Veterinary sustainability

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Abstract

Respected for their knowledge of animal health and disease, veterinarians safeguard animal health and welfare and, where applicable, the productivity of animals under their care. With the threats posed by climate change, the veterinary profession must use this privilege to support the whole spectrum of the human-animal-environmental interface to shift towards the objectives outlined in the United Nations 17 Sustainable Development Goals. This article provides medical writers with an overview of the challenges specific to veterinary sustainability, both in supporting others to make sustainable choices and improving sustainable veterinary practice. A veterinary-led initiative that produces sustainability guidelines for the veterinary profession is also showcased as a model of information-sharing and engagement. This is discussed against a food security and sustainability background, likely unfamiliar territory for the medical communications professional

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Introduction

The vast majority of the discourse surrounding the impact of climate change is anthropocentric: it is a crisis for humanity.[1] This narrative minimises, or omits completely, the effects on the non-human species that share the planet with us, whether domesticated, feral, or wild. Apart from the ethical and philosophical questions it raises about the imposition of climate change by human activity on non-human species, the narrow focus on humankind is a reductive approach that threatens to undermine efforts to become a genuinely sustainable global society.[2]

Humanity's interaction with domesticated species has environmental (gaseous emissions, water and soil pollution, ecosystem damage, and depleted species diversity); animal welfare (intensive production systems and breeding); and human and animal health (threat of zoonoses and antimicrobial resistance) consequences. As health care providers of all non-human species, the veterinary profession could be considered a part of the problem, particularly in prescribing practices and the support of intensive farming industries. However, acknowledging the substantial environmental impact of food animal production on the environment, veterinary expertise to improve animal health and welfare, increase productivity, and reduce waste will be essential for the development of sustainable animal agriculture. A new academic field has even been introduced, the Veterinary Humanities, out of a need to properly define the relationship between animal protection and sustainability.[2]

All sectors of the global society are redefining their roles in society for a sustainable future using the UN Sustainable Development Goals (SDG) framework. Many domains, including the veterinary profession and animal welfare, have found that the SDG framework does not directly address their domain (yet).[3] However, the scope of the SDGs is broad enough to ensure that high animal welfare standards are not incompatible with the SDGs and vice versa.[4]

This article describes the veterinary profession's role and responsibility in sustainable development, here defined as a "negotiated path toward some notion of sustainability."[2]

The focus is on humankind's interaction with domesticated species. However, mention must be given to wildlife trade, a major driver of environmental change.[2]

The central role of the veterinary profession in supporting sustainable development is illustrated using three examples: food production animals, aquaculture, and pets. The obstacles and solutions to mitigating the environmental impact of veterinary practice itself are then discussed. Finally, the challenge of disseminating the sustainability message to the broader profession is discussed. This article aims to provide the medical communications professional with an overview of veterinary sustainability.

Veterinary sustainability in the global political arena

Three prominent global bodies, the World Health Organization (WHO), the Food and Agriculture Organization (FAO), and the World Organisa-

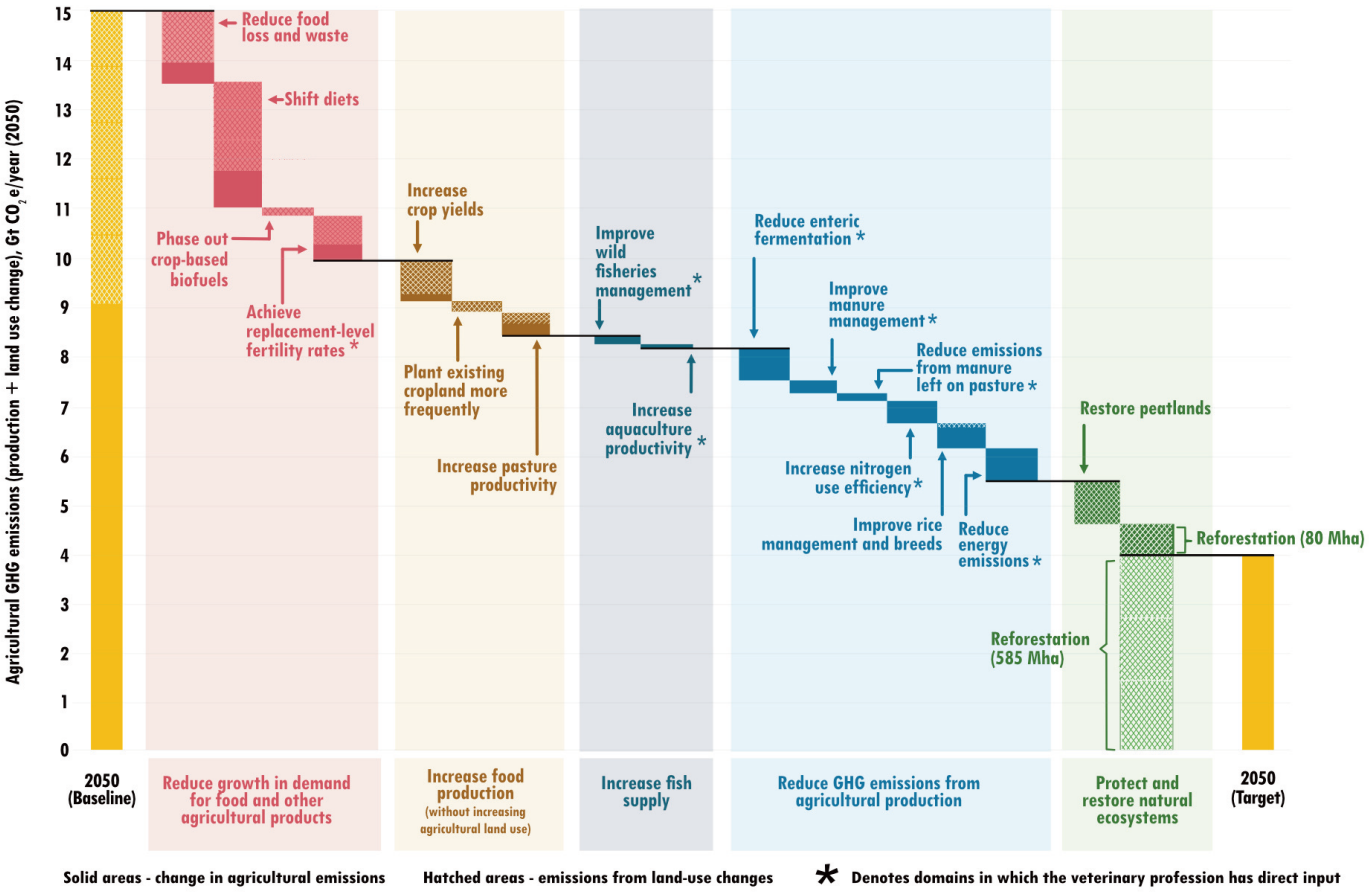

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Figure 1. Closing the greenhouse mitigation gap

Qualitative representation of the per-sector contribution of mitigation measures to the reduction of total annual agricultural GHG emissions in 2050 to a target of 4 Gt CO_2 e/year. Areas where the veterinary profession has direct input are also depicted.

Abbreviation: GHG, greenhouse gas

Source: World Resources Report, World Resources Institute, July 2019

tion for Animal Health (OIE), came together in 2010 to produce the Tripartite Concept Note.[5] This unprecedented collaboration was formed to facilitate a globally integrated network to manage the increased risk of a zoonotic disease that had arisen due to climate change impacts at the human-animal-ecosystem interface. The OIE has 182 member countries, and national delegates include veterinary surgeons, chief veterinary officers, and veterinary leaders. It provides a crucial platform for the veterinary profession to communicate with international policymakers. Food sustainability and the importance of animal health and welfare is also detailed in the European Union's "Farm to Fork" strategy, part of the European Green Deal.[6]

Furthermore, in June 2021, the Federation of Veterinarians of Europe (FVE) published a position statement that committed members to the active contribution to sustainable food systems through "the promotion of animal health, welfare, and public health", which represents "the backbone for improved sustainability, global health, and security."[7] In the UK, the British Veterinary Association has produced a position statement supporting the sustainable development of animal agriculture, with a strong emphasis on animal welfare.[8]

In summary, veterinary policymakers at the national, international, and global levels are universally committed to finding sustainable solutions to the role of animals in agriculture.

Some environmental impacts of domesticated species (and their sustainability solutions)

Veterinarians are not just healthcare professionals. Those who work in farm practice have a central role in food production and security, a subject with which medical writers may be unfamiliar. Veterinarians are also ideally positioned to advise and educate animal owners to make more sustainable choices.

As is commonly reported in the mainstream media, the global agriculture sector is one of the industries with the highest environmental impact due to land use, consumption of natural resources, and greenhouse gas (GHG) emissions.[9] The global livestock population is estimated to contribute about 8% of the total anthropogenic GHGs, of which beef cattle production contributes a disproportionate amount of this impact. Figure 1 provides a quantitative overview of how veterinary input can help reduce GHG emissions associated with food production.

Methane from the bovine gastrointestinal

tract is, perhaps for obvious reasons, the GHG pollutant that has caught the imagination of the public. However, nitrous oxide (N_2O) and ammonia (NH_4) emissions from the vast quantities of slurry produced, contribute to a substantial cumulative effect.[10] GHG emissions are the metrics most commonly used to compare the environmental impacts of human activity. However, there is an inherent bias in reporting agricultural emissions solely in the context of GHGs, which has arisen because they are relatively easy to measure. Other relevant factors, such as soil organic carbon (SOC), have the potential to be a carbon sink (or "negative emission technology")[11] and counterbalance GHGs. However, measuring SOC is difficult and expensive, and it is often left out of the discussion altogether. Apart from the possibility of SOC being the means to sequester atmospheric carbon, this also highlights a need for the discourse around climate change and emissions to be more balanced.

Veterinarians have played a central role in efforts to reduce the impacts of livestock production generally, and beef cattle specifically. A "less and better" policy has been proposed as part of the sustainable development, where citizens reduce their consumption of food animal products, but health and welfare are protected by maintaining costs.[8] There are three main areas to mitigate the impact of cattle farming:

1. resource efficiency and environmental management,
2. modification of enteric fermentation to reduce GHG emissions, and
3. selective breeding of animals that produce fewer GHGs and are resilient to climate change.[10]

Central to these is the improvement of cattle health to reduce waste caused by disease and reproductive inefficiency. National health schemes, such as those tackling mastitis, lameness, and bovine viral diarrhoea virus in the UK can help to improve efficiency. Improving the submission rate (a measurement of fertility) from 50% to 70% is estimated to reduce methane emissions by 24%.[10]

Aquaculture, the farming of aquatic species, is a rapidly growing industry that now provides over 50% of fish for human consumption,[12] overtaking wild-caught fish about 4–5 years ago. The exponential growth of this industry brings with it similar demands for veterinary services and resources of other animal production systems (Figure 1), such as feed, welfare (particularly at slaughter), waste management, and preventative health plans (against sea lice and amoebic gill disease). However, the rapid growth of aquaculture has raised questions about its sustainability and effects on the fragile aquatic ecosystem, particularly the administration of veterinary medicinal products, which can flow freely into bodies of water.[13]

The sea louse, *Lepeophtheirus salmonis,* is a parasite that causes 3.62%–16.5% biomass loss per production cycle in farmed salmon,[14] due to spoilage or even mass mortality. This inefficiency represents a significant sustainability challenge. The efficacy of "natural" treatments, such as cleaner fish, is supported by weak evidence and dogged by environmental, economic, and welfare concerns.[15] CleanTreat® is an innovative treatment system that removes farmed salmon from open water to treat the parasite.[16] Treatment residues and parasite debris, including eggs, are then washed off the fish before they are returned to their open water pens. CleanTreat®, the active ingredient of which is a neonicatinoid, obtained regulatory approval in Norway in July 2021[17] and a vessel equipped with the CleanTreat filtration system is currently deployed there. It is an example of how technology can be used to protect the environment whilst still optimising production animal health and welfare.

> Any profession claiming a leadership role in sustainable development must first practice what they preach.

Although, by far the most significant environmental impact is from food production animals, the sustainability challenges presented by companion animals need to be taken into consideration. The ecological burden associated with the feeding of a combined total of almost 200 million cats and dogs in Europe[18] has prompted life cycle analysis (LCA) ("cradle to grave") of commercial pet food.[19] Dog food production has a higher environmental impact than that for cats, simply due to the volume produced. Furthermore, wet food requires a greater consumption of natural resources (for example, tin plating for packaging). Some have suggested that the high protein content (> 30% crude protein on a dry matter basis) in many commercial diets is more due to client demand than an evidence-based nutritional requirement.[19] And given protein is the most ecologically demanding macronutrient, reducing protein content could be a means to improving sustainability. Some producers now offer commercial pet food ranges derived from insect protein.[20] Veterinarians are best positioned to counsel owners on sustainable diets for their pets, with precision advice based on the individual animal's healthcare needs.

Putting one's own house in order

Any profession claiming a leadership role in sustainable development must first practice what they preach. Additionally, as a healthcare system, the veterinary practice must "develop strategies to mitigate (avoid the unmanageable) and adapt (manage the unavoidable)" in response to environmental issues.[21] There is relatively little published literature on sustainability in the veterinary workplace compared to the human healthcare sector. One recent systematic literature search found only three opinion papers (one on the environmental impact of veterinary anaesthesia and the other two on farm animal impacts).[22] This is compared to a systematic search of the human literature seven years earlier, which returned 49 articles on sustainable hospital design, energy and water efficiency, travel, procurement of medical materials, waste, and staff behaviour.

Gaseous anaesthetics were identified as environmentally damaging in 1975,[21] and the majority of waste anaesthetic gases are scavenged and vented into the atmosphere. At the human healthcare scale, it is estimated that 5% of the National Health Service's carbon emissions in the UK are due to anaesthetic gas emissions. Although this is a relatively small proportion of total GHG emissions, nitrous oxide (N_2O) and desflurane are particularly potent pollutants, having 310 and 2540 times the global warming potential of CO_2 over 100 years, respectively.[21] Furthermore, N_2O persists for 110 years in the atmosphere. Reducing anaesthetic emissions is possible, either by capturing and recycling waste gases, or rendering them chemically inert.[21] Other measures, such as swapping to a less potent gaseous anaesthetic, utilising total intravenous anaesthesia (TIVA), or local anaesthetic blocking techniques, are effective mitigating strategies.

Waste and the inefficient use of resources are significant problems in clinical practice. Two studies have estimated a 32%-51% wastage of the injectable anaesthetics in human hospitals,[21]

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which, if not addressed, negates the sustainability gains of switching to TIVA. Single-use surgical gowns, drapes, and gloves, which are expensive to dispose of, make up a large proportion of clinical waste. But is the environmental cost really offset when considering the water and electricity consumption required to clean reusable gowns and drapes? In the veterinary clinical practice setting, changes are being made to conserve high priority resources, such as electricity, gas, oil, water, and paper,[21] through efficient waste sorting and incorporating sustainability practices into the procurement of materials and equipment. Changing the tap that surgeons use to scrub into a sterile operation, from an elbow-operated faucet to a foot-operated pedal, saves 5.7 L of water per scrub. Switching to eco-friendly autoclaves (or retrofitting older models) can save 60,000 gallons of water per year.[22]

Disseminating the veterinary sustainability message to the profession: a case study of communication and engagement

In 2019, a group of veterinarians in the UK founded Vet Sustain (www.vetsustain.org), the first sustainability support organisation for veterinary professionals.[23] This Community Interest Company aims to provide members of the veterinary profession with the tools to cultivate sustainable practice, in whichever sector of the profession they may work. This has been achieved through building a network of veterinary professionals, working with veterinary schools to integrate sustainability topics into the curriculum, and equipping veterinary professionals with the tools to support the uptake of sustainable development policies. To this end, Vet Sustain's 5-year strategic plan is to ensure that 50% of UK veterinary practices and all key UK veterinary associations have a sustainability policy in place by 2025.

Vet Sustain has defined six sustainability outcomes, which have been aligned with the SDGs (Figure 2):

1. Diverse and abundant wildlife
2. A good life for animals
3. Net zero warming
4. Health and happiness
5. A no-waste society
6. Clean water for all

In the two short years since its launch, Vet Sustain has forged partnerships with the prominent veterinary membership organisations in the UK. They also foster a global vision and, to this end, have been reaching out to veterinary organisations in Australia, North America, the Caribbean, and Europe to support them in the establishment of local veterinary sustainability initiatives. Vet Sustain is also developing strategies to engage the animal-owning public by introducing a sustainable practice accreditation system, which will enable clients to select practices according to sustainability credentials. Many pet owners would seek out a clinic that operates sustainably,[24] indicating that adopting sustainable practice need not result in an economic penalty.

Conclusion

Veterinary sustainability is not just a cut and paste of sustainability measures adopted in human healthcare, although many translate directly from the human to the veterinary clinical setting. Veterinary sustainability is also not just about using expertise to tackle the vast issues of food security and sustainable food production. Veterinary sustainability also brings the role of non-human species into the sustainability development discussion, where previously, animals were either considered inert bystanders or vessels through which to achieve SDGs. Active engagement of the profession by dedicated organisations such as Vet Sustain is essential for the sustainable development of the profession, and the demand for their resources is likely to grow.

The COVID-19 pandemic has taught us how inextricably interlinked animal and human health is, and that one cannot focus on one without considering the other. The key to the medical communicator's role in veterinary sustainability is education. Through increased understanding of the unique issues that affect veterinary sustainability, the services of the medical communications professional will be essential for the engagement of all stakeholders. These stakeholders range from policymakers deciding on key veterinary sustainability issues, to the practising veterinarian who needs support keeping up to date with sustainability science, and needs to be provided with the language and methods to discuss climate change with a diverse client base.[24] And finally, the use of appropriate plain language is key in educating the animal-owning public to make sustainable choices for the benefit of their animals, the environment, and themselves.

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THE VETERINARY SUSTAINABILITY GOALS

THE VETERINARY SUSTAINABILTY GOALS	THE UN SUSTAINABLE DEVELOPMENT GOALS

DIVERSE AND ABUNDANT WILDLIFE

Conserve and enhance natural landscapes, habitats and biological diversity and abundance of wild terrestrial and aquatic plants and animal species

- *Conserving and creating wildlife habitats*
- *Preserving and regenerating high conservation-value landscapes*
- *Mitigating water, air, and light pollution*
- *Supporting wildlife health and conservation programmes*
- *Understanding the merits and trade-offs in land-sparing and land-sharing approaches of human activities*
- *Developing and promoting diverse food and farming systems that work in harmony with and restore natural ecosystems*
- *Supporting where appropriate alternative protein-based diets for humans and animals*
- *Promoting sustainable sourcing of feed ingredients and reducing dependence on human-edible feedstuffs for animals.*

A GOOD LIFE FOR ANIMALS

Safeguard and advocate for the health and welfare, in life and at the point of death, of animals under our care and those affected by human activity

- *Advocating animal welfare as a core sustainability objective, as a hallmark of our social progress*
- *Ensuring recognition of animal sentience in policy and practice*
- *Advocating the use of sustainable breeding practices and genetics*
- *Supporting animal welfare-centred husbandry and management, including stimulating living environments to permit highly motivated behaviours*
- *Ensuring humane slaughter and transport*
- *Supporting the phase-out of mutilations*
- *Advocating for wildlife welfare (e.g. opposing the wildlife trade, cruel sports, marine animal entanglement, ocean plastic pollution, habitat loss)*

NET ZERO WARMING

Implement and promote decarbonisation through energy efficiency, the generation and use of renewable energy, mitigation of global warming and sequestration of carbon

- *Developing climate literacy within our profession*
- *Understanding and mitigating the climate impacts of veterinary activities*
- *Using and generating renewable energy*
- *Sequestering carbon*

HEALTH AND HAPPINESS

Safeguard and enhance the physical and mental wellbeing of people and support a transition to livelihoods and lifestyles that are fit for the future

- *Supporting food and nutritional security for all*
- *Mitigating antimicrobial resistance*
- *Reducing risk of zoonoses*
- *Improving food safety and quality*
- *Upholding human rights*
- *Identifying and mitigating domestic and animal abuse*
- *Supporting mental health and wellbeing*
- *Optimising the health benefits of animal ownership*
- *Supporting sustainable livelihoods in our profession and the sectors we influence*
- *Promoting sustainble lifestyles*
- *Ensuring diversity and inclusion*

A NO-WASTE SOCIETY

Minimise the usage and disposal of resources, and support a transition to a circular economy

- *Supporting a circular economy*
- *Reducing food waste from farm-to-fork*
- *Reducing wastage of resources and impacts on ecosystems and landscapes*
- *Minimising plastic waste by reusing and recycling materials where possible*
- *Reducing medical waste whilst upholding infection control*
- *Understanding supply chains*

ENOUGH CLEAN WATER FOR ALL

Uphold best practice in fresh water conservation and protection to mitigate water stress and prevent water pollution

- *Conserving and recycling water in the workplace*
- *Understanding and mitigating medicine ecotoxicity*
- *Supporting the conservation and recycling of water in agriculture*
- *Protecting waterways from pollution*
- *Supporting soil health and management*

Figure 2. This figure created by and used with permission of Vet Sustain

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Disclosures and conflicts of interest

The author declares no conflicts of interest.

Disclaimers

The opinions expressed in this article are the author's own and not necessarily shared by her employer or EMWA.

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