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ORIGINAL RESEARCH

Sustainability policies and practices at veterinary centres in the UK and Republic of Ireland

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Abstract

Background: Veterinary professionals operate at the human–animal–environment interface and are concerned about sustainability issues. This study examined the extent to which sustainability is represented in policy and enacted in veterinary practice settings, as reported by practice representatives.

Methods: An online survey was completed by 392 veterinary centre representatives in the UK and Republic of Ireland to identify existing policies and practices around the environmental impacts of veterinary services and animal husbandry, responsible medicine use, animal welfare and social wellbeing.

Results: A minority of respondents were aware of an environmental policy at their practice (17%, 68/392). Many others were undertaking waste reduction initiatives, but wider environmental interventions were infrequently reported. The majority were aware of medicine stewardship and animal welfare policies or guidelines, but a minority reported social wellbeing policies (40%, 117/289) and the provision of advice to clients on the environmental impacts of animal husbandry (31%, 92/300).

Limitations: The bias arising from the small convenience sample of practice representatives and potential discrepancies between the claims of survey respondents and their practices' policies and activities are acknowledged.

Conclusion: Results depict a value–action gap between the concern of veterinary professionals towards sustainability and the policies and practices at their workplaces. Building on progress in the sector, wider adoption of comprehensive policies and practices, with guidance, could enhance veterinary contributions to the sustainability agenda, in particular to mitigate the environmental externalities of veterinary services and animal care and ensure safe, fair and inclusive workplaces.

INTRODUCTION

Humanity is currently facing a multitude of complex and pressing sustainability challenges, including climate change,[1,2] biodiversity loss,[3] public health epidemics,[4,5] social inequity[6] and animal welfare problems.[7] The need to address these issues has driven many disciplines to conceptualise and define sustainability based on a spectrum of ideologies regarding the relative value of humans within the Earth's ecosystem. At one end, the neoclassic 'technocentric' paradigm assumes that the Earth's resources are available for exploitation and technological solutions will facilitate continued and unfettered growth and consumption.[8,9] At the other end, 'ecocentrism' considers nature to hold intrinsic value, with humans, animals and plants possessing equal rights to exist.[10–12]

The current dominant paradigm lies somewhere along this continuum and is articulated in the widely adopted definition of sustainable development from the United Nations' (UN) Brundtland Report: 'Development which meets the needs of current generations without compromising the ability of future generations to meet their own needs'.[13] It recognises the value of ecological integrity, but asserts that natural capital can, in some circumstances, be substituted for man-made capitals.[14] Such anthropocentric viewpoints

prioritise human development over the needs of all other species, while generating and detaching various sub-disciplines, such as environmental management.[12,15] Following this philosophy, many organisations address sustainability concerns by monitoring and controlling the environmental impact of 'business-as-usual' processes, framed as working 'more efficiently', by accelerating innovation to reduce the utilisation of inputs while maintaining levels of consumption.[10]

The Brundtland definition succeeded in acknowledging the biosphere's finite resources[13] and brought intergenerational ethics of resource use into sharp focus.[16] However, definitions have since evolved towards an ecological sustainability paradigm, which places inherent value on the ecosystem and supports interspecies and intergenerational justice. In the UN's updated Sustainable Development Goals (SDGs) Agenda for 2030,[17] 'sustainability' includes environmental, human and animal welfare domains in line with the One Health concept,[18] and a recent development is the recognition of ultimate planetary boundaries that define a safe operating space for humanity[19] and limits to 'conventional' economic growth.[15]

Veterinary professionals and sustainability

Sustainability issues are often characterised as the depletion of resources embodied in manufactured, human, social and natural capital. The public and private goods and services flowing from these capital stocks generate a range of use and non-use values (i.e., human wellbeing) and, in some cases, harmful social and environmental impacts (externalities) that impose costs on society.

Veterinary professionals, including veterinary scientists and allied professionals,[20] operate at the human–animal–environment interface[21] and are involved in the delivery of public and private goods and services[22] that generate both positive externalities[21–23] (e.g., the social benefits of healthy animals) and negative externalities[24–27] (e.g., environmental impacts of service delivery). Veterinary scientists have a core mandate to protect the welfare of animals under their care,[29] and in a minority of jurisdictions (including the UK, the Republic of Ireland and Canada), a professional duty to consider their impacts on public health and the environment.[29–31] The World Veterinary Association acknowledges that 'Veterinarians … have a responsibility to protect ecosystem health',[32] in alignment with an ecological sustainability ideology and the One Health paradigm, which aims to balance and optimise the health of people, animals and ecosystems.[18] Supportive of their multiple obligations, Stephen et al.[34] envisage 'veterinary medicine [as] a steward of healthy animal populations and biodiversity and the benefits they bring ecosystems and society', and 89% of UK veterinary surgeons wish to play a more active role in the sustainability agenda.[35]

To operationalise the responsibility and concern of veterinary professionals for sustainability, frameworks have been created by organisations including the RCVS (Practice Standards Scheme [PSS] for Sustainability, in development[36]), Investors in the Environment[37] and Vet Sustain. Considering all three of the One Health domains and using the UN SDGs as a blueprint, Vet Sustain devised a set of 'veterinary sustainability goals' (VSGs)[38] (see Table 1), mapped to current and potential actions by veterinary professionals.

Many of the day-to-day actions of veterinary professionals listed in Table 1, such as the delivery of clinical and public health services, are extensively documented[39] and can contribute directly to the VSGs/SDGs.[40,41] However, other potential contributions, such as reducing the environmental impacts of veterinary services, are characterised by a nascent body of literature,[27,33,42–48] individual cases of exemplary practice,[49] and a growing but fragmented movement of voluntary support, education, information and labelling schemes. Such programmes include the involvement of professional bodies in environmental consortia,[50] the appointment of sustainability specialists and publication of sustainability reports by practice groups,[51–55] professional environmental training, guidance and self-assessments,[56–58] undergraduate curriculum projects,[59] environmental accreditation schemes,[36,37] antibiotic stewardship training, awards and guidance,[60–63] animal welfare accreditation schemes,[64] workplace wellbeing guidelines and accreditations[36,65] and mental health support.[66,67] A number of independent communities also work to promote sustainability,[56] diversity and inclusion,[68] women's empowerment,[69] veterinary wellbeing,[70] fulfilling veterinary careers[71] and One Welfare.[72]

However, the extent to which potential veterinary contributions to sustainability are represented in veterinary centre operations is currently unknown. This study was conducted to identify existing sustainability policies and practices as reported by representatives of clinical veterinary centres in the UK and Republic of Ireland. 'Policy' in this context relates to those devised at the veterinary centre level to define intentions, objectives or goals, as opposed to higher-level national or legal policy. The study also aimed to identify opportunities to enhance veterinary contributions to the sustainability agenda, with a focus on opportunities within clinical settings.

MATERIALS AND METHODS

The survey was devised by Vet Sustain in partnership with The Veterinary Defence Society (VDS) to identify veterinary clinic policies and practices around sustainability, according to contemporary definitions including human, animal and environmental wellbeing. Vet Sustain is a social enterprise aiming to enable and inspire the veterinary profession to drive change for a more sustainable future, and VDS is the UK's largest provider of veterinary professional indemnity insurance, working to support and protect veterinary professionals, practices and businesses.

TABLE 1 The veterinary sustainability goals (VSGs) (adapted from Vet Sustain 2020[38]), mapped to the United Nation (UN) Sustainable Development Goals (SDGs),[74] and relevant veterinary roles

UN SDGs[74]	VSGs[38]	Veterinary roles to support the VSGs
	Diverse and abundant wildlife	Sustainable operating practices and circular/efficient resource use[42,47] Owner education and farm consultancy for sustainable animal care[75,76] Provision of undergraduate, postgraduate and specialist training and education[21] Leadership and public advocacy[20]
	A good life for animals	Ensuring the welfare of animals under veterinary care[79] The delivery of veterinary services for animal health, welfare and production[39] Responsible medicine use[63,80,81] Product innovation, development and marketing[82,83] Provision of undergraduate, postgraduate and specialist training and education[21] Leadership and public advocacy[20,78]
	Net zero warming	Sustainable operating practices and circular/efficient resource use[42,47] Owner education and farm consultancy for sustainable animal care[70,71,77] Provision of undergraduate, postgraduate and specialist training and education[21] Leadership and public advocacy[20,78]
	Health and happiness	Public health and food safety[25,84] Disease surveillance and control[85] Responsible medicine use[63,80,81] Social interventions, such as green and social prescriptions and recognising and responding to signs of abuse[86,87] Workplace practices for equality and wellbeing in the veterinary team[65,67,88] Provision of undergraduate, postgraduate and specialist training and education[21] Leadership and public advocacy[20,78]
	A no-waste society	Sustainable operating practices and circular/efficient resource use[42,47] Responsible medicine use[63,80,81] Owner education and farm consultancy for sustainable animal care[75,76] Provision of undergraduate, postgraduate and specialist training and education[21] Leadership and public advocacy[20,78]
	Enough clean water for all	Responsible medicine use[63,80,81] Sustainable operating practices and circular/efficient resource use[42,47] Owner education and farm consultancy for sustainable animal care[75,76] Provision of undergraduate, postgraduate and specialist training and education[21] Leadership and public advocacy[20,78]

In the absence of an established framework for assessing the sustainability of veterinary services across the One Health domains, the themes of the survey were scoped using a literature search to identify the roles played by veterinary professionals in contributing to the VSGs. The results are displayed in Table 1. To focus the survey, these roles were consolidated into: (1) environmental impacts of veterinary services, (2) responsible medicine use (antibiotics and parasiticides), (3) promoting animal welfare, (4) environmental impacts of animal husbandry and (5) promoting social wellbeing. The survey questions were then devised using several rounds of consultation with Vet Sustain and VDS representatives. The full survey can be found in Appendix A and included a variety of open and closed questions relating to the role of the respondent, the type of veterinary practice they represented, policies or activities at their practices around the five key themes, and preferences for future training. Questions explored participants' awareness of legal requirements, examples of sustainability advice provided to animal owners, and their views on interventions to support sustainability at their workplace and in the veterinary sector.

Closed questions generated multiple choice, ranking or Likert scale[73] responses. Throughout the survey,

'policies' were described as 'a business-wide, generally agreed set of principles that influence the working environment and culture', in order to capture both written and non-written policies and principles communicated by management. Respondents provided informed consent and were offered the opportunity to either remain anonymous or share their contact details to be entered into a prize draw for a free book. Personal data were deleted as soon as the draw was complete.

The survey was distributed electronically to a sample of 4947 VDS members who had opted to receive mailings, representing clinical veterinary centres in the UK and Republic of Ireland. The survey was also disseminated to 1109 veterinary professionals in a Vet Sustain Mailchimp newsletter and via Vet Sustain and VDS social media channels. This convenience sample using the VDS and Vet Sustain databases aimed to maximise participation from across the profession, considering the VDS' representation of the vast majority of UK veterinary practices. The survey was open between 21 April and 4 June 2021 and could be completed by any member of the veterinary centre team, reflecting their awareness of workplace policies and practices.

When more than one submission was received from the same practice site, one of the responses was randomly selected for inclusion by VDS, leaving 446 unique responses. Data were then anonymised and transferred to Vet Sustain in a password-protected Microsoft Excel 2016 (Microsoft Corporation) database, cleaned, and 54 responses without answers to questions beyond role and practice type were removed, leaving 392 for analysis. Simple descriptive and qualitative analyses were performed, and categorical variables were described with frequency, percentages and 95% confidence intervals (CIs) for proportions. A content analysis approach was adopted for free-text responses, in which concepts were identified and categorised into common themes by the primary author and described with frequency. The number of responses to each question was specified as '*n*' within the results. Following the survey, a selection of potential interventions that may address the gaps in policies and practices identified by the survey was compiled by the authors.

RESULTS

The roles of respondents are shown in Table 2. The majority of respondents (66%, 257/392) were from small animal and exotics practices, 14% (54/392) from mixed practices, 9% (34/392) from equine practices and 8% (30/392) from farm animal practices. Of those specifying practice type, respondents worked at first opinion practices (33%, 131/392), specialist referral clinics (9%, 35/392), charity clinics (3%, 13/392), teaching institutions (3%, 10/392), industry (2%, 8/392) and government (2%, 7/392), with some representing multiple practice types.

TABLE 2 Number and proportion of survey respondents based on role in the veterinary practice ($n = 392$)

Role in practice	Number	Proportion
Veterinary surgeon	288	0.73
Practice owner or partner	67	0.17
Clinical director, director or other member of the leadership team	56	0.14
Veterinary nurse	52	0.13
Practice manager	25	0.06
Trainee veterinary nurse	4	0.01
Receptionist	4	0.01
Other	4	0.01
Animal assistant	3	0.01
Veterinary student	2	0.01
Technician	0	0.00

Note: Some respondents held multiple roles.

Environmental impacts of veterinary services

A minority of the 392 respondents (17%, 68/392; 95% CI = 0.14–0.21) reported having an environmental policy at their practice, 53% (208/392; 95% CI = 0.48–0.58) did not and 30% (116/392; 95% CI = 0.25–0.34) did not know. Of those that claimed to have an environmental policy, 55 selected the items it included from a list, as shown in Table 3. The majority of respondents selecting the contents of their environmental policy (62%, 34/55; 95% CI = 0.49–0.75) listed at least seven elements.

Respondents who did not have a policy were offered the opportunity to select or specify any actions their practices undertook to support the environment, and the results are displayed in Figure 1. Among the 'other' actions, small numbers of respondents reported that their practices were using electric vehicles (2%, 4/266; 95% CI = 0.00–0.03), reducing energy usage (2%, 4/266; 95% CI = 0.00–0.03), composting kitchen waste (2%, 4/266; 95% CI = 0.00–0.03), using or installing solar panels (1%, 3/266; 95% CI = 0.00–0.02), using specialist recycling for pet food and crisp packaging (1%, 3/266; 95% CI = 0.00–0.02) and using reusable surgical hats/gowns (1%, 3/266; 95% CI = 0.00–0.02).

When asked what measures would support their practices to adopt an environmental policy, 78% of 293 respondents (228/293; 95% CI = 0.73–0.83) selected greater knowledge on sustainable solutions for veterinary practices. The majority of respondents who selected greater knowledge on sustainable solutions also requested standards and guidelines to follow (63%, 143/228; 95% CI = 0.56–0.69). When asked how aware they were of legal and regulatory requirements relating to sustainability and their impact on veterinary practice, 50% (170/341; 95% CI = 0.45–0.55) were not aware and 2% (6/341; 95% CI = 0.00–0.03) were fully aware.

TABLE 3 Elements included in veterinary practice environmental policies by number and proportion of survey respondents with 95% confidence intervals (CIs) ($n = 55$)

Response	Number	Proportion	95% CIs
Recycling and waste segregation	41	0.75	0.63–0.86
Reduction in usage of packaging and single-use items	33	0.60	0.47–0.73
Energy usage	32	0.58	0.45–0.71
Paper usage (source, use, disposal)	29	0.53	0.40–0.66
Staff engagement	26	0.47	0.34–0.60
Anaesthetic gases	25	0.45	0.32–0.59
Water usage	22	0.40	0.27–0.53
Transport (e.g., commuting, travel in company vehicles, supporting walking/cycling and use of public transport)	20	0.36	0.24–0.49
Procurement of supplies	20	0.36	0.24–0.49
Medicine use (waste reduction; ecotoxicity of antiparasitics)	20	0.36	0.24–0.49
On-site biodiversity and green spaces	20	0.36	0.24–0.49
Carbon footprint information	17	0.31	0.19–0.43
Legal compliance	16	0.29	0.17–0.41
Publicly available policy statement	14	0.25	0.14–0.37
Chemicals, for example, cleaning materials, sterilising fluids, radiography developers	12	0.22	0.11–0.33
Environmental building design and infrastructure	12	0.22	0.11–0.33
Community projects	12	0.22	0.11–0.33
Carbon offsetting	11	0.20	0.09–0.31
Monitoring and reporting	10	0.18	0.08–0.28
Client education	8	0.15	0.05–0.24
External accreditations	8	0.15	0.05–0.24
Do not know	8	0.15	0.05–0.24
Food procurement and/or disposal	6	0.11	0.03–0.19
Preventive medicine	6	0.11	0.03–0.19
Other	1	0.02	0.00–0.05

Responsible medicine use

Of 339 respondents, 72% (243/339; 95% CI = 0.67–0.76) had a policy on antibiotic use and stewardship, 17% (59/339; 95% CI = 0.13–0.21) did not and 11% (37/339; 95% CI = 0.08–0.14) did not know. Analysing these by practice type, 74% (25/34; 95% CI = 0.59–0.88) of representatives from equine and 73% (22/30; 95% CI = 0.58–0.89) from farm animal practices reported having antibiotic stewardship policies, compared to 65% (167/257; 95% CI = 0.59–0.71) of respondents from small animal and exotics and 54% (29/54; 95% CI = 0.40–0.67) from mixed practices. The elements of antibiotic policies most frequently cited by 231 respondents are shown in Figure 2. Respondents who did not have a policy most frequently specified infection and hygiene procedures (71%, 59/83; 95% CI = 0.61–0.81) as the actions their practices were undertaking around antibiotic stewardship. Of the 93 respondents who specified what would support their practices in implementing an antibiotics policy, the highest percentage (66%, 61/93; 95% CI = 0.56–0.75) selected standards, guidance and frameworks to follow.

Of 321 respondents, 51% (165/321; 95% CI = 0.46–0.57) reported having a policy on the use of medicines for parasite control at their practice, 35% (111/321; 95% CI = 0.29–0.40) did not and 14% (45/321; 95% CI = 0.10–0.18) did not know. The most frequently included policy elements cited ($n = 164$) were treatment protocols and guidelines (88%, 145/164; 95% CI = 0.84–0.93), guidelines on prophylactic use of parasiticides (62%, 101/164; 95% CI = 0.54–0.69) and client education and compliance (60%, 98/164; 95% CI = 0.52–0.67). Other responses included risk assessments for use in individual patients (37%, 61/164; 95% CI = 0.30–0.45) and the requirement for pre-treatment diagnostic testing prior to prescribing (21%, 34/164; 95% CI = 0.15–0.27).

The actions around parasiticide use specified by respondents who reported not to have a policy ($n = 99$) are shown in Figure 3. Of 142 respondents without a policy, 66% (94/142; 95% CI = 0.58–0.74) believed that standards, guidelines and frameworks for practices to follow would support uptake of a parasite control policy at their practice, and 61% (87/142; 95% CI = 0.53–0.69) felt that clear demonstration of the benefits to public/animal health would have this effect.

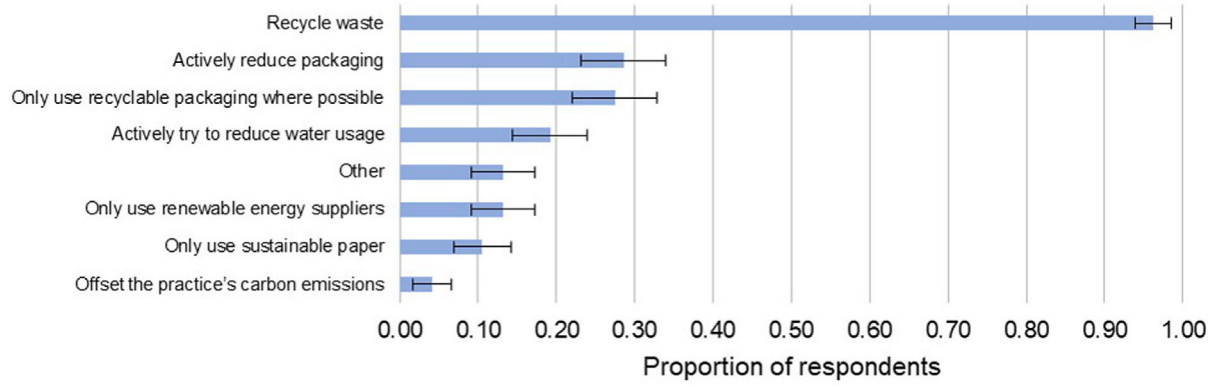

FIGURE 1 Actions by veterinary practices to support the environment, as reported by survey respondents, with 95% confidence intervals ($n = 266$)

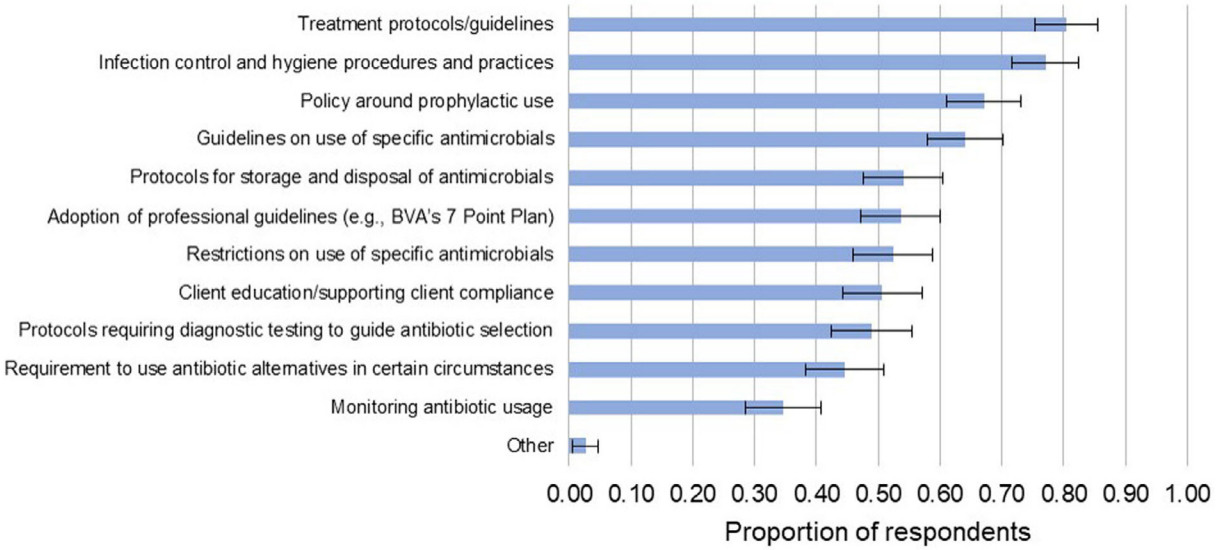

FIGURE 2 Elements included in veterinary practice antibiotic use and stewardship policies, as reported by survey respondents, with 95% confidence intervals ($n = 231$)

Promoting animal welfare

Of 313 respondents, 33% (102/313; 95% CI = 0.27–0.38) reported having an animal welfare policy at their practice, 38% (118/313; 95% CI = 0.32–0.43) did not and 30% (93/313; 95% CI = 0.25–0.35) did not know. Of those that did have a policy, 98 specified the elements it included (Figure 4). Respondents from practices without a policy were given the opportunity to specify any guidelines they had around animal welfare issues (see Figure 5). When asked what would support their practice in adopting an animal welfare policy, the highest percentage of 204 respondents (72%, 147/204; 95% CI = 0.66–0.78) selected standards, guidance and frameworks to follow. Animal welfare training topics suggested by 140 respondents were grouped into themes, and the three most popular were owner and public education on animal welfare and responsible animal adoption (21%, 29/140; 95% CI = 0.14–0.27), breeding and reproduction including brachycephalic breeds (14%, 20/140; 95% CI = 0.08–0.20) and environments for good welfare at home, in transport, at veterinary practices and in animal shelters (12%, 17/140; 95% CI = 0.07–0.18).

Environmental impacts of animal husbandry

Respondents were asked if their practice occasionally, regularly or routinely advised clients on environmentally responsible animal husbandry. Of 300 respondents, 31% responded 'yes' (92/300; 95% CI = 0.25–0.36), 52% responded 'no' (157/300; 95% CI = 0.47–0.58) and 17% did not know (51/300; 95% CI = 0.13–0.21). The majority of respondents specified that this advice applied to cats and dogs (72%, 63/87; 95% CI = 0.63–0.82), followed by exotic pets (39%, 34/87; 95% CI = 0.29–0.49) and farmed livestock (29%, 25/87; 95% CI = 0.19–0.38). Examples of topics for advice are shown in Table 4.

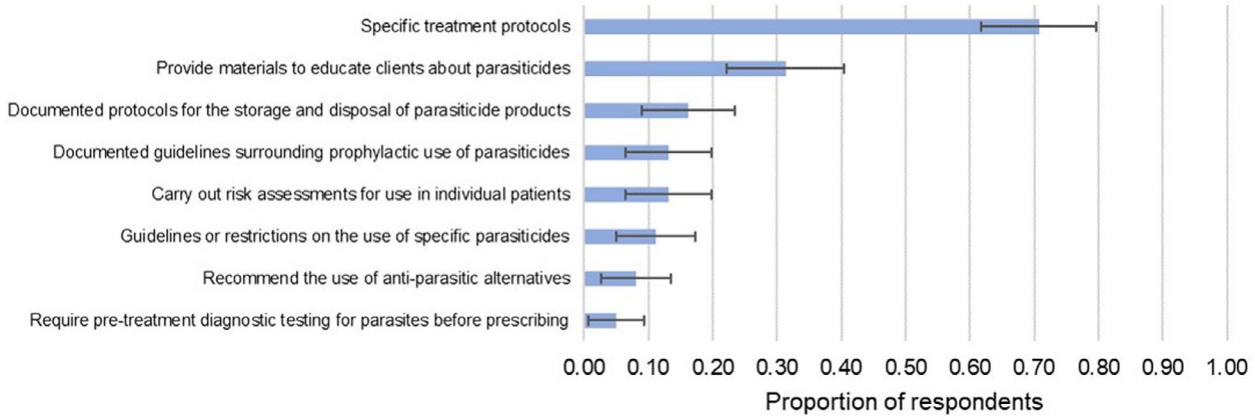

FIGURE 3 Actions taken by veterinary centres on the use of medicines for parasite control, as reported by survey respondents, with 95% confidence intervals ($n = 99$)

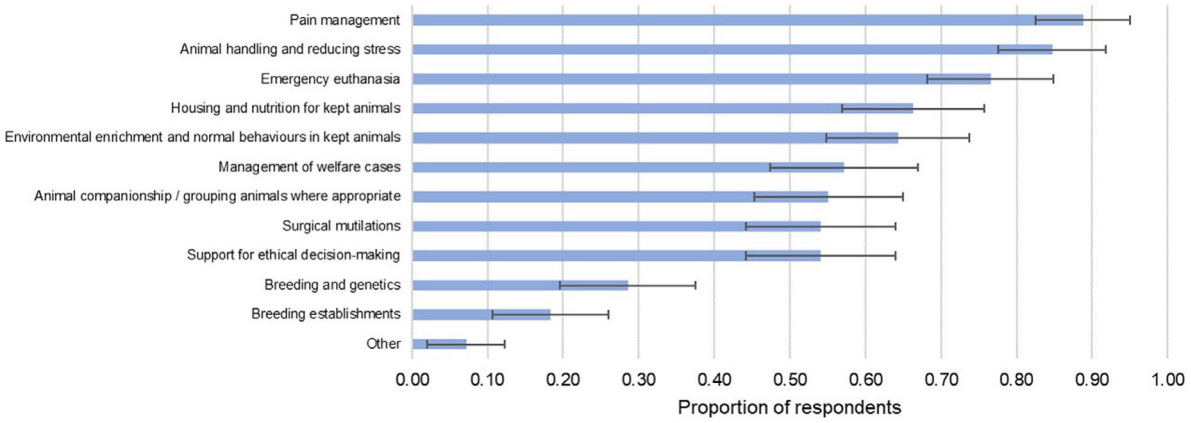

FIGURE 4 Aspects included in veterinary practice animal welfare policies, as reported by survey respondents, with 95% confidence intervals ($n = 98$)

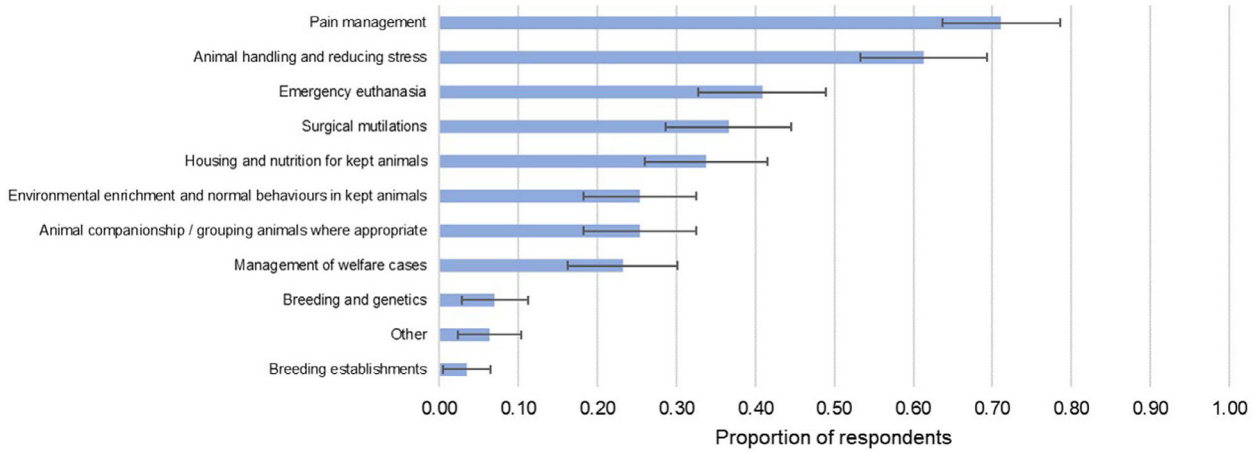

FIGURE 5 Issues covered by animal welfare guidelines in place at veterinary centres, as reported by survey respondents, with 95% confidence intervals ($n = 142$)

Promoting social wellbeing

Of 289 respondents, 40% had a policy on social wellbeing issues at their practice (117/289; 95% CI = 0.35–0.46), 39% did not (114/289; 95% CI = 0.34–0.45) and 20% did not know (58/289; 95% CI = 0.15–0.25). The most frequently included aspects are displayed in Figure 6. When asked what would support their practice to adopt such a policy, the highest percentage of 172 respondents selected standards, guidance and frameworks to follow (61%, 105/172; 95% CI = 0.54–0.68).

TABLE 4 Examples of advice given to clients on environmentally responsible animal husbandry by number and proportion of survey respondents with 95% confidence intervals (CIs) ($n = 87$)

Theme	Number	Proportion	95% CIs
Responsible use of parasiticides in small animals	18	0.21	0.12–0.29
Sustainable diets, feeding and packaging	11	0.13	0.06–0.20
Use of biodegradable poo bags and picking up dog waste	9	0.10	0.04–0.17
Biodegradable cat litter	8	0.09	0.03–0.15
Responsible use of parasiticides in farm animals	7	0.08	0.02–0.14
Responsible use of parasiticides in equids	6	0.07	0.02–0.12
Responsible antibiotic use	6	0.07	0.02–0.12
Use of sustainable toys and enrichment materials for small animals and exotics	5	0.06	0.01–0.11
Advice on efficiency, productivity and herd health planning in farm animal practice	5	0.06	0.01–0.11
Disposal of medicines and packaging	4	0.05	0.00–0.09
Grazing and soil management	4	0.05	0.00–0.09
Sustainable agriculture	4	0.05	0.00–0.09
Rescuing pets, neutering and breeding advice	3	0.03	0.00–0.07
Risk of cats to wildlife/use of bells on collars	2	0.02	0.00–0.05
Manure disposal	2	0.02	0.00–0.05
Choice of pet	1	0.01	0.00–0.03
Preventative medicine	1	0.01	0.00–0.03
Biodiversity surveys on farms	1	0.01	0.00–0.03
Wildlife management and release	1	0.01	0.00–0.03
Avoiding use of chemical rodenticides	1	0.01	0.00–0.03

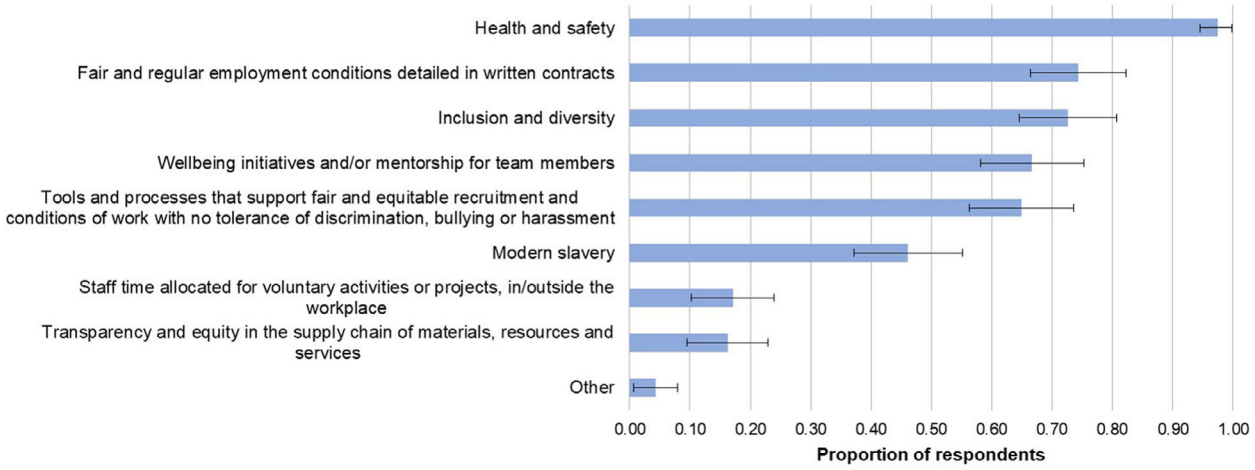

FIGURE 6 Elements included in veterinary practice social sustainability policies, as reported by survey respondents, with 95% confidence intervals ($n = 117$)

Sustainability in the veterinary sector

A clear majority (71%, 159/225; 95% CI = 0.65–0.77) favoured the production of educational materials and protocols for all staff as a means of supporting sustainability in veterinary workplaces (see Table 5). The majority of respondents were interested in receiving training in environmental management in the clinic (76%, 194/255; 95% CI = 0.71–0.81), the legal and regulatory sustainability landscape for veterinary practices (71%, 181/255; 95% CI = 0.65–0.77), responsible medicine use to mitigate potential eco-toxicity (64%, 163/255; 95% CI = 0.58–0.70) and environmentally responsible pet ownership (51%, 131/255; 95% CI = 0.45–0.58). The most popular proposed intervention for supporting sustainability in the profession was the development of toolkits for practices, ranked as a first priority by 44% of 256 respondents (112/256; 95% CI = 0.38–0.50).

Solutions

In response to the results of the survey, a list of possible interventions to drive change under the previous five themes was compiled (Table 6), drawing

TABLE 5 Suggestions from survey respondents on the activities that they believe would help to drive sustainability in their veterinary workplaces by number and proportion of survey respondents with 95% confidence intervals (CIs) ($n = 225$)

Theme	Number	Proportion	95% CIs
Education, training, resources, templates, guidance, signposting, protocols appealing to all staff	159	0.71	0.65–0.77
Accreditation, auditing and benchmarking of veterinary practices	21	0.09	0.06–0.13
Campaign for regulation and policy change to veterinary institutions, drug companies and government	20	0.09	0.05–0.13
Appeal to practice managers and corporate leaders to drive changes	13	0.06	0.03–0.09
Recommended suppliers lists	11	0.05	0.02–0.08
Demonstrate the cost benefits of sustainable practices	9	0.04	0.01–0.07
Communications and marketing resources for veterinary practices	6	0.03	0.01–0.05
Research and provide more evidence where it is lacking	5	0.02	0.00–0.04
Practice and staff rewards systems including financial incentives	3	0.01	0.00–0.03
Case studies	2	0.01	0.00–0.02
Practice mentorship	1	0.00	0.00–0.01
Exercise group buying power/collective bargaining	1	0.00	0.00–0.01
Supply products, for example, sustainable surgical kits	1	0.00	0.00–0.01

from experience from other sectors in supporting sustainability outcomes. For each theme, approaches including voluntary initiatives, incentives (e.g., financial or technical support), command-and-control (i.e., mandatory regulations) and market-based instruments (i.e., policy instruments using markets and prices to incentivise organisations to reduce their impacts) are considered for application at the level of teaching institutions, practice groups, membership associations and professional regulators.

DISCUSSION

Environmental impacts of veterinary services

Among the minority of respondents (17%, 68/392) who were aware of an environmental policy at their practice, waste policies were most frequently cited. A larger number of participants reported environmental actions ($n = 266$) than the existence of policies ($n = 68$), with waste recycling reported by a large majority (96%, 256/266). Non-waste-based interventions such as use of renewable energy were reported by a minority (13%, 35/266), indicating a primary focus on waste reduction and a narrow scope of environmental interventions at many veterinary centres. A desire was expressed by the majority for greater knowledge on sustainability solutions and guidance for practices to follow, a finding supported by other studies.[45]

Policy and practice to improve the environmental performance of the human healthcare sector and to address the health crises arising from healthcare pollution is considered an urgent imperative,[89] with important insights to be extrapolated to the veterinary sector. Adoption of environmental policies may also generate wider business benefits: over half of 1044 pet owners surveyed in the USA would pay more for veterinary services at a clinic with a reduced environmental impact, and would value sustainability certification to aid the identification of such practices.[48] Other studies suggest that socially and environmentally responsible firms may hold a competitive advantage in attracting a quality workforce.[90,91] Accreditations for a broad range of environmentally sustainable practices, such as the RCVS PSS[36] and the Investors in the Environment scheme,[37] should be leveraged, and other potential interventions (outlined in Table 6) include grants and incentives to adopt green infrastructure and emissions standards and reporting.

Responsible medicine use

The majority of respondents (72%, 243/339) reported an antibiotic use policy, aligning with the significant progress being made by UK veterinary professionals and their clients in antimicrobial stewardship.[92–94] Although around half of the respondents reported having a parasiticide policy at their practice, a minority included key recommendations of risk-based assessments and pre-treatment diagnostic testing as recommended by a group of British veterinary associations[80] in response to nascent ecotoxicity concerns about certain pet parasiticides. Many practices that did not have policies still implemented measures around medicine use and impacts, such as infection control and hygiene procedures and parasiticide treatment protocols. However, considering the gaps in policy and misalignment with recommendations from British veterinary associations at some veterinary centres, there may be inconsistencies in prescribing activities (as documented in other studies[83,84]). This may also present a risk of negative public health[25] and ecosystem externalities, particularly relating to environmental drug residues.[95,96] Potential interventions (outlined in Table 6) include stewardship champions programmes and medicine use reporting requirements, the latter of which has been effective in other countries.[97] Practices around the use of other medicines with potential ecosystem impacts, such

TABLE 6 Potential programmes, incentives and policy instruments for the veterinary professions to support ecological sustainability outcomes

Veterinary role	Examples of ecological sustainability outcomes[38]	Examples of programmes and policy instruments to support outcomes
Managing the environmental impacts of veterinary services	Restoration of habitats and increasing biodiversity; net zero; use of 100% renewable energy; clean air and water; water recycling; circular economy for packaging/waste	Undergraduate and professional education[a] Information and labelling (e.g., green accreditation schemes)[a] Grants or incentives (e.g., for green infrastructure; technology support)[b] Codes of practice[c] Emissions standards[c] Reporting requirements (e.g., carbon foot-printing)[c] Performance bonds (contracts based on meeting environmental obligations)[c,d] Deposit–refund schemes for veterinary product packaging[d]
Responsible medicine use	Declining global antimicrobial resistance (AMR) health burden; declining environmental pollution with drug residues and resistance determinants	Information and labelling (e.g., stewardship champions)[a] Grants or incentives (e.g., for diagnostic testing)[b] Codes of practice[c] Reporting requirements (e.g., for medicine sales and use)[c]
Promoting animal welfare	A 'good life' for all species; a 'good 'life' for current and future generations	Undergraduate and professional education[a] Information and labelling (e.g., supporting uptake of farm assurance schemes; welfare-friendly practice schemes)[a] Grants and incentives for practices (e.g., for welfare-centred modifications)[b] Grants and incentives for clients (e.g., for modifying farm production systems—supporting clients in the application process)[b] Codes of practice (e.g., alleviating stress in clinical settings; bans on cosmetic surgical mutilations)[c] Reporting requirements (e.g., on patient welfare outcomes)[c]
Managing the environmental impacts of animal husbandry	Restoration of habitats and increasing biodiversity; net zero; use of 100% renewable energy; clean air and water; healthy soils; water recycling; circular economy for packaging/waste	Undergraduate and professional education[a] Information and labelling (e.g., supporting uptake of farm assurance schemes)[a] Subsidies for clients (e.g., for environmental land management—supporting clients in the application process)[d]
Promoting social wellbeing	A 'good life' for current and future generations; equality and diversity; safe, fair, inclusive workplaces	Information and labelling (e.g., good workplace and mentor schemes)[a] Grants or incentives (e.g., for wellbeing initiatives in practice or for collaborations with human health services on green or social prescriptions)[b] Codes of practice (e.g., for wellbeing initiatives in practice or to support vulnerable clients)[c]

[a]Voluntary initiatives (some of which are currently being implemented in the UK).
[b]Incentives (e.g., financial or technical support).
[c]Command-and-control (i.e., mandatory regulations) (some of which are currently being implemented in the UK).
[d]Market-based instruments (i.e., policy instruments that use markets and prices to incentivise organisations to reduce their impacts).

as non-steroidal anti-inflammatories,[81,98] hormones[99] and psychoactive drugs,[100] were not explored in this study.

Promoting animal welfare

A minority of respondents (33%, 102/313) reported having an animal welfare policy at their practice, but a larger number reported the use of animal welfare guidelines (n = 142). Animal welfare training on owner and public education around responsible animal adoption/selection was suggested by the largest proportion of respondents (21%, 29/140), reflecting concerns for the problems arising from pet acquisition reported by PDSA in 2022.[101] Codes of practice for clinical settings, such as the use of animal handling and stress guidelines (as reported by 61%, 87/142) and clinical audits,[28,79] can help veterinary centres to manage the unintended welfare impacts of veterinary consultations and treatment and signal a welfare-centred approach.[102] Other interventions included in Table 6, such as welfare outcome measure reporting requirements and supporting farm animal clients with welfare grant applications, could also address specific welfare issues in domestic settings in alignment with professional priorities.[7,102]

Environmental impacts of animal husbandry

A minority of respondents (31%, 92/300) claimed that their practice occasionally, regularly or routinely advised clients on environmentally responsible animal husbandry, with advice most commonly

relating to cats and dogs, reflecting the respondent demographics. The provision of environmental advice represents a substantial, untapped opportunity for veterinary professionals to mitigate certain negative externalities and support the provision of public goods derived from domestic animals. Topics of sustainability relevance routinely discussed by veterinary professionals with clients include responsible breeding and neutering, obesity management, preventative healthcare, nutrition and efficiencies in farmed animal production.[103,75] However, our results suggest that some are also extending their advice to important aspects such as appropriate dog faeces disposal (10%, 9/87)[104] and minimising wildlife predation and disruption (2%, 2/87)[105–108] in the companion animal sector, and grazing and soil management (5%, 4/87) and biodiversity surveys (1%, 1/87) in large animal practice.[109–111] Further interventions (outlined in Table 6) could include environmental education for veterinary professionals and assisting farm clients in the uptake of environmental subsidies and assurance schemes to support specific systems, such as agroecology.[112,113]

Promoting social wellbeing

A 40% minority (117/289) of respondents stated that their practice had a policy on the social aspects of sustainability, and 'standards, guidance and frameworks to follow' were frequently desired. Mental health problems and workforce attrition[114,26] persist as harmful social externalities of veterinary work, although guidance from the BVA,[65] mental health initiatives from RCVS and VetLife[66,67] and practice mentorship schemes are available to help address these issues. As included in Table 6, practices could consider establishing codes of practice to formalise the important personal and social support function of veterinary professionals as 'community care givers' and 'trusted advisors',[115,116] for example, detailing their approaches to vulnerable clients and recognising and responding to signs of abuse.[86] Collaborations with the human healthcare sector on green and social prescriptions[87] could further enhance the positive externalities of veterinary services.

Solutions

In a survey conducted by RCVS,[117] supported by others,[118] the veterinary profession was considered to be one of the most trusted in the UK, and similar to other sectors, it works within a 'social licence to operate'. This refers to the implicit process by which communities approve an industry's activities as socially acceptable and grant it permission to conduct its business.[119] Public concern regarding specific sustainability risks associated with veterinary work can erode this social licence and lead to government regulation.[119]

However, industry self-regulation has been highly effective in driving sustainability in many sectors,[120–122] helping to protect an industry's social licence to operate. Voluntary initiatives to inform and certify veterinary service providers for sustainability credentials are gaining momentum, as evidenced by the 126 veterinary practices and organisations engaged in the Investors in the Environment accreditation scheme (April Soyomayor of iiE, personal communication, 8 December 2022). However, survey respondents indicated that additional programmes to provide knowledge, standards and guidance may support their practices' sustainability agenda. Sector-led solutions could therefore involve explicit inclusion of sustainability in veterinary undergraduate curricula and postgraduate training, reinforced by performance standards, codes of practice, reporting requirements and financial incentive schemes in practice, as used in other sectors to modify behaviours (see Table 6). Such initiatives could be implemented at the level of teaching institutions, practice groups, membership associations and professional regulators.

Considering the multi-faceted role of veterinary professionals, this mix of incentives for positive externalities and abatement measures to mitigate negative impacts could help to reconcile the conflicts that are frequently navigated in veterinary practice, between the opposing private and public interest claims on valuable resources.[123] For example, the responsibility to secure 'good life' opportunities for animals[124] is sometimes in tension with maximising production in farmed animals,[125] and reducing antimicrobial and parasiticide use in pursuit of public health or environmental objectives may necessitate a change in current veterinary business models, while protecting against potential animal welfare trade-offs.[126–128]

Conclusions

Considering the Earth's finite resources and the need to consider intergenerational and interspecies wellbeing, there is justification for the veterinary profession to build an ecological sustainability discourse that leverages its influence at the human–animal–environment interface. In addition to conceptualising sustainability for the veterinary context, opportunities for sustainability could be located at the level of veterinary centres and practitioners, and enacted through working policies and practices that accurately internalise (i.e., reward or penalise) the impacts of veterinary work.

Interpreted alongside previous studies, our results depict a value–action gap between the concern of veterinary professionals around sustainability issues and the policies and practices they report at their workplaces. Wider adoption and implementation of policies and practices is required, supported by further information and guidance, in particular to mitigate the environmental externalities of veterinary services and the animals under veterinary care and ensure

safe, fair and inclusive workplaces. Addressing the smaller gaps in policy identified in this survey could further alleviate animal welfare issues in clinical and domestic settings and maintain momentum around responsible medicine use. Building on the progress made to date, additional sector-led programmes to address the policy, practice and knowledge gaps could enhance veterinary contributions to the sustainability agenda and help to protect the sector's social licence to operate. Such programmes could involve a policy mix of education, reporting requirements, performance standards and incentives, implemented at the level of practice groups, membership associations, educational institutions and professional regulators.

Limitations

The authors recognise the limitations of using an iterative process to devise the research questions, rather than a standardised methodology, which would have been more robust. The participation of a self-selecting group of 392 individuals is a source of bias towards those interested in sustainability. The sample size of 392 was relatively low, considering over 5000 practices are currently operating in the UK. Furthermore, the results reflect the responses of veterinary practice representatives in a variety of roles and their current awareness of policies and activities at their practices, which were not validated against any practice documentation. We acknowledge the possibility of discrepancies between the claims of survey respondents and the policies and activities of their practice or practice group. The term 'policy' was defined broadly as a written or generally agreed set of principles, which may have been interpreted differently between respondents, representing a source of inaccuracy in responses. Respondents were given the opportunity to declare either sustainability policies or activities at their practices; the translation of policy to practice was beyond the scope of this study.

AUTHOR CONTRIBUTIONS

Laura E. Higham, Zoe J. Halfacree, Jo Stonehewer, David H. Black and Gudrun Ravetz conceived the research and developed the survey. Jo Stonehewer disseminated the survey and organised the responses for transmission to Laura E. Higham for analysis. Laura E. Higham performed the analysis and wrote the manuscript with input from all authors. Dominic Moran supported the economics framing of the research. Lisa Boden supported the interpretation and presentation of results. Catherine Oxtoby organised the ethical review and supervised delivery. All authors contributed to the final manuscript.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT

The raw data collected in this study are not available because participants did not give written consent for their data to be shared publicly. However, tables of data relating to the five themes described are available from the corresponding author on reasonable request.

ETHICS STATEMENT

Ethical approval for this study was granted by the RCVS Ethics Review Panel (Reference 2022-090-Oxtoby).

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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