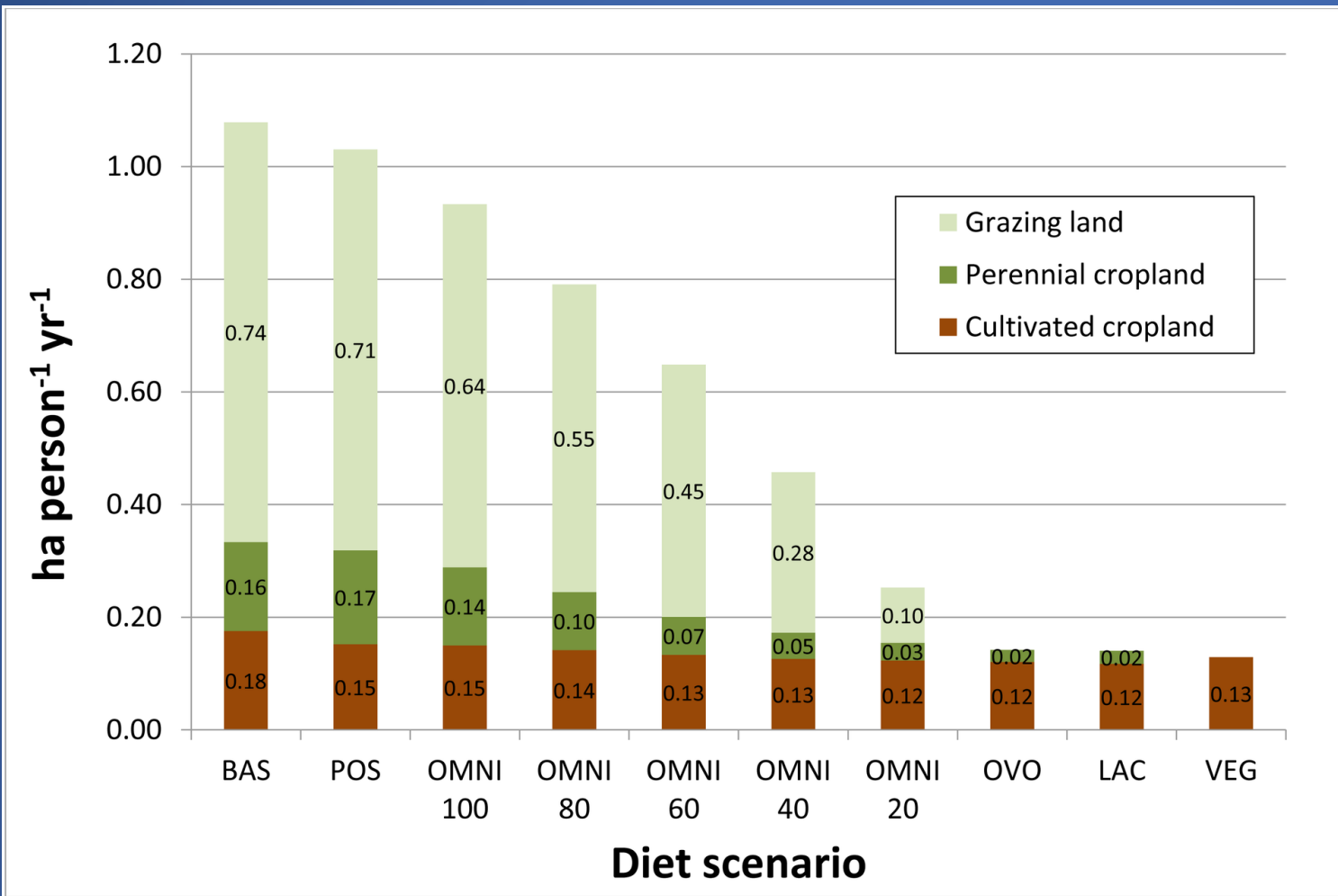
LAND CLEARING FOR SOY – HOW IS IT USED?



SOY PRODUCTION, YIELD AND AREA HARVESTED



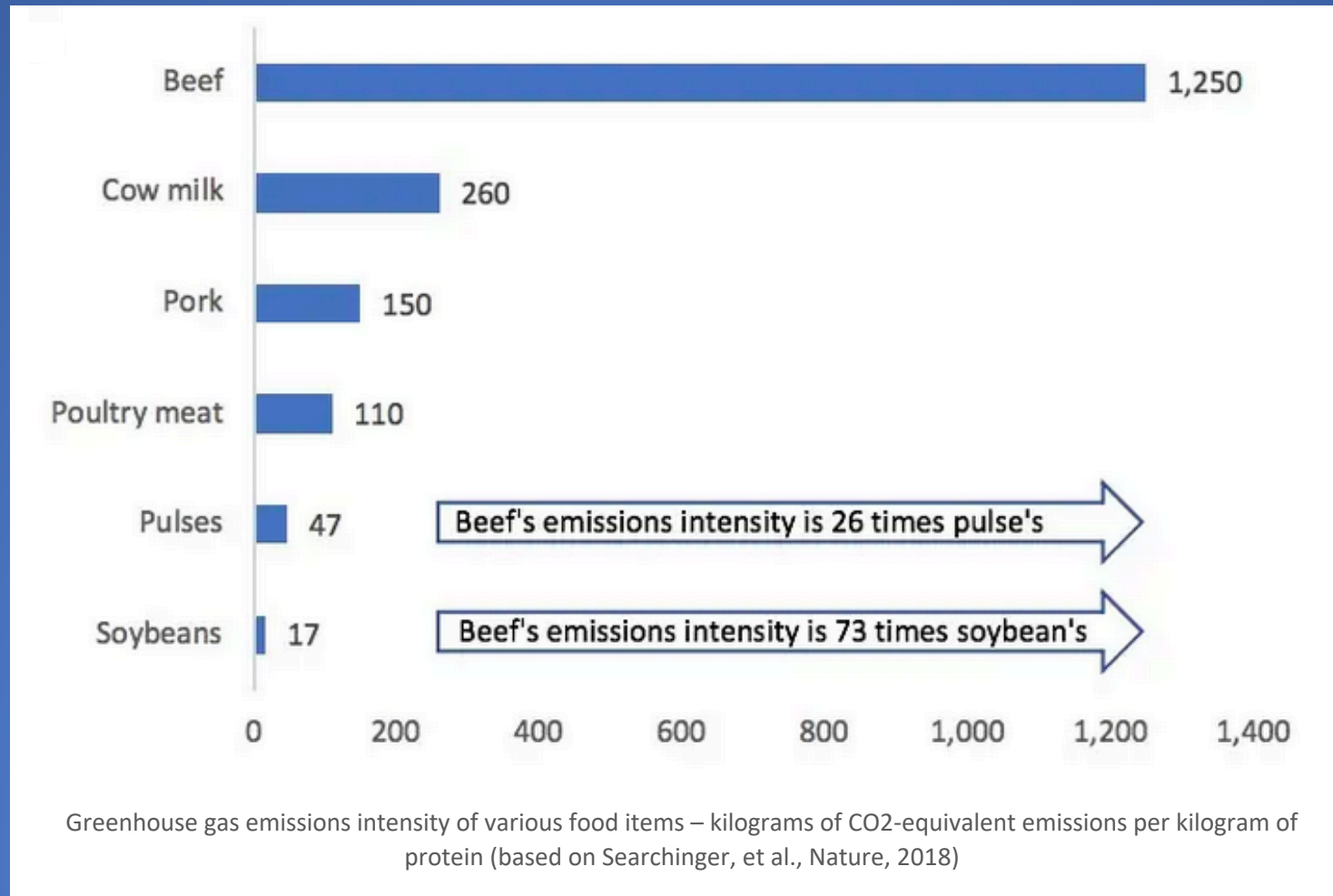
LAND AREA REQUIRED FOR ALTERNATIVE DIETS



Symbol	Key attributes
BAS	Food intake equals loss-adjusted food availability for individual food commodities.
POS	As above, except intake of fats and sweeteners is reduced to make diet energy-balanced.
OMNI 100	100% of person-meals follow an omnivorous healthy diet pattern.
OMNI 80	80% of person-meals follow an omnivorous healthy diet pattern and 20% follow a ovo-lacto vegetarian healthy diet pattern.
OMNI 60	60% of person-meals follow an omnivorous healthy diet pattern and 40% follow a ovo-lacto vegetarian healthy diet pattern.
OMNI 40	40% of person-meals follow an omnivorous healthy diet pattern and 60% follow a ovo-lacto vegetarian healthy diet pattern.
OMNI 20	20% of person-meals follow an omnivorous healthy diet pattern and 80% follow a ovo-lacto vegetarian healthy diet pattern.
OVO	Includes both eggs and dairy products.
LAC	Includes dairy products. Excludes eggs.
VEG	Excludes all livestock products.

EMISSIONS INTENSITY ALLOWING FOR CARBON OPPORTUNITY COST

“... standard methods for evaluating the effects of land use on greenhouse gas emissions systematically underestimate the opportunity of land to store carbon if it is not used for agriculture.”



NET CO₂ DRAWDOWN POTENTIAL OF ALTERNATIVE DIETS GLOBALLY 2015 - 2050

547
GtCO₂
Equal to
previous
16 years
of fossil
fuel
emissions

Animal-free

332
GtCO₂

70% reduction
in meat consumption

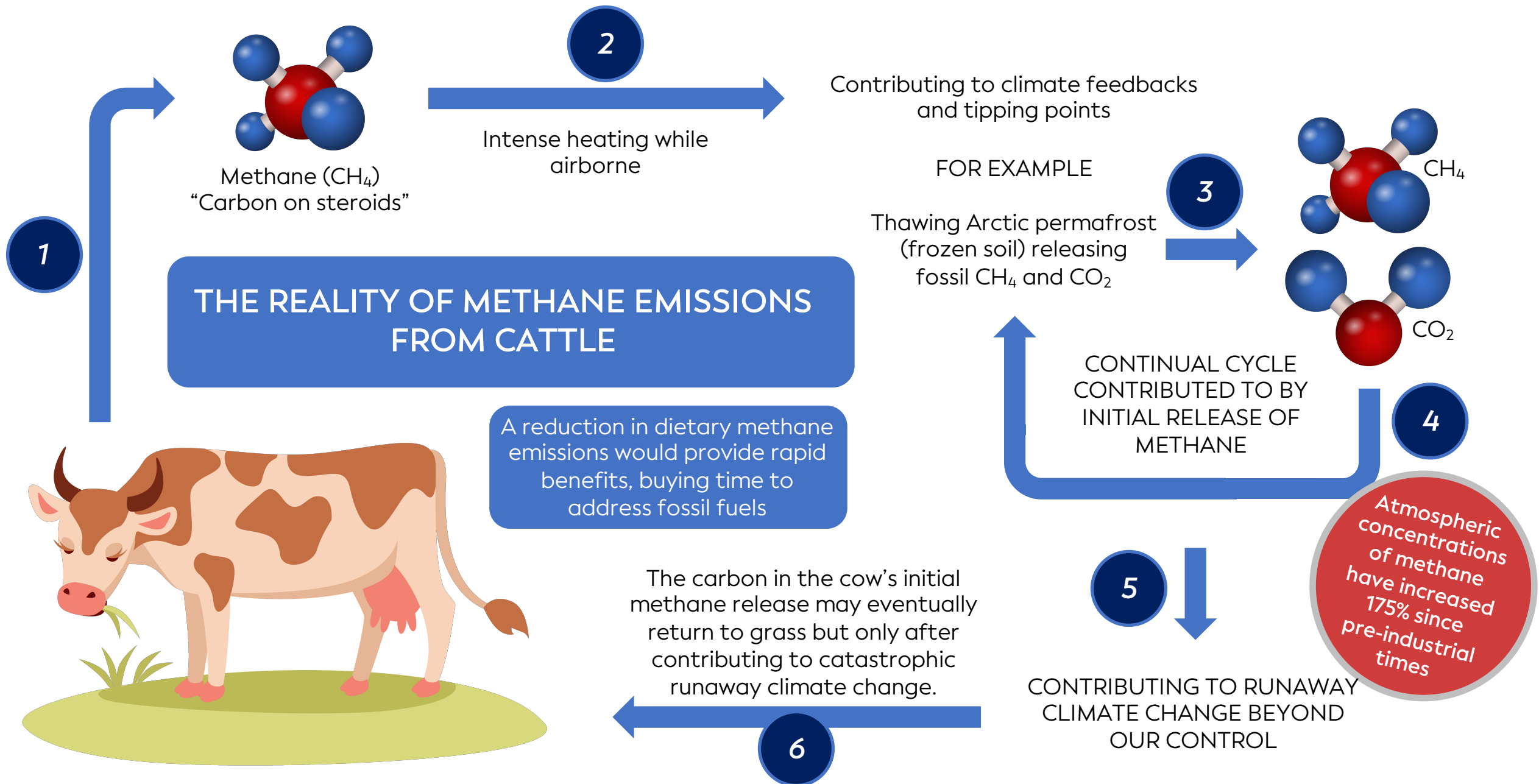
86 GtCO₂
Land use change
emissions

Business as usual

NON-CO₂ WARMING AGENTS

Methane: Carbon on steroids





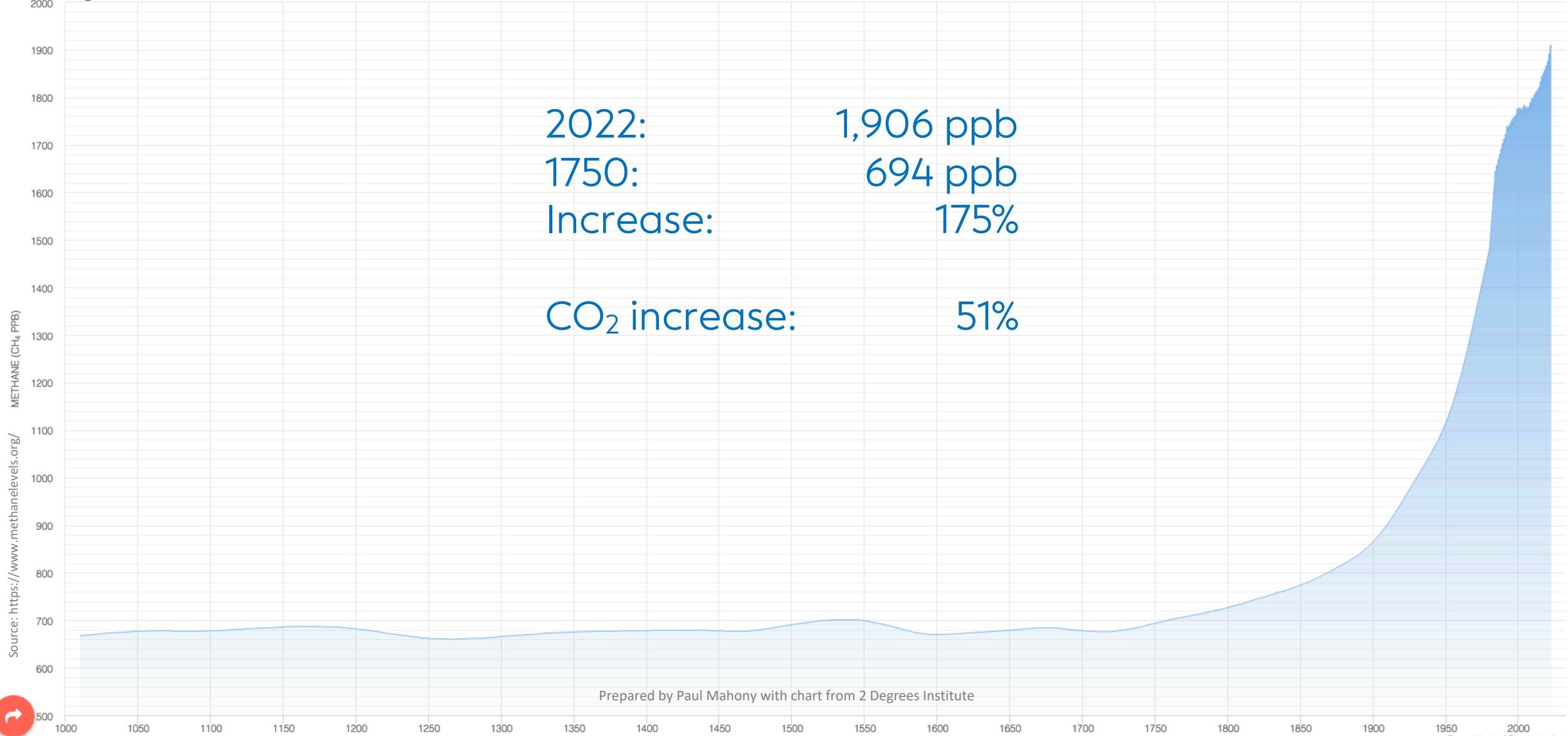
Even ignoring this process, the global warming potential (GWP) multiplier for non-fossil (biogenic) methane is close to that of fossil methane. The figures are 80.8 and 82.5 respectively over a 20-year time horizon or 27.2 and 29.8 over 100 years. No methane is good methane.

ATMOSPHERIC METHANE (CH₄) CONCENTRATIONS



GLOBAL CH₄ LEVELS

Click and drag in the plot area to zoom in

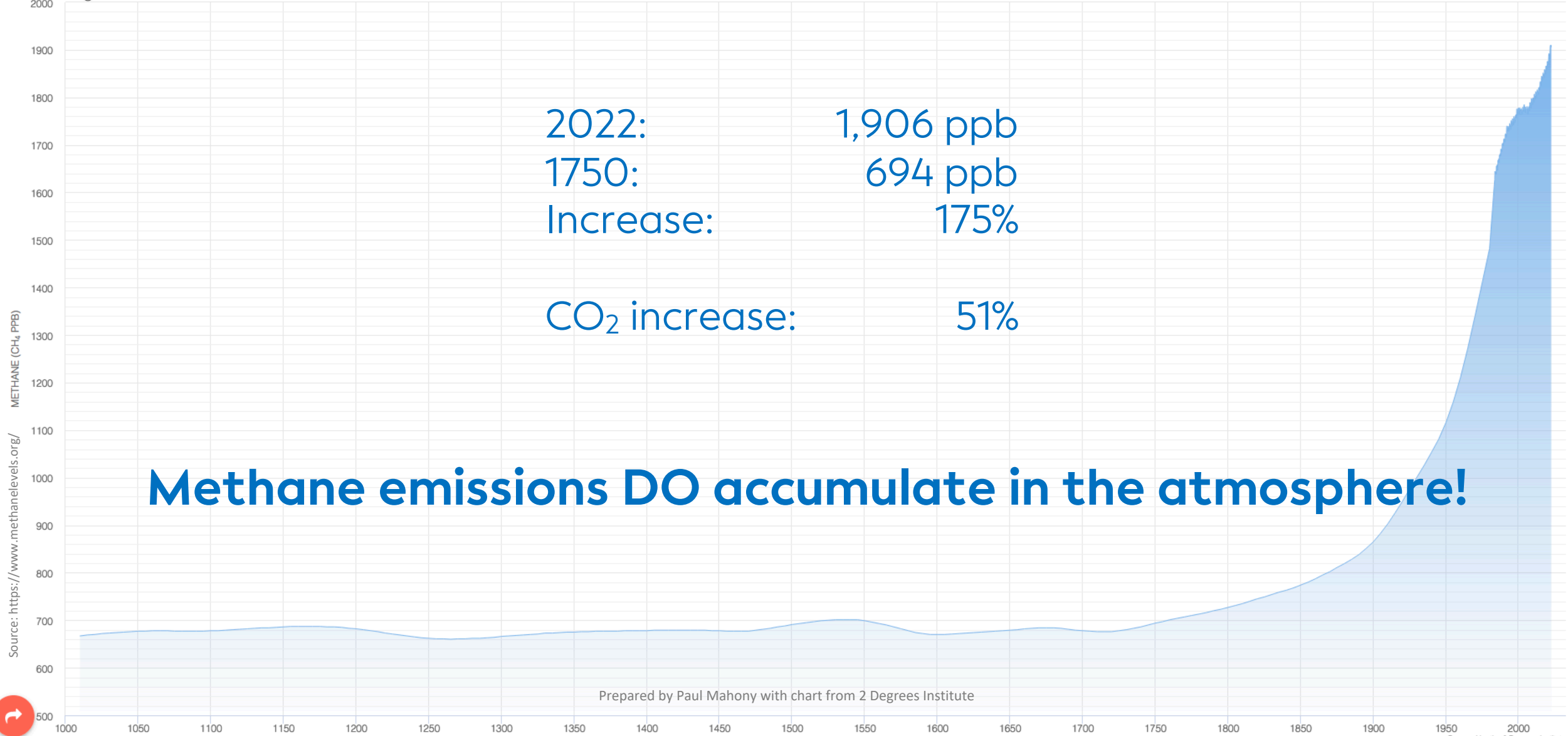


ATMOSPHERIC METHANE (CH₄) CONCENTRATIONS



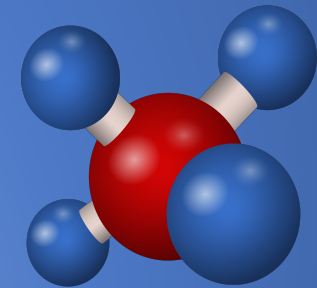
GLOBAL CH₄ LEVELS

Click and drag in the plot area to zoom in



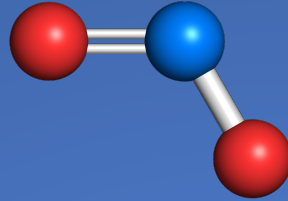
METHANE (CH₄) UPDATE – JUNE 2022

- Global heating is four times more influential in accelerating methane emissions than previously estimated.
- Rising temperatures are helping to produce more methane, for example by speeding up microbe activity in wetlands and permafrost.
- At the same time, the removal of methane from the atmosphere has slowed down, with increasing numbers of wildfires reducing the availability of the hydroxyl (OH) radical – a “detergent” in the upper atmosphere.

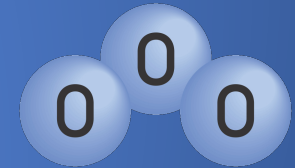


OTHER NON-CO2 WARMING AGENTS RELEVANT TO ANIMAL AGRICULTURE

- Nitrous Oxide (N₂O)
273 times as potent as CO₂



- Black Carbon
Contributes to global warming in two ways. Firstly, the particulates create heat by absorbing the sun's radiation while airborne. Secondly, they can blow thousands of kilometres to land on glaciers and polar ice caps, where they cause solar radiation to be absorbed, rather than reflected, thereby speeding melting.
- Tropospheric (ground level) Ozone (O₃)
IPCC: "there is robust evidence that tropospheric ozone also has a detrimental impact on vegetation physiology, and therefore on its CO₂ uptake"



Sources: 1. IPCC draft AR6 WG1, Ch. 7, Table 7.15

2. World Preservation Foundation, "Reducing Shorter-Lived Climate Forcers through Dietary Change: Our best chance for preserving global food security and protecting nations vulnerable to climate change" (undated),

3. Myhre, et al., 2013: "Anthropogenic and Natural Radiative Forcing. In: Climate Change 2013: The Physical Science Basis. Contribution of Working Group 1 to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change", p. 661 [Stocker, T.F., et al. (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, <https://www.ipcc.ch/report/ar5/wg1/>.

THE DOUBLE-EDGED SWORD OF REDUCING FOSSIL FUEL EMISSIONS

We have created a potentially tragic double-edged sword in the form of aerosols generated by the burning of fossil fuels.

Aerosols are airborne particulates such as sulphates, nitrates, and dust from smoke and manufacturing. They have a cooling effect, sometimes referred to as “global dimming”, which has offset some of the warming effects of greenhouse gases.

They only remain in the atmosphere for around ten days, so their cooling impact will be short-lived in any transition away from fossil fuels to less carbon-intensive energy sources.

Based on research from organisations such as NASA and Australia’s CSIRO, climate researcher David Spratt has suggested that aerosol cooling is in the range of 0.5-1.2°C.

Warming the planet by that much through the removal of aerosols could contribute to further climate system feedbacks and runaway climate change.

In contrast, the overwhelming effect of reduced reliance on farmed animals will be cooling, without a corresponding warming effect.

BIODIVERSITY LOSS

Food system impacts on biodiversity loss

Three levers for food
system transformation
in support of nature

Tim G. Benton, Carling Bieg, Helen Harwatt,
Roshan Pudasaini and Laura Wellesley



Report published by Chatham House, the
Royal Institute of International Affairs, London
in February 2021

Supported by the United Nations Environment
Programme (UNEP)

“Plant-based diets crucial to saving global
wildlife, says report”

Guardian Australia, 4 Feb 2021

“Humanity must shift towards more
plant-based diets . . .”

Report extract

Back to Brigalow Belt in Queensland and NSW

“Many of the wildlife species that were once common in Brigalow forests are now threatened, including the . . . golden-tailed gecko . . .”



INVASIVE GRASS SPECIES

GAMBA GRASS, NORTHERN AUSTRALIA

It is invasive, competes with native grasses and greatly increases the frequency and intensity of wildfires, leading to ecosystem degradation, habitat loss and species decline.



Fires in areas with gamba grass typically burn five to twenty times more intensely than fires in areas without it. Normal dry season fires have little impact on trees but gamba fires kill them.

Source 1: Australian Government, Department of the Environment and Energy, "Question and answer: How does the listing of gamba grass and four other grasses as a key threatening process affect me?".

Introduced to Australia for pasture.

Source 2: Rossiter NA, Setterfield SA, Douglas MM, Hutley BB (2003) Testing the grass-fire cycle: alien grass invasion in the tropical savannas of northern Australia. Diversity and Distributions 9, 169-176, cited in Woinarski, J., et al., p. 149.
Image: Bushfires NT. Used with permission.

GAMBA GRASS, NORTHERN AUSTRALIA

Gamba grass has been banned in Western Australia, and its use is restricted by legislation in the Northern Territory and Queensland.

“It was legitimately introduced and as far as we’re concerned it . . . should remain as one of a suite of pasture species that is available to the pasture industry.”

Greg Brown
Former cattle president AgForce
(Queensland’s peak farm lobby group)

BUFFEL GRASS

Declared a weed and banned in South Australia.

“Buffel grass is arguably the single greatest invasive species threat to biodiversity across the entire Australian arid zone . . .”

“Modelling suggests buffel grass could establish in over 60% of mainland Australia . . .”



BUFFEL GRASS

Ecologist John Read says buffel grass in the Northern Territory is moving like “*a cancer across the countryside*”, taking out trees and all the other grasses.

It is also adversely affecting the ability of indigenous communities to utilise native food resources and access cultural sites.

BUFFEL GRASS

Meat & Livestock Australia has acknowledged that most sown pasture development in inland Queensland has occurred on fertile soils that have been cleared of brigalow and gidgee woodlands and that buffel grass is the predominant introduced pasture species in the region, representing over 75% of the area sown to tropical grasses

“We’re in a business. I mean, our business is growing kilos of beef per square kilometre and that’s what we do and if this grass is going to help us do that and stay viable, well, we’ll keep it.”

Grazier Steven Cadzow
Mt Riddock Station, NT

Sources: 1. Peck, G., Buck, S., Hoffmann, A., Holloway, C., Johnson, B., Lawrence, D. and Paton, C. (2011) “Review of productivity decline in sown grass pastures”, Project Report. Meat & Livestock Australia Limited, p. 12
2. ABC Landline, “Mixed Blessing”, 2 February 2015

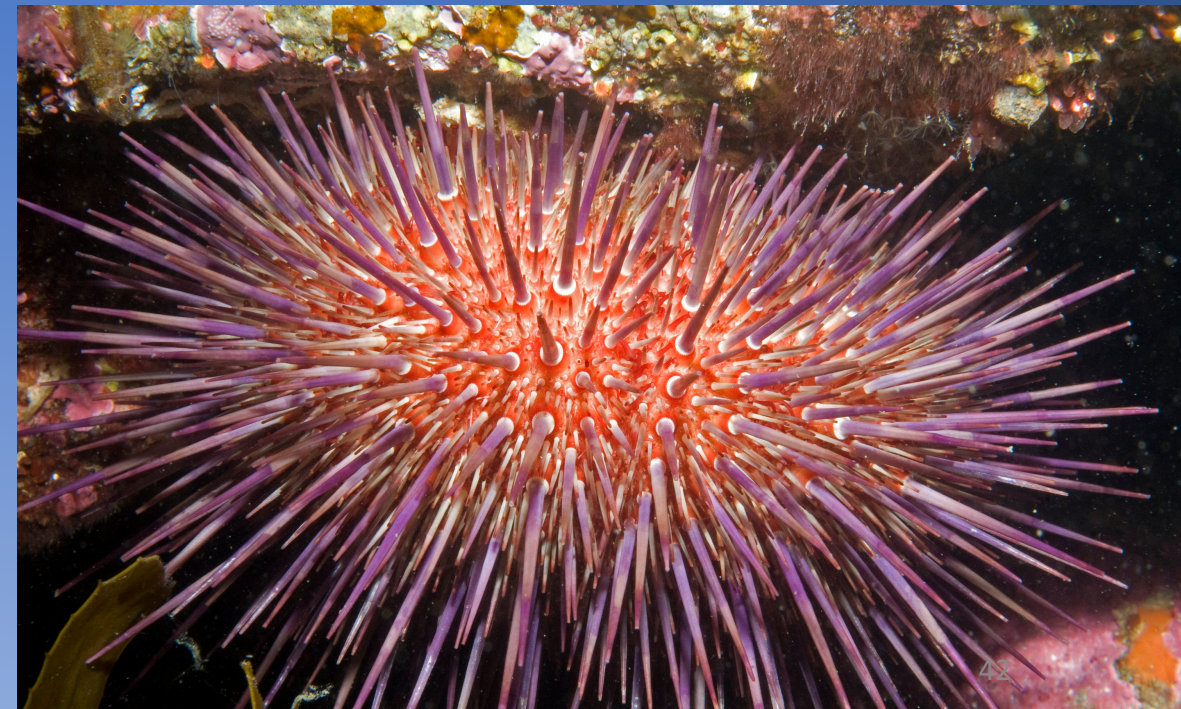
Note regarding Source 2: The transcript of ABC’s Landline program mistakenly attributed Steven Cadzow’s comment to Stewart Taylor of North Australian Pastoral Company (NAPCO). Cadzow’s Mt Riddock Station is not a NAPCO property.
This author has notified the ABC.

MARINE ECOSYSTEMS

A hidden catastrophe

With the loss of predators such as large carnivorous fish, sharks, crabs, lobsters, seals and sea lions, and the corresponding population increase of herbivores and bioturbators, massive amounts of carbon are lost from vegetation and sediment.

Kelp forests and sea grass meadows are decimated.



Source: Atwood, T.B., et al., "Predators help protect carbon stocks in blue carbon ecosystems", Nature Climate Change 5, 1038-1045 (2015), doi: 10.1038/nclimate2763, published online 28 September 2015, <http://www.nature.com/nclimate/journal/vaop/ncurrent/full/nclimate2763.html>

Images: 1. NOAA National Ocean Service, Kelp forest, Flickr, CC BY-NC-SA 2.0, <https://creativecommons.org/licenses/by-nc-sa/2.0/>; 2. Julian Finn, Museums Victoria, CC BY 4.0, creativecommons.org/licenses/by/4.0/

BLUE CARBON



Vegetated coastal habitats are the most carbon-rich ecosystems in the world, capturing carbon forty times faster than tropical rainforests.

Seagrass meadows “are extremely efficient at sequestering carbon, they act as a nursery ground for juvenile fish . . . they cycle nutrients, they stabilise our coast lines and prevent erosion . . . In terms of all those ecosystem services . . . they are worth about four times more . . . than coral reefs globally”.

CORAL REEFS



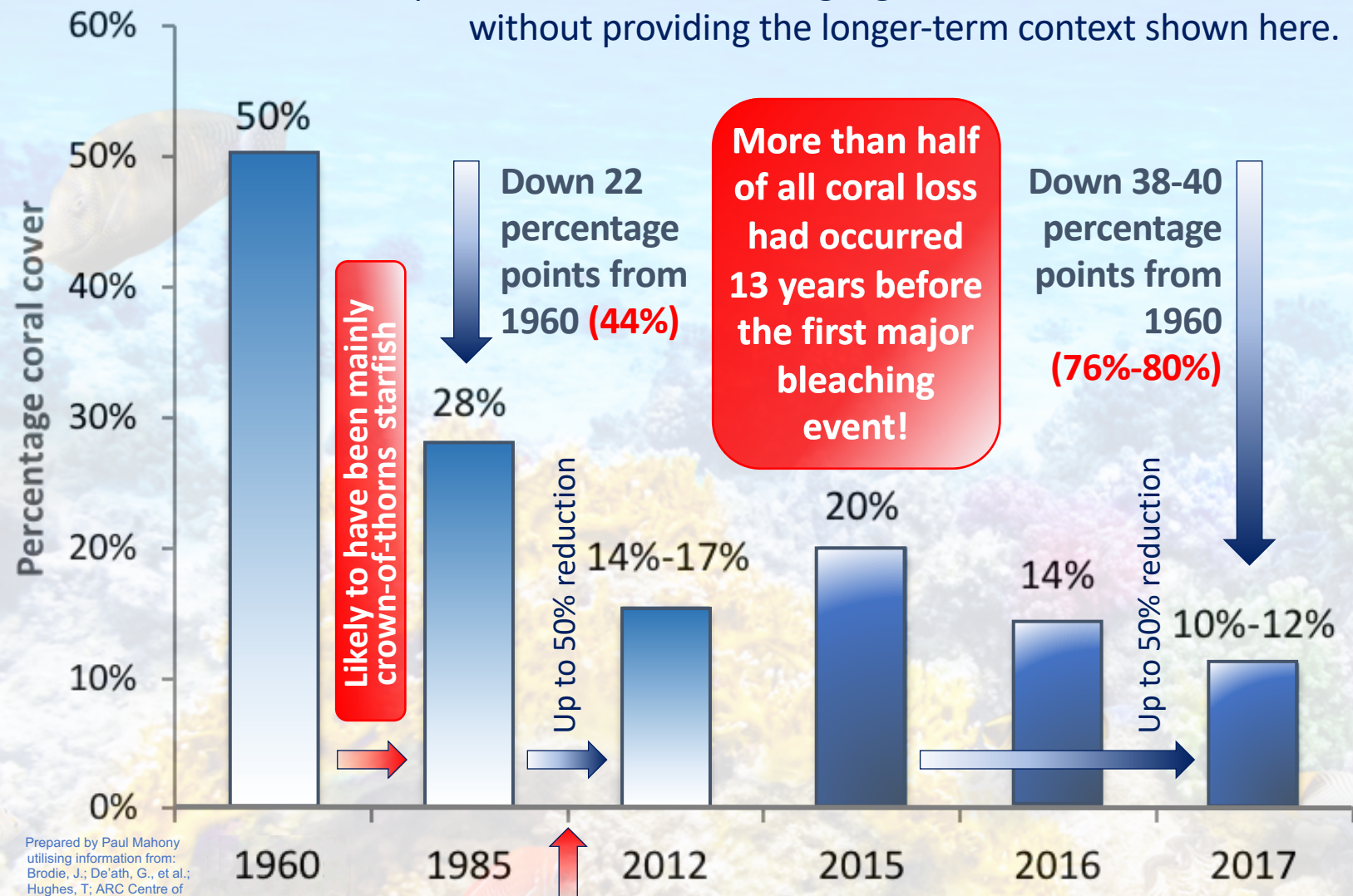
“At least thirty, perhaps anything up to eighty, per cent of all marine species have some part of their life cycle in a coral reef.”

Dr. John "Charlie" Veron
former Chief Scientist
Australian Institute
of Marine Science

EXTENT OF CORAL COVER ON GREAT BARRIER REEF

Media reports in 2012 and 2017 highlighted 50% reductions for relevant periods without providing the longer-term context shown here.

The reef is around the size of Italy



More than half of all coral loss had occurred 13 years before the first major bleaching event!

Major causes of coral loss 1985-2012

Cyclones	48%
Crown-of-Thorns starfish	42%
Coral bleaching	10%

Cattle grazing and other agricultural practices have been major contributors through nutrient and sediment discharge.

Nutrients increase the number of phytoplankton, which provide nutrition for crown-of-thorns starfish larvae. Sediment blocks the sun, smothers coral and reduces its resilience.

Around 70% of sediment comes from cattle grazing.

First major bleaching event 1998



NEW ZEALAND – MAYBE NOT 100% PURE?

- 1990–2019 – Number of dairy cattle up 82%.¹
- 12-fold increase in Canterbury and Southland.
- Intensive dairy means water abstraction, increased stocking rates, riparian grazing, fertiliser application, vegetation removal, and wetland drainage.
- This results in increased faecal contamination, excess nutrients, and sedimentation.
- Fertiliser and effluent lead to increased nitrates, causing toxic algal blooms, which extract oxygen and make the water unsafe for fish and other inhabitants. Effluent also adds pathogens such as *E. coli*.²
- 60% of New Zealand's rivers now have unacceptable levels of contamination. The figure is 95-99% in pastoral, urban and non-native forested areas.³
- 76% of native freshwater fish are classified as being threatened with, or at risk of, extinction.⁴
- The carcinogenic nitrates enter ground water systems. Canterbury and Southland have some of the highest rates of bowel cancer in the country.⁵



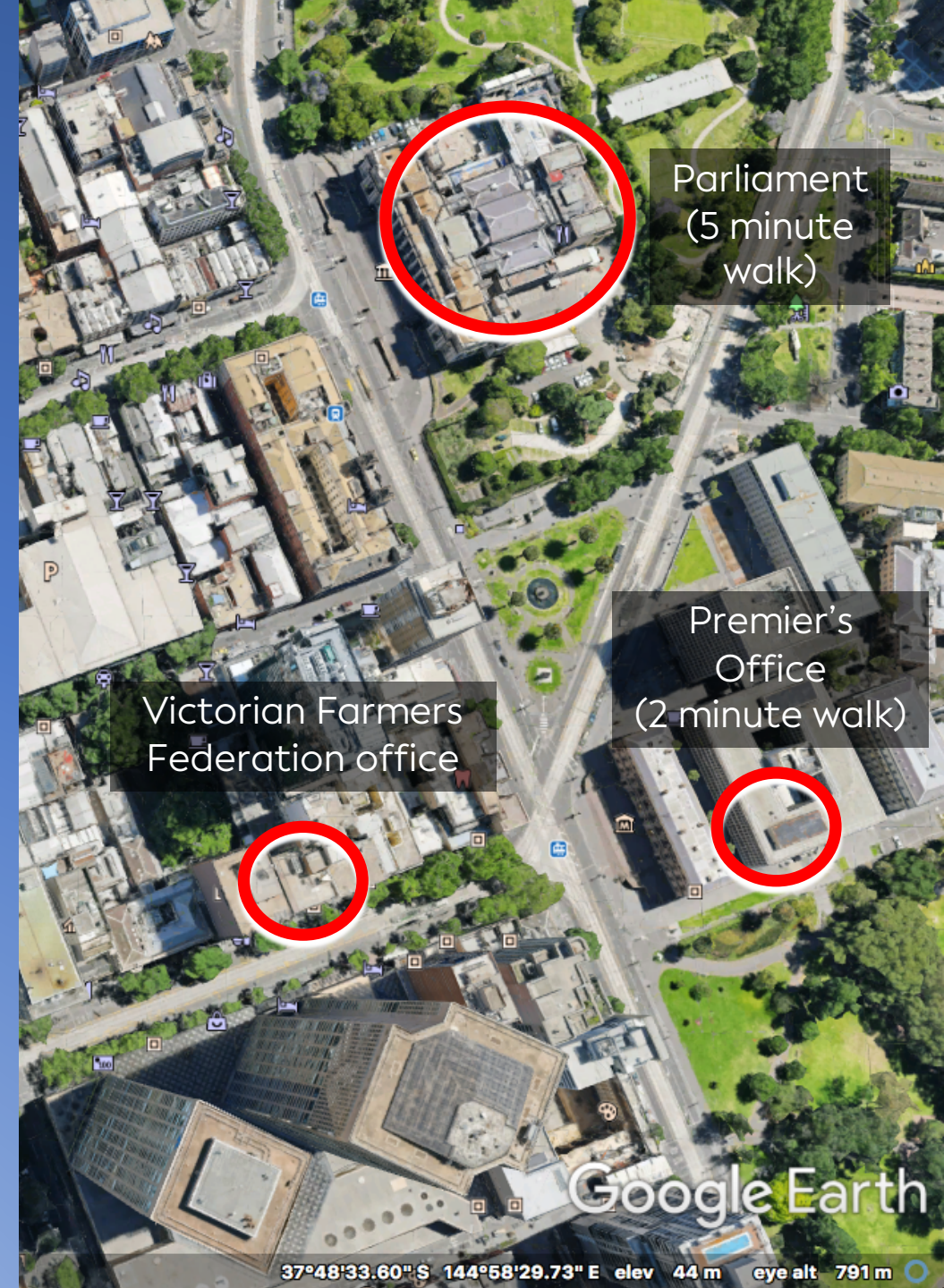
DIRECT POLITICAL PRESSURE FROM FARMED ANIMAL ORGANISATIONS

An example: Victorian Farmers Federation

The Victorian Farmers Federation describes itself as
“an active, powerful lobby group dedicated to the
interests of farmers...”

In January 2018, it issued a
“stern warning to
government” condemning the
proposal to introduce the
concept of sentience to
animal welfare legislation.

Sources: 1. Victorian Farmers Federation, “About us”, https://www.vff.org.au/vff/The_VFF/AboutUs/vff/About_Us/About_Us.aspx?hkey=d1685f71-c8b5-43ae-b571-a2594d327d9d 2. Victorian Farmers Federation, “Farmers condemn unnecessary animal welfare legislation”, 5 January 2018, https://www.vff.org.au/vff/Media_Centre/Media2018/Farmers_condemn_unnecessary_animal_welfare_regulation.aspx

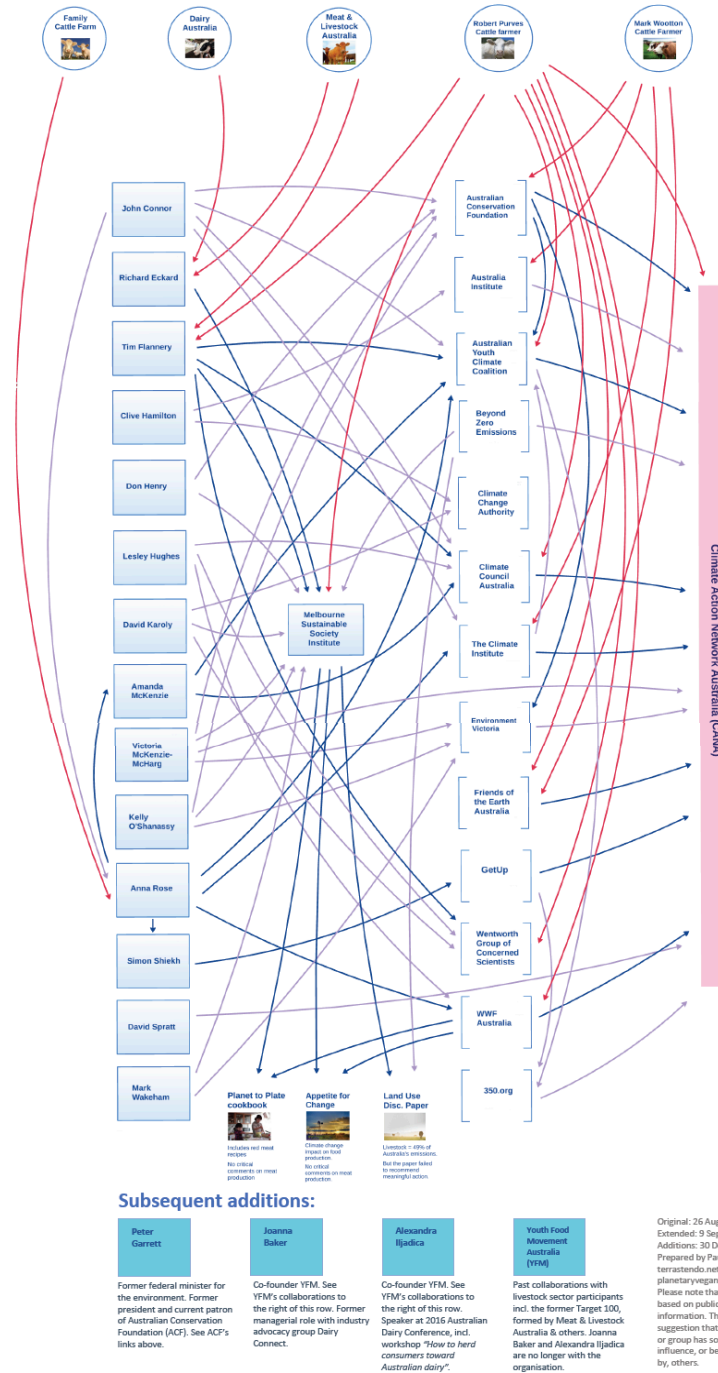


**LINKS
BETWEEN
FARMED ANIMAL SECTOR
AND
ENVIRONMENTAL GROUPS
2016**

The link that too many ignore: Australian farmed animal sector and environmental campaigners 2016

Note: This author is not suggesting that any person or organisation has sought to influence others or that any person or organisation has been influenced.

More detail:
<https://terrastendo.net/2016/08/26/the-link-that-too-many-ignore/>



AN EXAMPLE

The “60L Green Building”

60 Leicester St,
Carlton, Victoria.

A redeveloped
hi-tech “green”
building.

A gift to Australian
Conservation
Foundation (ACF)
from sheep and
cattle farmers.



Home of ACF,
Environment
Victoria, and
Australian Youth
Climate Coalition

Office of former
Greens MP Greg
Barber during his
parliamentary term

Source: Australian Conservation Foundation,
2009-10 Annual Report, p. 14
Image: Nick Carson, Wikimedia, CC BY-SA 3.0,
<https://creativecommons.org/licenses/by-sa/3.0/>

Note: This author and presenter is not
suggesting that any person or organisation
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Midnight Oil's Peter Garrett is ACF's patron and former president.

His "idea of heaven" is "a series of sausage sizzles all together".



Climate Council
Australia's Chief
Councillor Prof. Tim
Flannery, a "proud eater
of flesh" and former paid
consultant to Meat &
Livestock Australia.

Has received funding
from a prominent cattle
farmer and philanthropist,
to whom he dedicated a
book.

Sources: 1. Manning, P., "Wrestling with a climate conundrum", 19th Feb 2011, Sydney Morning Herald. 2. Russell, G., Quarterly Essay 32 (2008), Correspondence in response to Now or Never (Quarterly Essay 31) by Tim Flannery, p. 104.
3. Pearse, G., "The Climate Movement", 1 September 2011. 4. Flannery, T., "Atmosphere of Hope: Searching for Solutions to the Climate Crisis" (2015). Image: National Climate Change Adaptation Research Facility, Flickr,
NCCARF Welcome Reception 1.5 Tim Flannery, Creative Commons Attribution-NonCommercial 2.0 Generic, <https://creativecommons.org/licenses/by-nc/2.0/>

Note: This author and presenter is not suggesting that any person or organisation has sought to influence others or that any person or organisation has been influenced.

MARKETING AND PR

RED MEAT IN THE CLASSROOM

Meat & Livestock Australia's "core purpose" is "fostering the prosperity of the red meat industry".

MLA website pages and links

"MARKETING BEEF AND LAMB" PAGE

➡ **"GOOD MEAT" CAMPAIGN PAGE**

➡ **"EDUCATION" RESOURCES PAGE**



"National
curriculum
study
guides"

"Facts
for
students"

"Virtual
excursion"

"Interactive
board
Game"

"Lessons
and activity
sheets"

"Digital
lessons"

"Classroom
posters"

"Paddock to
Plate VR
Roadshow"

PRIMARY INDUSTRIES EDUCATION FOUNDATION AUSTRALIA (PIEFA)

A registered charity

Members include:

- Meat & Livestock Australia
- Australian Pork Limited
- Australian Eggs Limited
- Dairy Australia

PIEFA claims to be a “source of credible, objective and educational resources for schools”, with beneficiaries who include children and youth.

CEO (2017/18 annual report with this presenter’s underline):

“Like many not-for-profit organisations, our biggest threat remains the security of sustainable levels [of] funding. Tied in with this is the need to demonstrate continued value to our members’ investment.”



Is this charity working for the interests of children and youth or its members?

Industry “education” (an example)

Meat &
Livestock
Australia tells
school
children that
farmers
provide
sheltered
areas for
native animals
to feed and
breed.

Reality

“Victorian farmers have called for kangaroos to be culled in much greater numbers because of the hazards they pose to motorists, as well as the damage they are inflicting on pastures, crops, fences and earnings.”

The Age, 2015



CSIRO's partnership with Meat & Livestock Australia: How reliable is the information?

Some examples of concerns about past projects:

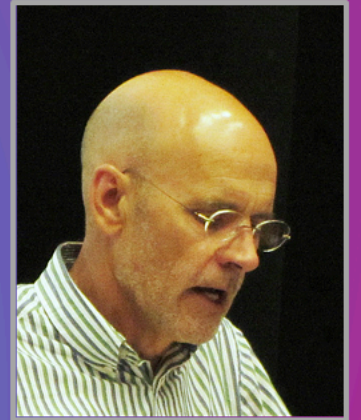
"The CSIRO's endorsement of a high-meat diet is perhaps an indication of the extent to which our scientists have taken on the role of consultants to industry in their bid to raise funds, and their willingness to deliver research findings that industry finds agreeable."

Rosemary Stanton, OAM and Gyorgy Scrinis, University of Melbourne and formerly RMIT



"Concerns about CSIRO management's commitment to independent science go back at least to 1994 . . ." [CSIRO's director of communications had been] "chief executive of the Tobacco Institute of Australia where she had rejected the science linking smoking and cancer, telling a Senate committee: 'I do not believe that cigarette smoking is an addiction, based on any reasonable definition'."

Clive Hamilton, Author and Professor of Public Ethics at Charles Sturt University



Feedback on claims of meat industry proponents

The “extremely ambitious claims” made by proponents of regenerative grazing and associated approaches are “dangerously misleading”.

Food Climate Research Network, University of Oxford,
“Grazed and Confused”, 2017



Use of an alternative metric for measuring methane’s impact [supported by the Australian red meat sector] is flawed and a form of “creative accounting”.

Prof. Pete Smith (IPCC convening lead author), University of Aberdeen and Prof. Andrew Balmford, University of Cambridge

SOLUTIONS

SOME POTENTIAL SOLUTIONS

Create meaningful price signals through carbon and biodiversity taxes and the valuation of natural capital.

Return the tax revenue to the community through the tax and welfare systems.

Address the community in frank terms regarding the dire reality.

Meaningfully regulate marketing and PR.

Seek to ensure a just transition.

BUT WILL ENOUGH LAW MAKERS ACT FOR THE GREATER GOOD?

CONCLUSION

We face dire circumstances that must be recognised as such.

Only then will we be in a position to take the steps required to overcome the biodiversity and climate change emergencies we face.

It is hoped this presentation will assist the process in a meaningful way.