

Original Article

Perception of UK companion animal veterinarians on risk assessment based parasite control

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ABSTRACT

Parasites can pose a risk to companion animals and potentially their owners. Current parasiticide use is possibly impacting the environment, increasing adverse reaction and resistance risk. As such parasiticides should be dispensed by the veterinary team proportional to individual risk, including owners in their approach. A mixed-methods questionnaire was designed and distributed using snowball sampling to ascertain overall awareness, observance, and attitude towards utilising a risk assessment based approach to parasite prophylaxis by UK companion animal veterinarians. 85.7% of veterinarians surveyed reported that they were aware of risk assessment based parasite control whereas only 53.9% said they utilise it always or often. Significant correlations were found between more frequent risk assessment based parasite control utilisation and increased owner involvement ($P = 0.0007$) and prescription confidence ($P = 0.0001$). Most attitudes towards adopting risk assessment based parasite control were positive. There was significant association with positive attitude and greater utilisation frequency ($P = 0.0010$), as well as working in corporate practice ($P = 0.0126$). Awareness of risk assessment based parasite control has potential to increase responsible utilisation of parasiticides by veterinarians, and therefore mitigate risks associated. Most veterinarians would like to see the profession move towards risk assessment based control use, but institutional changes are required. Further research, and education is also needed.

1. Introduction

Effective parasite control is critically important for the health and welfare of companion animals and their owners. The risk of parasitism varies based upon parasite-related, and demographic, lifestyle, and geographic host-related factors. Mitigating these risks should be the primary aim of parasite control, involving a combination of practical advice and an individually tailored parasiticide programme to strike a balance between appropriate parasite control and minimisation of any potential adverse reactions and environmental impacts. Risk assessment based parasite control involves prescribing prophylactic treatment and offering of bespoke advice that is individualised based on assessment of demographic, geographic, and lifestyle factors (Wright, 2020).

Appropriate parasite control guidelines based on individual risk have been developed by The European Scientific Counsel for Companion Animal Parasites (ESCCAP) (ESCCAP, 2021). ESCCAP's endoparasite guidelines categorise four risk groups based upon individual lifestyle and geography. Consideration of factors including outdoor status, freedom to roam, in-contact animals, eating offal, carcasses, an

unprocessed raw diet, or actively hunting should guide the formulation of an appropriate treatment frequency for roundworms and/or tapeworms. Additional recommendations are given based on risk factors, such as pregnancy/ lactation status, the animal's age, eating slugs/snails, travel to endemic areas, flea infestation, other parasite infection history, and contact with children or immunocompromised individuals, to treat for additional worms and/or treatment intervals (ESCCAP, 2021). Additionally, 'Control of Ectoparasites in Dogs and Cats' guidelines categorise five and six different risk scenarios for fleas and ticks, respectively, and provide recommendations on control. These recommendations range from regular examination for ticks and fleas (and where found, manual removal in the case of ticks, and administration of treatment for both), to sustained integrated tick and flea control generally monthly alongside environmental cleaning and treatment (ESCCAP, 2018).

Maximising effective control requires pet owner involvement with the veterinary team. Therefore, preventative drug treatment should be used in combination with giving practical recommendations to clients about environmental control and reducing zoonotic risk (Wright, 2017).

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Stokes and Wright (2018) summarised how to use best practice to create tailored parasite control plans for clients. This includes performing a risk-assessment to allocate pets into a risk group from which to base a tailored parasite control plan, with an annual review. Demographics should be taken into account, and questions regarding general health, lifestyle, parasite infection/ infestation history, previous treatments, adverse reactions, and geography should be asked. Wright (2020) reviewed the UK parasite trends and emerging threats, alongside some risk assessment questions to ask. Owner involvement and discussion was advised as essential to compliance, because understanding why and how best to give treatment increases the likelihood of following instructions (Richmond, 2017). It was also recommended that consideration of owner preferences and circumstances should be integrated into this approach to maximise compliance (Elsheikha, 2016a, 2016b).

The veterinary team should be involved in consistent risk assessment based parasite control. With an average vet consult time of 10 min (Gray and Cripps, 2005), there is limited time to comprehensively discuss risk assessment based parasite control, and formulate an individualised protocol on top of other duties. Veterinary nurses are best placed to carry out parasite control plans, and can play a vital role by leading parasite prevention clinics (Richmond, 2017; Richmond et al., 2017; Stokes and Wright, 2018; Wright, 2017, 2020). The British Veterinary Association (BVA) and British Small Animal Veterinary Association (BSAVA) policy position on responsible use of parasiticides for cats and dogs states that 'Veterinary professionals must always follow a risk assessment based approach to parasite control' (BVA, 2021). The position outlined concerns of current parasite control practices involving 'blanket-treatment' and called for more responsible use of parasiticides to limit the risk of resistance developing and minimise environmental contamination.

Previous pet owner surveys in five European countries (McNamara et al., 2018) and the UK (Pennelegion et al., 2020) found that dosing frequencies used for endoparasites of dogs and cats in the UK are lower than recommended by ESCCAP highlighting the need for improved education around dog and cat patient risk assessments, and greater adherence to ESCCAP guidelines. Owner education and compliance in many cases will come secondary to that of the veterinary professionals advising on and administering parasite control. Current awareness about, utilisation of, and attitudes towards risk assessment based parasite control of UK companion animal veterinarians remains however unknown. Hence, the present study was conducted to ascertain the overall awareness, observance, and attitude towards utilising a risk assessment based approach to cat and dog preventative parasite control by current practicing small animal veterinarians. This was achieved through distribution of a questionnaire. It was hypothesised that when prescribing preventative parasite control, despite clinicians' awareness of what a risk assessment based approach entails, this approach is not utilised, and as such owners are not often consulted by veterinarians.

2. Materials and methods

2.1. Ethical approval

The survey received ethical approval from the Committee for Animal Research and Ethics, School of Veterinary Medicine and Science, University of Nottingham. Informed consent was obtained, and the participants were made aware that participation is voluntary and that they are free to withdraw at any point. All collected data was kept anonymised and confidential.

2.2. Questionnaire design and piloting

A questionnaire (Supplementary file 1) was produced in Jisc Online Surveys to collect data on awareness, observance, and attitudes of UK-based small animal veterinarians towards utilising risk assessment based preventative parasite control. Eligible participants were any

current practicing small animal veterinarian working in UK general practice. A small pilot survey was first conducted to three veterinarians, one doctoral researcher, one clinician and one advanced practitioner. Feedback was implemented and pilot responses were not included in the analysis.

The survey contained 18 mixed-methods questions over 7 pages. The first two pages gave information and gained consent. Page 3 included multiple choice and free text questions, and collected information on demographics, practice outcode and practice type. This was performed to compare any age, gender, and/or practice type-related differences in awareness, approach, and attitude towards preventative parasite control. Page 4 included multiple choice and free text questions and collected information about current approach to prescribing preventative parasite control, as well as awareness of a risk assessment based approach. Page 5 gave the authors' definition of risk assessment based preventative parasite control comparative to routine blanket approach, and then collected information from multiple choice questions on participants observance, and perceived confidence in altering prescription, based on following a risk assessment. Page 6 involved a Likert scale and collected information on attitudes towards risk assessment based parasite control, centred on 13 statements about said approach. An optional free text question was inputted for final participant comments on the topics covered in the questionnaire. Pages 4, 5, and 6 were designed to compare alignment of awareness and attitudes towards a risk assessment based approach with prescribing tendencies. Page 7 offered participants the option to be contacted to receive a summary of the study, to take part in further research, and/or to be entered into the random free draw which was offered to encourage participation.

2.3. Questionnaire administration

The questionnaire was distributed via convenience snowball sampling in October 2021. Distribution was to the authors' professional contacts within the industry, veterinary social media groups, and all active practice email addresses from the RCVS website that were categorised as 'small animal general practice' (RCVS, 2021) through an easily accessible URL link. This technique required respondents to complete the questionnaire and pass it on to other potential participants. The virtual snowball sampling was used to maximise sample size and ensure adequate response rate was achieved over a period of 14 days. This approach was also used because the size of the target population was unknown, relevant individuals could not be easily identified, access to potential respondents was restricted, or contact information was unattainable.

2.4. Data processing and analysis

Data collected from the survey was exported into Microsoft Excel and underwent data cleaning. Three data sets were identified as incomplete due to invalid outcodes. These responses were included in the study but excluded from any distribution mapping. Respondents who did not meet the participant criterion (i.e. current practicing small animal general practitioner working in the UK) were excluded from the analysis. Personal information collected for participants was removed prior to analysis to protect anonymity.

Distribution maps were produced using symbol maps (Datawrapper, 2021). Statistical analysis for associations between categorical variables was carried out using a Fisher's exact two-tailed test using GraphPad prism software (GraphPad Software, San Diego, CA, USA). For testing purposes, age categories and forced Likert scale responses were grouped into two as follows: 22–40 or 41+ year; always and often, or rarely and never. One 'other' response was removed from analysis of participant confidence and other responses were grouped into yes and mostly, or somewhat and no. Likert scale responses were grouped into strongly agree and agree, neutral, or disagree and strongly disagree. Only female and male categories were included in gender-related analyses.

3. Results

3.1. Participant demographics

A total of 120 online questionnaires were completed, of which 119 responses met the participant criteria. Of the 119 participants included in the study, 38.66% ($n = 46/119$) were 22–30 years old, 25.21% ($n = 30/119$) were 31–40 years old, 26.05% ($n = 31/119$) were 41–50 years old, 9.24% ($n = 11/119$) were 51–60 years old, and 0.84% ($n = 1/119$) were 61+. Regarding gender, 76.47% ($n = 91/119$) participants were female, 22.69% ($n = 21/119$) were male, and 0.84% ($n = 1/119$) preferred not to say. 72.27% ($n = 86/119$) participants work in a corporate and 27.73% ($n = 33/119$) in independent practice. The geographic distribution of the study participants is shown in Fig. 1.

3.2. Awareness of risk assessment based parasite control

Upon being asked to self-assess whether they understood what risk assessment based parasite control comparative to routine blanket treatment was, 85.71% ($n = 102/119$) of the participants responded yes and 14.29% ($n = 17/119$) responded no. A significant association was found between awareness and age where more participants with 41+ years said yes ($P = 0.0286$).

3.3. Utilisation of risk assessment based control frequencies

When asked if a risk assessment based approach to parasite prophylaxis is currently utilised at their practice following being given the authors' definition, 7.56% ($n = 9/119$) said always, 42.86% ($n = 51/119$) said often, 44.54% ($n = 53/119$) said rarely, and 5.04% ($n = 6/119$) said never. Reasons for why risk assessment based parasite control was never or rarely utilised are summarised in Fig. 2.

A higher proportion of participants who self-assessed as yes to understanding what risk assessment based parasite control means,

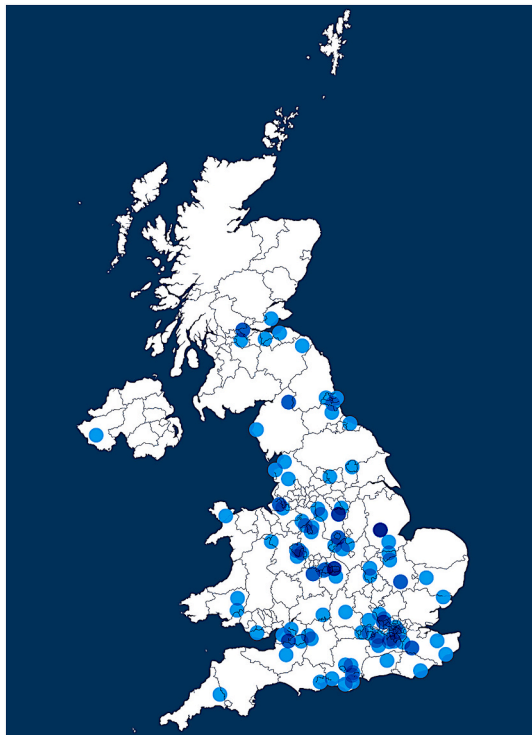


Fig. 1. Symbol map showing distribution of veterinary practices of veterinarians who participated in the UK survey in October 2021 by postcode. Colour has been multiplied where postcodes overlap.

responded to utilising it always or often (53.92%, $n = 55/102$) comparative to those who said no (29.41%, $n = 5/17$). A higher proportion of participants who self-assessed as no to understanding, said they utilised risk assessment based parasite control rarely or never (70.59%, $n = 12/17$), than those who said yes (46.08%, $n = 47/102$). However, the difference was not statistically significant ($P = 0.0714$) (Fig. 3A).

3.4. Owner involvement with parasite prophylaxis

Out of the participants who utilised risk assessment based parasite control 'always or often', a higher proportion responded always or often when asked if they involve owners in a discussion about parasite prevention prior to dispensing treatment (91.66%, $n = 55/60$), comparative to those who utilised it 'rarely or never' (66.10%, $n = 39/59$). Only 8.33% ($n = 5/60$) of those who 'always or often' utilised risk assessment based parasite control rarely involved owners, however (33.90%, $n = 20/59$) of those who 'rarely or never' utilised risk assessment based parasite control, rarely or never involved pet owners. This difference was statistically significant ($P = 0.0007$) (Fig. 3B).

3.5. Confidence in utilising risk assessment based parasite control

Upon being asked if they were confident in altering parasite prophylaxis active ingredient combinations, spectrum of activity, and interval of prescription based on a given set of demographic, lifestyle, and geographic factors, 31.93% ($n = 38/119$) said yes, 37.82% ($n = 45/119$) said mostly, 21.85% ($n = 26/119$) said somewhat, 7.56% ($n = 9/119$) said no, and 0.84% ($n = 1/119$) said other. Non-significant trends were observed between increased confidence and age, as well as males ($P = 0.2064$ and $P = 0.4717$, respectively).

Participants who utilised risk assessment based parasite control 'always and often' said yes or mostly more (91.67%, $n = 55/60$), comparative to the utilisation frequencies 'rarely or never' (48.28%, $n = 28/58$). Of participants who utilise risk assessment based parasite control 'always or often', 8.33% ($n = 5/60$) said somewhat or no about their confidence levels, whereas 51.72% ($n = 30/58$) of those who 'never or rarely' utilise risk assessment based parasite control said somewhat or no. These differences were statistically significant ($P = 0.0001$) (Fig. 4).

3.6. Attitude towards risk assessment based parasite control

Responses from the statement 'The companion animal veterinary profession should move away from a routine blanket approach and adopt a risk-assessment based approach towards parasite control' were used to assess the attitude towards risk assessment based parasitic control. Most responses were positive: 30.25% ($n = 36/119$) strongly agreed, 36.13% ($n = 43/119$) agreed, 23.53% ($n = 28/119$) were neutral, and 10.08% ($n = 12/119$) disagreed. No participants strongly disagreed (Fig. 5).

More females than males agreed or strongly agreed, and more males than females disagreed out of their respective populations, however this difference was not statistically significant ($P = 0.0585$). There was a significant association between overall attitude and practice type, where a higher proportion of participants currently working in corporate practice agreed or strongly agreed with the statement ($P = 0.0126$) (Fig. 6A).

Of the participants who utilised risk assessment based parasite control 'always or often', a greater proportion (80.00%, $n = 48/60$) strongly agreed or agreed, compared to those utilised it 'never or rarely' (52.54%, $n = 31/59$). A greater proportion of those who utilised risk assessment based control 'never or rarely' disagreed (18.64%, $n = 11/59$), compared to those who utilised it 'always or often' (1.67%, $n = 1/60$). These differences were statistically significant ($P = 0.0010$) (Fig. 6B).

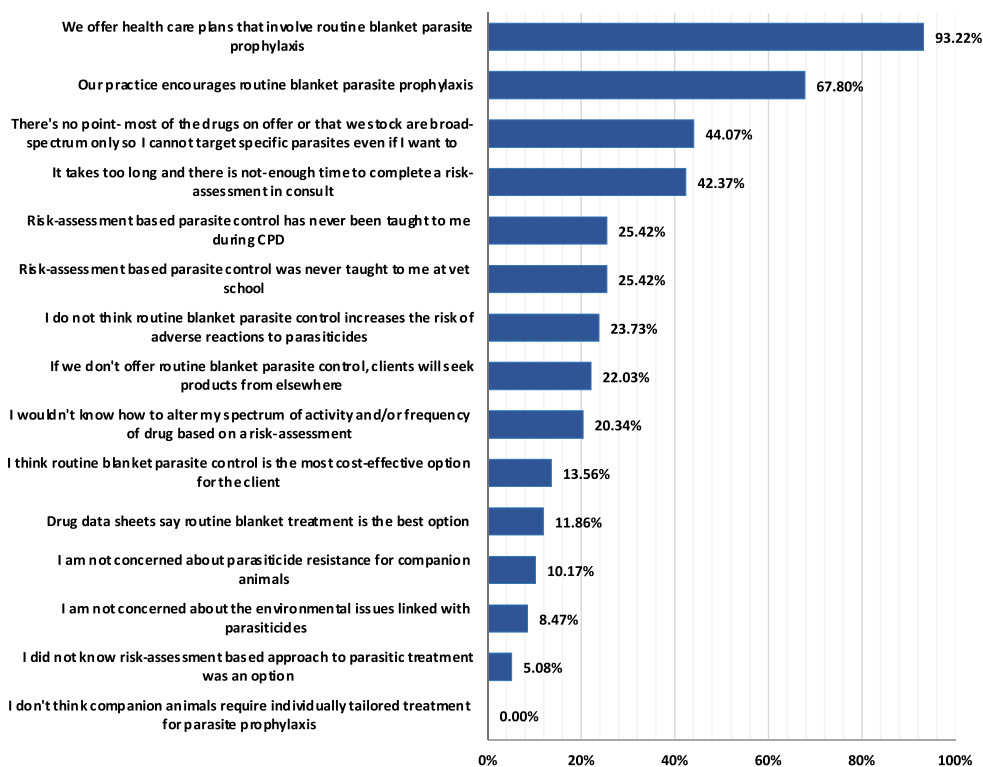


Fig. 2. Frequency of the participant responses to reasons for never or rarely utilising risk assessment based parasite control approach.

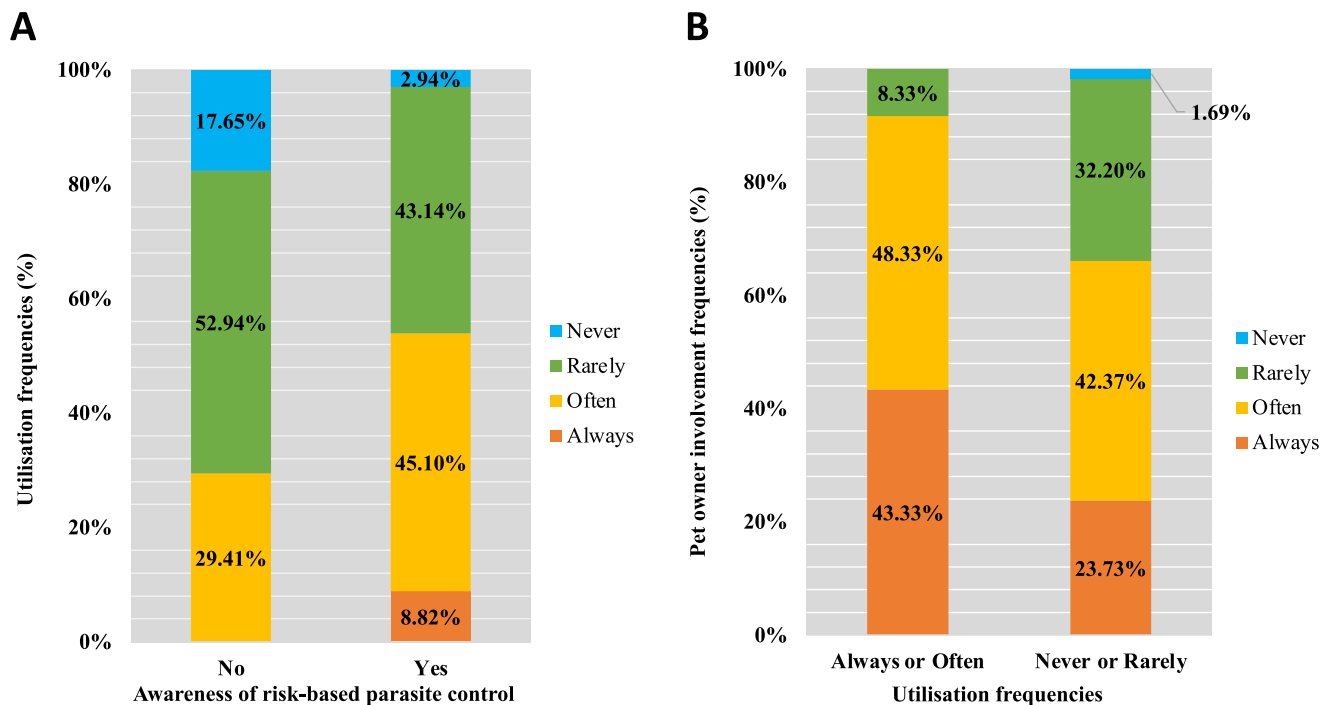


Fig. 3. Stacked bar charts showing the participants' responses to awareness and utilisation of risk assessment based parasite control approach. (A) Self-assessed awareness of risk assessment based parasite control by utilisation frequencies. (B) Frequency of pet owner involvement in parasite control by utilisation frequencies of risk assessment based parasite control approach.

4. Discussion

This study aimed to ascertain the overall awareness and observance of risk assessment based parasite control utilisation among UK small

animal clinicians. It was found that 85.71% of veterinarians said they understood what risk assessment based parasite control comparative to routine blanket treatment, indicating good levels of awareness about risk assessment based parasite control approach. The significant

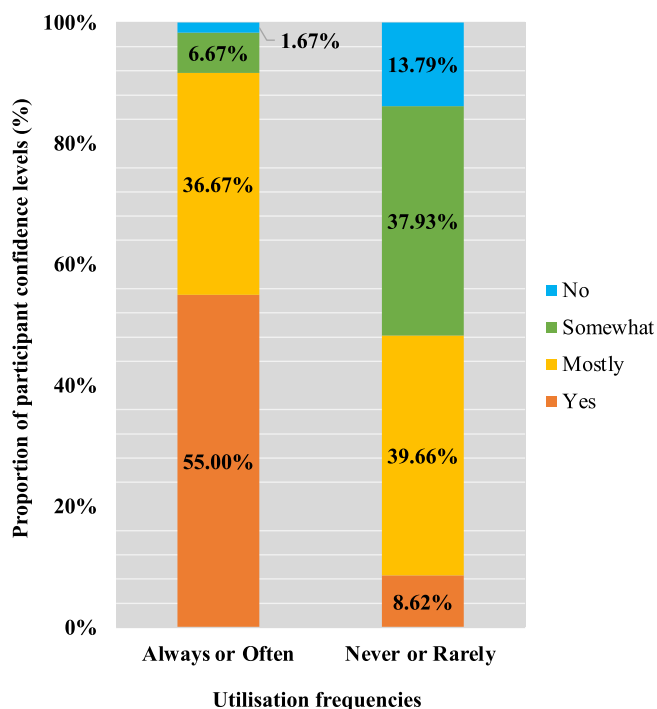


Fig. 4. Frequency of the participant responses to self-assessed confidence in utilising risk assessment based parasite control approach by utilisation frequencies.

association with over 40 age categories may imply that more experience in practice, or greater age may increase the likelihood of encountering risk assessment based parasite control in literature, on continued professional development, through colleagues, or otherwise. This may also explain the association between age and increased prescribing confidence.

More frequent utilisation of risk assessment based parasite control should logically follow from understanding its' basic principles comparative to blanket treatment however 35.29% more veterinarians self-assessed that they understand what risk assessment based parasite control is than frequently utilise the approach. The largest perceived barriers to frequent utilisation were external factors, including practice offering and encouragement of healthcare plans, broad-spectrum parasiticide products on offer, and restricted consult times. Other internal factors including lack of education, perceived financial cost to owners and lack of concern about the risks of parasiticides also contributed towards infrequent use, but proportionally less so than external factors. Availability of non prescription products was given as an additional contributing reason for infrequent use, however this was minor to all other external factors. Lack of knowledge was the least reported reason, and no participants reported that they didn't think companion animal require individually tailored parasite control.

Similar to prior work (McNamara et al., 2018; Pennelegion et al., 2020), the observed trend between awareness and utilisation, although not statistically significant, indicates that an increased understanding

may result in more frequent utilisation. Although educational resources do exist and are publicly available, for example on the ESCCAP UK & Ireland website (ESCCAP, 2021), more widespread education and awareness among veterinarians could lead to more frequent observance of the risk assessment based parasite control approach. Minimising barriers to utilisation could be achieved via integrating nurse-led parasite clinics and risk assessment based control into monthly practice health care plans, for example (Stokes and Wright, 2018). The recently published BVA and BSAVA policy may trigger institutionalisation of a risk assessment based approach, as well as alterations to parasiticide products and their availabilities (BVA, 2021).

4.1. The importance of owner involvement

25.56% of veterinarians who utilise risk assessment based control were more likely to involve owners in their pets' parasite control plan. Given that pet owner compliance is cornerstone to parasite control efficacy and infection risk minimisation (Maddison et al., 2021), it is important to engage pet owners when evaluating parasite treatment efficacy and any potential environmental impacts.

Where owner knowledge is lacking about parasite risk, this could be for example via lack of veterinary involvement, preventative treatment is often not given according to data sheets (Abdullah et al., 2016; Cooper et al., 2020; McNamara et al., 2018; Pennelegion et al., 2020). A major part of the veterinary role is client education (Dolby and Litster, 2015), and a discussion about parasite control may help the pet owner and the veterinarian to make more appropriately tailored parasite control decisions.

Even if pet owners are sourcing their products from elsewhere due to convenience, cost or otherwise, discussion can still occur for example during annual health check-ups. Having these discussions may lead to beneficial effects, such as increased client retention and improved client trust in the veterinary profession (Elsheikha, 2016a, 2016b), thereby increasing overall safeguarding of animal health and welfare.

4.2. Prescribing confidence

43.39% of the participants were more likely to be confident in their prescription if they utilised risk assessment based control more frequently. Interestingly, only 20.34% of those who used risk assessment based parasite control less frequently reasoned because they wouldn't know how to alter their prescription, compared to 51.72% who reported they had lower confidence levels overall. Lack of confidence in prescription was not a major contributing factor behind less frequent risk assessment based control use. This association is therefore much more likely to be explained by a lack of confidence resulting from a reduced utilisation and/or understanding, as opposed to a lack of confidence leading to reduced utilisation. This could be due to veterinarians who frequently use risk assessment based parasite control being more assured in their decision making from being more up to date with current literature about parasite and host risk factors, parasiticide products, and implementing risk assessment based control.

Educational providers have a role to play, particularly considering lack of education from CPD and vet school were reported as reasons why just over a quarter of the participants never or rarely used risk

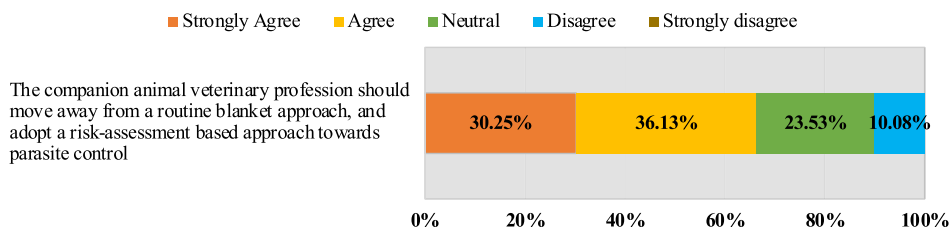


Fig. 5. Frequency of the participant responses regarding adopting a risk assessment based parasite control approach.

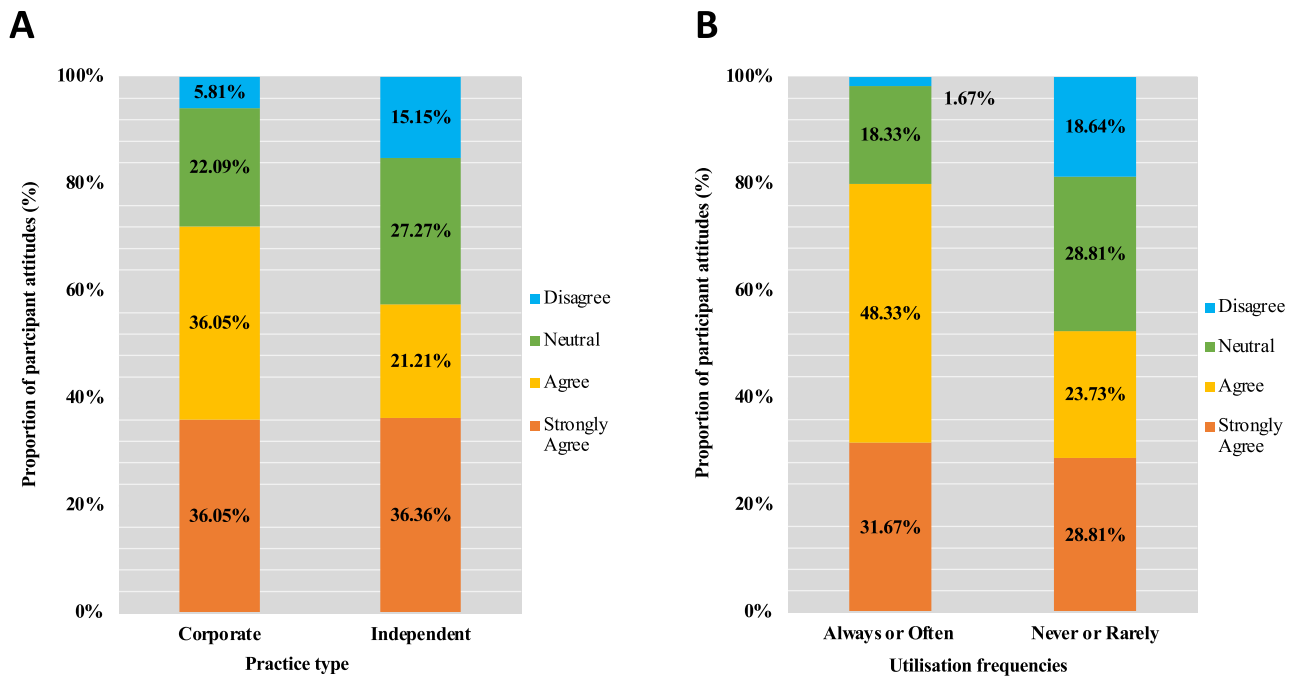


Fig. 6. Frequency of the participant responses to perception towards the veterinary profession adopting risk assessment based parasite control approach by (A) practice type and (B) utilisation frequencies.

assessment based parasite control. Higher veterinarian prescription confidence levels may have a similar positive follow-on effect as that of increased pet owner involvement, namely increased owner compliance and trust in the veterinary profession, therefore increased efficacy of treatment and mitigation of parasiticide use risks.

4.3. Veterinarians' attitudes towards risk assessment based parasite control

Another aim of this study was to ascertain the overall attitude towards using a risk assessment based approach. Most veterinarians surveyed would like to see the profession move towards using a risk assessment based parasite control approach. The association between practice type and the observed attitude may be indicative of practice economic reliance on monthly health plans that include parasite control, and/or practice policy in place that restrict veterinarians' ability to deviate from these health care plans. The utilisation frequency and attitude association indicate that those who currently utilise risk assessment based parasite control often or always are unlikely to have encountered problems large enough to not want this approach to be adopted by the profession, and presumably believe it is of value to their patients, clients, and the profession. The overall agreeable attitude, in context with most barriers to utilisation being external, reveals a move to risk assessment based parasite control is feasible, but will rely on institutional changes. A wider evidence base supporting this, combined with increased dissemination of educational resources, may also help to alter attitudes through increased awareness, observance and therefore confidence in this approach. Improved owner compliance, therefore, minimisation of infection risk and parasiticide risks, should naturally follow.

4.4. Future research

Wider epidemiological studies quantifying host-related demographic, lifestyle, and geographic factors relevant to parasites of veterinary importance in the UK are needed to better understand individual risk and continually update control guidelines accordingly.

Prevalence and impact of exotic parasites and their vectors in the UK also need regular quantifying in both animal and human populations to ensure best advice and management practices. Other areas of further research include experimental and review studies looking at the environmental impact, potential risk of resistance development, adverse reactions to parasiticide products, and efficacy of alternatives to a routine blanket parasite control approach. These will all provide a more extensive evidence-base for a move towards risk assessment based control approach by the veterinary profession, as well as assist in the design of up-to-date and relevant educational resources that can contribute towards more responsible parasiticide use, increasing the observance of risk assessment based parasite control, and ultimately improve parasite treatment efficacy whilst minimising adverse effects. More similar studies to those by Pennelegion et al. (2020) could be conducted involving companion animal owners, considering the importance of compliance (Elsheikha, 2016a, 2016b; Maddison et al., 2021), as well as veterinary nurses (Elsheikha, 2016c; Wright, 2020), given the emerging role they are best placed to play in parasite control (Richmond et al., 2017). Understanding current knowledge, practices, and attitudes will further assist the development and dissemination of appropriate educational resources, empowering vet professionals and owners alike.

4.5. Conclusion

Most veterinarians surveyed said they understood risk assessment based parasite control comparative to routine blanket treatment, and there was a significant association with the age categories over 40. The largest perceived barriers to frequent utilisation are external factors affecting veterinarian prescribing autonomy such as practice healthcare plans; internal factors, such as lack of concern about the risks of parasiticide use, also contribute. Awareness of risk assessment based parasite control has potential to increase responsible utilisation of parasiticides by veterinarians, and therefore mitigate risks associated. Additionally, owners are more likely to be involved in their pets' parasite control plans, and veterinarians are more likely to be confident in their prescription, both of which potentially improve pet owner compliance,

increasing efficacy of treatment and further mitigating risks of parasiticide use. Most veterinarians surveyed would like to see the profession move towards using risk assessment based parasite control. In context of the barriers in place, this majority indicates that a move to the approach is possible but relies on institutional changes within the profession, for example practices integrating risk assessment based control into health care plans and spearheading nurse-led parasite clinics. Further research is needed to understand individual risk of parasitism and how best to use parasiticides in clinically effective ways.

Ethics statement

The survey received ethical approval from the Committee for Animal Research and Ethics, School of Veterinary Medicine and Science, University of Nottingham. Informed consent was obtained, and the participants were made aware that participation is voluntary and that they are free to withdraw at any point. All collected data was kept anonymised and confidential.

Declaration of Competing Interest

The authors declare no conflict of interest.

Acknowledgments

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.vprsr.2022.100774>.

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