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INQUIRY INTO CLIMATE CHANGE (NET ZERO FUTURE) BILL 2023

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CLIMATE CHANGE (NET ZERO FUTURE) BILL 2023

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About Animal Liberation

Animal Liberation is proud to be Australia's longest serving animal rights organisation. We have worked to permanently improve the lives of all animals for over four decades. During this time, we have accumulated considerable experience and knowledge relating to issues of animal welfare and animal protection in this country. We have witnessed the growing popular sentiment towards the welfare of animals, combined with a diminishing level of public confidence in current attempts, legislative or otherwise, to protect animals from egregious, undue, or unnecessary harm. Our mission is to permanently improve the lives of all animals through education, action, and outreach.

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On behalf of Animal Liberation, we hereby submit our response and commentary regarding the *Climate Change (Net Zero Future) Bill 2023*. We are grateful for the opportunity to engage in this critical dialogue and the necessity of mitigating climate impacts through state legislation.

Animal Liberation is a non-profit animal protection organisation with a distinguished history of over four decades in advocating for animal justice and welfare. We proudly hold the distinction of being Australia's longest-serving animal rights organisation. Our mission centres on the principle of interspecies equality, with a commitment to permanently improving the lives of all animals through education, action, and outreach.

While our advocacy spans the spectrum of animal protection issues, we also recognise that our mission extends to the broader sphere of environmental and public health issues stemming from contemporary production systems and supply chains. We are acutely aware of the environmental challenges posed by animal agriculture, including its significant contribution to greenhouse gas emissions, deforestation, habitat loss, water and energy consumption, and its impact on biodiversity.

This document is intended to focus on specific areas of key concern within the Bill. We acknowledge that our submission does not provide an exhaustive analysis of its entirety but rather highlights critical aspects that warrant attention and action. As such, the absence of discussion on certain elements within the Bill should not be misconstrued as an endorsement or acceptance of those aspects. Finally, this document reflects our unwavering commitment to addressing the environmental consequences of animal agriculture and the urgency of integrating mitigation measures into climate action. We believe that the current consultation process offers the state of New South Wales a critical opportunity to play a pivotal role in tackling these challenges and achieving a sustainable, net-zero carbon future.

We appreciate the Committee's attention to this critical matter and look forward to engaging in a constructive dialogue about the environmental impact of animal agriculture and the essential steps needed to address these issues. Together, we can make a significant difference in preserving our environment and ensuring a healthier, more sustainable future for all.

Alex Vince
Campaign director

Section 1: The urgent climate challenge

Section 1.1: Introduction to climate change

Climate change refers to significant changes in the average values of various meteorological elements for which averages have been recorded over an extended period.[1] Driven by the accumulation of greenhouse gases ('GHGs') in the Earth's atmosphere[2], primarily produced by human activities and industry[3], climate change is manifesting in rising global temperatures, extreme weather events, sea-level rise, and myriad ecological and societal disruptions.[4-5] Such consequences are not a distant threat; they are a current reality. As such, the global community faces an unprecedented challenge - the urgent need to address the climate emergency.[6-7] We are tasked with taking immediate, bold, and collective action to mitigate its impacts and ensure a sustainable future for our planet.[8-9]

Section 1.2: The Australian context

Australia has unquestionably felt the profound and distressing effects of climate change. The revelation from the Intergovernmental Panel on Climate Change ('IPCC') in its most recent report, released during the aftermath of the catastrophic March 2022 floods, underscores the severity of Australia's vulnerability. The report identifies Australia as one of the nations bearing a disproportionate burden, experiencing more severe impacts of climate change than any other advanced economy.[10-11]

Extensive and comprehensive examinations of climatic shifts in Australia have exposed the alarming trends that are becoming increasingly evident. Rising temperatures are causing heat waves and extreme weather events to occur more frequently and with greater intensity.[12] These temperature increases have far-reaching consequences, not only for the environment but for the well-being and safety of communities across the nation. Changing rainfall patterns further exacerbate these challenges, leading to more prolonged periods of drought in some regions and heightened flood risks in others.[13-15]

The aforementioned March 2022 floods, which occurred alongside the release of the IPCC report, were a stark reminder of the destructive power of extreme weather events, causing significant loss of life, property damage, and displacement of communities.[16] Australia's coastal areas are feeling the impact of increasing ocean temperatures and rising sea levels, resulting in greater risks to coastal communities and ecosystems.[17] These developments have prompted recent assessments that suggest the window of opportunity to "save ourselves" from the mounting impacts of climate change is rapidly closing.[18]

With the anticipation of more frequent and intensified ecological adversities, including rising bushfire occurrences[19], flooding events[20], and prolonged droughts[21], Australia is at a critical juncture. Addressing the challenges posed by climate change is not just an environmental issue but a matter of survival and the well-being of the nation's citizens. The devastating consequences of these climatic shifts highlight the urgent need for comprehensive and immediate climate action to mitigate the intensifying ecological adversities that Australia is expected to face in the coming years.

Section 1.3: The imperative of net-zero emissions

In this context, it is clear that attaining 'net-zero' is not merely a catchphrase aimed at promoting ambitious emission reductions. Rather, it is an imperative for halting global warming and its consequences.[22] The concept of 'net-zero' emissions is not just a lofty goal but a fundamental strategy rooted in the necessity to control the increase in global temperatures. To achieve this, an emissions budget has emerged as a crucial

framework for climate policy and a tool for understanding and addressing the complex dynamics of climate change.[23,24] This budget provides us with a finite amount of GHGs, principally CO_2, that we can release into the atmosphere while still staying within specific temperature targets, such as those outlined in the Paris Agreement.

However, there has been some confusion surrounding the role of non-CO_2 gases within this framework.[25] As the cumulative carbon budget exclusively pertains to CO_2, it has prompted the need to broaden our focus beyond just this one gas.[26] Other potent greenhouse gases, such as methane (CH_4) and nitrous oxide (N_2O), have gained prominence as they significantly contribute to global warming. Their warming potential, when compared to CO_2, is substantially higher, making them key contributors to the overall heat-trapping capacity of the atmosphere.[27]

Section 1.4: The unmet challenge of global emissions reductions

In acknowledgment of these findings and the pressing need for climate action, governments and policymakers across the world are setting ambitious targets, crafting comprehensive strategies, and enacting progressive legislation to combat climate change.[28] The gravity of the situation is well understood, and the international community has recognized the necessity for swift and resolute action. Yet, three decades of political initiatives and a wealth of scientific studies on the origins and consequences of climate change have failed to stall global warming; rather, global emissions have increased, reaching levels approximately 60% higher than those recorded in 1990.[29] While more must be done, many Australians believe governments are not doing enough quickly enough.[30,31] While significant strides have been made in transitioning away from fossil fuels, a commendable step in the right direction, it is imperative to mitigate the impacts caused by emissions from all other sources to fulfil climate objectives and commitments. To genuinely fulfil climate objectives and commitments, it is imperative to take a holistic approach that addresses emissions from all sources comprehensively.[32]

In this context, there is an often overlooked or underestimated yet significant contributor to GHG emissions that requires additional consideration: animal agriculture.[33-38] Despite its undeniable role as a significant contributor to GHG emissions, animal agriculture has not received the attention and focus it deserves in climate action discussions. It is essential to acknowledge that the path to a sustainable and climate-resilient future requires us to confront all sources of emissions. While we must continue the transition away from fossil fuels, it is equally critical to confront emissions stemming from other sectors, including animal agriculture. By doing so, we not only broaden our scope but also address a major contributor to global emissions, one that plays a pivotal role in climate change.

Section 1.5: The 'policy void' of animal agriculture

Despite the wealth of scholarly research that has extensively examined and highlighted the environmental consequences of animal agriculture's significant contribution to climate change, and the formulation of policy solutions for reducing emissions, the impact of this knowledge on the execution of policies, both at the global and national levels, has remained disappointingly minimal, if not entirely negligible. The research paints a clear picture of the detrimental effects of animal agriculture on our climate and presents viable pathways for emission reduction. However, these findings have often failed to translate into meaningful policy actions, leaving a substantial gap between knowledge and implementation.[39]

As of mid-2022, a mere 16 countries across the globe had taken the vital step of setting emissions reduction targets specifically for the agricultural sector.[40] This statistic is indicative of a concerning trend where policymakers have paid limited attention to the profound environmental implications of animal agriculture. This situation has been aptly characterised as a 'livestock policy void', signifying a significant gap in our collective efforts to combat climate change.[41]

To meet the ambitious climate goals and targets established on both national and international fronts, it is imperative that every sector, including agriculture, embarks on large-scale and rapid initiatives aimed at significantly reducing their emissions across all types of GHGs.[42] Failing to do so would not only hinder our ability to achieve these critical climate objectives but would also jeopardise our capacity to limit global warming to levels that avoid catastrophic consequences.[43]

The urgency of the climate crisis necessitates immediate and concerted action from all segments of society, including governments, industries, and individuals. This action must be informed by the wealth of scientific evidence highlighting the role of animal agriculture in climate change and the range of effective policy solutions that have been proposed. As we move forward, it is essential that this knowledge is not only acknowledged but acted upon. Only through the integration of robust climate policies that address the emissions from animal agriculture can we hope to make meaningful progress in mitigating the impacts of climate change and securing a sustainable future for our planet.

Section 1.6: *The Climate Change (Net Zero Future) Bill 2023*

The introduction of the *Climate Change (Net Zero Future) Bill 2023* ('the Bill') is a significant step forward in the global effort. With its aim of achieving net-zero GHG emissions, the Bill demonstrates the state's commitment to playing a pivotal role in mitigating climate change. This response offers the Committee a comprehensive response to the Bill. It does so by providing a series of recommendations, including support for sustainable farming practices, investments in research and development ('R&D'), the promotion of plant-based alternatives, the implementation of emission reduction targets, and the support for a just transition and reskilling of those currently employed in the animal agriculture sector. It also explores the concept of balancing environmental, economic, and social objectives, ensuring that mitigation efforts are equitable, fostering resilience, and promoting sustainability. Ultimately, it seeks to bring attention to the critical issue of animal agriculture's role in the climate emergency and to offer a comprehensive response that incorporates this vital aspect into the state's mitigation efforts.

Section 2: Understanding the impact

Section 2.1: The global significance of animal agriculture

Understanding the scale of animal agriculture's contribution to GHG emissions is crucial in assessing its impact on the climate. Globally, the sector is responsible for between 16.5 and 18% of all human-induced GHG emissions, making it one of the largest contributors to climate change.[44-47] These statistics underscore the urgent need to comprehend and address the environmental footprint of the sector.

The production of animal-based foods on a worldwide scale encompasses not only the raising of animals but also the cultivation of crops to feed them, as well as the utilisation of pastures for grazing. Collectively, these activities within the animal agriculture sector are responsible for contributing to at least 57% of all GHG emissions associated with food production.[48] This statistic illuminates the pivotal role that animal agriculture plays in driving GHG emissions, further emphasising its significant impact on our climate.

One of the lesser-explored but immensely important aspects of the sector's environmental footprint is the historical transformation of land to support the industry. This process involves the conversion of natural landscapes into grazing areas and the cultivation of feed and forage crops, which has had far-reaching consequences. It has been a major contributor to the release of GHGs into the atmosphere, particularly CO_2, which is a major driver of global warming. Astonishingly, the historical transformation of land for animal agriculture has been held accountable for generating as much as a third of all anthropogenic CO_2 emissions

to date.[49-50] This sobering fact underscores the profound impact of animal agriculture on altering the Earth's carbon balance and further necessitates comprehensive actions to address its emissions.

Comprehending the extensive contributions of animal agriculture to GHG emissions, both in terms of its direct emissions and the land use changes associated with it, is of paramount importance for tackling climate change. These insights underscore the urgency of addressing the environmental consequences of the sector and highlight the need for strategic policies and practices that can help reduce its impact and pave the way for a more sustainable and climate-resilient future.

Section 2.2: The complex warming impact

Estimating the warming impact of the agricultural sector is complex due to the emission of multiple GHGs with varying properties, lifespans, and sources.[51-52] However, it is feasible to assess its risk by focusing on the GHGs it releases in substantial quantities. Animal agriculture, in particular, is a noteworthy source of GHGs, and its emissions are associated with various activities within the sector.[53-54]

Methane (CH_4) emissions

CH_4 is released primarily through enteric fermentation in ruminant animals such as cattle. This natural digestive process results in the production of methane, a potent GHG that is approximately 83 times more effective at trapping heat in the atmosphere than CO_2 when considering an equivalent mass.[55] CH_4 has a relatively short atmospheric lifespan of about a decade.[56] The emissions from enteric fermentation and manure management in animal agriculture are substantial contributors to this potent GHG.[57] It's noteworthy that between 2-12% of the energy consumed by ruminant species is transformed into enteric methane during digestion.[58] This process alone is responsible for accounting for approximately 40% of GHG emissions within the global agricultural sector, representing around 5% of total GHG emissions.[59]

Nitrous oxide (N_2O) emissions

N_2O is another significant GHG associated with animal agriculture. It is primarily emitted through the application of synthetic fertilisers, crop cultivation, and ruminant excretion on rangelands.[60] N_2O has an extremely high heat-trapping potential, over 250 times greater than CO_2 by mass, and a relatively long atmospheric lifespan, lasting roughly a century.[61] This makes it a particularly worrisome GHG when it comes to its contribution to long-term climate change.

Carbon dioxide (CO_2) emissions

While CO_2 is emitted throughout the food supply chain, it persists in the atmosphere for hundreds of years.[62] CO_2 emissions in animal agriculture can originate from sources such as energy consumption in machinery used for farming and transportation of animal products.[63]

Section 3: The environmental impact in Australia

Section 3.1: Environmental consequences of food production

The food production system is a major source of environmental impacts[64], and there is a growing call for a reduction in the negative impacts of human activity, particularly those associated with intensive agricultural enterprises.[65] Impacts associated with food production include land-use change and biodiversity loss[66], the depletion of water resources[67], pollution[68], and climate change through the emission of various GHGs.[69] While agricultural production in Australia since European colonisation has played a pivotal role in enhancing the social and economic progress of the nation, this has come at considerable ecological expense.[70-71] The introduction of European agricultural practices to Australia has proven to be environmentally harmful in various ways.[72]

Section 3.2: Historical land transformation

The early practices of settlers were often influenced by government policies or laws that either encouraged or forced the clearing of native vegetation for productive purposes.[73-75] Shortly after the establishment of the first permanent settlement in Sydney Cove in 1788, land clearing for agricultural enterprises began "almost immediately"[76], primarily in service of the rapidly expanding wheat and sheep industries.[77] Laws aimed at 'opening up' the colony for settlement and production were soon complemented by financial support from government departments and advancements in land clearing technology.[78] In the process, much of Australia's landmass has been transformed by human activity[79], particularly through extensive conversion of natural vegetation.[80] By the 1980s, approximately 38% of Australia's forests had undergone severe modification by clearing[81], and by 1995, the country had the smallest total area of remaining forests compared to other regions.[82] Today, land clearing is recognised as "the root of many environmental problems," including the production of GHGs and the ongoing biodiversity crisis.[83]

Section 4: Understanding the risk

Section 4.1: Climate implications and the call for action

Food production is a significant driver of climate change[84-87], and the anticipated 50% rise in global demand for agricultural goods by mid-century is expected to exceed climate targets.[88-91] Thus, any climate strategy striving for 'net-zero' emissions must incorporate the food production sector, including animal agriculture.[92-94] As such, the proposed bill presents a historic opportunity for NSW to lead in climate action and set ambitious yet achievable targets that align with international efforts to curb global warming. Achieving these targets is crucial for environmental sustainability and the well-being of future generations.

Section 4.2: Significance of agricultural GHG emissions

The significance of agriculture in contributing to GHG emissions in Australia cannot be understated. According to the Australian Bureau of Statistics ('ABS'), it stands as the second-largest GHG emitting sector in the country.[95] Direct emissions attributed to animal agriculture are estimated to account for approximately 70% of emissions within the agricultural sector and about 11% of the nation's total GHG emissions.[96] The leading source of these emissions, approximately 72.6%, arises from CH_4 produced through enteric fermentation, primarily in the red meat sector.[97] These emissions have far-reaching consequences for climate, biodiversity, human health, and overall environmental sustainability.[98-101] Failing to address the emissions from animal agriculture in climate action legislation poses significant risks and challenges.[102-103]

Section 4.3: Risk and urgency in climate action

In the context of climate change, risks emerge from the potential impacts, as well as responses and failures to respond, to these impacts.[104] The heightened commitment within international climate policy, exemplified by the objectives of the Paris Agreement[105], has accentuated the scrutiny of contributions from all sectors to mitigate climate change.[106] Animal agriculture, being the second-largest contributor to anthropogenic GHG emissions and a leading cause of deforestation, water and air pollution, and biodiversity loss, has come under increasing scrutiny.[107] Numerous studies have emphasised the need to reduce agricultural emissions to meet climate commitments[108-110], supported by robust scientific evidence highlighting the urgency of combating climate change through changes in consumption patterns.[111-112]

Section 4.4: Challenges in meeting growing demand

Over the past five decades, animal agriculture has witnessed unprecedented changes to meet growing demand.[113] During this period, the human population has grown by a factor of ~2.4, while meat consumption has surged by a factor of ~4.7.[114] Meeting the projected increase of 72kg in global meat consumption per person per year until 2050 is likely to necessitate further intensification of existing systems, significantly expanding the existing environmental footprint of the sector.[115] Currently, agriculture occupies around 55% of the Australian landmass, predominantly for grazing[116], contributing to land clearing and releasing approximately 115 million tonnes of GHG into the atmosphere each year.[117] Climate change exacerbates these environmental challenges, amplifying stresses such as habitat fragmentation, deforestation, and water resource pressures.[118]

Section 4.5: Ecological footprints and land use challenges

Animal-based products have particularly high ecological footprints, and as the sector continues to expand due to rising demand, it is anticipated to exacerbate these climate-related challenges.[119-121] Over the past four decades, global per capita consumption of animal products has more than doubled[122], with corresponding impacts on climate change.[123] While production efficiency improvements have reduced methane emission intensity[124], they are insufficient to offset emissions increases driven by growing demand.[125-126] Land use for the sector is a significant concern, with contemporary estimates suggesting that an average global diet requires approximately 0.85 hectares per person each year[127], with animal products responsible for roughly 87% of this land use.[128] Increased demand, coupled with limited available land, has made the sector a leading cause of land clearing, contributing to land degradation.[129] Meat and fish production alone account for nearly half (44%) of land degradation, primarily due to the cultivation of terrestrial feed crops for livestock and aquaculture activities.[130]

Section 4.6: The need for sustainable food systems

Australian reports indicate that the animal agriculture sector will "struggle to supply" animal protein using the limited resources available and the environmentally harmful practices of many contemporary production systems[131], which can also negatively impact public health.[132] The public health and environmental costs associated with the increasing demand for animal proteins are estimated to be as high as $1.6 trillion by 2050.[133] If GHG emissions intensities of animal products remain unchanged, the projected production growth will lead to corresponding increases in GHG emissions, undermining mitigation efforts.[134] Improving our understanding of where and why emissions arise in supply chains is crucial for addressing this challenge.

Section 4.7: Transitioning to a plant-rich diet

While addressing the climate crisis requires substantial reductions in GHG emissions from various sectors, including energy and transport[135], recent reviews have emphasised the necessity of significant emissions reductions from food production systems to limit global warming.[136] While increasing efficiency, reducing waste, and curbing excess consumption can contribute to these reductions[137-138], transitioning to a plant-rich diet is expected to have the most beneficial impact.[139-140] Proactively restructuring food systems to improve public health and environmental outcomes is recognized as one of the most critical global challenges of the 21st century.[141]

This holistic understanding of the environmental and climate impacts of animal agriculture underscores the urgent need for comprehensive climate action that incorporates this sector. As an animal protection organisation, we advocate for policies and practices that promote sustainable and humane food production systems, reduce GHG emissions, and protect the environment. The proposed bill represents an opportunity for NSW to lead the way in addressing these pressing issues and achieving a more sustainable and equitable future for all.

Section 5: Conclusion and recommendations

Section 5.1: Conclusion

In conclusion, achieving net-zero emissions, as defined by the United Nations ('UN'), is a global imperative that demands a comprehensive approach to addressing all sources of greenhouse gas emissions.[142] The *Climate Change (Net Zero Future) Bill 2023* currently under consideration offers NSW a unique opportunity to lead by example and set a precedent for holistic climate action. However, it is crucial that legislation aimed at achieving or facilitating this ambitious goal be equally comprehensive in its scope.

The consensus among scientists, environmentalists, and experts is resounding: meeting net greenhouse gas emission reduction objectives requires us to leave no stone unturned.[143] While transitioning away from fossil fuels is both commendable and necessary, we must also confront the significant role that animal agriculture plays in our emissions profile.[144] Therefore, the proposed legislation should be structured to encompass measures that not only target the reduction of emissions from fossil fuels such as coal and gas but also address emissions stemming from animal agriculture.

By taking proactive steps to address the emissions associated with animal agriculture, NSW has the potential to be a trailblazer in climate action. This demonstrates a commitment to a comprehensive and holistic approach to environmental responsibility that aligns with the urgent need to combat climate change effectively. Such leadership can serve as an inspiring model for other regions and nations to follow, ultimately leading to a collective and united effort to achieve net GHG emission reduction objectives worldwide.

Animal Liberation expresses its gratitude to the Committee for the opportunity to provide this response and sincerely hopes that the contents presented here serve as a compelling rationale for recognizing the critical role of animal agriculture in the pursuit of net-zero greenhouse gas emission reduction objectives. Together, we can pave the way for a sustainable and resilient future for NSW and the entire planet.

Section 5.2: Recommendations

We encourage the Committee to consider the following:

Recommendation 1: Promote sustainable agricultural practices

The ongoing climate crisis and health challenges necessitate a large-scale transition in global food systems.[145] Global authorities have warned that current food production systems will fail to sustainably feed the world unless urgent changes and sustainable transitions are made.[146-148] One of the key features of such a transition is shifting away from meat and animal product consumption towards increased plant-based diets, especially in industrialised nations.[149] We recommend that the Committee encourage and incentivise sustainable agricultural practices that reduce emissions and deforestation. Promoting regenerative agriculture, reducing meat consumption, and exploring alternative protein sources can significantly impact emissions reduction. Studies consistently show that replacing animal-based products with plant-based substitutes can dramatically reduce the environmental impacts associated with food consumption.[150-152]

Recommendation 2: Encourage shifts to sustainable diets

Animal products significantly contribute to GHGs, deforestation, biodiversity loss, and public health issues.[153] Therefore, there's a need to encourage shifts to more sustainable diets.[154-155] As meat consumption contributes substantially more to GHG emissions than plant-based diets, this represents a significant potential for emissions reduction.[156] Government involvement is imperative in addressing the overconsumption of unsustainable foods, given the scientific evidence presented.[157-158] While other actions like promoting reusable bags are favoured for their ease of adoption[159-160], they are far less effective in reducing emissions compared to adopting a meat-free diet for a year.[161] We recommend that government policies emphasise the efficacy of dietary modifications and actively inform the public about their effectiveness.[162-164]

Recommendation 3: Invest in research and innovation

We strongly recommend the NSW Government allocate additional resources to support research, development, and innovation in sustainable alternatives to traditional animal agriculture. These innovations can significantly lower emissions and provide economic opportunities for producers.[165] Just as legislating emissions reduction targets attracted significant private investment in renewable energy[166], we suggest expanding consideration to food production and consumption, which is a leading cause of the emissions targeted by the proposed bill. Australia's growing awareness of meat consumption's impacts has led to substantial investment in the plant-based protein market.[167] These investments not only reduce emissions but also stimulate economic growth.[168-169]

Recommendation 4: Ensure a just transition

Enabling a just transition to a low-emissions, climate-resilient future should be a priority for the NSW Government. The climate crisis will result in increased frequency and intensity of extreme events such as floods, heatwaves, droughts, and wildfires.[170-172] Additionally, gradual climate changes will impact various segments of the population differently, with agriculture being one of the sectors facing disproportionately elevated risks.[173-174] The NSW Government should focus on policies and measures that ensure a fair and equitable transition to a sustainable and climate-resilient future for all residents.

References

1. World Meteorological Organisation. *International Meteorological Vocabulary*; 2nd ed.; World Meteorological Organisation: Geneva, Switzerland, 1992.
2. United Nations. Causes and effects of climate change; Available online: www.un.org/en/climatechange/science/causes-effects-climate-change.
3. Intergovernmental Panel on Climate Change. *Climate Change 2007: Synthesis Report*; Intergovernmental Panel on Climate Change: Geneva, Switzerland, 2007.
4. Shivanna, K. Climate change and its impact on biodiversity and human welfare. *Proc. Indian Nat. Sci. Acad.* **2022**, *88*(2), 160-171.
5. Clarke, B.; Otto, F.; Stuart-Smith, R.; Harrington, L. Extreme weather impacts of climate change: an attribution perspective. *Environ. Res. Clim.* **2022**, *1*(1), 012001.
6. United Nations. Climate change; Available online: www.un.org/en/global-issues/climate-change.
7. Han, H.; Ahn, S. Youth mobilisation to stop global climate change: narratives and impact. *Sustainability* **2020**, *12*(10), 4127.
8. Brügger, A.; Dessai, S.; Devine-Wright, P.; Morton, T.; Pigeon, N. Psychological responses to the proximity of climate change. *Nat. Clim. Chang.* **2015**, *5*, 1031-1037.
9. McDonald, R.; Chai, H.; Newell, B. Personal experience and the 'psychological distance' of climate change: an integrative review. *J. Environ. Psychol.* **2015**, *44*, 109-118.
10. Intergovernmental Panel on Climate Change. *Climate Change 2022: Impacts, Adaptation and Vulnerability*; Available online: https://report.ipcc.ch/ar6wg2/pdf/IPCC_AR6_WGII_FinalDraft_FullReport.pdf.
11. O'Malley, N. 2022. 'Atlas of human suffering': more drought, fire and flood, less snow and coral, UN report says; Available online: www.smh.com.au/environment/climate-change/more-drought-fire-and-flood-less-snow-and-coral-un-report-says-20220228-p5a0cw.html.
12. Steffen, W.; Hughes, L.; Perkins, S. *Heatwaves: Hotter, Longer, More Often*; Climate Council of Australia Ltd.: Sydney, Australia, 2014.
13. Head, L.; Adams, M.; McGregor, H.; Toole, S. Climate change and Australia. *WIREs Clim. Chang.* **2014**, *5*, 175-197.
14. Pearce, T.; Rodriguez, E.; Fawcett, D.; Ford, J. How is Australia adapting to climate change based on a systematic review? *Sustainability* **2018**, *10*, 3280.
15. Kingwell, R. Making agriculture carbon neutral amid a changing climate: the case of south-western Australia. *Land* **2021**, *10*, 1259.
16. Centre for Disaster Philanthropy. 2022 Australian flooding; Available online: https://disasterphilanthropy.org/disasters/2022-australian-flooding.
17. NSW Government. Climate change impacts on sea level rise; Available online: www.climatechange.environment.nsw.gov.au/impacts-climate-change/weather-and-oceans/sea-level-rise.
18. Slezak, M. Window to save ourselves from climate change 'rapidly closing', IPCC warns; Available online: www.abc.net.au/news/2022-02-28/ipcc-adaption-report-australia-not-ready-for-climate-change/100866968.
19. Canadell, J.; Meyer, C.; Cook, G.; Dowdy, A.; Briggs, P.; Knauer, J.; Pepler, A.; Haverd, V. Multi-decadal increase of forest burned area in Australia is linked to climate change. *Nat. Comm.* **2021**, *12*, 6921.
20. Commonwealth Scientific and Industrial Research Organisation. Understanding the causes and impacts of flooding; Available online: www.csiro.au/en/research/natural-disasters/floods/causes-and-impacts.
21. NSW Government. Climate change impacts on drought; Available online: www.climatechange.environment.nsw.gov.au/drought.
22. Hausfather, Z. Will global warming 'stop' as soon as net-zero emissions are reached? Available online: www.carbonbrief.org/explainer-will-global-warming-stop-as-soon-as-net-zero-emissions-are-reached.
23. Frame, D.; Macey, A.; Allen, M. Cumulative emissions and climate policy. *Nat. Geosci.* **2014**, *7*, 692.
24. Rogelj, J.; Forster, P.; Kriegler, E.; Smith, C.; Séférian, R. Estimating and tracking the remaining carbon budget for stringent climate targets. *Nature* **2019**, *571*, 335-342.
25. Lynch, J.; Cain, M.; Frame, D.; Pierrehumbert, R. Agriculture's contribution to climate change and role in mitigation is distinct from predominantly fossil CO_2-emitting sectors. *Front. Sustain. Food Syst.* **2021**, *4*.
26. United Nations. Climate action fast facts; Available online: www.un.org/en/climatechange/science/key-findings.
27. Intergovernmental Panel on Climate Change. *Climate Change 2014: Synthesis Report*; Intergovernmental Panel on Climate Change: Geneva, Switzerland, 2014.
28. Klein, D.; Carazo, M.; Doelle, M.; Bulmer, J.; Higham, A. *The Paris Agreement on Climate Change: Analysis and Commentary*; Oxford University Press: Oxford, UK, 2017.
29. Stoddard, I.; Anderson, K.; Capstick, S.; Carton, W.; Depledge, J.; Facer, K.; Gough, C.; Hache, F.; Hoolohan. C.; Hultman, M.; Hällstrôm, N.; Kartha, S.; Klinsky, S.; Kuchler, M.; Lövbrand, E.; Nasiritousi, N.; Newell, P.; Peters, G.; Sokona, Y.; Stirling, A.; Stilwell, M.; Spash, C.; Williams, M. Three decades of climate mitigation: why haven't we bent the global emissions curve? *Annu. Rev. Environ. Res.* **2021**, *46*, 653-689.
30. Climate Council of Australia. *The Lost Years: Counting the Costs of Climate Inaction in Australia*; Climate Council of Australia Ltd.: Sydney, Australia, 2022.
31. Quicke, A.; Venketasubramanian, S. *Climate of the Nation 2022: Tracking Australia's Attitudes Towards Climate Change and Energy*; Australia Institute: Canberra, Australia, 2022.
32. Myhre, G.; Shindell, D.; Bréon, F; Collins, W.; Fuglestvedt, J.; Huang, D.; Koch, D.; Lamarque, J.; Lee, D.; Mendoza, B.; Nakajima, T.; Robock, A.; Stephens, G.; Takemura, T.; Zhang, H. 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*; Cambridge University Press: Cambridge, UK, 2013.
33. Goodland, R.; Anhang, J. *Livestock and Climate Change: What if the Key Actors in Climate Change Were Pigs, Chickens and Cows?* Worldwatch Institute: Washington, USA, 2009.
34. Bristow, E.; Fitzgerald, A. GLobal climate change and the industrial animal agriculture link: the construction of risk. *Soc. Anim.* **2011**, *19*, 205-224.
35. Bailey, R.; Froggatt, A.; Wellesley, L. *Livestock: Climate Change's Forgotten Sector - Global Public Opinion on meat and Dairy Consumption*; Royal Institute of International Affairs: London, UK, 2014.
36. McAllister, T. Greenhouse gases in animal agriculture: finding a balance between food production and emissions. *Anim. Feed Sci. Tech.* **2011**, *166-167*, 1-6.
37. McMahon, J. Why agriculture's greenhouse gas emissions are almost always underestimated; Available online: www.forbes.com/sites/jeffmcmahon/2019/12/02/5-reasons-agricultures-greenhouse-gas-emissions-are-usually-underestimated/?sh=51e3b4666ac8.

38. Hayek, M.; Miller, S. Underestimates of methane from intensively raised animals could undermine goals of sustainable development. *Environ. Res. Lett.* **2021**, *16*(6), 063006.
39. Kristiansen, S.; Painter, J.; Shea, M. Animal agriculture and climate change in the US and UK elite media: volume, responsibilities, causes and solutions. *Environ. Commun.* **2020**, 1-20.
40. Organisation for Economic Co-operation and Development. *Agriculture and Climate Change: OECD Meeting of Agriculture Ministers 2022 - Background Note*; Available online: www.oecd.org/agriculture/ministerial/documents/Agriculture%20and%20Climate%20Change.pdf.
41. Bailey, R.; Froggatt, A.; Wellesley, L. *Livestock: Climate Change's Forgotten Sector - Global Public Opinion on Meat and Dairy Consumption*; Royal Institute of International Affairs: London, UK, 2014.
42. Rogelj, J.; Shindell, D.; Jiang, K.; Fifita, S.; Forster, P.; Ginzburg, V. Mitigation pathways compatible with 1.5°C in the context of sustainable development; In *Global Warming of 1.5°C: An IPCC Special Report on the Impacts of Global Warming of 1.5°C Above Pre-industrial Levels Related Global Greenhouse Gas Emission Pathways in the Context of Strengthening the Global Response to the Threat of Climate Change, Sustainable Development, Efforts to Eradicate Poverty*; Masson-Delmotte, V., Zhai, P., Pörtner, H., Roberts, D., Skea, J., Shukla, P., Eds.; Available online: www.ipcc.ch/site/assets/uploads/sites/2/2019/02/SR15_Chapter2_Low_Res.pdf.
43. Leahy, S.; Clark, H.; Reisinger, A. Challenges and prospects for agricultural greenhouse gas mitigation pathways consistent with the Paris agreement. *Front. Sust. Food Syst.* **2020**, *4*, 69.
44. Twine, R. Emissions from animal agriculture: 16.5% is the new minimum figure. *Sustainability* **2021**, *13*(11), 6276.
45. Brown, N. 7 reasons why meat is bad for the environment; Available online: www.greenpeace.org.uk/news/why-meat-is-bad-for-the-environment.
46. Ritchie H.; Roser, M. Environmental impacts of food production; Available online: https://ourworldindata.org/environmental-impacts-of-food.
47. Stehfest, E.; Bouwman, L.; van Vuuren, D.; den Elzen, M.; Eickhout, B.; Kabat, P. Climate benefits of changing diet. *Climatic Change* **2009**, *95*, 83-102.
48. Xu, X.; Sharma, P.; Shu, S.; Lin, T.; Ciais, P.; Tubiello, F.; Smith, P.; Campbell, N.; Jain, A. Global greenhouse gas emissions from animal-based foods are twice those of plant-based foods. *Nat. Food* **2021**, *2*, 724-732.
49. Friedlingstein, P.; O'Sullivan, M.; Jones, M.; Andrew, R.; Hauck, J.; Olsen, A.; Peters, G.; Peters, W.; Pongratz, J.; Sitch, S.; Le Quéré, C.; Canadell, J.; Ciais, P.; Jackson, R.; Alin, S.; Aragão, L.; Arneth, A.; Arora, V.; Bates, N.; Becker, M.; Benoit-Cattin, A.; Bittig, H.; Bopp, L.; Bultan, S.; Chandra, N.; Chevallier, F.; Chini, L.; Evans, W.; Florentie, L.; Forster, P.; Gasser, T.; Gehlen, M.; Gilfillan, D.; Gkritzalis, T.; Gregor, L.; Gruber, N.; Harris, I.; Hartung, K.; Haverd, V.; Houghton, R.; Ilyina, T.; Jain, A.; Joetzjer, E.; Kadono, K.; Kato, E.; Kitidis, V.; Korsbakken, J.; Landschützer, P.; Lefèvre, N.; Lenton, A.; Lienert, S.; Liu, Z.; Lombardozzi, D.; Marland, G.; Metzl, N.; Munro, D.; Nabel, J.; Nakaoka, S.; Niwa, Y.; O'Brien, K.; Ono, T.; Palmer, P.; Pierrot, D.; Poulter, B.; Resplandy, L.; Robertson, E.; Rödenbeck, C.; Schwinger, J.; Séférian, R.; Skjelvan, I.; Smith, A.; Sutton, A.; Tanhua, T.; Tans, P.; Tian, H.; Tilbrook, B.; van der Werf, G.; Vuichard, N.; Walker, A.; Wanninkhof, R.; Watson, A.; Willis, D.; Wiltshire, A.; Yuan, W.; Yue, X.; Zaehle, S. Global carbon budget 2020. *Earth Syst. Sci. Data* **2020**, *12*, 3269-3340.
50. Hayek, M.; Harwatt, H.; Ripple, W.; Mueller, N. The carbon opportunity cost of animal-sourced food production on land. *Nat. Sustain.* **2021**, *4*, 21-24.
51. Masson-Delmotte, V.; Zhai, P.; Pirani, A.; Connors, S.; Péan, C.; Chen, Y.; Goldfarb, L.; Gomis, M.; Matthews, J.; Berger, S.; Huang, M.; Yelekçi, O.; Yu, R.; Zhou, B.; Lonnoy, E.; Maycock, T.; Waterfield, T.; Leitzell, K.; Caud, N. *Climate Change 2021: The Physical Science Basis*; Cambridge University Press: Cambridge, UK, 2021.
52. Lynch, J.; Cain, M.; Frame, D.; Pierrehumbert, R. Agriculture's contribution to climate change and role in mitigation is distinct from predominantly fossil CO_2-emitting sectors. *Front. Sustain. Food Syst.* **2021**, *4*, 518039.
53. Steinfeld, H.; Gerber, P.; Wassenaar, T.; Castel, V.; Rosales, M.; de Haan, C. *Livestock's Long Shadow: Environmental Issues and Options*; Food and Agriculture Organisation of the United Nations; Rome, Italy, 2006.
54. Steinfeld, H.; Gerber, P.; Wassenaar, T.; Castel, V.; Rosales, M.; de Haan, C. *Livestock's Long Shadow: Environmental Issues and Options*; Food and Agriculture Organisation of the United Nations; Rome, Italy, 2006.
55. Commonwealth Scientific Industrial Research Organisation. Greenhouse gases; Available online: www.csiro.au/en/research/environmental-impacts/climate-change/state-of-the-climate/greenhouse-gases.
56. Schiermeier, Q. Global methane levels soar to record high; Available online: www.nature.com/articles/d41586-020-02116-8.
57. Ivanovich, C.; Sun, T.; Gordon, D.; Ocko, I. Future warming from global food consumption. *Nat. Clim. Chang.* **2023**, *13*, 297-302.
58. Beauchemin, K.; Ungerfeld, E.; Eckard, R.; Wang, M. Fifty years of research on rumen methanogenesis: lessons learned and future challenges for mitigation. *Animal* **2020**, *14*, S2-S16.
59. Rosa, L.; Gabrielli, P. Achieving net-zero emissions in agriculture: a review. *Environ. Res. Lett.* **2023**, *18*, 063002.
60. Ivanovich, C.; Sun, T.; Gordon, D.; Ocko, I. Future warming from global food consumption. *Nat. Clim. Chang.* **2023**, *13*, 297-302.
61. Masson-Delmotte, V.; Zhai, P.; Pirani, A.; Connors, S.; Péan, C.; Chen, Y.; Goldfarb, L.; Gomis, M.; Matthews, J.; Berger, S.; Huang, M.; Yelekçi, O.; Yu, R.; Zhou, B.; Lonnoy, E.; Maycock, T.; Waterfield, T.; Leitzell, K.; Caud, N. *Climate Change 2021: The Physical Science Basis*; Cambridge University Press: Cambridge, UK, 2021.
62. Masson-Delmotte, V.; Zhai, P.; Pirani, A.; Connors, S.; Péan, C.; Chen, Y.; Goldfarb, L.; Gomis, M.; Matthews, J.; Berger, S.; Huang, M.; Yelekçi, O.; Yu, R.; Zhou, B.; Lonnoy, E.; Maycock, T.; Waterfield, T.; Leitzell, K.; Caud, N. *Climate Change 2021: The Physical Science Basis*; Cambridge University Press: Cambridge, UK, 2021.
63. Ivanovich, C.; Sun, T.; Gordon, D.; Ocko, I. Future warming from global food consumption. *Nat. Clim. Chang.* **2023**, *13*, 297-302.
64. Intergovernmental Panel on Climate Change. *Special Report on Climate Change and Land*; Available online: www.ipcc.ch/srccl.
65. Gordon, E.; Davila, F.; Riedy, C. Transforming landscapes and mindscapes through regenerative agriculture. *Agric. Hum. Values* **2022**, *39*, 809-826.
66. Newbold, T.; Hudson, L.; Hill, S.; Contu, S.; Lysenko, I.; Senior, R.; Börger, L.; Bennett, D.; Choimes, A.; Collen, B.; Day, J.; De Palma, A.; Díaz, S.; Echeverria-Londoño, S.; Edgar, M.; Feldman, A.; Garon, M.; Harrison, M.; Alhusseini, T.; Ingram, D.; Itescu, Y.; Kattge, J.; Kemp, V.; Kirkpatrick, L.; Kleyer, M.; Correia, D.; Martin, C.; Meiri, S.; Novosolov, M.; Pan, Y.; Phillips, H.; Purves, D.; Robinson, A.; Simpson, J.; Tuck, S.; Weiher, E.; White, H.; Ewers, R.; Mace, G.; Scharlemann, J.; Purvis, A. Global effects of land use on local terrestrial biodiversity. *Nature* **2015**, *520*, 45-50.
67. Shiklomanov, I.; Rodda, J. *World water Resources at the Beginning of the Twenty-First Century*; Cambridge University Press: Cambridge, UK, 2004.
68. Diaz, R.; Rosenberg, R. Spreading dead zones and consequences for marine ecosystems. *Science* **2008**, *321*, 926-929.
69. Springmann, M.; Wiebe, K.; Mason-D'Croz, D.; Sulser, T.; Rayner, M.; Scarborough, P. Health and nutritional

aspects of sustainable diet strategies and their association with environmental impacts: a global modelling analysis with country-level detail. *Lancet Planet: Health* **2018**, *2*, e451-e461.
70. Hobbs, R.; Hopkins, A. From frontier to fragments: European impact on Australia's vegetation. *Proc. Ecol. Soc. Aust.* **1990**, *16*, 93-114.
71. Seabrook, L.; McAlpine, C.; Fensham, R. Cattle, crops and clearing: regional drivers of landscape change in the Brigalow Belt, Queensland, Australia, 1840-2004. *Landscape and Urban Planning* **2006**, *78*, 373-385.
72. Cocklin, C.; Dibden, J. Systems in peril: climate change, agriculture, and biodiversity in Australia. *IOP Conf. Series: Earth and Environmental Science* **2009**, *8*, 012013.
73. Braithwaite, L. Conservation of arboreal herbivores: the Australian scene. *Aust. J. Ecol.* **1996**, *21*, 21-30.
74. Bolton, G. *Spoils and Spoilers: Australians Make Their Environment, 1788-1980*; George Allen and Unwin: Sydney, Australia, 1981.
75. Tonts, M. Government policy and rural sustainability. In *Sustainability and Change in Rural Australia*; Cocklin, C., Dibden, J., Eds.; UNSW Press: Sydney, Australia, 2005.
76. Bradshaw, C. Little left to lose: deforestation and forest degradation in Australia since European colonisation. *J. Plant Ecol.* **2012**, *5*(1), 109-120.
77. Norton, T. Conserving biological diversity in Australia's temperate eucalypt forests. *For. Ecol. Manag.* 1996, *85*, 21-33.
78. Beeton, R.; Buckley, K.; Jones, G.; Morgan, D.; Reichelt, R.; Trewin, D. *Australia State of the Environment 2006: Independent Report to the Australian Government Minister for the Environment and Heritage from the 2006 Australian State of the Environment Committee*; Commonwealth of Australia: Canberra, Australia, 2006.
79. Lindenmayer, D. *On Borrowed Time: Australia's Environmental Crisis and What We Must Do About It*; CSIRO Publishing: Camberwell, Australia, 2007.
80. Lindenmayer, D.; Fischer, J.; Felton, A.; Crane, M.; Michael, D.; Macgregor, C.; Montague-Drake, R.; Manning, A.; Hobbs, R. Novel ecosystems resulting from landscape transformation create dilemmas for modern conservation practice. *Conserv. Lett.* **2008**, *1*(3), 129-135.
81. Watson, J.; Fuller, R.; Watson, A.; Mackey, B.; Wilson, K.; Grantham, H.; Turner, M.; Klein, C.; Cawardine, J.; Joseph, L.; Possingham, H. Wilderness and future conservation priorities in Australia. *Divers Distrib.* **2009**, 15, 1028-1036.
82. Bradshaw, C. Little left to lose: deforestation and forest degradation in Australia since European colonisation. *J. Plant Ecol.* **2012**, *5*(1), 109-120.
83. Cocklin, C.; Dibden, J. Systems in peril: climate change, agriculture, and biodiversity in Australia. *IOP Conf. Series: Earth and Environmental Science* **2009**, *8*, 012013.
84. Rosa, L.; Gabrielli, P. Achieving net-zero emissions in agriculture: a review. *Environ. Res. Lett.* **2023**, *18*, 063002.
85. Intergovernmental Panel on Climate Change. *Climate Change 2022: Impacts, Adaptation, and Vulnerability - Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*; Cambridge: Cambridge University Press: Cambridge, UK, 2022.
86. Intergovernmental Panel on Climate Change. *Climate Change 2022: Mitigation of Climate Change - Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*; Cambridge University Press: Cambridge, UK, 2022.
87. Zhang, X.; Yao, G.; Vishwakarma, S.; Dalin, C.; Komarek, A.; Kanter, D.; Davis, K.; Pfeifer, K.; Zhao, J.; Zou, T.; D'Odorico, P.; Folberth, C.; Rodriguez, F.; Fanzo, J.; Rosa, L.; Dennison, W.; Musumba, M.; Heyman, A.; Davidson, E. Quantitative assessment of agricultural sustainability reveals divergent priorities among nations. *One Earth* **2021**, *4*(9), 1262-1277.
88. Beltran-Pena, A.; Rosa, L.; D'Odorico, P. Global food self-sufficiency in the 21st century under sustainable intensification of agriculture *Environ. Res. Lett.* **2020**, *15*, 095004.
89. van Dijk, M.; Morley, T.; Rau, M.; Saghai, Y. A meta-analysis of projected global food demand and population at risk of hunger for the period 2010–2050. *Nat. Food* **2021**, *2*, 494-501.
90. Clark, M.; Domingo, N.; Colgan, K.; Thakrar, S.; Tilman, D.; Lynch, J.; Azevedo, I.; Hill, J. Global food system emissions could preclude achieving the 1.5 and 2 C climate change targets *Science* **2020**, *370*, 705-708..
91. Ivanovich, C.; Sun, T.; Gordon, D.; Ocko, I. Future warming from global food consumption. *Nat. Clim. Change* **2023**, *13*, 297-302.
92. Intergovernmental Panel on Climate Change. *Climate Change 2022: Mitigation of Climate Change - Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*; Cambridge University Press: Cambridge, UK, 2022.
93. Rosa, L.; Gabrielli, P. Achieving net-zero emissions in agriculture: a review. *Environ. Res. Lett.* **2023**, *18*, 063002.
94. Llonch, P.; Haskell, M.; Dewhurst, R.; Turner, S. Current available strategies to mitigate greenhouse gas emissions in livestock systems: an animal welfare perspective. *Animal* **2016**, *11*(2), 274-284.
95. Climate Council of Australia. *Australia's Rising Greenhouse Gas Emissions*; Climate Council of Australia: Potts Point, Australia, 2018.
96. Government of Western Australia Department of Primary Industries and Regional Development. Breeding for lower greenhouse gas emissions; Available online: www.agric.wa.gov.au/climate-land-water/breeding-lower-greenhouse-gas-emissions.
97. Mayberry, D.; Bartlett, H.; Moss, J.; Davison, T.; Herrero, M. Pathways to carbon-neutrality for the Australian red meat sector. *Agric. Syst.* **2019**, *175*, 13-21.
98. Brondizio, E.; Settele, J.; Díaz, S.; Ngo, H. *Global Assessment Report on Biodiversity and Ecosystem Services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services*; Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services: Bonn, Germany, 2019.
99. Tilman, D.; Clark, M. Global diets link environmental sustainability and human health. *Nature* **2014**, *515*, 518-522.
100. Strassburg, B.; Iribarrem, A.; Beyer, H.; Cordeiro, C.; Crouzeilles, R.; Jakovac, C.; Junqueira, A.; Lacerda, E.; Latawiec, A.; Balmford, A.; Brooks, T.; Butchart, S.; Chazdon, R.; Erb, K.; Brancalion, P.; Buchanan, G.; Cooper, D.; Díaz, S.; Donald, P.; Kapos, V.; Leclère, D.; Miles, L.; Obersteiner, M.; Plutzar, Scaramuzza, C.; Scarano, F.; Visconti, P. Global priority areas for ecosystem restoration. *Nature* **2020**, *586*, 724-729.
101. Clark, M.; Springmann, M.; Hill, J.; Tilman, D. Multiple health and environmental impacts of foods. *Proc. Nat. Acad. Sci.* **2019**, *116*, 23357-23362.
102. Rockström, J.; Williams, J.; Daily, G.; Noble, A.; Matthews, N.; Gordon, L.; Wetterstrand, H.; DeClerck, F.; Shah, M.; Steduto, P.; de Fraiture, C.; Hatibu, N.; Unver, O.; Bird, J.; Sibanda, L.; Smith, J. Sustainable intensification of agriculture for human prosperity and global sustainability. *Ambio* **2017**, *46*, 1-14.
103. Campbell, B.; Beare, D.; Bennett, E.; Hall-Spencer, J.; Ingram, J.; Jaramillo, F.; Ortiz, R.; Ramankutty, N.; Sayer, J.; Shindell, D. Agriculture production as a major driver of the Earth system exceeding planetary boundaries. *Ecol. Soc.* **2017**, *22*(4), 8.
104. Reisinger, A.; Howden, M.; Vera, C.; Garschagen, M.; Hurlbert, M.; Kreibiehl, S.; Mach, K.; Mintenbeck, K.; O'Neill, B.; Pathak, M.; Pedace, R.; Pörtner, H.; Poloczanska, E.; Corradi, M.; Sillman, J.; van Aalst, M.; Viner, D.; Jones, R.; Ruane, A.; Ranasinghe, R. *The Concept of Risk in the IPCC Sixth Assessment Report: A Summary of Cross-Working Groups*

Discussions; Intergovernmental Panel on Climate Change: Geneva, Switzerland, 2020.
105. United Nations Framework Convention on Climate Change. The Paris Agreement; Available online: https://unfccc.int/process-and-meetings/the-paris-agreement.
106. Lynch, J.; Cain, M.; Frame, D.; Pierrehumbert, R. Agriculture's contribution to climate change and role in mitigation is distinct from predominantly fossil CO_2-emitting sectors. *Front. Sustain. Food Syst.* **2021**, *4*.
107. Gerber, P.; Steinfeld, H.; Henderson, B.; Mottet, A.; Opio, C.; Dijkman, J.; Falcucci, A.; Tempio, G. *Tackling Climate Change Through Livestock: A Global Assessment of Emissions and Mitigation Opportunities*; Food and Agriculture Organisation of the United Nations: Rome, Italy, 2013.
108. Alsaffar, A. Sustainable diets: the interaction between food industry, nutrition, health and the environment. *Food Sci. Technol. Int.* **2016**, *22*, 102-111.
109. Fresán, U.; Sabaté, J. Vegetarian diets: planetary health and its alignment with human health. *Adv. Nutr.* **2019**, *10*, S380-S388.
110. Jarmul, S.;, Dangour, A.; Green, R.; Liew, Z.; Haines, A.; Scheelbeek, P. Climate change mitigation through dietary change: a systematic review of empirical and modelling studies on the environmental footprints and health effects of 'sustainable diets'. *Environ. Res. Lett.* **2020**, *15*, 123014.
111. Poore, J.; Nemecek, T. Reducing food's environmental impacts through producers and consumers. *Science* **2018**, *360*(6392), 987-992.
112. Springmann, M.; Clark, M.; Mason-D'Croz, D.; Wiebe, K.; Bodirsky, B.; Lassaletta, L.; de Vries, W.; Vermeulen, S.; Herrero, M.; Carlson, K.; Jonell, M.; Troell, M.; DeClerck, F.; Gordon, L.; Zurayk, R.; Scarborough, P.; Rayner, M.; Loken, B.; Fanzo, J.; Godfray, H.; Tilman, D.; Rockström, J.; Willett, W. Options for keeping the food system within environmental limits. *Nature* **2018**, *562*, 519-525.
113. Alonso, M.; González-Montaña, J.; Lomillos, J. Consumers' concerns and perceptions of farm animal welfare. *Animals* **2020**, *10*(3), 385.
114. Fernandes, J.; Blache, D.; Maloney, S.; Martin, G.; Venus, B.; Walker, F.; Head, B.; Tilbrook, A. Addressing animal welfare through collaborative stakeholder networks. *Agriculture* **2019**, *9*, 132.
115. Buller, H.; Blokhuis, H.; Jensen, P.; Keeling, L. Towards farm animal welfare and sustainability. *Animals* **2018**, *8*(6), 81.
116. Australian Bureau of Agricultural and Resource Economics and Sciences. Snapshot of Australian Agriculture 2023; Available online: www.agriculture.gov.au/abares/products/insights/snapshot-of-australian-agriculture.
117. Climate Council. Agriculture's contribution to Australia's greenhouse gas emissions; Available online: www.climatecouncil.org.au/resources/australia-agriculture-climate-change-emissions-methane.
118. Australian Academy of Science. What are the impacts of climate change? Available online: www.science.org.au/learning/general-audience/science-climate-change/7-what-are-impacts-of-climate-change.
119. Rosi, A.; Mena, P.; Pellegrini, N.; Turroni, S,; Neviani, E.;Ferrocino, I.; Di Cagno, R.; Ruini, L.; Ciati, R.; Angelino, D.; Maddock, J.; Gobbetti, M.; Brighenti, F.; Del Rio, D.; Scazzina, F. Environmental impact of omnivorous, ovo-lacto-vegetarian, and vegan diet. *Sci. Rep.* **2017**, *7*, 1-9.
120. Alexandratos, N.; Bruinsma, J. *World Agriculture Towards 2030/2050: The 2012 Revision*; Food and Agriculture Organisation of the United Nations: Rome, Italy, 2012.
121. Ferguson, D.; Colditz, I. What does the future hold for livestock production in Australia? Available online: www.csiro.au/en/news/all/articles/2019/july/what-does-the-future-hold-for-livestock-production-in-australia.
122. Herrero, M.; Henderson, B.; Havlík, P.; Thornton, P.; Conant, R.; Smith, P.; Wirsenius, S.; Hristov, A.; Gerber, P.; Gill, M.; Butterbach-Bahl, K.; Valin, H.; Garnett, T.; Stehfest, E. Greenhouse gas mitigation potentials in the livestock sector. *Nat. Clim. Change* **2016**, *6*, 452-461.
123. Reisinger, A.; Clark, H.; Cowie, A.; Emmet-Booth, J.; Gonzalez Fischer, C.; Herrero, M.; Howden, M.; Leahy, S. How necessary and feasible are reductions of methane emissions from livestock to support stringent temperature goals? *Phil. Trans. R. Soc. A.* **2021**, *379*, 20200452.
124. Chang, J.; Peng, S.; Yin, Y.; Ciais, P.; Havlik, P.; Herrero, M. The key role of production efficiency changes in livestock methane emission mitigation. *AGU Adv.* **2021**, *2*, e2021AV000391.
125. Beauchemin, K.; Ungerfeld, E.; Eckard, R.; Wang, M. Fifty years of research on rumen methanogenesis: lessons learned and future challenges for mitigation. *Animal* **2020**, *14*, S2-S16.
126. Reisinger, A.; Clark, H.; Cowie, A.; Emmet-Booth, J.; Gonzalez Fischer, C.; Herrero, M.; Howden, M.; Leahy, S. How necessary and feasible are reductions of methane emissions from livestock to support stringent temperature goals? *Phil. Trans. R. Soc. A.* **2021**, *379*, 20200452.
127. Equivalent to 8,500 square metres per person per year.
128. Espinosa-Marrón, A.; Adams, K.; Sinno, L.; Cantu-Aldana, A.; Tamez, M.; Marrero, A.; Bhupathiraju, S.; Mattei, J. Environmental impact of animal-based food production and the feasibility of a shift toward sustainable plant-based diets in the United States. *Front. Sustain.* **2022**, *3*.
129. Dopelt, K.; Radon, P.; Davidovitch, N. Environmental effects of the livestock industry: the relationship between knowledge, attitudes and behaviour among studies in Israel. *Int. J. Environ. Res. Public Health* **2019**, *16*(8), 1359.
130. Froehlich, H.; Runge, C.; Gentry, R.; Gaines, S.;Halpern, B. Comparative terrestrial feed and land use of an aquaculture-dominant world. *Proc. Natl. Acad. Sci.* **2018**, *115*, 5295-5300.
131. Admassu, S.; Fox, T.; Heath, R.; McRobert, K. *The Changing Landscape of Protein Production: Opportunities and Challenges for Australian Agriculture*; AgriFutures Australia: Wagga Wagga, Australia, 2020.
132. Manyi-Loh, C.; Mamphweli, S.; Meyer, E.; Okoh, A. Antibiotic use in agriculture and its consequential resistance in environmental sources: potential public health implications. *Molecules* **2018**, *23*(4), 795.
133. Springmann, M.; Godfray, H.; Rayner, M.; Scarborough, P. Analysis and valuation of the health and climate change benefits of dietary change. *Proc. Nat. Acadm. Sci.* **2016**, *113*(15), 4146-4151.
134. MacLeod, M.; Vellinga, T.; Opio, C.; Falcucci, A.; Tempio, G.; Henderson, B.; Makkar, H.; Mottet, A.; Robinson, T.; Steinfeld, H.; Gerber, P. A position on the Global Livestock Environmental Assessment Model (GLEAM). *Animal* **2018**, *12*(2), 383-397.
135. Eisen, M.; Brown, P. Rapid global phaseout of animal agriculture has the potential to stabilise greenhouse gas levels for 30 years and offset 68 percent of CO_2 emissions this century. *PLoS Clim.* **2022**, *1*(2), e0000010.
136. Clark, M.; Domingo, N.; Colgan, K.; Thakrar, S.; Tilman, D.; Lynch, J.; Azevedo, I.; Hill, J. Global food system emissions could preclude achieving the 1.5° and 2°C climate change targets. *Science* **2020**, *370*(6517),705-708.
137. Poore, J.; Nemecek, T. Reducing food's environmental impacts through producers and consumers. *Science* **2018**, *360*(6392), 987-992.
138. Cusack, D.; Kazanski, C.; Hedgpeth, A.; Chow, K.; Cordeiro, A.; Karpman J.; Ryals, R. Reducing climate impacts of beef production: a synthesis of life cycle assessments across management systems and global regions. *Glob. Chang. Biol.* **2021**, *27*(9), 1721-1736.
139. Gerber, P.; Steinfeld, H.; Henderson, B.; Mottet, A.; Opio, C.; Dijkman, J.; Falcucci, A.; Tempio, G. *Tackling*

Climate Change Through Livestock: A Global Assessment of Emissions and Mitigation Opportunities; Food and Agriculture Organisation of the United Nations: Rome, Italy, 2013.
140. Clark, M.; Domingo, N.; Colgan, K.; Thakrar, S.; Tilman, D.; Lynch, J.; Azevedo, I.; Hill, J. Global food system emissions could preclude achieving the 1.5° and 2°C climate change targets. *Science* **2020**, *370*(6517),705-708.
141. Hirvonen, K.; Bai, Y.; Headey, D.; Masters, W. Affordability of the EAT-*Lancet* reference diet: a global analysis. *Lancet: Global Health* **2020**, *8*(1), e59-e66.
142. United Nations. For a livable climate: net-zero commitments must be backed by credible action; Available online: www.un.org/en/climatechange/net-zero-coalition.
143. Fankhauser, S.; Smith, S.; Allen, M.; Axelsson, K.; Hale, T.; Hepburn, C.; Kendall, J.; Khosla, R.; Lezaun, J.; Mitchell-Larson, E.; Obersteiner, M.; Rajamani, L.; Rickaby, R.; Seddon, N.; Wetzer, T. The meaning of net zero and how to get it right. *Nat. Clim. Chang.* **2022**, *12*, 15-21.
144. Lynch, J.; Cain, M.; Frame, D.; Pierrehumbert, R. Agriculture's contribution to climate change and role in mitigation is distinct from predominantly fossil CO_2 -emitting sectors. *Front. Sustain. Food Syst.* **2021**, *4*, 518039.
145. Willett, W.; Rockström, J.; Loken, B.; Springmann, M.; Lang, T.; Vermeulen, S.; Garnett, T.; Tilman, D.; DeClerck, F.; Wood, A.; Jonell, M.; Clark, M.; Gordon, L.; Fanzo, J.; Hawkes, C.; Zurayk, R.; Rivera, J.; De Vries, W.; Sibanda, L.; Afshin, A.; Chaudhary, A.; Herrero, M.; Agustina, R.; Branca, F.; Lartey, A.; Fan, S.; Crona, B.; Fox, E.; Bignet, V.; Troell, M.; Lindahl, T,. Singh, S.; Cornell, S.; Reddy, K.; Narain, S.; Nishtar, S.; Murray, C. Food in the anthropocene: the EAT-Lancet Commission on healthy diets from sustainable food systems. *Lancet Commissions* **2019**, *393*(10170), 447-492.
146. Wilmoth, J. *Press Briefing of the Launch of the World Population Prospects: the 2017 Revision*; United Nations: New York, USA, 2017.
147. Froggatt, A.; Wellesley, L. Meat analogues: considerations for the EU. Available online: www.chathamhouse.org/sites/default/files/2019-02-18MeatAnalogues3.pdf.
148. World Economic Forum. *Meat: The Future - A Roadmap for Delivering 21st-Century Protein*; World Economic Forum: Geneva, Switzerland, 2019.
149. Poore, J.; Nemecek, T. Reducing food's environmental impacts through producers and consumers. *Science* **2018**, *360*(6392), 987-992.
150. Goldstein, B.; Moses, R.; Sammons, N.; Birkved, M. Potential to curb the environmental burdens of American beef consumption using a novel plant-based beef substitute. *PLoS ONE* **2017**, *12*(12).
151. Ritchie, H.; Reay, D.; Higgins, P. Potential of meat substitutes for climate change mitigation and improved human health in high-income markets. *Front. Sustain. Food Syst.* **2018**, *2*.
152. Santo, R.; Kim, B.; Goldman, S.; Dutkiewicz, J.; Biehl, E.; Bloem, M.; Neff, R.; Nachman, K. Considering plant-based meat substitutes and cell-based meats: a public health and food systems perspective. *Front. Sustain. Food Syst.* **2020**, *4*.
153. Poore, J.; Nemecek, T. Reducing food's environmental impacts through producers and consumers. *Science* **2018**, *360*(6392), 987-992.
154. Harwatt, H.; Sabaté, J.; Eshel, G.; Soret, S.; Ripple, W. Substituting beans for beef as a contribution toward US climate change targets. *Clim. Chang.* **2017**, *143*, 261-270.
155. Wynes, S.; Nicholas, K. The climate mitigation gap: Education and government recommendations miss the most effective individual actions. *Environ. Res. Lett.* **2017**, *12*(7), 074024.
156. Poore, J.; Nemecek, T. Reducing food's environmental impacts through producers and consumers. *Science* **2018**, *360*(6392), 987-992.
157. Wellesley, L.; Happer, C.; Froggatt, A. *Changing Climate, Changing Diets: Pathways to Lower Meat Consumption*; Royal Institute of International Affairs: London, UK, 2015.
158. Godfray, H.; Aveyard, P.; Garnett, T.; Hall, J.; Key, T.; Lorimer, J.; Pierrehumbert, R.; Scarborough, P.; Springmann, M.; Jebb, S. Meat consumption, health, and the environment. *Science* **2018**, *361*(6399), eaam5324.
159. NSW Government Department of Planning and Environment. Single-use plastics ban in NSW; Available online: www.dpie.nsw.gov.au/our-work/environment-heritage/plastics-action-plan/phasing-out-single-use-plastics-in-nsw.
160. Wynes, S.; Nicholas, K. The climate mitigation gap: Education and government recommendations miss the most effective individual actions. *Environ. Res. Lett.* **2017**, *12*(7), 074024.
161. Kristiansen, S.; Painter, J.; Shea, M. Animal agriculture and climate change in the US and UK elite media: volume, responsibilities, causes and solutions. *Environ. Commun.* **2020**, 1-20.
162. Kristiansen, S.; Painter, J.; Shea, M. Animal agriculture and climate change in the US and UK elite media: volume, responsibilities, causes and solutions. *Environ. Commun.* **2020**, 1-20.
163. Neff, R.; Chan, I.; Smith, K. Yesterday's dinner, tomorrow's weather, today's news? US newspaper coverage of food system contributions to climate change. *Pub. Health Nutr.* **2009**, *12*(7), 1006-1014.
164. de Boer, J.; de Witt, A.; Aiking, H. Help the climate, change your diet: a cross-sectional study on how to involve consumers in a transition to a low-carbon society. *Appetite* **2016**, *98*, 19-27.
165. Krzywonos, M.; Piwowar-Sulej, K. Plant-based innovations for the transition to sustainability: a bibliometric and in-depth content analysis. *Foods* **2022**, *11*(19), 3137.
166. Rossi, S. Landmark bill to slash emissions; Available online: www.climatecontrolnews.com.au/contracting/landmark-bill-to-slash-emissions.
167. Food Frontier. *2020 State of the Industry*; Food Frontier: North Melbourne, Australia, 2021.
168. Waters, C. V2food raises $77 million to take its plant-based burgers to China; Available online: www.smh.com.au/business/small-business/v2food-raises-77-million-to-take-its-plant-based-burgers-to-china-20201020-p566q2.html.
169. Haynes, A. Bunge invests $45.7 million in Australian Plant Proteins; Available online: www.foodmag.com.au/bunge-invests-45-7-million-australian-plant-proteins.
170. Islam, M. *Development, Power, and the Environment: Neoliberal Paradox in the Age of Vulnerability*; Routledge: New York, USA. 2013.
171. Qafoku, N. Climate-change effects on soils: accelerated weathering, soil carbon and elemental cycling. *Adv. Agron.* **2015**, *131*, 111-172.
172. Commonwealth Scientific and Industrial Research Organisation. Australia's changing climate; Available online: www.csiro.au/en/research/environmental-impacts/climate-change/state-of-the-climate/australias-changing-climate.
173. Hughes, N.; Gooday, P. Climate change impacts and adaptation on Australian farms; Available online: www.agriculture.gov.au/abares/products/insights/climate-change-impacts-and-adaptation.
174. NSW Government. Climate change impacts on our agriculture; Available online: www.climatechange.environment.nsw.gov.au/impacts-climate-change/agriculture.