



# Sheltie Showdown



A publication of the Central Indiana Shetland Sheepdog Club

May 2011

## Club Meetings

CISSC holds membership meetings at the Circle City Veterinary Specialty & Emergency Hospital, 9650 Mayflower Park Drive, Carmel, IN 46032. We meet in the Rehab Room on the ground floor. This room has a private entrance on the right side of the building. *Note: meetings start promptly at 7:30 p.m. and end promptly at 9:30 p.m.* Well-behaved dogs and puppies are welcome.

Directions to Circle City Vet Clinic: From I-465, take exit 27, U.S. 421/Michigan Road. Go north on 421/Michigan Road to 96<sup>th</sup> Street and turn left (west). Turn right on Mayflower Park Drive. 9650 is on the left.

Remaining membership meetings for 2011: **May 6<sup>th</sup>**, July picnic, Sept. 9<sup>th</sup>, Nov. 4<sup>th</sup>. Board meetings for 2011: Aug. 5<sup>th</sup>, October 7<sup>th</sup>.

## May Meeting

We will view the DVD from the 100<sup>th</sup> Anniversary Celebration of the Shetland Sheepdog recognized by the AKC.



Celebrating A Century

**PLEASE SEND WELL WISHES TO  
KAREN BURTON**

Karen suffered a serious injury from a fall on April 16<sup>th</sup>. On April 28<sup>th</sup>, she undergoes shoulder replacement and rotor cuff reconnection surgery.

## In Memoriam

After a long illness, Pat Ropke, a long time member of CISSC, passed away on April 21<sup>st</sup>.

Heartfelt condolences to Bettie Hartsock on the passing of "Danny," Ch. Baccara Just the Facts, UD NAP NJP U-CDX.

### 2011 Officers

President: Kathleen Morphew  
Vice President: Carole Creech  
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Recording Secretary: Cheryl Sharp  
Corresponding Secretary: Kathy McKee

### Board of Directors

Jaye Athy  
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Bettie Hartsock  
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### Standing Committees

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Showdown: Carole Creech  
Sunshine Committee: Kathleen Morphew  
Ways & Means: Karen Burton  
Website: Jaye Athy  
Club Website: <http://www.ciissc.net>

## 2011 CISSC Upcoming Events

**Fall Agility Trial** (pending AKC approval)

November 19-20, 2011

Pawsitive Partners Dog Training Center

Beech Grove, IN

Judge: Blair Kelly



## About the Newsletter

The *Sheltie Showdown* is the official newsletter of the Central Indiana Shetland Sheepdog Club and is published six times per year. Subscriptions are free to members and to other clubs on an exchange basis. Non-members may subscribe by contacting the editor for the current subscription price. Subscription is free to non-members if requested via email. The deadline for news and advertising is the 15<sup>th</sup> of the month before publication. Send news and advertisements to: *Sheltie Showdown* c/o Carole Creech, 12945 Fleetwood Drive, North, Carmel, IN 46032 or email [whitehall.shelties@yahoo.com](mailto:whitehall.shelties@yahoo.com).

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## Bragging Rights!



### From Karen Adams:

Gilda (Baccara Alpenglo Ms Chevious, NJP) had a great weekend at her first CPE trial at the Tippecanoe and Rally Too the weekend of April 2 & 3. She had 4 Q's for 4 runs. She earned her CL1-R title (**NEW TITLE!**) and Q'd in Jumpers and Colors. Gilda had all 1st Place finishes. At the K9 Athletes CPE trial 4/16 & 4/17, she earned a Level 1 Wildcard leg with a 1st Place finish, 2 Level 2 Standard legs with 1st and 2nd Place finishes, a Level 2 Colors leg with a 3rd Place finish, a Level 2 Jumpers leg with a 1st Place finish and a Level 1 Fullhouse leg with a 1st Place finish. She earned her CL1-H and CL1-F titles (**NEW TITLES!**). She only needs 1 Snooker and 1 Jackpot leg in Level 1 to complete all of her Level 1 requirements for her CL1 title.

Piper (Brandywines Sea Breeze, NA, NAJ) earned a Colors leg at the CPE trial. Piper earned a Level 1 Standard leg on 4/17 at the K9 Athletes CPE trial with a 2nd Place finish. She also earned a Level 1 Wildcard leg with a 1st Place finish on 4/17 and a Level 1 Jumpers leg with a 2nd Place finish. She now has her CL1-H title (**NEW TITLE!**).

Riff (Road's End Sirius Mayhem) went to his first trial ever at the T&RT trial. He earned a Jumpers leg with a 1st Place finish!

Baxter, Alpenglo's Gale Force went WD, BOW at the Terre Haute Kennel Club on 4/21/2011 under Judge Carl Liepman for 1 pt. Baxter is now singled out and needs 1 major to finish.

Edy, Alpenglo's Sundae Surprise was WB, BOS at the Terre Haute Kennel Club on 4/21/2011 under Judge Carl Liepman for 1 pt. Edy was RWB on 4/22/2011 at the Bloomington Kennel Club show under Mr. Bolus. Edy went RWB at the Bloomington Kennel Club show under Judge Mrs. Barbara Dempsey-Alderman.

Quinn (Baccara Makin' Waves) earned his first point at the Bloomington Kennel Club show on 4/22/2011 under Judge Mr. David Bolus. Quinn was WD, BOW. He was co-bred by Kathleen Carver and owned by Kathleen.

Karen received notice that she has been accepted in the AKC Breeder of Merit Program!

### From Bettie Hartsock:

Saturday April 23 at the Terre Haute Kennel Club show under Judge Patty Sample, Qism's Storm Chaser (Reggie) scored a 89 in Rally Novice B to finish his Rally Novice title. (**NEW TITLE!**) He also placed third in Rally Novice B.

### From Sheila Kitchens:

Plail's Ruff N' Ready Riley, PT, MX, MXJ, XF Riley at the Tippecanoe & Rally Too CPE Agility Trial April 2, 2011:

Jackpot Level III Q'd with first place  
Standard Level III Q'd with first place  
Snooker Level III Q'd with first place  
Wildcard Level III Q'd with first place

Riley at the Tippecanoe & Rally Too CPE Agility Trial April 3, 2011:

Standard Level III Q'd with First place  
Snooker Level III Q'd with Second place  
Fullhouse Level III Q'd with Second place

Riley at the K-9 Athletes CPE Trial April 16, 2011:

Jackpot Level III, Q'd with First place  
Fullhouse Level III, Q'd with First place  
Colors Level III, Q'd with First place  
Standard Level III, Q'd with Third place

Riley at the K-9 Athletes CPE Trial April 17, 2011:

Jumpers Level III, Q'd with First place  
Standard Level III, Q'd with Second place  
Snooker Level III, Q'd with Third place

Road's End American Girl Unleashed, OA, OAJ Frankie at the K-9 Athletes CPE Trial April 16, 2011:

Colors Level III, Q'd with First place  
Standard Level III, Q'd with First Place  
Jackpot Level III, Q'd with Second Place

Frankie at the K-9 Athletes CPE Trial April 17, 2011:

Standard Level III, Q'd with First Place  
Wildcard Level III, Q'd with Second Place  
Snooker Level III, Q'd with Second Place  
Jumpers Level III, Q'd with Third Place

River Tyne's Bust A' Move "Buster"

Buster at the K-9 Athletes CPE Trial April 16, 2011:

Standard Level I, Q'd with First place  
Fullhouse Level I, Q'd with First place  
Jackpot Level I, Q'd with First place

Buster at the K-9 Athletes CPE Trial April 17, 2011:  
Standard Level I, Q'd with First place  
Snooker Level I, Q'd with First place  
Jumpers Level I, Q'd with First place

### From Jane Masters:

Prelude's Tupper, PT, RN placed 4th in Started Sheep; 2nd in Std. Nov, 2nd in JWW Nov. at ASSA Natl. - owned by Nancy Akers.

HC MACH Prelude's Grand Slam, UD, RAE2, HXASD, MX, MXJ, AXP, AJP --- Went Best All Around Sheltie at the National-owned by Jan Miller.

Ch. VCX Prelude's Lakeview Bitomagic HSAS, AXP, AJP - 1st Place Started Ducks at ASSA Natl., and March 18, she also acquired her RN and Beg. Nov. (**NEW TITLES!**) Magic is owned by Jan Miller and Jane Masters.

Prelude's Panache - earned her RN on March 27<sup>th</sup>.

Prelude's Protocol, PT - RWD - Terre Haute, April 21<sup>st</sup>.

Prelude's Prada - RWB - Terre Haute, April 21<sup>st</sup>.

### From Kathy McKee:

Bliss "Coastal Keeara Euphoria AX, AXJ, CGC" earned her MXJ title (**NEW TITLE!**) at the Greater St Louis Agility Club's trial in Glen Carbon, IL on Saturday, April 16th under Judge Scott Chamberlain. She also got her first Double Q towards her MACH title on Sunday, April 17th.

At the Terre Haute Kennel Club's dog show on April 22nd, Derby (Keeara Down and Derby) was Reserve Winners Bitch under Judge Judith Goodin.

### From Tammy Van Deusen:

ASSA National Herding Trial:

MACH HCh WTCh Faerie Dream Catcher HXAsdc HSBs MX MXJ HTD-Is HRD-IIIs, Cloud

Advance Sheep A Course 1st Place  
Advance Ducks A Course 2nd place Reserve High in Trial and HIGH COMBINED!!!! This is after Cloud was gone for a year; he was only home for 10 days and only got to work stock 3 times before this trial.

HTCh HCh Wildrose Faerie Tale HXAdsc AX AXJ STDd OTDs HRD-IIIs HTAD-IIIs, Flutter  
Advance Sheep A Course 2nd Place. This was Flutter's retirement trial.



## ASSA National in Review

Take aways from the Annual Meeting, April 21, 2011

The permanent location for the Central Region ASSA National will be Purina Farms in Gray Summit, MO. The ASSA board is looking for more than one club to help with the National and will be soliciting clubs in each region for assistance when the National is located in their region. The ASSA Board re-aligned the 7 Regions. Indiana remains in Region 4 with Ohio added and Wisconsin moved to Region 5.

A webpage will be added to the ASSA website for Breeder Referral. ASSA members with puppies and dogs for sale may add their name and email address to the Breeder Referral page on the ASSA website. There will no longer be a Breeder Referral representative designated by state.

Associate Membership is now available for those that do not qualify for full ASSA membership.

Mary Mahaffey, DVM, MS and head of the ASSA Medical Advisory Committee, asked that breeders send in DNA to help with the Gallbladder Mucocoeles in Shetland Sheepdogs research conducted by Washington State University. (See article in this newsletter).

### Reflections from this year's National

Purina Farms is a WONDERFUL site for the national. This facility has been open less than a year and will only get better as time goes on. The weather was an issue during the week, so be sure and bring rain gear when attending shows at Gray Summit in the spring!

The vendors were terrific, as usual, and many purchases were made by Hoosiers in attendance!

The CISSC Banner looked great. All club banners were placed on the wall around the show ring. Our raffle basket was a big hit, too. Many commented on the thought put into the items offered in the basket, including the artwork Kathy McKee painted on the treasure box.

Overall, the dogs entered at this year's national were very pleasing with good fronts and rears, pretty outlines, plenty of neck, pretty heads and gorgeous coats.

Socks and Libby had a great time staying in the motel. Libby performed her normal wakeup call each morning; giving us her cold nose and a lick in the ear ☺ Both dogs had professional photo sittings. After a few hours of grooming and pictures, they came back to the motel and crashed for the night on the bed until morning!

~ Carole Creech



# Candid Shots from 2011 ASSA National Purina Farms, Gray Summit, MO




**Event Sponsors**  
Celebrating A Century

**Greater St. Louis Shetland Sheepdog Club**

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**\$250 Century Supreme Donor**

*Central Indiana Sheltie Club  
 Karen & Ralph Elledge – Karral Shelties  
 Sharon Steen  
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**\$50 Grass Roots Donor**

*Barbara Aulbach – Caledon Shelties  
 Chicagoland Sheltie Club  
 James & Carole Creech – Whitehall Shelties  
 George & Patty Page – Cataway Shelties*





# AKC Legislative News

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The American Kennel Club and our Washington, D.C.-based advocacy team continue to closely monitor the federal Puppy Uniform Protection and Safety (PUPS) legislation.

Recently, Senator Richard Durbin of Illinois introduced a Senate version of this measure, [S.707](#), which contains the same language as the 2010 version of the bill and current House legislation ([H.R. 835](#)). Each of the bills has been assigned to the Agriculture committees of their respective chambers. To date, no hearings have been scheduled.

The measure would require anyone who *owns or co-owns* dogs that produce 50 or more puppies sold in a 12-month period to be regulated under existing USDA dog “dealer” regulations. These regulations are designed for high-volume commercial kennels that produce puppies for wholesale, and require a USDA commercial license, maintenance of specified standards and regular inspections.

The AKC does not oppose the concept of reasonable regulations for high volume breeder/retailers. We also believe that the 2010/2011 version of this legislation is a significant improvement over previous versions in that it moves away from defining a commercial breeder based on the number of dogs a person owns, and instead establishes a threshold for regulation based on the number of puppies bred and sold by a breeder.

However, the AKC also has a number of *serious concerns with the bill as introduced and does not support this measure*. Some of these concerns include:

*Definition of “breeding female” as an intact female dog aged 4 months or older.* This definition is misleading because female dogs are not sufficiently mature at 4 months of age to be bred. Additionally, such a definition should not be necessary if a “high volume retail breeder” designation is to be based on puppy sales, rather than the number of dogs owned.

*Definition of “high volume retail breeder” as someone with “an ownership interest in or custody of one or more breeding female dogs.”* This definition is overly broad and does not take into account the tradition of co- and joint ownerships common among dog show participants, sporting dog trainers, hunting club members, and other hobbyists. Additionally, a reference to the number of dogs owned by a breeder is unnecessary and potentially misleading.

*Current exercise language that is overly vague* and should be clarified to ensure that the daily exercise requirements do not preclude training or other types of physical activity.

*An exponential expansion of the number of breeders regulated and inspected* by the Animal Care division of the United States Department of Agriculture’s (USDA) Animal, Plant and Health Inspection Service (APHIS). However, a May 2010 audit of this program found that the existing inspections program is already insufficient to carry out current responsibilities. The AKC believes these issues and full funding for the current program should be addressed before attempting to dramatically expand the program’s responsibilities and workload. The AKC does not expect a hearing to be scheduled in the near future. However, we encourage all responsible dog breeders and owners to stay active in your community as a role model for responsible dog ownership and breeding and to share concerns with your federal legislators.

We will continue to monitor this legislation vigilantly, to outline our concerns regarding PUPS legislation in our communications and meetings with members of Congress and their staff, and to keep you up to date on any changes in the status of this legislation.

## **Gallbladder Mucoceles in Shetland Sheepdogs**

Mary B. Mahaffey, DVM, MS  
Chair, ASSA Research Advisory Committee  
March, 2011

Gallbladder mucocele formation is a relatively uncommon problem in dogs that results in inflammation and possible rupture of the gallbladder wall. Clinical signs of affected dogs include vomiting, loss of appetite, and abdominal pain. Without surgical removal of the gallbladder, the dog may die if rupture occurs. Many other diseases cause similar clinical signs, and because gallbladder mucoceles are relatively uncommon, the diagnosis can be missed or delayed. The diagnosis is usually made via ultrasound examination (Figure 1), exploratory surgery, or on necropsy. The Shetland Sheepdog is one of the breeds that is predisposed to the problem.<sup>1</sup>

In 2008, Katrina Mealey, DVM, Ph.D. of the College of Veterinary Medicine, Washington State University, began searching for a genetic mutation that might be a contributory factor in the formation of gallbladder mucoceles in Shelties. The American Shetland Sheepdog Association played an integral part in soliciting DNA samples from affected and unaffected (control) Shelties. Owner participation was outstanding and within 18 months of the time the ASSA joined the effort, Dr. Mealey received enough DNA samples to help her identify the mutation. Her work was published in 2010 and is available online.<sup>2</sup>

### Brief review of the anatomy and physiology of the biliary tree and bile

Bile is produced in the liver to aid in the digestion of food in the small intestine. Liver cells (hepatocytes) excrete bile into a tree-like system of branched ducts (bile ducts) within the liver. These ducts gradually coalesce into a large duct that extends between the liver and the small intestine. The gallbladder is an oval shaped sack-like structure that extends from the large bile duct via a short “cystic” duct. The gallbladder acts as a reservoir to store and concentrate bile between meals as some bile exiting the liver via the large bile duct enters the gallbladder. When food enters the intestine, the gallbladder is stimulated to contract, thus depositing bile into the intestine.

### Probable mechanism for gallbladder mucocele formation in Shelties<sup>2</sup>

Bile salts are one of the components of bile. They have an important function in digestion of food; however, they are toxic to the cells lining the biliary tree and gallbladder. Phospholipids are another component of bile, and they have an important protective effect on the cells lining the biliary tree and the inner wall of the gallbladder. A specific protein (called ABCB4) within the hepatocyte cell membrane is essential for the transfer of phospholipids from the hepatocyte and into the bile ducts. If the amount of this ABCB4 protein is deficient or if its function is altered, inadequate amounts of phospholipids are transferred into the bile ducts. Without the protective effect of the phospholipids, the bile salts cause chronic irritation of the gallbladder wall. The gallbladder wall responds by producing mucin, a thick, gooey substance. Over time, the

gallbladder wall becomes inflamed and the mucin combines with the bile to form a thick semi-solid gelatinous mass (mucocele) within the gallbladder and its duct (Figures 1 & 2). Bile no longer can enter or exit the gallbladder and flows directly from the liver into the intestine. Eventually, the gallbladder wall may rupture, resulting in patient death. The mutant gene found in affected Shelties is responsible for the synthesis of the ABCB4 protein that transfers the phospholipids into the bile ducts.<sup>2</sup> The amount of ABCB4 protein within the hepatocyte cell membrane is then insufficient to transfer enough protective phospholipid into the bile ducts.

In general, this appears to be a disease of older dogs. In Dr. Mealey's report, Shelties with confirmed gallbladder mucoceles had clinical signs that prompted owners to seek veterinary help. The average age of affected dogs was 9 years (range 5 – 12 years). Since the report was published, one affected 3-year-old Sheltie was discovered (Dr. Mealey, personal communication). Fourteen of the 15 affected Shelties tested and all 3 affected dogs of other breeds had one copy of the mutant gene. Only 1 of 21 unaffected shelties had the mutant gene. Since all affected dogs were heterozygous for the mutant gene, a dominant mode of inheritance with incomplete penetrance was suggested. None of the dogs was homozygous for the mutation.

This mutant gene is not likely to be the only factor in gallbladder mucocele formation in dogs, but it appears to be the major contributory factor in Shelties. A commercially available DNA test will help breeders eliminate the mutation from the Sheltie population. Dr. Mealey is working to develop a DNA test that is accurate and affordable. The method used to identify the mutant gene during the research phase is difficult, time consuming, and expensive.

Once a DNA test becomes commercially available, work can be initiated to answer several questions:

- 1) What percent of Shelties (and dogs of other breeds) carry the mutation?
- 2) What happens to dogs with two copies of the mutation? Perhaps, these dogs have a more severe form of the disease that results in death either during embryonic development or in the perinatal period.
- 3) What percent of dogs with one copy of the mutant gene develop gallbladder mucoceles? (It may be 100% if the dogs live long enough.)
- 4) If dogs with one copy of the mutation are identified early and then followed with periodic ultrasound examinations, at what age do the mucoceles form?
- 5) What percent of dogs diagnosed with mucoceles prior to onset of clinical signs develop clinical problems necessitating surgical removal of the gallbladder?
- 6) What treatment, if any, should be undertaken for young dogs with the mutant gene? Should such dogs be treated prophylactically with drugs that make the bile



thinner? For instance, we might learn that medical treatment should be instituted when the dogs are a certain age, ex. 4 -5 years old.

- 7) Should dogs at risk for gallbladder mucoceles receive periodic ultrasound examination, and if so, beginning at what age and how often?
- 8) Would periodic blood tests be indicated for at risk dogs?
- 9) Should the gallbladder be removed in asymptomatic dogs with gallbladder mucoceles? This has been recommended in one report.<sup>1</sup>
- 10) Should the normal gallbladder of dogs with the mutant gene be removed at an early age? For example, when a female carrying the mutant gene is spayed, should the gallbladder be removed at the same time?
- 11) Are the bile ducts within and outside the liver adversely affected or is the gallbladder the only structure adversely affected?

#### What do Sheltie owners do while waiting for a commercially available DNA test?

If you are unaware of any affected dogs in your dog's pedigree, then inform your veterinarian of the possibility of gallbladder mucocele formation if your dog develops any of the above mentioned clinical signs. The information we now have concerning Shelties is very new and not widely known in the veterinary community.

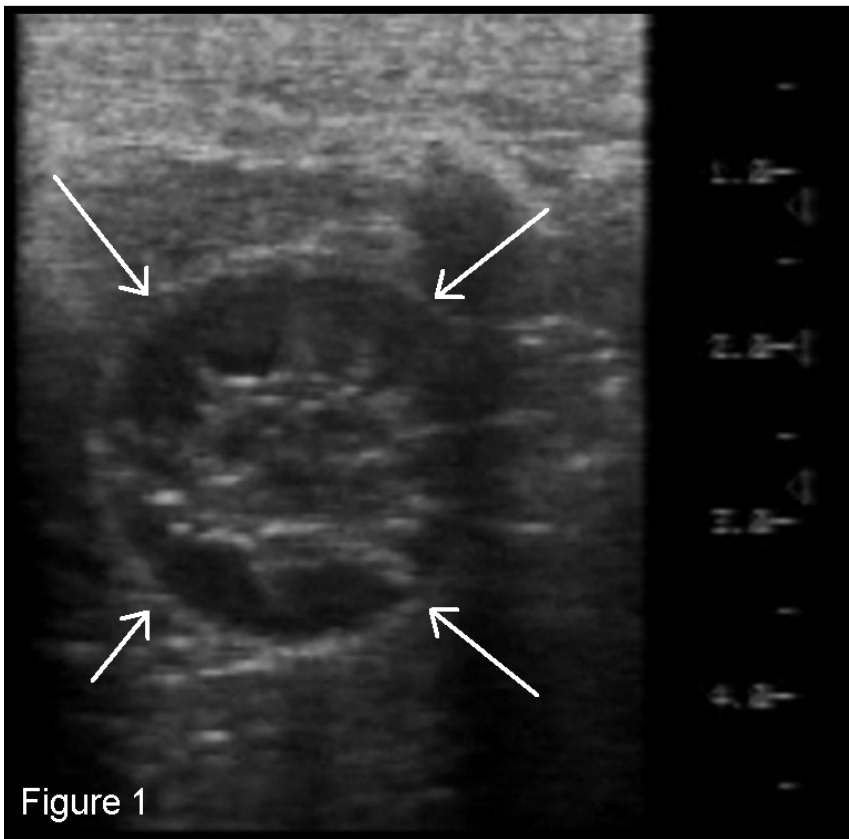
If you know that an affected dog exists in your dog's pedigree –

- Inform the dog's veterinarian that the dog may be at risk for gallbladder mucocele formation. Again, mucoceles are uncommon and most veterinarians are unaware of the newly found mutant gene in some Shelties. Corticosteroid therapy and Cushing's disease may also be risk factors in development of gallbladder disease,<sup>1,3</sup> so veterinarians may want to take these factors into consideration when treating at risk dogs.
- One could consider prophylactic medical therapy as noted above (#5) before mucocele formation begins. If the dog develops clinical signs consistent with mucocele formation, the veterinarian can include that on the rule out list as a possible cause. Normal liver function tests results may not rule out the presence of a gallbladder mucocele.
- Consider periodic ultrasound examination of the gallbladder starting at 5 to 8 years of age. The examination must be performed by a veterinarian experienced in recognizing gallbladder mucoceles. Sludge within the gallbladder is a common finding in "normal" dogs and should not be confused with mucocele formation. In general, board certified radiologists and internal medicine

veterinarians are competent at making the diagnosis. Some general practitioners are also very experienced and capable of making the correct diagnosis.

- If your dog is diagnosed with a gallbladder mucocele, discuss the options with your veterinarian. Considerations include: 1) prophylactic gallbladder removal, 2) no action unless clinical signs develop, and 3) medical therapy. One study of gallbladder disease in 38 Shelties found that gallbladder mucoceles could be subclinical, but quickly result in acute illness.<sup>1</sup> In 11 Shelties, gallbladder disease was found serendipitously indicating that dogs may not have clinical signs of disease during mucocele development. Mucoceles were confirmed in 25 of 38 Shelties included in the report. The authors recommended gallbladder removal in asymptomatic dogs with mucoceles because of low survival rate of clinically affected dogs. In one dog, a mucocele resolved 6 months after medical treatment (with ursodeoxcholic acid) and a fat-restricted diet; there was no change in mucoceles of 2 other dogs treated similarly.

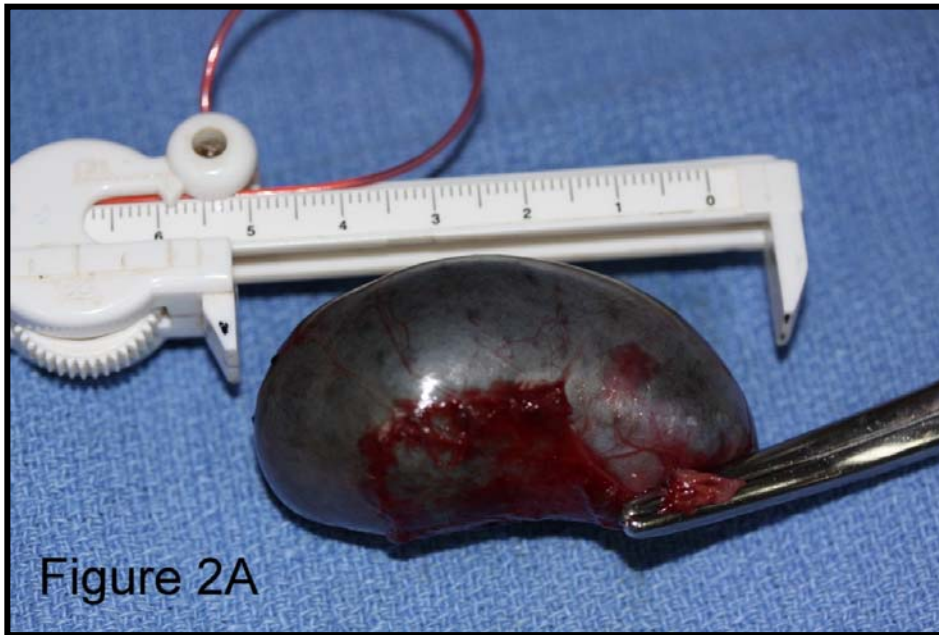
Figures 1 and 2 are ultrasound and gross images a gallbladder and mucocele removed from an asymptomatic 8-year-old Sheltie. The owner had 2 full siblings sired by an affected dog. Both dogs were clinically normal, but received ultrasound scans as a screening measure since they were at an age where mucocele formation might occur and the sire was known to have been affected. Each dog had a 50:50 chance of having a gallbladder mucocele. One was normal, the other had a mucocele. Even though the affected dog was clinically normal and the blood work was also normal, the owner elected to have the gallbladder removed. The gallbladder was moderately distended and filled with a gelatinous, semi-solid material. The dog recovered uneventfully.



**Figure 1:** Ultrasound image of the gallbladder (arrows) of an asymptomatic 8-year-old Sheltie with a gallbladder mucocele. The mucocele appears as a stellate-shaped gray object within the gallbladder. The

Figure 1

inside of a normal gallbladder would be uniformly black.



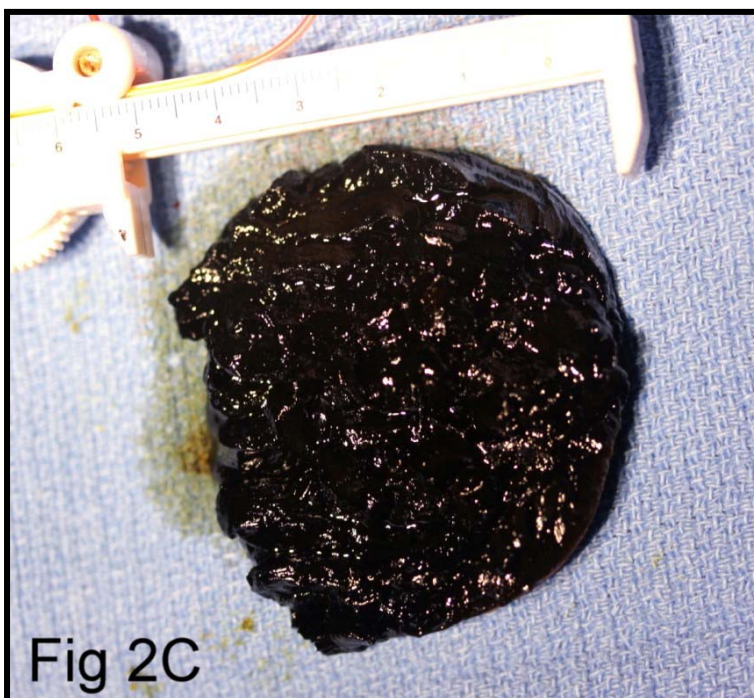
**Figure 2:**  
The photos of a gallbladder and mucocele removed from the same Sheltie as in Figure 1.  
(A) Intact gallbladder shortly after

surgical removal. The gallbladder is distended.

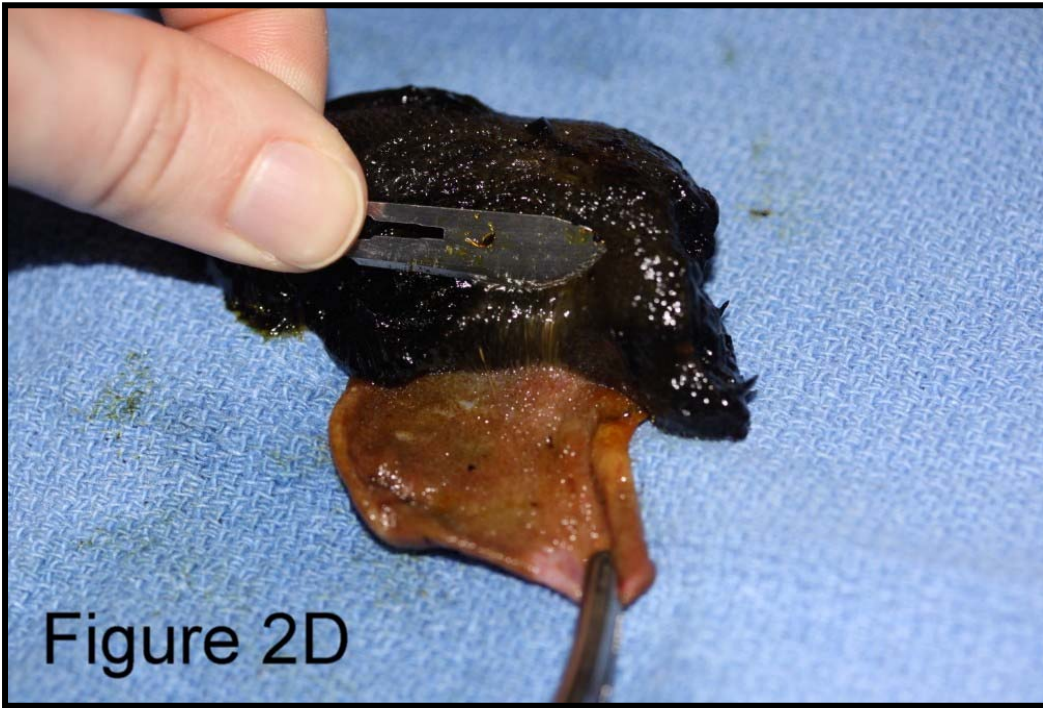


**Figure 2B:**  
An incision  
has been  
made along  
the long axis  
of the  
gallbladder  
revealing the  
gelatinous  
mass of the  
mucocele.

In a normal dog, the gallbladder would have collapsed and the fluid contents spilled onto the towel when incised.



**Figure 2C:** The gallbladder  
and mucocele  
have been cut  
in half.



**Figure 2D:** Mucocele being peeled away from the gallbl

adder wall. The mucocele was tightly adhered to the gallbladder wall.

It is not known how long the mutant gene has been in the Sheltie population. The clinical signs associated with mucoceles are common to other diseases, so some dogs with mucoceles may have been misdiagnosed, especially prior to the use of ultrasound in veterinary medicine. Also, many dogs are elderly when clinical signs occur. These dogs

often have other medical problems, so expensive diagnostic tests may not have been pursued. Some carriers may have died from other causes before gallbladder mucoceles could result in clinical signs.

Since the problem is one of older dogs, dogs will have been bred and produced offspring long before the diagnosis is made. As noted above, a commercially available DNA test will aid breeders in eliminating the mutation from the population while retaining the desirable genes of those dogs and maintaining genetic diversity within the breed. Carriers should be bred to non carriers, so as to eventually select for non carriers with the most desirable traits. Each pup from such a breeding would have a 50:50 chance of being normal (non carrier). Geneticists generally do not recommend immediate culling of carrier dogs in order to maintain genetic diversity and to avoid a genetic “bottle neck” of other potentially undesirable traits.<sup>4</sup> Thanks to the efforts of Dr. Mealey and her colleagues and to those owners who participated in the study, breeders will eventually have the knowledge needed to decrease the incidence of gallbladder mucoceles in the breed.

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## Additional reading:

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