As the nation’s largest manufacturer of Custom Made Vaccines, Newport Laboratories is a highly focused, technology–based company dedicated to providing timely, science–based solutions to food animal disease problems. Our products and services are delivered and supported by a dedicated and experienced sales staff and Veterinary Service team.

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<td>Refrigerate</td>
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<td>Refrigerate/ frozen</td>
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<tr>
<td></td>
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</tr>
<tr>
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<tr>
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<td>Refrigerate</td>
<td>Histopathology, qPCR, VI</td>
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<td><strong>Gastric Ulcers</strong></td>
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<td>Gross lesions</td>
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For bacterial culture, we recommend swabs with transport media to prevent desiccation. For virus isolation, swabs should be placed into viral transport media; see tissue submission guidelines on next page or call the lab for information.

FREE Diagnostic Submission Kits.
Whenever possible, animals selected for laboratory analysis should be free from antibiotic therapy and in an early or acute disease stage. Selected tissues should be collected as aseptically as possible. Ideally, two or three humanely euthanized pigs in the early stages of disease that are displaying typical clinical signs and immediately necropsied will yield the most reliable diagnostic data. A meaningful history of the disease outbreak and a tentative diagnosis, based upon clinical evaluation and necropsy findings, should be included. Laboratory test results are directly affected by animal selection, necropsy technique, specimen selection, specimen handling, adequate preservation, and speed of shipment to the laboratory. Contact Newport Laboratories if you have any questions regarding sample collection or the diagnostic process.

Preparation & Collection of Tissues/Samples

**Tissues-Fresh**
Aseptically collect approximately 2x4 inch samples and place in a plastic bag. Sample visible lesions with adjacent normal tissue. Double bag in Whirl-pak® bags. Do not mix swabs, intestines, or brains with other tissues in one single bag. Transport tissues with 2-3 cold packs in an insulated container. It is important that the tissue samples arrive at the laboratory before the cold packs expire.

Collect sections of small and large intestine. The selected, clearly identified samples should be double bagged and sealed in Whirl-pak bags to prevent spillage. Do not cut the loops of intestines open. The intestine, approximately 2 inches long, should be refrigerated and cooled thoroughly prior to shipping. Avoid shipping whole pigs or over weekends.

**Swabs**

**Aerobic Culture**
Commercial swabs with Stuart’s or Amies transport media is recommended to prevent desiccation.

**Anaerobic Culture**
Port-A Cult® (BBL) or other anaerobic transport system. (The Port-A Cult® tube can be used for anaerobic, facultative, and aerobic bacteria.) For abscesses or exudates use a capped syringe with needle removed or a tube with a snug cap.

**Nasal Swabs-Bacterial Suspect**
Clean the external nares and internal nostrils with a moist towel to remove common contaminants. (Use swabs with transport media such as Amies or Stuart’s). Insert swab into the pre-cleaned nasal cavity and rotate. Upon successful sample collection, the swab is inserted into the accompanying sterile plastic sheath. The ampule located at the end of the sheath is gently crushed, releasing transport medium.

**Nasal Swabs-Viral Suspect**
Prepare nostrils and sample as in bacterial suspect. For viral swabs use Universal Viral Transport Kit (Becton Dickinson #220528) or equivalent.

Use of the incorrect swab and media may jeopardize the ability to detect or culture the offending pathogen. For bacterial isolation, avoid using Mycoplasma or viral media which contain antimicrobials and may inhibit growth of the desired pathogen. Avoid using bacterial culture media to isolate viruses or Mycoplasma organisms.

Identify all swabs with the following:
- Farm ID, including site and building where appropriate
- Animal identification number
- Source of the swabbed material such as oral fluid, joint exudate, pericardial fluid, peritoneal fluid, tracheal wash, urine, blood

**Histopathology**

**Preparation of Tissue for Fixation**
Multiple sites or types of lesions, to include both normal and diseased tissue and a sample at the line of demarcation, should be taken. The sections should be no more than 1 inch thick. The small size of the tissue results in rapid and complete penetration of the fixative.

Selected tissues should be cut with a sharp knife or scalpel since the squeezing action of scissors crushes and tears tissue. Autolysis or freezing will make samples unsuitable for histopathological evaluation. Place formalin and tissues in double Whirl-paks. Identify bags if multiple animals are submitted. Do not use narrow mouth bottles to submit fixed tissues.
Volume of Fixative
The selected tissues should be fixed in 10% neutral buffered formalin. Use 10 times the volume of the tissues being fixed to assure good perfusion of the sample and to maintain the tissue architecture. After 24 hours fixation, excess formalin can be poured off, and a smaller formalin volume can then be used for shipping.

Formula to make 10% Neutral Buffered Formalin
37-40% formaldehyde 100 mL
Distilled water 900 mL
Sodium phosphate, monobasic monohydrate 4.0 g
Sodium phosphate, dibasic anhydrous 6.5 g

Tissue Selection for Histopathology
Check the recommended samples in the guideline table on page 4 and 5. If the cause of death is unknown or the clinical syndrome is vague, then submit samples exhibiting gross lesions and sections from all of the following: lung, heart, liver, kidney, spleen, various levels of the gastrointestinal tract, mesenteric lymph nodes, and brain.

If hollow organs (gut or uterus) retain significant amounts of content, then they should be gently flushed with 10% formalin without disturbing the mucosal lining before placing in the formalin bag. Be sure to take proper precautions when handling formalin.

I.D. & Handling of Blood Samples:
Collection of Blood Samples
• Collect in sterile tubes. Serum separator tubes work well. Follow the manufacturer’s directions. Based on the number of tests requested, 1 mL – 3 mL of nonhemolyzed serum is required.
• Fill vacutainer tubes ⅔ full and allow to stand at room temperature for an hour to permit a solid clot to form and retract.
• Pipette the serum into sterile tubes with snap caps (3 mL plastic tubes with snap caps, Falcon #2054, are recommended). Make sure caps are securely closed.
• Use permanent markers and underline the I.D. numbers (e.g. 16 vs. 91).
• Do not freeze whole blood or samples with the clot remaining.
• Contaminated or toxic samples cannot be used in virus isolation tests.

I.D. Samples on Submission Forms
• Using one form per client and site, identify the tubes on the submission request form by different barns, or age groups as logical for the diagnostic investigation.

• Clearly specify the test(s) requested on the submission form.
• When sending paired sera, identify the acute samples from the convalescent samples on the tube and on the request form.

Diagnostic submission forms can be downloaded from our website: www.newportlabs.com, or by calling Newport Customer Service at 800-220-2522.

Packing Specimens
To avoid leaking in transit, double bag ALL samples. Whirl-pak bags or equivalent are recommended. Wrap sample bags and 2-4 ice packs in absorbent paper (e.g. newspaper). Place the package into a styrofoam container. Completed submission forms should be inserted in a separate bag in case of leakage and clearly attached to the matching specimens. This is especially important if your container contains specimens from multiple clients or sites. Avoid mixing intestinal samples with other tissues. If you need more information about shipping specimens to Newport’s Diagnostic Laboratory, please call us at 800-220-2522.

Mailing
Newport Laboratories provides free diagnostic kits for sample submission. Call us at 800-220-2522 to request submission form(s) or shipper containers. Submission forms are also available online at www.newportlabs.com. Samples should be submitted by the fastest means possible to avoid deterioration of specimens. Next day or overnight delivery is preferred. The most reliable mailing services that we have found are listed below:

• United Parcel Service (UPS)
• Fed Ex
• Spee-Dee
• U.S. Parcel Post (only as a final option)

Laboratory Hours
The Newport Diagnostic Laboratory is open for service from 8:00 A.M. to 5:00 P.M. (CST) Monday through Friday, with the exception of holidays.

Diagnostic Shipping Address
Newport Laboratories
1524 Prairie Drive
Worthington, MN 56187
The Dx-REPORTS is a secure site which allows veterinarians to view diagnostic testing results where they want and when they want. This system allows veterinarians to easily organize and distribute diagnostic results. Livestock producers receive pertinent information from their veterinarian in a precise and understandable format.

**Dx-REPORTS provides numerous features and benefits:**

- Password protected site maintains confidentiality of all diagnostic information
- Complies with producer’s and attending veterinarian’s privacy requirements
- Accessible from any computer location at any time
- Easy to navigate interface
- Applications for all food animals and cervidae
- Ease of collecting, distributing and banking individual pork production site data
- Data analysis to identify disease trends within groups and between groups
- Left margin icons and header action button provide data management menu options
- Real-time database allows you to see results and status of submissions

**Call Newport Laboratories at 800-220-2522 for more information about Dx-REPORTS capabilities.**
Major Pig Organs

- Liver
- Lung
- Heart
- Cecum
- Small Intestine
- Spiral Colon
- Stomach
- Spleen
- Kidney
- Urinary Bladder
- Head
Nursery Pig - Necropsy Instructions

Important: Start with a sharp knife.

Cut through the axilla to partially separate the front limb from the rib cage. Repeat for other side.

After cutting through the axillae, the pig will lie upright on its back.

Hook the knife under the cranial sternum. Cut through the cartilage of all the ribs on both sides.

Continue this cut to remove the skin with sternum, and the ventral abdominal wall (belly) of the pig.

Most organs are now visible.
Nursery Pig - Necropsy Instructions

Cut between the ribs below the collar bone.

Discuss flexing the nose toward the floor and the ears down to open the space between the top vertebra and the skull. This will allow room to cut between them.

Place a swab on the exposed spinal cord toward the brain. This is an excellent way to test for strep.

Organs are easily examined.

Brain Swabs: Cut through the skin and muscle behind the ears at the base of the skull.

Spread and crack the ribs open.
Grower/Finisher - Necropsy Instructions

With the pig on its side, hold the lower front limb down with your foot while pulling up on the upper front limb.

Use the knife to cut through the axilla (armpit) to separate the leg from the rib cage.

The upper hind limb is cut and laid back likewise.

As you push the hind limb back, up and over the hip by cutting muscle in the area, the hip socket will become exposed, cut through socket and continue pushing the limb straight back over hip.

Cut between the skin and body wall, beginning at the pelvis, along the midline all the way to the neck.

Continue the cut along the ventral midline toward the neck.
Following the cut just made, dissect the skin away from the body wall, reflecting it over the back.

Continuation of previous step. Note that abdominal wall and back muscles are being exposed, but abdomen is not open.

Carefully open the abdomen wall without cutting into intestines or urinary bladder; beginning near the pelvic floor working toward the head along midline. Reflect abdominal wall over the back.

Puncture the diaphragm near caudal sternum. Cut through cartilage of the sternum all the way to neck.

Cut muscles between ribs in pairs; break ribs by pushing one or two at once over the back.

Organs are now exposed for examination.
Glässer’s Disease  
*Haemophilus parasuis*

### Tissues to Submit
- Synovium
- Joint Fluid
- Meninges
- Lung with Pleura
- Exudate
- Heart with Pericardium

### Diagnostic Tests
- Culture-sensitivity
- Quantitative PCR
- Histopathology
- Whole Genome Sequencing

### Clinical Signs & History
- Sudden death.
- A temperature of 104°-107°F develops, and there is anorexia, depression, and occasionally mild rhinitis and dyspnea with coughing.
- Some pigs become lame with painful, warm, swollen, joints.
- Chronic arthritis and occasionally meningitis and convulsions may develop.

### Stage of Production
- Nursery
- Grow-Finish

### Diagnosis
- Based on history, clinical signs, and necropsy. Confirmed by culture of the organism from joint fluids, involved tissues, or CSF.
- Polyserositis, polyarthritis and meningitis.
Clinical Signs & History
- Coughing is the most common sign and is most obvious when pigs are roused.
- Sporadically, individual pigs or groups develop severe pneumonia.
- Often accompanied with secondary *Pasteurella multocida* or other bacterial infections.

Stage of Production
- Nursery
- Grow-Finish

Diagnosis
- Affected lung tissue is gray or purple, most commonly in the apical and cardiac lobes (cranioventral).
- Lesions are clearly demarcated from normal lung.
- The associated lymph nodes may be enlarged.

Tissues to Submit
- Lung
- Serum

Diagnostic Tests
- Mycoplasma
  - Multiplex PCR
- Mycoplasma culture
- Quantitative PCR
- Histopathology
- Serology
Pneumonic Pasteurellosis
*Pasteurella multocida*

**Clinical Signs & History**
- Respiratory: Cough, rapid breathing (thumping).

**Stage of Production**
- Nursery
- Grow-Finish

**Diagnostic Tests**
- Culture
- Serogrouping PCR

**Diagnosis**
- Diagnosis is based on necropsy findings and culture of *P. multocida* from the lesions.
- Exudative bronchopneumonia, sometimes with pericarditis and pleuritis.

### Tissues to Submit
- Lung

### Mycoplasma Lung

### Normal Lung

### Mycoplasma and Pasteurella Lung
**Clinical Signs & History**
- Respiratory: cough, rapid breathing (thumping), unthrifty pigs.
- Reproductive: late-term abortions after 90 days gestation with fresh and autolyzed piglets, stillborns, weak live piglets.

**Stage of Production**
- Gestation
- Farrowing
- Nursery
- Grow-Finish

**Diagnosis**
- Characteristic lesions and organism identification.
- Diagnosis is based on herd history and Virus Isolation (VI) or viral antigen testing (PCR or IHC).

**Tissues to Submit**
- Lung
- Serum
- Semen

**Diagnostic Tests**
- Virus Isolation
- Quantitative PCR
- Sequencing
- Histopathology
- IHC
- Serology
IAV-S Pneumonia
Influenza A Virus - Swine

Normal lung: pink, collapses uniformly, soft upon palpation

Dorsal view of IAV-S Pneumonia: lungs stay upright due to diffuse interstitial pneumonia with patchy red lobules of consolidation; palpates rubbery compared to normal.

IAV-S Pneumonia: diffuse interstitial pneumonia as described above with cranioventral consolidation related to secondary bacterial bronchopneumonia (arrow).

Clinical Signs & History
- Respiratory: Rapid spread of severe cough throughout the barn, rapid breathing (thumping), depression, fever to 108°F, anorexia, dyspnea, weakness, prostration and a mucous discharge from the eyes and nose.
- Outbreak is characterized by sudden onset and rapid spread through the entire herd, often within 1-3 days.

Stage of Production
- Farrowing
- Nursery
- Grow-Finish

Diagnosis
- In uncomplicated infections, lesions are usually confined to the lungs.
- Necrotizing bronchiolitis becomes proliferative in chronic cases; IAV-S is confirmed by IHC or PCR or VI.
- The airways contain a copious mucopurulent exudate, and the bronchial and mediastinal lymph nodes are edematous and enlarged.

Tissues to Submit
- Lung
- Nasal Swabs
- Serum
- Trachea

Diagnostic Tests
- Virus Isolation
- Quantitative PCR
- Sequencing
- Histopathology
- Serology (HI, ELISA)
- HT-SN™
Swine Pleuropneumonia - APP  
*Actinobacillus pleuropneumoniae*

### Clinical Signs & History
- Respiratory distress is severe; there is thumping and occasionally open-mouth breathing with a blood-stained frothy nasal and oral discharge, fever, anorexia, and reluctance to move.

### Stage of Production
- Grow-Finish

### Diagnosis
- An explosive disease onset is suggestive.
- The pneumonia is usually bilateral, but often unevenly distributed with unique dorsal and caudal lung lobe involvement.
- The characteristic lesion is a severe fibrinonecrotic and hemorrhagic pneumonia with accompanying fibrinous pleuritis.
- In acute cases, the lesions are sharply delineated, dark consolidated regions that ooze bloody fluid from the cut surface. The involved pleura and interlobular septa are thick with exudate.
- The trachea may contain blood-stained froth. Bloody nasal/oral discharge is common.
- In chronic cases, the lesions are more organized and adhesions between the lung and rib cage become fibrous.

### Tissues to Submit
- Lung
- Serum

### Diagnostic Tests
- Culture
- Histopathology
- Serotyping PCR
Clostridial GI Diseases  
*C. perfringens & C. difficile*

Clinical Signs & History
- Diarrhea is the most common sign in enteric clostridial infections.
- Sudden onset of hemorrhagic diarrhea followed by collapse and death is characteristic in piglets 1-3 days old as a result of *Clostridium perfringens* Type C.
- *Clostridium perfringens* Type A and *Clostridium difficile* most frequently cause diarrhea without hemorrhage in pigs 3-15 days of age.

Stage of Production
- Farrowing
- Nursery

Tissues to Submit
- Small Intestine
- Large Intestine
- Colon
- Colon Content
- Fecal Swabs

Diagnostic Tests
- Culture
- Toxin PCR
- Histopathology
- A/B Toxin ELISA

Diagnosis
- Necropsy is usually sufficient to establish the diagnosis of *C. perfringens* Type C in the peracute hemorrhagic form and in the acute form with jejunal emphysema. Histologic observation of villous necrosis with mucosal colonization by numerous large gram-positive rods is adequate for confirmation.
- Isolation and identification of the organism is necessary to diagnose *C. perfringens* Type A and *C. difficile*.
- *C. perfringens* Type C - In acute cases, gas bubbles (gut emphysema) will be visible through the serosa and within the mucosa. The disease is often segmental, normal areas can be adjacent to severely diseased areas. Important to find and submit specimens from diseased areas.
- *C. perfringens* Type A - Lesions are much milder than seen with *C. perfringens* Type C and are similar to those seen with *E. coli*.
- Mesocolonic edema can be seen in *C. difficile* and *C. perfringens* Type A cases.
Coccidiosis

Clinical Signs & History
- Diarrhea in farrowing house caused by *Isospora suis*, usually after 5 days of age. The disease is most intense from 7 to 14 days of age. Less common in nursery pigs where it can be associated with *I. suis* or other types of coccidia.
- Clinical signs of coccidiosis are due to destruction of the intestinal epithelium and, frequently, the underlying connective tissue of the mucosa.
- Infection is characterized by a watery or greasy diarrhea, usually yellowish to white and foul smelling. Piglets may appear weak, dehydrated and undersized; weight gains are depressed and sometimes piglets die.

Stage of Production
- Farrowing house disease after 5 days of age; intense between 7 to 14 days of age.
- Nursery (less common)

Diagnosis
- Diagnosis is by histopathological observation of sporozoites in the diseased mucosa; or by finding sporozoites in mucosal smears via direct microscopic examination.

Tissues to Submit
- Small Intestine
- Large Intestine
- Fecal Swab

Diagnostic Tests
- Smear
- Histopathology
**Intestinal Colibacillosis/Edema Disease**

**E. coli**

**Clinical Signs & History**
- Diarrhea
- Sudden Death
- CNS (Edema Disease)

**Stage of Production**
- Farrowing
- Nursery

**Diagnosis**
- Confirmation is based on histologic observation of villous colonization and isolation of pathogenic *E. coli*.
- Dehydration and distension of the small intestine and colon with yellowish, watery to cream-like fluid. Mesenteric lacteals are still white with milk fat, indicating absorption is still normal, but hypersecretion is producing diarrhea.

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**Tissues to Submit**
- Small Intestine
- Large Intestine
- Fecal Swab
- Brain

**Diagnostic Tests**
- Culture
- Histopathology
- Toxin PCR
- Pilin PCR
- Adherence Factor PCR

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Distension of the intestine with yellowish fluid

Litter with diarrhea

Pig down on side paddling
Gastric Ulcers

Clinical Signs & History
- Sudden death related to gastric bleeding; hematoma (large blood clot) found in stomach.
- In the “chronic” form, hemorrhage results in anorexia, weakness, anemia, and black tarry feces.

Stage of Production
- Grow-Finish

Diagnosis
- Appearance in a pen of one or two listless, anorexic pigs that show weight loss, anemia, and dark feces.
- Sometimes dyspnea is suggestive of gastric ulceration, as is the sudden death of an apparently healthy pig.
- The typical terminal ulcer lesion is found in the gastric mucosa near the esophageal opening (cardia) in the rectangular area of white, glistening, non-glandular, squamous epithelium.
- In cases of sudden death, the stomach will contain a large hematoma (blood clot) that originates from a chronic bleeding ulcer.

Tissues to Submit
- Stomach

Diagnostic Tests
- Post-mortem Exam
**Hemorrhagic Bowel Syndrome - HBS**

**Mesenteric Torsion of the Small Intestine**

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**Tissues to Submit**
- Small Intestine
- Colon

**Diagnostic Tests**
- Post-mortem Exam
- Tests to rule out Salmonellosis, Ileitis, and Swine Dysentery

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**Clinical Signs & History**
- Sudden death of 4-6 month old grow-finish and young breeding pigs.
- Only involves a few animals; not a large outbreak.

**Stage of Production**
- Grow-Finish

**Diagnosis**
- Sudden death of previously healthy grow-finish pigs and characteristic post-mortem findings.
- Before manipulating the intestines, palpate the mesenteric root (tissue coming down from the lumbar back and supporting the gut mass) for a twist or torsion. When present this is diagnostic for mesenteric torsion. Smaller lesions may only involve a torsion within the mesentery of a portion of the small intestine.
- The involved gut loops are thin-walled, gas-filled, red due to congestion, and contain bloody fluid.

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Bright red gas distended loops of small intestine with bloody content.
Clinical Signs & History

- Diarrhea
- Ileitis can be either a chronic disease in growing pigs, or an acute hemorrhagic form in market weight and adult pigs.

Stage of Production

- Grow-Finish

Diagnosis

- Confirmation is based on histologic observation of characteristic proliferation and inflammation of mucosal crypts.
- Lesions may occur anywhere in the lower half of the small intestine, cecum, or colon, but are most frequent and obvious in the ileum.
- The wall of the intestine is thickened and the mesentery may be edematous.

Tissues to Submit

- Ileum
- Feces

Diagnostic Tests

- Histopathology
- PCR
Porcine Epidemic Diarrhea
PEDv

Clinical Signs & History
- The primary clinical sign in outbreaks that occur in previously naïve herds is severe diarrhea in all ages.
- Clinical signs will be essentially identical to those expected with acute TGEv infections.
- Virus is shed in the feces and transmission is via the fecal-oral route.
- The incubation period is 12-24 hours after exposure with clinically ill pigs shedding virus for 7-10 days.
- Mortality rate in suckling pigs in a naïve herd can be 30-100%.

Stage of Production
- Farrowing
- Nursery
- Grow-Finish

Diagnosis
- Clinical signs with severe diarrhea begin explosively in naïve herds leading to a presumptive diagnosis of TGEv or PEDv.
- PEDv in naïve herds affects animals of all ages.
- The most common sources of infected feces are pigs, trucks, boots, clothing or other fomites.
- Preferred samples for diagnostic testing are live pigs in acute stages of disease, fresh and formalin-fixed small intestine and colon.

Tissues to Submit
- Small Intestine
- Colon

Diagnostic Tests
- PCR
Clinical Signs & History
- In susceptible herds, vomiting often is the initial sign, followed by profuse watery diarrhea, dehydration, and excessive thirst.
- Feces of nursing pigs often contain curds of undigested milk.
- Mortality is nearly 100% in piglets <1 week old, whereas pigs >1 month old seldom die.
- Gestating sows occasionally abort and lactating sows often exhibit vomiting, diarrhea and agalactia.
- Diarrhea in surviving nursing piglets continues for 5 days, but older pigs may be diarrheic for a shorter period.
- Clinically and pathologically mimics PEDv.

Stage of Production
- Farrowing
- Nursery
- Grow-Finish

Diagnosis
- Clinical signs in the epidemic form of TGE usually provide a presumptive diagnosis.
- In the mild endemic form, laboratory procedures are required. Histologic and immunofluorescent examination of the small intestine to demonstrate typical lesions and the presence of TGE viral antigen provide confirmatory evidence.
- Piglets are severely dehydrated and the skin is soiled with liquid feces.
- The stomach usually contains milk curd, but may be empty.
- The small intestine is thin-walled, and the entire intestine contains greenish or yellow watery fluid and clumps of undigested milk.

Tissues to Submit
- Small Intestine
- Large Intestine
- Fecal Swab
- Serum

Diagnostic Tests
- Histopathology
- PCR
Rotavirus A
Rotavirus Enteritis

Clinical Signs & History
- Diarrhea
- Commonly, the infection is endemic in a herd. Sows have varying levels of antibody in the colostrum and milk which provides varying degrees of passive protection to nursery pigs.
- Diarrhea often begins in pigs 5 days to 3 weeks old, and is very common immediately after weaning.

Stage of Production
- Farrowing house and nursery piglets.

Diagnosis
- Laboratory procedures are required for accurate diagnosis.
- The small intestine appears thin-walled and the cecum and colon contain abundant liquid and usually yellow feces.

Tissues to Submit
- Small Intestine
- Large Intestine
- Fecal Swabs

Diagnostic Tests
- PCR
- Virus Isolation
- Histopathology
- Sequencing

Thin-walled fluid filled small intestine and spiral colon (arrow).

Evidence of diarrhea around anus of a nursery pig.
Salmonellosis
Enteritis & Septicemia

Clinical Signs & History
- Septicemia is the usual syndrome in pigs up to 6 months of age. Illness is acute, depression is marked, fever (105º-107ºF) is common and death occurs in 24-48 hours. Nervous signs may occur in pigs; these animals may also suffer from pneumonia. Mortality may reach 100%.
- Nursing pigs may develop diarrhea, but usually succumb to generalized septicemia.
- Weaning or grow-finish pigs are febrile and have liquid feces that may be yellow and contain shreds of necrotic debris.

Stage of Production
- Farrowing
- Nursery
- Grow-Finish

Diagnosis
- Depends on the clinical signs and on the laboratory examination (culture) of feces, tissues from affected animals, feed (including all mineral supplements used), water supplies, and feces from wild rodents and birds that may inhabit the premises.
- A dark red to purple discoloration of the skin is common, especially at the ears and ventral abdomen.
- Also, a swollen spleen, liver and lymph nodes can be seen as well as rubbery congested hemorrhagic lungs and roughened necrotic intestinal mucosa with ulceration and accumulation of debris.

Tissues to Submit
- Small Intestine
- Large Intestine
- Liver
- Lung
- Spleen
- Mesenteric Lymph Nodes

Diagnostic Tests
- Culture
- Histopathology
- Sequencing for Serovar determination

Intestine distended, edematous and thickened wall
Diffuse interstitial pneumonia with congestion, edema, and patchy consolidation (arrow).
Proctitis with rectal stricture
Swollen lymph nodes

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**Swine Dysentery**

*Brachyspira hyodysenteriae*

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**Clinical Signs & History**

- Bloody diarrhea, affects large intestine, partial anorexia, soft feces, dehydration, profoundly weak, gaunt, and emaciated.

**Stage of Production**

- Grow-Finish.

**Diagnosis**

- Presumptive diagnosis can be based on necropsy and direct examination of smears prepared on slides from fresh colonic mucosa or feces.

**Lesions**

- Diffuse superficial lesions, confined to cecum, spiral colon and rectum.

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**Tissues to Submit**

- Feces
- Cecum
- Spiral Colon

**Diagnostic Tests**

- Histopathology
Erysipelas
Erysipelothrix rhusiopathiae

Clinical Signs & History
- Acute septicemia, the skin (subacute) form, chronic arthritis and vegetative endocarditis may occur together or separately.
- Pigs with acute septicemia may die suddenly without previous signs. This occurs most frequently in finishing pigs weighing 100-200 lb.
- Acutely infected pigs are febrile (104°-108°F), walk stiffly, and lie on their sternums separately rather than piling in groups. They squeal when handled and may shift weight from foot to foot when standing.
- Skin discoloration may vary from widespread erythema and purplish discoloration of the ears, snout, and abdomen to diamond, square or rhomboid-shaped skin lesions (infarcts) almost anywhere on the body, particularly the lateral and dorsal areas.

Stage of Production
- Grow-Finish

Diagnosis
- Acute Erysipelas is difficult to diagnose in pigs showing only fever, poor appetite, and listlessness.
- The typical diamond-shaped skin lesions are highly characteristic when found, but not always present and can sometimes be seen with other bacterial septicemias.
- Arthritis and endocarditis are not diagnostic in the live animal because other agents can cause similar syndromes.
- In acute infection, in addition to skin lesions, lymph nodes are usually enlarged and congested, the spleen is noticeably enlarged and the lungs are edematous and congested.
- Petechiae may be found in the kidneys, heart, and occasionally elsewhere.

Tissues to Submit
- Heart
- Lymph Nodes
- Liver
- Spleen
- Joints
- Joint Fluid

Diagnostic Tests
- Culture
- Histopathology
Lack of characteristic lesions. HEV almost exclusively affects piglets less than 4 weeks of age with vomiting, emaciation, or neurological signs such as tremors and dog-sitting posture.

Clinical Signs & History
- Occurs in pigs less than four weeks of age with 100% mortality.
- Young pigs: sneezing, coughing, vomiting, constipation, anorexia, rapid death or chronic emaciation, huddling, nervous disorders, tremors, jerky gait, walking backwards, dog-sitting posture, down paddling, dehydration, teeth grinding.

Stage of Production
- Nursery

Diagnosis
- Isolation of virus from brain stem.
- Histopathology of brain stem and pyloric portion of stomach has characteristic lesions.
Clinical Signs & History

- *M. hyorhinis, Strep suis, H. parasuis* signs are similar because these organisms all can cause polyarthritis and polyserositis.
- *M. hyorhinis* generally occurs in 3 to 10-week-old pigs becoming unthrifty, with roughened coat, slight fever, difficult movement, swollen joints, and lameness with duration up to 14 days.

Stage of Production

- Nursery

Diagnosis

- Isolation of organism from acute and subacute cases depends on freshly necropsied pigs.
- Polyserositis affected lungs, pleura, pericardium, epicardium, and peritoneum.

Tissues to Submit

- Consolidated Lung
- Heart with Pericardium
- Joint Fluid
- Synovium
- Peritoneal Fluid

Diagnostic Tests

- Culture
- Myco Multiplex PCR
- Serology

Fibrinous peritonitis and polyserositis over intestinal serosa, peritoneum, and liver capsule.
Porcine Circovirus
PCV2 • PMWS • PDNS

Clinical Signs & History
- The most frequent clinical sign is wasting or failure to thrive. In decreasing order of frequency, other signs include dyspnea, enlarged lymph nodes, diarrhea, pallor, and jaundice.
- All of the fundamental clinical signs are often not observed in a single pig, but most affected farms will present the majority - if not all - of the signs over a period of time.
- Less common clinical signs include: coughing, fever, gastric ulceration, multifocal hemorrhagic dermatitis, and central nervous disorders.

Stage of Production
- Nursery
- Grow-Finish

Diagnosis
- Diagnosis of PCV2 requires that a pig or group of pigs have a specific set of clinical signs and microscopic lesions.

PCV2 Diagnostic Criteria
- Microscopic Lesions: depletion of lymphoid tissues and/or lymphohistiocytic to granulomatous inflammation in any organ (predominantly lung, lymphoid tissue, liver, kidney, intestine, pancreas), or interstitial pneumonia with bronchiolitis.
- PCV2 antigen or genetic material within characteristic lesions.
  - Clinical signs alone are not diagnostic.
  - Gross lesions alone are not diagnostic.
- Role of co-infections: Field observations and scientific literature suggest that PCV2, although essential for development of PCVAD, may require other factors or agents to induce the full spectrum of clinical signs and lesions associated with advanced PCVAD in conventional pigs:
  - PRRS + PCV2
  - Mycoplasma + Swine Influenza + PCV2

Tissues to Submit
- Lung
- Spleen
- Lymph Nodes
- Kidney
- Intestine with Peyer’s patches
- Pancreas

Diagnostic Tests
- Virus Isolation
- Quantitative PCR
- Sequencing
- Histopathology
Strep
Streptococcus suis

Clinical Signs & History
- CNS/brain disease; lateral recumbency, paddling, ataxia, head tilt, convulsions, sudden death, arthritis with warm swollen joints, endocarditis (heart).

Stage of Production
- Farrowing
- Nursery

Diagnosis
- Definitive diagnosis depends on gross and microscopic lesions and isolation and identification of the organism. The disease can be confused with other streptococcal infections, other bacterial infections (such as Erysipelas, Salmonellosis, or acute Glässer’s disease), water deprivation, or pseudorabies.
- The skin may be reddened in patches. Lymph nodes are often enlarged and congested, and fibrinopurulent polyserositis is common.
- Joint capsules may be thickened and joints may contain excessive clear or cloudy fluid.
- Affected lungs may show varying degrees of diffuse rubbery interstitial change or patchy consolidation due to bronchopneumonia.

Tissues to Submit
- Brain
- Lung
- Joint
- Liver
- Spleen

Diagnostic Tests
- Culture
- Histopathology
- Whole Genome Sequencing
Mulberry Heart Disease
Nutritional Cardiomyopathy of Pigs

Clinical Signs & History
- Sudden death in healthy rapidly growing piglets and young pigs.
- One or a few pigs in a barn.
- No premonitory signs, but collapse may be precipitated by exercise.

Stage of Production
- Farrowing House or Nursery
- 2 to 16 weeks old

Diagnosis
- Necropsy reveals pericardial effusion and marked epicardial hemorrhages.
- Cross sections of the ventricles show hemorrhages extend throughout the wall.
- Hemorrhages are not superficial on the epicardium, as seen with bacterial septicemias.
- Histopathological heart lesions are pathognomonic. Send formalin-fixed cross section of ventricles for definitive diagnosis.
- A Vitamin E/Selenium responsive disease.
- Diets may be low in active form of Vitamin E or selenium (Se).
- Factors that may increase Se demand include low concentrations of dietary protein (especially sulfur-containing amino acids), diets with an excess of selenium antagonistic compounds, and possibly genetic influences on selenium metabolism.
- Vitamin E demand may increase with diets high in polyunsaturated fatty acids, Vitamin A, mycotoxins, or rancid fats.
M. hyo Polyarthritis
Mycoplasma hyosynoviae

Clinical Signs & History
• Lameness typically occurs at 3 to 5 months of age, appearing acutely and may occur in more than one leg.
• Slight reduction in appetite resulting in weight loss.

Stage of Production
• Grow-Finish

Diagnosis
• Infected joints are swollen with edema and hyperemia of synovial membranes.
• On necropsy, lesions are restricted to the joints; especially stifles.
• Joints contain excess of clear, yellow synovial fluid while surrounding tissues are unaffected.
• Definitive diagnosis is made based on isolation of organism.

Tissues to Submit
• Joints
• Synovium

Diagnostic Tests
• Myco Multiplex PCR
• Culture
Reproductive Diseases
Lepto/Parvo/PRRSV

Clinical Signs & History
- Abortions, mummies, stillborns, weakborns.
- PPV is the most commonly identified cause of reproductive failure with associated mummification.
- Lepto can cause abortions occurring 2-4 weeks before farrowing and is the most common manifestation of leptospirosis in pigs.

Stage of Production
- Gestation
- Farrowing

Diagnosis
- Porcine Parvovirus (PPV) is usually asymptomatic in adults.
- Sows infected with PPV before 70 days of gestation may abort mummified or near-term autolyzed fetuses.
- PRRS causes late-term abortions including fresh and autolyzed pigs; or weak born piglets.

Tissues to Submit
- Aborted Fetus - two of the freshest
- Mummies - two typical
- Stillborns
- Weakborns
- Sow Serum

Parvovirus infected sow litter following abortion. Note mummified fetuses, uneven sizes, and post-mortem change indicative of in utero death.

One litter from a PRRS virus associated abortion. Note litter has late term piglets, at varying stages of in utero decomposition, typical of the disease infecting one piglet at a time in utero.