

## Factors Associated with Acute Bloat Syndrome in Pre-Weaned Dairy Heifers

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### Abstract

Acute bloat syndrome (**ABS**) is an emerging problem in dairy herds. Affected calves suffer from the sudden onset of bloat or abdominal distention and die, generally within 6 to 24 hours. Little is known about this frustrating disease. To identify factors associated with ABS, a survey was developed and sent to members of the American Association of Bovine Practitioners self-identified as dairy or mostly large animal veterinarians. Seven hundred eight (30%) of 2,312 surveys were returned, with 37.6% (n = 276) responding to questions about their last case of ABS. In the previous 12 months, half of the practitioners reported seeing  $\leq 4$  cases of ABS and 5% seeing > 40 cases. Over half of the practitioners saw cases sporadically, with only 6.5% reporting multiple outbreaks (an outbreak was defined as 3 or more cases in 3 weeks). A necropsy was performed in 73% of the reported cases. The primary organ(s) involved were the abomasum (34%), the rumen (6.6%), or both the rumen and abomasum (21.1%). In 60.5% of the samples submitted for laboratory analysis, no bacteria were isolated. In 31.3% of the cases *Clostridium spp.* and in 5 to 8% of the cases, *Sarcina spp.* were reported. The ABS cases were observed in all age groups (0 to > 21 days). Less than 3% of cases were reported in calves < 4 days old. No clear seasonal patterns emerged. Common symptoms included abdominal distension on both sides (65.8%), fluid slosh (56.4%), colic (47%), and dehydration (42.1%). Only 23.3%

reported diarrhea. Of the reported cases, 60.3% resulted in death. More than 62% of the time, practitioners rated overall calf management as very good or excellent. Management was rated at least good 88.5% of the time. Responses regarding management practices of the calf's herd reflected common management practices. No particular management practices were excluded. Additional questions were asked about treatments used by practitioners. This survey begins to identify factors associated with ABS. Further work is needed to more clearly identify causes leading to successful treatment and prevention of this costly disease.

### Introduction

Acute bloat syndrome, also known as abomasal bloat syndrome, is an emerging problem for dairy herds in Ohio. The disease syndrome typically affects calves less than 2 weeks of age who are apparently healthy before onset of the disease. Affected calves suffer from the sudden onset of bloat or abdominal distention and die, generally within 6 to 24 hours. Some calves will respond to therapy if they receive immediate and aggressive intervention. While this syndrome has been identified in a number of herds that have very well-managed calf and heifer herds, it is likely that the problem also exists in many other herds that place a lower level of importance on calf illness and death loss.

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Profitability of individual dairy herds supports a stable Ohio dairy industry. Successfully raising or selling quality dairy heifers is a profitability-enhancing activity for Ohio dairy farms. Losing heifers to ABS reduces profit opportunities. In severely affected herds, additional replacements may need to be purchased to replace calves that died. In the calf barn, additional labor and expense are required to constantly monitor pre-weaned calves for signs of ABS and then to rigorously treat affected calves to prevent death. Finally, it is unknown what the long-term impacts on potential productivity of recovered animals might be.

In order to further clarify the syndrome and in hopes of identifying promising avenues for further research, members of the American Association of Bovine Practitioners were asked about their experience with ABS.

## Materials and Methods

The “Dairy Practitioner Survey: Acute Bloat Syndrome in Pre-weaned Dairy Heifer Calves” was developed and tested on practicing veterinarians before being mailed to the full survey group. In October 2004, the questionnaire was mailed to 2,312 members of the American Association of Bovine Practitioners who listed their activity code as 10 (dairy), 14 (mostly large animal), or 15 (50/50 large animal/companion animal). The response rate was 30.6%, with 708 surveys being returned. Of those respondents, 276 (39%) had seen at least one case of ABS, and it is these surveys upon which the results of this study were based. Practitioners were asked both general questions regarding their experience with ABS, as well as questions regarding the last case of ABS that they had seen.

## Results

### *General experience with ABS*

Two hundred seventy-six veterinarians had seen a median of 4 cases of ABS, with 710 cases being the highest number reported. These cases were seen on a median of 3, or 10% of the practitioner’s dairy farms. Half of the dairy farms experienced sporadic cases of ABS over time (Table 1), with a third experiencing 2 or fewer cases.

Onset of ABS symptoms occurred most often between 4 and 21 days of age (75% of cases), with calves between 4 and 14 days of age accounting for 60% of all cases. Only 3% of cases occurred at less than 4 days, with the remaining cases occurring after 21 days of age.

In cases seen by the practitioner in the previous year where tissue or fluid samples were submitted to a diagnostic lab for analysis, 60.5% of the samples revealed the presence of no bacteria (Table 2). In 31.3% of the samples, *Clostridium spp.* was present, either alone (26.2%) or in combination with other bacteria. *Sarcina spp.* was reported as the sole bacteria present in 5.2% of the samples and in combination with *Clostridium spp.* in an additional 3% of the samples.

For cases that were confirmed by necropsy, the abomasum was involved in over half (55.1%) of the reported cases. Cases seen by breed was reflective of the national cow population, 91% Holstein, 5% Jersey, and 4% mixed or other breeds. Cases were seen in all herd sizes.

### *Last case seen by the veterinarian*

Regarding the last individual case that the practitioner had seen, there were again no clear trends regarding herd size or breed. In contrast to the responses regarding seasonality of all cases seen during the past 12 months (no seasonality),

responses to the question regarding the last case seen revealed more cases in the fall ( $P = 0.0087$ ; with 23.8% in winter, 20.3% in spring, 21.9% in summer, and 34.0% in fall). Keep in mind that this survey was also sent to veterinarians in the fall.

### *Clinical symptoms*

Results for the clinical signs observed by the practitioner in the last case seen are summarized in Table 3. Common clinical findings included abdominal distension observed on both sides of the calf, fluid slosh in the abdomen, colic, and dehydration. Affected calves tended neither to have diarrhea nor fever. Of the 60.3% of the ABS case calves last seen by the veterinarian, 60.3% died.

### *Treatments used on last case seen*

Seventy-three different treatments were reported as having been used on the last case seen by the practitioner (Table 4). Those mentioned most commonly included antibiotics (primarily penicillin and ampicillin), rumen “tonics” (included a wide variety of medicaments), anti-inflammatories (primarily flunixin meglumine), attempting to relieve the distension via tube or trocar, *Clostridial* antitoxin, and fluid therapy. Of those responding, 5% reported that they felt there were no effective therapies.

### *Preventive treatments or strategies*

Practitioners were asked to list up to 3 preventive strategies, in order of efficacy, that they felt were effective. About 64 different preventive treatments or strategies were identified by practitioners as being, in their opinion, effective at preventing ABS (Table 5). Nearly half (49%) involved changing the diet or how the diet was delivered to the calf.

Some treatments mentioned included anti-*clostridial* specific treatment (*Clostridial* toxoids,

pre-treatment with a *Clostridial* antitoxin, autogenous *Clostridial* vaccination). Other strategies included general sanitation, consistency in temperature of the milk or milk replacer, consistency in feeding time intervals, consistency in milk replacer mixing, and switching to milk replacer from milk or vice versa. Another respondent observed that “There is no effective preventive strategy.”

### *Management and nutrition*

Overall, the majority of cases (62%) were seen on farms rated as having very good or excellent management. An additional 26% of the farms were categorized as having “good” management. Nearly 90% of the herds were described as having good, very good, or excellent management.

No single diet type or feeding method emerged as being a conspicuous risk factor for ABS. Cases of ABS were seen on farms that fed conventional milk replacers, “accelerated growth” milk replacers, fresh pasteurized milk, fresh unpasteurized milk, pasteurized milk from treated cows, and unpasteurized milk from treated cows. Milk was fed from bottles, buckets, and multiple nipple gang feeders. It must be noted, however, that it would have been difficult to have detected such a factor from our data since we did not have data from farms that did not have a case of ABS to which to compare our results.

Nevertheless, based upon the limited published information regarding calf feeding practices and upon the authors’ knowledge of typical calf feeding practices, diet constitution and method of feeding on farms with a case of ABS reasonably reflected the diet constitution and methods of feeding on dairy farms in the US. Likewise, frequency of feeding, type of calf-starter feed, access to hay, presence of antibiotics or coccidiostats in the milk replacer, and type of calf housing on the farms with a case of ABS seemed to reflect typical management practices in the US.

## Conclusions

Acute bloat syndrome has been identified by 276 veterinarians across the country on a median of three farms per practitioner. Common symptoms included abdominal distension, fluid slosh in the abdomen, colic, and dehydration. Symptoms did not commonly include either diarrhea or an elevated temperature. The majority of cases were seen in calves 4 to 21 days old. Knowledge of these common clinical signs can help calf managers detect problems in calves as early as possible and to begin treatment of the syndrome.

In calves exhibiting clinical symptoms, the respondents' who reported effective treatments and therapies suggest some combination of antibiotics, rumen tonics, anti-inflammatories, and bloat-relieving measures. The majority of possible preventive therapies focused around the diet and feeding program. However, no particular diet or feeding strategy in place on any of the case farms precluded a case of ABS from occurring.

Notwithstanding that management was rated as good to excellent on most farms where a case had been seen, various improvements in calf management practices, such as consistency in feeding time intervals, were cited as being effective at preventing future cases. This underscores the idea that attention to detail cannot be overstated regarding calf management practices.

While isolation of *Clostridia spp.* from clinical cases does not prove that *Clostridia spp.* are the sole causative agents of ABS, the frequency with which these organisms were isolated deserves to be noted. Roeder et al. (1987, 1988) isolated *Clostridia perfringes* in calves that were both inoculated and those brought into Kansas State University with similar symptoms. However, all of the 8 calves inoculated with *Clostridia perfringes* type A experienced diarrhea, with only 2 of the 8 calves' clinical symptoms resulting in death. They

did not rule out other factors contributing to ABS-like symptoms.

*Sarcinia spp.* were the second most common bacterial isolate. *Sarcinia spp.* have been associated with an abomasal bloat type syndrome in goat kids (DeBey et al., 1996). Further research to clarify the role of *Clostridia spp.* and *Sarcinia spp.* in the pathogenesis of ABS is needed.

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**Table 1.** Occurrence of acute bloat syndrome cases on affected dairy farms.

Occurrence of cases	% of respondents
2 or fewer cases, total	31
Sporadic cases over time	51
Single outbreak (3+ cases)	11
Multiple outbreaks	7

**Table 2.** Results of samples submitted to a diagnostic lab for bacterial analysis from calves diagnosed with acute bloat syndrome.

Bacteria Reported	% of respondents
<i>Clostridia spp.</i>	26.2
<i>Sarcinia spp.</i>	5.2
<i>Clostridia spp.</i> and <i>Sarcinia spp.</i>	3.0
<i>Clostridia spp.</i> and other	2.1
Other	3.0
None reported	60.5

**Table 3.** Clinical findings in the last case of Acute Bloat Syndrome seen by the practitioner.

Sign	% of cases where reported
Abdominal distension, left	22.2
Abdominal distension, right	7.1
Abdominal distension, both	65.8
Temperature <100.2 °F	26.3
Temperature, 100.3 to 102.5° F	32.7
Temperature, >102.5° F	4.9
Diarrhea, mild	19.6
Diarrhea, moderate or severe	3.7
Fluid slosh upon succussion	56.4
Recumbency (unable to stand)	33.1
Opisthotonus (unable to stand and head pulled towards back)	3.4
Dehydrated	42.1
Sunken eyes	39.5
Colic	47.0

**Table 4.** Most effective therapies/treatments for acute bloat syndrome identified by veterinarians. Therapies/treatments reported by practitioners in decreasing order of efficacy.

Therapy/treatment	Number 1 <sup>st</sup> choice	First Choice (%)	Total number of 1 <sup>st</sup> , 2 <sup>nd</sup> , 3 <sup>rd</sup> choices	Total of Choices (%)
Antibiotics	83	27	197	26
Hole (tube/trochar)	46	15	77	10
<i>Clostridial</i> antitoxin	37	12	67	9
Anti-inflammatory	30	10	89	12
Rumen tonics	18	6	96	13
IV fluids	16	5	54	7

**Table 5.** Preventive therapies or strategies grouped by category.

Strategy type	Number 1 <sup>st</sup> choice	First Choice (%)	Total number of 1 <sup>st</sup> , 2 <sup>nd</sup> , 3 <sup>rd</sup> choices	Total of Choices (%)
Feeding mechanics	57	28	124	34
<i>Clostridium</i> vaccination	58	28	104	28
None	36	18	36	10
Feed (non-milk)	17	8	28	8
Antibiotic	13	6	27	7
Liquid diet	12	6	27	7