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INQUIRY

INQUIRY INTO FOOD PRODUCTION AND SUPPLY IN NSW

AN ANIMAL LIBERATION SUBMISSION

TO THE LEGISLATIVE ASSEMBLY COMMITTEE ON ENVIRONMENT AND PLANNING

DOCUMENT DETAILS

Animal Liberation. 2022. A submission by Animal Liberation in response to the Legislative Assembly Committee on Environment and Planning's Inquiry into Food Production and Supply Chain in NSW. Prepared by Alex Vince and Lisa J Ryan.

ABOUT ANIMAL LIBERATION

Animal Liberation has worked to permanently improve the lives of all animals for over four decades. We are proud to be Australia's longest serving animal rights organisation. 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.

INTELLECTUAL PROPERTY RIGHTS

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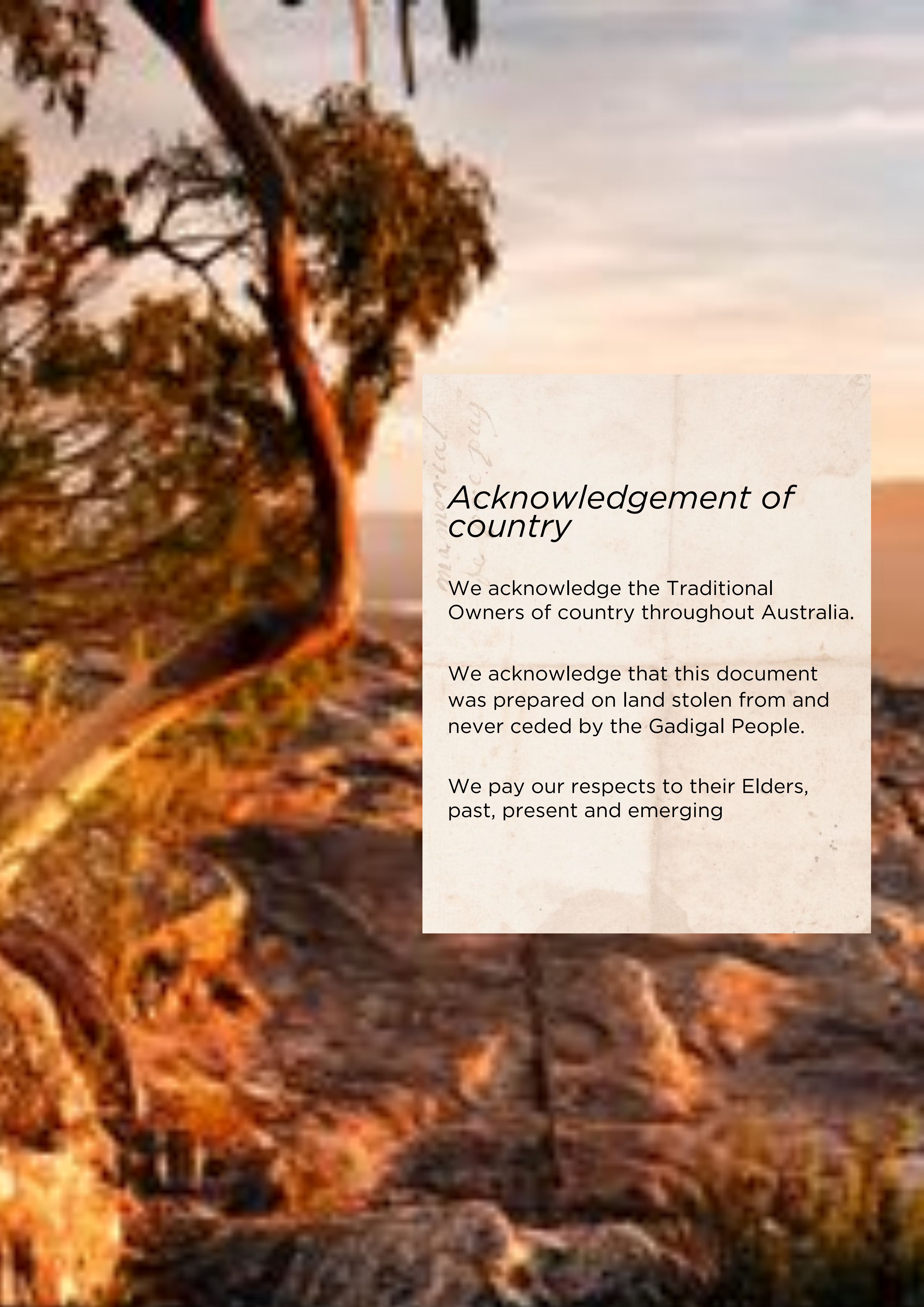


Acknowledgement of country

We acknowledge the Traditional Owners of country throughout Australia.

We acknowledge that this document was prepared on land stolen from and never ceded by the Gadigal People.

We pay our respects to their Elders, past, present and emerging

28 February 2022

State Development Committee
Parliament of New South Wales
Via email: environmentplanning@parliament.nsw.gov.au.

Animal Liberation
Compassion without compromise

ATT: LEGISLATIVE ASSEMBLY COMMITTEE MEMBERS

We welcome and appreciate the opportunity to present the following submission in response to the NSW Legislative Assembly Committee on Environment and Planning's inquiry into food production and supply in NSW on behalf of Animal Liberation.

Animal Liberation is a non-profit animal rights organisation that has operated in the field of animal justice for over four (4) decades. During this time, we have accumulated considerable experience and knowledge relating to animal welfare and protection issues across the country. We are proud to be Australia's longest-serving animal rights organisation and proud to work for this organisation and our ethos of interspecies equality. Our mission is to permanently improve the lives of all animals through education, action, and outreach.

While we have and continue to pursue the rights of all animals, this advocacy extends to the environment and public health impacts posed by contemporary production and supply systems.

We request that it be noted from the outset that the following submission is not intended to provide an exhaustive commentary or assessment in response to the review or its accompanying documentation. Rather, our submission is intended to provide a general examination and responses to select areas of key concern.

As such, the absence of discussion, consideration or analyses of any particular aspect or component of the inquiry must not be read as or considered indicative of consent or acceptance. For the purposes of this submission, Animal Liberation's focus covers aspects that we believe warrant critical attention and response.

We thank Committee members for their objective and informed consideration of the following submission.

Kind regards,

Alex Vince
Campaign director

&

Lisa J Ryan
Regional campaign manager

LIST OF ABBREVIATIONS

AAP	Australian Associated Press
ABARES	Australian Bureau of Agricultural and Resource Economics and Sciences
ABS	Australian Bureau of Statistics
AHA	Animal Health Australia
AL	Animal Liberation (NSW)
CBD	Convention on Biological Diversity
CIWF	Compassion in World Farming
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DAWE	Department of Agriculture, Water and the Environment (Cth)
DPI	Department of Primary Industries (NSW)
FAO	Food and Agriculture Organisation of the United Nations
GHG	Greenhouse gas
ILO	International Labour Organisation
IMF	International Monetary Fund
IPCC	Intergovernmental Panel on Climate Change
ISF	Institute for Sustainable Futures
NRHA	National Rural Health Alliance
OECD	Organisation for Economic Cooperation and Development
OIE	World Organisation for Animal Health
OECD	Organisation for Economic Cooperation and Development
PMSEIC	Prime Minister's Science, Engineering and Innovation Council
RFS	Rural Fire Service (NSW)
RSPCA	Royal Society for the Prevention of Cruelty to Animals
SDG	Sustainable Development Goals
TOR	Terms of Reference
UA	Urban agriculture
UN	United Nations

UNDESA	United Nations Department of Economic and Social Affairs
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNICEF	United Nations International Children's Emergency Fund
UNSCN	United Nations System Standing Committee on Nutrition
WFP	World Food Programme
WHO	World Health Organisation
WWF	World Wildlife Fund

LIST OF FIGURES AND TABLES


There is
NO Planet B

EXECUTIVE SUMMARY

i. Food security and sustainability represent global concerns that are particularly troubling for policymakers precisely because policies are critical for ensuring sustainable food security. Though there are a range of factors that contribute to the creation of conditions that cause food insecurity, the government must provide a resilient system that is underpinned by an equitable, scientific and proactive framework.

ii. Food production and consumption practices incur opportunity costs by prioritising or selecting some options over others. At present, the predominant agricultural sectors are deeply implicated in generating conditions conducive to increasingly adverse climate consequences. It is imperative that the government transparently consider and assess all available mitigation options, including the prioritisation of alternative protein production. This should be augmented by transparent and scientific public education that empowers the community to make transformative food choices.

iii. The ongoing climate crisis necessitates an urgent recalibration of key productivity metrics that incorporate the environmental and public health consequences of a business as usual approach. Scientific consensus indicates that current approaches to climate mitigation will be insufficient without structural changes to food production and consumption. Failing to do so will risk further extreme climate events and the suite of adverse environmental and public health consequences these cause.

iv. It is essential that zoonotic disease be proactively incorporated in policies relating to food security. Though the COVID-19 pandemic represents unprecedented disruption and devastation, evidence suggests that failing to address its root cause could enable the generation further zoonoses of equal or increased severity. It is essential that the government shift from a reactive to a proactive approach to these public health disasters. Advocating and facilitating transitions to sustainable plant-based diets represents a sensible solution whose basis is ground in sound science.

v. The environmental and public health costs of the current food system and the disproportionate contribution of animal-based foods to these costs are firmly established. Dietary change can deliver benefits on a scale unachievable under the current system. Transitions to plant-based diets have transformative potential, especially if these are sustained and supported by policy.

INTRODUCTION

INTRODUCTION

The connected impacts of the ongoing climate crisis, increasing rates of biodiversity loss and the inefficient use of finite resources create an environmental catastrophe and a major threat to food security and ecological stability.

Food practices are complex and influenced by multiple interacting factors (Köster 2009; Atkins and Michie 2013). Within the context of the environmental change which this inquiry relates, the security and prosperity of individuals and societies rely on assuring food production and distribution systems that make food available, plentiful and accessible (Graça et al. 2019). However, while sustaining life, such systems may also contribute to draining finite natural resources, catastrophic declines in biodiversity, infringements of ecological thresholds that support life, and dietary habits that are suboptimal to human health (Aiking 2014; Campbell et al. 2017; Ritchie et al. 2018a). Moreover, these impacts are expected to increase over the coming decades as growing populations and dietary changes are expected to occur worldwide (Tilman et al. 2011; Alexandratos and Bruinsma 2012; Clark and Clark Tilman 2017).

The following submission will show that one sector, in particular, contributes a disproportionate number of key threats: the animal agriculture sector. In its routine activities, the threats that this sector produces include adverse environmental, public health and animal welfare outcomes.

Based on the key considerations outlined in our submission, Animal Liberation provides several modest recommendations. Chief amongst these is that the NSW Government promote and facilitate an equitable transition away from animal agriculture towards alternatives whose impacts are far less adverse on the environment and public health. In line with a wealth of historical and contemporary scientific studies, our submission will demonstrate that the consumption of animal products is not imperative for a healthy human diet. As such, we encourage the NSW Government to seize the opportunity offered by this inquiry to promote a transition to plant-based diets. As we will show, this can be achieved while simultaneously facilitating the growth and development of supporting industries.

The present inquiry represents a valuable opportunity to thoroughly consider the deleterious effects of animal agriculture on food supply and security. We will show, in particular, that the environmental vandalism of this sector has contributed to Australia's shameful record of biodiversity loss and habitat destruction. The magnitude of these impacts is vast. Over half a billion animals are bred, confined, and slaughtered for human consumption each year. Industry reports predict that these figures will continue to rise and expand their ecological footprint in the process. Today, animal agriculture operations have annexed over half of Australia's total landmass. In order to expand its territory, the sector is responsible for the majority of land clearing. Its total operations are a significant source of harmful greenhouse gases.

In response to these concerns and the data in support of our associated conclusions, a key recommendation is that the NSW Government should implement a well-timed and managed transition away from animal agriculture which has as a priority the best interests of the animals involved, the environment and those employed in this sector. As our submission will show, this could dramatically increase food security while rehabilitating declining environmental values. In addition, a proactive and supervised policy will allow the environment to recover while protecting jobs and the economy.

In requiring recognition of these impacts, the Terms of Reference ('TOR') for this inquiry invite consideration of alternative approaches to food production. These alternatives must incorporate the environmental harms we have briefly described and discussed below. These alternatives, however, must also consider and account for the suffering animal agriculture causes. Our response to the TOR will show that this element of the supply chain is projected to become increasingly incidental as community concerns for animal welfare and environmental degradation reach ever greater heights.

We appreciate the opportunity to provide the Committee with information on these emerging issues.

SECTION ONE
FOOD SECURITY AND WASTE

SECTION ONE

FOOD SECURITY AND WASTE

1.1 FOOD SECURITY

Human well-being is generally comprised of four (4) major elements: basic human needs, economic needs, environmental needs and subjective well-being (Smith et al. 2013). Food is a key component of the first element (Summers and Smith 2014). Though there is no universally recognised definition of food security (Maxwell 1992; Gibson 2012), the concept refers to the ability to have reliable physical and economic access to safe, sufficient, and nutritious foods that meet dietary needs and preferences (FAO 2002; FAO 2006). This widely accepted definition is drawn from the 1943 Hot Springs Conference of Food and Agriculture (Napoli 2011) that was subsequently ratified at the 1996 World Food Summit and the United Nations Committee on World Food Security ('CFS') (FAO 2021). Moreover, it is multidimensional insofar as it contains four (4) key measurements: availability, access, utilisation and stability (Gibson 2012; Jones et al. 2013; FAO 2016).[1] These relate to the existence of food, the ability to obtain food, the available foods providing adequate nutrition, and the reliability of the previous dimensions, respectively. Together, these dimensions are often referred to as "the four pillars" of food security (Mbow et al. 2019; García-Díez et al. 2021).

Food security is also related to sustainable production sectors because the needs of current generations must be met with consideration for the environmental, social and economic consequences incurred by future generations (FAO 2014). In this way, food security is intimately associated with intergenerational equity (Weiss 1992; Tai 2020), which holds that natural resources must be preserved for the benefit of future generations (Summers and Smith 2014; Spijkers 2018; Venn 2019). These considerations are broadly provided for in the four pillars outlined above (Richardson 2010; Berry et al. 2015; Allen et al. 2019; Singh et al. 2021) and both the Rio Declaration on Environment and Development and the United Nations Framework Convention on Climate Change ('UNFCCC') (Henckens 2021). As such, the concepts of food security, sustainability and climate change are widely recognised as interrelated (Berry et al. 2015; Guiné et al. 2021).

Finally, though food security is part of the Sustainable Development Goals ('SDGs') (UN 2021), it is widely accepted that sustainability should be more adequately addressed in the four pillars of food security (Guiné 2021).[2] This has led to a series of associated recommendations, including incorporating sustainability as "a fifth pillar" while integrating other variables, such as climate change (Richardson 2010; Berry et al. 2015; Singh et al. 2021).

1.1.1 | WHY FOOD (IN) SECURITY MATTERS

Food insecurity occurs when one or more of the domains described in section 1.1 are not met (Hendriks 2015; Kent et al. 2020). While there are notable correlations between a nation's relative level of development and the food security of its citizens (Pérez-Escamilla 2017), food insecurity is also influenced by political stability and, increasingly, the ongoing climate crisis (Wischnath and Buhaug 2014; Guiné et al. 2021). In addition, while determinants of food insecurity include

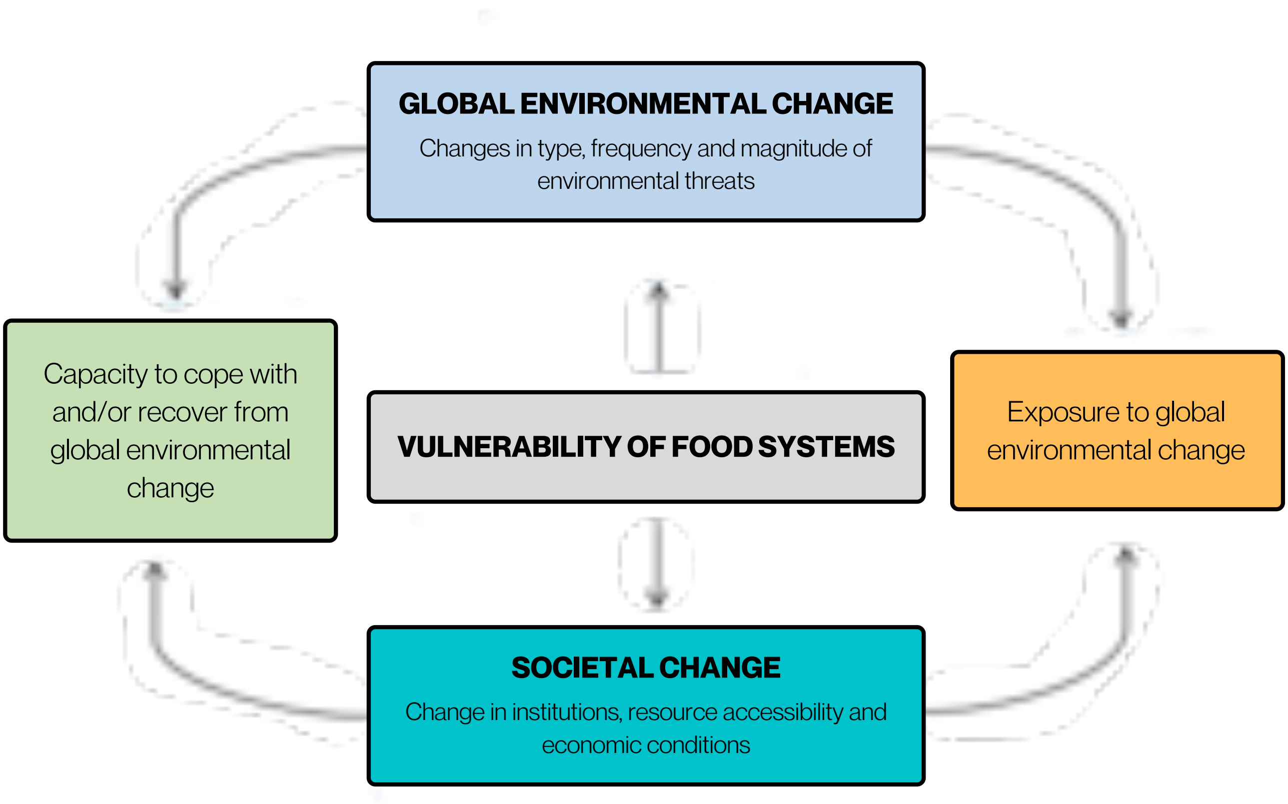
1 Though some definitions contain an additional pillar, acceptability, this is not generally present in many of those widely used (Béné 2020; Éliás and Jámbor 2021). See PMSEIC (2010) for an example of acceptability as an additional pillar.

2 See Goal 2 for zero hunger.

low income (Kleve et al. 2017) or sudden reductions in income (Temple 2018), with these factors being crucial elements of consumer resilience (Béné 2020), food shocks can be triggered by unexpected events and cause food insecurity. These triggers can include substantial or unexpected loss of employment, periods of sickness, environmental disasters or pandemics (Éliás and Jámbor 2021; McKay 2021).

FIG. 1: FACTORS INFLUENCING FOOD SYSTEM VULNERABILITY

Adapted from Ingram et al. 2005



Food insecurity is related to poorer physical and mental health because it is responsible for hunger, undernourishment and malnutrition (FAO 2020a; Éliás and Jámbor 2021).[3] Among vulnerable populations, it is strongly associated with higher risks of elevated stress levels, anxiety, depression, weight gain, malnutrition, and high-risk behaviours such as smoking and drinking alcohol (Bruening et al. 2017; Larson, Laska & Neumark-Sztainer 2020). The increased probability of these outcomes occurring is often due to individuals experiencing food insecurity consuming poor or low-cost diets that are typically high in energy-dense foods that contain lower amounts of plant-based foods (Hughes et al. 2011; Gallegos et al. 2014; McKay and Lindberg 2019; Whatnall et al. 2019; Larson et al. 2020).

In addition, several other factors, such as access to technological innovations in the agricultural sector (Magrini and Vigani 2016) and unanticipated shocks to the supply chain (UN 2021), can also trigger increased rates of food insecurity. These can have profound implications and cause significant complications in securing

3 Undernourishment is associated with food *quantity* while malnutrition is associated with food *quality* (Éliás and Jámbor 2021).

balanced and healthy diets (Markandya et al. 2021). We will show that a key example of an unanticipated shock is the ongoing impacts of COVID-19 (Galanakis et al. 2021; Knorr and Augustin 2021; Houessou et al. 2021).

Ultimately, higher levels of food insecurity have been recorded during economic downturns (Nord et al. 2014). For example, research shows that inadequate and low levels of government welfare support and high housing costs mean some families go without food to afford other critical needs and services (McKenzie and McKay 2017). In addition to the wealth of evidence demonstrating that a steady state of food insecurity can cause chronic diseases (Crawford et al. 2015; Willis 2021; Yii et al. 2020) and thereby contribute to the burden on the public health sector (Farahbakhsh et al. 2017; Martinez et al. 2019; Rewa et al. 2020), the contemporary agricultural production system is implicated in a host of adverse environmental impacts.

Though food insecurity is often regarded as a problem that predominantly impacts developing nations (Temple 2016), it is a critical public health issue in Australia (Nut et al. 2019). As Australia produces over 90% of its domestic food requirements (DAWE 2020a), it is often considered "food secure" when compared with many other nations worldwide (ABARES 2020; DAWE 2020b; Sullivan and Jasper 2020; DAWE 2021a). However, while Australia produces enough food to feed an estimated 60 million people, food security is not frequently or consistently measured at a population level (Bowden 2020).

Finally, it is important to note that historical and structural challenges, including poverty, racism, bigotry and prejudice against some members of society, and social disadvantages in communities, are recognised as the fundamental causes of unequal access to sufficient supplies of safe, nutritious, affordable, adequate, and culturally acceptable foods (McClintock et al. 2017; McClintock 2018; Siegner et al. 2018).

1.1.2 | THE IMPACT OF COVID-19 ON FOOD SECURITY

The COVID-19 pandemic is a prime example of the potential for increased levels of food insecurity triggered by widespread and unanticipated global shocks (Béné 2020; Gross 2020; OECD 2020; Searcy and Castka 2020). Though COVID-19 was declared a global pandemic by the World Health Organisation ('WHO') on 11 March 2020 (Ghebreyesus 2020), the first reported case in New South Wales was identified and documented on 25 January 2020 (Commonwealth of Australia 2020; NSW Health 2020). At the same time, Australia was also suffering the impacts of some of the most destructive bushfires on record (Cook et al. 2021). These triggered the declaration of a state of emergency across vast areas of the country (van Eeden et al. 2020; Bessell 2021).[4] Studies subsequently emphasised that understanding the impacts of such disasters on both the community and the environment, and their connection to climate change (Canadell et al. 2021), is "crucial" and increasingly challenging amidst the spread of COVID-19 (Lawes et al. 2021). Moreover, it is evident that pre-existing limitations on mitigation measures have been compounded by complications associated with COVID-19 (Bazerghi et al. 2016; McKay and Lindberg 2019). This subsection will demonstrate the impacts on food security associated with COVID-19 in Australia.

4 By March, at least 34 people had died (Fife -Yeomans 2020; Maynard 2020; Wahlquist et al. 2020), over 18 million hectares of land had been burned (Filkov et al. 2020; UNEP 2020), almost 3000 homes were destroyed (Blake 2020) and up to three billion animals had died (Readfearn 2020; Reiner 2020; WWF 2020). Subsequent studies have found that health risks associated with smoke are substantial, particularly in children (Curtin et al. 2020). In January, a survey found that over 78% of Australian adults were either directly or indirectly impacted by the bushfires and subjective wellbeing had declined (Biddle et al. 2020).

Though the Commonwealth and State Governments introduced a range of relief measures to ameliorate the predicted loss of income, food supplies were also disrupted due to changing consumption patterns, panic buying, and hoarding (Kinsella 2020).

While widespread public health measures, including social isolation, lockdowns, and travel restrictions, were introduced relatively early in Australia (Bessell 2021) and helped minimise the rate of transmission (Sakzewski 2020), these measures also triggered sudden and significant changes in employment for many Australians (Kent et al. 2020). Similarly, access to food services was also restricted and caused many in the hospitality sector to close (Leo Brown 2020). The first weeks of the pandemic triggered queues outside Centrelink (Worthington 2020) and while many were protected from the worst economic impacts (Bessell 2021), treasury figures indicate that within four weeks of JobKeeper ending in March 2021 approximately 56,000 Australians had lost their jobs (Kennedy 2021). These complications have resumed as additional public health measures are taken (Wiggins 2022) and are expected to continue (Butler 2022).

Between March and June of 2020, there was an unparalleled reduction (5.7%) in the number of Australians receiving a wage reduction in payroll jobs across the country (ABS 2020).

As a result, households experienced heightened economic vulnerability (Karácsonyi et al. 2021). Reports indicated that almost 50% of Australians drew on unsustainable and finite resources, such as credit or superannuation, to manage unexpected cash-flow complications and expenses (Kent et al. 2020). This likely also reduced the money available to buy food supplies (Thomsen et al. 2020). Because this can produce significant physical or mental health complications, insecure work is becoming recognised as a psychosocial health hazard (Vassiley 2022).[5] It is likely that this will become increasingly important as the complications of "living with the pandemic" continue (Janda 2021).

Over 20% of Australians were estimated to experience food insecurity prior to the pandemic (Foodbank 2019a). This figure has increased substantially since the onset of COVID-19 (Wright and Duke 2020).

There are segments of the population who regularly experience food insecurity and many more for whom it is a recurring problem (NRHA 2016). Though estimates of the population who experience food insecurity are often conflictual, with estimates ranging from 4% to 18% (Temple 2008; ABS 2015; Butcher et al. 2019; Foodbank 2019a), higher figures are reported when more accurate measurements are used (McKay et al. 2019). These have increased since the onset of COVID-19 (Kleve et al. 2021; Louie et al. 2022). For example, substantial increases in the number of people requiring food assistance have been reported since the onset of the pandemic (Foodbank 2019a). While an estimated 1.4 million people sought aid during May 2020 compared to 815,000 prior to the pandemic (Wright and Duke 2020), the number of

5 Western Australia, for example, became the first Australian state to recognise this in its new Code of Practice on Psychosocial Hazards in the Workplace, which provides practical guidance on how workplaces can comply with responsibilities under its *Occupational Safety and Health Act*.

Australians seeking food aid has increased in recent years (McKay et al. 2019). Despite this, there is currently no cohesive federal policy platform underpinning the goal of achieving food security in Australia (Foodbank 2021).

The pandemic exposed pre-existing vulnerabilities in the food production system and its supply chain (McKay 2021; Sen and Srivastava 2022).

Between late April and early June 2020, more than 1 in 4, approximately 26%, of Australians had experienced food insecurity (Kleve et al. 2021). In addition, approximately 14% of these people reported experiencing "more severe food insecurity", meaning they were regularly hungry or unable to afford balanced meals (Kent et al. 2020). Such figures are significantly higher than pre-pandemic statistics (ABS 2015; Farrell et al. 2021). As we have shown, food insecurity can worsen diet quality and increase the risk of various adverse health conditions, including excess weight or obesity (Farrell et al. 2018) and diabetes (Carey et al. 2020). Such conditions may also place people at greater risk of getting sick or dying from COVID-19 (Steiner et al. 2020).

We have shown that food insecurity impacts a substantial cohort of the population. Moreover, unanticipated shocks, including possible future pandemics, can be expected to aggravate pre-existing complications further. The following subsection will show that agricultural practices significantly impact food security and sustainability (Liu et al. 2019; Lin et al. 2020). This includes significant water use (Liu et al. 2021), soil salinity issues (Mangu et al. 2019), pest and disease control measures (Qi et al. 2019), and the concentration and intensification of production efforts (Scherer et al. 2018; Campi et al. 2021). As such, the farming sector represents a major determinant of sustainable food security (Borchert et al. 2021). This incorporates a range of other critical dimensions of increasing community concern, including animal welfare (Buller et al. 2018; Futureye 2018; McGreevy et al. 2019).

Given the implications of food insecurity we have outlined above, the inquiry must consider the quantity and quality available, obtained and consumed by residents in examining issues concerning improvements to food security and equitable access. In addition, it must explicitly consider recent, ongoing and predicted impacts of COVID-19. While Animal Liberation acknowledges that the current inquiry offers a crucial opportunity to explicitly evaluate these elements, which we recognise as essential in ensuring equitable access, we strongly recommend that the Committee transparently assess the opportunity costs inherent in the business-as-usual ('BAU') production system. Subsequent sections of this submission will demonstrate that many adverse environmental and public health outcomes are influenced by current dietary practices that can be reasonably expected to become increasingly impactful due to the combined effects of the pandemic and the ongoing climate crisis. This will be further elucidated in section 3 of this submission per Terms 5 and 6. We will also show that such adverse outcomes may be further compounded by the impacts of zoonotic diseases, such as COVID-19, which is positively tied to animal production and consumption.

1.1.3 | FOOD SECURITY AND THE CLIMATE CRISIS

"The 21st century represents a phase of life where nature is unable to regenerate, the fundamental credo of the future should be the efficient management of limited resources" - Maxton (2018)

Although many factors affect climate change, increasing greenhouse gas ('GHG') emissions are often identified as the leading cause of declining climatic conditions. While this will be described and discussed in the relevant section of this submission, the increased concentration of GHGs in the atmosphere traps more heat on Earth, and increases mean temperatures (Thomas and López 2015). As a result, climate change causes adverse impacts on both ecosystems and human societies. Furthermore, it increases the incidence of extreme weather events, such as floods, droughts and other climate-related disasters, which can adversely affect food production and supply (Gould and Lewis 2009). Three key factors have been identified as having the most immediate impacts on food production: soil, water and crops (Lal 2013). These factors are critical in understanding the effect of climate change on food security because they are the most fundamental and essential components of food production (Islam and Wong 2017). Each will be briefly outlined below.

Soil resources are limited, unequally distributed and vulnerable to degradation by land misuse, mismanagement and climate change (ITPS 2015).

Increasing air temperatures for an extended period will significantly impact soil properties and fertility, affecting food quantity and quality (Lal 2013; Islam and Wong 2017; Mondal 2021). Research has demonstrated that climate change causes damaging impacts on agro-ecosystems and food security because it increases the probability of climate-related disasters, such as droughts, floods and heatwaves (Islam 2013; Qafoku 2015). These changes can elevate the possibility of food insecurity by decreasing the quality and quantity of crops, thereby diminishing food availability (Islam and Wong 2017). As soil is a non-renewable resource, research has demonstrated that soil damage is irreparable when it exceeds a particular threshold (FAO 2015a). While it is apparent that soil plays a crucial role in securing food security, damage to soil caused by climate change represents an imminent crisis as it impacts food production, the emission of GHGs and the quality and quantity of water (Shahid and Ahmed 2014).

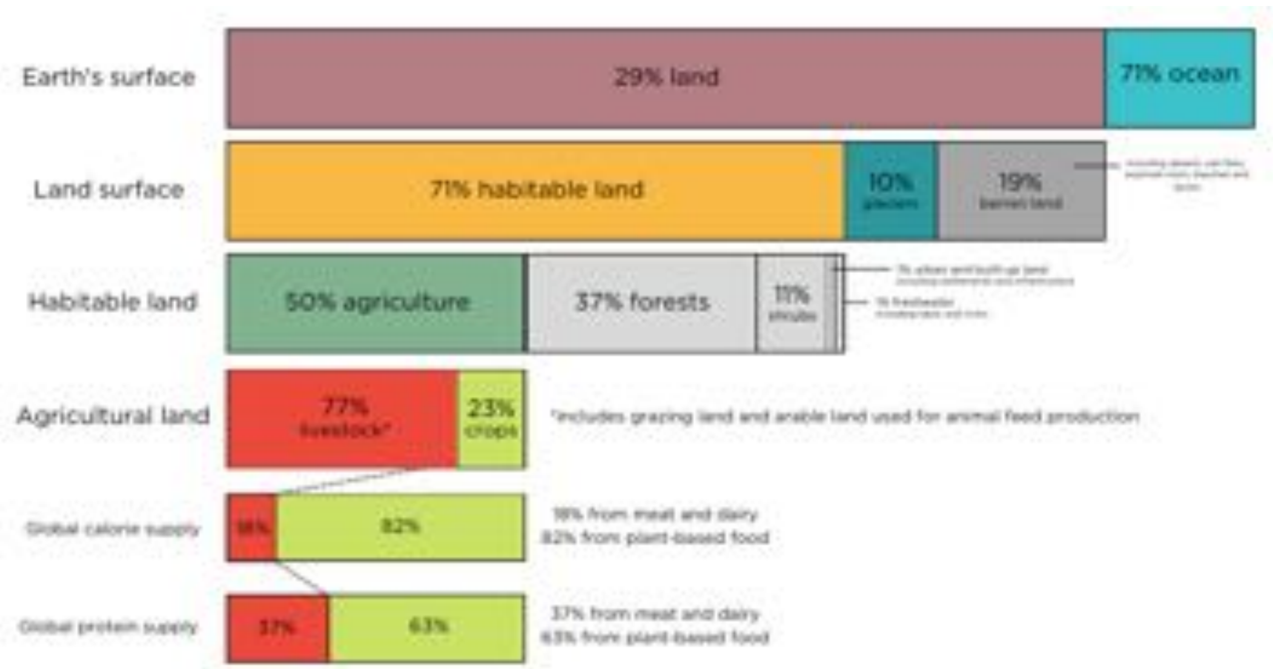
Water scarcity has been identified as "one of the greatest challenges of the twenty-first century" (FAO 2020b).

While approximately 70% of the Earth's surface is water, freshwater accounts for just 1% (FAO 2017a), and a third of this fraction is already in distress, meaning water is extracted faster than it is replenished (Richey et al. 2015). The United Nations Department of Economic and Social Affairs ('UNDESA') predicted in 2014 that current climate change scenarios would result in nearly half the world's population living in areas of "high water stress" by 2030 (UNDESA 2014). Estimates suggest that 700 million people could be displaced by intense water scarcity by that year (UN 2016). Figures from the United Nations ('UN') suggest that the number of people living in water-stressed countries exceeds 2 billion (UN 2021), while about 4 billion, or nearly two-thirds of the total global population, experience severe water scarcity at least one month a year (Mekonnen and Hoekstra 2016). This figure is predicted to increase to 5.7 billion by 2050 (Burek et al. 2016).[6]

These sobering insights are drawn from the fact that water is highly susceptible to pollution, contamination, eutrophication and changes in climate (OECD 2017a; Lu et al. 2018).[7] Climate change jeopardises water availability because it can decrease or cause oscillations in temperature and rainfall (Kang et al. 2009). As fluctuations in rainfall and temperature can induce crop failure, recent reviews have concluded that "by continuing to deplete these resources, the system is heading towards collapse" (Šulyová et al. 2021). Because over 70% of all water withdrawals are used by agriculture (Panchasara et al. 2021; UN 2021), it is apparent that significant changes must be made in order to avoid this outcome. Australia's variable climate has historically led to long periods of drought that are often punctuated by periods of heavy rainfall and flooding, producing natural limits on both the quantity and quality of available surface water (Crawford 2020).

FIG. 2: GLOBAL LAND USE FOR FOOD PRODUCTION

Adapted from Ritchie 2017



6 Most recently, the ongoing war in Ukraine is, at least partially, being fought over water access (UNICEF 2019; Marques 2021; Olearchyk and Seddon 2021; Vanderklippe 2022).

7 Eutrophication is a grave concern as high concentrations of nutrients, such as nitrogen and phosphorus, from different sources, including agriculture, can cause algal blooms that disrupt the normal functioning of ecosystems (Nazari-Sharabian et al. 2018).

The rise in GHGs and global temperatures caused by climate change will increasingly reduce plant growth and nutrient availability (Islam and Wong 2017).

Crops are also adversely impacted by climate change due to altered weather conditions. This may increase the development of weeds and the use of pesticides (Keating 2013). In addition, rising temperatures typically produce more favourable conditions for disease-causing organisms and pests, adversely affecting crop quality and growth (Santra et al. 2014). Some estimates suggest that there would be a “loss of 4–5 million tonnes in wheat production with every 1°C rise in temperature throughout the growing period” (Keating 2013: 219). Climate change thus affects food security, as increasing temperatures and conditions detrimental to crop production affect the quality and quantity of crops (Islam and Wong 2017).

In combination, these key factors impact food security in a range of profound and accumulating ways. For example, if soils lack nutrients or cannot sustain the growth of crops, there will be a corresponding decline in availability and supply (Islam and Wong 2017). Because these crops are sensitive to temperature and precipitation changes, a 2°C rise in global temperatures could severely disrupt production and output (Kang et al. 2009). This will likely have increasingly adverse impacts on affordability (Goulding et al. 2020; May 2022a; Murphy 2022). While health and sustainability are preferred outcomes for many consumers, affordability frequently takes precedence, particularly for lower-income consumers (Pearson et al. 2014; Hoek et al. 2017; Hoek et al. 2017; Graća 2016). The availability will be further jeopardised as climate change leads to fluctuations that lead to lower varieties of resources for both current and future generations (Úbeda et al. 2013), thereby affecting intergenerational equity. Those that survive these fluctuations will be less nutritious, as rising CO2 emissions reduce nutrient levels in crops (Carrington 2014; Myers et al. 2014). Climate change may also impact food safety if contaminated water supplies are used to grow crops and indirectly cause the consumption of potentially toxic products (Islam and Wong 2017). Climate-related disasters, such as flooding experienced in March 2022 across Queensland and NSW, could also cause harmful substances to enter water sources and pollute water sources used for agricultural purposes (IPCC 2007).

There will also be related consequences on income security. For example, in the decade between 2003 and 2013, climate-related environmental disasters impacted nearly 2 billion people in developing countries and resulted in an estimated half a trillion US dollars in damages (FAO 2015b). The FAO estimates that the “agricultural sector absorbs approximately 22 per cent of the total economic impact of these disasters”, which in turn impacts its capability to support food security (FAO 2015c). This has led researchers to conclude that “evidently the effects of climate change are unequal” (Islam and Wong 2017).

1.1.4 THE IMPACT OF COVID-19 ON PUBLIC HEALTH, WITH A FOCUS ON ANIMAL AGRICULTURE

We have shown that the health, economic and social crises caused by the COVID-19 pandemic have disrupted the spectrum of human activity. Subsequent sections will provide the Committee with a range of relevant considerations applicable to the TOR provided. This subsection, however, will discuss the impacts of COVID-19 on animal agriculture. In conjunction with the case study provided on pages 17-25, this subsection will demonstrate how the production, distribution and consumption of animal products constitutes a major risk for zoonotic disease transmission. Finally, it will be referred to when discussing our key recommendation that the NSW Government investigate and implement measures to promote a just transition from animal-based to plant-based production and consumption.

Farmed animals now constitute more biomass than all wild mammals combined (Bar-On et al. 2018) and harbour significantly more zoonotic viruses than their free-living counterparts (Johnson et al. 2020). Though some industry representatives maintain that the risk of zoonotic disease in the sector is significantly reduced by adherence to biosecurity mitigation measures (Schuck-Paim 2020), intensive animal operations have historically generated several severe threats to public health through the production of infectious diseases (Otte et al. 2007; Espinosa et al. 2020). While protocols and standards to prevent or mitigate diseases exist, various factors diminish their efficacy. For example, the immense scale of the production of industrial operations, the vertically integrated nature of many systems, the live transport of animals across borders and the myriad transmission avenues during slaughter “make it unlikely that these measures would be sufficient even if they were strictly implemented” (Schuck-Paim 2020; Schuck-Paim and Alonso 2020). However, poor compliance with biosecurity is endemic across the sector (Scott et al. 2018).

The zoonotic origin of COVID-19 is believed to be a "wet market" in Wuhan City, China, where a considerable proportion of infected people were exposed during the early stages, with bats and birds identified as the potential intermediary connection between animals and humans (Horton and Horton 2020; Rothan and Byrareddy 2020; Zhou et al. 2020). COVID-19 has been described as a "perfect example" of a zoonosis spillover from wildlife that subsequently became established in human populations (Roche et al. 2020). Though this type of event has happened many times in human history (Lloyd-Smith et al. 2009), the connectivity of current human populations, the globalisation of trade networks and high rates of urbanisation mean that such a disease could spread at an accelerated pace post-spillover (Saker et a. 2004; Shrestha et al. 2020; Sigler et al. 2021). In July 2020, the United Nations Environment Programme ('UNEP') published a report underscoring the significance of investigating the causes leading to the spread of COVID-19 as a pathway to preventing future pandemics (Sandhu et al. 2021). Though the public health response has primarily focused on interventions to contain or prevent further human-to-human transmission, there is notably less discussion on how the originating factors of COVID-19 can be mitigated, removed, or proactively addressed (Sandhu et al. 2021). This represents a significant oversight.

While no industry has been immune to the impacts of COVID-19 (Hashem et al. 2020), it has been particularly pronounced in the industrial animal production sector (Garcés 2020). This was initially seen as slaughterhouses emerged as major transmission hotspots (Lakhani 2020; Taylor et al. 2020; Yussuf 2020). Studies subsequently identified contributing causes of the rapid spread of COVID-19 among slaughterhouse employees, including prolonged contact with infected co-workers, an inability to social distance, shared working areas and common transportation methods (Ijaz et al. 2021). Such factors contributed to the role played by slaughterhouse workers during Australia’s “second wave” outbreak of COVID-19 clusters (AAP 2020; Boseley 2020; Cunningham 2020; Marshall and Unger 2020). Similar occurrences have been demonstrated internationally (Teperman 2020). Other factors that compromised the normal functioning of animal agriculture included difficulties in purchasing production inputs, including feed, restrictions on the transport of live animals and workforce restrictions through quarantine-related furloughs (FAS 2020). These caused a decline in processing capacity and subsequent declines in sales (Marchant-Forde and Boyle 2020) while also producing significant adverse animal welfare outcomes.

For example, while much focus has been on the workforce (Risse and Jackson 2021) and food security impacts (Asher 2021; Galanakis et al. 2021) of COVID-19, associated supply chain disruptions have been described as “unprecedented” by the Australian chicken industry (May 2022b) and are a major concern for other intensive animal production industries (Gortázar and de la Fuente 2020). This is primarily due to personnel impacts, including staff shortages due to movement restrictions and furloughs, that have reduced the sector’s ability to maintain facilities and impacted processing capacities (FAO 2020c). This has subsequently caused additional overcrowding and “a backlog of animals at farms” that would have otherwise been slaughtered (Baptista et al. 2021). Though similar examples have been noted in other intensive animal production industries (Marchant-Forde and Boyle 2020), this is a particularly profound problem for chicken welfare due to the rapid rate at which they grow (RSPCA Australia 2022c). Therefore, a lockdown or staff shortage period of just a few weeks represents the production time and risks severe welfare issues (AWC 2020) by placing additional stress on stocking densities and generating significant welfare issues (Julian 1998; Bessei 2006).[8]

While intensive poultry farming has produced significant zoonotic viruses, such as highly pathogenic avian influenza (‘HPAI’), which has been increasingly reported in the three (3) weeks from 1 to 20 August 2020 (Dhingra et al. 2018; OIE 2020), pigs have been identified as ideal “mixing vessels” to generate viruses with pandemic potential (Ma et al. 2008). This is because pigs have receptors for avian, swine, and human influenza viruses (Shuck-Paim 2020), as demonstrated by the 2009 “swine flu” (‘H1N1’) pandemic (Gibbs et al. 2009).

1.1.5 | CONCLUSION

It can be demonstrated that climate change has, is and will continue to directly impact the four pillars of food security. It will do so by impacting employment security, directly affecting supply quantities, disrupting the distribution and reducing the nutritional value of produce. Moreover, in concert with emerging public health disasters, the scale and frequency of these issues can be expected to rise exponentially (Bartos 2022; Whittaker 2022). This necessitates urgent, proactive and radical transformations in both the production system and consumption habits (Green et al. 2015; Milner et al. 2015; UNSCN 2017). While short-term efforts may focus on dealing with the pandemic and the aftermath of various extreme weather events intensified by the climate crisis, meaningful and structural changes are necessary to mitigate and minimise their occurrence (Horton and Horton 2020). A critical component of this will be radical transformations in how food is produced and consumed (Horton 2017). The following section of this submission will demonstrate that reform of the food production system should be based on two guiding principles. The first is the inseparable connection between human and planetary health: actions that ameliorate the burden of malnutrition by supplying equitable access to healthy, safe and nutritious food will mitigate the adverse effects of climate change and help rehabilitate degraded environments (Tilman and Clark 2014). The second is

8 In this regard, we note recent documents submitted by one of Australia’s largest vertically-integrated chicken meat production companies (Baiada Group 2017; ACMF 2020; PSA Consulting 2021), pursuing the development of a breeding facility in Grenfell (NSW) that failed to adequately address or provide sufficient detail regarding either mitigation or disposal methods in the event of an event requiring mass euthanasia (AL 2022b). This demonstrates the lack of adequate disaster preparedness and suggests an urgent need for government intervention in securing proactive emergency management planning.

the principle that humanity does not have the right to exploit or manipulate everything on Earth for its own advantage or benefit regardless of the consequences (Horton and Horton 2019).

In sum, this section has demonstrated that the impacts of climate change can be shown to directly impact the four pillars of food security (Barrett 2010). We have similarly demonstrated that the immediate impacts are likely to be on the ability to produce enough food for the population (i.e., the availability pillar). However, it can also be shown to impact the access and utilisation pillars through limitations on productivity (Tapsell et al. 2011). As such, it is reasonable to conclude that climate change will continue to pose threats to food security. Moreover, these threats will likely be compounded by preexisting or emerging public health crises, such as the COVID-19 pandemic, which will be outlined and discussed in the following subsection.

CASE STUDY:
ZOONOTIC DISEASES AND INTENSIVE ANIMAL AGRICULTURE

BACKGROUND

Throughout human history, major changes have occurred in response to human activity. The transition from small hunter-gatherer communities to extensive agricultural societies is strongly correlated with the emergence of human contagious diseases (Jones et al. 2013). Though enhanced nutrition, hygiene, vaccines and antimicrobials have reduced the risks of infectious communicable diseases, particularly in the past century (Schlipköter and Flahault 2010), the following case study on zoonotic diseases associated with intensive animal agriculture will show that many of these risks have their origins in the farming of animals. It will conclude by demonstrating that a transition away from animal agriculture reduces the risks of zoonotic disease generation and transmission. This will then inform the corresponding recommendation provided for the Committee's consideration in section 4 of this submission.

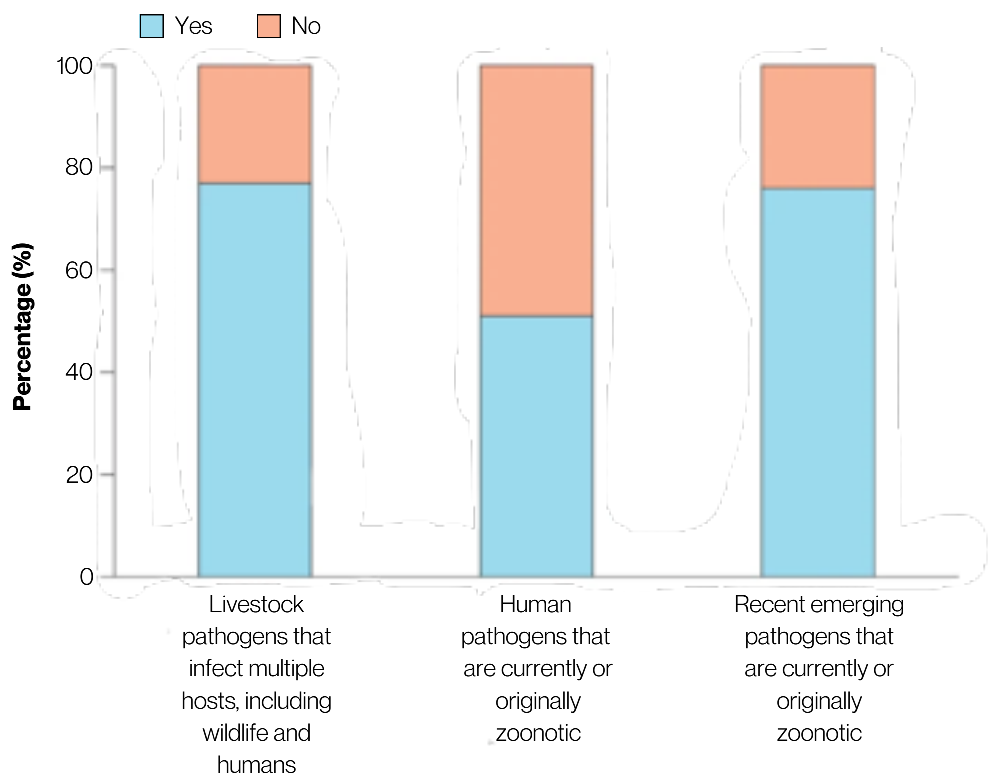
While public health improvements have significantly reduced the risk of contracting communicable diseases, many human activities of recent decades have all increased risks from emerging diseases with pandemic potential (Morse 1995; McMichael 2004; Harper and Armelagos 2010). Behavioural changes, for instance, driven by rising population, economic and technological development, and the associated spatial proliferation of agriculture, are producing novel and more intensive interactions between humans, farmed animals, and wildlife (Jones et al. 2013). These changes have been implicated as drivers of several recent examples of emerging disease events that had significant adverse consequences on global human health (Woolhouse and Gowtage-Sequeria 2005). A number of these will be outlined to provide the Committee with a brief historical context and an overview of the potential trajectory of emerging zoonoses.

CASE STUDY ONE CONTINUED

In many parts of the world, farmed animal production has experienced a transformation towards intensification and industrialisation (Graham et al. 2008).

At least three (3) major forces associated with an increasing demand for meat have driven this change: a rapidly growing world population, increased urbanisation and socio-economic progress (Moekti 2020). Distinctive features of the facilities used to produce the requisite animals to feed this growing demand involve the confinement of many thousands of animals, fed on defined diets and deprived of foraging, at increasingly high densities (Graham et al. 2008; Ilea 2009). Experts agree that such conditions represent "an excellent breeding ground for zoonotic pathogens" (Brozek and Falkenberg 2021). Furthermore, the highly concentrated nature of these facilities boosts the risk of disease transmission (Jones et al. 2013; Anomaly 2015) and favours mutations among pathogens that are mutually transferable between wildlife, farmed animals and humans (Graham et al. 2008). The spread of pathogens beyond farms can occur in myriad ways, mainly via infection of employees in close contact with animals and through the disposal of their waste (Schmidt 2009). Factory farms, therefore, act as "incubators, amplifiers and transmission ports of zoonotic pathogens" (Brozek and Falkenberg 2021).

FIG. 3: LIVESTOCK PATHOGENS AND ZOONOSES



Adapted from Rohr et al. 2019

CASE STUDY ONE CONTINUED

Up to 75% of all known human pathogens are zoonoses (Recht et al. 2020), with COVID-19 being one of a plethora that has and continues to impact our species (Brozek and Falkenberg 2021).

According to the World Health Organisation ('WHO'), "any disease or infection that is naturally transmissible from vertebrate animal to humans" is zoonotic (WHO 2020). Among the emerging infectious diseases that arose between 1940 and 2004, zoonoses account for approximately 60% (Jones et al. 2008). Among emerging and re-emerging infectious diseases that have occurred or reappeared within the decades since the 1970s, this figure increases to 73% (Woolhouse and Gowtage-Sequeria 2005; Watkins 2018). As such, zoonoses are widely regarded as one of the most critical threats to public health (Bueno-Marí et al. 2015).

During the ongoing COVID-19 pandemic, which is the third pandemic of the 21st century caused by a zoonotic pathogen (Brozek and Falkenberg 2021), the focus has predominantly been on vaccines as a solution (Stuckler et al. 2021).

While these have been unequally distributed, and this represents a significant flaw in global preparedness and equity that could be perpetuating the pandemic (Tatar et al. 2021; Rydland et al. 2022), relatively little attention has been given to the prevention of future zoonoses in order to achieve a healthy and sustainable future (Stel et al. 2022). For example, the origins of the global SARS epidemic of 2002 and 2003 have been traced to the wildlife trade in South China (Bell et al. 2004). In this way, it is akin to the onset of the COVID-19 outbreak (Brozek and Falkenberg 2021). The influenza pandemic of 2009 and 2010 due to "swine flu" ('H1N1'), however, stemmed from intensive pig farms in Mexico (Gibbs et al. 2009; Lymbery 2020). Reports on H1N1 by Chinese researchers shows that pigs can act as intermediate hosts for the generation of influenza viruses with epidemic potential (Sun et al. 2020). Despite over 70% of infectious zoonotic diseases emerging between 1940 and 2004 originating from wildlife (Jones et al. 2008), intensive livestock farming is considered a major driver of their emergence (Jones et al. 2013; Roe et al. 2020; Wiebers and Feigin 2020). Zoonotic outbreaks are therefore becoming more frequent and intense (Wolfe et al. 2007; Coker et al. 2011). Moreover, recent zoonoses are predominantly correlated with human activity, notably intensive modern animal production systems, unsustainable land use, the extraction of natural resources, and climate change (Jones et al. 2008; Cutler et al. 2010; Karesh et al. 2012).

CASE STUDY ONE CONTINUED

Though most zoonoses have emerged in wildlife (Jones et al. 2008), most zoonoses of recent concern were caused by animal agriculture (Leibler et al. 2009).

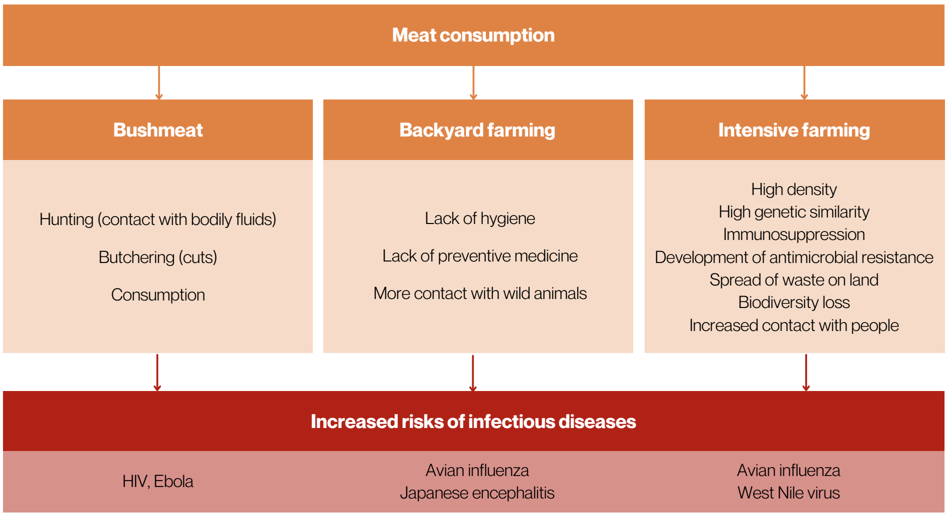
Intensive animal agriculture plays a primary role in the emergence of zoonoses because the growth of intensive animal farming operations increases the risk of zoonotic outbreaks (Stel et al. 2022). In addition, farmed animals may be intermediate or amplifier hosts, wherein pathogens evolve and either "spillover" into humans or cause direct infection from wildlife or other animal vectors (Childs et al. 2007). As such, the production and consumption of animals and animal-based products affect zoonotic risks, either directly through increased contact with farmed and wild animals or indirectly through environmental impacts (Civitello et al. 2015; Espinosa et al. 2020).

Multiple studies have confirmed a connection between intensive animal agriculture and heightened zoonotic risk (Graham 2008; Leibler et al. 2009; Coker et al. 2011; Drew 2011; Karesh et al. 2012; Dhingra et al. 2018; Espinosa et al. 2020). Though steps are taken in intensive farming, such as biosecurity, restrictions on movement, and the prompt isolation of infected farms, to reduce the transmissibility of zoonotic disease (Garske et al. 2008), these do not eliminate the risks (Stel et al. 2022). Though these measures can lower the risk of zoonotic disease, the conditions in which farmed animals are confined and transported increase zoonotic risks (Stel et al. 2020), which are intensified when the number of animals and stocking densities increase (Leibler et al. 2009; Wallace 2016; Espinosa et al. 2020).

The probability of animals developing a disease that emanates either within or outside farms is higher in intensive systems due to the proximity of intensively farmed animals and their weaker immune systems (Springbett et al. 2003; Dhingra et al. 2018). Likewise, the high density and stressful conditions in which they are confined and transported further weakens their immune systems, which similarly inflates the risk and rate of disease transmission (El-Lethey et al. 2003; Greger 2007; Rostagno 2009; Schuck-Paim and Alonso 2020). Evidence shows that highly pathogenic viruses that generate zoonoses' emergence primarily occur in high-density facilities (Graham et al. 2008). In addition to these concerns, COVID-19 has demonstrated how zoonotic disease can spread through production facilities based on their structure and design. Abattoirs, for example, have been at the forefront of many COVID-19 outbreaks across the world (Teperman and Lettini 2020). Finally, the transportation of animals from farm to abattoir augments transmission risk (Lieibler et al. 2009).

CASE STUDY ONE CONTINUED

FIG. 4: LIVESTOCK PATHOGENS AND ZOONOSES

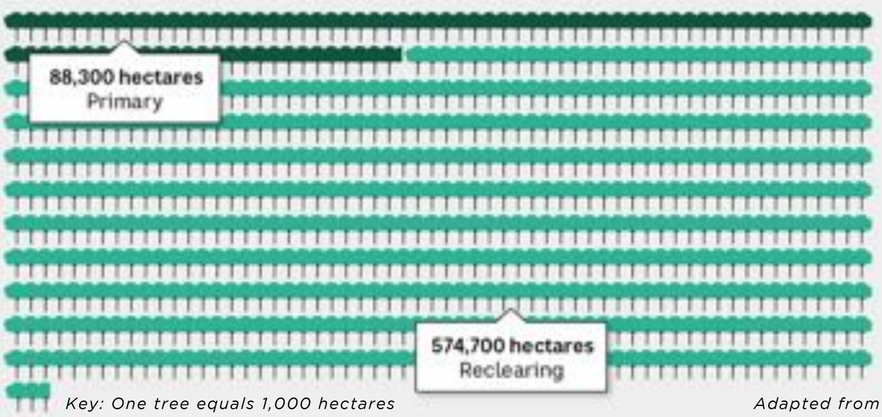


Adapted from Espinosa et al. 2020

In addition to the primary role played by intensive animal agriculture in zoonotic risk production, intensive facilities play an indirect role through land clearing and deforestation (Civitello et al. 2015; Espinosa et al. 2020).

The expansion of agricultural land for pasture and growing feed for farmed animals causes wild animals to lose their habitats, intensifies pressure on existing social structures, increases cohabitation and expands the exploitation of finite natural resources, including water. This increases animal-human contact and, thus, increases zoonotic risks (Stel et al. 2020). The cultivation of crops fed to farmed animals also requires vast tracts of land. The clearing that this necessitates results in the widespread destruction of habitats, deforestation and biodiversity loss (Stoll-Kleemann and Schmidt 2017), which are themselves considerable drivers of zoonotic disease (Everard et al. 2020).

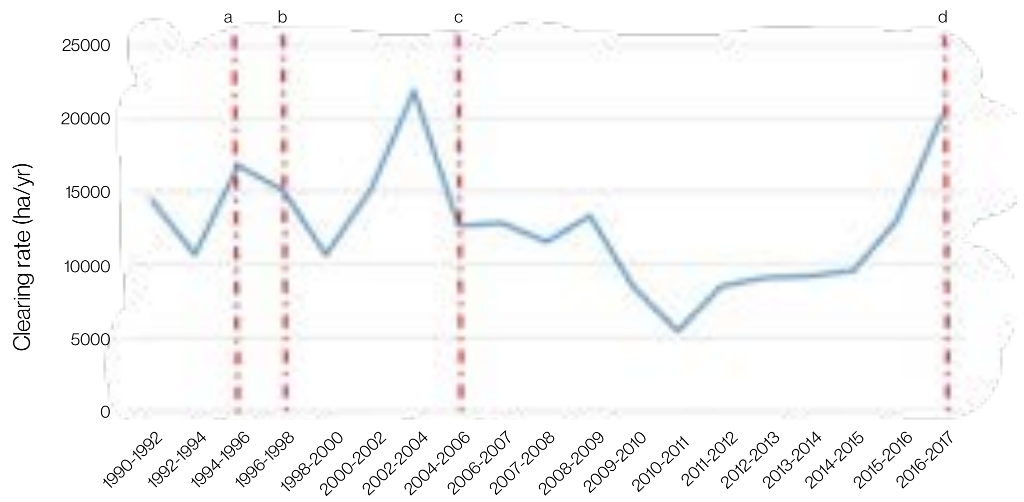
FIG. 5: LAND CLEARED IN NSW (2010-18)



Adapted from Machan 2020

CASE STUDY ONE CONTINUED

FIG. 6: AGRICULTURAL LAND CLEARING, NSW (1990-2017)



Adapted from Heagney et al. 2021

WHERE TO FROM HERE?

The expansion of agricultural land for pasture and growing feed for farmed animals causes wild animals to lose their habitats. This increases animal-human contact and, thus, increases zoonotic risks (Stel et al. 2020). The cultivation of crops fed to farmed animals also requires vast tracts of land. The clearing that this necessitates results in the widespread destruction of habitats, deforestation and biodiversity loss (Stoll-Kleemann and Schmidt 2017), which are themselves considerable drivers of zoonotic disease (Everard et al. 2020).

Sustainable food systems that diminish the threat of emerging diseases will be required to satisfy the nutritional requirements of the rising global population while simultaneously safeguarding human health and preserving biodiversity and the environment (Jones et al. 2013). The circumstances outlined above are exacerbated because animals bred to have high yields are frequently genetically identical (Brozek and Falkenberg 2021). Thus, animals confined in intensive facilities are more vulnerable to infections and epidemics than genetically diverse animals (de Haan et al. 2001). Furthermore, the abundant application of antibiotics, especially for non-therapeutic disease prevention and growth promotion, also encourages the development of drug resistance to emerging strains (Holmes et al. 2016; Anomaly 2020). Even if these strains do not cause human infections, antibiotic resistance can be circulated among bacteria that are pathogenic to humans, thereby posing another significant threat to public health (Anomaly 2015; Brozek and Falkenberg 2021). While it is sometimes argued that biosecurity measures and reduced contact with wildlife mean that factory farms are safer than small-scale farms (Espinosa et al. 2020; Robbins 2020), it is reasonable to conclude that the liabilities outlined above surpass any plausible advantage (Weibers and Feigin 2021). Given that global meat consumption has been increasing for at least the past fifty (50) years and that this trend is expected to continue into the coming

CASE STUDY ONE CONTINUED

decades (Godfray et al. 2018), the significance of intensive animal production in creating future zoonotic diseases with pandemic potential will likely increase unless dietary changes and production transitions are made (Brozek and Falkenberg 2021).

Emerging evidence suggests that responses to the COVID-19 pandemic have the potential for sustainable social evolution that neutralises the emergence of zoonotic diseases (Brozek and Falkenberg 2021). For example, a Chinese study conducted during the early pandemic showed that COVID-19 strongly influenced adverse attitudes towards game meat compared to organic food, particularly among the younger generations (Xie et al. 2020). Another recent study demonstrated that COVID-19 elicited increased environmental awareness, social accountability and sustainable consumption (Severo et al. 2021). Specific policies undertaken in response to COVID-19 may also activate sustainable transitions. For example, China's ban on the wildlife trade and the consumption of terrestrial animals was declared to protect ecosystems and mitigate the risk of future zoonotic pandemics (Koh et al. 2021). Similar proposals for an international ban on the wildlife trade and consumption have occurred in response to COVID-19 (Chakraborty and Maity 2020; Yang et al. 2020). However, it is essential to emphasise that stricter hunting and wildlife trade regulation cannot be considered the only approach to preventing future zoonotic spread. The major drivers of infectious disease include expanding human settlements, deforestation and the proliferation of agricultural land, and intensive animal farming (Jones et al. 2008; Allen et al. 2016; Roe et al. 2020). Moreover, these effects are expected to grow due to the predicted demands for animal products. Ultimately, increased animal agriculture will increase the risk of future zoonoses (Rzymski et al. 2021).

CONCLUSION

COVID-19 has exaggerated pre-existing vulnerabilities in the animal agriculture sector (Millet et al. 2021). Assessments have shown that the concurrent emergence of COVID-19 and other zoonoses can further compound existing issues. The African swine fever ('ASF') pandemic, for example, has created a "double pandemic" in the pig meat sector (Millet et al. 2021). ASF is a highly contagious viral disease with no known cure (DPI 2020). The current strain impacting global pig populations is considered highly virulent (Malladi et al. 2022) and has killed approximately 80% of the pigs it infects (WHA 2020; DAWE 2021b). It can kill 100% of infected animals (Queensland Government 2021). This virulence is responsible for its continuous spread, both in new countries and new zones in those already affected (OIE 2022). It is widely regarded as one of the most threatening diseases for the global pig farming sector (Busch et al. 2021).

Though there have been no reported cases of ASF in Australia to date, the proximity of the Indonesian and Timor-Leste ASF outbreaks increases the risk of an equivalent outbreak in Australia (DPI 2020; WHA 2020). Each form of preemptive disease control that involves the large-scale killing of pigs produces significant environmental concerns relating to disposal (Cadenas-Fernández et al. 2019; Busch et al. 2021). It also raises serious ethical concerns when otherwise healthy animals are killed to prevent the spread of disease. For example, over 11 million pigs were killed in the Netherlands in 1997 to halt the spread of classical swine fever ('CSF') when less than 1 million were infected (Meuwissen et al. 1999). Critics have argued

CASE STUDY ONE CONTINUED

that blanket policies that fail to account for either the characteristics of a pandemic in animal populations or the conditions in which they are kept can effectively impede control efforts (Busch et al. 2021). It is important to note, moreover, that human activity has been identified as the primary driver of disease transmission in domestic pigs and is responsible for their spread in wild pigs population (Chenais et al. 2019; Schulz et al. 2019).

Communicable diseases with animal origins are increasingly spilling over into human disease transmission (Sabin et al. 2020). Avian influenza outbreaks due to an emerging subtype known as H5N8 in poultry farms worldwide have led to the first known cases of human infection in late 2020 (Shi and Gao 2021). More recently, the detection of mosquito-borne Japanese encephalitis virus ('JEV') in dozens of piggeries across the country has led to the deaths of at least two (2) Australians (Davey 2022; Michie and Johnson 2022). The latter has led to predictable calls for preemptive lethal control of free-living pigs (Hugo and Becker 2022). These examples constitute the most recent prompts that urgently require decisive action (Brozek and Falkenberg 2021).

Like the threats described in relation to food insecurity, the risks associated with emerging zoonotic diseases may be most profound in vulnerable communities. Though pandemic planning has been triggered by events in the Asia-Pacific region, including the emergence of SARS in 2003 and avian ('H5N1') influenza in 2004 (Weeramanthri et al. 2010), recent examples do not elicit the requisite confidence in their application. While previous pandemics, such as "swine flu" ('H1N1'), have constituted global crises in a similar manner to COVID-19 because they cause many deaths and public fear based on uncertainty (Hamilton et al. 2010), they have also disproportionately affected vulnerable communities. Like COVID-19, certain individuals were at higher risk of disease from H1N1 (Jamieson et al. 2009; Hamilton 2010). However, it has long been recognised that Indigenous peoples are at increased risk of adverse consequences and complications associated with influenzas (Cleland-Burton 1928; Rice 2005). Following the emergence of novel H1N1 in April 2009 and its subsequent spread that constituted the first global influenza pandemic since 1968 (Gostin 2009; WHO 2009; Jhung et al. 2011), Indigenous populations in Australia, New Zealand, Canada, Brazil and the Pacific Islands were particularly vulnerable to the H1N1 infection and experienced disproportionately higher rates of hospitalisation and mortality (Goggin et al. 2011). The hospitalisation and mortality rates among Indigenous Australians were 7.7 and 5.1 times higher, respectively, compared to the non-Indigenous population (La Ruche et al. 2009). Though the majority of deaths attributed to H1N1 in Australia were in NSW (Hamilton et al. 2010), its impact was particularly pronounced in some parts of the country where the Indigenous population was found to be twelve (12) times more likely to be hospitalised and five (5) times more likely to be admitted to intensive care (Flint et al. 2010). In total, these hospitalisations represented an 8-fold higher rate when compared with those of the non-Indigenous population (Department of Health and Ageing 2009). Other studies have shown disproportionate rates of hospital admission in remote or isolated communities elsewhere in the world (Mostaço-Guidolin et al. 2012).

In sum, overcrowded conditions, genomic mutations and exchange with other strains encourage disease outbreaks in intensive animal agriculture facilities could increasingly produce pathogens with the capacity to spread

CASE STUDY ONE CONTINUED

efficiently in humans. We have demonstrated several recent examples that we believe require urgent policy responses beyond immediate treatment. These must approach the root causes of their creation proactively and transparently. Failing to do so risks serious public health consequences.

The scale of future pandemics may be catastrophic. For example, human fatalities caused by the H5N1 virus could be as high as 33%, meaning its potential pandemic would be unprecedented (Li et al. 2008). This has led to proposals to reduce the risks posed by infectious disease outbreaks and arange of other serious public health challenges by transitioning away from intensive animal farming practices (Wiebers and Feigin 2020a; Wiebers and Feigin 2020b).

Understanding COVID-19 as a cue that necessitates a transition to a sustainable food system could feasibly spare humankind such a monumental tragedy.

1.2 FOOD WASTE

1.2.1 GENERAL

Worldwide, approximately one-third of all production is lost to conventional food loss (Gustavsson et al. 2011; FAO 2013).[9] This figure is equivalent to 1.3 billion tonnes of edible foods (Ishangulyyev et al. 2019). Other estimates suggest that up to 50% of food is wasted in the food chain (i.e., between “field and fork”) worldwide (Lundqvist et al. 2008; Smil 2000). Though both the reasons for this wastage and the amount varies between countries (Ishangulyyev et al. 2019), large amounts are wasted in private households (Pearson et al. 2013). This represents a significant source of resource and economic wastage (Buzby and Hyman 2012). As such, advancing the sustainable management of food waste has been identified as crucial for improving food security and sustainability (Shaw et al. 2018; FAO 2019; Foodbank 2020; UNEP 2020; Wang et al. 2021).

At the same time, estimates suggest that every ninth person, or the equivalent of over 790 million people (FAO et al. 2015), suffers from hunger or a lack of food security worldwide (Filippini et al. 2019). This represents a striking inequality between food waste practices, food poverty and deteriorating food security (Papargyropoulou et al. 2014). In addition, current treatment methods threaten environmental sustainability (Foley et al. 2011; Shafiee-Jood and Cai 2016; Awasthi et al. 2021). Though landfilling has been the “automatic choice" for managing large quantities of waste “from time immemorial” and is the most common destination for food waste (Blair and Mataraarachchi 2021), some of the most damaging GHGs, including carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O), can be produced by landfills (IPCC 2018). Each of these issues will be briefly outlined before a series of modest and scientifically-informed recommendations are provided for the Committee’s consideration.

If global food waste were a country, it would:

- consume 32% of the global food supply by weight (UNEP n.d.-b) at the cost of approximately AU$1.8 trillion a year (Barthel 2020);
- consume 25% of all water used in agriculture (DAWE 2021a);
- utilise 23% of all fertilisers (Kummu et al. 2012);
- consume one in four of all food calories available on Earth (Lipinski et al. 2013) and;
- be the third-highest greenhouse gas emitter (FAO 2013).

These figures, however, fail to accurately outline the disproportionate amount of food wasted in developed nations (Gustavsson et al. 2011; Gordon et al. 2016). While food waste occurs at all stages of the supply chain (Keegan and Breadsell 2021), it predominantly occurs at retail and consumer levels in relatively high-

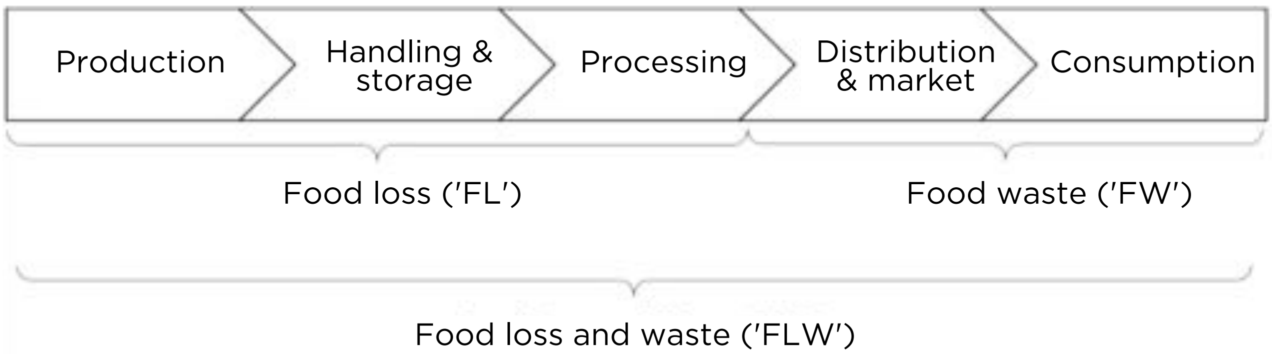
9 Food loss and food waste are denoted by “FL” and “FW”, respectively, in Figure 7.

income nations (Gustavsson et al. 2011; Graham-Rowe et al. 2015; Ishangulyyev et al. 2019). In these contexts, where agricultural sectors have developed technological systems, including refrigeration and reliable supply chains, consumers generate most food waste (Pearson et al. 2013; Reynolds et al. 2019). In addition, the growing urban population and the strong association between increased per capita wealth and refuse production have generated vast quantities of waste (Blair and Mataraarachchi 2021).

Recent studies, conducted by the United Nations Environment Programme ('UNEP'), found Australian households rank among the highest of all countries in food wastage (UNEP 2021a). This review found that food waste has been significantly underestimated, with global waste at the consumer level more than twice as high as previous estimates by the United Nations Food and Agriculture Organisation ('FAO') (McCarthy 2021).

FIG. 7: FRAMEWORK FOR FOOD LOSS AND FOOD WASTE

Adapted from Ishangulyyev et al. 2019



1.2.1 | FOOD WASTE IN AUSTRALIA

Across Australia, estimates suggest that food waste comprises approximately one-third of everyday rubbish ('municipal solid waste' or 'MSW') and one-fifth of commercial and industrial waste (Mason et al. 2011). Approximately 3.2 million tonnes of food is destined for landfills every year, with over 75% originating in households (Commonwealth of Australia 2017). Contextually, the total figure is sufficient to fill over 5,000 Olympic swimming pools (Blair and Mataraarachchi 2021).

There have been several state-based audits of household food wastage carried out in Australia. For example, the Victorian Department of Sustainability carried out a statewide audit in 2013 that found 7.81 litres of food was wasted per week per household (Sustainability Victoria 2014). The 2017 NSW Love Food Hate Waste program found that households wasted an average of 5.46 litres of food per week (EPA 2018). Nationally, estimates have suggested that households waste over 3 million tonnes of edible food per year (FFWCRC 2020). Studies have also estimated the cost of such wastage. For example, one survey analysed what households believed was spent on food not eaten during a year and estimated that approximately $5.2 billion was spent nationally on food not consumed (Baker et al. 2009). In NSW, estimates suggest that up to $2.5 billion is wasted on edible food not consumed (EPA 2012). Importantly, these figures do not include spending by businesses or the energy or labour costs incurred (Mason et al. 2011).

In total, food waste costs the Australian economy $20 billion a year (Blair and Mataraarachchi 2021).

Despite these findings, the practical utility of many studies into food waste is "highly variable", and there is often insufficient data contained within them (Mason et al. 2011). As such, a report prepared by the Institute for Sustainable Futures ('ISF') at the University of Technology ('UTS') for the Department of Sustainability, Environment, Water, Population and Communities ('DSEWPC') in 2011 recommended the development of a national approach to the management and recovery of resources (ibid). This is verified elsewhere (Pearson et al. 2013).

As there are significant negative environmental externalities associated with the production of food for human consumption (Keegan and Breadsell 2021), including adverse impacts on biodiversity, soil erosion and pollution (Shaw et al. 2018; Hodgkins et al. 2019), its waste also generates additional environmental impacts (Lipinski et al. 2013; Ishangulyyev et al. 2019). For example, food waste is estimated to be responsible for up to 10% of global GHG emissions (UNEP 2021a). These will be further outlined and discussed in section 3 of this submission.

1.3 OPPORTUNITY COSTS: FOOD PRODUCTION AND DIETARY CHOICES

1.3.1 BACKGROUND

Sustainable diets are those intended to address the increasingly adverse public health and environmental issues related to the production and consumption of foods by humans (Springmann et al. 2018a). In the developed world, dietary habits are a choice motivated by a range of personal, cultural and social factors (Steptoe et al. 1995; Cooke et al. 2011; Lin-Schilstra and Fischer 2020). Though earlier subsections revealed the inequity of current food supply networks, many Australians have the comfort, security and means to consciously select the food they consume (Gendelman 2017). However, this relative freedom suggests that morality is implicated in food choices (Ruby and Heine 2011). In these contexts, various features, including organisational and logistical systems and personal preference, play a fundamental role in what and how we eat (Köster 2009; Warde 2016; Graća et al. 2019). On this basis, it is reasonable to challenge the viability of this choice based on the environmental and public health concerns we have outlined above.

Traditional food loss theory focuses on available food that is lost or destroyed before consumption (UNEP n.d.-a; Parfitt et al. 2010). Opportunity costs refer to the amount of produce and income that could be yielded if the resources extended were put to an alternative use (Dwivedi 2016). It relates to the loss of value or benefit that would be incurred by engaging in an activity relative to engaging in another (Dane 2009; Richards 2009). For example, the extensive use of land to produce animal-based proteins means it cannot be used for the production of plant-based alternatives. This example also implicates the lost opportunity to remove CO2 via shifts to plant-rich diets provided for by the alternative land use. As such, it can be described as the value lost by not using the same resource to produce a similar or a superior alternative (Hutton and Balutssen 2021).

The following subsections will discuss the concept of opportunity costs as it applies to current food production and dietary choices. These will provide the Committee with sufficient information to conclude that the concept of food loss should be expanded to include the choice of resources produced with the finite land available. It will do so by applying opportunity cost analyses to diet and animal agriculture.

1.3.2 | FOOD LOSS AND OPPORTUNITY COSTS

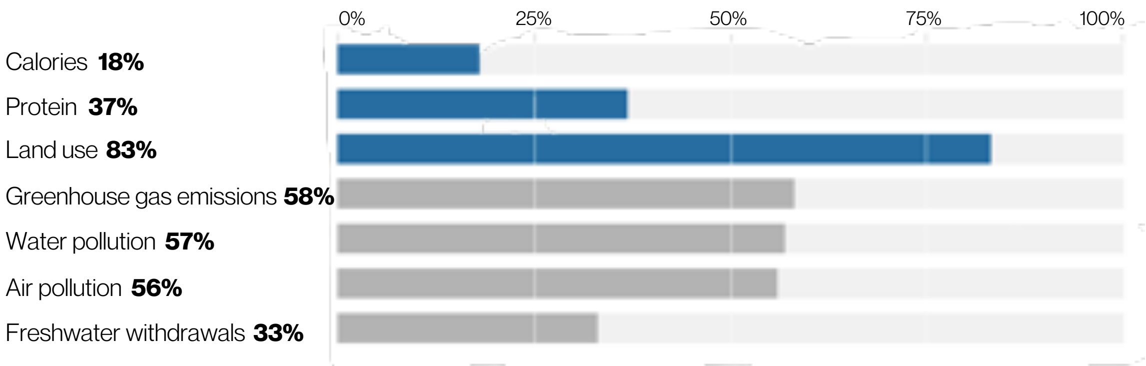
Recent decades have seen an increasing awareness of the potential sustainability benefits of reducing meat consumption (Schenk et al. 2018). While much of this is due to a corresponding rise in consumer awareness of animal welfare issues inherent in the intensive production of animal products (Broom 2010; Ruby 2012; Spain et al. 2018; Alonso et al. 2020; Lin-Schilstra and Fischer 2020), GHG emissions generated by this sector are also an increasing concern (De Backer and Hudders 2015; Capper 2020). The latter relates to the "carbon footprint" of relative diets, with increasing public concern over climate change generating a corresponding rise in desires to adhere to sustainable diets (Weber and Matthews 2008). Though the post-production loss is similar for plant- and animal-based products, the production of calories from animal sources requires considerably more resources and produces more emissions than producing an equal amount of calories from plant sources (Buzby and Hyman 2012; Eshel et al. 2014; Tilman and Clark 2014; Eshel et al. 2015; Eshel et al. 2016; Ranganathan et al. 2016; Springmann et al. 2016).

Currently, farmed animal protein production occupies approximately 80% of global agricultural land yet produces less than 20% of the world's supply of calories (Ritchie 2017; Carrington 2018; Semov 2020).

We have demonstrated that it generates significant environmental and animal welfare costs in the process. Therefore, shifting to plant-based diets confers significant environmental savings that some have suggested are proportional to, or could exceed, forecast refinements in the productivity of existing operations (Popp et al. 2010; Henedus et al. 2014; Tilman and Clark 2014; Springmann et al. 2016; Shepon et al. 2018). Due to the different resource requirements for the plant-and animal-based food production, replacing the latter with more resource-efficient plant-based alternatives increases the availability of food by facilitating the reallocation of production resources from animal feed to human food (Godfray et al. 2010; Foley et al. 2011; Cassidy et al. 2013; Pradhan et al. 2013; West et al. 2014; Eshel et al. 2016; Peters et al. 2016; Shepon et al. 2016).

FIG. 8: FARMED ANIMAL PRODUCTION OUTPUTS

Adapted from Poore and Nemecek 2018 and Carrington 2018



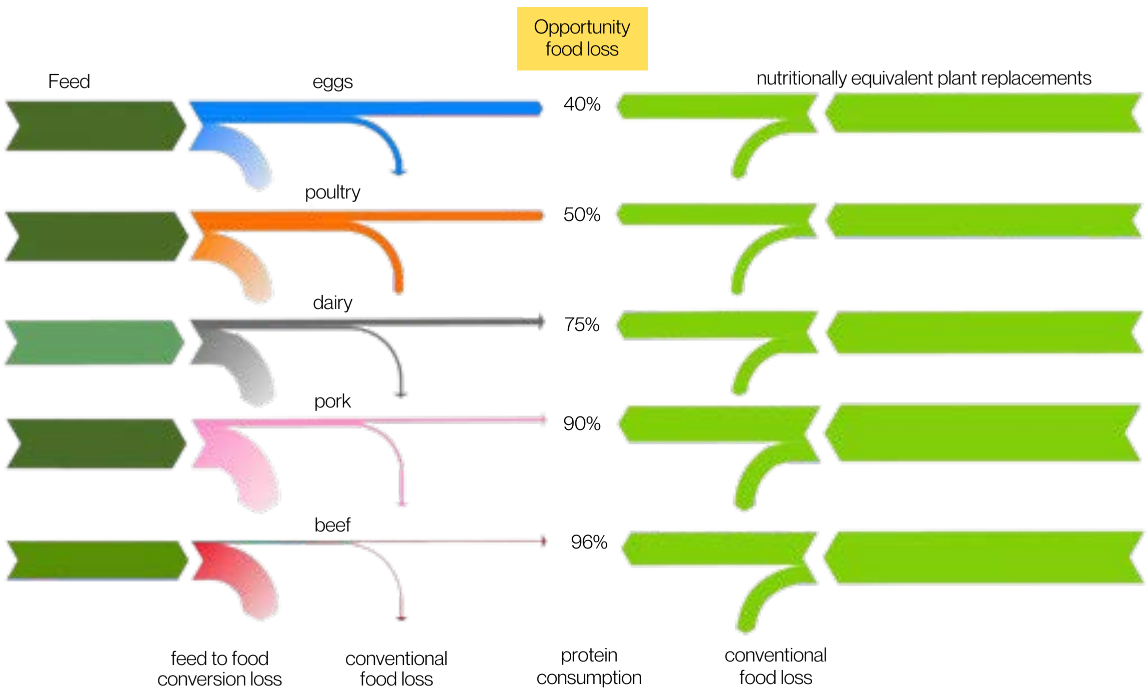
World meat consumption has increased from 65 to 279 million tonnes in the past fifty (50) years (Vranken et al. 2014). In the past decade, high-income countries have recorded the highest rates of animal consumption that are two to three times the world average (FAO 2017b). As dietary transitions towards more processed foods continue in many regions, and developing nations increasingly adopt dietary practices and meat consumption rates similar to those that characterise many Western countries (Delgado 2003; Kearney 2010; Cole and McCoskey 2013), such risks are expected to worsen with diet changes implicated in emerging public health threats (Hawkes 2006; Springmann et al. 2016).

Farms as a largely "neglected hot spot of food waste" (WWF 2021)

The land area required to produce meat is more significant than for crop production (Islam and Wong 2017). For example, an area of 200m² can produce approximately 142kg of wheat while only supporting the production of 9.6kg of beef (Lal 2013). As such, the number of people who can be fed in one day from this land use is 210 for a plant-based diet and only 13 for the meat-based diet (ibid). Though both require the same amount of input (i.e., 200m² of land), the yield and outputs from crop production are significantly more substantial than for meat production (Islam and Wong 2017).

FIG. 9: COMPARATIVE PROTEIN OPPORTUNITY COSTS

Adapted from Shepon et al. 2018



Despite several initiatives examining country- and crop-specific scale of food waste on farms (WWF n.d.), the push to produce more food from existing or improved agricultural systems is a major feature of the food security narrative (Guillou and Matheron 2014). Current production provides enough food to support the global human population (FAO 2011; Hiç et al. 2016). However, the current prioritisation of animal production constitutes a significant opportunity cost. For example, studies have shown that beef production's consumer-level opportunity loss is 96%. This means that the land area that produces 100g of edible protein can make only 4g of edible beef when used to produce a plant-based alternative. This, therefore, translates to an opportunity cost of 96g of protein (Shepon et al. 2018). The estimated losses from failing to replace animal-based foods with nutritionally similar crops are also significant: 90% for pork, 75% for dairy, 50% for poultry and 40% for eggs (ibid). These sobering findings are outlined in Figure 9 above. Critically, these are "higher than all conventional food losses combined" (Milo 2018).

SECTION TWO

MANAGING THE CLIMATE CRISIS AND THE IMPACT OF FOOD PRODUCTION

SECTION TWO

MANAGING THE CLIMATE CRISIS AND THE IMPACT OF FOOD PRODUCTION

2.1 DEFINING THE CLIMATE CRISIS

The planet is getting warmer: Earth's temperature has risen by 0.08°C each decade since 1880, and the per decade warming rate has doubled over the last 40 years (Lindsey and Dahlman 2021). In conjunction with a rapid increase in extreme heat events and rainfall declines (Timabel and Drosdowsky 2013; Risbey et al. 2013; BOM and CSIRO 2020), Australia's mean temperature has increased by 1.4°C since 1910 (Canadell et al. 2021).

The previous section demonstrated that the global climate crisis is predicted to impact most of the world's population in the near future and produce several substantial public health implications (Costello et al. 2009). In 2021, the Intergovernmental Panel on Climate Change ('IPCC') released their most comprehensive report on the global climate crisis to date. The report stated that "it is unequivocal that human influence has warmed the atmosphere, ocean and land" and, as a result, "widespread and rapid changes in the atmosphere, ocean, cryosphere and biosphere have occurred" (IPCC 2021). A primary environmental impact of food production is GHG emissions (White and Hall 2017). Such emissions are increasing at a rate exceeding the worst-case scenarios outlined by the IPCC and remain on an ascending trajectory (Twine 2021). As such, adverse climatic outcomes are expected to continue and intensify (Raupach et al. 2007).

To be classified as "extreme", a weather event must meet several criteria. It must differ from normal patterns, generate severe impacts and be historically uncommon (US EPA 2016; Sambrook and Richardson 2019).

Though climate scientists have previously been unable to definitively demonstrate or prove the connections between individual weather events and climate change, often despite the broader trends being quite clear (Zeng 2021), the emerging field of attribution studies today can show how extreme events were affected by climate change and provide insights on whether they can be explained by natural variability alone (Marjanac and Patton 2018; Pidcock and McSweeney 2021; van Oldenborgh et al. 2021). That is, while scientists may not be able to definitively *prove* that climate change causes extreme weather events such as these, it is possible to demonstrate that climate change *contributed* to their frequency and severity (Otto 2020; Zeng 2021; IPCC 2022; King et al. 2022).

Weather conditions conducive to extreme events, such as bushfires, are becoming more frequent as a consequence of climate change (Bowman et al. 2017; Arriagada et al. 2020).

As such, there is strong evidence confirming that abnormally high temperatures and extreme weather are related to human activities (Sambrook and Richardson 2019). The association between extreme weather events and human activity has been shown in a range of examples, including heatwaves (Hansen and Sato 2016; Perkins-Kirkpatrick and Lewis 2020), coastal flooding (Rahmstorf 2017; Collini 2021; Denning 2022; Lindsey 2022), heavy rainfall (Emanuel 2017; Shultz 2019), drought (Seneviratne et al. 2002; Ogburn 2013) and wildfires (Voiland 2015; Abatzoglou and Williams 2016).

As global temperatures are warmer than during 75% of the Holocene temperature history (Marcott et al. 2013) and the average global temperature is over 1°C above pre-industrial levels (Allen et al. 2018a), it is reasonable to conclude that we have the context of climate change has entered a crisis (Twine 2017). As such, this term will replace references to "climate change" in the following response to Term 5.

2.1.1 | THE CLIMATE CRISIS IN AN AUSTRALIAN CONTEXT

Australia has already begun to experience the devastating impacts of climate change. Recent assessments suggest that the opportunity to "save ourselves" from its impacts is rapidly closing (Slezak 2022). An estimated 60% of the Great Barrier Reef is bleached due to an increase in water temperature (GBRMPA 2022), the 2019/20 bushfires claimed the lives of three billion native animals (van Eeden et al. 2020), up to 95% of NSW was affected by droughts in 2019 (RFS 2019) and the "unprecedented" yet catastrophic floods in South East Queensland and parts of coastal New South Wales are recent examples (AAP 2022a; Anon. 2022a; Ludlow et al. 2022; Readfearn et al. 2022). The recent report published by the Intergovernmental Panel on Climate Change ('IPCC'), released amidst the ongoing devastation of the March 2022 floods, identifies Australia as experiencing greater impacts from climate change than any other advanced economy (IPCC 2022; O'Malley 2022).

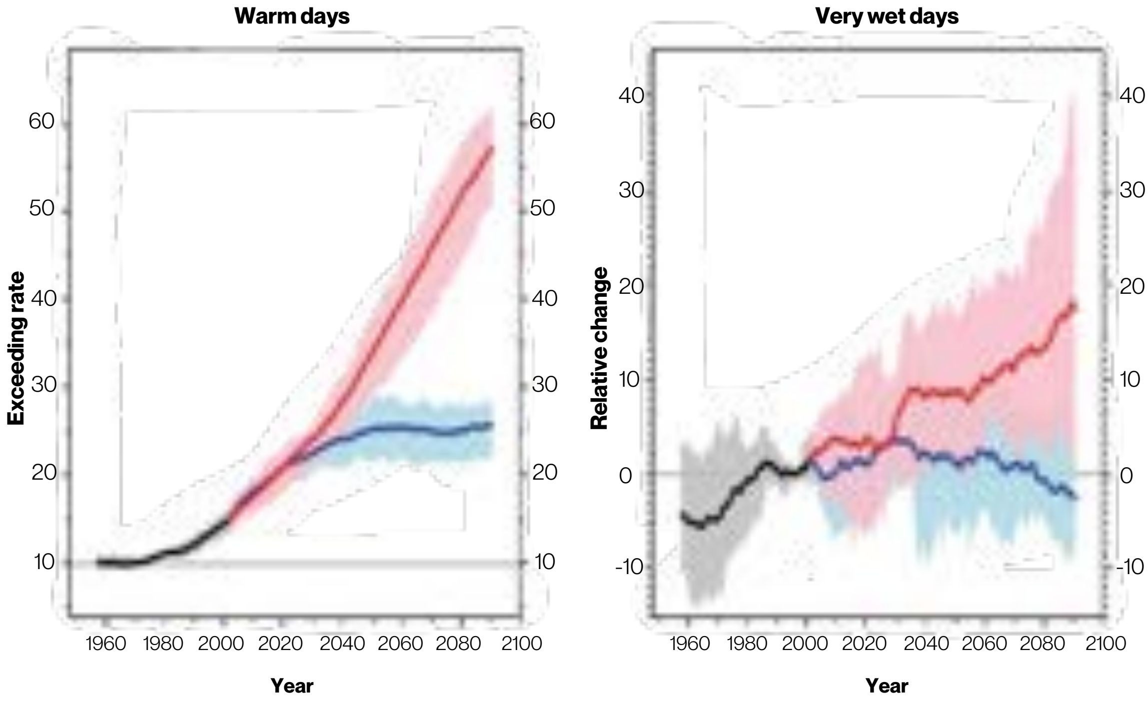
Extensive reviews of climatic changes in Australia reveal trends in rising temperature, changing rainfall patterns, more extreme weather events, increasing ocean temperatures and rising sea levels (Head et al. 2014; Pearce et al. 2018; Kingwell 2021).

Several of Australia's most recent extreme weather events have been described as "unprecedented". The 2019/20 bushfires, for example, have been described as "unprecedented" in reports by NGOs (van Eeden et al. 2020), the media (Cox 2020a), as well as the State (DPIE 2021) and Commonwealth government (Richards et al. 2020). Though this extreme event generated damages above $2.3 billion (ICA 2021), its impacts extended beyond direct threats to the welfare of wildlife and ecological stability to potentially devastating public health consequences. For example, in addition to the 33 deaths during the fires (Filkov et al. 2020), the smoke produced has been linked to over 400 deaths and over 1,000 hospitalisations (Arriagada et al. 2020).

The future consequences Australia will endure due to climate change include the intensification and proliferation of ecological adversities we have already witnessed (Slezak and Timms 2021). This will include increasing bushfires (in terms of both severity and length) (Canadell et al. 2021), heavy rainfall events causing flooding (though many parts of the country will experience less rainfall) (CSIRO 2021) and intensified and more frequent periods of drought (DAWE 2021a). As Australia's terrestrial ecosystems are among the most fire-prone globally (Canadell et al. 2021), these predicted impacts are expected to increase cumulative severity. In addition, estimates suggest there could be up to 10,000 heat-related deaths by 2100 (Brandy 2018) and catastrophic water shortages in both regional and rural areas (WMO 2021).

FIG. 10: PREDICTED INCREASES IN EXTREME WEATHER IN AUSTRALIA

Adapted from AAS 2022. Note: the red and blue lines represent under high-emissions and low-emissions pathways, respectively



The climate crisis will cost lives and money unless urgent action is taken to remedy its causes.

In 2007, the predecessor of the Commonwealth Department of Industry estimated the average cost of natural disasters in Australia between 1967 and 1999 to be $1.14 billion (Middelmann 2007). Last year, estimates suggested that disasters caused by climate change will cost Australia up to $73 billion a year by 2060 even if action to curb emissions is taken today and that the figure could rise to $94 billion a year by 2060 if no mitigation measures are taken (DAE 2021; Kurmelovs 2021). Given recent reviews suggesting that Australian climate policies are predicted to “miss the modest emission reduction target” of 26% by 2030 (Swann et al. 2019), it is possible that climate change could cost Australia over $3 trillion by 2070 (Masige 2020).

The recent IPCC report suggests climate change will cost Australia “hundreds of billions of dollars” in the coming decades (Foley 2022). If current data is consistent, up to 90% of the damages these weather events cause will be personal rather than commercial (ICA 2021). Individually, this could amount to up to $245,000 per person (Mallon 2020), though this estimate does not consider associated health impacts (Phelan and Svenson 2021). Flash floods from high-intensity rainfalls are already Australia’s most expensive disasters (Croke 2017), costing an average of $8.8 billion per year (O’Malley 2022). While the scale of damage caused by the ongoing February-March 2022 floods remains unknown, the widespread flooding across Eastern Australia in March 2021 generated an estimated $652 million in damages (ICA 2021). These are expected to become more devastating and frequent as the climate crisis progresses (Reid and King 2022).

The impacts of extreme weather events that are either exacerbated or caused by the climate crisis may be further compounded by pre-existing or emerging public health emergencies.

Though we have demonstrated the aggravating nature of COVID-19 and the climate crisis, there are other examples. Severe Tropical Cycle Seroja made landfall on the Western Australian Mid West region, the coastal town of Kalbarri and the inland community of Northampton in April 2021. These were regions not usually impacted by cyclones, and, as such, their buildings and infrastructure were not built to withstand such an event (ICA 2021). In the aftermath, the Department of Fire and Emergency Services ('DFES') reported that 70% of structures in Kalbarri were damaged, and up to 40% were completely destroyed (Anon. 2021a; Ramsey 2021a). Some of these properties had previously used asbestos which created a potential public health risk in the immediate aftermath and clean up stages (Parry and Christmass 2021). The cyclone was later declared an "insurance catastrophe" by the Insurance Council of Australia ('ICA') (ICA 2021; Ramsey 2021b),[10] with estimates of damages placed at $200 million (Law and Steger 2021; Raphael 2021). The remoteness, shortage of trades, and COVID-related border restrictions combined to slow down the recovery process significantly (ICA 2021).

2.2 THE ENVIRONMENTAL IMPACTS OF ANIMAL AGRICULTURE

We have shown that the food production system is a major source of environmental impacts (IPCC 2019), including land-use change and biodiversity loss (Foley et al. 2005; Newbold et al. 2015), the depletion of water resources (Shiklomanov and Rodda 2004; Wada et al. 2010), pollution (Diaz and Rosenberg 2008; Robertson and Vitousek 2009; Cordell and White 2014) and climate change (Vermeulen et al. 2012; IPCC 2014; Springmann 2018a). Research shows that food production and consumption are significant contributors to life-cycle environmental impacts and account for 48% and 70% of household impacts on land and water resources, respectively (Tukker 2015; Ivanova et al. 2016). Other sustainability issues related to socio-economic aspects of food production and consumption include food security (Godfray et al. 2010; Adegosan et al. 2019), food waste (Aschemann-Witzel et al. 2018) and animal welfare (Gross et al. 2021). The latter represents an additional measure added to those outlined above (i.e., economic or environmental measures) that amounts to an ethical assessment (D'Silva 2013).

Western dietary patterns, in particular, are widely regarded and recognised as unsustainable in terms of environmental and public health impacts (Foley et al. 2011; Sabaré and Soret 2014; Smith and Gregory 2013; Tilman and Clark 2014).

While it is widely agreed and accepted that solving the climate crisis will

10 Access and communication was cut off in townships to the north, thereby complicating support and making estimations of the scale of damage in those areas difficult (Ramsey 2021b).

require massive cuts to GHG emissions from a range of sectors, including energy and transport (Eisen and Brown 2022), recent reviews have warned that even in the context of large-scale emissions reduction from these sources major reductions in emissions generated by food production systems will be necessary by 2075 to limit global warming to 1.5°C (Clark et al. 2020). Though a reduction of such emissions may be achieved by increasing efficiency, reducing waste, curtailing excess consumption or reducing emission intensities of farmed animal production [Montes et al. 2013; Hristov et al. 2013a; Hristov et al. 2013b; Poore and Nemecek 2018; Springmann et al. 2018; Cusack et al. 2021), these are not expected to generate as beneficial an impact as a transition to a plant-rich diet would (Gerber et al. 2013; Clark et al. 2020).

Of particular importance is an urgent reduction in overconsumption, waste, land-use and GHG emissions (Garnett 2011; Bajzelj et al. 2014; Röös et al. 2016). Therefore, proactively restructuring food systems to facilitate improved public health and environmental outcomes is “among the most important global challenges of the 21st century” (Hirvonen et al. 2020). The conclusion of this section will contain several modest recommendations, informed by the following subsections, for the Committee’s consideration.

Over the past five (5) decades, animal agriculture has undergone unprecedented changes to accommodate increasing demand (Alonso et al. 2020).

During this time, the human population grew by a factor of 2.4, while meat consumption increased by a factor of 4.7 (Fernandes et al. 2019). Intensification of existing systems appears inevitable (Buller et al. 2018) if the sector is to meet the 72kg global meat consumption increase per person per year expected until 2050 (Miele 2016). However, the sector is responsible for a number of outcomes that the community increasingly consider unacceptable (Broom 2019). These include, for example, highly inefficient usage of finite resources, adverse human health effects, harmful environmental consequences and poor animal welfare outcomes. There is strong evidence, for example, that community concerns over the ethical implications of animal production systems on animal welfare (Futureye 2018; Broom 2019; Fernandes et al. 2019; McGreevy et al. 2019; Alonso et al. 2020).

Increased demand has generated increased land use and production cycles, causing a corresponding rise in environmental impacts. Though the debate about emissions from animal agriculture is, as with other high emissions sectors, politically charged (Twine 2021), it is widely accepted that meat production and consumption is responsible for a large segment of adverse environmental impacts (Steinfeld et al. 2006; Notarnicola et al. 2017; Van Mierlo et al. 2022). As such, though the actual scale of animal agriculture’s contribution to GHG emissions is controversial, a range of estimates have been produced (O’Mara 2011).

Animal agriculture has been identified as responsible for generating between 8-11% of global anthropogenic GHG emissions (O’Mara 2011).

Animal agriculture produces greenhouse gases in the form of methane from enteric fermentation, nitrous oxide from nitrogenous fertilisers, and methane and nitrous oxide from manure management and its depositing on pastures (Steinfeld et al. 2006). Though some, including the Australian beef industry (Claughton 2021), argue that cattle production is (Stocks 2019) or can be "climate neutral" (Verley et al. 2019), either because methane is a relatively short-lived GHG (Nicholls and Baxter 2020; Kebreab and Roque 2021) or the use of feed additives can reduce emissions in ruminants (DPIRD 2021; DPIRD 2022), critics consider this claim to be an example of "creative accounting" (Smith and Balmford 2020) because it neglects the deforestation the sector requires (Carrington 2020). This account also fails to consider the IPCC's findings that methane heats the climate 28 times more than carbon dioxide when averaged over a century and 84 times when averaged over two (2) decades (IPCC 2014).

An example of attempts to deflect this key issue and greenwash the beef industry (Christen 2021; Hayek and Dutkiewicz 2021; Sharma and Lilliston 2021; Splitter 2021) are increasing reports regarding the use of algae or seaweed as a feed additive or supplement (Anon. 2020; Goodwin 2021; Phelps 2021). While researchers and industry promote the use of seaweed, either commercially produced or grown on-farm (MLA 2016; Thompson 2020), as an additive to reduce methane emissions (Kinley et al. 2016; Machado et al. 2016; Kelly 2020), others have highlighted the large-scale operations that would be required to produce the volumes required (Vijn et al. 2020). Importantly, this has several serious implications. For example, seaweed farming can potentially involve marine entanglement and pollution if equipment is damaged during extreme weather (Cottier-Cook et al. 2016). Each of these issues is already a significant threat to marine life and ecosystems (Eriksen et al. 2014; Wilcox et al. 2015; Senko et al. 2020; Thushari and Senevirathna 2020; AL 2021).

It is reasonable to associate such measures as a new form of greenwashing insofar as it combines "poor environmental performance and positive communication about environmental performance" (Delmas and Burbano 2011), potentially misleads consumers regarding the true environmental impacts of the sector (Laufer 2003; Ramus and Montiel 2005) and is thereby an example of selective disclosure of positive environmental impacts of the sector's practices (Lyon and Maxwell 2011; Mitchell and Ramey 2011).[11] We urge the Committee to review such pursuits and consider the sector's overall impact. We emphasise that the primary motivation of such innovations are continued production.[12] As we have shown, this has a devastating effect on the environment and public health (Springmann et al. 2018b).

2.3 CARBON OPPORTUNITY COSTS

2.3.1 BACKGROUND

As the previous section of this submission demonstrated, opportunity costs relate to the loss of a value or benefit caused by choosing to engage in a particular activity relative to another alternative (Dane 2009; Richards 2009; Dwivedi 2016). Subsection 1.3 detailed opportunity costs associated with the choice to exploit finite farmland for animal agriculture. We have shown that while farmed animal

11 Similar examples in other sectors, such as mining, include various climate-related policies that rely on technological innovation. Recent studies, however, have found that these are "not enough to keep global warming within safe levels" (Mazengarb 2022).

12 Victoria's first seaweed farm, which recently began operations, promote the use of seaweed in the beef sector on the basis that its application as a feed additive can reduce a cow's methane emissions and "even help the cattle gain weight faster" (Somerville 2022).

production occupies approximately 80% of global agricultural land, it produces less than 20% of the world's supply of calories (Ritchie 2017; Carrington 2018; Semov 2020). See Figure 2 on page 12 for an outline of this. It simultaneously causes an array of adverse environmental outcomes, outlined in Figure 8 on page 29. While dietary choices can thereby be regarded as generating an opportunity cost (Milo 2018; Shepon et al. 2018), extensive land use to meet dietary preferences also incurs a "carbon opportunity cost" (Hayek et al. 2020).

Though discarding food is akin to discarding the embodied GHG emissions involved in the production of animal products (Kim et al. 2015), the conventional framework for calculating GHG emissions does not consider opportunity costs (Ritchie 2021).

As such, it represents a hidden cost insofar as if the land used to produce food were employed for other purposes - or to produce alternative foods - it would minimise or remove existing impacts on ecosystems and wildlife. Pastures for ruminant meat and dairy production represent the majority of the total carbon opportunity cost (72%) compared with animal feed crops that suppress the remainder (28%) (Hayek et al. 2020). This is particularly important because the world has lost one-third of all forests (FAO 2020a), and biodiversity loss constitutes a significant risk to global health and supply chains (UNESCO 2020).

Farmed animal production is responsible for over 14.5% of anthropogenic GHG emissions globally (FAO 2022; Twine 2022).[13]

The environmental impacts, measured by GHG emissions, of animal agriculture are narrowly smaller than the ~15% estimate of emissions attributed to global transport (Alhindawi et al. 2020). Cattle and dairy cows alone emit enough GHGs to place them on par with the highest-emitting nations (Ahmed et al. 2020). In Australia, direct emissions attributable to animal agriculture account for approximately 70% of GHG emissions by the agricultural sector and 11% of total national GHG emissions (DPIRD 2021). Of these emissions, enteric methane (CH_4) is the largest contributor (~40%) to global GHG emissions from animal agriculture (Gerber et al. 2013). In this context, animal agriculture contributes up to 30% of methane released into the atmosphere, which is more than any other source (Black et al. 2021).[14]

While ceasing the use of fossil fuel is necessary to proactively limit global warming (Howden 2021), CO_2 removal via shifts to plant-rich diets offers significant contributions to international GHG reduction targets (Hayek et

13 Though the Food and Agriculture Organisation ('FAO') of the United Nations estimates that emissions from animal agriculture account for 14.5% of total global emissions (Gerber et al. 2013; Kristiansen et al. 2021), this figure is based on outdated data and is therefore likely to underestimate the true scale of the sector's impact (Twine 2021). In addition, it is notable that while the two key FAO reports, particularly "Livestock's Long Shadow" (Steinfeld et al. 2006) and "Tackling Climate Change Through Livestock" (Gerber et al. 2013), have played a prominent role in debates regarding GHG emissions from animal agriculture (Twine 2021). The earlier report, published in 2006, had cited the sector's contribution as 18% of all emissions (Steinfeld et al. 2006) and then amended this down to 14.5% in 2013 (Gerber et al. 2013). Critically, the lead authors of each report are the same and neither promoted reductions in animal consumption, opting instead to prioritise improvements in efficiency and sustainable intensification (Twine 2021). As a result, the latter figure of 14.5% has been regularly cited in research (Ripple et al. 2014; Eisler et al. 2014; Taylor et al. 2016; Grossi et al. 2019; Eisen and Brown 2022), the media (Cameron and Cameron 2017; Mitloehner 2018; Kevany 2021) and in reports published by advocacy organisations (CIWF 2020).

14 While farmers could potentially offset emissions by planting trees or restoring vegetation on their properties to inflate carbon stores (Simmons et al. 2021) and this has become a key element of the Morrison government's emissions reduction policy (Australian Government 2020), such an approach would simultaneously prevent the selling of those emissions reductions on carbon markets and remove a potential source of income (Howden 2021). There are also considerable concerns regarding the validity of carbon crediting. In one deal made in January 2021, a northern NSW cattle business (Wilmot Station) sold soil carbon credits to the multi-national computer company Microsoft under an American-based scheme (Anon. 2021b). Subsequent analysis of the methodology found "increases in soil carbon claimed under the scheme were far too optimistic" (Simmons et al. 2021). Similarly, mass tree planting has been critiqued as incapable of achieving desired outcomes (Gramling 2021).

al. 2020).[15] However, while demand for animal-based foods remains high in high-income countries, it is reaching a plateau (Springmann et al. 2018a). As such, the total carbon opportunity cost of animal production in these countries is estimated to equal the previous nine (9) years of domestic fossil fuel emissions (Hayek et al. 2020). As previous subsections of this submission have shown, however, the dietary practices of developing countries are expected to increase shifts towards higher meat consumption (Delgado 2003; Kearney 2010; Cole and McCoskey 2013).

2.4 FOR PEOPLE, THE PLANET AND ANIMALS: LEADING THE WAY WITH SENSIBLE, ETHICAL AND SUSTAINABLE DIETS

Evidence is increasingly revealing that the ongoing climate crisis and critical human and planetary health challenges necessitate a large-scale transition of the food system (Willett et al. 2019). One of the key features of such a transition, especially in industrialised Western nations, is a shift away from meat and animal product consumption towards increased plant-based consumption (Poore and Nemecek 2018). Despite a growing awareness of the environmental, public health and animal welfare implications of eating meat, consumers continue to exhibit ambivalence and resistance to reducing or eliminating its consumption (Macdiarmid et al. 2016). High consumption rates in Western countries, including Australia, have been identified as at least partially due to the deployment of a range of "coping strategies", including concealing "the animal origin of meat" (Negowetti 2020), the adjustment of underlying belief systems (Bastian and Loughnan 2017) or "strategic ignorance" (Onwezen and van der Weele 2016). The latter two have been identified as facilitating the continued consumption of meat products, despite an underlying awareness of the harms produced (Thunström and Ritten 2019). This section will demonstrate the benefits such a transition would produce. The following section contains a series of recommendations based on this evidence.

2.4.1 | FOR PEOPLE

Though the Terms provided by the Committee primarily relate to environmental considerations, it is imperative to include an overview of the co-occurring public health impacts that result in animal agriculture's inefficient use of resources. Though humans have considered animal products, particularly meat, to be an essential part of their diets (Stanford and Bunn 2001), vegan diets have been practised for centuries (Ruby 2012; Joshi and Kumar 2015; Ismail 2020) and the health benefits of plant-based diets have been well addressed and acknowledged (Nguyen et al. 2020). Though health benefits accrued in the adoption of a plant-based diet are often cited among the most important reasons for doing so (Lea et al. 2006), decades of continual growth in worldwide meat consumption rates continue to shape the international political economy of food (Lundström 2019).

15 The recent IPCC report shows how different GHG trajectories translate to global temperature increases (Howden 2021). CO_2 emissions persist for a long time (Buis 2019) and accumulate in the atmosphere (West 2019). Net CO_2 emissions must decline sharply as soon as possible if temperatures are to be limited to 1.5-2°C above pre-industrial levels (Howden 2021). Critically, however, CO_2 emissions need to reach more than "net-zero" - they need to reach "net-negative" (IPCC 2021). This necessitates significant measures to remove the existing CO_2 in the atmosphere (Howden 2021). There are a range of approaches to removing CO_2 from the atmosphere. Some have been widely implemented, such as mass tree planting (Carrington 2019). Others, such as soil carbon trading, are difficult to implement at such large scales (Simmons et al. 2021). Critics have maintained that the "net-zero by 2050" phraseology effectively conceals the complexity of the challenges in removing CO_2 from the atmosphere (Howden 2021).

It is widely understood and accepted that the consumption of meat or other animal products, particularly in developed nations such as Australia, exceeds basic biological requirements (Walker et al. 2005; Fehrenbach 2015; Buddle 2019).

Despite a growing awareness of the health implications of eating meat, consumers continue to exhibit ambivalence and resistance to reducing or eliminating its consumption (Macdiarmid et al. 2016). High consumption rates in Western countries, including Australia, have been identified as at least partially due to the deployment of a range of "coping strategies", including concealing "the animal origin of meat" (Negowetti 2020), the adjustment of underlying belief systems (Bastian and Loughnan 2016) or "strategic ignorance" (Onwezen and van der Weele 2016). The latter two have been identified as facilitating the continued consumption of meat products, despite an underlying awareness of the harms produced (Thunström and Ritten 2019).

While animal products, including red meat, are a source of nutrients, protein, iron and vitamins, these are also available in well planned plant-based foods (De Smet and Vossen 2016; Wyness 2016).[16] Though the Australian Dietary Guidelines ('ADGs') currently situate some plant-based foods, such as tofu, in the same category as lean meats, poultry, fish and eggs (NHMRC 2013), expert health advice recommends that red meat be restricted to 14 grams a day (Willett et al. 2019) on the basis that its consumption is associated with higher risks of health complications (Papier et al. 2021).

In the past few decades an expansive amount of solid research containing "overwhelming scientific evidence about the urgent need to rebalance plant and animal ratios in Western diets" (Dagevos 2021).

This has culminated in a number of prestigious studies (Tilman and Clark 2014; Godfray et al. 2018; Poore and Nemecek 2018; Springmann et al. 2018; Willett et al. 2019) whose shared conclusion is that transitioning to diets with less animal-based foods - particularly meat - has significant public health benefits. A large library of this evidence indicates that high consumption rates of red meat, the product whose sector instigated the current inquiry, is associated with increased risks of diabetes (Pan et al. 2011), cardiovascular disease (Micha et al. 2010), cancer (Demeyer et al. 2016) and mortality (Larsson and Orsini 2013). While many acknowledge these risks, concern regarding the perceived lack of nutrients or the general healthiness of a plant-based diet are often sufficient to motivate consumers to continue practising a meat-based diet (Lea and Worsley 2001).

Though there has been a steady increase in the numbers of Australians adopting a vegan diet, the largest barrier preventing people from doing so remains the enjoyment of eating meat (Corrin and Papadopoulos 2017). A health barrier also exists, especially insofar as many consumers consider meat to be an "irreplaceable" dietary staple (Graça et al. 2014; Lacroix and Gifford 2019) due its functional role in historical human society

16 Though the majority of essential vitamins and minerals that are found in animal products can be sourced from plant-based alternatives (Haddad et al. 1999; Turner et al. 2014; De Smet and Vossen 2016; Wyness 2016; McManus 2020), Vitamin B12 (cobalamin) is found almost exclusively in animal-based products. While studies have identified this as a potential health issue in vegan diets (Gilsing et al. 2010), there is little evidence that this is widespread or prevalent in the community (Hokin and Butler 1999; Miller et al. 1991) and it is rectified through responsible dietary planning (Zeuschner et al. 2012; Rogerson 2017). Numerous large studies that span over four (4) decades of research have concluded that veg*n diets are positively associated with lower risks of several serious diseases, including diabetes (Tonstad et al. 2013), ischaemic heart disease (Fraser 1999) and cancer (Tantamango-Bartley et al. 2013). Though there are a range of positive effects, a key attribute of plant foods shown to positively contribute to health outcomes is fibre (Key et al. 1996).

(McNeill et al. 2017). This belief informs the opinion that veg*n diets are nutritionally unbalanced (Povey et al. 2001), rendering the consideration of altering a meat-based diet and incorporating more plant-based items appear both undesirable and inconvenient (Lea et al. 2006; Pohjolainen et al. 2015). Despite this, research suggests that PBMAs are generally healthier than meat products (Sadler 2004) and Australian health authority audits conclude that any hazards are "expected to be the same as in traditional meat products" (NSW Food Authority 2021).

As such, it is advisable to develop and disseminate fact-based public education materials to counteract these concerns. We have demonstrated that there is ample scientific evidence with which to do so. This will form one of our recommendations in the following section in this submission.

The overconsumption of meat is producing "an epidemic of disease" (Carrington 2020).

There is substantial evidence indicating that meat consumption, particularly red meat consumption, is having a range of serious and detrimental effects on public health (Cancer Council n.d.; Raphaely and Marinova 2014; Richi et al. 2015; Fegan and Jenson 2018; Al-Shaar et al. 2020). Consumption of red meat is the cause of several of the most prolific diseases in the developed world (D'Silva 2016). Australia has historically been one of the highest meat consuming countries (Baghurst 1999). Depending on the year and the statistics used to measure indicators, Australia remains the biggest or the second biggest consumers of animal products on the planet (Ting 2015; Marinova and Bogueva 2019). Though these figures are shifting, these shifts are largely towards different species rather than downwards (Taylor and Butt 2017). Beginning in the 1960s, public health messages steered consumers away from red meat (Taylor and Butt 2017). This, coupled with the rapid proliferation of fast-food franchises selling chicken, caused substantial and long-lasting shifts in consumption patterns (Taylor and Butt 2017).

An estimated $285 billion is spent globally every year on efforts to treat illnesses caused by the consumption of red meat alone (Springmann et al. 2018b). In addition to the now-infamous pronouncement by the World Health Organisation that red meat is carcinogenic (WHO 2015) and advice from medical authorities that "there is no safe amount of processed meat" (PCRM 2022), a large library of evidence indicates that high consumption rates of red meat are associated with increased risks of diabetes (Pan et al. 2011), cardiovascular disease (Micha et al. 2010), cancer (Demeyer et al. 2016) and mortality (Larsson and Orsini 2013).

2.4.2 | FOR THE PLANET

While earlier subsections have shown the multitude of adverse impacts agriculture has on the environment, the following subsection will provide the Committee with an overview of the positive possibilities that may be accrued by promoting transitions to a plant-based diet. In general, we will demonstrate that replacing animal products for meat substitutes could lower the environmental impacts associated with food consumption (Goldstein et al. 2017; Ritchie et al. 2018b; Santo et al. 2020; Van Mierlo et al. 2022).

Plant-based diets have been recognised as the “foundation for healthy sustainable diets” and have “co-benefits for health, climate and the environment” (Macdiarmid 2021).

Environmentally friendly eating habits reduce the consumption of animal products and increase the consumption of plant products (Birt et al. 2017). Global food production is the most significant pressure caused by humans that endangers the resilience and stability of regional ecosystems. Combined with projected population growth, current dietary trends will intensify these risks. The strain of non-communicable diseases on public health is expected to increase, while the consequences of food production on GHG emissions, pollution, biodiversity loss, and water and land use will diminish the stability of the food supply network. This will have devastating impacts on food security.

Unhealthy and un-sustainably produced food constitute a significant risk to people and the planet. The production of plant foods, including fruits and vegetables, grains, legumes, nuts and seeds, produces lower GHG emissions than animal foods (Springmann et al. 2018c). As food production causes major global environmental risks, many of which we have outlined in this submission, sustainable food production must use no further land, protect existing biodiversity, decrease wasteful water use and manage natural resources responsibly. Adaptation to healthy and nutritious diets from sustainable production systems is critical. Transformation to healthy diets by 2050 will involve considerable shifts, including a greater than 50% reduction in global consumption of unhealthy foods, including animal products, and a greater than 100% increase in consumption of healthy foods (Willett et al. 2019). Such a transition is likely to benefit human health substantially, preventing an estimated 11 million deaths per year (Springmann et al. 2018a).

Shifting towards plant-based diets can also help prevent biodiversity and habitat loss (Steinfeld et al. 2006; Tilman et al. 2017).

Internationally, the decline of biological diversity ('biodiversity') has been recognised as one of the most pressing modern ecological problems (Ritchie et al. 2013; Ceballos et al. 2017). Australia's biodiversity is one the richest in the world, with over 600,000 species, many of which are endemic (Chapman 2005): approximately 85% of flowering plants, 84% of mammals, over 45% of birds and 89% of reptiles are endemic (Saunders et al. 1996). Though it accounts for approximately 5% of the world's landmass, Australia supports almost 8% of all described floral, faunal and fungal species (Chapman 2009). As such, it is considered one of only 17 'megadiverse' nations (Mittermeier et al. 1997). In addition, it is one of only two of such nations that is wealthy in economic terms (McDonald et al. 2015; World Bank 2017). Historically, however, many anthropogenic activities have deleteriously impacted populations and habitats of many terrestrial and marine species, leading to one of the highest extinctions rates in the world (Cork et al. 2006; Lindenmayer 2007; Kingsford et al. 2009). Since European invasion, the extinction of ninety (90) Australian taxa have been recognised under the Environment Protection and Biodiversity Conservation Act ('EPBC Act') (Kearney et al. 2019).

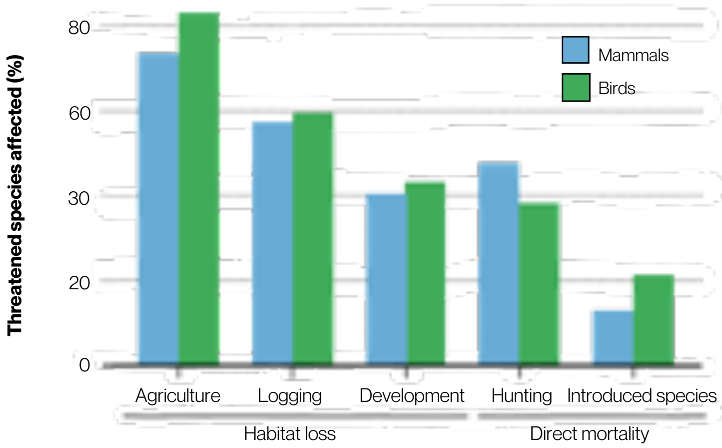
As many governments worldwide have done, the Australian government lists threatened species and extends commitments to recovery (Wintle et al. 2019). The federal system of government, comprising the Commonwealth, six (6) states and two (2) territories, has seen the production of at least twenty (20) pieces of such legislation that incorporate elements from international conservation agreements (Bates 2006). These interventions, however, have not interrupted the loss of species or prevented further extinctions (Garnett et al. 2011; Woinarski et al. 2014). Changes to policy and legislation have been implicated in these failings (Ritchie 2013) and it is predicted that the challenges that have made mitigation and prevention difficult will be exacerbated by the ongoing impacts of climate change, continued population growth rates and fibre production practices (McDonald et al. 2015).

Although not alone in experiencing unprecedented extinction rates (Mace et al. 2005), Australia has the worst record of extinction and declines of native mammals (Johnson 2006). Almost half of the forty (40) mammalian extinctions globally in the past 200 years have occurred in Australia (Banks et al. 2018). More than 1,800 species and ecological communities in Australia are currently threatened with the same fate (Cox 2018; Hepburn 2018). Almost 1,000 of these are located in NSW (DPIE n.d.). Furthermore, since the EPBC Act was enacted, four (4) times as many species identified as vulnerable have declined in their status than have improved (Simmonds et al. 2019). As such, Australia represents an example of how efforts to mitigate species loss can be ineffective despite economic wealth and internationally recognised scientific expertise (McDonald et al. 2015).

Land clearing and deforestation fundamentally impact biodiversity (Neldner 2018), damages fragile ecosystems (Hepburn 2018), destroys habitat, increases GHG emissions (Battaglia 2011) and is a significant animal welfare issue (Finn and Stephens 2017). In the 2001 and 2006 State of the Environment Reports, land clearing was listed as one of the greatest threats to biodiversity (Commonwealth of Australia 2001; Commonwealth of Australia 2006). Yet Australia is predicted to clear up to 3 million hectares of native forest by 2030 (Cox 2018). Critics have maintained that due to the "staggering" rates of land clearing carried out across the country that threaten vulnerable species and ecological communities with extinction, the EPBC Act is "clearly not working" (Hepburn 2018). Similar conclusions may be reached in relation to NSW legislation. For example, relaxations of native vegetation protections have triggered increased land clearing rates across NSW, particularly by the agriculture sector (Cox 2020b). Though data indicated that agricultural interests had doubled land-clearing rates in 2020 (Hannam 2020), recent reports indicate that this has tripled in NSW in the past decade (Cox 2022).

FIG. 11: THREATENED SPECIES AND THEIR KEY THREATS

Adapted from Tilman et al. 2017



Approximately 80% of all threatened terrestrial bird and mammal species are threatened by habitat loss driven by agriculture (Tilman et al. 2017). As incomes and the population grow, the demand for agricultural land and animal products increases, which further threatens biodiversity through habitat loss (Grossman and Krueger 1995; Balmford et al. 2009). As such, the figures provided in Figure 11 below can be reasonably expected to rise exponentially unless structural changes in food production and consumption patterns transition towards a plant-based diet.

A shift to plant-based dietary patterns could dramatically reduce land use for agriculture by reducing the amount of land required for grazing and growing crops to feed animals raised for meat and dairy (Poore and Nemecek 2018; Springmann et al. 2018a).

Because the global farmed animal population and the grain it consumes occupies approximately 83% of global farmland yet produces only 18% of total food calories (Poore and Nemecek 2018), transitioning to a plant-based diet has been described as "simply a far more efficient use of the planet's stretched resources than feeding the plants to animals and then eating them" (Carrington 2020). If all of the world's pastures were rehabilitated or otherwise returned to natural vegetation, it would remove GHGs equivalent to an estimated 8 billion tonnes of carbon dioxide per year (Poore and Nemecek 2018). This figure represents approximately 15% of the world's total GHG emissions (Carrington 2020).

2.4.3 | FOR ANIMALS

The last two decades have seen increased public concern regarding animal welfare issues (Taylor and Signal 2009; Bennett and Blaney 2003; Futureye 2018).

Research is increasingly demonstrating that community concern for issues relating to farmed animal welfare in Australia is growing (Bray et al. 2017; Doughty et al. 2017; Buddle et al. 2018; Coleman et al. 2018; Futureye 2018; McGreevy et al. 2019). This evolution is shifting attitudes from a traditional utilitarian perspective of animal welfare to a more compassionate approach to its legal application (Singer 1993; Franklin and White 2001; Mazur et al. 2006; Gruen 2018; Parbery and Wilkinson 2012). These attitudes are widely recognised as important determinants of consumer behaviour and community expectations (Coleman et al. 2014), with greater knowledge of industry practices associated with decreasing rates of consumer support (Erian and Phillips 2017). Due to these emerging attitudes, the Australian public expects corresponding advancements in welfare regulation that match their expectations (McGreevy et al. 2019; Morton et al. 2020).

Plant-based diets prevent animal suffering and cruelty.

Declines in meat consumption and increases in plant-based diets represent a positive step forward for a range of reasons, including those outlined in previous subsections. We have shown that many consumers have ethical objections to the exploitation of other animals for food. Such objections may be in response to the prioritisation of economic efficiency that has led to increasingly cruel conditions for farmed animals (Graça et al. 2015; Reese 2018; Fehér et al. 2020). For example, it is estimated that over 90% of farmed animals live their lives confined in factory farms worldwide (Anthis and Reese 2019). In these facilities, they are kept in cages, routinely mutilated without pain relief, and painfully slaughtered (Lymbery and Oakeshott 2014). This figure represents billions of animals every year (Anthis and Reese 2019).

Ultimately, if animal suffering is taken seriously, and we recognise that most animal suffering is caused by the subordination of animal interests and welfare to human interests and economic benefit (Rollin 2006; Linzey 2009; Gullone 2017), the sheer scale and intensity of current production means that contemporary animal agriculture is “one of the largest moral failings of our time” (Bryant 2019).

SECTION THREE

RECOMMENDATIONS

SECTION THREE

RECOMMENDATIONS

We urge the Committee to recognise that animal agriculture is a key threat to food security in NSW and consider this when making the inquiry's final report. Animal Liberation makes the following recommendations:

3.1 THE NSW GOVERNMENT SHOULD INVESTIGATE AND TRIAL STRATEGIES TO MINIMISE FOOD LOSS

One viable mechanism to meet the growing demand for food is waste reduction (Ashchemann-Witzel 2016). A waste and loss reduction of 50% across the entire food chain, including agricultural and post-harvest practices, would have significant benefits (Lundqvist et al. 2008). These benefits would include food security and nature conservation outcomes because if less food is wasted, agricultural production will be higher per unit area of land and per person fed (Munesue et al. 2015). This would result in less pressure to expand the area of land used to meet growing demand (Gordon et al. 2016). This relates to the opportunity costs currently incurred due to demand for particular products.

While Animal Liberation recognises that diets and food systems are complex, we recommend the NSW Government investigates and trials strategies that promote the total use of foods, the development of composting, and the promotion of industry programs designed to reduce waste. We recommend that the NSW Government consider similar strategies developed elsewhere, such as those outlined in Victoria's recent plan to have food waste (Sustainability Victoria 2021).

3.2 THE NSW GOVERNMENT SHOULD CONSIDER ENACTING LEGISLATION THAT TREATS AGRICULTURAL EMISSIONS SEPARATELY FROM OTHER SOURCES

Unlike Australia, New Zealand has recognised this and has passed legislation that treats agricultural emissions separately (Morton 2021). While New Zealand is more focused on biogenic methane than most nations because it constitutes approximately 43% of its total emissions (McClure 2021), almost half of Australia's annual methane emissions are from the agriculture sector (Climate Council 2021a; Howden 2021). While most of this is produced by farmed animals due to the fermentation of plant matter in their stomachs (Black et al. 2021), similar volumes are produced by fertilisers added to crops or waste, including manure or decaying organic matter (Petersen et al. 2013). We recommend the NSW Government consider a similar approach to that taken by the NZ Government and treat agricultural emissions separately to other sources.

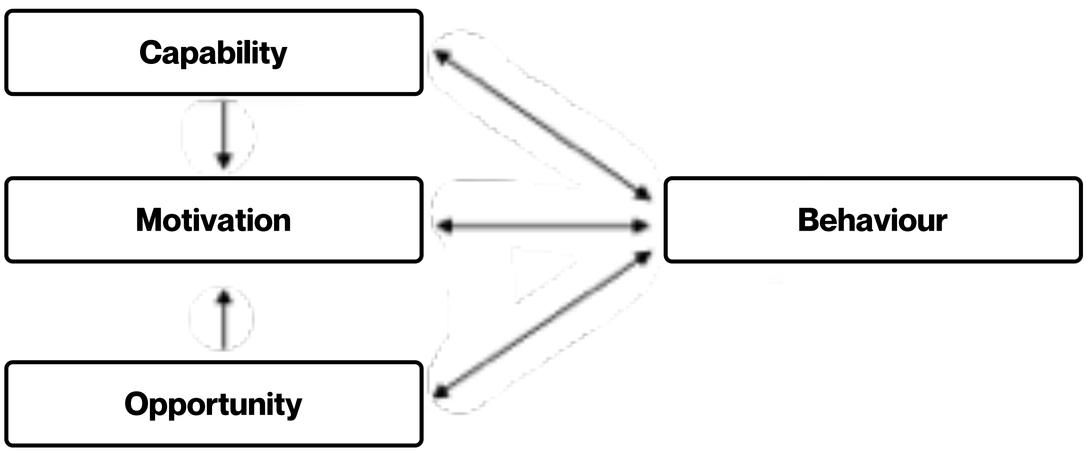
3.3 THE NSW GOVERNMENT SHOULD PROMOTE TRANSITIONS TO PLANT-BASED DIETS AND INSTITUTE DEPARTMENTAL MEAT-FREE INITIATIVES

Throughout our submission we have demonstrated that there is growing consensus that a proactive shift towards reducing meat consumption and increasing plant-based diets are a crucial feature in addressing the critical health and environmental challenges we have outlined throughout this submission (Graça et al. 2019). Similarly, there is widespread scientific agreement that steps taken to enhance the sustainability of food systems will benefit from such a shift (Tilman and Clark 2014; Springmann et al. 2016; Röös et al. 2017; Godfray et al. 2018; Shepon et al. 2018; Aiking and de Boer 2020). Moreover, cumulative data indicates that comprehensive modifications to dietary patterns can assist in delivering public health and environmental advantages on a scale not feasible through improvements to productivity alone (Clark and Tilman 2017; Poore and Nemecek 2018; Willet et al. 2019). Based on this evidence, we strongly recommend the NSW Government consider and promote transitions to plant-based diets, provide transparent educational materials containing independent guidance on doing so, and institute departmental meat-free initiatives. A range of options and supporting evidence for promoting such a transition will be outlined below.

Historical reviews of meat consumption, from its origins to contemporary trends, drivers and consequences, suggest that it has become increasingly invested with an essential function in social representations of food, particularly in western societies such as Australia (Fiddes 1991; Graça 2016; Hartman and Siegrist 2017). Despite the evidence-based rationales in support of undertaking significant transition from meat-based to plant-based diets, such a process will involve profound societal modifications (Dagevos and Voordouw 2013; de Boer and Aiking 2017; Graça et al. 2019). This informs concerns that shifting consumer demand towards reducing meat consumption and increasing plant-based diets will presumably be challenging, regardless of the validity of this approach and the urgency of its enactment. Accordingly, a transition towards healthier and more sustainable food systems must be supported by a coordinated effort that incorporates civil society, governmental departments and authorities, non-governmental organisations ('NGOs'), and relevant market actors (Graça et al. 2019). These forces should be informed and supported by a body of independent research detailing both the efficacy of meat reduction and the practicalities of plant-based transitions (Godfray et al. 2018; Stoll-Kleemann and O'Riordan 2015). We have shown that consumers are increasingly motivated to reduce meat consumption, primarily for animal welfare or environmental reasons. These form the motivation component of Figure 12 below.

FIG. 12: PROPOSED SYSTEM FOR UNDERSTANDING BEHAVIOURAL CHANGE

Adapted from Graça et al. 2019



While Animal Liberation understands that prohibiting intensive animal farming practices will not be widely regarded as an appropriate policy, we have demonstrated its urgency throughout this submission. Similarly, we understand that this perspective is unlikely to change unless accompanied by a marked decline in demand for animal-based products. However, these expected challenges must not be permitted to stall urgent remedial action to mitigate a root cause of the climate crisis: animal agriculture. The WHO recommends an incremental transition towards plant-based diets “by adopting plant-forward eating” (WHO 2021). To support transitions to plant-based diets and compensate for predicted complications, we propose the NSW Government consider the model outlined in Figure 12. This model of behaviour has been demonstrated to be functional across a range of contexts and domains (Cane et al. 2012), including food consumption (van der Vliet et al. 2018; Graća et al. 2019). Known as the COM-B system of behaviour, this model shows that three (3) broad elements influence behaviour: capability, opportunity and motivation (Michie et al. 2011; Michie et al. 2014). According to this model, sustained behavioural change is dependent on the alignment of and interactions between a cluster of three (3) key variables:

capability includes psychological and physical features that influence the capacity to perform a particular behaviour. For example, capability refers to understanding what comprises a healthy and sustainable diet and having the skills to prepare meals that are healthy and environmentally friendly

opportunity includes social and physical features that support or inhibit the behaviour. For example, opportunity refers to social and physical circumstances that make it affordable, reasonable and comparatively easy to perform a particular behaviour. This could include knowledge on plant-based meal preparation that is nutritious whilst also meeting personal preferences.

motivation entails deliberative and intuitive psychological processes that either stimulate or impede the behaviour. Motivation refers to psychological processes that compel the behaviour. Examples of motivational drivers could be a positive attitude towards engaging in healthy and sustainable eating practices or deriving pleasure in eating plant-based meals. For instance, having a positive social experience, particularly relating to taste, when trialling a plant-based meal may assist in shaping positive attitudes toward such meals and thereby strengthen motivation while creating a proximal social context also strengthens opportunity. Increased capability and opportunity to perform a behaviour may plausibly assist in reinforcing motivation (Michie et al. 2011; Michie et al. 2014).

The role of incentives to encourage a transition away from industrial animal farming has been identified as a viable approach to mitigating the environmental, climate and zoonotic risks the sector presently poses (Schuck-Paim 2020). For example, levying a tax on animal-based food has been proposed as a mechanism to decrease the consumption of animal products and associated zoonotic risk (Espinosa et al. 2020; Jones 2021). By introducing such a “zoonotic tax”, the government could communicate an articulate message dissuading the purchase of “risky” products and promote the adoption of more sustainable dietary habits (Blum and Neumärker 2020). In addition, tax revenues generated through such a tax could be distributed to support the public healthcare system or implement measures for environmental protection and conservation (Bogueva and Marinova 2020). Taxation could also apply to meat and livestock production (Pueyo 2020), with revenues benefiting sustainable farming and funding educational campaigns to stimulate dietary change further (Brozek and Falkenberg 2021).

While we have demonstrated the urgency of behaviour change through transitions to plant-based consumption, we also emphasise the importance of facilitating production-level transitions. Given the evidence we have provided indicating the extensive damage caused by animal agriculture and the fact that humans do not need animal products to live healthily, Animal Liberation suggests the NSW government adopt policies to support the transition of the agricultural system away from animal production to other uses of the land. Despite the widespread scientific consensus on the urgency of structural changes to food production and consumption practices, which we outlined above, significant questions remain on how to facilitate the increasingly necessary transition from animal-based to plant-based consumption a just transition (Rosemberg 2010). The concept of "Just Transition" has become increasingly recognised as a viable framework to support the transition of various economic industries towards a low-carbon and climate-resilient future (Blattner 2020). For example, the International Labor Organisation ('ILO') adopted the Guidelines for a Just Transition Towards Environmentally Sustainable Economies and Societies for All in 2015 (ILO 2015). The same year, the Paris Climate Conference ('COP21') led to 195 countries signing the Paris Agreement, a legally binding treaty relating to GHG emissions mitigation and adaptation (UN 2022b; UN 2022c). Though Australia was a signatory to the Paris Agreement, it is not a signatory to the Silesia Declaration which highlights the value and validity of just transition (UN 2018). In short, Just Transition is widely accepted as "a guiding framework to adapt and, in some cases, reform economic sectors in response to climate change challenges" (Blattner 2019).

Though the concept of a just transition has been widely applied to the energy sector (McCarthy 2021),[17] it is apparent that the environmental consequences of animal agriculture necessitate its extension to this sector. In this regard, animal agriculture has been described as "the new coal" (Blattner 2020). We propose a similar approach to that taken in response to the adverse impacts of the fossil fuel sector be made in relation to the animal agriculture sector. We note, for example, a recommendation made by Portfolio Committee No. 4 in response to its inquiry into the long-term sustainability of the dairy industry. This recommendation stated that the NSW Government should "undertake preliminary work to understand the costs, demand and practicalities for developing a government supported transition program for dairy farmers wanting to transition out of the industry" (Parliament of NSW 2021). Given the evidence we have provided the Committee, we strongly recommend the NSW Government institute a just transition towards plant-based production and consumption.

3.4 THE NSW GOVERNMENT SHOULD PROVIDE EDUCATION AND GUIDANCE ABOUT HEALTHY PLANT-BASED DIETS

Demand for animal products is the driving force that dictates the size of the industrial animal farming sector and its associated zoonotic risk (Brozek and Falkenberg 2021). Alternative protein sources, such as pulses, algae, plant-based meats ('PBMs') and cultured meat, have been proposed as substitutes for meat

17 For example, a 2017 report by the Senate Standing Committee on Environment and Communications on options for managing the transition away from coal-fired power stations contained a recommendation that the Commonwealth establish an energy transition authority with adequate powers and resources to devise and coordinate transition in the energy sector (McCarthy 2021).According to a report prepared by the Institute for Sustainable Futures ('ISF') at the University of Technology Sydney ('UTS'), a just transition in the energy sector will "create new jobs, drive economic diversification and encourage investments" while "ensur[ing] environmental sustainability [and] social inclusion" (Briggs and Mey 2020).

from industrial agriculture, thus providing a possible solution to the environmental impacts and zoonotic risks we have discussed throughout this submission (Onwezen et al. 2021).

People tend to estimate various risks as low (Stel et al. 2022). When evaluating risks, people make errors as their estimations are influenced by subjective perceptions, intuitive judgments, feelings, and inferences made from limited information and media coverage (Loewenstein et al. 2001; Slovic et al. 2004; Paek and Hove 2017). Specifically for zoonoses, several studies have shown that people's limited knowledge leads to them having inaccurate risk perceptions (e.g., [44–46]). This also applies to livestock farmers [47]. As intensively farmed animals are locked in factory farms and not visible to people, it is likely that people are less aware of the number of animals held. What is visible to them is the amount of meat and dairy offered in supermarkets. However, as people cognitively dissociate the meat they consume from its animal origins (e.g., [48]), they may not link the amount of meat available to the risk of diseases from animals. Therefore, we also aimed to explore to what extent people could accurately estimate the percentage of meat coming from intensive animal farming.

A direct impact of the COVID-19 pandemic has been a reduction in global meat consumption (FAO 2020c), likely imposed by limitations of availability rather than an active awareness of the zoonotic origin of the pandemic and corresponding concerns (Brozek and Falkenberg 2021). However, eating meat as a critical contributing source of COVID-19 was recognised as a major topic in conversations on social media platforms where non-vegetarians were blamed for the outbreak of the pandemic (Abd-Alrazaq et al. 2020). The blame was not restricted to the consumption of wild meat, despite the presumable wildlife origin of COVID-19. However, previous zoonotic events prompted noticeable yet transient changes in consumer behaviour following the outbreaks (Attwood & Hajat 2020). For example, Chinese consumers' demand for poultry products declined after the 2013 avian influenza outbreak due to food safety concerns, and beef sales declined for many years following the discovery of bovine spongiform encephalopathy ('BSE') throughout the 1980s and 1990s (Attwood and Hajat 2020; Brozek and Falkenberg 2021). Recent research suggests that COVID-19 has influenced consumers to rank factory farming and global meat-eating as issues that are less critical zoonotic risk factors than the wildlife trade and the consumption of wild meat (Dhont et al. 2021). For example, messages stating the zoonotic risk of factory farming to survey participants during the COVID-19 pandemic did not provoke intentions to reduce meat consumption rates (Niemiec et al. 2021). Therefore, a lasting impact of the pandemic on boosting low-meat and no-meat diets is not anticipated (Brozek and Falkenberg 2021; Halabowski and Rzymski 2021). At best, a slight increase in the vegetarian and vegan population may be observed. Future meat consumption can be expected to follow previous projections that anticipate a 75–80% rise from 2005 to 2050 (Alexandratos and Bruinsma 2012; Godfray et al. 2018).

Achieving extensive adoption of alternative proteins to replace conventional meat products, either as a possible solution to zoonotic threats or for environmental reasons, has several challenges. First, consumer acceptance is low (Onwezen et al. 2021). While many meat-eaters reject changes in their diet (Rzymski et al. 2021), subjects committed to high meat consumption are particularly receptive to cultured meat (Onwezen et al. 2021). This is likely due to its potential to closely simulate "real meat" (Brozek and Falkenberg 2021).

While animals would still be utilised to produce cultured meat, cell culture growth for animal-free products has been developed (Rzymski et al. 2021; Treich 2021) [79,130]. However, a range of concerns will require consideration. For example, potentially complex issues include the use of growth promoters to the culture that might adversely affect human health (Chriki and Hocquette 2020), upscaling operations for cost-effective production, and energy consumption (Brozek and Fralkenberg 2021; Treich 2021). While some have argued that in vitro meat could be comparable, in terms of greenhouse gas emissions, with industrial livestock products (Jairath et al. 2021), this can be mitigated through the use of renewable energy (Rzymski et al. 2021). It is also associated with substantially reduced land use and decreased water consumption than those incurred by the current process of intensive animal production (Gravel and Doyen 2020).[18] Other implications include potentially adverse impacts on livestock-based economies, particularly in developing countries (Jairath et al. 2021). Moreover, alternative meat sources do not necessarily resolve the health-related issues of high-meat diets. However, cell-based meat production techniques offer targeted modification possibilities to reduce the presence of potentially harmful compounds (Rzymski et al. 2021; Treich 2021).

In addition to our previous recommendation that the NSW Government institute a just transition towards plant-based production and consumption, we recommend investment in alternatives that will enable consumers to do so without sacrificing the four pillars we discussed in section 1.

3.5 THE NSW GOVERNMENT SHOULD INVEST IN PLANT-BASED PRODUCTION

Industrialised animal agriculture is becoming increasingly automated to reduce labour costs and increase profits (Buller et al. 2020; Sparrow and Howard 2021). A range of scientific literature confirms the many physical and psychological risks experienced by personnel employed in these environments (Otte et al. 2007; Sigsgaard and Balmes 2017). These factors, combined with low wages, continue to contribute towards a range of negative impacts that affect a sustainable and reliable work force (Jacobs et al. 2020).

Economic strength and prosperity from strong and long-term employment will be better met by a carefully managed transition to more sustainable food production system. Such a system would also significantly reduce harm to workers, incur less costs on the health system and decrease harm to the environment, including the diminishing natural resources we have discussed elsewhere in this submission.

3.6 THE NSW GOVERNMENT SHOULD IMMEDIATELY PROHIBIT ANY FURTHER LAND CLEARING

The clearing of native vegetation to other land uses, or “land clearing”, constitutes a key pressure on the Australian environment (Jackson et al. 2016). The amount of native vegetation cleared each year in Australia is significant in global terms (Bradshaw 2012; Ritchie et al. 2013; Evans 2016). Eastern Australia is one of the world’s top 11 “deforestation hotspots” (WWF Australia 2020). At least 1,000 floral and faunal species face extinction in NSW (DPIE n.d.). Habitat destruction is the leading threat (Evans et al. 2011; Wintle and Bekessy 2017; Barham et al. 2018).

18 Global meat and dairy industries use one third of the Earth’s fresh water, with a single quarter-pound patty requiring 460 gallons of water, or the equivalent of almost 30 showers, to produce (Hunter 2021).

Nationally, over 7.7 million hectares of potential habitat was cleared between 2000 and 2017 (Ward et al. 2019). In this time, iconic Australian species, such as the koala, lost ~1 million hectares of potential habitat (Barham et al. 2018). A mere 9% of NSW remains in a healthy, near-natural condition (EPA 2015), and now a staggering 8 million hectares of forest and bushland has no protection from deforestation (EA 2016). While analysts and ecologists predict a rapid increase in habitat destruction, the true extent of clearing is hidden from view because of the lack of publicly available data (Evans 2016; Barham et al.[18] 2018). As such, available figures are inconclusive and substantially under-estimate clearing rates (Hannam 2016a; Hannam 2016b).

Land clearing has significant adverse impacts on animal welfare (Finn and Stephens 2017). Habitat destruction prevents safe movement across the landscape, restricts the ability to engage in normal behaviour and denies animals access to basic needs, such as food, water and shelter (DAWE 2004; Zachary and McGavin 2012). Other impacts include stress, disease, injury, illness, pain, psychological distress, reproduction complications, and death (Wobeser 2006; Acevedo-Whitehouse and Duffus 2009; Ladds 2009; Brearley et al. 2013; Cooper and Cooper 2013; Hing et al. 2016; Narayan and Williams 2016). Estimates suggest that over 50 million mammals, birds and reptiles are killed every year due to land clearing in Queensland and NSW alone (Finn and Stephens 2017). Furthermore, the loss of animals from land clearing can trigger adverse ecological effects, such as disrupting natural food chains (RSPCA Australia 2019). This can lead to further negative impacts on animals that may not be directly impacted by the initial land clearing (Cogger et al. 2017).

Despite widespread awareness and knowledge of these issues, biodiversity laws in NSW are weak and have been continuously modified to permit large agribusinesses, developers and private landholders to clear vital wildlife habitats. As a result of these new laws, 99% of identified koala habitat on private land can be bulldozed (NCC 2018). Between 1990 and 2010, koala numbers plunged 33% (Barham et al. 2019). The status of the species has recently been upgraded from vulnerable to endangered in NSW, QLD and the ACT (Lapham 2022). It is estimated that there are fewer than 21,000 koalas left in NSW (Barham et al. 2018). This figure is a minute fraction of the millions that occupied the forests and bushlands of NSW at the time of European invasion (OEH 2018).

While free-ranging animals suffer independent of human activity (Kirkwood et al. 1994; Nussbaum 2006; Doherty et al. 2016), the continuation of activities known to cause significant suffering and serious adverse ecological outcomes require critical attention. Land clearing kills, injures or otherwise harms animals directly (i.e. the clearing of vegetation either generates detrimental physical contact or creates a dangerous environment), demonstrably (i.e. the harms can be verified via investigation) and in a manner that can be avoided or minimised with appropriate regulation (Finn and Stephens 2017). Thus, efforts to disregard or otherwise excuse the damage that land clearing causes constitute willful ignorance that is incompatible with objective and transparent decision-making processes.

We strongly recommend the NSW Government mandate the conservation and enhancement of biodiversity in legislation at state, regional and local scales. This must protect all remnant and regrowth vegetation, prioritising the protection and restoration of koala habitat to save the species from imminent extinction. Such a policy should also protect and restore forests, bushlands and catchments for carbon storage. This must be augmented by an adequate resourcing, monitoring and compliance scheme that utilises an early detection system to support proactive intervention. Ultimately, we believe that the NSW Government should establish an independent Land and Biodiversity Fund to support these objectives.

3.6 THE NSW GOVERNMENT SHOULD DEVELOP A MANAGEMENT AND CONTINGENCY PLAN TO DIRECT ANIMAL, BIOSECURITY AND CLIMATE RELATED EMERGENCIES

Recent disasters, including the 2019-20 bushfires and the March 2022 floods, have made the vulnerability of animals to disasters acutely apparent (Best 2021). We have shown that the increasing frequency and severity of these events are being influenced by the ongoing climate crisis. Elsewhere, improvements to emergency management protocols have been made (Travers et al. 2017). The exceptionally high rates of companion animal ownership in Australia (AMA 2019) and the well-documented impacts of grief at animal loss (Zottarelli 2010; Hall et at. 2004; Thompson 2013) has generated calls for the consideration of animals "at all stages of emergency preparedness and planning" (Taylor et al. 2015). The status of animals as property, however, makes them legally subordinate, and they are often afforded a corresponding lower priority in emergency response management plans as a result (Best 2021). For example, although some jurisdictions, including Australia (Agriculture Victoria 2019), have begun integrating animals in disaster management, their interests frequently remain secondary to those of humans (Best 2021) and distinct categories of animals are "differentially provided opportunities for rescue or escape" (Irvine 2009).[19] It follows, therefore, that emergency planning frameworks are negligent if they exclude animals confined and dependent on automated food and water systems in intensive facilities or in environments where they can not physically escape or avoid harm.

We note that the preventative killing of healthy animals has become an increasingly common response in zoonotic disease control (Degeling et al. 2016). Critically, as the animal agriculture sector is responsible for a substantial percentage of GHG emissions (Vermeulen et al. 2012) and finite resource exploitation (Shiklomanov and Rodda 2004; Ramankutty et al. 2008), this directly implicates the production of farmed animals. This necessitates urgent and proactive response from the NSW Government.

We strongly recommend the NSW Government investigate, prepare and provide industry and public education, including emergency preparedness measures, for the extensive climate-related complications in order to to mitigate the predicted impacts of the climate crisis (RSPCA Australia 2020). These measures should be inclusive of all animals, including companion (Thompson 2013), entertainment (Rebbeck 2013), wild (van Eeden et al. 2020) and farmed (Lacetera 2019) animals. Similarly, we recommend that the Committee consider the findings of the several historic and ongoing reports and inquiries. For example, the 2011 Queensland Flood Commission of Enquiry, the 2009 Victorian Bushfires Royal Commission, and the 2013 Tasmanian Bushfires Inquiry have all included references to the management of animals in catastrophes and recommendations on necessary improvements to emergency preparedness (Taylor et al. 2015).

Finally, we recommend the NSW Government review a range of relevant reports, including those in response to a comprehensive review of the potentially catastrophic animal welfare impacts of the COVID 19 pandemic. Elsewhere in this submission, we have demonstrated the multitude of adverse consequences of the COVID-19 pandemic. Though this type of event has happened many times in human history (Lloyd-Smith et al. 2009), the connectivity of current human populations, the globalisation of trade networks and high rates of urbanisation

19 In response to the recommendations of the 2009 Victorian Bushfires Royal Commission, for example, the Victorian Emergency Animal Welfare Plan ('VEAWP') was introduced (Agriculture Victoria 2019). However, despite being the first significant attempt to safeguard animals in disasters in Australia (White 2012), the instrument is considered "highly anthropocentric" (Best 2021) as its first guiding principle is that the "protection and preservation of human life is paramount" (Agriculture Victoria 2019: 6).

mean that such diseases can and do spread at an accelerated pace post-spillover (Saker et a. 2004; Shrestha et al. 2020; Sigler et al. 2021). While much focus has been on the workforce (Risse and Jackson 2021) and food security impacts (Asher 2021; Galanakis et al. 2021; McKay 2021) of COVID-19, associated supply chain disruptions have been described as “unprecedented” by the Australian chicken industry (May 2022a) and are a major concern for other intensive animal production industries (Gortázar and de la Fuente 2020). This is primarily due to personnel impacts, including staff shortages due to movement restrictions and furloughs, that have reduced the sector’s ability to maintain facilities and impacted processing capacities (FAO 2020c).

This has subsequently caused additional overcrowding and “a backlog of animals at farms” that would have otherwise been slaughtered (Baptista et al. 2021). Though similar examples have been noted in other intensive animal production industries (Marchant-Forde and Boyle 2020), this is a particularly profound problem for chicken welfare due to the rapid rate at which they grow (RSPCA Australia 2022c). Therefore, a lockdown or staff shortage period of just a few weeks represents the production time and risks severe welfare issues (AWC 2020) by placing additional stress on stocking densities and generating significant welfare issues (Julian 1998; Bessei 2006). In this regard, we note recent documents submitted by one of Australia’s largest vertically-integrated chicken meat production companies (Baiada Group 2017; ACMF 2020a; PSA Consulting 2021), pursuing the development of a breeding facility in Grenfell (NSW) that failed to adequately address or provide sufficient detail regarding either mitigation or disposal methods in the event of an event requiring mass euthanasia (AL 2022b). This demonstrates the lack of adequate disaster preparedness and suggests an urgent need for government intervention in securing proactive emergency management planning. As such, we strongly recommend that the Committee find that the current emergency preparedness framework fails to adequately incorporate animal welfare. We have shown in previous subsections that the community is increasingly expecting improvements to animal welfare policy. At present, the absence of a proactive policy relating to animal welfare catastrophes due to disease or climate-related emergencies is incompatible with contemporary expectations and sound science.

Finally, we note that the NSW Animal Welfare Action Plan includes a goal to “develop a crisis plan” for intensive livestock business failures” (DPI n.d.-b). We strongly recommend that this objective be implemented and expanded to include the urgent concerns outlined in this subsection.

19 In response to the recommendations of the 2009 Victorian Bushfires Royal Commission, for example, the Victorian Emergency Animal Welfare Plan (‘VEAWP’) was introduced (Agriculture Victoria 2019). However, despite being the first significant attempt to safeguard animals in disasters in Australia (White 2012), the instrument is considered “highly anthropocentric” (Best 2021) as its first guiding principle is that the “protection and preservation of human life is paramount” (Agriculture Victoria 2019: 6).

SECTION FOUR

CONCLUSION

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We have demonstrated that plant-based diets offer a viable solution to many of the issues discussed throughout this submission.

In principle, Animal Liberation subscribes to the conclusion reached by Albert Schweitzer, a French theologian, musician, philosopher, and physician born in 1875, who said that “we must fight against the spirit of unconscious cruelty with which we treat the animals. Animals suffer as much as we do. True humanity does not allow us to impose such sufferings on them. It is our duty to make the whole world recognize it. Until we extend our circle of compassion to all living things, humanity will not find peace” (Schweitzer 1969).

We believe that our recommendations facilitate a suite of positive outcomes for people, the planet and animals. We expect the Committee to thoroughly and transparently consider these in its deliberations.

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