



**California Animal Health & Food Safety  
Laboratory System**

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**Final  
Version 1**

*This report supersedes all  
previous reports for this case*

**CAHFS Case #:** D1206050  
**Referral #:** Cali  
**Date Collected:**  
**Date Received:** 06/05/2012  
**Case Coordinator:** Bradd Barr, DVM,  
PhD  
**Electronically Signed and Authorized  
By:** Barr, Bradd on 7/13/2012 5:58:32PM

**Email To:**  
Reimschuessel, Renate  
[renate.reimschuessel@fda.hhs.gov](mailto:renate.reimschuessel@fda.hhs.gov)

**Collection Site:**  
Chambers, Rachael  
141 Tarragon Ave  
Morgan Hill, CA 95037

**Specimens Received:** 1 Carcass;

**Comments:** 1-carcass

**Case Contacts**

Owner	Chambers, Rachael	408-779-8108	141 Tarragon Ave Morgan Hill, CA 95037
Report To	Harika, Jaspal	408-779-7325	16150 Monterey Street Morgan Hill, CA 95037
Submitter	Reimschuessel, Renate	301-210-4024	8401 Muirkirk Rd Laurel, MD 20708

**Specimen Details**

ID	ID Type	Taxonomy	Gender	Age
6495	Unknown	Canine	Female	12.00 Years

**Laboratory Findings/Diagnosis**

- 1) Presumptive gastric dilation, rupture and volvulus with:
  - A. Displaced, markedly enlarged, congested spleen.
  - B. Dilated, flaccid stomach with diffuse transmural congestion, multifocal hemorrhage and ruptured stomach at esophageal inlet (cardia).
  - C. Large amounts of free gastric content, abdominal cavity with mild acute, fibrinous peritonitis, gastric serosa adjacent to rupture.
- 2) Focally extensive, acute bridging centrilobular to paracentral hepatocellular necrosis. Etiology: Presumptive hypoxia secondary to gastric dilation and volvulus.
- 3) Regurgitated stomach content, esophagus with marked terminal aspiration pneumonia.
- 4) Moderate amounts of red-tinged serous fluid, thoracic cavity.
- 5) Marked chronic osteoarthritis hip and elbow joints.
- 6) Very mild acute multifocal renal tubular epithelial necrosis.
- 7) Miscellaneous findings:
  - A. Solitary presumptive small hepatic adenoma.
  - B. Small focus of cystically-dilated, blood-filled vessels, liver.
  - C. Solitary presumptive pheochromocytoma, adrenal gland.
  - D. Moderate, multifocal hepatic portal and central venous fibrosis.
  - E. Renal tubular basement membrane thickening, tubules of outer medullary stripe.

**Case Summary**

7/13/12:  
All toxicology testing is now completed and there are essentially no significant findings. Numerous toxicologic tests were run on GI content and liver and I refer you to the toxicology section summary for a discussion of these tests and the results. The cause for the gastric upset and vomiting in this dog therefore remains undetermined. Death was due to gastric dilation and rupture associated with a presumed gastric volvulus in addition to terminal aspiration of regurgitated stomach content.

Immunohistochemistry on the small adrenal tumor is positive for chromogranin A which would support the diagnosis of a pheochromocytoma. I reviewed the tissue sections. In addition to the previous findings there also is very mild acute multifocal renal tubular necrosis. While the cause is not determined I suspect it may have resulted from hypoxia or ischemia.

This is the final report.

6/13/2012:

The combined gross and microscopic findings support antemortem rupture of the stomach secondary to gastric dilation, and a greatly enlarged, displaced, blood-filled spleen compatible with gastric volvulus. In addition there was significant terminal aspiration pneumonia. Because the stomach had collapsed secondary to its rupture and due to the partially frozen state of the abdominal viscera at necropsy, the actual orientation of the stomach prior to rupture could not be determined. Displacement of the stomach therefore is presumed based on the position of the engorged spleen appearance the grossly dilated stomach with diffuse transmural congestion/hemorrhage. The history of dry heaves would also support a volvulus as this would have prevented any regurgitation of stomach content (the stomach contained a rather large amount of ingesta). However at necropsy there also was a large amount of stomach content in both the esophagus and large airways of the lung (terminal aspiration pneumonia) and so I am uncertain as to how this could have occurred with a gastric volvulus. The cause for the regionally extensive acute centrilobular hepatocellular necrosis is undetermined but I suspect is due to regional ischemia/hypoxia secondary to gastric volvulus.

6/7/2012:

The gross findings would be compatible with a terminal gastric volvulus. The spleen was greatly enlarged with a rather firm texture and displaced with a large portion of the spleen displaced to the right side of the abdomen. Due to the freezing and thawing and presence of a large amount of free stomach content in the abdominal cavity, and because the stomach had ruptured and was collapsed, the actual anatomic position of the stomach was impossible to determine in the abdomen. The stomach had ruptured right near the esophageal inlet just caudal to the diaphragm. Because of the somewhat firm texture to the spleen, I am uncertain as to whether this enlargement was due entirely to vascular congestion secondary to displacement or could indicate some possible previous splenic cellular infiltration. There was a large amount of vomitus in the esophagus which was mildly dilated and flaccid and there also was a large amount of vomitus in the trachea and mainstem bronchi, compatible with terminal aspiration pneumonia. Samples of stomach content in the stomach, as well as the free ingesta in the abdominal cavity and the separate collection of regurgitated stomach content in the esophagus, as well as the small amount of intestinal content and feces have been saved; in addition, to liver, spleen, kidney, brain, serosanguineous fluid from the thoracic cavity and frozen clotted blood from the heart. The bladder was empty so urine could not be collected. Microscopic examination of tissues as requested as pending and an updated report will follow.

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### Clinical History

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Duration of Illness: 3 days.

Cali (shep/dane) consumed "Milo's brand chicken jerky treats" on 5/28/12 in the mid-morning. The evening of 5/28/12 she was lethargic. The morning of 5/29/12 she refused breakfast and vomited multiple times. She was admitted to the vet at 10:30 am on 5/29/12. She remained under observation w/ bloodwork and fluids. At 5:30 pm she was released after eating canned vet food and water. At 6:30 pm she ate her dinner and vomited again. AT 1:45 am on 5/30/12 she began dry heaving. AT 5:45 am on 5/30/12 she collapsed and died.

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### Gross Observations

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A single female dog weighing 59 pounds is submitted. The dog is presented in a black plastic sack and is frozen solid. It is left for 24 hours at which time there is moderate gaseous distension of the abdomen. The dog is placed in left lateral recumbency and the thorax and abdomen are opened. The thoracic viscera is still largely frozen. There is frozen red-pink fluid in the thoracic cavity. In the abdomen, there is a large amount of free ingesta lying over all serosal surfaces of the abdominal viscera. This material is frozen or semi-frozen. There are moderate to fairly large fat depots in the omentum and surrounding the kidneys, as well as the mesentery. The ventral half of the spleen has been reflected over onto the right side of the abdomen (displaced). The remaining abdominal viscera is still frozen (intestines, stomach, spleen, mesentery, omentum) and due to the frozen state of the viscera and the obvious gastrointestinal rupture at some unidentified location, the carcass is then covered and left for approximately four hours at room temperature at which time the carcass is placed in a cooler over night to completely thaw. The following morning (Wednesday, June 7, 2012 at approximately 8:15 AM), the carcass is re-examined. There are still portions of the carcass which are frozen, including the heart and portions of the lungs. The abdominal viscera is photographed. The entire pluck is removed to separate thoracic viscera from the abdominal viscera covered with GI content. There is a distinct, dark red, slightly eroded focus noted on the distal cut of the caudal thoracic esophagus where it was severed. The spleen is dissected free from the omentum. The entire GI tract is then dissected free to examine the external surface. There is a rupture of the stomach at the cardia (esophageal-gastric junction) which also includes a portion of the transected caudal thoracic esophagus. The majority of the stomach wall is a dark blue-red in color, compatible with marked diffuse mural congestion and hemorrhage. The stomach-wall is particularly

thin adjacent to edges of the rupture site. It contains a modest amount of a soft slurry of fine, granular brown ingesta identical to that seen lying free within the abdominal cavity. There also is a large amount of regurgitated stomach content (brown granular slurry of material) in the thoracic and cervical esophagus. The esophageal lumen is diffusely and mildly dilated with a very flaccid texture to the esophageal wall which also appears somewhat thin. The gastric mucosa is autolyzed, a muddy red-brown in color with a dark red color to the majority of the fundic mucosa. The pancreas is congested, dark muddy red-brown in color. The small intestine contains a relatively small amount of light tan-brown mucoid-like material with an additional small amount of granular, soft ingesta in the lumen of the distal ileum. Mesenteric lymph nodes are very small in size and light tan-brown in color embedded within mesenteric fat. The colon contains a scant amount of fluid brown-green feces. The mucosa is light tan to brown in color. The bladder is empty with a congested, muddy red-brown mucosa. There is no visible uterus noted (presumptive spayed female). Both kidneys are red-brown in color with a smooth capsular surface and unremarkable on cut surface. The spleen is greatly enlarged and weighs 350 g. It is dark red-black in color with a uniform, soft, but somewhat heavy and resilient texture. The liver is covered with a layer of free, granular, brown stomach content. It has a muddy brown color. The gallbladder contains a moderate amount of green bile. There are two, soft, slightly raised, nodular foci noted in the liver. The first consists of a slightly raised, very soft mottled, light brown/dark red, round focus approximately 2 x 2.5 cm in diameter seen within the liver at the caudal reflection of the left lateral liver lobe. There is an elongated, slightly depressed, very soft red focus seen on the surface of this light brown raised nodule which is approximately 8 x 14 mm in size. The second pale focus consists of a very slightly raised, elevated capsular surface on the lateral side of the left medial liver lobe near the lateral reflection. This focus is very light tan in color and also has a very soft texture and is approximately 3 x 3.5 cm in size with several small, dark red foci which range from 2-4 mm in size. The remainder of the liver has a uniform brown color with a normal texture. The pancreas is a muddy brown in color, but otherwise unremarkable.

Both thyroids were examined. They are normal in size and dark red in color. Both adrenal glands are also unremarkable with a light tan, uniform cortex. In the thoracic cavity, there is a moderate amount of red-tinged serous fluid lying in the left thoracic cavity following removal of the pluck. The right ventricle and atrium are dilated and filled with a large amount of frozen blood. There is extensive post-mortem blood staining of the endocardial surface of the heart chambers. The heart is otherwise grossly unremarkable. The lungs have a mottled, dark red-pink/dark red color throughout a uniform, soft soggy texture. There is a large amount of aspirated regurgitated stomach content (granular brown soft slurry of material) in the trachea and mainstem bronchi. The tracheal mucosa generally is a light tan-pink in color, but the mainstem bronchial mucosa is a darker red in color.

The brain has diffuse, dark red meninges (post-mortem freeze-thaw artifact), but is otherwise unremarkable with a very soft texture (post-mortem freeze-thaw artifact). It is grossly unremarkable. Aqueous humor is removed from one eye and is red-tinged. The eyes are otherwise grossly unremarkable.

The select muscles examined from front hind limbs are unremarkable. Hip and stifle joints, as well as, shoulder and elbow joints are examined from the right front and hind limbs. The stifle and shoulder joints are unremarkable. However, in the coxofemoral joint, there is marked remodeling of the head of the femur. The articular surface is markedly flattened and greatly enlarged, but has a very smooth surface. There is extensive periarticular reactive bone formation around the proximal neck of the femur. The articular surface of the acetabulum has a large, depressed focus near the ligamentous attachment. The remainder of the articular surface has a distinct granular white appearance. The capsule around the coxofemoral joint also appears markedly thickened. In the right elbow joint, there is extensive periarticular reactive bone formation creating a marked extension of the anconeal process on the ulna and on the anterior articular surface of the radius and ulna. There are one or two distinct prominent depressed grooves on the articular surface of the medial condyle of the distal humerus but the overall articular surface is fairly smooth and glistening.

## Histology

T49: Sections of liver, kidney, heart, lung, spleen, lymph node, pancreas, adrenal gland, thyroid, trachea, joint capsule, peripheral nerves, skeletal muscle, tongue, bone marrow, multiple sections of brain and GI tract are examined with findings greatly summarized.

The tissues are variably autolyzed and there is also a variable amount of post-mortem freeze-thaw artifact throughout the various tissues. In the sections of lung, there are large collections of aspirated heterogeneous feed material including plant fiber material, unidentified pink proteinaceous material, unidentified cellular material as well as numerous bacterial colonies. The epithelium lining the large and small airways containing this aspirate is absent (presumptive post-mortem artifact). Additional aspirated feed material is seen within select central acinar alveolar ducts and/or parenchyma. There is no appreciable inflammatory response to this aspirated foreign body material. There is a variable amount of granular pink

proteinaceous material within alveolar lumen compatible with pulmonary edema. Within the sections of lung, there are rare isolated pulmonary veins or venules containing small, dense luminal collections of mixed neutrophils and monocytes. There also are numerous post-mortem bacterial colonies within the parenchyma. Small numbers of presumptive macrophages containing abundant, dark brown cytoplasmic granules are seen adjacent to select airways suggestive of hemosiderin-filled macrophages. In addition there is acid hematin artifact with numerous scattered, brown-black granules seen throughout alveolar septa and free in alveolar lumen adjacent to parenchyma containing aspirated foreign material. In one section of lung, there is a large pulmonary vein that is markedly dilated and filled with autolyzed red blood cells (actual lumen of the vessel is filled with elongated, dark red material compatible with free hemoglobin secondary to freeze-thaw artifact?). Additional random, large pulmonary arteries contain luminal collections of laminated fibrin with variable numbers of trapped leukocytes (real antemortem thrombus or terminal nonspecific change?). There are very rare, random, small focal collections of macrophages containing fine to coarse, dark black material admixed with clear crystalline material, some of which is birefringent under polarized light, compatible with inhaled carbon and/or silicate particles. In one section of an apparent mainstem bronchus with adjacent fatty connective tissue, there is a small bronchiolar lymph node. The node is relatively unremarkable, aside from the presence of mild-moderate aggregates of plump, dust-filled macrophages. There is mild-moderate fat infiltration in the subepicardial myocardium of the heart. There are moderate beds of fat seen within the epicardium at the base of the heart. There are very infrequent isolated, post-mortem colonies of bacteria within the myocardium.

Several sections of the liver are examined including sections through the two, slightly raised, somewhat nodular foci noted grossly within the liver. There is extensive freeze-thaw artifact throughout the sections. In sections taken distant from the two liver nodules, there is a variable degree of portal fibrosis consisting of an increase in dense fibrous stroma that has variably expanded the portal tracts. There also is accompanying focal centrilobular fibrosis with variable fibrous connective tissue surrounding larger central veins. In one or two of these, there are accompanying dilated lymphatics. In two of the four sections examined, there is extensive bridging, centrilobular to paracentral hepatocellular necrosis. The necrotic hepatocytes are slightly shrunken with intense eosinophilic cytoplasm and in select areas, these cells have dissociated or separated from hepatic plates. Periportal hepatocytes in these sections often contain abundant, light brown cytoplasmic granules (presumptive lipofuscin possibly admixed with hemosiderin?). In the remaining two sections of liver there is less prominent portal fibrosis (also no obvious centrilobular necrosis noted). Centrilobular hepatocytes contain abundant, fine gray-brown cytoplasmic granules. There are two adjacent portal tracts that have mild mixed mononuclear cell infiltrates surrounding the bile ducts. In one section there are scattered, mononuclear cells adjacent to sinusoids that have large single clear vacuoles filling cytoplasm compatible with fat vacuoles (presumptive Kupffer cells?). There is a mild lymphocytic infiltrate surrounding bile ducts within one large portal tract. In the section of liver with the first nodule noted grossly there is a large multilobulated discrete, expanding nodular focus within the parenchyma which is compressing the surrounding hepatic parenchyma and is composed of a very ordered pattern of hepatic plates similar to surrounding hepatic parenchyma. Portal tracts are present along the periphery of this nodule but normal lobular architecture is lost within the nodule. In the second grossly-identified nodular focus, the lobular architecture remains, but individual lobular size varies markedly with random areas in which hepatic plates and hepatocytes are larger in size, compatible with focal cellular hypertrophy. There is very mild focal compression of surrounding parenchyma at the periphery of some of these foci. In addition, there is a collection of large cystic spaces lined by apparent endothelium with a thin peripheral fibrous stroma in which there are small, loose fibrin deposits with additional focal deposits of fibrin adhered to the apparent endothelium.

In the kidney, there appears to be a mild diffuse increase in mesenchymal matrix within glomerular tufts (real change or post-mortem artifact?). There are infrequent isolated small sclerotic glomeruli. There are very rare isolated epithelial cells within proximal convoluted tubules which contain small to large, single, fat-like vacuoles. The basal lamina surrounding tubules within medullary rays or distal straight tubules is diffusely thickened consisting of very prominent glassy pink basal lamina. The epithelium is intact but the overall diameter of the tubules appears slightly reduced suggesting mild tubular epithelial atrophy. The basal lamina surrounding isolated glomeruli is also focally thickened. On PAS stain this material is compatible with thickened basal lamina (PAS positive material similar to basal lamina which is thickened around tubules near the corticomedullary junction and focally around select glomeruli). There are infrequent foci of acute renal tubular epithelial necrosis. The necrotic epithelial cells are slightly more eosinophilic with a glassy cytoplasm and pyknotic nuclei and in some foci have separated from the basal lamina.

Two sections of spleen are examined. The parenchyma is markedly autolyzed. In one section, there are large, blood-filled spaces with a very loose, expanded, fine reticulated-like stroma separating these blood-filled spaces in which there are small numbers of scattered hemosiderophages and random islands of white pulp in which there appears to be extensive apoptosis of lymphocytes. In the second section the parenchyma also is dilated and filled with blood but there is more recognizable splenic cord stroma present in which there are small, scattered numbers of plump hemosiderophages.

In one of the two sections of adrenal gland within the adrenal medulla, there is a discrete round cellular mass composed of thin cords or plates of polygonal-shaped cells separated by dilated, blood-filled sinus-like spaces. There are very small numbers of isolated hemosiderophages along the border of these blood-filled spaces. The polygonal-shaped cells appear somewhat compressed with oval to elliptical-shaped, dense hyperchromatic nuclei and moderate amounts of very fine, light eosinophilic to amphophilic cytoplasm. There are no visible mitotic figures. This mass is compressing the surrounding adrenal medullary parenchyma with a very thin band of fibrous connective tissue which is interrupted in multiple foci (interpreted as compressed medullary stroma). In the second adrenal gland there are small nodular aggregates of adrenocortical tissue that extend through the capsule (incidental finding).

Throughout the pancreas, there are very infrequent, discrete, small, focal dense glassy pink proteinaceous deposits seen within the stroma around exocrine cells. In an adjacent lymph node, there are large numbers of hemosiderophages within medullary cords. The section of mesenteric lymph node is relatively unremarkable.

In the section of tongue, there is a small focal mucosal infiltrate of mixed mononuclear inflammatory cells surrounding ducts of lingual salivary glands. Several sections of stomach are examined including several sections from around the rupture site. The tissue is severely autolyzed which limits cellular detail within the wall. There also is post-mortem loss of superficial mucosal and superficial glandular epithelial cells throughout the glandular mucosa. There are small numbers of lymphoid follicles in the mucosa near the junction with non-glandular mucosa. In some of the sections that extend through the grossly visible rupture site the submucosa is separated from the underlying muscularis (frayed edge) and in these small separated creases, there are collections of foreign body ingesta embedded within submucosal connective tissue. There is a very fine band of adherent fibrin covering a portion of this frayed exposed submucosal connective tissue as well as along the adjacent serosal surface of the stomach focally accompanied by very light surface-oriented neutrophilic infiltrates. There is relatively mild, multifocal serosal congestion and hemorrhage with mild edema. In some of these sections there are several small vessels in the submucosa, muscularis and serosa that contain prominent luminal collections of neutrophils. There is focal hemorrhage in the submucosa (ghost outline RBCs). In the muscularis there is focal expansion of stroma (edema) around vessels with rare interstitial neutrophilic infiltrates and small fibrin deposits. In the serosa there also is focal edema with hemorrhage (very autolyzed ghost outline of RBCs) and light interstitial neutrophilic infiltrates. There are small beds of fat in the adjacent serosa and in one section at the rupture there are adipocytes filled with saponified fat immediately beneath the serosal surface. These adipocytes are swollen containing cytoplasmic collections of fine, starburst-like granular basophilic material often admixed with additional dense, granular to glassy pink proteinaceous material and there is mild edema in the immediately surrounding superficial serosa. In additional areas within the intact gastric wall peripheral to the tear, there is marked focal vascular congestion in the submucosa.

Sections of small intestine are relatively unremarkable with a uniform density of moderate-sized crypts and mild mucosal population of mixed inflammatory cells consisting predominantly of plasma cells and lymphocytes. The villous epithelium has undergone post-mortem sloughing and loss. Sections of colon are also unremarkable.

Throughout the sections of brain, there is marked freeze-thaw artifact. Sections of brain are otherwise relatively unremarkable.

Two sections of skeletal muscle from front and hind limbs are unremarkable.

## Toxicology

**Reporting Limit (Rep. Limit):** The lowest routinely quantified concentration of an analyte in a sample. The analyte may be detected, but not quantified, at concentrations below the reporting limit. Sample volumes less than requested might result in reporting limits that are higher than those listed.

Amanitin was not detected in the submitted kidney sample at or above the indicated reporting limit. Exposure to a toxic, amanitin-containing mushroom cannot be confirmed in this case. Also note that none of the hepatotoxic microcystins (blue-green algae toxins) were detected in the submitted stomach contents.

Broad-based gas and liquid chromatography mass spectrometry screens were run on appropriate samples, but no toxic compounds were detected. These screen is designed to potentially detect a large number of organic compounds belonging to diverse chemical classes (pesticides, environmental contaminants, drugs and natural products). Control matrices were obtained to compare analytical results with those obtained from the submitted specimen. No unexpected chemicals were identified.

The detected liver iron concentration is moderately elevated, but this is a non-specific finding. Elevated liver iron concentrations can result from congestion, hemolysis, overexposure to iron, iron storage abnormalities or starvation/fasting. The other detected liver mineral results are within acceptable or non-diagnostic ranges for this species.

GI contents were analyzed for biogenic amines, which are typically produced in fish and meat products by microbial degradation of amino acids. Very high concentrations of some biogenic amines can be associated with adverse effects in animals, although there is rather limited toxicity information available specific to dogs. However, based upon available information, we believe that the detected concentrations are incidental findings in this case. We more typically analyze feed samples for these compounds and not GI contents; results from analysis of GI contents are more difficult to evaluate.

Within the limits of the samples tested and the analytical procedures performed, chemical contamination of the submitted specimens appears unlikely.

**AMANITIN**

Animal/Source	Specimen	Specimen Type	Results	Units	Rep. Limit
6495	Cali	Kidney Tissue	Not Detected	ppb	5.0

**GCMS Screen**

Animal/Source	Specimen	Specimen Type
6495	Cali	Liver Tissue

Analyte	Result	Units	Rep. Limit	Units
Negative	See comment under Toxicology	NA	NA	NA

**HEAVY METAL SCREEN**

Animal/Source	Specimen	Specimen Type
6495	Cali	Liver Tissue

Analyte	Result	Units	Rep. Limit	Units	Ref. Range
Lead	Not Detected	PPM	1	PPM	0.1-3.5
Manganese	2.9	PPM	0.04	PPM	3.0-5.0
Iron	800	PPM	0.2	PPM	100-300
Mercury	Not Detected	PPM	1	PPM	<0.1
Arsenic	Not Detected	PPM	1	PPM	<0.2
Molybdenum	0.50	PPM	0.4	PPM	
Zinc	53	PPM	0.1	PPM	30-70
Copper	80	PPM	0.1	PPM	30-100
Cadmium	Not Detected	ppm	0.3	ppm	<0.1

**MICROCYSTINS**

Animal/Source	Specimen	Specimen Type
6495	Cali	Stomach Contents

Analyte	Result	Units	Rep. Limit	Units
MICROCYSTIN LA	Not Detected	ppb	25	ppb

MICROCYSTIN LR	Not Detected	ppb	25	ppb
MICROCYSTIN RR	Not Detected	ppb	25	ppb
MICROCYSTIN YR	Not Detected	ppb	25	ppb

**ORGANIC COMPND BY REQUEST**

Animal/Source	Specimen	Specimen Type			
6495	Cali	Small Intestinal Contents			
Analyte	Result	Units	Rep. Limit	Units	
Putrescine	140	ppm	50	ppm	
Cadaverine	700	ppm	50	ppm	
Histamine	Trace	ppm	50	ppm	
Agmatine	200	ppm	50	ppm	
Spermidine	Trace	ppm	50	ppm	
Spermine	91	ppm	50	ppm	

**SELENIUM - TISSUE/OTHER**

Animal/Source	Specimen	Specimen Type	Results	Units	Rep. Limit	Ref. Range
6495	Cali	Liver Tissue	1.1	ppm	0.020PPM	

**Phone Log**

<u>Client Contact</u>	<u>CAHFS Contact</u>	<u>Date</u>	<u>Time</u>	<u>Subject</u>
Rachael Chambers	KHILL	07/13/2012	8:40 AM	Release of Results to NBC