

Submitted: 12/10/2020

Accepted: 11/01/2021

Published: 31/01/2021

Flea and tick treatment satisfaction, preference, and adherence of US cat owners prescribed topical fluralaner (Bravecto® Topical Solution for Cats)

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Abstract

Background: Fluralaner is a novel isoxazoline compound and the only systemically distributed ectoparasiticide approved in the United States for redosing at up to 12-week intervals for flea and tick control in cats. Other feline ectoparasiticides, including other systemic isoxazolines, are approved for redosing at monthly intervals. A survey developed in 2016 to assess the satisfaction, preference, and adherence of dog owners prescribed fluralaner as an ectoparasiticide with the treatment and veterinary flea and tick protection recommendations was adapted for completion by cat owners in the USA.

Aim: The study objective was to use cat-owner survey data obtained at US veterinary practices to assess client satisfaction and utilization practices for fluralaner, and to evaluate owner adherence to current flea and tick control recommendations.

Methods: US veterinary practices ($n = 26$) were asked to obtain completed surveys for up to 25 active clients who were currently treating their cats with a topical preparation of fluralaner for flea and tick control. Clients who had previously used flea and tick products for cats other than fluralaner were enrolled in the study. Participating cat owners completed an 11-question survey on their satisfaction with, preference for, and adherence to treatment recommendations for topically applied fluralaner as a feline flea and tick control medication.

Results: The average cat in this study had a mean (\pm SD) body weight of 5.1 (\pm 0.9) kg and was 7.1 (\pm 1.4) years old. Most cats lived in a home versus an apartment and more than half spent some time outside. Satisfaction was assessed with a 5-point Likert scale, with nearly all cat owners (97%) indicating that they were satisfied or very satisfied with fluralaner. Most of them (66%) had previously used other monthly flea and tick products for cats. Owners were not excluded if they had previously used a canine flea and tick product. The extended dosing interval up to 12 weeks was the most frequently selected benefit of fluralaner. Nearly 9 out of 10 respondents indicated they readministered fluralaner mostly on time or delayed by a few days, and most said they were more likely to give a repeat dose of fluralaner at the recommended redosing interval compared to monthly products. 87% of the responding cat owners preferred topical fluralaner over the monthly flea and tick products they had used.

Conclusion: The extended dosing interval of up to 12 weeks was the leading preference factor and the key driver of user satisfaction with fluralaner leading to improved adherence to redosing recommendations. Cat owners said they were more likely to administer fluralaner at the recommended redosing interval compared to monthly products, indicating that less frequent redosing contributes to improved adherence.

Keywords: Cats, Ectoparasites, Fluralaner, Preference, Satisfaction.

Introduction

Therapeutic efficacy in both human and veterinary medicine heavily depends on client adherence to treatment recommendations. Furthermore, adherence is motivated by user satisfaction and preference, particularly for discretionary or client-administered treatments in veterinary medicine. This cause-and-effect relationship between treatment satisfaction, preference, and adherence is well established in human medicine. For example, the randomized, controlled Denosumab Adherence Preference Satisfaction study of female osteoporosis patients found that user preference for denosumab subcutaneous (SC) injections every 6 months versus weekly oral medication was a significant

predictor of adherence to denosumab treatment, and that adherence improved progressively from 1 year to the next (Freemantle *et al.*, 2012). Similarly, European investigators found that psoriasis treatment, which has a generally poor record of patient adherence, had significantly improved outcomes and patient satisfaction scores when physicians matched treatment recommendations with their patients' preferences (Umar *et al.*, 2013). Our research group previously evaluated the relationship between satisfaction, preference, and adherence in studies on canine ectoparasite control (Lavan *et al.*, 2017a, 2020), finding that the use of an extended duration medication was associated with strong satisfaction, strong preference, and improved

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adherence to veterinary recommendations. In summary, successful long-term chronic treatment has reliably been linked to patient or client satisfaction and preferences as drivers of adherence (Barton, 2009; Lizán *et al.*, 2014; Belinchón *et al.*, 2016).

Companion animal veterinarians make recommendations for annual flea and tick control using ectoparasiticides. The Companion Animal Parasite Council (CAPC, 2020) recommends year-round treatment of dogs and cats for fleas and ticks due to: the prevalence of flea infestation; the role of fleas in allergic dermatitis; the potential for fleas and ticks to transmit vector-borne pathogens, including zoonoses; and the growing US populations of wildlife ectoparasite hosts. Therefore, continuous flea and tick control is a common goal; however, most cat and dog owners fall well short of this standard, and cats are conspicuously undertreated for ectoparasites (Gates and Nolan, 2010).

Convenience and efficacy for companion animal flea and tick control improved initially in the 1990s with the introduction of topical ectoparasiticides administered at monthly intervals, replacing very short acting baths, dips, or sprays (Dryden, 2009; Dryden *et al.*, 2013). These new monthly products protected against flea infestations by combining rapid on-animal adulticidal activity with a residual ovicidal or larvicidal effect following a single dose. Continuous presence for up to a month in the treated animal or its surrounding minimized interruptions in parasitocidal activity. This approach advanced to another step with the introduction in 2014 of the isoxazoline class of long-acting parasiticides for canine use with feline approvals (although not for afoxolaner) 1–2 years later. Currently, there are four food and drug administration (FDA)-approved isoxazolines including fluralaner (Bravecto® Chews, Bravecto® Topical Solution for Dogs and Bravecto® Topical Solution for Cats, Bravecto® Plus for Cats, Merck Animal Health, Madison, NJ), sarolaner (Simparica®, Simparica Trio™ and Revolution Plus®, Zoetis), lotilaner (Credelio®, Elanco), and afoxolaner (Nexgard®, Boehringer Ingelheim). Two of these (sarolaner and lotilaner) are FDA-approved for administration to cats at monthly intervals. Fluralaner (Bravecto Topical Solution for Cats, Merck Animal Health, Madison, NJ) is unique because it is the only ectoparasiticide FDA-approved for redosing at up to 12-week intervals in cats (Williams *et al.*, 2014; Kilp *et al.*, 2016; NADA 141-459, 2016).

The US prescribing information for Bravecto Topical Solution for Cats indicates that the product kills adult fleas and is indicated for the treatment and prevention of flea infestations (*Ctenocephalides felis*) and the treatment and control of *Ixodes scapularis* (black-legged tick) infestations for up to 12 weeks in cats and kittens 6 months of age and older, and weighing 2.6 pounds or more. It is also recommended for the treatment and control of *Dermacentor variabilis* (American dog tick) infestations for 8 weeks in cats and kittens 6 months of

age or older, and weighing 2.6 pounds or more (NADA 141-459, 2016).

Recent US and international studies based on veterinary practice client surveys have assessed the extent of dog-owner satisfaction with fluralaner. The studies compared dog-owner preference for fluralaner versus shorter-acting monthly ectoparasiticides and assessed the effect on treatment adherence (Lavan *et al.*, 2017a, 2017b, 2020). These studies found a strong and consistent preference for fluralaner's extended redosing interval over monthly administration. Client purchasing data indicate that veterinary prescription of fluralaner results in more months of flea and tick treatment coverage during the year in dogs compared to monthly ectoparasiticides (Lavan *et al.*, 2017b) indicating improved dog-owner adherence to annual treatment recommendations.

The purpose of this study was to survey cat owners at US veterinary practices to evaluate their satisfaction with, preference for, and treatment adherence to fluralaner prescribed for their cats. We are not aware of any prior surveys of owner satisfaction, preference, and adherence to veterinarians' treatment recommendations for flea and tick control options for cats.

Materials and Methods

Survey population

A total of 26 veterinary clinics geographically distributed throughout the US participated in the survey. The clinics were located in the eastern (6 clinics, 89 cat-owner surveys), central (12 clinics, 247 cat-owner surveys), southern (5 clinics, 86 cat owners) and western (3 clinics, 29 surveys) regions of USA. At least one veterinarian was also surveyed at each participating clinic. Each veterinary practice was asked to obtain completed surveys from up to 25 active, cat-owning clients who were currently using a topical preparation of fluralaner for flea and tick control on their cats. Cat owners who had previously used flea and tick products other than fluralaner for their cats or dogs also participated in the study. Participating veterinarians were asked to survey cat owners who presented their cats for non-acute care visits, such as a wellness check, vaccinations, or grooming, and who were knowledgeable consumers of flea and tick medications, including fluralaner, and were asked to not "hand-pick" individual cat owners. Cat owners were excluded if they participated in a feline healthcare plan that included a designated flea and tick medication as a component of the plan to avoid bias toward any flea and tick medication. All participating clients signed a consent form agreeing to complete the survey.

Survey instruments

Participating veterinarians were asked about their gender, years in practice, and annual recommendations for feline flea and tick control (Table 1). Cat owners completed a survey that consisted of three parts: owner demographic information (Table 2); cat

Table 1. Clinical practice experience of surveyed US veterinarians and their feline patient flea and tick control recommendations (November, 2019–February, 2020).

Survey category	Responding veterinarians		
	Female (n = 13)	Male (n = 12)	Overall (n = 25)
Mean years in practice (range)	12.8 (1–31)	20.9 (1–43)	16.8
Flea control recommended coverage (months)	11.1 (8–12)	11.6 (8–12)	11.7
Tick control recommended coverage (months)	11.1 (0–12)	10.5 (0–12)	10.8
% recommending year-round flea coverage			90 (26/29) ^a
% recommending year-round tick coverage			79 (23/29) ^a

^aAll veterinarians provided their annual recommendation for flea and tick protection (n = 29). Not all veterinarians provided their age or years in practice (n = 25).

Table 2. Demographics and ectoparasite observation experience of cat owners responding to a US survey.

Owner gender	
Male	98 (22%)
Female	350 (78%)
Unspecified	3 (1%)
Owner age distribution (years)	
<20	5 (1%)
20–35	109 (24%)
36–45	98 (22%)
46–55	99 (22%)
>55	105 (23%)
Unspecified	35 (8%)
Years as cat's primary caregiver (Mean ± SD)	
	6.9 ± 3.1
Owner's flea observation	
Never	197 (44%)
On cat	243 (54%)
In house	81 (18%)
In bed	9 (2%)
On family member	15 (3%)
Owner's tick observation	
Never	343 (76%)
On cat	80 (18%)
In house	26 (6%)
In bed	4 (1%)
On family member	27 (6%)
Owner's understanding of the veterinarian's recommendation for duration of flea and tick coverage (n = 451 responses)	
1–3 months	14 (3%)
4–6 months	16 (3%)
7–9 months	12 (3%)
10–12 months	338 (75%)
Does not know	71 (16%)

(Continued)

Has owner used flea and tick products other than fluralaner	Yes, 298 (66%)
	No, 122 (27%)
	Don't know, 31 (7%)
Is cat treated with ≤ 1 month of heartworm preventive?	Yes, 65 (14%)
	No, 386 (86%)

Table 3. Demographic profile of cats reported by owners surveyed in the US.

Cat gender	
Male	228 (51%)
Female	223 (49%)
Neutered or spayed ($n = 451$ responses)	
	429 (95%)
Mean body weight (kg \pm SD)	5.1 \pm 0.9
Mean age (years \pm SD)	7.1 \pm 1.4
Cat's living environment	
Apartment	46 (10%)
House	395 (88%)
Unspecified	10 (2%)
Cat's environmental access ($n = 239$ responses)	
Outdoor or mostly outdoor	24 (10%)
Indoor–outdoor equally	45 (19%)
Mostly indoor	61 (25%)
Indoor only	109 (46%)
Cat has passed tapeworm segments	
Occasionally	82 (18%)
Often	5 (1%)
Never	364 (81%)
Cat's overall health	
Poor or fair	27 (6%)
Good	217 (48%)
Excellent	207 (46%)
Cats in multi-pet households (n [%])	
Lives with dogs, mean no. of dogs in household \pm SD	244 (54%), 1.8 \pm 0.38
Lives with other cats, mean no. of cats in household \pm SD	266 (59%), 2.3 \pm 1.2
Lives with other pet species	26 (6%)

SD = standard deviation.

demographic information (Table 3); and questions on the cat owner's satisfaction with, preference for, and adherence to treatment recommendations for topically applied fluralaner as a flea and tick control medication for cats (Table 4). The survey section on fluralaner utilization included 11 separate questions, described in the Results section. The survey instrument was provided in hard-copy form designed to be completed in 5–10 minutes. The survey was printed on both sides of a single sheet, with demographics questions on one side and the

fluralaner utilization questions on the reverse. Responses from all cat owners were assessed for questions 1–3 and 5 and responses from owners with prior experience with monthly flea and tick products were assessed for questions 4, 6–11. Logistic regression was used to determine whether there were predictors of satisfaction or preference.

Ethical approval

This study did not involve testing of live animals. Respondent cat owners provided signed informed consent prior to completing the survey.

Table 4. Responses of US cat owners prescribed fluralaner to a survey of their flea and tick treatment satisfaction, preferences, and adherence.

Survey question and response options	Response rate (n)
Q1. What is your level of satisfaction with Bravecto®? [% (n)]	
Very satisfied	65% (292)
Satisfied	32% (142)
Neutral	3% (12)
Unsatisfied or very unsatisfied	<1% (2)
Q2. Which Bravecto® benefits are important to you (select all that apply)? [% (n)]	
One treatment every 12 weeks	76% (344)
Veterinarian recommended	57% (255)
Eliminate fleas and ticks with one dose	55% (246)
Less stress for me	54% (243)
Less stress for my cat	53% (238)
Ease of use	34% (154)
Q3. Most important reason to use Bravecto® (Choose One)? [% (n)]	
One treatment every 12 weeks	36% (162)
Eliminate fleas and ticks with one dose	24% (107)
Veterinarian recommended	15% (66)
Less stress for cat	12% (54)
Less stress for me	11% (51)
Q4. Compared to a monthly flea and tick product, which of the following have you experienced with Bravecto® for Cats (select all that apply)? [% (n)]	
I can treat my cat less often	63% (189)
My cat has fewer fleas	39% (116)
12 weeks is easier to remember than monthly	36% (108)
I am more likely to apply on time and therefore my cat is better protected.	31% (93)
I am less likely to forget to treat my cat.	30% (89)
Q5. When your cat is due for its next dose of Bravecto for Cats, do you give this treatment (Choose One): [% (n)]	
Mostly on time	66% (293)
Delayed a few days	24% (108)
Delayed by weeks or months	10% (47)
Questions 6–11 were answered by cat owners (n = 300) with prior experience using flea and tick products administered monthly	
Q6. If offered, would you go back to using a monthly product? [% (n)]	
Yes	7% (20)
No	71% (214)
Don't know	22% (66)
Q7. Are you more likely to give Bravecto® for Cats on time compared to monthly flea and tick products? [% (n)]	
Yes	62% (186)
No	<1% (2)
About the same	33% (100)
Don't know	4% (12)
Q8. Does Bravecto® provide more months of flea and tick coverage per year compared to other flea and tick products you have used? [% (n)]	

(Continued)

Survey question and response options	Response rate (n)
More months	37% (110)
Fewer months	26% (80)
Same number of months	37% (110)
Q9. Is it more convenient to give repeat doses of Bravecto® for Cats compared to monthly flea and tick products? [% (n)]	
More convenient	86% (259)
About the same	13% (37)
Less convenient	1% (4)
Q10. Is dosing with Bravecto® easier than dosing with a monthly flea and tick product? [% (n)]	
Easier	78% (233)
About the same	21% (64)
Less easy	1% (3)
Q11. Do you prefer Bravecto® for Cats compared to other flea and tick products you have used? [% (n)]	
Yes	87% (260)
No	2% (7)
No preference	11% (33)

Results

Attending veterinarian demographics

Veterinarians from 26 participating practices completed the demographics questionnaire, but not all veterinarians answered all questions. Veterinarians were approximately evenly divided by gender and in general had many years of practice experience (Table 1). Most veterinarians surveyed recommended year-round control for fleas (90%) and ticks (79%), and the average recommended duration of coverage was close to 1 year for both fleas and ticks. The lower percentage of veterinarians recommending year-round tick control was due primarily to geographic variation in tick prevalence, with two practitioners in California recommending no tick control for cats in their practices. Veterinarians with ≤ 10 years of practice experience were more likely to recommend year-round protection for ticks, compared to veterinarians with more than 10 years in practice experience.

Cat-owner demographics

A total of 451 cat-owner clients submitted the survey, although not all respondents answered every question (Table 2). Respondents were predominately female, and their age was distributed (across age blocks) from <20 to >55 years. The largest group of female respondents (25%) were in the 20–35-year block and the largest group of male respondents (34%) were in the >55 -year block. Respondents were experienced owners, averaging 6.9 years as primary caregivers for their cats. Over half of the owners (54%) had directly observed fleas on their cats at some time, with a smaller percentage observing fleas in environmental locations or on family members. Forty-four percent of the respondents had never observed fleas on their cats or in their local environment. In comparison,

76% of the owners had never observed ticks, either on their cats or elsewhere in the home setting (Table 2). When the percentage of owners who observed fleas and ticks on their cats was sorted by the cat's indoor or outdoor status, there was a trend toward greater prevalence of infestation as outdoor status increased, particularly for ticks (Fig. 1). Nearly three-quarters (75%) of the cat owners understood their veterinarian's recommendation for flea and tick coverage to be 10–12 months (Table 2), tracking closely with veterinarians' actual recommendations (Table 1). One in six cat owners (16%) was unaware of their veterinarian's coverage recommendation for flea and tick control. Two-thirds of the cat owners had used ectoparasiticide products other than fluralaner, while only a minority (14%) used heartworm preventive medication in their cats.

Feline patient demographics

The demographic profile of the cats represented in the owner survey (Table 3) indicates a similar proportion of male and female cats, with almost all (95%) spayed or neutered. The mean body weight (\pm SD) for cats in this study was 5.1 (\pm 0.9) kg and the mean age was 7.1 (\pm 1.4) years. Close to one-third of the cats (29%) had routine outdoor access, and approximately half were exclusively indoor cats. Of the indoor only cats, 48% of the cat owners had seen fleas on the cat. We do not know if the indoor only cats lived with a cat that went outdoors and do not know when fleas were observed, relative to the time that the cat was acquired. The owners had seen fleas on 64% of the cats that spend time outdoors. Owners of 19% of the cats observed fecal tapeworm segments, suggesting flea infestation. Almost all owners (94%) indicated their cats were in good or excellent health. Most cats (77%) lived in

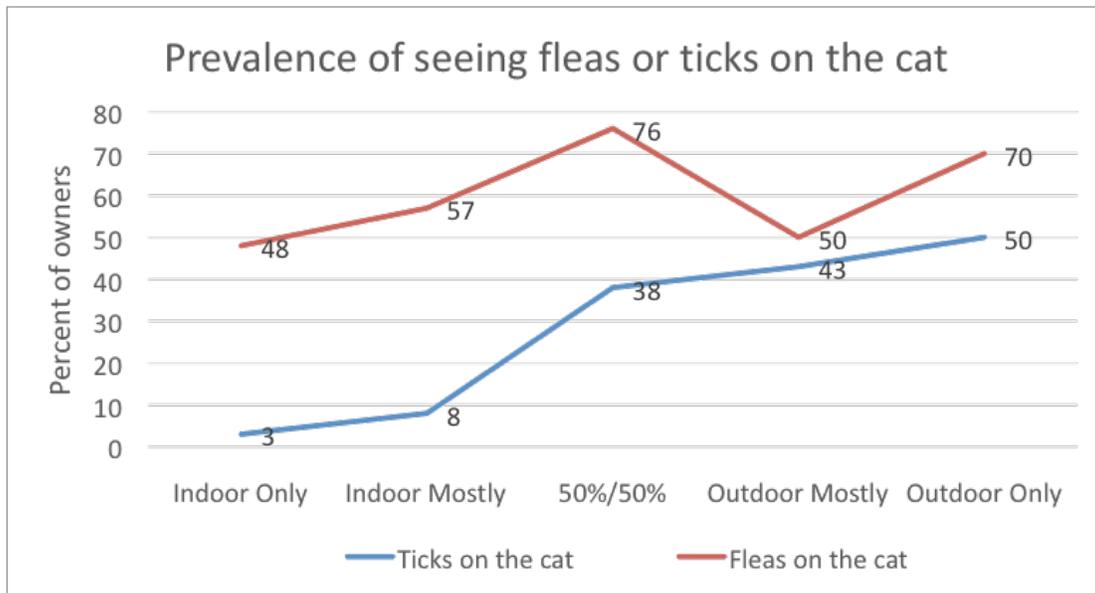


Fig. 1. Owners indicated that a high percentage of their cats had observable flea or tick infestation, regardless of whether they were in an indoor or outdoor environment. Ticks were less prevalent, with higher rates of infestation occurring as outdoor access increased. Survey was conducted from November, 2019 to February, 2020.

multi-pet settings, averaging 2.3 cats and 1.8 dogs, when other animals were present in the household.

Survey results

Cat-owner satisfaction proportions with fluralaner for flea and tick control are presented in Table 4. Almost all cat owners (97%) were satisfied or very satisfied with fluralaner. This high satisfaction proportion was consistent regardless of respondent gender or indoor–outdoor status of the cats. Owners aged 46–55 years ($p = 0.03$) and owner preference for fluralaner ($p = 0.0007$) were predictors of satisfaction.

Cat owners were asked whether there were benefits associated with using fluralaner for flea and tick control (question 2). Respondents could select one or more choices or draft their own write-in response. Up to 12-week redosing was the most selected benefit for 76% of all cat owners. Of the six most selected benefits, four were related to convenience (extended duration redosing, less stress for the owner, less stress for the cat, and ease of use), one to product efficacy (one-dose efficacy), and one to adherence to the veterinarian’s recommendation. Response data were sorted by indoor–outdoor status of the cat and whether the owner observed fleas on the cat or environment at any time. The extended redosing interval was the most frequently selected benefit for all indoor–outdoor cat categories and was most frequently selected by owners who had observed fleas on their cats (80%) or whose cat lived primarily in an indoors environment (82%).

Cat owners were asked to identify the single most important benefit to them of using an extended duration flea and tick medication and included a write-in response (question 3). The top three responses (Table

4) include extended duration redosing interval as most frequently selected (36%), followed by “eliminate fleas and ticks with one dose” (24%) and “recommended by my veterinarian” (15%).

Cat owners were asked to select, from a list of nine choices including a write-in response, different outcomes they may have experienced following the use of fluralaner (question 4) and compare this with their experience with monthly flea and tick products. “Less frequent flea and tick treatment” was the most popular choice, followed by efficacy (“fewer fleas”), and the “12-week redosing interval being easier to remember than monthly redosing”. “Less frequent treatment” was most frequently observed (41%) by a wide margin among female respondents, suggesting that convenience was a key attraction for these cat owners.

Cat owners who used fluralaner were asked to indicate the likelihood of their adherence to the recommended redosing interval (question 5). All cat owners were currently prescribed fluralaner at the time of the study. Nearly 9 out of 10 respondents indicated that they readministered fluralaner mostly on time or delayed by a few days. Cat owners were asked to compare their experience using fluralaner with their experience using other flea and tick products for cats (questions 4, 6–11). Cat owners with prior experience using monthly flea and tick products were asked whether they would revert to a monthly medication after using fluralaner (question 6). Only 7% would return to a monthly product, while 71% would not go back to monthly dosing. Owners were asked whether they were more likely to give repeat doses of fluralaner on time compared to a monthly flea and tick product (question 7). Nearly two-

thirds of the respondents (62%) were more likely to give a repeat dose of fluralaner on time compared with monthly products, while 33% said the likelihood of on-time dosing would be about the same for both types of medication.

Cat owners were asked whether fluralaner provided equivalent yearly durations of flea and tick treatment coverage compared to other flea and tick products (question 8). About one-third (37%) of the respondents indicated that fluralaner would provide more months of treatment coverage, while a similar proportion said that fluralaner would provide the same (37%) or fewer (26%) months of coverage.

Cat owners were asked whether it was more convenient and easier, respectively, to readminister fluralaner compared to monthly flea and tick products (questions 9 and 10). Most respondents (86%) found that fluralaner was more convenient to redose, and 78% said it was easier to redose with fluralaner. Female respondents were somewhat more likely than males to report that fluralaner was more convenient (88% vs. 78%) and easier (79% vs. 72%) to administer.

Cat owners were asked whether they preferred fluralaner compared with other flea and tick products they have used (question 11). Nearly 9 out of 10 (87%) respondents indicated they preferred fluralaner, with female and male owners having equivalent positive response rates. Statistically significant predictors of preference for fluralaner included product satisfaction ($p = 0.0007$) and owner observance of fleas on the cat ($p = 0.0002$).

Discussion

This survey of cat-owner preference, satisfaction, and adherence related to flea and tick treatment with fluralaner found that cat owners have a high level of satisfaction with fluralaner treatment; prefer long-acting treatment over monthly treatment; and select convenience and ease of administration as their principal reasons for these results. These results are important because of the poor compliance with flea and tick treatment generally reported for cats. The introduction of a longer duration flea and tick treatment creates an opportunity for veterinarians to improve cat-owner adherence in this important health management area.

These results are consistent with previously reported dog-owner survey results (Lavan *et al.*, 2017a, 2020). Dog owners in the US and several international markets indicated that the 12-week redosing interval was the single most important benefit of using fluralaner. Additionally, >94% of the respondents in both canine and feline surveys were satisfied or very satisfied with the fluralaner. The high proportion of cat owners who were satisfied or very satisfied with fluralaner (one owner was not satisfied) was similar to the high level of satisfaction reported by dog owners in the US, UK, and Australia for oral fluralaner (Lavan *et al.*, 2020).

Cats in this study seemed to have a significant risk of exposure to fleas and/or ticks. The cat demographic data (Table 3) showed just over half of cats had outdoor access for some part of the day. Owners of cats reportedly without outdoor access observed fleas on about half of the cats (48%). This, combined with the observation that most survey cats live in households with other cats or with dogs, shows that ectoparasite exposure is common. Fleas and ticks freely feed on dogs, cats, and humans. Cat owners confirm (Fig. 1) that all environments, whether indoor or outdoor, carry flea and tick exposure risk. An exclusively indoor cat is not guaranteed ectoparasite avoidance. Owners observed nearly one out of five cats passing tapeworm segments, an indirect indicator of exposure to the flea vector. Only 14% of owners treated their cats for heartworms, suggesting that a large part of the population is at-risk for feline heartworm and may be an indicator that veterinarians could increase their attention to educating owners regarding heartworm risks for cats.

The extended dosing interval up to 12 weeks for topically administered fluralaner for cats contributes to on-time readministration and is not a deterrent to user recall. Owners of cats prescribed fluralaner reported that they are likely to recall the recommended redosing interval. Respondents also said that the extended redosing interval made treatment easier to remember; 62% said that on-time redosing with fluralaner was more likely than with monthly products; and 89% said that they give fluralaner mostly on time or delayed by a few days. These results indicate that the use of extended duration dosing does not mean that a cat owner is more likely to forget the next dose. This result may be counterintuitive to people with multiple monthly obligations (rent or mortgage payments and utility bills, for example). Improved owner adherence is likely related to the reduced frequency of treatment that makes administration easier and more convenient (Table 4). Modern use of reminder systems on cell phones, email, or messaging systems further enables correct readministration of extended duration medications.

The communication of all staff at the veterinary practice with the owner during the office visit may influence the owner's adherence to flea and tick treatment recommendations and emphasizes the need for recommendations to be clearly stated and consistent. Seventy-five percent of cat owners in this study could recall a veterinary recommendation for flea/tick protection as 12 months (Table 2). Most of the surveyed owners reported that use of a product that conformed to their veterinarian's recommendation was a benefit; therefore, professional clinical advice is important to owners and has an impact on their subsequent treatment administration decision. The veterinary recommendation was the second most frequent benefit that cat owners associated with their use of fluralaner (Table 4, question 2).

Convenience was a consistent factor in cat-owner preference for fluralaner. Owners reported that 12-week re-dosing was more convenient (86%, question 9) and easier (78%, question 10) than monthly flea and tick products. More than half of cat owners responded that fluralaner administration resulted in less stress for them and the cat (Table 4, question 2). Owner perception of animal stress was cited by most cat owners as a reason for avoiding veterinary care visits (Volk *et al.*, 2011); therefore, treatment approaches that reduce stress could reduce visit avoidance.

The wording of survey question 8 generated some confusion among cat owners. Less than half of the cat owners reported that fluralaner provided more months of flea and tick treatment coverage compared to monthly products and about a quarter reported that fluralaner provided fewer months (Table 4, question 8). The intent of the question was to determine whether cat owners thought that use of extended duration fluralaner resulted in their cat receiving more months of protection per year. However, the mixed responses suggest that the owners did not clearly understand this objective. A more precise question wording is required to evaluate this point in future research.

Acknowledgment

The authors acknowledge the contribution of Mark Dana from Scientific Communications Services LLC in the writing and editing of the manuscript.

Conflict of interest

The authors are employees of Merck Sharp & Dohme Corp., a subsidiary of Merck & Co., Inc., Kenilworth, NJ, which provided the funding for the study.

Authors' contribution

All authors participated in designing or administering the study.

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