

## Prospective medical evaluation of 7 dogs presented with fly biting

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**Abstract** – Fly biting describes a syndrome in which dogs appear to be watching something and then snapping at it. Medical work-up of fly biting in dogs has never been reported. The aims of this case series were to characterize fly biting and perform a complete medical evaluation of dogs displaying fly biting.

**Résumé** – **Évaluation médicale prospective de 7 chiens présentés pour un comportement de gobeur de mouches.** Le comportement de gobeur de mouches décrit un syndrome où les chiens semblent regarder quelque chose, puis tentent ensuite de le mordre. Le bilan médical de l'attrapage de mouches chez les chiens n'a jamais été signalé. Les objectifs de cette série de cas étaient de caractériser l'attrapage de mouches et de réaliser une évaluation médicale complète des chiens manifestant un comportement d'attrapage de mouches.

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### Introduction

**F**ly snapping, fly biting, air biting, or jaw snapping, all describe a syndrome in which dogs appear to be watching something and then suddenly snapping at it (1). In behavioral medicine, fly biting has been categorized as a hallucinatory (2,3), locomotory (4), or oral (obsessive) compulsive behavior (5,6). Differential diagnosis of fly biting also includes neurological conditions of the central nervous system, disorders of the special senses, and neuropathic pain syndromes (2). Medical work-up of fly biting in dogs has never been reported.

A 9-year-old neutered male Labrador retriever dog, was presented to the Centre Hospitalier Universitaire Vétérinaire (CHUV) of the University of Montreal for fly biting (duration: 2 mo) and intermittent episodes of excessive salivation that the dog had endured for 4 y. At the time of presentation, fly biting behavior was occurring several times daily, lasting a few minutes each time. Following medical evaluation for the salivation episodes, a diagnosis of eosinophilic gastritis was made and subsequently treated (hypoallergenic diet and prednisone). Episodes of excessive salivation and fly biting both resolved. This case, along with a reported case of fly biting presumably as a result of dietary intolerance in a cavalier King Charles spaniel (7), led to the hypothesis that fly biting may be the consequence of discomfort or pain resulting from an underlying medical disorder (especially gastrointestinal). The aims of this case series were to

characterize fly biting, perform a complete medical evaluation of dogs presented with fly biting, and evaluate the outcome of this behavior following appropriate treatment of the underlying medical condition.

### Materials and methods

The study protocol followed Canadian Council on Animal Care (CCAC) guidelines and was approved by the Animal Care Committee of the University of Montreal. All owners signed a consent form. Seven dogs were recruited from January 2007 to October 2008 at the CHUV of the University of Montreal. Dogs were included in the study if they presented daily fly biting behavior that prompted the owner to seek medical advice. Owners were asked to fill out a questionnaire about the frequency and duration of the fly biting behavior and to video record typical episodes at home. Dogs included were not receiving any medication for this repetitive behavior. Additionally, for 2 wk prior to the medical investigation, owners had to record daily fly biting behavior in a logbook prepared by the investigators.

### Clinical evaluation

Dogs were fasted for a minimum of 12 h prior to evaluation. For each dog a complete medical and behavioral history was obtained (DF) and a physical examination was carried out by a board-certified internist (MCB). Specific questions about the presence, duration, and frequency of concomitant vomiting, diarrhea, flatulence, borborygmus, and eructation or any manifestation of pain/discomfort were asked. A neurological examination by a board-certified neurologist (JP) followed. Further investigation was performed if an abnormality was found or if the history was suggestive of an underlying problem.

Complete blood (cell) count, serum chemistry panel, and urinalysis were obtained for all dogs. For dogs with a history of gastrointestinal (GI) signs, a complete GI evaluation was performed, including measurement of total serum bile acids

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**Table 1.** Descriptive data collected from behavioral consultations, questionnaires, and home videos

Dog	Breed	Age of dog (y)	Age of onset of fly biting behavior (y)	Weight (kg)	Gender	History of fly biting behavior	Frequency: fly biting bouts	Duration: fly biting bouts	Other signs; Owner comments; Treatments prior to referral
1	Bernese mountain dog	9	8	38.6	NM	1 y + After meals	2×/d	2 to 3 min	Chronic intermittent diarrhea; air licking; repeated swallowing with fly biting; stops if spoken to loudly or touched Metronidazole (diarrhea)
2	Cavalier King Charles spaniel	7	3	8.8	NM	4 y After meals	Every hour daily	Seconds to minutes	Air/floor licking; hiding; yelping; leaping; neck pain; worse when anxious Clomipramine and fluoxetine
3	Boston terrier	6.5	6.5	10.2	IF	6 d	Increasing frequency	5 to 60 min	Agitated; panting; racing; pacing; leaping; worse when excited Phenobarbital
4	Cavalier King Charles spaniel	6	4	12.5	NM	2 y (20 to 45 min after meals or treats)	1 to 10×/d	34 to 60 min	Agitated; racing; hiding; pica; pain (anal sac); air licking; self licking (limbs, anus); up and down on furniture; staring at ceiling and walls; worse in evening Phenobarbital
5	Labrador × Bernese mountain dog	2.5	1.8	37.8	IF	8 mo Spontaneous remission 1×	3×/2 h/evening	1 to 5 min	Licking lips at times
6	Schnauzer	10		8.1	SF	2 mo	Early morning to night time	A few minutes	Occasional vomiting/regurgitation; flatulence; noise and thunder phobia
7	Rottweiler × Bernese mountain dog	2	0.5	49	NM	1.5 y Spontaneous remissions	2 to 3×/d or more	A few seconds	Lip/air licking; agitated; hiding; following the owner; attention-seeking; occasionally feces with mucus

IF — intact female; NM — neutered male; SF — spayed female.

before and after a test meal, and canine specific pancreatic lipase immunoreactivity. Stool samples were examined for endoparasites using zinc-sulfate flotation technique. A rectal smear was obtained for fecal cytology and culture. Abdominal ultrasound was performed by a board-certified radiologist. Food and water were then withheld for the night. Dogs were anesthetized the following day. Premedication was achieved with butorphanol (Torbugesic; Wyeth, Ville Saint-Laurent, Quebec); 0.2 mg/kg body weight (BW), SQ with or without acepromazine (Atravet 10 mg; Boehringer Ingelheim, Burlington, Ontario), 0.04 mg/kg BW, SQ. Propofol (Diprivan; AstraZeneca, Mississauga, Ontario), 4 mg/kg BW, IV was used for induction and isoflurane was used for maintenance. During anesthesia, the dogs underwent a complete oral and dental examination. A standard upper GI endoscopy (Olympus GIF-160 Video Gastroscope, Richmond Hill, Ontario) was performed. The macroscopic appearance of the stomach and the duodenum was evaluated as described elsewhere (8). A minimum of 16 mucosal samples was collected in all dogs. Two mucosal samples were taken from each of the following 5 gastric locations: cardia, greater curvature and fundus, lesser curvature, pyloric antrum, and pylorus. A minimum of 6 mucosal samples was obtained from the orad duodenum. Other samples were also collected if specific lesions were observed. Colonoscopy was performed if signs of colitis were reported by the owner. Delayed gastric emptying was suspected when a large amount of food was still

present and obstructed the entire pyloric antrum and/or fundus after more than 8 to 10 h of fasting (9,10).

Tissue samples were fixed by immersion in 10% neutral buffered formalin, routinely processed, embedded, sectioned, and stained with hematoxylin and eosin. Sections were evaluated by a board-certified pathologist in accordance with the guidelines recently published by the World Small Animal Veterinary Association GI Standardization Group (11).

### Behavioral evaluation

Behavior was evaluated using a standardized questionnaire. Information about fly biting included age at onset, frequency and duration of bouts, changes in frequency and duration of bouts since onset, occurrence of any situation eliciting the behavior, and time of the day when it occurred. All dogs were filmed during the first 30 min of the behavioral assessment (Sony digital video camera video recorder DCR-HC30; Sony Canada, Montreal, Quebec). Dogs were also filmed for 2 h after their test meal to record their postprandial behaviors. The specific goals of the video analysis were to evaluate how dogs behaved in the stressful contexts of veterinary consultation and hospitalization and, whether they would present the fly biting behavior during consultation (owner present), hospitalization (owner absent), or in both contexts, and to determine if fly biting was more prevalent after ingesting food. A battery-powered camera (Panasonic AG 195 VHS video recorder; Panasonic Canada, Mississauga,

**Table 2.** Fly biting, signs during video analysis, diagnosis and outcome following treatment in fly biting dogs

Dog	Breed	Video consultation	Video hospitalization	Diagnoses	Treatment	Outcome
1	Bernese mountain dog	No FB	70 FB	Gastric and duodenal LP GER	Elimination diet Metronidazole; Famotidine Prednisone	<b>(from d 30)</b> Resolution
2	Cavalier King Charles spaniel	13 FB	1 FB	Gastric E Chiari malformation; right tympanic mass (granuloma or polyp)	Elimination diet Fenbendazole; Prednisone Pregabalin	<b>(d 90)</b> Improvement with pregabalin (GI treatment no improvement)
3	Boston terrier	23 FB 187 HR/NE	No FB No HR/NE	Gastric and duodenal LP	Elimination diet Prednisone	<b>(from d 30)</b> Resolution
4	Cavalier King Charles spaniel	23 FB	No FB	Gastric and duodenal LP; DGE	Elimination diet	<b>(from d 30)</b> Resolution
5	Labrador × Bernese mountain dog	1 FB	No FB	Gastric and duodenal E GER	Elimination diet Fenbendazole Famotidine	<b>(from d 30)</b> Resolution
6	Schnauzer	21 FB 112 HR/NE	No FB 27 HR/NE	Gastric L	Elimination diet Famotidine; Sucralfate; Prednisone	<b>(d 90)</b> Improvement (required more than 90 days for resolution)
7	Rottweiler × Bernese mountain dog	No FB	No FB	DGE F	Elimination diet Metronidazole Famotidine Metoclopramide then Cisapride	<b>(d 90)</b> No change

DGE — delayed gastric emptying; E — eosinophilic; F — flaccid and distended stomach; FB — number of fly biting events; GER — gastro-esophageal reflux; HR — number of head-raising events; L — lymphocytic; LP — lymphoplasmacytic; NE — number of neck extension events.

Ontario) was mounted on the outside of each kennel and activated as soon as the dog was fed. A single blinded observer, unfamiliar with the study protocol, reviewed all videotapes of the behavioral appointment and the first 30 min after the test meal, using The Observer<sup>®</sup> software program (Noldus Information Technology, Leesburg, Virginia, USA).

### Treatment and monitoring

Based on clinical presentation, physical examination, neurologic examination, and laboratory test results, a diagnosis was made and a specific treatment was recommended. Response to treatment was monitored and evaluated following phone conversations with owners at days 30, 60, and 90 from onset of treatment. During this follow-up period, owners had to complete a logbook in which they recorded every episode of fly biting, its duration and any other clinical signs. If the investigators noted inadequate compliance, or if a new treatment was needed, follow-up time was prolonged until the proper treatment had been correctly administered for 90 consecutive days.

### Statistical methods

Behaviors exhibited during consultation and hospitalization were compared (Wilcoxon paired tests). A value of  $P < 0.05$  was considered statistically significant. All analyses were performed using commercially available statistical software.

## Results

### Signalment, behavioral questionnaires, and home videos

Our study group included 4 neutered males and 3 females (2 intact, 1 spayed). Four breeds (2 cavalier King Charles span-

iels; 1 miniature schnauzer; 1 Boston terrier; 1 Bernese mountain dog), and 2 mixed breeds, both listed as crosses of Bernese mountain dogs were presented. Based on answers to the initial behavioral questionnaires, age of dogs at the onset of fly biting varied between 6 mo to 10 y. History of the repetitive behavior prior to presentation ranged from 6 d to 4 y. Age at presentation ranged from 2 to 10 y. Frequency of bouts varied from once daily to once every hour. Duration of a single bout varied from seconds to 1 h. At home, fly biting was more frequent following feeding in 3 dogs (dogs 1, 2, and 4). Descriptive data from the behavioral consultation, questionnaires, and home videos are summarized in Table 1.

### Clinical evaluation

Results of video analyses as well as medical findings, and diagnoses are listed in Table 2. The most significant finding was the occurrence of head-raising and neck extension preceding jaw snapping in all dogs. In some cases raising the head and extending the neck occurred more frequently than snapping (dogs 3 and 6). Additional work-up for some of the dogs included colonoscopy (dog 4), magnetic resonance imaging (MRI) of the cervical column and brain (dog 2), and cardiac ultrasound (dogs 2 and 4). Underlying medical abnormalities found included gastric and/or duodenal eosinophilic (dogs 2 and 5) or lymphoplasmacytic infiltration (dogs 1, 3, 4 and 6), and delayed gastric emptying (dogs 4 and 7). Gastroesophageal reflux was observed upon endoscopy in dogs 1 and 5. Dog 7 had no histological abnormalities but had a flaccid and distended stomach upon ultrasound and endoscopic examination. Following MRI dog 2 was also diagnosed with Chiari malformation. Treatments included fenbendazole, metronidazole, famotidine, sucralfate, prescription

elimination diets (HYPOallergenic Formula, HYPOallergenic HP formula, and Gastro Formula, Royal Canin Medi-cal, Guelph, Ontario; HYPOallergenic HA, Purina, Mississauga, Ontario), prednisone and pregabalin (Lyrica; Pfizer, Kirkland, Quebec), 2.5 mg/kg BW, PO, q8h. Prokinetic drugs (metoclopramide or cisapride), low fat canned food (Gastro Formula; Royal Canin Medi-Cal), and frequent feeding of small meals were prescribed for delayed gastric emptying.

## Outcome

The treatment and outcome of fly-biting behavior throughout the study period are summarized in Table 2. At day 30, 4 dogs had completely stopped fly biting (dogs 1, 3, 4, and 5). No relapses occurred throughout the study in dogs 3 and dog 5. The dramatic improvement in dog 3 (stopped fly biting, pacing, and panting) occurred within the first week. The 60- and 90-day follow-up communications were not documented in 2 cases (dog 1 was euthanized because of degenerative joint disease; dog 4 was hit by a car and died). Dog 2, with neck pain and Chiari malformation, responded well initially to pregabalin; the fly biting improved but never disappeared. Dog 6 at day 30 showed a decrease in frequency. By day 60, the behavior was exhibited 10 to 15 min daily as opposed to the entire day. By day 90, it still occurred daily. Owners of dog 7 did not comply with the diet change and fly biting remained unchanged.

Statistical analysis of filmed behaviors at the CHUV included events and states that were most frequently observed (yawning, lip licking, fly biting, raising of the head, and neck extension without snapping, standing, sitting, lying down with head on the floor or lying down with head raised, panting, immobility, vocalization, attentive to the environment, feeding, other oral behavior). No significant differences were noted for events or states during consultation or hospitalization with the exception of yawning (more frequent during consultation than hospitalization;  $P = 0.03$ ), lying down with head raised above the ground (more common during hospitalization than consultation;  $P = 0.008$ ), moving (more common during consultation than hospitalization;  $P = 0.008$ ), and immobility (more common during hospitalization than consultation;  $P = 0.02$ ). "Fly-biting behavior," and "head raised and neck extension without snapping" are listed in Table 2.

## Discussion

The data indicate that fly biting may be caused by an underlying medical disorder, GI disease being the most common. At home, 3 dogs (dogs 1, 2, and 4) consistently presented more fly biting following feeding suggesting potential postprandial discomfort. Dog 1 presented fly biting during hospitalization within 30 min of being fed. The video analysis data showed that in all fly biting dogs, the jaw snapping was preceded by head raising and neck extension. In 2 dogs, head raising and neck extension occurred more frequently than jaw snapping. Dogs 3 and 6 presented repeated raised head and neck extension during the consultation. On home videos as well as consultation and hospitalization videos, all dogs raised their head and extended their neck prior to fly biting.

Head raising and neck extension in the dogs may be similar to Sandifer syndrome, a rare paroxysmal movement disorder in infants characterized by abnormal movements of the head, neck, and trunk in association with gastroesophageal reflux (GER) disease (12–14). One of the 5 reported clinical symptoms used to distinguish between healthy infants with GER and those suffering from GER disease is presence of neck extension, arching back, and head retraction (15). Infants often have retrocollis and opisthotonic posturing, whereas older children have side-to-side head movements (12). Patients with Sandifer syndrome, especially infants, are often misdiagnosed due to the occurrence of paroxysmal neurobehaviors such as head/eye version, torticollis, extensor spasm, and dystonic posture (16). The first signs of Sandifer syndrome often resemble torticollis or dystonia, hence early evaluation focuses on neurological etiologies (12,14). The children receive unnecessary medications and more importantly fail to receive primary treatment for GER disease (16). Sandifer movements are often precipitated by meals, unlike other movement disorders (12,14). Other conditions such as delayed gastric emptying when associated with GER disease may also result in abnormal posturing such as seen in Sandifer syndrome (12). It is still unclear why less than 1% of children with GER disease (14) present abnormal movements and others do not (12). It is believed that the abnormal movements are learned behaviors by children to reduce reflux (12) as well as protect air passages from reflux and relieve the abdominal pain caused by acid reflux (16,17).

One can hypothesize that some fly biting dogs raise their heads and extend their necks because of oesophageal discomfort or pain. Gastroesophageal reflux was observed upon endoscopy in dogs 1 and 5. In humans, endoscopically visible breaks in the distal esophageal mucosa are the most reliable evidence of reflux oesophagitis. However, significant GER disease can also be present in the absence of macroscopic lesions of the oesophagus (18). Presence of GER disease was not further investigated in these dogs since it required pHmetry or scintigraphy studies which were unavailable.

Signs of pain and anxiety can overlap. Panting, pacing, agitation, hiding, and vocalizing can be seen in painful and in anxious canine patients. Four dogs (dogs 2, 3, 4, and 7) presented behavioral changes compatible with anxiety (pacing, panting, hiding, increased attention seeking) along with the fly-biting episodes. Dog 3 paced continuously during the entire behavioral assessment. Treatment of the underlying medical condition resulted in disappearance of the anxiety-like signs as well as the neck extensions and fly-biting behaviors for dogs 3 and 4. All patients that may initially present as "anxious" should therefore be evaluated for painful visceral medical conditions.

Data specifically addressing fly biting in dogs is scarce. In 1962, McGrath (19) associated the syndrome of "jaw snapping" with ocular disease (vitreous). It was thought that the dog may have floating (synchysis scintillans) or movable opacities causing the fly "biting" behavior. No study to substantiate this possibility was ever done. In 1972, Lane and Holmes (20) reported auto-induced fly catching in 7 cavalier King Charles spaniels. The authors examined 2 of the dogs and received personal communications about the other 5 dogs. Age of onset of the



behavior ranged from 8 to 18 mo (in contrast with 6 mo to 10 y in this case series) with no gender predisposition. These authors concluded that further investigation of fly biting cases with radioelectric electroencephalography would be indicated. Such a study was never performed. In 1979, Cash and Blauch (21) reported 8 cases of jaw snapping in various breeds. Age of onset of the behavior varied from 1 to 11 y. Periods of spontaneous remission were reported and lasted from less than 1 wk to 5 mo. Periods between remissions ranged from 1 wk to 2 y. In addition to the jaw snapping, behavioral changes observed included licking of the paws ( $n = 4$ ), licking of the paws and the adjacent floor ( $n = 1$ ), becoming fractious ( $n = 1$ ), becoming fractious running into objects and lying in the yard crying ( $n = 1$ ), eating mud prior to exhibiting paw snapping and following the owner everywhere ( $n = 1$ ). Miscellaneous findings (24) in 2 or fewer of these dogs included chorioretinitis, grand mal seizures and increased jaw snapping when nervous. Drugs such as phenobarbital, primidone, diazepam, diphenylhydantoin, and combinations were unsuccessful although the details of dosages and duration of treatment were not specified. In this case series, dogs 5 and 7 exhibited, prior to the study, spontaneous remissions and 4 dogs (dogs 2, 3, 4, and 7) presented behavioral changes (agitation; anxiety) in addition to the fly biting. Dogs 2, 3, and 4 were all unresponsive to previous pharmacological treatments: phenobarbital (dogs 3 and 4), psychotropic medication such as clomipramine and fluoxetine (dog 2) and neurogenic pain medication (dog 2). It is possible that in dog 2 (Chiari and eosinophilic gastritis), the use of pregabalin decreased the pain associated with both conditions without specifically treating the underlying causes.

In 1987, a case of fly biting in a cavalier King Charles spaniel was reported in which fly catching (duration: 5 mo) ceased after a diet change to treat flatulence (7). Subsequent experimentation with food revealed that the dog tolerated fish and milk. If red meats, poultry, or rabbit were fed, the behavioral problems recurred (the dog became excitable and jumped at imaginary flies within an hour of eating). Similarly in this case series, several dogs exhibited more fly biting after meals and responded to diet changes (+/- medication). Among humans, 1 case report cites food hypersensitivity in an 8-month-old infant with feeding disorders, atopic dermatitis, and Sandifer syndrome (22).

By the 1990s, "fly snapping" was reported as a sign of psychomotor epilepsy associated with metastatic thymoma in a dog (23). A document written in 2000 by veterinary neurologist O'Brien, and still available on the Internet (<http://www.canine-epilepsy.net/flybite/flybite.html>), describes fly biting as a type of complex partial seizure. Fly biting is also described as a compulsive disorder (CD) (2,6) or an obsessive compulsive disorder (OCD) (5). The condition ("CD") as currently understood is not homogeneous (24) and more work is needed to validate the diagnosis (6).

In most publications, the listed causes of fly biting are theoretical. This prospective case series is the first step to collect information following medical evaluation of this syndrome. The data indicate that fly biting may be caused by an underlying medical disorder, GI disease being the most common. The authors suggest that the term "fly biting" be replaced by "neck

extension" syndrome. This removes an anthropomorphic interpretation allowing a more scientific approach. The causal link between GI discomfort and neck extension syndrome requires further investigation.

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## Book Review

### Compte rendu de livre

#### Plumb's Veterinary Drug Handbook. Pocket – 7th edition

Plumb DC. 2011. Wiley-Blackwell, Ames, Iowa, USA. 1567 pp. ISBN: 9780-4709-5965-7. \$87.99.

This excellent resource is available in a number of formats (desk, pocket, CD, and electronic). The scope of species covered is wide, and includes the cat, dog, and for some drugs may include horses, rabbits, rodents, small mammals, swine, small ruminants, cattle, zoo/exotic/wildlife species, ferrets, and some birds. Most clinicians would agree that for less common species, it is still helpful to have a separate formulary to access additional species-specific issues.

The drug monographs are comprehensive, well-referenced, and up-to-date. Sections include a new feature termed **Prescriber Highlights** which gives the reader a boxed summary at the start of each monograph that provides quick access to key points. References are provided directly after each monograph, which is a time saver if one wishes to read further.

Readers are informed about the stability of many compounded versions of drugs, which is timely, considering the recent shortages of many commercial formulations. Drug interactions are presented in bold type, which is an excellent way to point the clinician to these very important safety points.

Overall it appears to be a very accurate resource. For accuracy check, the erratum page found online for the 7th edition online is short; most recent edits are dated early 2012. It is advisable to download this or a more recent one if available since as with any formulary or reference, erratums should be inserted.

Some of the drugs that are being used more frequently in practice than when the last edition was published were closely reviewed. Examples of these are maropitant and gabapentin.

Overall the reference is succinct, with practical information available in all monographs. It is reassuring to have listed references for different dose protocols right in the section.

The appendix is one that is perhaps under-used, certainly in my practice. Topical dermatological and ophthalmic products

are presented at the back of the handbook in appendices. Both sections are quite encompassing of the products used in general practice. This is an excellent addition (started with the 6th edition). The otic section follows next in the topicals appendices, and is up to date as of last year's products, for those used commonly in practice. A kilogram to BSA conversion chart is available and the parenteral fluids chart is a handy feature. The prescription abbreviation chart is helpful and there is a bolded note here which suggests the short-form **S.I.D.** be eliminated from all veterinary scripts since pharmacists do not know this abbreviation. That could certainly help eliminate prescription error, so this is a great opportunity to educate veterinarians about this issue. Conversions, normals, and reference ranges are provided in short tables and lists. The phone numbers and Web sites section is helpful, although primarily pointing to American services—one link is given for Canada.

This reference is an excellent value for the dollar. Practitioners and others will find it a “*must access daily*” resource. Older editions in our practice are dog-eared, meaning well-worn, indicating the long-term utility of the Plumb drug resources.

Previous extra-label and licensed drugs are updated in this most recent addition. There are 22 additional drugs in this edition, per the publisher press release.

This is a top drawer reference for the clinic, and also a comprehensive pharmacy guide for students, both veterinary and technician. It would also serve as a solid resource for academic and research environments, and for pharmacies that provide product to veterinarians.

The Plumb's 6th edition was published May 2008, and had a higher purchase cost. The 2011 7th edition is a welcome update since much changed during those 3 years. There is definitely enough updated and new information to warrant the cost of an upgrade to the 7th edition.

*Reviewed by Kathleen Cavanagh, BSc, DVM, MET, 2005 Hansler Street Ridgeville, Ontario.*