Estimated Lifetime Prevalence Of Bloat In Curly-Coated Retrievers Using International Survey Data Of Owners

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INTRODUCTION

Commonly referred to as "bloat," Gastric Dilated Volvulus, or GDV, occurs when a dog's stomach fills with gas, food, or fluid and subsequently twists on itself, closing off the opening of the stomach to the esophagus and intestines, and closing off blood vessels providing critical oxygen to the tissue of the stomach. GDV develops without warning and can progress quickly. Stomach distension alone is referred to as a "simple bloat", or dilatation. Once the stomach twists on itself, it is called "bloat" or GDV, and death of the tissue of the stomach, spleen and intestines follows quickly.

On average, 25% of large and giant breed dogs will bloat assuming an average lifespan of 10 years. And of those that bloat, one third will die. This bloat rate is very different for different breeds. Almost half of all Great Danes will bloat in their lifetime. This extremely high risk is not shared by their fellow giant breeds of Irish Wolfhounds, Saint Bernards and Newfoundlands. Studies show bloat rates vary tremendously across the large and giant breeds. (1)

There is no data on the lifetime risk of bloat for Curly-coated Retrievers (CCRs). Evaluating lifetime rates of bloat is not easy. Rates of bloat must consider the number of CCRs that do not bloat to make accurate assessments. It is difficult to measure every CCR who has bloated and every CCR that has not bloated over the life span of the dog. Survey methods offer an excellent way to obtain a reasonably accurate estimate. Dog owners' memories are fairly accurate in their ability to remember the dogs that they have owned in a lifetime in part because they keep records of their dogs using club registrations, but also in part because the dogs they have owned meant a great deal to them. For this reason, we set out to complete a survey of Curly-coated Retriever (CCR) owners to estimate the lifetime prevalence of bloat in this breed.

METHODS

Between the dates of August 2021 and October 2022, we collected data about Curly-coated Retrievers (CCRs) using a JotForm survey. We posted the link and information about the survey on social media CCR groups on Facebook and CCR publications such as the CCRCA's Curly Commentator and on the Curly World Seminar website.

Using the JotForm platform, we downloaded the data into an Excel database. This database was cleaned of duplicate entries for the same dog. After cleaning, the data was processed using statistical software from JotForm to create graphs and summary information. Online statistical programs such as www.medcalc.org were also used to perform means, medians, and odds ratios. All surveys requested permission to use the data for summary statistics. Surveyed people were also asked if they permitted us to share the names of the dogs with other CCR enthusiasts. We also asked open ended questions to allow people to share more detail about the dog that bloated.

RESULTS

We had 77 people respond to the survey and enter detailed data for 127 unique dogs. All participants granted permission for us to use the data in summary statistics for publication. In Table 1., we see that dogs entered by participants in the survey were from 11 different countries (n=126, 1 missing country data). Figure 1. shows that more male than female CCRs were entered into the database. The participants reported that they had owned a total of 509 CCRs. The mean number of CCRs owned by participants was 7.5; the median number of CCRs owned by participants was 4; these findings show that a small number of participants have owned many CCRs. Thirty-five CCRs were reported to have bloated at one point in their life.

The estimated lifetime prevalence of bloat in CCRs is 35/509=7%.

Of the 35 CCRs that bloated, 12 died providing an estimated 34% fatality rate. Of the CCRs that bloated and survived, 5 bloated again. The recurrence rate of bloat is 22% in dogs that survive their first episode of bloat, and the

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population recurrence rate of bloat is 1%. A layman's interpretation of this data is that one in fifteen CCRs will develop bloat at some point in their life. And of those, a third will not survive.

Figure 2. shows the distribution of age of the CCRs that bloated. The vast majority of CCRs (91%) bloated after the age of 3 years. Figures 3.-8. show the odds ratios calculations from the 127 unique dogs for the effect of being male, having a raised bowl, being anxious, being EIC affected, eating quickly, and having a 1st degree relative on the risk of bloating. Only being male, having a raised bowl, and having a 1st degree relative that bloated showed effect sizes on risk, but of those, only having a 1st degree relative that bloated was statistically significant. Being male had a strong trend to being statistically significant.

Increasing age, male gender and the presence of 1st degree relatives who bloated are the most important risk factors for bloat in CCRs in our study.

DISCUSSION

Our estimate of lifetime prevalence bloat rates in Curly-coated Retrievers of 7% is lower than the estimates for bloat rates in other breeds of comparable size of approx. 23%* (1). In Glickman's study, he recruited dogs from dog shows (American Kennel Club purebred dogs being actively shown) and followed these dogs over time to determine bloat incidence rates. He found overall incidence rates for large breeds (50-99 lbs.) was 23 cases/1000 dog years which if we assume dogs average lifespan of 10 years, and small incidence of repeat bloat episodes in individuals, equates to a lifetime prevalence of 23%. He looked at Akitas, Bloodhounds, Collies, Irish Setters, Rottweilers, Poodles and Weimaraners. The Bloodhounds had the highest incidence of bloat 39% and lowest incidence of bloat was seen in Rottweilers 4%. (1). As the largest of the retriever breeds whose standard calls for "a decidedly deep chest", Curly-coated Retrievers might be expected to have higher bloat rates than dog breeds with comparable weights and sizes, but they do not. These dramatic differences in breed rates of bloat suggest that other factors besides size and depth of chest are playing a role in bloat risk.

Our survey was introduced and disseminated to participants as a bloat survey. For this reason, we anticipated that our data might result in estimated rates that were higher than the actual bloat rates because people who had a Curly-coated Retriever (CCR) that bloated were more likely to participate in the survey than people who had not had a CCR that bloated. On the other hand, some people, especially breeders, may have hesitated to report bloat in their lines to avoid criticism from others or a desire to maintain privacy. Despite these obstacles, we had excellent participation from breeders and owners of CCRs from many different countries. Because of excellent participation from people in many different countries, it is felt that our estimated rates are robust. In our study, we found a bloat lifetime prevalence rate estimate for CCRs that is lower than expected (7%). Our low rates may also be because most of the CCRs in our study are family pets and not show dogs, or it may be because we have an international sample. In the study by Glickman et al, all studied dogs used to estimate bloat risks were AKC show dogs from the USA.

Many of our findings were like those in the Glickman et al. 2000 study. He found a fatality rate of 28.6%. Our fatality rate was estimated at 34%. Glickman et al. 2000 study found a trend that large breed male dog bloat rates (27%) were higher than large breed female dogs bloat rates (19%) p=0.22. We also found a trend that male CCRs were more likely to bloat than female CCRs, but similar to Glickman et al. 2000, it did not quite reach statistical significance. p=0.15 (Figure 3.) He found that large dogs with 1st degree relatives who bloated were more likely to bloat. We also found that CCRs with 1st degree relatives that bloated were more likely to bloat. p=0.06 (Figure 4.) These comparable findings suggest that our data for CCRs is robust (valid and reliable).

Studies have found many other factors that contribute to risk for bloat. (References 1, 2, 3, 4, 5, 6, 7). For example, being a giant breed rather than a large breed, eating from a raised food bowl, having a higher degree of fearfulness, and eating quickly were all found to increase the risk of bloat in different studies. However, in our study of CCRs, we did not find that being anxious or eating quickly were associated with increased bloat risk. Our study only found a trend that eating from a raised bowl may reduce the risk of bloat, but this was far from statistically significant. p=0.30.

Finally, we feel that our study was successful at estimating lifetime prevalence of bloat rates in a rare breed, and we encourage other dog clubs with rare breeds to use similar methods outlined here to obtain information on their breeds that can be difficult to obtain because of low numbers.

Estimated Lifetime Prevalence Of Bloat In Curly-Coated Retrievers Using International Survey Data Of Owners

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Figure 1. Gender of CCR Dog's Sex

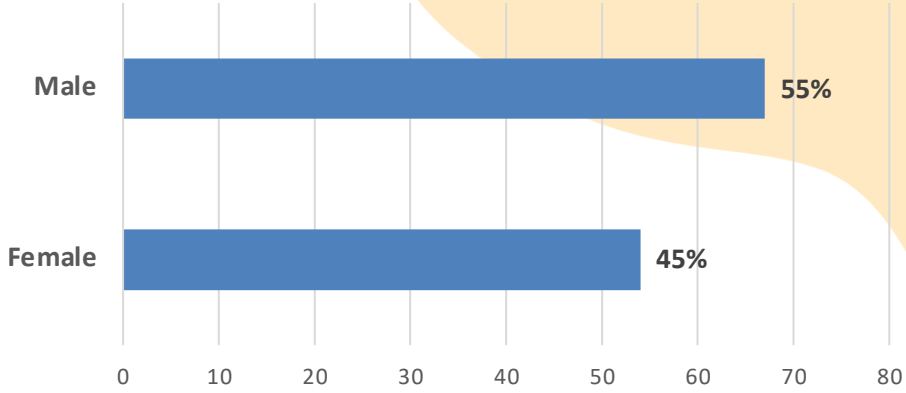
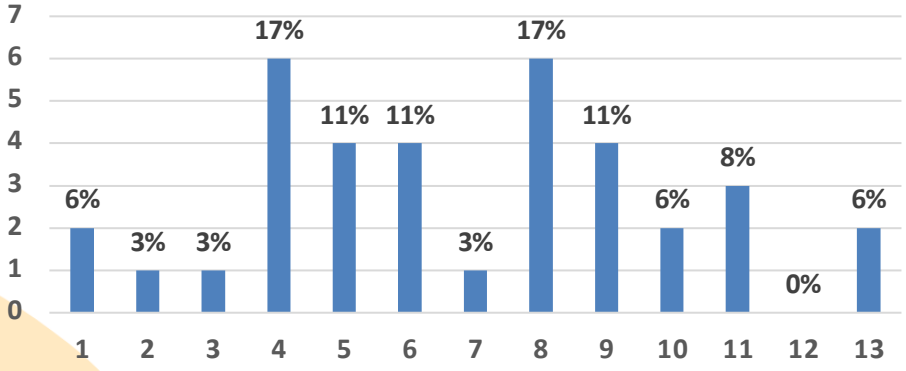


Figure 2. Age in Years at First Bloat



*While lifetime prevalence and incidence are different calculations obtained using different study methods, we can estimate lifetime prevalence rates from incidence rates by assuming an average lifespan of 10 years and low rates of individual bloat recurrence. In this way, we can directly compare incidence rates provided by studies such as Glickman et al. 2000 to our rate estimates.

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Table 1. Country of Origin of CCR	Responses n=126, 1 missing data
Finland	54
United States	36
United Kingdom	9
Norway	8
New Zealand	5
Australia	5
Netherlands	4
Lithuania	2
France	1
Canada	1
Panama	1
	126

Figure 3. Gender of CCR	Male	Female
Bloated	23	12
Not bloated	44	42

Odds ratio=1.8, p=0.15

Figure 4. 1st Degree Relative bloated	Yes	No
Bloated	11	24
Not bloated	14	72

Odds ratio= 2.4 p=0.06

Figure 5. Eats from Raised bowl	Yes	No
Bloated	6	29
Not bloated	23	63

Odds ratio= 0.5, p=0.30

Figure 6. Anxious or Anxious episodes	Yes	No
Bloated	16	19
Not bloated	37	49

Odds ratio=1.1, p=0.80

Figure 7. EIC affected (two copies)	Yes	No
Bloated	3	32
Not bloated	8	78

Odds ratio=0.9, p=0.90

Figure 8. Eats quickly or inhales food	Yes	No
Bloated	11	24
Not bloated	25	61

Odds ratio= 1.1 p=0.80

Write to Karleen Swarztrauber

Do you have any questions or concerns regarding the information in this article? We encourage you to submitted letters to the author, which will be published in the next issue of the *Curly Commentator*, along with the response. Email swarztra@stanfordalumni.org by March 1, 2023, for consideration.