

Comment

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Cow Methane-Reduction Wearable Technology and Animal Welfare: Humane Solutions to Lessen Livestock’s Environmental Impact

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INTRODUCTION

In March 2020, the World Health Organization declared COVID-19 a worldwide pandemic. After two years of the pandemic, governments began to lift mask mandates. While many individuals gladly began taking off their masks, restrictive methane-reduction masks were developed for beef and dairy cows to wear for the duration of their already-shortened lives.

After the 2021 Climate Change Conference (“COP26”) in Glasgow highlighting the agricultural industry’s environmental impact, *Time Magazine* wrote an article provocatively titled *Cows Are the New Coal*.¹ Was this simply a catchy headline or the realization that an often overlooked industry—agriculture and, specifically, livestock—was essential in combating climate change? Simply put: yes, the agricultural livestock industry plays a large role in combating climate change, and more must be done, especially by companies, to make sustainable changes.²

Time did not create this headline; rather, the magazine quoted Jeremy Collier, chair of the Farm Animal Investment Risk & Return (FAIRR): “Cows are the new coal. The emissions from agriculture and related land use are on a level with the greenhouse gases emitted by the

¹ Aryn Baker, ‘Cows Are the New Coal.’ *How the Cattle Industry Is Ignoring the Bottom Line When It Comes to Methane Emissions*, TIME (Dec. 2, 2021, 10:57 AM), https://time.com/6125014/cows-agricultural-emissions/?utm_source=twitter&utm_medium=social&utm_campaign=editorial&utm_term=_&linkId=144700635 [<https://perma.cc/3JLG-GBXV>].

² *Id.*

EU, US and Japan combined.”³ The impact of the agricultural livestock industry was further detailed in the *Time* article:

The one billion cows used in the global meat and dairy industries, combined with other animals raised for livestock, are responsible for releasing the methane equivalent of some 3.1 gigatons of carbon dioxide into the atmosphere every year—accounting for some 44% of global anthropogenic methane. If the global livestock industry were its own country, it would be the world’s third-biggest greenhouse gas emitter, falling between U.S. and India when it comes to total greenhouse gas emissions.⁴

In 2017, ZELP, a United Kingdom-based start-up at the Royal College of Art in London,⁵ created an ambitious and novel, yet non-peer-reviewed product: a methane-reduction device worn by cows that attempts to lessen the environmental impact of methane emissions created by the cow’s breath.⁶ The methane-reduction device⁷ captures methane emitted from a cow’s mouth and nostrils and oxidizes their methane in real time.⁸ ZELP’s current mask design is a plastic, rubber-like device⁹ affixed to a standard harness¹⁰ that fits over a cow’s nostrils and mouth. At the time this Comment went to press, ZELP is beta testing the product’s efficacy rate in undisclosed trials,¹¹ and its methane-reduction device has not been peer-reviewed.¹² ZELP plans

³ Katy Askew, ‘Cows Are the New Coal’: FAIRR and Ban Ki-moon Urge G20 Leaders to Act on Agricultural Emissions, FOODNAVIGATOR.COM, <https://www.foodnavigator.com/Article/2021/07/01/Cows-are-the-new-coal-FAIRR-and-Ban-Ki-moon-urge-G20-leaders-to-act-on-agricultural-emissions> [https://perma.cc/BKB6-8KFC] (July 1, 2021, 8:58 AM).

⁴ Baker, *supra* note 1.

⁵ ZELP (*Zero Emissions Livestock Project*), ROYAL COLL. OF ART, <https://www.rca.ac.uk/business/innovationrca/start-companies/zelp-zero-emissions-livestock-project/> [https://perma.cc/D4MD-BPSL].

⁶ *Id.*

⁷ Depending on the source, the methane-reduction device is also referred to as “wearable technology,” “smart cattle wearable,” “mask,” or “livestock wearables.” This Comment may vary in its usage, but primarily refers to ZELP technology as a (cow) methane-reduction mask or as wearable technology.

⁸ *Discover the Tech That’s Revolutionizing Livestock Farming*, ZELP, <https://www.zelp.co/the-technology-2/> [https://perma.cc/LN2H-UPES].

⁹ *Id.*

¹⁰ Anna Marks, *This Burp-Catching Mask for Cows Could Slow Down Climate Change*, WIRED (Jan. 1, 2021, 6:00 AM), <https://www.wired.co.uk/article/cows-climate-change-methane-stop> [https://perma.cc/A9F5-CQK2].

¹¹ *Frequently Asked Questions*, ZELP, <https://www.zelp.co/faq-2/> [https://perma.cc/AXN3-3TN5].

¹² Agnieszka de Sousa & Akshat Rathi, *These Face Masks for Cows Have Nothing to Do with Coronavirus*, BNN BLOOMBERG (Apr. 21, 2020), <https://www.bnnbloomberg.ca/these>

to initially launch its platform and device in Europe and the United States.¹³ In June 2021, the multibillion-dollar agriculture services corporation Cargill, Inc., announced a strategic partnership with ZELP to introduce its methane-reduction product to the European dairy market by 2022.¹⁴ No concrete date for the product's arrival in the United States has been set.

This Comment details ZELP technology and potentially similar products from an animal welfare and anti-cruelty perspective by analyzing the product's design and implementation through the lens of California's and Wisconsin's animal cruelty statutes; this Comment then discusses cattle behavior studies and possible cow responses to such wearable technology. California and Wisconsin are model states because they produce the largest amounts of dairy within the country.¹⁵

Generally, neither California nor Wisconsin prohibits the use of a harness or devices like ZELP's methane-reduction device. Still, ZELP's methane-reduction device could violate animal cruelty laws if it is shown to deprive the cow of food or water, restrict the cow's movement by becoming entangled in vegetation, or harm and wound the cattle with a device that is too tight or that becomes unsanitary.¹⁶ Furthermore, studies indicate that such devices may have negative psychological impacts on cattle.¹⁷ As the product is still in its trial phase, there are unknowns about ZELP's methane-reduction device, including its final design and independent efficacy testing. Those details could further implicate animal cruelty or make the cruelty of such a device more ascertainable.

Animal welfare is often a secondary concern within the agricultural livestock industry, playing a minor role to production and

-face-masks-for-cows-have-nothing-to-do-with-coronavirus-1.1424477 [https://perma.cc/M9XP-JQUK].

¹³ ZELP, *supra* note 11.

¹⁴ Agnieszka de Sousa, *Cargill Backs Cow Masks to Trap Methane Burps*, BLOOMBERG (May 31, 2021, 9:00 PM), <https://www.bloomberg.com/news/articles/2021-06-01/wearable-technology-to-filter-cow-methane-burps> [https://perma.cc/2ADR-ELP9]; *Cargill and ZELP Embark on Strategic Partnership to Tackle Methane Emissions in the Dairy Industry*, CARGILL (June 1, 2021), <https://www.cargill.com/2021/cargill-and-zelp-embark-on-strategic-partnership> [https://perma.cc/YS4C-DD83].

¹⁵ U.S. DEP'T OF AGRIC. MKTG. SERV. DAIRY PROGRAM, 2020 MILK PRODUCTION (2021) [hereinafter U.S. DEP'T OF AGRIC.], <https://www.fmmacentral.com/PDFdata/msb202102.pdf> [https://perma.cc/RG9Y-J8EY].

¹⁶ See *infra* Part III for California and Wisconsin animal cruelty statutes.

¹⁷ See *infra* Part IV for ZELP's potential psychological impact on cows.

profitability.¹⁸ But it is important that climate combating technological devices' impacts on livestock welfare be considered when advancing new technologies. Therefore, it is imperative to consider not only animal welfare when implementing such products but also alternative, more effective methods and solutions that provide for the best possible outcomes for animals and the planet. Many humane and alternative methods for combating cow methane emissions exist, such as reducing or eliminating meat consumption or adding red seaweed into cow feed. Yet instead of focusing on these viable solutions, humans place extraordinary hope in technology to solve its anthropogenic climate concerns—technology that ultimately burdens already suffering farm animals.

This Comment proceeds in five parts. Part I examines the importance and relationship between methane emissions and the agricultural livestock industry within the context of mitigating climate change. Part II provides an overview of livestock wearable technology and discusses ZELP's methane-reduction mask for cattle, the company's welfare considerations, and efficacy. Part III analyzes ZELP's methane-reduction mask through the California and Wisconsin animal cruelty statutes. Part IV discusses the ZELP methane-reduction device's potential psychological impact on cows, and Part V provides alternative methods for reducing livestock's environmental impact. Finally, I offer a brief conclusion.

I

LIVESTOCK AND GREENHOUSE GAS EMISSIONS

The production of livestock is a significant contributor to greenhouse gas (GHG) emissions.¹⁹ Cattle are the primary agricultural

¹⁸ See Déborah Temple & Xavier Manteca, *Animal Welfare in Extensive Production Systems Is Still an Area of Concern*, FRONTIERS IN SUSTAINABLE FOOD SYS., Sept. 22, 2020, at 1, <https://www.frontiersin.org/articles/10.3389/fsufs.2020.545902/full> [<https://perma.cc/YA8Z-MQ9K>]; Oscar Madzingira, *Animal Welfare Considerations in Food-Producing Animals*, in ANIMAL WELFARE 99, 116–17 (Muhammad Abubakar ed., 2018), <http://dx.doi.org/10.5772/intechopen.78223> [<https://perma.cc/GVG3-LWXM>].

¹⁹ P. Llonch et al., *Current Available Strategies to Mitigate Greenhouse Gas Emissions in Livestock Systems: An Animal Welfare Perspective*, 11 ANIMAL 274, 274 (2017), <https://www.sciencedirect.com/science/article/pii/S1751731116001440?via%3Dihub> [<https://perma.cc/XCV7-433Q>]; U.N. ENV'T PROGRAMME & CLIMATE & CLEAN AIR COAL., GLOBAL METHANE ASSESSMENT: BENEFITS AND COSTS OF MITIGATING METHANE EMISSIONS 1, 29 (2021) [hereinafter GLOBAL METHANE ASSESSMENT], <https://www.unep.org/resources/report/global-methane-assessment-benefits-and-costs-mitigating-methane-emissions> [<https://perma.cc/X498-Z5SX>].

source of GHG around the world.²⁰ Here, “cattle livestock” refers to cows used for dairy and beef production.²¹ Mitigation of farming-related emissions is crucial in combating climate change.²² A 2021 assessment conducted by the United Nations Environment Programme (UNEP) and the Climate and Clean Air Coalition detailed how decreasing farming-related methane emissions benefits the fight against climate change:

Livestock emissions—from manure and gastroenteric releases—account for roughly 32 per cent of human-caused methane emissions. Population growth, economic development and urban migration have stimulated unprecedented demand for animal protein and with the global population approaching 10 billion, this hunger is expected to increase by up to 70 per cent by 2050.²³

Additionally, according to the U.S. Environmental Protection Agency (EPA), GHG emissions from the agriculture sector contributed eleven percent of total U.S. GHG emissions in 2020.²⁴ Further, since 1990, GHG emissions from agriculture have increased by six percent.²⁵ In Australia alone, “direct livestock emissions account for about 70% of greenhouse gas emissions by the agricultural sector and 11% of total national greenhouse gas emissions.”²⁶ “Australia’s livestock [is] the third largest source of greenhouse gas emissions after the energy and transport sectors [within the country].”²⁷ “Livestock are the dominant source of methane (CH₄) and nitrous oxide (N₂O), accounting for 56% and 73%, respectively, of Australia’s emissions.”²⁸

²⁰ Amy Quinton, *Cows and Climate Change*, UC DAVIS (June 27, 2019), <https://www.ucdavis.edu/food/news/making-cattle-more-sustainable> [https://perma.cc/AA7H-NEMW].

²¹ *What’s the Difference Between Beef and Dairy Cattle?*, KAN. FARM FOOD CONNECTION, <https://kansasfarmfoodconnection.org/blog/2019/02/28/what%E2%80%99s-the-difference-between-beef-and-dairy-cattle> [https://perma.cc/PZM7-SWXJ].

²² *Methane Emissions Are Driving Climate Change. Here’s How to Reduce Them.*, U.N. ENV’T PROGRAMME (Aug. 20, 2021) [hereinafter UNEP], <https://www.unep.org/news-and-stories/story/methane-emissions-are-driving-climate-change-heres-how-reduce-them> [https://perma.cc/FDK8-DYGH].

²³ *Id.*

²⁴ *Sources of Greenhouse Gas Emissions*, U.S. ENV’T PROT. AGENCY [hereinafter EPA], <https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions#agriculture> [https://perma.cc/3325-7LY2].

²⁵ *Id.*

²⁶ *Carbon Farming: Reducing Methane Emissions from Cattle Using Feed Additives*, GOV’T OF W. AUSTRAL., DEP’T OF PRIMARY INDUS. & REG’L DEV. (Feb. 1, 2022, 11:39 AM) [hereinafter AUSTRALIA], <https://www.agric.wa.gov.au/climate-change/carbon-farming-reducing-methane-emissions-cattle-using-feed-additives> [https://perma.cc/H2SK-KTBG].

²⁷ *Id.*

²⁸ *Id.*

Specifically, livestock, such as cattle, “produce methane (CH₄) as part of their normal digestive processes. This process is called enteric fermentation, and it represents over a quarter of the emissions from the Agriculture economic sector.”²⁹ On average, one cow burps 220 pounds of methane each year.³⁰ Furthermore, even though methane from cattle lives in the atmosphere for a shorter period of time than carbon dioxide, the methane from cattle is twenty-eight times more potent in heating the atmosphere.³¹

Decreasing methane emissions is the quickest method for slowing the rate of global warming.³² Therefore, curbing the impact of livestock, particularly cattle, on the environment is critical. “Methane has more than 80 times the warming power of carbon dioxide over the first 20 years after it reaches the atmosphere. Even though CO₂ has a longer-lasting effect, methane sets the pace for warming in the near term.”³³ Therefore, because livestock is the leading contributor to methane emissions, and these methane emissions are more potent and controllable than carbon dioxide, it is imperative to implement humane solutions that reduce livestock’s environmental impact.

To curb the livestock industry’s impact on climate change, activists, scientists, academics, and the public and private sectors have attempted to create and implement various strategies to control livestock’s carbon footprint.³⁴ Livestock wearable technology is one solution.

²⁹ EPA, *supra* note 24.

³⁰ Quinton, *supra* note 20.

³¹ *Id.*

³² *Methane: A Crucial Opportunity in the Climate Fight*, ENV’T DEF. FUND, <https://www.edf.org/climate/methane-crucial-opportunity-climate-fight> [<https://perma.cc/F9G2-ZZV6>].

³³ *Id.*

³⁴ See, e.g., P.J. GERBER ET AL., FOOD & AGRIC. ORG. OF THE UNITED NATIONS (FAO), TACKLING CLIMATE CHANGE THROUGH LIVESTOCK: A GLOBAL ASSESSMENT OF EMISSIONS AND MITIGATION OPPORTUNITIES (2013), <http://www.fao.org/3/i3437e/i3437e.pdf> [<https://perma.cc/3JFZ-MPNV>]; BLOOMBERG, *Wearable Tech for Cows Could Help Tackle Methane Emissions*, SUPPLY CHAIN BRAIN (June 3, 2021), <https://www.supplychainbrain.com/articles/33189-wearable-tech-for-cows-could-help-tackle-methane-emissions> [<https://perma.cc/88V9-GA9P>].

II

WEARABLE LIVESTOCK TECHNOLOGY

In 2016, *Modern Farmer* discussed the future of livestock wearables, citing a 2014 *Fierce Electronics* report³⁵ on the growing use and profitability of wearable animal technology.³⁶ The 2014 report stated that the animal wearables market, which includes electronics for livestock, pets, and wildlife, is expected to grow from \$0.91 billion to \$2.6 billion by 2025.³⁷ Wearable technology ranges from e-tags, e-pills that the cow must ingest, cow collars, electronic identification earrings, GPS cowbells, and so-called cow Fitbits.³⁸ The wearable devices track the animal's movements, health, behavior, and more.³⁹

As technology advances to assist with the production demands of meat and dairy, it is necessary to understand the potential impacts on animal welfare. Unfortunately, since animal science focuses on reducing the environmental impacts of production while enhancing the profitability and efficiency of herds, the welfare of individual animals is often given secondary consideration.⁴⁰

One company seeking to reduce livestock methane emissions is ZELP.

A. Overview of ZELP

Francisco Norris founded ZELP, a London-based private agricultural technology start-up while completing his MA in Information Experience Design at the Royal College of Art.⁴¹ ZELP is part of the Royal College of Art's InnovationRCA,⁴² a high-growth start-up

³⁵ Sensors Staff, *Wearable Technology for Animals – A \$2.6bn Market Worth Watching*, FIERCE ELECTRONICS (May 28, 2014, 1:00 AM), <https://www.fierceelectronics.com/components/wearable-technology-for-animals-a-2-6bn-market-worth-watching> (last visited Apr. 17, 2023).

³⁶ Brian Barth, *Luddites, Beware: These 5 Livestock Wearables Are the Future*, MOD. FARMER (Jan. 28, 2016), <https://modernfarmer.com/2016/01/wearable-devices-livestock/> [<https://perma.cc/38D4-E9ZE>].

³⁷ Sensors Staff, *supra* note 35.

³⁸ Barth, *supra* note 36; Cal. Dep't of Food & Agric., *Fitbits for Cows?*, GROWING AM. (Jan. 16, 2020), <https://www.growingamerica.com/news/2020/01/fitbits-cows> [<https://perma.cc/2MB7-WZED>].

³⁹ Suresh Neethirajan, *Recent Advances in Wearable Sensors for Animal Health Management*, SENSING & BIO-SENSING RSCH., Feb. 2017 at 15, 16, <https://www.science-direct.com/science/article/pii/S2214180416301350> (last visited Apr. 17, 2023).

⁴⁰ Lonch et al., *supra* note 19, at 283.

⁴¹ ROYAL COLL. OF ART, *supra* note 5.

⁴² *Start-Up Companies*, ROYAL COLL. OF ART, <https://www.rca.ac.uk/business/innovationrca/start-companies/?page=3> [<https://perma.cc/GS36-CK35>].

incubation program that helps students, alumni, and staff turn ideas into businesses. InnovationRCA offers mentoring, facilities, and funding through its angel investor network, AngelClubRCA.⁴³

Francisco Norris runs ZELP together with his brother, Patricio Norris, and employs a team of scientists, engineers, and veterinarians.⁴⁴ The Norris brothers' interest in cattle and climate change stems from growing up on a livestock ranch in Argentina.⁴⁵

The company's mission is to develop scalable and efficient technology, specifically through a cow wearable device that neutralizes livestock methane emissions.⁴⁶ Additionally, ZELP aims to combat methane emissions in two ways. First, the ZELP platform offers a quality stamp certification system alerting customers that meat and dairy products purchased from ZELP cows "are the more sustainable option."⁴⁷ The ZELP certification system gives farmers or companies the option "to add a premium to the retail price of their products, allowing them to recoup the purchase costs of the ZELP wearable device."⁴⁸ Second, technology embedded within the wearable mask collects data relating to "animal efficiency, health, mitigation, and greenhouse gas inventories."⁴⁹

1. ZELP Wearable Technology: What Is It and What Does It Do?

ZELP asserts that around "95 per cent of the cattle's methane emissions come from their nostrils and mouths."⁵⁰ Accordingly, ZELP developed an experimental, wearable methane-reduction device, described as a rubber-like plastic cover that sits above the cow's nostrils and mouth.⁵¹ The patented methane-reduction device⁵² comes with either an adjustable fabric halter or it attaches to any standard

⁴³ *About InnovationRCA*, ROYAL COLL. OF ART, <https://www.rca.ac.uk/business/innovationrca/about-innovationrca/> [<https://perma.cc/LE53-8SF8>].

⁴⁴ *About ZELP*, ZELP, <https://www.zelp.co/about-zelp-2/> [<https://perma.cc/G4GB-LD6V>].

⁴⁵ Marks, *supra* note 10.

⁴⁶ ZELP, *supra* note 8.

⁴⁷ ROYAL COLL. OF ART, *supra* note 5.

⁴⁸ *Id.*

⁴⁹ *Id.*

⁵⁰ Marks, *supra* note 10.

⁵¹ AJ Dellinger, *New Masks Designed to Catch Cow Burps Could Help Save the Planet*, MIC (Apr. 21, 2020), <https://www.mic.com/p/new-masks-designed-to-catch-cow-burps-could-help-save-the-planet-22833811> [<https://perma.cc/QKY7-57WN>].

⁵² ROYAL COLL. OF ART, *supra* note 5.

halter on the back of a cow's head with a zip-tie-like apparatus.⁵³ The methane-reduction device lasts up to four years and automatically charges with a solar cell and thermoelectric generator.⁵⁴

In 2018, the methane-reduction device, initially marketed as a “smart” cattle nose ring,⁵⁵ was altered to a nose cover and halter apparatus. But since there are no images detailing how the cover fits over the cow's nose, it is uncertain whether the methane-reduction device will still attach to a piercing on the cow's nose. ZELP has stated that there are several prototypes of the methane-reduction device.⁵⁶

The methane-reduction device's main component consists of a cover over the cow's nostrils that aims to “capture and oxidize methane emissions in real time, right after the animal exhales.”⁵⁷ The wearable device oxidizes the cow's methane exhalations by using “unique catalytic technology.”⁵⁸ A report by Agnieszka de Sousa and Akshat Rathi described how the methane-reduction device works:

A set of fans powered by solar-charged batteries sucks up the burps and traps them in a chamber with a methane-absorbing filter. The chamber is a bit like the catalytic converter on a car: once the filter is saturated, a chemical reaction turns the methane (CH₄) into carbon dioxide (CO₂).⁵⁹

ZELP is currently trialing a beta product on live animals and in 2022 reported a fifty-three percent efficacy rate.⁶⁰ The company conducted multiple small- and large-scale trials of its technology in the United Kingdom, Ireland, Argentina, and the Netherlands, and continues to carry out trials “to continue improving the design and functionality of

⁵³ Marks, *supra* note 10.

⁵⁴ *What Is the Point of a Smart Face Mask for Cows?*, GOV'T TECH. (June 1, 2021), <https://www.govtech.com/question-of-the-day/what-is-the-point-of-a-smart-face-mask-for-cows> [<https://perma.cc/4SBS-B539>].

⁵⁵ Adrian Bell, *Smart Cattle Nose-Ring Converts Up to 80% of Belched Methane*, FARMERS WKLY. (July 24, 2018), <https://www.fwi.co.uk/livestock/smart-cattle-nose-ring-can-convert-convert-80-percent-belched-methane> [<https://perma.cc/7UGR-V2NT>].

⁵⁶ Kristine Hansen, *Can Methane-Zapping Masks Help Cool Down the Planet?*, DARIGOLD (June 2, 2021), <https://www.darigold.com/can-methane-zapping-masks-help-cool-down-the-planet/> [<https://perma.cc/6B6H-BFDD>].

⁵⁷ *Id.*

⁵⁸ CARGILL, *supra* note 14.

⁵⁹ de Sousa & Rathi, *supra* note 12.

⁶⁰ CARGILL, *supra* note 14.

[the] device.” The trial results are not yet public⁶¹ and to date, ZELP’s wearable technology has not been peer-reviewed.⁶²

2. Animal Welfare

The American Veterinary Medical Association defines animal welfare as follows:

Animal welfare means how an animal is coping with the conditions in which it lives. An animal is in a good state of welfare if (as indicated by scientific evidence) it is healthy, comfortable, well-nourished, safe, able to express innate behavior, and if it is not suffering from unpleasant states such as pain, fear, and distress. Good animal welfare requires disease prevention and veterinary treatment, appropriate shelter, management, nutrition, humane handling, and humane slaughter. Animal welfare refers to the state of the animal; the treatment that an animal receives is covered by other terms such as animal care, animal husbandry, and humane treatment. Protecting an animal’s welfare means providing for its physical and mental needs.

Ensuring animal welfare is a human responsibility that includes consideration for all aspects of animal well-being, including proper housing, management, nutrition, disease prevention and treatment, responsible care, humane handling, and, when necessary, humane euthanasia.

There are numerous perspectives on animal welfare that are influenced by a person’s values and experiences. There are also various means of measuring animal welfare, including (but not limited to) health, productivity, behavior, and physiological responses.⁶³

A 2017 piece in *Animal* titled, *Current Available Strategies to Mitigate Greenhouse Gas Emissions in Livestock Systems: An Animal Welfare Perspective*, further elaborated on the meaning of animal welfare:

Animal welfare has been defined in several ways and using numerous criteria (e.g. biological function, behavioural ecology or emotional state). There is one approach that gathers all these aspects to an apparently simple definition of animal welfare; animals are healthy and they have what they want . . . This definition stresses the

⁶¹ Maureen Hanson, *The Latest Mask Design: For Cows*, DAIRY HERD MGMT. (July 7, 2021), <https://www.dairyherd.com/news/education/latest-mask-design-cows> (last visited Apr. 17, 2023).

⁶² de Sousa & Rathi, *supra* note 12.

⁶³ *Animal Welfare: What Is It?*, AM. VETERINARY MED. ASS’N, <https://www.avma.org/resources/animal-health-welfare/animal-welfare-what-it> [<https://perma.cc/B9FQ-XS9Q>].

importance of good health and animal needs (either physical or emotional) to achieve good standards of welfare.⁶⁴

As evidenced by these definitions, animal welfare entails many aspects of an animal's physical and emotional well-being. ZELP's statement on animal welfare considers two questions: (1) the impact of ZELP technology on animal welfare and (2) the "key benefits of the technology for the animals."⁶⁵ As to the first statement regarding ZELP technology's impact on animal welfare,

ZELP technology has been developed with animal welfare at its core and independent studies conducted with leading academic institutions in the UK and Argentina have demonstrated that animals wearing the device show no change in their behaviour or cortisol levels, and no impact on their feeding, yields or rumination patterns—which are the most sensitive indicators of stress by the animal.

On the other hand, our technology's data and methane sensing capabilities make us unique. Through this monitoring, we can help farmers identify diseases early and minimize the spread and onset of harmful conditions, and tap into a brand new layer of analyses in the fields of digestion, feed optimization, and disease management. The ability of ZELP to monitor animals for health in addition to methane conversion places farmers and their animals at the forefront of the technology.⁶⁶

According to *American Humane*, the five freedoms are "[the] freedom from hunger and thirst; freedom from discomfort; freedom from pain, injury, and disease; freedom to express normal and natural behavior (e.g. accommodating for a chicken's instinct to roost); and freedom from fear and distress."⁶⁷ Missing from ZELP's consideration is the impact of the cow wearing the ZELP wearable device at all times—for example, is the cow's face sensitive to the touch of such a device? Even though ZELP states that its technology "has been developed with animal welfare at its core," the company's role in complying with such welfare considerations ends at the design and sale of the product. It is then left to the farmers and companies to monitor the device once it is installed on the cow's head.

⁶⁴ Llonch et al., *supra* note 19, at 275 (internal citation omitted).

⁶⁵ ZELP, *supra* note 11.

⁶⁶ *Id.*

⁶⁷ *Five Freedoms: The Gold Standard of Animal Welfare*, AM. HUMANE (Oct. 17, 2016), <https://www.americanhumane.org/blog/five-freedoms-the-gold-standard-of-animal-welfare/#:~:text=These%20Five%20Freedoms%20are%20globally,normal%20and%20natural%20behavior%20> [https://perma.cc/5T2A-E9RZ].

Furthermore, ZELP claims that the methane-reduction device tested via behavioral trials at “leading academic institutions in the UK and Argentina,” showed no impact on animal behavior and no effect on the cows’ eating patterns.⁶⁸ This statement could not be independently verified. One description of ZELP’s testing measures was found in a *BNN Bloomberg* report:

One cold morning in mid-February, two cows outfitted with Zelps milled around a research farm in Hertfordshire, 20 miles north of London, while members of Norris’s team observed their behavior. They were wearing non-working prototypes, meant to test whether the mask’s design allowed the cows to eat normally and stayed on when friends came by for a cheerful nose rub.⁶⁹

Citing ZELP’s second statement on animal welfare—its potential to improve animal welfare by tracking and analyzing collected on each cow—ZELP said the wearable device is nonintrusive, takes seconds to install, and that the cow adapts to the wearable device within minutes.⁷⁰ ZELP states:

Our device is fine-tuned into the needs of every individual animal, ensuring through 24/7 monitoring they are maintained at the best of welfare standards. The device monitors subtle behavioural changes ensuring welfare conditions can be identified and prevented early. We know exactly how the animals are feeling through the data we collect allowing us to act quickly if anything changes.⁷¹

As *Animal* contends, animal welfare includes the cow’s physical or⁷² emotional health. However, it is unclear if ZELP has met these

⁶⁸ ZELP, *supra* note 11.

⁶⁹ de Sousa & Rathi, *supra* note 12. “Norris’s team” refers to the Norris brothers who cofounded ZELP. ZELP may intend for its wearable device to be marketed to a rare and small segment of the dairy and beef industry: the farm where cows peacefully graze among acres of green grass while the farmer lovingly engages with them regularly with a “cheerful nose rub.” Unfortunately, this is far from the reality of what most cows experience within the agricultural industry. This type of “behavior testing” does not adequately reflect the stressful, abusive, and deadly environment that the cows wearing ZELP’s device will be living in. For factor farming conditions and undercover investigations, see also Anya Marchenko, *Happy Dairy Companies Are Lying to You*, DIRECT ACTION EVERYWHERE (Apr. 20, 2021), <https://www.directactioneverywhere.com/theliberationist/happy-dairy-companies-are-lying-to-you> [<https://perma.cc/HD4X-3D87>]; *Suffering in the Dairy Industry*, ANIMAL EQUAL., <https://animalequality.org/issues/dairy/> [<https://perma.cc/8ABX-YFQ9>]; *Cattle*, ANIMAL WELFARE INST., <https://awionline.org/content/cattle> [<https://perma.cc/LC24-NBR9>].

⁷⁰ ZELP, *supra* note 8.

⁷¹ ZELP, *supra* note 11.

⁷² I would argue that “and” should replace “or” because proper animal welfare practices ensure that the animal’s physical *and* emotional needs are met.

standards because much is still unknown about the product as it is still in a trial phase, ZELP's self-conducted behavioral trials and methods are not public, and the product is not peer reviewed. Furthermore, while ZELP's technology is commendable and aids in monitoring each animal's medical health, it is unknown how this platform will function in large-scale commercial lots and whether such data will be monitored to actually render aid to a distressed animal.

ZELP's third animal welfare statement regarding farmer benefits does not reflect any commitments to animal welfare. ZELP states:

While the devices are oxidizing methane with every breath your cattle takes, they are also tracking valuable data like exactly how much methane is being emitted, each animal's activity, rumination, feeding, heat, and more. The corporations receive the carbon emission reductions, and you get the precise data to make you more profitable.⁷³

This assertion reflects benefits for farmers—not the cows who will be wearing the device. At bottom, this statement repeats the second animal welfare statement of data tracking technology for individual cow and herd medical health.

Finally, ZELP recommends using the methane-reduction device after a cow is weaned, or from six to eight months of age, “to reap the highest benefits of the device.”⁷⁴ According to Penn State, a calf is usually weaned between six and eight weeks, although due to labor and feed costs, producers may start to wean calves at four weeks of age.⁷⁵ ZELP's age ranges of when to start using the methane-reduction device is conflicting because six and eight weeks of age are significantly different than six to eight months of age. This may indicate that while ZELP recommends the methane-reduction device is most effective at the older calf age range, it does not want to preclude businesses from using the product on much younger calves even though the product could be useless from a data standpoint or potentially harmful to a growing calf.

⁷³ *For Farmers*, ZELP, <https://www.zelp.co/for-farmers-2/> [https://perma.cc/Y8XX-UVUP].

⁷⁴ *Id.*

⁷⁵ *Early Weaning Strategies*, PENN. ST. EXTENSION (May 5, 2016), <https://extension.psu.edu/early-weaning-strategies#:~:text=Over%20the%20years%2C%20many%20research,to%206%20weeks%20of%20age> [https://perma.cc/QP7J-YAGC].

3. Strategic Partnership with Cargill

In June 2021, Cargill, one of the largest privately held American global food corporations, announced its partnership with ZELP.⁷⁶ Cargill will be the sole distributor of the wearable device for the European dairy markets, beginning in 2022.⁷⁷

Mighty Earth, a global environmental advocacy organization, named Cargill the “worst company in the world” in July 2019 due to its environmentally destructive business practices.⁷⁸ Cargill faced animal welfare and labor complaints from misleading consumers on where its meat comes from⁷⁹ to allegedly forcing workers at a Smithfield pork plant in South Dakota to run at full capacity without safety measures despite over eighty employees testing positive for COVID-19.⁸⁰ Although a partnership with Cargill does not necessarily indicate that ZELP is not concerned with animal welfare, the partnership nonetheless arguably calls ZELP’s animal welfare concerns or commitment into question.

4. ZELP Wearable Technology Viability and Efficacy

As mentioned above, it is currently unknown if ZELP’s methane-reduction device and technology is viable. ZELP’s trials claim to produce a fifty-three percent efficacy rate, but this cannot be independently verified.

In June 2021, Professor Frank Mitloehner, a professor at the University of California, Davis’s (UC Davis) Department of Animal Science was asked about ZELP’s wearable technology.⁸¹ Professor Mitloehner was unsure if the mask would work: “While I think, as a scientist, it’s interesting as a concept . . . I’m not sure whether it will work in practice. These things will not stay in place. They will get

⁷⁶ CARGILL, *supra* note 14.

⁷⁷ *Id.*

⁷⁸ MIGHTY EARTH, CARGILL: THE WORST COMPANY IN THE WORLD (2019), <http://www.mightyearth.org/wp-content/uploads/Mighty-Earth-Report-Cargill-The-Worst-Company-in-the-World-July-2019.pdf> [<https://perma.cc/K9YM-XHWR>].

⁷⁹ Todd Neeley, *Animal Rights Groups Cry Foul: Complaint Calls on Cargill to Take Back Claims About Turkey Farms*, PROGRESSIVE FARMER (Nov. 30, 2020, 9:33 AM), <https://www.dtnpf.com/agriculture/web/ag/livestock/article/2020/11/25/complaint-calls-cargill-take-back> [<https://perma.cc/NV9Z-AWRY>].

⁸⁰ *Profits Above All: World’s Largest Pork Company Propagates Global Pandemics*, GRAIN (Apr. 15, 2020), <https://grain.org/en/article/6445-profits-above-all-world-s-largest-pork-company-propagates-global-pandemics> [<https://perma.cc/8JML-DDEV>].

⁸¹ Hansen, *supra* note 56.

dirty.”⁸² Furthermore, research at UC Davis indicated the most effective tool in reducing methane in livestock is to add a type of red seaweed called *Asparagopsis armata* to cow feed, which decreases enteric methane by over eighty percent in beef cattle.⁸³

Research published in the *Journal of Dairy Science* in 2018 concluded that the ability to measure a cow’s breath to determine methane production is “highly uncertain and requires further investigation into variation sources with a systematic nature.”⁸⁴ The study was completed in an air quality lab using an artificial cow reference that “breathes” into a feed bin to determine methane production.⁸⁵ Issues that interfered with the ability to measure a cow’s breath to determine methane production included aerial conditions in the barn, head movements of the cows, ventilation management, barn layout, and general differences between each cow (such as different breathing rates).⁸⁶ The issues cited by the *Journal of Dairy Science* could foreshadow the problems faced by ZELP—and similar methane-reduction wearable device manufacturers—in determining the efficacy of its technology.

Finally, though not directly related to the efficacy of ZELP’s methane-reduction technology, there may be a “cost deterrent” to this type of technology and product. Though ZELP’s site does not currently list the specific cost, reports have indicated that an annual ZELP subscription will start at \$45 per cow, plus a fee to access data.⁸⁷ Other reports cited an annual subscription fee of \$80 per cow.⁸⁸ Farmers have described these costs as “pricey” compared to other more cost-efficient measures.⁸⁹

The ZELP wearable device’s potential cruelty implications in California and Wisconsin are discussed in Part III, below.

⁸² *Id.*

⁸³ Breanna M. Roque et al., *Red Seaweed (Asparagopsis taxiformis) Supplementation Reduces Enteric Methane by over 80 Percent in Beef Steers*, PLOS ONE (Mar. 17, 2021), <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0247820> [<https://perma.cc/A6AW-46ZU>].

⁸⁴ Liansun Wu et al., *Uncertainty Assessment of the Breath Methane Concentration Method to Determine Methane Production of Dairy Cows*, 101 J. DAIRY SCI. 1554, 1563 (2018), [https://www.journalofdairyscience.org/article/S0022-0302\(17\)31062-7/fulltext](https://www.journalofdairyscience.org/article/S0022-0302(17)31062-7/fulltext) [<https://perma.cc/EQ59-HAX5>].

⁸⁵ *Id.* at 1555.

⁸⁶ *Id.*

⁸⁷ de Sousa & Rathi, *supra* note 12.

⁸⁸ de Sousa, *supra* note 14.

⁸⁹ de Sousa & Rathi, *supra* note 12.

III
ANALYZING ZELP'S METHANE-REDUCTION WEARABLE MASK
AGAINST CALIFORNIA'S AND WISCONSIN'S
ANIMAL CRUELTY STATUTES

California Penal Code section 597 “Cruelty to Animals” and Wisconsin Statute section 951 “Crimes Against Animals” are the two most relevant animal cruelty statutes through which the ZELP wearable mask, and similar technology, would be analyzed if ZELP becomes available to U.S. agricultural markets. California and Wisconsin animal cruelty statutes were chosen because these states produce the largest amounts of dairy within the country,⁹⁰ and thus, the product could reasonably be heavily marketed to these states. Overall, without more information on how the devices would be used and monitored, it does not appear that the ZELP wearable device for cows constitutes animal cruelty per California and Wisconsin statutes.

A. California

The ZELP methane-reduction device, as it is currently designed, does not appear to constitute animal cruelty per California’s animal cruelty statute. This position is based solely on a review of currently available information on the beta product being trialed. But there are situations where it is highly likely that the mask could constitute animal cruelty. The likelihood of animal cruelty depends on the following factors: (1) whether the mask obstructs the nostrils and mouth, preventing regular breathing, eating, and drinking; (2) how the cow reacts to the mask being installed; (3) how long the mask is worn; and (4) whether the cows will be continuously monitored to ensure the mask does not become too tight, become caught on another apparatus, or become unsanitary.

1. Relevant Law: California Penal Code Section 597 “Cruelty to Animals”

Farmed animals, including cows, are protected under California’s animal cruelty statute.⁹¹ California Penal Code section 597 is the state’s animal cruelty statute.⁹² California Penal Code section 599b

⁹⁰ U.S. DEP’T OF AGRIC., *supra* note 15.

⁹¹ See *People v. Baniqued*, 101 Cal. Rptr. 2d 835, 840, 842 (Cal. Ct. App. 2000).

⁹² CAL. PENAL CODE § 597 (West 2020).

defines an animal as “every dumb creature.”⁹³ California does not exempt traditional husbandry practices that violate anti-cruelty laws.⁹⁴ And California does not prohibit the use of harnesses or technological devices, similar to the proposed ZELP methane-reduction device, on farmed animals.

Section 597(a) makes it a crime to intentionally maim, mutilate, torture, wound, or kill a living animal.⁹⁵ Under California Penal Code section 599b, the terms “‘torment,’ ‘torture,’ and ‘cruelty’ include every act, omission, or neglect whereby unnecessary or unjustifiable physical pain or suffering is caused or permitted.”⁹⁶ “Maiming means disabling or disfiguring an animal permanently or depriving it of a limb, organ, or other part of the body.”⁹⁷ Therefore, to be convicted of animal cruelty in California, a person⁹⁸ must maliciously⁹⁹ commit an act involving maiming, mutilating, torturing,¹⁰⁰ wounding, or killing a living animal. To act with malicious intent means the act was committed with the “intent to disturb, annoy, or injure an animal.”¹⁰¹

If the requisite mental state of “malicious intent” is not found per section 597(a), courts have held that the mens rea for section 597(b) is criminal negligence.¹⁰² To prove criminal negligence, the following elements must be met: “(1) [t]hat a person has custody or is responsible for providing care to an animal[;] (2) [t]hat person committed a grossly negligent act or omission[; and] (3) [t]hat act or omission caused danger to an animal’s life.”¹⁰³ Negligence requires finding that “the defendant was conscious, acting voluntarily, and that a reasonable person in the

⁹³ *Id.* § 599b.

⁹⁴ ANIMAL LEGAL DEF. FUND, FARMED ANIMAL CRUELTY PROSECUTION GUIDE: CALIFORNIA 7 (2020) [hereinafter ALDF CA FARMED ANIMAL GUIDE 2020], <https://aldf.org/wp-content/uploads/2020/10/Farmed-Animal-Cruelty-Prosecution-Guide-California-2020.pdf> [<https://perma.cc/DL5D-CXJX>]; see also CAL. AGRIC. ISSUES CNTR., CAL. DEP’T OF FOOD & AGRIC., ANIMAL WELFARE (2009), https://www.cdfa.ca.gov/agvision/docs/Animal_Welfare.pdf [<https://perma.cc/Q68S-FHDB>].

⁹⁵ PENAL § 597(a).

⁹⁶ *Id.* § 599b.

⁹⁷ CALCRIM No. 2953 (emphasis omitted) (providing the California jury instructions for a “Cruelty to Animals” charge).

⁹⁸ PENAL § 599b.

⁹⁹ *Id.* (“Someone acts *maliciously* when he or she intentionally does a wrongful act or when he or she acts with the unlawful intent to disturb, annoy, or injure an animal.”).

¹⁰⁰ CALCRIM No. 2953 (“*Torture* means every act, failure to act, or neglect that causes or permits unnecessary or unjustifiable physical pain or suffering.”).

¹⁰¹ *Id.*

¹⁰² *People v. Speegle*, 62 Cal. Rptr. 2d 384, 388 (Cal. Ct. App. 1997).

¹⁰³ *Id.* at 389.

defendant's position would have foreseen that harm to the animal would result from the care that the defendant was giving it"¹⁰⁴ California law prohibits people from torturing, tormenting, or depriving animals of elements necessary for life, including access to food, water, or shelter.¹⁰⁵ Similarly, animal caretakers are prohibited from subjecting their charges to "needless suffering" or "unnecessary cruelty."¹⁰⁶ Common signs of criminal neglect include untreated injuries, infections, open sores, or unsanitary living conditions, including a buildup of animal excrement.¹⁰⁷

2. *Analysis of California Penal Code Section 597(a)–(b) Against ZELP's Methane-Reduction Device*

The ZELP methane-reduction device likely implicates section 597. In addressing the "unnecessary" and "unjustifiable" component of section 597, if the product is considered experimental (and its efficacy at reducing a cow's methane emissions is low or unknown), if there are less intrusive ways of reducing livestock methane, or if the product simply does not work, then keeping a wearable device on a cow's head for up to four years is unnecessary and unjustifiable. And ZELP has indicated that it intends to keep its wearable technology on a cow for its entire life. If the ZELP mask is not controlled by concern for the cow's welfare or if the wearable device is not necessary for human consumption of the cow, then the mask is essentially rendered "unnecessary" and "unjustifiable," particularly if it causes physical pain or harms the cow in the manner described by California's animal cruelty statutes.

California case law has not squarely addressed "unjustifiable" or "unnecessary" animal cruelty within the context of section 597(a)–(b). But in *People v. Untiedt*, the court of appeals discussed "unjustifiable" within the context of section 597f¹⁰⁸ as "abandonment or neglect of animals, by their owners or keepers, under circumstances reasonably likely to result in the infliction of unjustifiable pain, or suffering, or

¹⁰⁴ *Id.* at 390.

¹⁰⁵ CAL. PENAL CODE § 597(b) (West 2020).

¹⁰⁶ *Id.*

¹⁰⁷ ALDF CA FARMED ANIMAL GUIDE 2020, *supra* note 94.

¹⁰⁸ PENAL § 597f (repealed 2022) (stating in part, "Every owner, driver, or possessor of any animal, who permits the animal to be in any building, enclosure, lane, street, square, or lot, of any city, city and county, or judicial district, without proper care and attention, shall, on conviction, be deemed guilty of a misdemeanor[)").

cruelty upon them.”¹⁰⁹ Furthermore, the Washington Court of Appeals, in *State v. Peters*, described unjustifiable animal cruelty as “‘unjustifiable physical pain’ [that] gives fair notice of the objective standard of reasonableness that persons of ordinary intelligence would understand. ‘Unjustifiable’ modifies ‘physical pain that extends for a period sufficient to cause considerable suffering’ or death.”¹¹⁰

The ZELP methane-reduction device could obscure a cow’s nostrils to the point where the cow could not breathe properly or, depending on how it fits around the cow’s head, could prevent it from accessing food or water. Breathing, eating, and drinking are necessary to sustain a cow’s life.¹¹¹ Depriving it of these essential elements would constitute animal cruelty and cause unnecessary suffering—it would constitute unjustifiable suffering. If the methane-reduction device was incorrectly installed—for example, if it was put on too tight—it could wound and constrict the cow. Possible wounds include bruises or abrasive ulcers, especially when the methane-reduction device is used on growing animals that require constant refitting.

Additionally, animal husbandry practices indicate that if cows are to be fitted with a wearable device that includes a halter (also referred to as a harness or headgear), they need to be halter trained.¹¹² It is also recommended that cows wearing halters should be constantly supervised¹¹³ so they do not get caught on vegetation or structures that can cause injury, stress, or death.¹¹⁴ If a cow wears the ZELP methane-reduction device for the entire lifespan of the mask, or up to four years, as recommended by ZELP, the mask could become dirty, potentially leading to unsanitary or unsafe conditions for the cow.

California Penal Code section 597t stipulates that:

Every person who keeps an animal confined in an enclosed area shall provide it with an adequate exercise area. If the animal is restricted by a leash, rope, or chain, the leash, rope, or chain shall be affixed in such a manner that it will prevent the animal from becoming

¹⁰⁹ *People v. Untiedt*, 116 Cal. Rptr. 899, 901 (Cal. Ct. App. 1974).

¹¹⁰ *State v. Peterson*, 301 P.3d 1060, 1069 (Wash. Ct. App. 2013).

¹¹¹ Hannah Himmelmann & Donna M. Amaral-Phillips, *Water Needs for the Dairy Herd*, UNIV. OF KY. COLL. OF AGRIC., FOOD & ENV’T, <https://afs.ca.uky.edu/content/water-needs-dairy-herd> [https://perma.cc/59X4-DYPT].

¹¹² Lisa Bass, *How to Halter Break a Calf*, FARMHOUSE ON BOONE, <https://www.farmhouseonboone.com/how-to-halter-break-a-calf> [https://perma.cc/A6DR-UKC9].

¹¹³ *Id.*

¹¹⁴ Anders Herlin et al., *Animal Welfare Implications of Digital Tools for Monitoring and Management of Cattle and Sheep on Pasture*, ANIMALS, Mar. 2021, at 829, 13 (2021), <https://www.mdpi.com/2076-2615/11/3/829/htm> [https://perma.cc/7REF-XLLH].

entangled or injured and permit the animal's access to adequate shelter, food, and water. Violation of this section constitutes a misdemeanor.

This section shall not apply to an animal which is in transit, in a vehicle, or in the immediate control of a person.¹¹⁵

It is unknown but unlikely that the ZELP wearable, in itself, would constitute "confinement." However, if the cow wearing the ZELP wearable had a "leash, rope, or chain" attached to its harness so that it was unable to access shelter, food, or water, then the person would be criminally liable so long as they were not present at the time the act occurred.

3. Scenario for Animal Cruelty in California

Consider the following example that illustrates a potential scenario for animal cruelty. A worker puts the ZELP methane-reduction device on a cow's head. The cow responds to having the device installed by resisting or shaking its head furiously as if to remove the device. The cow appears annoyed, hurt, or uncomfortable by the device on its head. The cow's response would allow a reasonable person to discern that placing and leaving the device on the cow's head was somewhat either torturous or unpleasant, and certainly uncomfortable. But if the person and company, if applicable, reasonably believe they are helping the cow with the device on its head (i.e., the device tracks animal illness and reduces livestock methane emission), then neither the worker nor the company acted maliciously. But as section 597(b) states, torturous acts require only criminal negligence. Thus, if the person who put the wearable device on the cow can reasonably foresee that the mask would cause harm, discomfort, or deprive, obstruct, or restrict the animal of sustenance or movement, then the person can be found liable of criminally negligent animal cruelty.

For the ZELP methane-reduction device to be exempt from California's animal cruelty statutes, the wearable device must not cause the cow unjustifiable or unnecessary pain or suffering. The cow must be able to access food and water and be able to breathe properly while wearing the ZELP methane-reduction device. The wearable device must not wound the cow's face. Finally, the wearable device must not restrict the cow's movement. Most dairy or beef production facilities

¹¹⁵ CAL. PENAL CODE § 597t (West 2020).

may not be able to provide the oversight or care that is necessary to prevent such scenarios from occurring.

B. Wisconsin

The ZELP methane-reduction device, under the current design, also does not appear to constitute animal cruelty under Wisconsin animal cruelty statutes. Again, this position is based solely on a review of what information is currently available on the beta product that is being trialed. But there are situations where the mask could constitute animal cruelty according to Wisconsin law. Wisconsin analyzes animal cruelty through the following factors: (1) whether the mask obstructs the nostrils and mouth, preventing regular breathing, eating, and drinking; (2) how the cow reacts to the mask being installed; (3) how long the mask is worn; and (4) whether the cow will be continuously monitored to ensure that the mask does not become too tight, get caught on another apparatus, or become unsanitary.

Similar to California's animal cruelty statutes, farmed animals are protected under Wisconsin animal cruelty laws,¹¹⁶ with some exceptions mentioned below. Section 951 is Wisconsin's law defining crimes against animals.¹¹⁷ Section 951.01 defines animal as every living "warm-blooded creature, except a human being"; as well as reptiles and amphibians.¹¹⁸ Farmed animals¹¹⁹ are exempt from "proper shelter" standards set forth in section 951.14.¹²⁰ Wisconsin does not prohibit the use of harnesses or technological devices, such as the ZELP methane-reduction device, on farmed animals.

In Wisconsin, "[n]o person may treat any animal, whether belonging to the person or another, in a cruel manner."¹²¹ "'Cruel' means causing unnecessary and excessive pain or suffering or unjustifiable injury or death."¹²² This section neither prohibits "normal and accepted veterinary practices"¹²³ nor "[t]eaching, research, or experimentation

¹¹⁶ WIS. STAT. ANN. § 951.01(1)(a) (West 2011).

¹¹⁷ *Id.* § 951.

¹¹⁸ *Id.* § 951.01(1)(a)–(c).

¹¹⁹ *Id.* § 951.01(3) (defining "[f]arm animal" as "any warm-blooded animal normally raised on farms in the United States and used or intended for use as food or fiber").

¹²⁰ *Id.* § 951.14 ("In the case of farm animals, nothing in this section shall be construed as imposing shelter requirements or standards more stringent than normally accepted husbandry practices in the particular county where the animal or shelter is located.").

¹²¹ *Id.* § 951.02.

¹²² *Id.* § 951.01(2).

¹²³ *Id.* § 951.02.

conducted pursuant to a protocol or procedure approved by an educational or research institution, and related incidental animal care activities, at [certain] facilities.”¹²⁴ Therefore, if the ZELP methane-reduction device was found to be an “accepted veterinary practice” or was used for research or experimentation purposes, it would not violate Wisconsin’s animal cruelty statute. Furthermore, even though a conviction under this section does not require proof of intent or negligence,¹²⁵ the nature and extent of the violation dictate the type of penalty assessed, from Class C forfeitures to felonies.¹²⁶

It is not always clear what constitutes “cruelty” or what is “unjustifiable” under Wisconsin animal cruelty statutes. This quandary was analyzed by the Wisconsin Court of Appeals in *State v. Pevan*.¹²⁷ There, the defendant was charged with a felony violation of section 951.02 after the defendant’s neighbor’s dog died from ingesting rat poison on defendant’s property.¹²⁸ The defendant argued that “the mere act of placing rat poison on his property does not, as a matter of law, constitute ‘cruel and unjustified’ treatment of an animal.”¹²⁹ The court disagreed: “Pevan asserts either he or his ex-girlfriend were entitled to place rodenticides on their property, and they were under no duty to refrain from this common practice even after they became aware S.C.’s dogs were entering their yard.”¹³⁰ The defendant also said the dog was not treated in a “cruel” manner because “the dog was only poisoned, not ‘tortured . . . caged or starved.’”¹³¹ The court again disagreed with the defendant’s understanding of the statute, saying that cruel treatment results when a person causes the “‘unnecessary and excessive pain or suffering *or* unjustifiable injury or death’ of an animal.”¹³² The defendant treated the dog victim, Moose, cruelly

¹²⁴ *Id.* § 951.015(3)(a)–(b).

¹²⁵ *State v. Stanfield*, 314 N.W.2d 339, 340 (Wis. Ct. App. 1982).

¹²⁶ *See generally* WIS. STAT. § 951.18. The civil and criminal penalties provided for in chapter 951 intentionally are different. For example, a first-time violation of section 951.02 (“Mistreating animals”) may be subject only to a Class C forfeiture. *See id.* § 951.18(1). The penalties are enhanced if the mistreatment is deemed intentional or negligent; in those instances, the defendant faces a misdemeanor charge. *Id.* Similarly, persons who engage in certain aspects of animal fighting under section 951.18 or engage in the “mutilation, disfigurement, or death of an animal” face Class I felony charges. *Id.*

¹²⁷ *State v. Pevan*, No. 2014CF34, 2017 WL 2870051, at *3 (Wis. Ct. App. July 5, 2017).

¹²⁸ *Id.* at *1.

¹²⁹ *Id.* at *3.

¹³⁰ *Id.*

¹³¹ *Id.*

¹³² *Id.* (citing WIS. STAT. § 951.01(2)).

because he fed the dog poison, which led to his drawn-out, painful death.¹³³

While *Pevan* is not analogous to a cow wearing ZELP's methane-reduction device, it nevertheless helps clarify the importance of intent, causation, and what is unjustifiable. For instance, regardless of intent—which goes to the severity of the crime in Wisconsin but not to whether a person may be convicted of animal cruelty—a person who fastens a ZELP methane-reduction device on a cow's head—whether it is in a manner that is too tight (causing wounds or sores), or in a manner that does not allow the cow to eat or drink, or the wearable device gets caught on vegetation (preventing the cow from moving or accessing what the animal needs)—the very act of placing the mask on the cow's head would still cause unjustifiable pain or suffering of the cow. And if the wearable device is not taken off after a person reasonably notices the cow's pain or suffering, it further adds to the unjustifiable nature of the crime: the drawn-out pain or suffering experienced by the cow. Additionally, it could be irrelevant whether someone is “entitled” to place the methane-reduction device on their property (including cattle): “they were under no duty to refrain from such a common practice [such as affixing methane-reduction devices to cows' heads],”¹³⁴ even if they know the wearable causes physical pain or suffering.

Wisconsin animal cruelty laws prohibit “bristle bur[s], tack bur[s]” and other similar devices from being affixed to any animal.¹³⁵ Therefore, in Wisconsin, a person could commit animal cruelty if they affixed a bristle bur, tack bur, or like device onto the ZELP methane-reduction device.

Finally, Wisconsin prohibits “for the purpose of feeding livestock, [the sale of] any utensil painted with a substance having a toxic effect upon livestock when taken orally.”¹³⁶ Even though the ZELP methane-reduction device is not used as a “utensil” for the “purpose of feeding livestock,” it would be interesting to determine if the plastic, rubber-like portion of the wearable contains any toxic substance that would have an effect on the cow.

In total, it is unlikely that ZELP's cow wearable device by itself, without more facts, constitutes animal cruelty per California and Wisconsin animal cruelty statutes. Under California or Wisconsin law,

¹³³ *Id.*

¹³⁴ *Id.*

¹³⁵ WIS. STAT. ANN. § 951.07 (West 2022).

¹³⁶ *Id.* § 95.235.

numerous factors and scenarios could render the device “cruel,” but at this time not enough is known to determine if the device itself is legally cruel.

But ZELP’s device is not necessarily harmless just because it does not per se constitute animal cruelty. Farmed animals—particularly animals in factory farms—suffer exponentially and have no federal legal protections in the United States, and states’ legal protections vary. If farmed animals are protected under state laws, those laws are fraught with exceptions (most state laws exempt standard agricultural practices, which are inhumane and cruel), ambiguities, or the crimes are not prosecuted. Further, as history has taught us, the law is not always just or right. Thus, just because an agricultural practice or methane-reduction device does not wholly satisfy animal cruelty statutes, it does not mean the agricultural practice or methane-reduction device is not cruel or inhumane.

IV

ZELP WEARABLE DEVICE’S PSYCHOLOGICAL IMPACT ON CATTLE

This Part shifts from cruelty implications of the ZELP wearable device to a discussion of potential psychological and behavioral impacts on cows.

A. Studying Cows as Individuals to Improve Animal Welfare

Studies on cow behavior and psychology provide useful insight on the potential impact of ZELP technology on these animals.

Given that cows are subjected to so many highly invasive and objectifying practices, the need to understand who they are—on their own terms—is long overdue . . . [Society should] attempt to place our understanding of them outside of the framework of their use as sources of food, clothing, work, and organ donors. The substantial and growing literature on the psychology of other animals indicating they have rich mental lives continues to have ethically important consequences for how we relate to and treat them. Therefore, understanding the psychology of cows should have a similar impact on our view of them and their wellbeing.¹³⁷

Cows experience pain and basic emotions; evidence suggests cows have complex emotional, social, and cognitive functioning. According

¹³⁷ Lori Marino & Kristin Allen, *The Psychology of Cows*, 4 ANIMAL BEHAV. & COGNITION 474, 475 (2017), [https://www.animalbehaviorandcognition.org/uploads/journals/17/AB&C_2017_Vol4\(4\)_Marino_Allen.pdf](https://www.animalbehaviorandcognition.org/uploads/journals/17/AB&C_2017_Vol4(4)_Marino_Allen.pdf) [<https://perma.cc/726A-WHU6>].

to Temple Grandin's research, fear is the main emotion experienced by cows.¹³⁸ Because animals "tend to make place-specific associations . . . it is . . . important that an animal's first association with something new is a good first experience."¹³⁹ Cows are also very touch sensitive: they have "mechanoreceptors, thermoreceptors, and nociceptors in the skin and muzzle."¹⁴⁰ Because of this sensitivity, the application of the ZELP mask could be particularly upsetting to a cow. One experiment with tail-mounted calving sensors found that "80% of farmers stated that the animals reacted negatively when the sensor was attached to the tail root, and 20% observed so much damage that amputation of the tail was necessary."¹⁴¹

Studies concerning the behaviors and sensitivities of cows can help understand how these animals might react to the ZELP methane-reduction device around their face. First, if the application of the ZELP methane-reduction device is conducted in a rough or painful manner, it will frighten the cow and may interfere with the animal's ability to successfully wear the device. Second, because cows are very sensitive to touch, they may be uncomfortable with a halter and rubber-like plastic cover over or attached to their nose. But, as research suggests, even though a cow may be in pain, they often mask emotion and do not display overt signs of distress to evade predators.¹⁴² Therefore, a person affixing the wearable device would need to monitor the animal's actions and be ready to interfere quickly, which may not be possible in an industrial farming setting.

In conclusion, the life of a dairy or beef cow is already stressful because the animals are forced to live in unnatural conditions and may be subject to various cruel acts;¹⁴³ therefore, adding a wearable device around the cow's head for either four years or for the duration of their life would likely add to these stressful and unnatural conditions.

¹³⁸ Temple Grandin, *Thinking the Way Animals Do: Unique Insights from a Person with a Singular Understanding*, DR. TEMPLE GRANDIN'S WEBSITE (Updated Jan. 2015), <https://www.grandin.com/references/thinking.animals.html> [<https://perma.cc/GB5F-4RDP>].

¹³⁹ *Id.*

¹⁴⁰ Marino & Allen, *supra* note 137, at 476.

¹⁴¹ Herlin et al., *supra* note 114, at 12.

¹⁴² Marino & Allen, *supra* note 137, at 476.

¹⁴³ *Id.* at 475.

B. The Relationship Between Cows' Reaction to Sudden, Intermittent Movements and Sounds, and Corresponding Temperament

The Department of Animal Studies at Colorado State University conducted a study of six commercial livestock auctions to determine the relationship between breed, gender, and temperament to the response of sudden, intermittent sights and sounds. Although a cow at an auction may not be wearing the ZELP methane-reduction device, the results of what types of cows were affected in this study is interesting, especially because it appears that the ZELP methane-reduction device is primarily targeted for the dairy cow industry. The study showed that Holstein dairy cows were more sensitive to sound and touch than beef cattle.¹⁴⁴ Therefore, if the product is particularly targeted toward dairy cattle, there is a high likelihood that the subject animals may be more sensitive to the device.

C. Cow Bell Studies

Swiss farmers typically attach bells around their cattle's necks to keep track of their herds.¹⁴⁵ Studies conducted on Swiss dairy cattle show that cows that experienced continuous exposure to cowbells (around their necks) had behavioral reactivity to the constant noise.¹⁴⁶ Generally, constant exposure to the chime of a bell may affect cows' acoustic perception and may be associated with hearing loss or pain.¹⁴⁷ A 2015 study also found that cows that wore a bell around their neck for over three days ate less, did not lie down as much, and spent less time ruminating.¹⁴⁸ For this experiment, noise was described as "an acute, chronic or intermittent sound, which can act as a potential stressor in farmed species."¹⁴⁹ Relatedly, since the ZELP methane-

¹⁴⁴ J.L. Lanier et al., *The Relationship Between Reaction to Sudden, Intermittent Movements and Sounds and Temperament*, DR. TEMPLE GRANDIN'S WEBSITE (Jan. 6, 2000), <https://www.grandin.com/references/cattle.sounds.sensitivity.html> [<https://perma.cc/T2Q2-JNA3>].

¹⁴⁵ Julia Johns et al., *Regular Exposure to Cowbells Affects the Behavioral Reactivity to a Noise Stimulus in Dairy Cows*, FRONTIERS IN VETERINARY SCI., Sept. 29, 2017, at 1, 1, <https://www.frontiersin.org/articles/10.3389/fvets.2017.00153/full> [<https://perma.cc/EQU6-B6E3>].

¹⁴⁶ *Id.* at 7–8.

¹⁴⁷ *Id.* at 9.

¹⁴⁸ Julia Johns et al., *Do Bells Affect Behaviour and Heart Rate Variability in Grazing Dairy Cows?*, PLOS ONE (June 25, 2015), <https://doi.org/10.1371/journal.pone.0131632> [<https://perma.cc/N4N4-97UN>].

¹⁴⁹ *Id.*

reduction device is described as a type of “catalytic converter,” it is possible that the wearable device emits a type of noise, such as a buzzing, or a frequency heard by only the cow, causing discomfort or pain.¹⁵⁰

Overall, cows are sensitive animals, and studies indicate wearing the ZELP methane-reduction device would cause—at the very least—discomfort, particularly if continuously worn for the duration of the cow’s life. If the wearable device becomes dirty, too tight, or stuck on another device, the cow’s mental and physical health could deteriorate and potentially cause pain to the animal.

This Comment concludes with a discussion of non-exhaustive alternative solutions to reducing livestock’s impact on the environment and alternatives that may prove to be more humane and more effective than a cow wearable device. The cow wearable can still be harmful to the animal despite its ostensibly legal status.

V

ALTERNATIVE METHODS FOR REDUCING LIVESTOCK’S ENVIRONMENTAL IMPACT

A 2021 study conducted by UNEP and the Climate and Clean Air Coalition shows that cutting farm-related methane emissions is crucial in combating climate change.¹⁵¹ As mentioned, various experts, including academics, scientists, and public and private sector employees, are discussing methods to combat methane emissions from cattle and other livestock ruminants. This Part is not an exhaustive list of alternative methods for methane-reduction strategies for cattle; rather, it is a representative sample of existing, alternative methods to the cow methane-reduction wearable device. Many of these solutions do not specifically suggest a cow methane-reduction wearable device, although of course it could be included in “leveraging new technology.”¹⁵² “UNEP Food Systems and Agriculture Advisor James Lomax says the world needs to begin by ‘rethinking our approaches to agricultural cultivation and livestock production.’ That includes

¹⁵⁰ Lanier et al., *supra* note 144 (“Cattle and horses have ears that are more sensitive than human ears. They are especially sensitive to high-frequency sounds. Therefore, noises that are a whisper to humans are quite audible to cattle. [Research has found] an inverse relationship between level of sound and abnormal behavior in dairy cattle. Noises in auction houses are diverse in frequency and source, so auction houses provide a good setting for observing cattle’s reaction to intermittent sound.”) (internal citations omitted).

¹⁵¹ UNEP, *supra* note 22.

¹⁵² *Id.*

leveraging new technology, shifting towards plant-rich diets and embracing alternative sources of protein.”¹⁵³ Manure management is another solution that includes “efficiently [] covering it, composting it, or using it to produce biogas.”¹⁵⁴ The 2021 UNEP and Climate and Clean Air Coalition study also included “breeding to improve productivity and animal health/fertility” as another livestock methane mitigation strategy.¹⁵⁵

UNEP’s solution includes giving animals more nutritious feed so they are “larger, healthier and more productive, effectively producing more with less.”¹⁵⁶ As previously mentioned, livestock feed is another method researched by scientists—essentially, feed that can reduce methane emitted by cows.¹⁵⁷ The Commonwealth Scientific and Industrial Research Organization, an Australian federal agency, collaborated with UC Davis professor Ermias Kebreab (and his Ph.D. graduate student Breanna Roque)¹⁵⁸ in conducting studies on “carbon farming” and the use of feed additives to reduce methane emissions from cattle.¹⁵⁹ The study elaborated on the use of feed additives:

Methane-reducing feed additives and supplements inhibit methanogens in the rumen, and subsequently reduce enteric methane emissions.

Methane-reducing feed additives and supplements are most effective when grain, hay or silage is added to the diet, especially in beef feedlots and dairies.

...

Methane-reducing feed additives and supplements can be:

- synthetic chemicals
- natural supplements and compounds, such as tannins and seaweed
- fats and oils.

Synthetic chemicals, such as antibiotics, are sometimes used to improve the efficiency of feed conversion in cattle, although it is not

¹⁵³ *Id.*

¹⁵⁴ *Id.*

¹⁵⁵ GLOBAL METHANE ASSESSMENT, *supra* note 19, at 16.

¹⁵⁶ UNEP, *supra* note 22.

¹⁵⁷ *Id.*; GLOBAL METHANE ASSESSMENT, *supra* note 19, at 103.

¹⁵⁸ Diane Nelson, *Feeding Cattle Seaweed Reduces Their Greenhouse Gas Emissions 82 Percent*, UC DAVIS (Mar. 17, 2021), <https://caes.ucdavis.edu/news/feeding-cattle-seaweed-reduces-their-greenhouse-gas-emissions-82-percent> [https://perma.cc/AQK6-P7UY].

¹⁵⁹ *Id.*; AUSTRALIA, *supra* note 26.

a recommended practice to use these additives to reduce methane emissions. There are legislative restrictions and human health concerns about using antibiotics as growth promotants in livestock.

There is potential for natural compounds and materials to reduce methane production in livestock, though these products have not been widely commercialised. Feeding one type of seaweed at 3% of the diet has resulted in up to 80% reduction in methane emissions from cattle.

Fats and oils show the most potential for practical application to farming systems and have shown methane emission reductions of 15–20%.¹⁶⁰

The study concluded by discussing the benefits and risks associated with using feed additives to reduce methane emissions from cattle.¹⁶¹ First, carbon benefits include “reducing greenhouse gas emissions by feeding nitrates to beef cattle.”¹⁶² Second, dietary additives are added to milking cows.¹⁶³ Further analysis on the two feed additives is described below:

Adding nitrates to the diet at a specified rate optimises rumen fermentation, and changes the pathway of hydrogen to produce ammonia rather than methane. This can have the dual effect of reducing methane emissions while improving or maintaining animal performance. We recommend that producers seek specialist advice before using this option because overdosing can result in nitrate poisoning.

In the approved methodology for feeding nitrates to beef cattle, nitrate salt licks are substituted for animals previously fed urea, and is potentially applicable outside of feedlots.

The use of dietary additives is currently approved only for grazing milking cows and includes the addition of eligible additives to increase fat content of the diet to reduce methane emissions.¹⁶⁴

In addition to the carbon-reduction benefits of these feed additives, “co-benefits” are also described:

- The reduced volume of methane formation may lead to better efficiency of feed utilisation, given that methane emissions represent a gross energy loss from feed intake of about 10%.
- Addition of fats and oils to the diet are a source of energy to the animal, as well as reducing methane.

¹⁶⁰ AUSTRALIA, *supra* note 26.

¹⁶¹ *Id.*

¹⁶² *Id.*

¹⁶³ *Id.*

¹⁶⁴ *Id.*

Opportunities to use feed additives or supplements:

- Reduction of methane emissions through feed additives, such as fats and oils, can reduce methane production by about 18% and offer energy and protein to the animal. For a 600 cow dairy herd (producing 100kg of methane per head per year) methane emissions could be reduced by 372 tonnes of carbon dioxide equivalent per year.
- Reducing methane emissions is deemed 'additional' to normal management practices.¹⁶⁵

Critically important is the inclusion of seaweed in cattle feed because it is extremely efficient at reducing methane emissions from cattle.¹⁶⁶ Recent research at UC Davis shows that adding red seaweed (*Asparagopsis armata*) to cow feed reduced cattle ruminant enteric methane by over eighty percent.¹⁶⁷ Additionally, red seaweed reduced ruminant enteric methane production by up to ninety-nine percent in vitro.¹⁶⁸ Presumably, inclusion of red seaweed into a dairy cattle's diet would result in the same methane reduction efficacy rate. The inclusion of red seaweed into cattle feed is more effective than a wearable device and would not implicate any current or potential animal welfare concerns because the cow would eat and digest the red seaweed as part of its regular meal.

Third, and finally, reducing human meat consumption is crucial to mitigating climate change.¹⁶⁹ *Science* published a piece in 2020 titled, *Global Food System Emissions Could Preclude Achieving the 1.5° and 2°C Climate Change Targets*.¹⁷⁰ The authors highlight how global food system GHG emissions can be mitigated by five strategies:

¹⁶⁵ *Id.*

¹⁶⁶ Roque et al., *supra* note 83.

¹⁶⁷ *Id.*; see also Nelson, *supra* note 158.

¹⁶⁸ Roque, et al., *supra* note 83. In vitro is Latin for "in glass." It describes medical procedures, tests, and experiments that researchers perform outside a living organism. An in vitro study occurs in a controlled environment, such as a test tube or petri dish. Jamie Eske, *What Is The Difference Between In Vivo and In Vitro?*, MED. NEWS TODAY (Aug. 31, 2020), <https://www.medicalnewstoday.com/articles/in-vivo-vs-in-vitro#definitions> [<https://perma.cc/N4PF-DS56>].

¹⁶⁹ Lili Pike, *Why We Need Policies to Reduce Meat Consumption Now*, VOX (Nov. 17, 2020, 1:30 PM), <https://www.vox.com/21562639/climate-change-plant-based-diets-science-meat-dairy> [<https://perma.cc/8AP2-VYSS>].

¹⁷⁰ Michael A. Clark et al., *Global Food System Emissions Could Preclude Achieving the 1.5° and 2°C Climate Change Targets*, 370 SCI. 705 (2020), <https://www.science.org/doi/10.1126/science.aba7357> [<https://perma.cc/3NUN-BN92>].

(i) globally adopting a plant-rich diet [here modeled as a diet rich in plant-based foods that contains moderate amounts of dairy, eggs, and meat, such as a Mediterranean diet or planetary health diet . . .]; (ii) adjusting global per capita caloric consumption to healthy levels; (iii) achieving high yields by closing yield gaps and improving crop genetics and agronomic practices; (iv) reducing food loss and waste by 50%; and (v) reducing the GHG intensity of foods by increasing the efficiency of production, such as by altering management regimes (e.g., precise use of nitrogen fertilizer and other inputs) or technological implementation (e.g., additives to ruminant feed).¹⁷¹

Notably, individuals adopting a plant-based diet will greatly reduce emissions.¹⁷² University of Oxford studies show that in the United States alone, “where per capita meat consumption is three times the global average, dietary change has the potential for a far greater effect on food’s different emissions, reducing them by 61 to 73%.”¹⁷³ Mitigating emissions through consumers, rather than producers, generates higher reduction rates.¹⁷⁴ This is, in part, due to the following:

Moving from current diets to a diet that excludes animal products . . . has transformative potential, reducing food’s land use by 3.1 (2.8 to 3.3) billion ha (a 76% reduction), including a 19% reduction in arable land; food’s GHG emissions by 6.6 (5.5 to 7.4) billion metric tons of CO₂eq (a 49% reduction); acidification by 50% (45 to 54%); eutrophication by 49% (37 to 56%); and scarcity-weighted freshwater withdrawals by 19% (–5 to 32%) for a 2010 reference year. The ranges are based on producing new vegetable proteins with impacts between the 10th- and 90th-percentile impacts of existing production. In addition to the reduction in food’s annual GHG emissions, the land no longer required for food production could remove ~8.1 billion metric tons of CO₂ from the atmosphere each year over 100 years as natural vegetation reestablishes and soil carbon re-accumulates, based on simulations conducted in the IMAGE integrated assessment model.¹⁷⁵

These studies tell a compelling story demonstrating various approaches to reduce GHG emissions. A plant-based diet, along with the methods outlined above, positively impacts the environment.

¹⁷¹ *Id.* at 705–06.

¹⁷² *Id.* at 706.

¹⁷³ J. Poore & T. Nemecek, *Reducing Food’s Environmental Impacts Through Producers and Consumers*, 360 *SCI.* 987, 991 (2018), <https://www.science.org/doi/10.1126/science.aag0216> [<https://perma.cc/B8NY-LYZZ>].

¹⁷⁴ *Id.*

¹⁷⁵ *Id.*

Reducing or eliminating meat consumption restricts the large-scale and expansive suffering of animals raised in factory farms;¹⁷⁶ this causes the least harm to animals and aligns with an animal welfare and animal rights–focused approach to climate change. Animal rights is a complex concept but, for this Comment’s purposes, it can be summed up by three distinct theories: (1) a utilitarian call to minimize suffering that states that sentient creatures have a right to “equal consideration” because of their capacity for suffering and because speciesism¹⁷⁷ is a form of discrimination;¹⁷⁸ (2) deontology, a philosophy that discusses a moral duty to animals because animals are individual “subjects of a life” with complex feelings and experiences beyond their capacity for suffering;¹⁷⁹ and (3) animal personhood, or the legal right to “bodily liberty,” due to animals’ superior cognitive abilities.¹⁸⁰ Furthermore, animal rights, autonomy, or personhood, does not mean animals should have the exact same rights as humans; rather, the movement often views animal rights on a sliding scale paradigm, such as quasi-property or quasi-person.¹⁸¹ Admittedly, it will be difficult, perhaps even unreasonable, to expect that humans will cease eating meat. Thus, the solutions outlined above are offered as a complimentary co-mitigation plan to tackle climate change and offer additional viable options to a methane-reduction wearable cattle device.

¹⁷⁶ Maya B. Mathur et al., *Reducing Meat Consumption by Appealing to Animal Welfare: Protocol for a Meta-analysis and Theoretical Review*, 9 SYSTEMATIC REVIEWS, no. 3, 2020, at 1, <https://systematicreviewsjournal.biomedcentral.com/counter/pdf/10.1186/s13643-019-1264-5.pdf> [<https://perma.cc/FC6R-DF58>].

¹⁷⁷ *Speciesism*, MERRIAM-WEBSTER, <https://www.merriam-webster.com/dictionary/speciesism> [<https://perma.cc/J284-YXW2>] (defining speciesism as “prejudice or discrimination based on species[;] especially: discrimination against animals”).

¹⁷⁸ Janet M. Davis, *The History of Animal Protection in the United States*, ORG. OF AM. HISTORIANS, <https://www.oah.org/tah/issues/2015/november/the-history-of-animal-protection-in-the-united-states/> [<https://perma.cc/97MG-XM8R>].

¹⁷⁹ *Id.*

¹⁸⁰ *Id.*

¹⁸¹ Angela Fernandez, *Animals as Property, Quasi-Property or Quasi-Person*, in BROOKS U. ANIMAL LAW FUNDAMENTALS, https://thebrooksinstitute.org/sites/default/files/presentations/Animal%20Law%20Fundamentals%20-%20Angela%20Fernandez_1.pdf [<https://perma.cc/BDS5-F3VA>].

CONCLUSION

The United Nations describes climate change as “the defining crisis of our time.”¹⁸² To combat climate change we must quickly work to enact viable solutions and seriously look into anthropogenic causes of warming. Experts, academics, scientists, activists, and governments are grappling with these issues; they are all coming together with innovative and commonsense solutions to combat climate change. One such novel and creative solution is ZELP’s methane-reduction cattle wearable device, which has yet to be peer-reviewed and used by the agriculture industry. Although such inventions invoke hope in combating climate change, other tested and more effective solutions are available. These include livestock feed additives, such a red seaweed and plant-based diets, which aid animal welfare and animal rights initiatives. These alternatives reduce land use and waste while ultimately curbing GHG and methane emissions.

Eliminating global meat and dairy production will be difficult, but if society is to test and ultimately use cattle methane-reduction masks or other devices as an alternative, then animal health and well-being must be given utmost consideration. After all, it is humanity’s mass production and breeding of cows (and other animals) that directly impacts anthropogenic climate change. But conversations within the agricultural industry often leave out animal welfare because profit comes first. Generally, the cattle industry sets the standards governing cattle health and welfare.¹⁸³ Therefore, cruel husbandry practices such as the castrating, dehorning, tail docking, or branding are accepted.¹⁸⁴ Traditional husbandry practices both worldwide and within the United States permit farmed animals to wear harnesses or devices. U.S. case law, statutes, or literature to the contrary was not found specifically addressing the cruelty of a device similar to the ZELP cow methane-reduction mask.

Per California and Wisconsin animal cruelty statutes, the ZELP methane-reduction device would likely be permitted, unless more evidence demonstrates that the device deprives, restricts, or harms cows. More information and research are needed on ZELP’s viability,

¹⁸² *The Climate Crisis – A Race We Can Win*, UNITED NATIONS [hereinafter *The Climate Crisis*], <https://www.un.org/en/un75/climate-crisis-race-we-can-win> [<https://perma.cc/2JJY-L8WL>].

¹⁸³ David S. Turk, *Detailed Discussion of Cattle Laws*, ANIMAL LEGAL & HIST. CTR. (2007), <https://www.animallaw.info/article/detailed-discussion-cattle-laws#husbandry> [<https://perma.cc/5DXY-UUT4>].

¹⁸⁴ *Id.*

design, and logistics to determine its impact on cows—specifically, peer-reviewed studies of cows wearing the mask in large-scale agricultural settings and other environments to determine efficacy, use, sustainability, and animal welfare. Finally, just because the methane-reduction device does not wholly violate animal cruelty statutes does not mean that the device is humane. Cows are sensitive animals and putting a methane-reduction mask on their heads for the duration of their lives is unnecessary and inhumane.

In finding solutions to anthropogenic climate change, we need to think creatively and act fast. Importantly, we must remember *all* suffering, including those of animals, in our plight to save the planet. Technology plays a role in these solutions, but humans must take responsibility and not use animals as experiments for technology. As the United Nations said:

Scalable new technologies and nature-based solutions will enable us all to leapfrog to a cleaner, more resilient world. If governments, businesses, civil society, youth, and academia work together, we can create a green future where suffering is diminished, justice is upheld, and harmony is restored between people and planet.¹⁸⁵

Animals are living, breathing, feeling creatures that deserve respect and bodily autonomy. Millions of farmed animals die each year for human consumption. The ever-growing human population's demand for meat and other animal products drives production. Cows are ultimately not to blame for anthropogenic climate change: humans are. Thus, humans should create and utilize alternative humane and sustainable methods beyond experimental technology to solve anthropogenic climate change concerns. A non-peer-reviewed invasive mask, forced upon a cow's head for its entire life in a factory farm, should not be an option—after all, if such an uproar was made by humans having to wear masks during the COVID-19 pandemic, why should it be any different for a cow?

¹⁸⁵ *The Climate Crisis*, *supra* note 182.

