

CONSIDERING ZONOTIC DISEASE RISK IN AUSTRALIA: AN ANALYSIS OF THE ADEQUACY OF INTENSIVE ANIMAL AGRICULTURE REGULATION

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Zoonotic diseases demonstrate that the way we relate to animals has considerable impact on public health. In Australia, this is best represented by intensive animal agriculture, a practice that creates conditions conducive to zoonotic disease emergence. This article contends that, as a symptom of the anthropocentric nature of the law, Australia's regulation of intensive animal agriculture is deficient in terms of mitigating the risk of zoonotic disease. It demonstrates the need for a regulatory framework that recognises the interdependence of human, animal and environmental health and explores One Health and Wild Law as alternative approaches. It argues that under Wild Law, intensive animal agriculture would be prohibited as it is imbalanced in the context of human, animal and environmental health. This article proposes Wild Law as the framework from which to advocate for reform, as it would produce the paradigm shift necessary to adequately address zoonotic disease risk in Australia.

I INTRODUCTION

The recent outbreak of COVID-19 has, in 2020, caused an unprecedented global health emergency. This global pandemic has had, and will continue to have, significant consequences for human health both in terms of people experiencing illness and people dying. As of 9 March 2022, globally there have been 446,511,318 confirmed cases of COVID-19, and 6,004,421 people have died as a result of being infected with COVID-19.¹ The measures taken by governments to try to prevent and slow the rate of COVID-19 infection, including restrictions

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The authors would like to thank Dr Katie Woolaston for her helpful feedback in relation to previous drafts of this article.

1 As of 9 March 2022 and reported to the World Health Organization: 'WHO Coronavirus (COVID-19) Dashboard', *World Health Organization* (Web Page, 9 March 2022) <<https://web.archive.org/web/20220309030136/https://covid19.who.int/>>.

on human movement,² compulsory mask-wearing³ and business closures,⁴ have their own major consequences. In particular, the pandemic and the restrictions have prompted mental health conditions and aggravated existing mental health conditions.⁵ The pandemic has also caused economic disruption and will have a considerable impact on the global economy in the short and medium-term future.⁶

While Donald Trump, then President of the United States, claimed in March 2020 that the COVID-19 pandemic could not have been predicted,⁷ researchers have been predicting the ‘Next Big One’ for some time.⁸ These predictions relate to the incidence of zoonotic disease. A zoonotic disease is an infectious disease that originates in a non-human animal, known as a reservoir host, and is then transmitted to humans. Past zoonoses include HIV, Ebola virus and Hendra virus.⁹ In the case of COVID-19, the disease is thought to have originated in bats and jumped to an intermediary animal before being transmitted to humans.¹⁰

Contemporary research in relation to zoonotic disease is clear that the merging of the human-animal interface is the fundamental reason for an increase in zoonotic

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- 2 See, eg, ‘Victoria Announces State of Disaster as Melbourne Enters Drastic Stage 4 Coronavirus Lockdown’, *SBS News* (online, 2 August 2020) <<https://www.sbs.com.au/news/victoria-announces-state-of-disaster-as-melbourne-enters-drastic-stage-4-coronavirus-lockdown>>.
 - 3 See, eg, ‘Greater Brisbane 3-Day Lockdown’, *Queensland Government* (Web Page, 11 January 2021) <<https://web.archive.org/web/20210111132939/https://www.qld.gov.au/health/conditions/health-alerts/coronavirus-covid-19/current-status/public-health-directions/restrictions-impacted-areas>>.
 - 4 See, eg, ‘Coronavirus Shutdown in Victoria Sees Gyms, Pubs and Cinemas Close as Police Taskforce Assembled’, *ABC News* (online, 23 March 2020) <<https://www.abc.net.au/news/2020-03-23/victoria-covid-19-coronavirus-shutdown/12080132>>.
 - 5 See, eg, Elise Kinsella, ‘As Victoria Endures Prolonged Coronavirus Lockdown, Mental Health Workers See Devastating Impacts of COVID-19’, *ABC News* (online, 2 September 2020) <<https://www.abc.net.au/news/2020-09-02/mental-health-crisis-coronavirus-victoria-lifeline-calls-rise/12588500>>.
 - 6 See, eg, ‘The Global Economic Outlook during the COVID-19 Pandemic: A Changed World’, *The World Bank* (Web Page, 8 June 2020) <<https://www.worldbank.org/en/news/feature/2020/06/08/the-global-economic-outlook-during-the-covid-19-pandemic-a-changed-world#:~:text=Businesses%20might%20find%20it%20hard,by%20almost%208%25%20in%202020>>.
 - 7 ‘The Pandemic Didn’t Come out of Nowhere: The US Ignored the Warnings’, *The Washington Post* (online, 21 April 2020) <https://www.washingtonpost.com/opinions/global-opinions/the-pandemic-didnt-come-out-of-nowhere-the-us-ignored-the-warnings/2020/04/21/3bf37566-7db3-11ea-a3ee-13e1ae0a3571_story.html>; Aaron Blake, ‘Trump Keeps Saying “Nobody” Could Have Foreseen Coronavirus: We Keep Finding Out about New Warning Signs’, *The Washington Post* (online, 19 March 2020) <<https://www.washingtonpost.com/politics/2020/03/19/trump-keeps-saying-nobody-could-have-foreseen-coronavirus-we-keep-finding-out-about-new-warning-signs/>>.
 - 8 See, eg, David Quammen, ‘Where Will the Next Pandemic Come from? And How Can We Stop It?’, *Popular Science* (Web Page, 15 October 2012) <<https://www.popsoci.com/science/article/2012-08/out-wild/>>.
 - 9 ‘Zoonoses’, *World Health Organization* (Web Page, 29 July 2020) <<https://www.who.int/news-room/factsheets/detail/zoonoses>>.
 - 10 A reservoir host for COVID-19 has yet to be identified and the exact origin of the virus remains contentious. While the World Health Organization has found no evidence of a direct link between COVID-19 and bats, both bats and pangolins remain potential reservoir hosts in the continued investigation: see ‘World Health Organization Team in China Says COVID-19 Probably Came from Animals, but No Evidence It Originated in Bats’, *ABC News* (online, 9 February 2021) <<https://www.abc.net.au/news/2021-02-09/world-health-organization-covid-19-team-mission-results-covid-19/13137984>>. The investigation into the origin of COVID-19 continues: see Amy Maxmen, ‘US COVID Origins Report: Researchers Pleased with Scientific Approach’, *Nature* (online, 27 August 2021) <<https://www.nature.com/articles/d41586-021-02366-0>>.

disease transmission.¹¹ A recent United Nations (‘UN’) report identifies seven key drivers of zoonotic disease,¹² six of which have some relationship to the increase in contact between human and non-human animals. These drivers include an increase in demand for animal protein, rapid growth in intensive animal agriculture, a rise in the use and mistreatment of wildlife, the impact of rapid urbanisation on natural resources, changes in land use including mining, travel and transportation, and changes in food supply chains.¹³ Moreover, given the continuing growth in human and animal contact, it is generally thought that the world is likely to see a continuing increase in incidents of emergence and the frequency of zoonotic disease transmission in the future.

A key driver of zoonotic disease in the Australian context is the intensification of animal agriculture. The last 60 years or so have seen a shift in animal agricultural practices from small family farms to increasingly intensive animal agriculture.¹⁴ Intensive animal agriculture practices, often dubbed ‘factory farms’, use industrial practices to breed and raise animals in generally unnatural and confined conditions in order to maximise profit.¹⁵ While this type of farming is frequently subject to criticism on the basis of animal welfare concerns, it is highly effective in producing large quantities of low-cost animal protein, for which there is increasing worldwide demand.¹⁶ Intensive animal agriculture, however, not only places farmed animals in closer proximity to humans,¹⁷ but also creates environmental conditions conducive to zoonotic disease transmission.

Given the significance of intensive animal agriculture in driving zoonotic disease and the unprecedented impact of COVID-19 on global human populations, this article will consider whether Australian laws that regulate intensive animal agriculture are appropriate to minimise the risk of zoonotic disease transmission and protect public health. In this respect, this article argues that Australian laws are insufficient to mitigate the risk of zoonotic disease emergence. Public health is dependent on a balanced interconnection between the world and its human

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- 11 Note that this article uses the term ‘animal’ to refer to all animals, excluding human beings. While human beings are themselves animals, this popular use of the term animal is helpful for the purposes of clear communication: see Peter Singer, *Animal Liberation* (Bodley Head, 2015) 26.
 - 12 Delia Grace Randolph et al, *Preventing the Next Pandemic: Zoonotic Diseases and How to Break the Chain of Transmission* (United Nations Environment Programme Report, 6 July 2020) 15–17 (‘*Preventing the Next Pandemic*’).
 - 13 *Ibid.*
 - 14 See Part II(C) below; Michael Greger, ‘The Human/Animal Interface: Emergence and Resurgence of Zoonotic Infectious Diseases’ (2007) 33(4) *Critical Reviews in Microbiology* 243, 253 <<https://doi.org/10.1080/10408410701647594>>.
 - 15 See Rachel Carey, Christine Parker and Gyorgy Scrinis, ‘How Free Is Sow Stall Free? Incremental Regulatory Reform and Industry Co-optation of Activism’ (2020) 42(3) *Law and Policy* 284, 289 <<https://doi.org/10.1111/lapo.12154>>.
 - 16 John Rossi and Samuel A Garner, ‘Industrial Farm Animal Production: A Comprehensive Moral Critique’ (2014) 27 *Journal of Agricultural and Environmental Ethics* 479, 480 <<https://doi.org/10.1007/s10806-014-9497-8>>.
 - 17 For instance, through the increase in peri-urban intensive agricultural facilities, or in the transport of significant numbers of animals: see generally Andrew Butt and Elizabeth Taylor, ‘Smells like Politics: Planning and the Inconvenient Politics of Intensive Peri-urban Agriculture’ (2018) 56(2) *Geographical Research* 206 <<https://doi.org/10.1111/1745-5871.12266>>.

and animal inhabitants.¹⁸ Australian laws regulating intensive animal agriculture are reflective of the manner in which the law positions humans over and above other animals. Such an approach, however, does not adequately reflect human dependence on the health of animals and therefore does not serve to mitigate the threat of zoonotic disease. For clarity, while laws should seek to protect animal health because of its influence on human health, they should also do so out of compassion for the animals themselves.

This article evaluates both One Health and Wild Law and asserts that Wild Law presents the most constructive framework to correct the deficiencies in the human animal-relationship. It argues that Wild Law should be utilised to reorientate the place of humans in the law so as to manage the risk of disease emergence. Ultimately, this would result in the eventual cessation of intensive animal agriculture, a necessary step to reduce the risk of zoonotic disease emergence and rectify the anthropocentrism evident in the law. The next Part of this article outlines the context of zoonotic disease, including an overview of what drives the transmission of zoonotic diseases to humans. In Part III, the article considers and critiques the laws in place in Australia that regulate intensive animal agriculture with a view to determining if they are sufficient to reduce zoonotic disease transmission. Having concluded that Australian laws are inadequate in this respect, Part IV considers the merits of One Health and Wild Law as alternative frameworks to underpin the regulation of intensive animal agriculture and concludes that a Wild Law approach would best reduce, or prevent, zoonotic disease transmission and promote public health.

II ZOOBOTIC DISEASE CONTEXT

A Defining Zoonotic Disease

Emerging infectious diseases represent an imminent threat to human health. Zoonotic diseases constitute a large proportion of this threat, with approximately 75% of all emerging or re-emerging human infectious diseases being of zoonotic origin.¹⁹ A disease of zoonotic origin is a disease that originated in a non-human animal, known as its reservoir host, before jumping to humans; this ‘jump’ is often referred to as ‘spillover’.²⁰ A pathogen, which is an organism such as a virus or bacterium that may emerge as an infectious disease, will likely be asymptomatic in its reservoir host.²¹ However, this pathogen may jump to and make a host of an intermediary animal, where it may then be primed to spillover to humans with potentially devastating consequences.

18 See Peter Rabinowitz and Lisa Conti, ‘Links among Human Health, Animal Health, and Ecosystem Health’ (2013) 34 *Annual Review of Public Health* 189, 190 <<https://doi.org/10.1146/annurev-publhealth-031912-114426>>.

19 *Preventing the Next Pandemic* (n 12) 4.

20 Rebecca Lipman, ‘Zoonotic Diseases: Using Environmental Law to Reduce the Odds of a Future Epidemic’ (2015) 33(1) *Virginia Environmental Law Journal* 153, 154–5.

21 ‘Studying How Pathogens Cause Disease’, *United States Food and Drug Administration* (Web Page, 12 February 2016) <<https://www.fda.gov/drugs/news-events-human-drugs/studying-how-pathogens-cause-disease>>.

Where spillover from a non-human animal host to a human is successful, a zoonotic disease will have ‘emerged’.²² More specifically, emergence will occur when a pathogen spills over to a human host, successfully adapts to that host, establishes itself within a local human population and finally, spreads.²³ Success here is not guaranteed. It is possible – and likely – that a zoonotic disease may spillover and meet a dead end, and thus fail to successfully emerge.²⁴ For example, where a pathogen is not contagious – that is, where it is not able to spread easily between people²⁵ – it is less likely to emerge successfully. A zoonotic disease that emerges successfully may become epidemic, where it affects many people within a community or region, or it may become pandemic, where it is prevalent in several countries and continents and affects large numbers of people globally.²⁶

B Key Drivers of Zoonotic Disease

The UN has identified seven key drivers of the emergence of zoonotic diseases. These include an increasing demand for animal protein; unsustainable agricultural intensification; increased use and exploitation of wildlife; unsustainable utilisation of natural resources accelerated by urbanisation, land use change and extractive industries; travel and transportation; changes in food supply chains; and climate change.²⁷ At the root of zoonotic diseases is the increase in human and animal contact. This is because human encroachment presents animal pathogens with the opportunity to jump species.²⁸ As outlined by Quammen, ‘[e]volution seizes [this] opportunity, explores possibilities, and helps convert spillovers to pandemics.’²⁹

While wildlife markets, or ‘wet markets’, are thought to be the source of the recent COVID-19 outbreak,³⁰ markets such as these are not common in Australia. Rather, the first two drivers of zoonotic disease emergence identified by the UN are the most salient in the Australian context and provide the most palpable opportunity for pathogen spillover in Australia. The first driver is a high demand for animal protein. While demand for animal protein has risen more dramatically in middle-income and developing countries over the past four decades,³¹ it has also increased in Australia. For instance, total meat consumption in Australia grew 13% in the time spanning 1998–2018, largely due to a significant increase in poultry

22 Lipman (n 20) 154–5.

23 Ibid; Stephen S Morse, ‘Factors in the Emergence of Infectious Diseases’ (1995) 1(1) *Emerging Infectious Diseases* 7 <<https://doi.org/10.3201/eid0101.950102>>.

24 Ishan Kukreti, ‘Bats Spread Viruses, so Do Humans’ (2020) 29(1) *Down to Earth* 38, 39; Lipman (n 20) 155.

25 Lipman (n 20) 155.

26 *Preventing the Next Pandemic* (n 12) 12.

27 Ibid 15–17.

28 Holger Breithaupt, ‘Fierce Creatures’ (2003) 4(10) *EMBO Reports* 921, 922 <<https://doi.org/10.1038/sj.embor.embor949>>.

29 Quammen (n 8).

30 Dina Fine Maron, ‘“Wet Markets” Likely Launched the Coronavirus: Here’s What You Need to Know’, *National Geographic* (Web Page, 15 April 2020) <<https://www.nationalgeographic.com/animals/article/coronavirus-linked-to-chinese-wet-markets>>.

31 *Preventing the Next Pandemic* (n 12) 15.

consumption.³² Moreover, Australia has a higher demand for animal food products when compared with other countries; in 2019, the average meat consumption per person in Australia was 89.7 kg, compared to the worldwide average of 34 kg.³³

The second driver of zoonotic disease emergence is intensification of animal agriculture. In Australia, there has been a significant increase in the intensification of animal agriculture in relation to all commonly farmed animals. For example, poultry constituted 43.5 kg of Australia's 89.7 kg of meat consumption in 2019, which is approximately 10 times more than the amount of chicken consumed in 1960.³⁴ Meanwhile, the costs of production, along with the retail costs of chicken meat, have been consistently decreasing.³⁵ The Victorian Chicken Meat Council, in its Chicken Meat Industry Strategic Plan 2025 for Victoria, concluded that this was the consequence of 'increasingly automated poultry processing plants' and 'improvements in how efficiently chickens convert feed into meat'.³⁶ Despite increasing poultry consumption, 70% of Australia's chicken consumption is supplied by two corporations.³⁷ As explained by the animal protection organisation, Voiceless, 'the modern chicken meat industry in Australia is vertically integrated and highly concentrated'.³⁸ Butt and Taylor further explain that the scale of poultry meat production has increased heavily, with '[r]ecent Australian planning applications for broiler operations propos[ing] to house in excess of one million birds at any time, a several-fold increase over past decades'.³⁹

Intensification of animal agriculture is also evident in pig and cattle farming in Australia. In relation to the farming of pigs, a report by the Department of Agriculture and Water Resources explains that there has been a transition from traditional small farms to 'large scale, specialist pig farming operations' in order

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- 32 Christine Parker, Rachel Carey and Gyorgy Scrinis, 'The Meat in the Sandwich: Welfare Labelling and the Governance of Meat-Chicken Production in Australia' (2018) 45(3) *Journal of Law and Society* 341, 347–8 <<https://doi.org/10.1111/jols.12119>>. While beef and veal consumption has decreased, poultry consumption increased from 29 kg per person per year to 47.1 kg per person per year from 1998–2018: see Tim Whitnall and Nathan Pitts, 'Meat Consumption', *Australian Bureau of Agricultural and Resource Economics and Sciences* (Web Page, 21 October 2020) <<https://www.agriculture.gov.au/abares/research-topics/agricultural-outlook/meat-consumption#:~:text=These%20%20countries%20are%20now,met%20principally%20by%20domestic%20production>>; 'Agricultural Commodities and Trade Data', *Australian Bureau of Agricultural and Resource Economics and Sciences* (Web Page, 2020) <<https://www.agriculture.gov.au/abares/research-topics/agricultural-outlook/data#2019>>.
- 33 'Meat Consumption', *OECD Data* (Web Page, 2022) <<https://data.oecd.org/agroutput/meat-consumption.htm>>.
- 34 *Ibid*; 'Facts and Figures', *Australian Chicken Meat Federation* (Web Page) <<https://www.chicken.org.au/facts-and-figures/>>.
- 35 Butt and Taylor (n 17) 209; RM Consulting Group and BDO EconSearch, *Economic Contribution of the Australian Chicken Meat Industry* (Report No 19-059, May 2020) 3, 16; 'Chicken Meat Industry Strategic Plan 2025 for Victoria' (Strategic Plan, Victorian Chicken Meat Council, March 2015) 21 <<https://web.archive.org/web/20210225153802/https://vcmc.org.au/wp-content/uploads/2015/05/VCMC-Plan-Final.pdf>> ('Strategic Plan 2025').
- 36 'Strategic Plan 2025' (n 35) 21.
- 37 'Structure of the Industry', *Australian Chicken Meat Federation* (Web Page, 2020) <<https://www.chicken.org.au/structure-of-the-industry/>>.
- 38 Voiceless, *From Nest to Nugget: An Exposé of Australia's Chicken Factories* (Report, November 2008) 17 ('From Nest to Nugget').
- 39 Butt and Taylor (n 17) 209.

to increase production efficiency.⁴⁰ This trend is also evident in the beef industry, where large and very large operations (1,600 to more than 5,400 heads of cattle) constitute 54% of total beef herds.⁴¹ The intensification of the beef industry is also apparent in the increasing use of feedlots.⁴² Feedlots have become key in the ability of the industry to meet consumer demand efficiently, especially in northern Australia where dry seasons make the pasture insufficient for ‘finishing’ the animals to consumer requirements.⁴³ The threat of disease emergence here is clear, as intensive and industrialised farming provides an ideal opportunity for spillover.

Agricultural intensification carries inherent risk for zoonotic disease transmission. In this respect, the UN Food and Agriculture Organization recognises that ‘[I]vestock health is the weakest link in our global health chain’.⁴⁴ A key part of this weak link is that evolution provides diversity in abundance, while intensive animal agriculture runs in stark contrast, instead seeking to reduce diversity in breeding.⁴⁵ The result is a series of genetically similar animals packed into overcrowded spaces. This is especially so in the case of poultry, who are ‘designed’ through selective breeding to have increased muscle and fat tissue.⁴⁶ A population of genetic uniformity is particularly susceptible if a virus is introduced – for instance, through some interaction with wildlife – as there is less likely to be gene variation capable of resisting the virus.⁴⁷ Intensive animal agriculture thus features high risks that are inherent to the industrial model given the tightly packed monoculture animals.⁴⁸

The risks arising from genetic uniformity are exacerbated given the health concerns for animals within the industrialised farming model. Intensively farmed animals are generally housed in confined spaces with high levels of contact between individual animals. High stocking densities and the associated contact between animals allows for increased virulence, which is the harm the virus may cause to its host,⁴⁹ without the risk of eradicating the host population. This is important because a virus has an evolutionary interest in survival, and thus an interest in persisting within its host population. As such, where the potential cost of virulence – being the eradication of the host population – is reduced, a more

40 K Watson et al, *Trends in Environmental Impacts from the Pork Industry* (Final Report, December 2018) 8.

41 Therese Thompson and Fred Litchfield, *Australian Beef: Financial Performance of Beef Farms* (Report, 8 October 2020) 29 <https://daff.ent.sirsidynix.net.au/client/en_AU/search/asset/1030821/0>.

42 Hannah E Salvin et al, ‘Welfare of Beef Cattle in Australian Feedlots: A Review of the Risks and Measures’ (2020) 60(13) *Animal Production Science* 1569, 1569 <<https://doi.org/10.1071/AN19621>>.

43 ‘Frequently Asked Questions: Why Are Cattle Placed in Feedlots?’, *Australian Lot Feeders Association* (Web Page) <<https://www.feedlots.com.au/faq>>.

44 Food and Agriculture Organization of the United Nations, *World Livestock 2013: Changing Disease Landscapes* (Report, 2013) ix <<http://www.fao.org/3/i3440e/i3440e.pdf>>.

45 Rob Wallace, *Big Farms Make Big Flu: Dispatches on Infectious Disease, Agribusiness, and the Nature of Science* (Monthly Review Press, 2016) 195.

46 *From Nest to Nugget* (n 38) 12.

47 Wallace (n 45) 196.

48 *Ibid.*

49 See ‘Virulence’, *Biology Online* (Web Page, 24 February 2022) <<https://www.biologyonline.com/dictionary/virulence>>.

virulent pathogen can emerge.⁵⁰ Cramped living conditions also prevent expression of natural behaviours and increase animals' feelings of frustration. Frustrated animals often exhibit acts of aggression, such as biting or pecking other animals.⁵¹ Conventional farming practices attempt to counter or prevent these behaviours through, for example, docking pigs' tails or cutting the beaks of chickens.⁵² These various factors, however, contribute to high levels of stress within farmed animals that make them particularly vulnerable to illnesses. Their susceptibility to illness because of their living conditions and stress is further exacerbated by the, often pre-emptive, use of antibiotics to reduce the costs associated with the spread of a bacterial infection.⁵³ The combined effect of these factors is high numbers of animals with weakened immune systems living in close proximity to each other. As a result, the animals are more susceptible to pathogens and ultimately the risk of zoonotic disease spillover to humans is increased.

C Zoonotic Disease Transmission and Human Behaviour

Analysis of past zoonotic disease transmissions indicates that human behaviour, and particularly human behaviour in relation to animals, has increased the incidence of transmission. In this respect, intensive animal agriculture is an example of the changed relationships between humans and some animals over time. This pattern of increased transmission can be gleaned from several previous zoonotic outbreaks that have been connected to livestock intensification, including Nipah virus, the 1997 Bird flu ('H5N1'), and the 2009 Swine flu ('H1N1'). Epidemiological investigation showed that Nipah virus spilled over from fruit bats to an intensive pig farm, where it then jumped to humans.⁵⁴ The transmission of the disease was facilitated by the intense confinement and transport of pigs that is

50 Marius Gilbert, Xiangming Xiao and Timothy P Robinson, 'Intensifying Poultry Production Systems and the Emergence of Avian Influenza in China: A "One Health/Ecohealth" Epitome' (2017) 75(1) *Archives of Public Health* 48:1-7, 2 <<https://doi.org/10.1186/s13690-017-0218-4>>.

51 See, eg, Iwona Radkowska, Dorota Godyn and Kinga Fic, 'Stereotypic Behaviour in Cattle, Pigs and Horses: A Review' (2020) 38(4) *Animal Science Papers and Reports* 303, 310.

52 See Primary Industries Standing Committee, *Model Code of Practice for the Welfare of Animals: Pigs* (CSIRO Publishing, 3rd ed, 2007) 14 ('Pigs MCOP'); Primary Industries Standing Committee, *Model Code of Practice for the Welfare of Animals: Domestic Poultry* (CSIRO Publishing, 4th ed, 2002) 17 [12.5] ('Poultry MCOP'); Arnja Dale and Steven White, 'Codifying Animal Welfare Standards: Foundations for Better Animal Protection or Merely a Façade?' in Peter Sankoff, Steven White and Celeste Black (eds), *Animal Law in Australasia* (Federation Press, 2nd ed, 2013) 151.

53 Australia has strict regulation surrounding the use of antibiotics that are of high importance for human health within animal agriculture. However, current data demonstrates that antibiotics that are not of high medical importance for humans are still commonly used: see *From Nest to Nugget* (n 38) 12; Ramon Z Shaban et al, *Surveillance and Reporting of Antimicrobial Resistance and Antibiotic Usage in Animals and Agriculture in Australia* (Report, 27 October 2014) 44; Australian Pesticides and Veterinary Medicines Authority, *Quantity of Antimicrobial Products Sold for Veterinary Use in Australia: July 2005 to June 2010* (Report, March 2014); Olasumbo Ndi and Mary Barton, 'Antibiotic Resistance in Animals: The Australian Perspective' in Patricia L Keen and Mark HMM Montforts (eds), *Antimicrobial Resistance in the Environment* (John Wiley & Sons, 2012) 265, 274.

54 Bryony A Jones et al, 'Zoonosis Emergence Linked to Agricultural Intensification and Environmental Change' (2013) 110(21) *Proceedings of the National Academy of Sciences* 8399, 8401 <<https://doi.org/10.1073/pnas.1208059110>>.

inherent in intensive animal farming.⁵⁵ Wild migratory birds were the reservoir host for H5N1, before the disease emerged within poultry factory farms.⁵⁶ As Kukreti explains, the key issue in the spread of H5N1 ‘stemmed from the model of growing chicken [sic] in an environment that is highly conducive for the virus’.⁵⁷ Similarly, H1N1 has been traced to pigs within industrial farms in North Carolina.⁵⁸ The UN notes that ‘[f]actory farming of pigs ... promoted transmission of swine flu due to a lack of physical distancing between the animals’.⁵⁹ As evidenced in this string of outbreaks, emerging zoonotic diseases are exploiting conditions that are a product of human behaviour.

The frequency of zoonotic disease emergence is increasing globally.⁶⁰ Over time, the emergence of new infectious diseases has consistently been linked to significant changes in human ecology.⁶¹ For instance, the Neolithic Revolution, which saw the transition from small hunter-gatherer to large agricultural societies, was connected to an increase in infectious diseases, including many zoonoses.⁶² More recently, the intensification of animal agriculture has been identified as potentially the most significant change in the relationship between humans and animals since the Neolithic Revolution.⁶³ As noted above, intensive animal agriculture is a key driver of zoonotic disease. The consequences of this societal change are already evident. With approximately 75% of all emerging or re-emerging human infectious diseases having originated from animals, it is likely that intensive animal agriculture has exacerbated emergence – regardless of whether the reservoir host was a farmed animal or wildlife.⁶⁴ Thus, as intensification of animal agriculture rises, it influences an increase in zoonotic disease emergence.

The COVID-19 pandemic has provided a global illustration of the significant potential consequences of successful transmission of zoonotic disease, including loss of life and impact on world economies. In this context, it is important to review the adequacy of regulations that seek to reduce the risk posed by drivers of zoonotic disease. In particular, as intensive animal agriculture presents a significant risk of zoonotic disease transmission in Australia, it is critical that the practice is adequately regulated to minimise risk. The next Part of this article will consider current regulation of intensive animal agriculture in Australia.

55 Ibid.

56 Kukreti (n 24) 44.

57 Ibid 45.

58 Ibid 44.

59 *Preventing the Next Pandemic* (n 12) 15.

60 Ibid 7; Kate E Jones et al, ‘Global Trends in Emerging Infectious Diseases’ (2008) 451(7181) *Nature* 990, 990 <<https://doi.org/10.1038/nature06536>>.

61 Institute of Medicine (US) Forum on Microbial Threats, *Microbial Evolution and Co-adaptation: A Tribute to the Life and Scientific Legacies of Joshua Lederberg* (National Academies Press, 2009) ch 5.

62 Jones et al (n 54) 8399.

63 Greger (n 14) 253.

64 Richard Coker et al, ‘Towards a Conceptual Framework to Support One-Health Research for Policy on Emerging Zoonoses’ (2011) 11(4) *Lancet Infectious Diseases* 326, 327 <[https://doi.org/10.1016/S1473-3099\(10\)70312-1](https://doi.org/10.1016/S1473-3099(10)70312-1)>.

III AUSTRALIAN LAWS REGULATING INTENSIVE AGRICULTURE

A Anthropocentrism as a Foundation

Historically, animals have generally been considered to be inferior to humans and have been treated as resources that exist for human use.⁶⁵ Such a view is anthropocentric, in that it is reflective of the idea that humans occupy the centre of existence.⁶⁶ Most human laws are fundamentally anthropocentric.⁶⁷ This is because the law centres humans as subjects and is designed to protect human interests. Deckha expressed the inherent human-centricity of law well when she asserted that ‘law venerates respect for human life, the sanctity of human life, and the inherent value of humans as foundational values’.⁶⁸ Similarly, Graham describes the anthropocentric nature of law as follows: ‘the separation and hierarchical ordering of the human and non-human worlds constitutes the primary assumption from which most western legal theory begins’.⁶⁹ Anthropocentrism in the law is reflected in the basic status of animals as legal property rather than as persons with their own inherent value.⁷⁰ Thus, anthropocentric legal systems provide animals with only indirect consideration, when animal interests align with those of legal (human) persons.⁷¹

Legal anthropocentrism manifests in many ways, a contemporary example of which is the regulation of intensive animal agriculture. The view that animals are property and exist only to meet human needs underpins methods of farming that seek to maximise production and efficiency with little regard for animal welfare.⁷² Within intensive animal agriculture systems, high numbers of animals are killed for human consumption each year. For example, data from the Australian Bureau of Agricultural and Resource Economics and Sciences indicates that 647 million chickens were slaughtered in 2016.⁷³ The Australian Bureau of Statistics further provides that in 2019 alone, close to 8.5 million cattle, 560,000 calves, over 21 million lambs, more than 8 million sheep and over 5.1 million pigs were

65 See, eg, Claire Williams, ‘Wild Law in Australia: Practice and Possibilities’ (2013) 30(3) *Environmental and Planning Law Journal* 259, 259; Singer (n 11) ch 4.

66 Cormac Cullinan, ‘A History of Wild Law’ in Peter Burdon (ed), *Exploring Wild Law: The Philosophy of Earth Jurisprudence* (Wakefield Press, 2011) 12, 21.

67 Peter Burdon, ‘The Earth Community and Ecological Jurisprudence’ (2013) 3(5) *Oñati Socio-Legal Series* 815, 818.

68 Maneesha Deckha, ‘Critical Animal Studies and Animal Law’ (2012) 18(2) *Animal Law* 207, 208.

69 Nicole Graham, *Landscape: Property, Environment, Law* (Routledge, 2011) 15.

70 Peter D Burdon, ‘Earth Jurisprudence and the Project of Earth Democracy’ in Peter Burdon and Michelle Maloney (eds), *Wild Law: In Practice* (Taylor & Francis, 2014) 19, 20; Alex Bruce, *Animal Law in Australia: An Integrated Approach* (LexisNexis Butterworths, 2nd ed, 2018) 77.

71 Jane Kotzmann and Gisela Nip, ‘Bringing Animal Protection Legislation into Line with Its Purported Purposes: A Proposal for Equality amongst Non-Human Animals’ (2020) 37(2) *Pace Environmental Law Review* 247, 250.

72 Carey, Parker and Scrinis (n 15) 289.

73 Australian Bureau of Agricultural and Resource Economics and Sciences, ‘Rural Commodities: Meat (Pigs and Poultry)’, *data.gov.au* (Web Page, 13 April 2018) <<https://data.gov.au/dataset/ds-dga-1f3da692-f0cf-4de4-a7d3-bae52d600bae/distribution/dist-dga-c2dd2d9a-f631-4f12-ae55-c5fab147af78/details?q=>>>.

slaughtered for human consumption.⁷⁴ This does not include ‘animals condemned, slaughtered for pet food or those killed for boiling down’.⁷⁵ This rate of slaughter is indicative of the manner in which anthropocentrism in the law permits the mass exploitation of animals for human interests.

Moreover, the number of animals slaughtered for consumption each year could not occur without the practices of intensive agriculture. For instance, broiler farms, which are those that house chickens bred for meat, supply 85–90% of all chicken consumption in Australia.⁷⁶ The average broiler farm has 8 sheds, with 40,000 to 60,000 chickens in each.⁷⁷ Similarly, in relation to cattle, 30–40% of Australia’s beef supply is met with the assistance of commercial feedlots.⁷⁸ Feedlots house cattle for the last 10–15% of their lives,⁷⁹ where they are fed high-energy diets in order to fatten them for slaughter.⁸⁰ This process accelerates the production of beef, and significantly increases the number of cattle killed for consumption.

Accepted industry practices within intensive animal agriculture are also suggestive of the way the law disregards animal welfare interests in favour of human interests in producing inexpensive food. For example, beak trimming of chickens is a common and accepted method employed by the poultry industry to control feather pecking between birds.⁸¹ Beak trimming involves the partial removal of the tip of a chicken’s highly sensitive beak through the use of a hot blade or infrared technology, and without anaesthesia.⁸² The Royal Society for the Prevention of Cruelty to Animals (‘RSPCA’) suggests feather pecking should instead be countered by a focus on good management strategies, such as environmental improvements and keeping chickens in small groups.⁸³ Good management strategies present an alternative solution to beak trimming because this behaviour is often a result of

74 ‘Livestock and Meat, Australia’, *Australian Bureau of Statistics* (Web Page, 7 February 2020) <<https://www.abs.gov.au/statistics/industry/agriculture/livestock-and-meat-australia/dec-2019>>.

75 See ‘Livestock and Meat, Australia Methodology’, *Australian Bureau of Statistics* (Web Page, 7 February 2020) <<https://www.abs.gov.au/methodologies/livestock-and-meat-australia-methodology/dec-2019>>.

76 J de Miranda, ‘The Chicken before the Egg’ in Tor Hundloe, Sarah Blagrove and Hannah Ditton (eds), *Australia’s Role in Feeding the World: The Future of Australian Agriculture* (CSIRO Publishing, 2016) 191, 192.

77 Ibid.

78 ‘Frequently Asked Questions: What Percentage of Australia’s Cattle Population Are Located in Feedlots?’, *Australian Lot Feeders Association* (Web Page) <<https://www.feedlots.com.au/faq>>.

79 This equates to about 50–120 days: see ‘Frequently Asked Questions: Do Cattle Spend Their Whole Lives in a Feedlot?’, *Australian Lot Feeders Association* (Web Page) <<https://www.feedlots.com.au/faq>>. However, it is important to note that 120 days is 10–15% of the lifespan of a cow raised for slaughter, which equates to around 2 years of life. The natural lifespan of a cow is around 20 years: see A de Vries and MI Marcondes, ‘Review: Overview of Factors Affecting Productive Lifespan of Dairy Cows’ (2020) 14(S1) *Animal* s155, s155 <<https://doi.org/10.1017/S1751731119003264>>.

80 Salvin et al (n 42) 1569; ‘Frequently Asked Questions: What Is the Feedlot Process?’, *Australian Lot Feeders Association* (Web Page) <<https://www.feedlots.com.au/faq>>.

81 See *Poultry MCOP* (n 52) 17 [12.5].

82 Royal Society for the Prevention of Cruelty to Animals, ‘What Is Beak Trimming and Why Is It Carried Out?’ *RSPCA Knowledge Base* (Web Page, 2 March 2020) <<https://kb.rspca.org.au/knowledge-base/what-is-beak-trimming-and-why-is-it-carried-out/>>.

83 Ibid.

poor living conditions and environmental stresses.⁸⁴ That the law permits beak trimming is indicative of the law's prioritisation of human interests in efficient production of chicken meat over chicken interests in their own welfare.

Legalised industry practices in relation to farmed pigs are also indicative of anthropocentrism in the law. For example, tail docking of pigs is a common and accepted husbandry practice.⁸⁵ Tail docking involves cutting the end of a pig's tail without anaesthesia and is designed to prevent pigs from biting each other's tails.⁸⁶ As with chickens, tail biting among pigs is largely symptomatic of the unnatural environment in which intensively farmed pigs are raised. Tail docking enables pigs to be farmed in this way for efficiency purposes, at the cost of the welfare interests of the pigs. Farrowing crates, which remain accepted industry practice,⁸⁷ provide a further example. Farrowing crates are utilised while a pig gives birth, and for around three to four weeks after, in order to prevent the sow from accidentally crushing her piglets.⁸⁸ The size of a farrowing crate prevents sows from turning around, while allowing piglets access to her udder. This practice frustrates sows from engaging in natural behaviours such as nesting and increases physiological stress within the sow.⁸⁹ These welfare costs, however, are considered to be outweighed by the economic benefits obtained through use of farrowing crates. Legalised industry practices like these are indicative of the way our legal systems prioritise human interests and are inherently anthropocentric.

This information provides a preliminary picture of what constitutes intensive animal agriculture, which is both a driver of zoonotic disease and an illustration of anthropocentrism in the law. This approach involves large numbers of animals in small spaces, kept in cages, pens and stalls with limited movement, in a manner designed to be efficient and consistent.⁹⁰ As outlined by Rossi and Garner, this approach can also be defined economically, in that '[industrial farm animal production] is characterized by farms that are corporate-owned and/or corporate-controlled, instead of farms that are both owned and managed by individuals or families'.⁹¹ Intensive animal farming practices make animal health and welfare subordinate. Instead, animals are viewed as machines that must operate efficiently, with animal health having little value outside of this context.

The application of anthropocentrism in intensive animal agriculture, however, fails to acknowledge the interconnectedness of the human and non-human animal

84 Ibid.

85 See *Pigs MCOP* (n 52) 14.

86 Royal Society for the Prevention of Cruelty to Animals, 'What Are the Animal Welfare Issues with Piglet Husbandry Procedures?', *RSPCA Knowledge Base* (Web Page, 3 August 2020) <<https://kb.rspca.org.au/knowledge-base/what-are-the-animal-welfare-issues-with-piglet-husbandry-procedures/>>.

87 This is despite an industry commitment to phasing out sow stalls: see *Pigs MCOP* (n 52) 23 app 3.

88 'Housing', *Australian Pork* (Web Page) <<https://australianpork.com.au/about-pig-farming/housing/>>.

89 *New Zealand Animal Law Association v A-G* [2020] NZHC 3009, [49] (Cull J).

90 John Rossi and Samuel A Garner, 'Industrial Farm Animal Production: A Comprehensive Moral Critique' (2014) 27(3) *Journal of Agricultural Environmental Ethics* 479, 482 <<https://doi.org/10.1007/s10806-014-9497-8>>.

91 Ibid 484.

relationship.⁹² Fundamentally, anthropocentrism makes champions of the humans at the centre, and victims of the animal ‘other’.⁹³ An unintended consequence of this approach to farming is that it facilitates zoonotic spillover which is ultimately to human disadvantage. This is evidenced in the string of zoonotic disease outbreaks detailed above that has been linked to intensive animal agriculture.

B Animals and the Law in Australia

In Australia, as with most other countries, the fundamental approach of the law to animals is to treat them as property.⁹⁴ In this respect, the law categorises animals in the same manner as it categorises other forms of personal property, including, for example, cars, furniture and clothing.⁹⁵ Given that animals are a form of personal property, the human owners of animals are legally permitted to treat them in any way they wish, restricted only by the requirements of animal welfare legislation.⁹⁶ This approach to the regulation of human interaction with animals aligns with the anthropocentric foundation of law described above, as humans are positioned at the centre of the paradigm, with animals and other property at the periphery and valued only to the extent that they are of benefit to humans.

The enactment of animal welfare laws in Australian states and territories recognises, at least to some extent, that there are some differences between animals and other forms of personal property. Each Australian state and territory has enacted legislation specifically directed towards the prevention of human cruelty to animals,⁹⁷ thus by implication recognising that animals,⁹⁸ unlike other property, are sentient.⁹⁹ However, each of the anti-cruelty statutes feature significant exemptions for farmed animals by excluding conduct that aligns with an approved

92 See Christine Parker et al, ‘Can Labelling Create Transformative Food System Change for Human and Planetary Health? A Case Study of Meat’ (2021) 10(12) *International Journal of Health Policy and Management* 923, 923 <<https://doi.org/10.34172/IJHPM.2020.239>>. See also Carol J Adams, ‘“Mad Cow” Disease and the Animal Industrial Complex: An Ecofeminist Analysis’ (1997) 10(1) *Organization and Environment* 26, 28 <<https://doi.org/10.1177/0921810697101007>>.

93 Deckha (n 68) 217–20.

94 Bruce (n 70) 77. This is the case under common law and statute. For example, under section 4 of the *Competition and Consumer Act 2010* (Cth), ‘goods’ are defined to include animals as well as ships, aircraft and other vehicles.

95 See generally Geeta Shyam, ‘Is the Classification of Animals as Property Consistent with Modern Community Attitudes?’ (2018) 41(4) *University of New South Wales Law Journal* 1418 <<https://doi.org/10.53637/HENG4704>>.

96 Bruce (n 70) 77.

97 Note that in Australia, legal regulation of industrial animal agriculture is the responsibility of states and territories. The relevant state and territory Acts are: *Animal Welfare Act 1992* (ACT); *Prevention of Cruelty to Animals Act 1979* (NSW); *Animal Welfare Act 1999* (NT); *Animal Care and Protection Act 2001* (Qld); *Animal Welfare Act 1985* (SA); *Animal Welfare Act 1993* (Tas); *Prevention of Cruelty to Animals Act 1986* (Vic); *Animal Welfare Act 2002* (WA).

98 Relevantly, sentience is recognised implicitly in all states and territories except the Australian Capital Territory, which has recognised sentience explicitly: see Jane Kotzmann, ‘Recognising the Sentience of Animals in Law: A Justification and Framework for Australian States and Territories’ (2020) 42(3) *Sydney Law Review* 281.

99 Ibid 282.

or mandatory code of practice.¹⁰⁰ For example, Victoria's *Prevention of Cruelty to Animals Act*¹⁰¹ does not apply to 'any act or practice with respect to the farming, transport, sale or killing of any farm animal which is carried out in accordance with a Code of Practice'.¹⁰² The Commonwealth has created Model Codes of Practice¹⁰³ through the Primary Industries Ministerial Council which have been largely incorporated into the Codes of Practice of each state and territory, and thus into state and territory law in most instances – although regulation in this respect is complex and layered.¹⁰⁴ These codes of practice set minimum welfare standards for farmed animals such as cattle, chickens, pigs and sheep.¹⁰⁵ Compliance with these minimum welfare standards generally offers a defence to, or an exemption from, cruelty offences,¹⁰⁶ although compliance is largely voluntary.¹⁰⁷ 'Minimum' must be emphasised here, as the respective codes of practice endorse the practices referred to in Part II, including high stocking densities,¹⁰⁸ restrictive conditions¹⁰⁹ and painful procedures such as debeaking that occur without anaesthetic,¹¹⁰ all of which serve to exacerbate disease vulnerability.¹¹¹

100 Kotzmann (n 98) 290; Amanda Whitfort, 'Justice and the Vulnerable: Extending the Duty to Prevent Serious Crimes against Children to the Protection of Agricultural and Research Animals' (2018) 39(1) *Adelaide Law Review* 125, 134; Arnja Dale, 'Animal Welfare Codes and Regulations: The Devil in Disguise?' in Peter Sankoff, Steven White and Celeste Black (eds), *Animal Law in Australasia* (Federation Press, 1st ed, 2009) 174.

101 *Prevention of Cruelty of Animals Act 1986* (Vic).

102 *Ibid* s 6(1)(c).

103 The Model Codes of Practice are being progressively replaced by the National Standards and Guidelines ('NSG'). However, the NSG is yet to be incorporated in every state and territory, and many still utilise the Model Codes of Practice. For instance, the NSG relating to cattle was agreed upon in 2016 but has only been implemented in three states and territories thus far. Further, there is not yet an NSG relating to poultry or pigs, both of which are heavily factory farmed: see 'About', *Australian Animal Welfare Standards and Guidelines* (Web Page, December 2020) <<https://www.animalwelfarestandards.net.au/about-2/>>. Further, the RSPCA indicates that the NSG produced thus far simply reflect industry standards and do not heighten welfare requirements: see Royal Society of Prevention of Cruelty to Animals, 'How Are National Farm Animal Welfare Standards Developed?', *RSPCA Knowledge Base* (Web Page, 3 March 2021) <<https://kb.rspca.org.au/knowledge-base/how-are-national-farm-animal-welfare-standards-developed/>>. As such, the Model Codes of Practice are utilised for the purposes of this article.

104 See Elizabeth Ellis, 'Making Sausages and Law: The Failure of Animal Welfare Laws to Protect Both Animals and Fundamental Tenets of Australia's Legal System' (2010) 4 *Australian Animal Protection Law Journal* 6, 14–20.

105 Steven White, 'Farm Animal Protection Policymaking and the Law: The Impetus for Change' (2018) 43(4) *Alternative Law Journal* 244, 246–8 <<https://doi.org/10.1177/1037969X18788658>>.

106 For example, under section 20 of the *Animal Welfare Act 1992* (ACT), provisions prohibiting cruelty do not apply if the relevant conduct complied with a code of practice. In this instance, conduct that complies with a code of practice is exempt from the application of anti-cruelty provisions: see Kotzmann (n 98) 289.

107 Bruce (n 70) 222; Elizabeth Ellis, 'Bobby Calves: An Example of the Standards Development Process' (2011) 5 *Australian Animal Protection Law Journal* 89, 89.

108 See, eg, *Poultry MCOP* (n 52) 25 app 1.

109 Such as sow stalls: see *Pigs MCOP* (n 52) 19 app 3.

110 *Poultry MCOP* (n 52) 17 [12.5].

111 Such as stocking densities for layer hens of 40 kg per m² (around 18 hens per m²) permitted by *Poultry MCOP* (n 52) 25–6 app 1: see Royal Society for the Prevention of Cruelty to Animals, 'How Much Space Does a Layer Hen Need?', *RSPCA Knowledge Base* (Web Page, 14 August 2020) <<https://kb.rspca.org.au/knowledge-base/how-much-space-does-a-layer-hen-need/#:~:text=What%20is%20the%20legal%20indoor,18%20hens%20per%20m2>>.

Given the animal welfare issues raised by intensive animal agriculture, codes of practice introduce restrictions on animal farming with a view to increasing animal welfare and ensuring consistency in what constitutes acceptable conduct. These restrictions, such as space allowances for chickens,¹¹² increase animal welfare to a minimum standard that is in line with a concern for animal health within the context of profitability.¹¹³ However, while profit and welfare may sometimes align, such as in the provision of feed, the interests of animals are often at odds with the productivity interests of industry. This is evident in terms of an animal's affective state, and in its desire to engage in natural behaviours, such as nesting in the case of sows.¹¹⁴ The codes of practice do not sufficiently navigate this conflict, given that they are subject to industry influence¹¹⁵ and are therefore imbued with a bias that disproportionately favours productivity over welfare benefits.¹¹⁶

These standards are deficient in the context of zoonotic disease and facilitate the 'Next Big One' in that they do not adequately manage the risks inherent in intensive animal agriculture. This is despite intensive animal agriculture being recognised as a key driver in zoonotic disease outbreaks.¹¹⁷ Rather, Australian regulation focuses primarily on reactive measures of control.¹¹⁸ For example, regulation prioritises the reduction of pathogen spread across borders, control of community outbreaks and reliance on medical science to find a quick vaccination, rather than addressing the underlying causes of zoonotic disease outbreaks.¹¹⁹ This lack of adequate risk management is further represented in Australia's public health law, which focuses heavily on surveillance, biosecurity and culling as measures of zoonotic disease control within intensive animal agriculture.

1 Surveillance

Surveillance is utilised to identify emerging and nationally significant animal diseases. This includes the collection and interpretation of health-related data

112 See *Poultry MCOP* (n 52) 25–6 app 1.

113 See Alexandra McEwan and Krishna Skandakumar, 'The Welfare of Greyhounds in Australian Racing: Has the Industry Run Its Course?' (2011) 6 *Australian Animal Protection Law Journal* 53, 56.

114 Jed Goodfellow, 'Animal Welfare Regulation in the Australian Agricultural Sector: A Legitimacy Maximising Analysis' (PhD Thesis, Macquarie University, September 2015) 85.

115 Kotzmann (n 98) 305–10; Elizabeth Ellis, 'Bearing the Burden: Shifting Responsibility for the Welfare of the Beast' (2013) 11(4) *Macquarie Law Journal* 39, 41–5; Australian Government Productivity Commission, *Regulation of Australian Agriculture* (Inquiry Report No 79, 15 November 2016) 219; Goodfellow (n 114) 126–8.

116 Australian Government Productivity Commission (n 115) 219; Christine Parker et al, 'A Public Appetite for Poultry Welfare Regulation Reform: Why Higher Welfare Labelling Is Not Enough' (2018) 43(4) *Alternative Law Journal* 238, 239 <<https://doi.org/10.1177/1037969X18800398>>.

117 *Preventing the Next Pandemic* (n 12) 15–17.

118 This is also the case globally and in international regulation: see P Daszak et al, *IPBES Workshop on Biodiversity and Pandemics* (Report, 2020) 29 <<https://doi.org/10.5281/zenodo.4147317>>.

119 Chris Degeling et al, 'Implementing a One Health Approach to Emerging Infectious Disease: Reflections on the Socio-Political, Ethical and Legal Dimensions' (2015) 15(1307) *BMC Public Health* 1, 5 <<https://doi.org/10.1186/s12889-015-2617-1>>.

and is undertaken at both state and national levels.¹²⁰ Identification of human and animal diseases is managed by many separate Commonwealth, state and territory sectors, and notifications of identified animal diseases are received by the National Notifiable Disease Surveillance System. This data is managed by the Australian Government Department of Health and presented to the Communicable Diseases Network Australia ('CDNA').¹²¹ The CDNA provides a core surveillance function for zoonotic diseases through 'public health coordination and leadership' and 'support[ing] best practice for the prevention and control of communicable diseases'.¹²² The role of the CDNA is supported by the *National Health Security Act 2007* (Cth). The *National Health Security Act* emphasises the importance of a national system of surveillance in identifying and responding to public health events such as the transmission of zoonotic disease.¹²³ OzFoodNet is a further actor within the surveillance mechanism and is a member of the CDNA.¹²⁴ OzFoodNet undertakes surveillance of, and investigates foodborne disease outbreaks, to ensure that food products are safe for human consumption.

In 2022 the Australian Government made a commitment to invest AUD8.4 million in Australia's surveillance systems over the next 4 years.¹²⁵ This investment is designed to bolster 'Australia's wildlife health and early warning capabilities' and is primarily aimed at investigating the cause and relevance of significant disease events in wildlife.¹²⁶ The program will be led by Wildlife Health Australia.¹²⁷

2 Biosecurity

Biosecurity in this context refers to measures adopted to prevent the introduction and spread of zoonotic disease to intensively farmed animals. In this respect, there is a high risk that a virus will be introduced to a farmed animal population by visiting wildlife.¹²⁸ As such, the UN has recommended the development and implementation of stronger biosecurity measures as a means to protect farmed animals from the introduction and spread of a virus.¹²⁹ In Australia, farm biosecurity

120 I Johnson, A Hansen and P Bi, 'The Challenges of Implementing an Integrated One Health Surveillance System in Australia' (2018) 65(1) *Zoonoses and Public Health* 229, 230 <<https://doi.org/10.1111/zph.12433>>.

121 Department of Health and Aged Care, 'Communicable Diseases Network Australia (CDNA)', *Australian Government* (Web Page, 12 July 2022) <<https://www1.health.gov.au/internet/main/publishing.nsf/Content/cda-cdna-index.htm>>.

122 Ibid.

123 *National Health Security Act 2007* (Cth) s 6.

124 'OzFoodNet: Enhancing Surveillance for Foodborne Disease in Australia', *Australian Government Department of Health* (Web Page, 30 September 2020) <<https://www1.health.gov.au/internet/main/publishing.nsf/Content/cdna-ozfoodnet.htm>>.

125 David Littleproud, 'Australia Leads Global Effort to Prevent Future Pandemics' (Media Release, Australian Government, 3 January 2022) <<https://web.archive.org/web/20220306184510/https://minister.ave.gov.au/littleproud/media-releases/australia-leads-global-efforts-prevent-future-pandemics>>.

126 Ibid.

127 Ibid.

128 Jones et al (n 54) 8402.

129 *Preventing the Next Pandemic* (n 12) 7.

practices are driven by industry.¹³⁰ The Emergency Animal Disease Response Agreement ('EADRA') was entered into in 2002 by federal, state and territory governments and industry groups, and is designed to increase the ability of industry to prepare for and respond to emerging animal diseases.¹³¹ This is representative of the 'shared responsibility' for biosecurity between these groups.¹³² The EADRA is managed by Animal Health Australia – a quasi-governmental body tasked with raising biosecurity awareness.¹³³ Farm biosecurity manuals constitute part of this preparedness mechanism and recommend minimum on-farm biosecurity practices for each livestock industry.¹³⁴

At first blush, intensive systems are better placed than extensive systems to implement tight biosecurity procedures. This is because they are segregated from the natural environment and can therefore reduce farmed animal contact with wildlife to a greater extent than extensive farms.¹³⁵ Intensive farms also require far fewer workers than extensive farms, which again favours stronger biosecurity by reducing the number of people that may be exposed to disease.¹³⁶ However, compliance with best practice biosecurity procedures is key here, and several studies within Australia suggest that uptake of recommended biosecurity practices is poor,¹³⁷ including those within small-scale pig farms¹³⁸ and commercial cage hen farms.¹³⁹ Further, while intensive systems may correspond to more advanced biosecurity practices, the scale and intensity at which they operate produce a different – and higher – set of risks in terms of pathogen spread.¹⁴⁰ This is due to the aforementioned factors inherent to industrialised agriculture, including genetic uniformity, high stocking

130 JW Aleri and M Laurence, 'A Description of Biosecurity Practices among Selected Dairy Framers across Australia' (2020) 60(14) *Animal Production Science* 1711, 1711 <<https://doi.org/10.1071/AN19340>>.

131 'Emergency Animal Disease Response Agreement', *Animal Health Australia* (Web Page, 2021) <<https://www.animalhealthaustralia.com.au/what-we-do/emergency-animal-disease/ead-response-agreement/>>.

132 Roger Beale et al, *One Biosecurity: A Working Partnership* (Report, 30 September 2008) 55.

133 'About', *Animal Health Australia* (Web Page, 2021) <<https://www.animalhealthaustralia.com.au/who-we-are/about/>>.

134 See, eg, 'Chickens', *Farm Biosecurity* (Web Page) <<https://www.farmbiosecurity.com.au/industry/chickens/>>.

135 Jones et al (n 54) 8401.

136 Ibid.

137 M Hernandez-Jover et al, 'Evaluating the Risk of Avian Influenza Introduction and Spread among Poultry Exhibition Flocks in Australia' (2015) 118(1) *Preventative Veterinary Medicine* 128, 129 <<https://doi.org/10.1016/j.prevetmed.2014.11.018>>; M Hernandez-Jover et al, 'Biosecurity Risks Associated with Current Identification Practices of Producers Trading Live Pigs at Livestock Sales' (2008) 2(11) *Animal* 1692, 1692 <<https://doi.org/10.1017/S1751731108003066>> ('Biosecurity Risks'); Sarah Palmer, Farida Fozdar and Max Sully, 'The Effect of Trust on West Australian Farmers' Responses to Infectious Livestock Diseases' (2009) 49(4) *Sociologia Ruralis* 360, 361 <<https://doi.org/10.1111/j.1467-9523.2009.00495.x>>; Lileko Lishomwa, 'Farmers' Perspectives on Post-border Biosecurity: On-Farm Biosecurity Knowledge and Practices' (PhD Thesis, Charles Sturt University, January 2016) 50.

138 Hernandez-Jover et al, 'Biosecurity Risks' (n 137) 1692–8.

139 Angela B Scott et al, 'Biosecurity Practices on Australian Commercial Layer and Meat Chicken Farms: Performance and Perceptions of Farmers' (2018) 13(4) *PLOS One* 1 <<https://doi.org/10.1371/journal.pone.0195582>>.

140 Marco Liverani et al, 'Understanding and Managing Zoonotic Risk in the New Livestock Industries' (2013) 121(8) *Environmental Health Perspectives* 873, 874 <<https://doi.org/10.1289/ehp.1206001>>; J Otte et al, *Industrial Livestock Production and Global Health Risks* (Research Report, June 2007) 6–10.

densities and stressed animals with an increased vulnerability to disease. There are also gaps in biosecurity within industrialised systems that are inherent in the scale of production. Such biosecurity compromises include ventilation systems, which increase the spread of potential pathogens – including the risk of spreading a virus into the environment,¹⁴¹ as well as the extensive quantities of animal waste which exit intensive systems, and the high frequency of animal transport to and from farms.¹⁴² Each of these factors diminishes the ability of biosecurity practices to rectify the inherent risks of zoonotic disease transmission within intensive animal agriculture. These deficiencies may also be exacerbated by the fact that compliance with best practice recommendations is voluntary.¹⁴³

3 Culling

Where biosecurity practices are not able to prevent the introduction of a disease, culling is the preferred method to control the spread.¹⁴⁴ Culling involves the killing of infected or at-risk farmed animals for disease control purposes.¹⁴⁵ The World Organisation for Animal Health recommends that a national disease control contingency plan be in place to explicitly outline control strategies. In accordance with this recommendation, the Australian Veterinary Emergency Plan ('AUSVETPLAN') is a set of manuals in place in Australia that outline the many policies to be followed in the case of an emergency animal disease ('EAD'). If an EAD is present, the policy under AUSVETPLAN is one of 'stamping out', which involves the destruction and disposal of infected and exposed animals.¹⁴⁶ The AUSVETPLAN manual on the destruction of animals stipulates best practice procedures for culling, and provides that 'a high standard of euthanasia and respect for the animals is an essential consideration during an EAD response'¹⁴⁷ where a large number of animals may need to be quickly 'destroy[ed]'.¹⁴⁸

C Conclusion regarding Australian Regulation of Intensive Animal Agriculture

Together, the categorisation of animals as property, minimal animal welfare requirements, codes of practice, surveillance, biosecurity and culling constitute the Australian approach to regulation of intensive animal agriculture to reduce the risk of zoonotic disease transmission. Unfortunately, animal welfare legislation and codes of practice are inadequate to reduce zoonotic disease emergence. Rather, codes of practice enable animal farming to be undertaken in a manner

141 Jones et al (n 54) 8401; Otte et al (n 140) 9–10; Greger (n 14) 262.

142 Jones et al (n 54) 8401.

143 See Lishomwa (n 137) 50.

144 Ibid 31.

145 Royal Society of Prevention of Cruelty to Animals, 'What Is Mass Euthanasia?', *RSPCA Knowledge Base* (Web Page, 31 May 2022) <<https://kb.rspca.org.au/knowledge-base/what-is-mass-euthanasia/>>.

146 Animal Health Australia, 'Australian Veterinary Emergency Plan Operational Manual: Disposal' (Manual, Version 5.0, 2021) 95.

147 Animal Health Australia, 'Australian Veterinary Emergency Plan Operational Manual: Destruction of Animals' (Manual, Version 3.2, 2015) 9 ('Destruction of Animals').

148 Ibid.

that significantly increases the risk of zoonotic disease spillover. Surveillance, biosecurity and culling are also deficient in combating zoonotic disease, as they are unable to overcome the inherent risks posed by intensive animal agriculture.

This article argues that there is a need for a paradigm shift in the way humans conceive of animal welfare and public health. The two are inextricably linked, and poor animal welfare outcomes can have a profound impact on the health of humans. As such, there is a need to undertake a fundamental rethinking of the human-animal relationship, based on understanding the interconnectedness of humans, animals and the world. The next Part of this article considers two frameworks that have been put forward as alternative foundations to the current approach to public health.

IV RETHINKING THE HUMAN-ANIMAL RELATIONSHIP

A The One Health Approach

‘One Health’ is gaining increasing popularity for its potential to rectify, or manage, the deficiencies in the human-animal relationship. A One Health approach is largely considered the best mechanism to mitigate and manage zoonotic disease outbreaks¹⁴⁹ and has been described as the ‘international standard for zoonotic disease control’.¹⁵⁰ One Health is also supported by the UN, which identified One Health as ‘the optimal method for preventing as well as responding to zoonotic disease outbreaks and pandemics’.¹⁵¹

The One Health concept is underpinned by a recognition of the interdependence of human, animal and environmental health.¹⁵² This approach acknowledges the nature of zoonosis in defying single sector parameters and seeks to manage threats of disease through interdisciplinary collaboration at the human-animal-environment interface. The need for a collaborative approach became evident on an international scale during the avian influenza outbreak in the early 2000s.¹⁵³ The World Health Organization (‘WHO’), the Food and Agricultural Organization (‘FAO’) and the World Organisation for Animal Health (‘OIE’) were in competition with each other, with each pushing an alternative solution with a focus on their respective sectors.¹⁵⁴ As zoonosis cannot be tackled with a single sector focus, this outbreak emphasised the need for a holistic response between institutions tasked with human, environment and animal health. In recognition of this, WHO, FAO and OIE endorsed the ‘One World – One Health Framework’ in 2008. The framework

149 See, eg, Joost van Herten, Bernice Bovenkerk and Marcel Verweij, ‘One Health as a Moral Dilemma: Towards a Socially Responsible Zoonotic Disease Control’ (2019) 66(1) *Zoonoses Public Health* 26, 26 <<https://doi.org/10.1111/zph.12536>>.

150 Ibid.

151 *Preventing the Next Pandemic* (n 12) 7.

152 Degeling et al (n 119) 2.

153 Victor Galaz et al, ‘The Political Economy of One Health Research and Policy’ (Working Paper No 81, Social, Technological and Environmental Pathways to Sustainability Centre, 2015) 3.

154 P Kingsley and EM Taylor, ‘One Health: Competing Perspectives in an Emerging Field’ (2017) 144(1) *Parasitology* 7, 11 <<https://doi.org/10.1017/S0031182015001845>>.

adopted by WHO, FAO and OIE was vague,¹⁵⁵ which some commentators suggest was key in facilitating the collaboration between three competing sectors.¹⁵⁶

Prior to this international recognition of One Health, a similarly interdisciplinary approach had success in controlling a zoonotic disease outbreak in Australia. Interdisciplinary collaboration was evident in the outbreak of Hendra virus, a zoonotic disease originating in flying foxes, in the early 1990s. In attempting to link an emergence of Hendra virus in Brisbane to an emergence 1000 km away in Mackay, an interdisciplinary group of scientists from both public and private sectors met to consider the source.¹⁵⁷ A zoologist was the first to propose flying foxes as the possible reservoir host of Hendra virus, which emphasised the potential public health benefits to be gained from multidisciplinary frameworks.¹⁵⁸ The success of One Health can also be seen in an anthrax outbreak in Nakuru County in Kenya in 2016. Here, a farmer sent samples from an animal that had died to a veterinary investigations laboratory. Upon discovering that these samples tested positive for anthrax, the laboratory notified the sub-county veterinary department, who then notified the sub-county department of health in Nakuru County. The veterinary and health departments each carried out their respective roles in controlling the outbreak, and the result was 3 out of 73 exposed people developing cutaneous anthrax.¹⁵⁹ As outlined by Munyua et al, '[t]he timely communication between the health sectors and intervention in those exposed resulted in fewer human cases during this outbreak'.¹⁶⁰ These instances signify the importance of collaboration between the human-animal sectors.

Despite these instances of success, the logistical vagueness evident in the WHO-FAO-OIE framework has yet to be addressed. There is uncertainty surrounding the practical implementation of the One Health concept and its definition remains unsettled.¹⁶¹ As outlined by Behravesh, 'organisations promoting One Health have historically employed different definitions of the term'.¹⁶² The imprecision in defining the concept can be linked to the difficulty in reaching a consensus between sectors on the meaning of health.¹⁶³ Establishing a unified definition of health for humans, animals and ecosystems is complex, and the three sectors may

155 Ibid.

156 Yu-Ju Chien, 'How Did International Agencies Perceive the Avian Influenza Problem? The Adoption and Manufacture of the "One World, One Health" Framework' (2013) 35(2) *Sociology of Health and Illness* 213, 222 <<https://doi.org/10.1111/j.1467-9566.2012.01534.x>>; Kingsley and Taylor (n 154) 11.

157 Adrian Coghill, Peter Black and Mark Schipp, 'The Role of One Health in Understanding and Controlling Zoonotic Diseases in Australia' (2012) 33(4) *Microbiology Australia* 148, 148 <<https://doi.org/10.1071/MA12148>>.

158 Ibid.

159 Peninah M Munyua et al, 'Successes and Challenges of the One Health Approach in Kenya over the Last Decade' (2019) 19(3) *BMC Public Health* 1, 4 <<https://doi.org/10.1186/s12889-019-6772-7>>.

160 Ibid.

161 See van Herten, Bovenkerk and Verweij (n 149) 26.

162 C Barton Behravesh, 'One Health: Over a Decade of Progress on the Road to Sustainability' (2019) 38(1) *Revue Scientifique et Technique* 21, 22 <<https://doi.org/10.20506/rst.38.1.2939>>.

163 Henrik Lerner, 'A Critical Analysis of Definitions of Health as Balance in a One Health Perspective' (2019) 22(3) *Medicine, Health Care and Philosophy* 453, 454 <<https://doi.org/10.1007/s11019-018-09884-1>>.

conflict.¹⁶⁴ On the other hand, room for alternative definitions can be beneficial to the One Health agenda, as was the case in the collaboration between WHO, FAO and OIE. Van Herten et al propose that the ambiguity of One Health is what has allowed the approach to take hold, as a concrete definition would impede One Health's malleability and thus its ability to facilitate cooperation.¹⁶⁵

The lack of a shared definition and approach, however, can fail to produce the necessary paradigm shift in the human-animal-environment interface. For instance, the ambiguity of One Health means that there is no framework available to address the conflicts of interest that will inevitably arise between human, animal and ecosystem health. Van Herten, Bovenkerk and Verweij identify the culling of healthy animals as such a conflict.¹⁶⁶ As outlined above, culling is currently a central strategy in controlling the spread of a disease that is a public health risk. Targeted animals can include those that are affected by disease, their direct contacts and other susceptible animals.¹⁶⁷ Thus, animals that may not be infected with the disease can be culled to protect public health. This clearly serves to promote human health, but the benefit to animal health here is less clear.¹⁶⁸

This feeds into a common criticism of the One Health approach, which is that the concept of interdependence between human-animal-environmental health does not guarantee the three spheres are equally valued or equally represented.¹⁶⁹ For instance, a systematic analysis of One Health networks found that around a third did not cover the environmental sector of the One Health triad.¹⁷⁰ This gap in coverage represents a larger neglect of the structural issues that drive zoonosis. The environment, and human activities in relation to the environment, contribute to disease emergence at a catalytic level. The disregard for the health of the environment within One Health networks inhibits policymaking towards the root cause of emergence. Without an increase in activities and collaborations that adequately feature the environment as a dynamic and interwoven sector within the One Health triad, this framework will fail to engender the level of change that is required to meet the risk of zoonosis.

A further instance of potential conflict is between human-animal-environmental health and socioeconomic impacts. For example, a One Health approach acknowledges that the intensification of animal agriculture is a key driver in disease emergence, but seeks to balance this with the potential cost of restricting development.¹⁷¹ As provided by Degeling et al, in order to successfully balance factors such as these within a One Health approach, there must be an explicit

164 Van Herten, Bovenkerk and Verweij (n 149) 31.

165 Ibid 27.

166 Ibid 29.

167 Animal Health Australia, 'Destruction of Animals' (n 147) 13.

168 See Evan Hamman, Katie Woolaston and Bridget Lewis, 'Legal Responses to Human-Wildlife Conflict: The Precautionary Principle, Risk Analysis and the "Lethal Management" of Endangered Species' (2016) 7 *IUCN AEL Journal of Environmental Law* 57, 58.

169 See, eg, van Herten, Bovenkerk and Verweij (n 149) 26.

170 Mishal S Khan et al, 'The Growth and Strategic Functioning of One Health Networks: A Systematic Analysis' (2018) 2(6) *Lancet Planetary Health* 264, 269 <[https://doi.org/10.1016/S2542-5196\(18\)30084-6](https://doi.org/10.1016/S2542-5196(18)30084-6)>.

171 Degeling et al (n 119) 5.

recognition of who will be the primary beneficiary of the system and which party will bear the costs.¹⁷² One Health in practice often appears to centre human health, with animal and environmental health managed because of the risk to human life.¹⁷³ Here, human health is placed as the primary beneficiary, with animals and the environment as the cost bearers.

The One Health concept also lacks a single agenda, with multiple narratives arising from different proponents. For instance, Galaz et al describe three primary and alternate narratives of One Health evident from their literature review.¹⁷⁴ The first is a conceptual narrative of integration between sectors; this narrative is largely aspirational and lacks a focus on implementation and action.¹⁷⁵ The second narrative emphasises the risk of an outbreak and the spread of disease, and focuses primarily on strengthening surveillance through collaboration.¹⁷⁶ The third focuses on the economic justifications of adopting a One Health approach, such as through avoiding the cost of a zoonotic disease outbreak; this narrative utilises the economic case to influence investment in a One Health framework.¹⁷⁷

Galaz et al found that the second narrative is the most prominent, as it attracts the political impetus and funding.¹⁷⁸ The second narrative, or ‘outbreak narrative’, supports increased surveillance by improving interdisciplinary identification and reporting between human and animal health sectors.¹⁷⁹ This focus on collaboration at the point of transmission is likely connected to the primacy of the human health sphere. As Galaz et al identify, ‘[m]ost investments have emphasised human health impacts, rather than long-term, unknown, potential emergence of disease’.¹⁸⁰ As attention and funding are largely concerned with the outbreak narrative, One Health in practice is not effectively addressing the structural drivers of zoonotic disease, such as the intensification of animal agriculture.¹⁸¹

The combination of the focus at transmission level and the prioritising of human health results in the One Health approach leading to insufficient structural change. One Health in its current form does not provide a sufficient alternative to our current approach to public health. Further, One Health does not provide the paradigm shift necessary to mitigate the risk of zoonotic disease arising from intensive animal agriculture. The next Part will explore an alternative approach.

B Wild Law

Wild Law, also referred to as Earth jurisprudence, challenges the anthropocentric nature of the law and proposes an alternative framework for regulating the human-

172 Ibid.

173 Van Herten, Bovenkerk and Verweij (n 149) 28.

174 Galaz et al (n 153) 5.

175 Kingsley and Taylor (n 154) 8.

176 Galaz et al (n 153) 5.

177 Ibid.

178 Ibid 13.

179 Johnson, Hansen and Bi (n 120) 234.

180 Galaz et al (n 153) 13.

181 Kingsley and Taylor (n 154) 10.

Earth relationship.¹⁸² Proponents of Wild Law recognise the segregation of human and Earth, and the dominant worldview that humans exist as subjects with dominion over the Earth, as a key cause of the current ecological crisis.¹⁸³ This dominant worldview is described by Cullinan as one which ‘reserves all the rights and privileges to use and enjoy Earth to humans’ and ‘reduce[d] other aspects of Earth and the other creatures that live on it, to the status of objects for the use of humans’.¹⁸⁴ Wild Law suggests that this worldview is facilitated by legal anthropocentrism.¹⁸⁵

As outlined above, legal anthropocentrism is evident in the regulation of intensive animal agriculture, which has been linked to several zoonotic disease outbreaks. Wild Law suggests that this is the result of the law’s failure to recognise the interdependence in the human-Earth relationship.¹⁸⁶ For instance, Lowe outlines that humans are as dependent on the health of the Earth’s natural system as any other species; however, the law does not represent this dependence and is placed over and above the Earth’s system.¹⁸⁷ The philosophy of Earth jurisprudence is thus underpinned by the recognition that human health is interdependent on the health of the Earth.¹⁸⁸

There is a correlation between One Health and Wild Law here, in that both concepts recognise the fundamental relationship between human, animal and environmental health. However, unlike a One Health approach, Wild Law challenges the source of the issues at the human-animal-environment interface and emphasises the necessity of legal recognition of interconnectedness.¹⁸⁹ As a core principle of Wild Law, the lawfulness of human action must be determined by ‘whether or not it strengthens or weakens the relationships that constitute the Earth community’.¹⁹⁰ This is because under Wild Law, laws and principles are derived

182 Peter Burdon, ‘The Great Jurisprudence’ in Peter Burdon (ed), *Exploring Wild Law: The Philosophy of Earth Jurisprudence* (Wakefield Press, 2011) 59, 59–60 (‘The Great Jurisprudence’).

183 See, eg, UN Environment, *Global Environment Outlook (GEO-6): Healthy Planet, Healthy People* (Cambridge University Press, 2019) 142 <<https://doi.org/10.1017/9781108627146>>; Felicity Deane and Katie Woolaston, ‘Coal Mines and Wild Law: A Judgment for the Climate’ in Nicole Rogers and Michelle Maloney (eds), *Law as if the Earth Really Mattered: The Wild Law Judgment Project* (Routledge, 2017) 125, 125 <<http://doi.org/10.4324/9781315618319-9>>; Michelle Maloney, ‘Building an Alternative Jurisprudence for the Earth: The International Rights of Nature Tribunal’ (2016) 41(1) *Vermont Law Review* 129, 132.

184 Cormac Cullinan, *Wild Law: A Manifesto for Earth Justice* (Green Books, 2nd ed, 2011) 63 (‘Wild Law’). See also Arian D Wallach et al, ‘Recognizing Animal Personhood in Compassionate Conservation’ (2020) 34(5) *Conservation Biology* 1097, 1104 <<https://doi.org/10.1111/cobi.13494>>.

185 Burdon, ‘The Great Jurisprudence’ (n 182) 59–60.

186 *Ibid* 63–4.

187 Ian Lowe, ‘Wild Law Embodies Values for a Sustainable Future’ in Peter Burdon and Michelle Maloney (eds), *Wild Law: In Practice* (Taylor & Francis, 2014) 3, 12

188 Michelle Maloney and Patricia Siemen, ‘Responding to the Great Work: The Role of Earth Jurisprudence and Wild Law in the 21st Century’ (2015) 5(1) *Environmental and Earth Law Journal* 6, 12. See also Cameron Holley et al, ‘Environmental Security and the Anthropocene: Law, Criminology, and International Relations’ (2018) 14 *Annual Review of Law and Social Science* 185, 191 <<https://doi.org/10.1146/annurev-lawsocsci-101317-030945>>.

189 Peter D Burdon, ‘Earth Jurisprudence and the Project of Earth Democracy’ in Peter Burdon and Michelle Maloney (eds), *Wild Law: In Practice* (Taylor & Francis, 2014) 19, 24.

190 Cullinan, ‘A History of Wild Law’ (n 66) 13.

from the universe which provides a self-regulating and universal framework.¹⁹¹ Within this framework ‘[t]he rights of each being are limited by the rights of other beings to the extent necessary to maintain the integrity, balance and health of the communities within which it exists’.¹⁹²

This is a clear divergence from the One Health concept, which proposes a framework that would operate inside the current systems of law and governance that are fundamentally anthropocentric. As outlined above, this is insufficient to drive the structural change necessary to mitigate the risk of zoonotic diseases. Wild Law offers an alternative framework that operates outside of current anthropocentric systems and emphasises the need for a paradigm shift which situates humans within the context of the Earth.

It is relevant to note the meanings of the terms ‘Earth’ and ‘universe’ in the context of Wild Law. While they are not limited by absolute definitions, the terms appear to take their literal meanings – ‘Earth’ refers to the planet humans share with a diverse range of flora and fauna, and ‘universe’ refers to the broader cosmos that Earth forms part of.¹⁹³ These terms within the Wild Law framework are rooted in the perspectives of many indigenous communities, where the integrity of the Earth is often at the forefront of governance.¹⁹⁴ Burdon outlines this in stating, ‘the basic principles of Earth Jurisprudence are not new and can be found in the law of indigenous people throughout the world’.¹⁹⁵ Considering the universe as the primary law giver means that the law to which humans are accountable is that which is *found* rather than made, and this system of law is universal.¹⁹⁶ This clearly has some connection to the more anthropocentric theory of natural law,¹⁹⁷ which dictates that natural law is inherent, universal, and can be ‘interpreted by human beings through reason’.¹⁹⁸ Ultimately, within Wild Law, the notion of law as being derived from the universe can be connected to a requirement that the law operate with ecological integrity at the centre, and within the limits of the Earth.¹⁹⁹

Wild Law demands a radical alteration of current legal systems to reorientate the human-Earth relationship. Implementing Wild Law would require an acknowledgement that rights are derived, not from human legal systems, but from

191 Cullinan, *Wild Law* (n 184) 78; Glen Wright, ‘Animal Law and Earth Jurisprudence: A Comparative Analysis of the Status of Animals in Two Emerging Discourses’ (2013) 9 *Australian Animal Protection Law Journal* 5, 13 (‘Animal Law and Earth Jurisprudence’); Glen Wright, ‘Climate Regulation as if the Planet Mattered: The Earth Jurisprudence Approach to Climate Change’ (2013) 3(1) *Environmental and Earth Law Journal* 33, 42.

192 Cullinan, ‘A History of Wild Law’ (n 66) 13.

193 Herman F Greene, ‘Cosmology and Earth Jurisprudence’ in Peter Burdon (ed), *Exploring Wild Law: The Philosophy of Earth Jurisprudence* (Wakefield Press, 2011) 126, 129–30, 133.

194 Helena Howe, ‘Making Wild Law Work: The Role of “Connection with Nature” and Education in Developing an Ecocentric Property Law’ (2017) 29(1) *Journal of Environmental Law* 19, 32 <<https://doi.org/10.1093/jel/eqw029>>.

195 Burdon, *Exploring Wild Law* (n 182) 157.

196 Peter D Burdon, ‘A Theory of Earth Jurisprudence’ (2012) 37 *Australian Journal of Legal Philosophy* 28, 33.

197 Burdon, ‘The Great Jurisprudence’ (n 182) 65.

198 Burdon, ‘A Theory of Earth Jurisprudence’ (n 196) 34.

199 *Ibid* 33.

the universe.²⁰⁰ Thus, human laws that exist outside the limits of nature and do not operate for the good of the Earth system would not be consistent with this jurisprudence. Under Wild Law, each member of the Earth community is awarded rights purely by virtue of their membership, and each member receives the same basic rights. As Cullinan argues, these rights exist solely to protect each component's liberty in 'fulfil[ing] its role within the Earth Community'.²⁰¹ Thus, as mentioned above, a being's rights are limited only by the rights of other beings: the back-and-forth is guided by the principle of what is best for the health of the Earth and all that inhabit it, which must be reflected in any laws enacted by humans.²⁰² As Wild Law awards all natural subjects within the Earth system the same set of rights, animals possess the same basic rights as humans. However, unlike some animal rights theories, the rights awarded to animals are not absolute and are instead engaged in a balancing act with the rights of other members of the Earth community, including humans – whose rights are also not absolute.²⁰³

As explained in Part III, intensive animal agriculture is representative of legal anthropocentrism in that human interests are placed at the centre with an absolute disregard for the interests of the animals, or the Earth's health. It has been established that intensive animal agriculture has facilitated zoonotic disease outbreaks, and that Australia's current laws are insufficient to mitigate the risk of further outbreaks. In balancing the rights of animals and the rights of humans, and guided by the Earth's health, intensive animal agriculture appears inconsistent with Wild Law.²⁰⁴ As opposed to some animal rights theories,²⁰⁵ this inconsistency does not appear to extend to an absolute right for an animal not to be consumed by humans. Rather, Wild Law appears to support the hunting of wild animals for food depending on the context of the locality's relationship with nature,²⁰⁶ in that this is consistent with the liberty of humans to fulfil their role in the Earth system.²⁰⁷ However, as explained in Part III, intensive animal agriculture does not operate within the context of the Earth system – it overpowers the interests of the Earth and its inhabitants and consequently impacts the health of all inhabitants, including humans.²⁰⁸ As such, the right of humans to engage in intensive animal

200 Cullinan, *Wild Law* (n 184) 82.

201 *Ibid* 105.

202 Howe (n 194) 24.

203 See generally Amanda Whitfort, 'Wildlife Crime and Animal Victims: Improving Access to Environmental Justice in Hong Kong' (2019) 22(3) *Journal of International Wildlife Law and Policy* 203, 208 <<https://doi.org/10.1080/13880292.2019.1677055>>.

204 Wright, 'Animal Law and Earth Jurisprudence' (n 191) 16; Alex Bruce, 'Animal Welfare, Food Security and Future Directions' (2011) 6 *Australian Animal Protection Law Journal* 114, 115–16.

205 See, eg, Gary L Francione, 'The Abolition of Animal Exploitation' in Gary L Francione and Robert Garner (eds), *The Animal Rights Debate: Abolition or Regulation?* (Columbia University Press, 2010) 1, 64–5; Tom Regan, *The Case for Animal Rights* (University of California Press, 1983); Sue Donaldson and Will Kymlicka, *Zoopolis: A Political Theory of Animal Rights* (Oxford University Press, 2011).

206 Cullinan, *Wild Law* (n 184) 105–6; Wright, 'Animal Law and Earth Jurisprudence' (n 191) 15.

207 This is similar to Singer's utilitarianism in that there is a balancing of interests, as opposed to an absolute set of rights that favours the protection of one species' interests: see Singer (n 11).

208 See generally Christine Parker, Fiona Haines and Laura Boehm, 'The Promise of Ecological Regulation: The Case of Intensive Meat' (2018) 59(1) *Jurimetrics* 15.

agriculture does not operate within the bounds of nature and it appears this right would therefore not be supported under Wild Law.

In terms of the practical effects that implementing Wild Law would have on animal agriculture, Melissa Hamblin suggests that this reorientation would occur with the human-animal-earth relationship at the forefront.²⁰⁹ Hamblin further outlines that there would likely be an ‘altered regulatory bias’ towards ‘smaller operations, improved welfare, [a] strong focus on whole of system environmental impacts, [and] consumer education’.²¹⁰ This is in line with the aforementioned balancing of human rights and animal rights under Wild Law. Thus, intensive animal agriculture would be replaced by smaller farming operations, which would likely reduce the risk of zoonotic disease outbreaks given the consequential increase in genetic diversity among animals. As outlined above, an abundance of genetic diversity, more complex ecosystems and a decrease in contact between animals is key in protecting against the introduction of disease. In making this transition, animal agriculture would pivot from anthropocentric to ecocentric, with the impact on the health of the Earth and its inhabitants influencing the practical effects on animal agriculture.

While a drastic change to human legal systems would be required, the rights awarded to animals under Wild Law would be more limited than those typically barracked for by animal rights proponents.²¹¹ For instance, animal advocates propose that animals are owed similar fundamental rights to humans, consisting primarily of a right to life.²¹² Conversely, Wild Law suggests that human rights should be constrained and animal rights lifted to reach an equal level.²¹³ In practice, this would likely mean that all members of the Earth community – including humans, animals, and Earth itself – possess a right to life.²¹⁴ However, under Wild Law, protecting ecological integrity necessitates the continuation of predator-prey relationships.²¹⁵ This is connected to the back-and-forth of rights discussed above, guided by each being’s role in the Earth community with the health of the Earth at the forefront. As explained above, this would allow humans to continue consuming animals and animal products where this consumption accords with their role in the Earth system. Thus, while Wild Law would significantly alter the current mode of life, it would likely be less abrasive than the absolute recognition of the right of animals not to be killed for human use which constitutes a common animal rights approach.

Despite this, Wild Law still faces significant barriers. One key challenge is that Wild Law is fundamentally a rights-based jurisprudence, and its implementation requires legal recognition of the basic rights aforementioned. In contrast, the

209 Melissa Hamblin, ‘Wild Law and Domesticated Animals: A Wild Law Approach to the Regulation of Farming Industries in Australia’ (Powerpoint, Wild Law Conference, 16–18 September 2011) 9; Wright, ‘Animal Law and Earth Jurisprudence’ (n 191) 17.

210 Hamblin (n 209) 10.

211 Steven White, ‘Wild Law and Animal Law: Some Commonalities and Differences’ in Peter Burdon and Michelle Maloney (eds), *Wild Law: In Practice* (Taylor & Francis, 2014) 247, 248.

212 Wright, ‘Animal Law and Earth Jurisprudence’ (n 191) 16.

213 Ibid.

214 Cullinan, ‘A History of Wild Law’ (n 66) 13.

215 Ibid 13–14.

express legal recognition of fundamental rights in Australia has traditionally been seen as peripheral to an effective democracy.²¹⁶ As pointed out by Saunders, this is likely connected to a cultural laxness towards the importance of ‘rights,’ in that Australia ‘does relatively little to reinforce the understanding of the significance of rights and the willingness to give them priority that [the current approach to rights] requires’.²¹⁷ This is represented by the way Australia’s protection of human rights has developed. For instance, Australia does not have a national codification of human rights entitlements,²¹⁸ which many have argued causes a susceptibility to rights incursions.²¹⁹ Attempts to introduce express recognition of human rights, through constitutional change or a national human rights charter, have thus far been largely unsuccessful.²²⁰ Wild Law is underpinned by the notion that law favours humans over and above the rest of the Earth. However, as outlined, there has been a continuing discourse surrounding Australia’s lack of adequate protection for human rights given the lack of a national codification. As such, it is difficult to envision Wild Law, with its far more substantive rights approach, receiving the necessary support for reform.

While the introduction of rights in this context would likely meet great resistance, a rights-discourse carries the transformative weight needed to correct the deficiencies in the human-animal relationship.²²¹ The attribution of rights is a particularly significant advocacy tool because it removes the need to incrementally request improvements in the treatment of animals or the environment; rather, these standards of treatment are bestowed upon them as rights-holders and advocates can argue for their entitlements to be met.²²² Further, the strength of a rights-discourse is evident in its ability to legitimise the interests of the rights-holder. Conferring the fundamental rights of Wild Law on animals and the Earth community would validate claims based on protecting the health of the comprehensive Earth system. Advocates could then argue that a corporation had violated these rights

216 Brendan Sydes, ‘The Challenges of Putting Wild Law into Practice: Reflections of Putting Wild Law into Practice’ in Peter Burdon and Michelle Maloney (eds), *Wild Law: In Practice* (Taylor & Francis, 2014) 58, 64.

217 Cheryl Saunders, ‘The Australian Constitution and Our Rights’ in Helen Sykes (ed), *Future Justice* (Future Leaders, 2010) 117, 119.

218 Sydes (n 216) 64. Some states and territories within Australia have enacted their own human rights acts, including the Australian Capital Territory, Queensland and Victoria. See *Human Rights Act 2004* (ACT); *Human Rights Act 2019* (Qld); *Charter on Human Rights and Responsibilities Act 2006* (Vic). However, this discussion centres around the lack of a national human rights charter in Australia, which remains a subject of debate: see ‘Human Rights: What Do I Need to Know? (2008)’, *Australian Human Rights Commission* (Web Page, 2008) <<https://humanrights.gov.au/our-work/human-rights-what-do-i-need-know-2008#Heading385>>.

219 See, eg, Jim McGinty, ‘A Human Rights Act for Australia’ (2010) 12 *University of Notre Dame Australia Law Review* 1, 25, 31; Law Council of Australia, Submission to the Australian Human Rights Commission, *Free and Equal: An Australian Conversation on Human Rights* (13 November 2019) 29 [91]–[92].

220 Sydes (n 216) 64; Williams (n 65) 271–2.

221 Meg Good, ‘The River as a Legal Person: Evaluating Nature Rights-Based Approaches to Environmental Protection in Australia’ (2013) 1 *National Environmental Law Review* 34, 37.

222 Jane Kotzmann and Nick Pendergrast, ‘Animal Rights: Time to Start Unpacking What Rights and for Whom’ (2019) 46(1) *Mitchell Hamline Law Review* 157, 185.

for undertaking intensive animal agriculture, which is a stronger position than attempting to show a diversion from environmental or welfare standards, which has to date proved insufficient.²²³ Finally, rights language alters public perception of the newly appointed rights-holders. It carries with it a moral authority that would redefine the current status of animals and the wider Earth community, shifting them from resources to fellow members of the Earth system.

In this respect, Wild Law is more compelling than other theories that do not feature rights language. Legal theories that utilise regulatory measures, a general duty of care to the environment,²²⁴ or welfarist protection to animals, amongst others, lack the strength in legal protection that a rights-based approach can offer. This heightened legal protection will bring with it a more radical alteration of current systems than alternative ecocentric theories,²²⁵ and will thus be more likely to meet derision and resistance. However, this article argues that a radical change is required to combat the risk of zoonosis, and thus a rights-based approach is the most compelling theory by which to approach this challenge.

Wild Law faces a further challenge in its practical implementation and ability to transition to more than a theory.²²⁶ For instance, Wild Law offers a critique of private property as a legal object for perpetuating the anthropocentric ordering of human subjects over and above nature.²²⁷ Wild Law proposes that under the current property system, nature is reduced to a resource and its value is merely instrumental.²²⁸ Changes to this system under Wild Law would be drastic, with an ecocentric reconceptualisation of property that would transform land to a holder of rights.²²⁹ However, Wild Law does not yet propose a detailed understanding of what this reconceptualisation would involve. Cullinan outlines this, pointing out that the ‘challenge that now faces us is how to begin the process of undoing the property systems that impede a proper relationship with land, and to build a workable alternative in its place’.²³⁰ This challenge would also extend to undoing the property systems that relate to animals, and discovering a workable alternative built on a foundation of rights.

An example of practical implementation could be gleaned from the rights awarded to the Whanganui River in New Zealand. The Whanganui River was recognised as a legal person in 2017, by section 14 of the *Te Awa Tupua (Whanganui*

223 Ibid.

224 See, eg, Lee Godden, Jacqueline Peel and Jan McDonald, *Environmental Law* (Oxford University Press, 2nd ed, 2019) 14.

225 For example, ecological modernism, the obligation to avoid harm, or regulatory measures premised on sustainability: see, eg, Brad Jessup and Kim Rubenstein, *Environmental Discourses in Public and International Law* (Cambridge University Press, 2012) <<https://doi.org/10.1017/CBO9781139094610>>; Nicole Graham, ‘Dephysicalisation and Entitlement: Legal and Cultural Discourses of Place as Property’ in Brad Jessup and Kim Rubenstein (eds), *Environmental Discourses in Public and International Law* (Cambridge University Press, 2012) 96 <<https://doi.org/10.1017/CBO9781139094610.008>>.

226 Cullinan, *Wild Law* (n 184) 158–9, 174–5.

227 Williams (n 65) 259.

228 Peter D Burdon, ‘Earth Jurisprudence: Private Property and Earth Community’ (PhD Thesis, University of Adelaide, May 2011) 14.

229 Howe (n 194) 27.

230 Cullinan, *Wild Law* (n 184) 145.

River Claims Settlement) Act.²³¹ The River now exists as an entity of its own before the law, with its rights to be enforced by two guardians,²³² a change designed to acknowledge that harm to the River is harm to the Whanganui people.²³³ This is represented by section 13 of the Act, which includes the maxim, ‘Ko au te Awa, ko te Awa ko au’, meaning ‘I am the River and the River is me’.²³⁴ This signifies a shift from the anthropocentric understanding of the ‘legal person’ to an ecocentric reconceptualisation of the law – with the health of the Earth at the forefront. Outside of this example, Wild Law lacks instances of practical implementation. As such, its ability to adequately respond to the risk of zoonosis has been largely untested and success here will depend upon a successful implementation.

Wild Law is at a disadvantage here in comparison to One Health, as its profile is relatively low. While One Health faces similar challenges in practical implementation, it has been the beneficiary of significant attention in Australia’s aid program, public health framework and agricultural policy. For instance, the Department of Foreign Affairs and Trade recognised One Health as a priority in a recent aid policy, committing to ‘share knowledge with counterpart agencies in the Pacific and Southeast Asia on the interaction between human, animal and environmental health, to better manage the risks of future pandemics’.²³⁵ The Australian Centre for International Agricultural Research has also emphasised the importance of an approach that focuses on the spheres of human, animal and environmental health concurrently,²³⁶ and Australia’s Indo-Pacific Centre for Health Security has partnered with the OIE in recognition of the cross-disciplinary nature of zoonoses.²³⁷ Wild Law has not yet garnered similar recognition or legitimacy, which is a significant obstacle towards its implementation.

Despite each of these challenges, the framework proposed by Wild Law represents the radical paradigm shift that is necessary to correct the human-animal-environment relationship. Wild Law recognises the interdependence of human and animal health and seeks to ensure both. As opposed to One Health, Wild Law challenges the legal anthropocentrism that facilitates a relationship of complete domination of humans over nature and serves as an appropriate framework by which to advocate for legal reform. As a rights-based approach, Wild Law also carries with it the strength of protection required to respond to the risk of zoonosis. As such, this article suggests that Wild Law be adopted as an alternative framework

231 *Te Awa Tupua (Whanganui River Claims Settlement) Act 2017* (NZ) (*‘Te Awa Tupua Act’*). See generally Kim Economides, Aaron Timoshanko and Leslie S Ferraz, ‘Justice at the Edge: Hearing the Sound of Silence’ (2020) 41(1) *Adelaide Law Review* 39, 68–9.

232 *Te Awa Tupua Act* (n 231) ss 18–20.

233 *Ibid* s 13.

234 *Ibid*.

235 Department of Foreign Affairs and Trade, *Partnerships for Recovery: Australia’s COVID-19 Development Response* (Report, 2020) 10.

236 Lisa Robins et al, *COVID-19 and Food Systems in the Indo-Pacific: An Assessment of Vulnerabilities, Impacts and Opportunities for Action* (ACIAR Technical Report No 96, 2020) 27.

237 ‘Australia-OIE One Health Partnership’, *Indo-Pacific Centre for Health Security* (Web Page) <<https://indopacifichealthsecurity.dfat.gov.au/australia-oie-one-health-partnership>>.

to our current approach to public health to manage the risk of zoonotic disease emergence arising from intensive animal agriculture.

The details of the legal reform necessary to implement Wild Law is not the subject of this article. However, as discussed above, it is expected that the changes would be radical and would necessitate a shift in the way human beings relate to both animals and the Earth, in a manner like the ecocentric reorientation of the law as occurred in relation to the Whanganui River. Ultimately, it is argued that as part of the practical implementation of Wild Law, there would need to be a phasing out of intensive animal agriculture. Given intensive agriculture is heavily relied upon to meet increasing demand for low-cost animal protein, extensive deliberation would be required to determine how best to move away from the practice while still meeting the nutritional needs of the population. Deliberation would also be required in regard to the extent of small-scale animal agriculture that would be permitted under a Wild Law framework. While small-scale agriculture may be an asset in regard to the transition from intensive systems, this article proposes that under a Wild Law framework, human reliance on animals would be minimal, and thus small-scale agriculture would also see an eventual phase-out. As outlined above, it is argued that a Wild Law approach would see any human use of animals situated in the context of the interdependence of the human-animal-Earth relationship and would not extend past the bounds of a predator-prey relationship.

V CONCLUSION

Emerging zoonoses have the potential to cause devastating effects on public health, as has been evidenced in the COVID-19 pandemic. Many of the structural drivers of zoonotic disease outbreaks are linked to an increase in human and animal contact.²³⁸ In the Australian context, a key driver is the intensification of animal agriculture. The increased demand for animal protein within Australia over the previous decades can be met because of the transition from traditional small-scale farms to industrialised animal agriculture.²³⁹

Intensified operations feature a myriad of heightened zoonosis risks, including genetic uniformity, high stocking densities and high levels of stress within farmed animals.²⁴⁰ This article has established that human engagement with animals directly correlates to the increased risk of zoonotic disease emergence, and that in the case of intensive animal agriculture, the exploitation of animals and the sacrifice of animal and environmental health in favour of human interests are linked to an increased risk of disease emergence. Hence, this practice requires adequate regulation to ensure this risk is mitigated.

Australian laws regulating intensive animal agriculture are fundamentally anthropocentric. Legal anthropocentrism is represented in the placement of human interests over and above that of animal interests, and the situating of animals

238 *Preventing the Next Pandemic* (n 12) 15–17.

239 Otte et al (n 140) 16.

240 *Ibid* 3; Liverani et al (n 140) 874.

as legal things with no inherent value. These principles manifest in intensified animal agriculture, where animals are subject to practices that prioritise efficient production over their welfare. Regulation of these practices in Australia is subject to structural anthropocentrism. This can be seen in the Model Codes of Practice, which manage minimal welfare requirements for farmed animals. These codes of practice reduce animal welfare to a standard consistent with profitability, while permitting the practices associated with an increased risk of zoonotic disease outbreaks in the interests of productivity.

Laws surrounding disease emergence within Australia are further lacking in terms of affecting the structural change necessary to combat the risk of zoonosis. For instance, the remainder of Australia's regulation surrounding zoonotic disease emergence is made up of surveillance mechanisms, biosecurity practices and culling. These methods are concerned with the spread of pathogens and do not address the deficiencies in the human-animal relationship which facilitate zoonotic disease outbreaks. Thus, Australia's approach to zoonotic disease emergence is focused on outbreak control as opposed to addressing the inherent risks of intensive animal agriculture.

This article argues that this can be remedied with recourse to a Wild Law framework, which will provide the paradigm shift necessary to address the risk of zoonotic disease. This would involve a fundamental reshaping of property law to a more ecocentric system, one that centres the rights of all beings within the context of the Earth. In this respect, intensive animal agriculture does not operate within the limits of the Earth system and would thus be inconsistent with Wild Law. This framework would therefore appropriately regulate the risk of zoonotic disease in intensive animal agriculture, by replacing these operations with small-scale farms that prioritise animal and environmental health, before transitioning away from human uses of animals outside of a basic predator-prey relationship entirely.