A Guide to Porcine Sample Submission and Diagnostic Tests

Veterinary Diagnostic Laboratory

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Pig Selection

The selection of pigs for testing, whether for serology or necropsy, is the most important step in obtaining an accurate and timely diagnosis. The majority of the veterinarian's time should be spent observing pigs, taking temperatures, and obtaining complete histories prior to collecting samples or performing euthanasia.

Sampling pigs that have been treated for days or weeks with antibiotics will be unrewarding if your goal is to isolate pathogenic bacteria. Likewise, sampling only pigs that are chronically ill will skew the diagnostic picture, resulting in isolation only of common secondary or opportunistic pathogens and finding histopathological lesions masked by scarring or regeneration rather than the inciting lesion.

In some situations, sample selection is straightforward – such as in outbreaks of TGEV. In other, more complex situations such as porcine respiratory disease, many agents may be involved. Diagnostic sample selection may involve testing pigs at recurring intervals in order to define all the agents involved. **Sampling carefully to include acutely affected pigs will be the greatest help to the producer, the pathologist, and the veterinarian seeking treatment or prevention strategies.**

The Necropsy

There are many ways to perform a necropsy. The key to a successful necropsy is thoroughness. Establishing a routine will ensure that all organs are examined and the important lesions discovered.

1. EXTERNAL EXAMINATION -

Place the pig down on its left side with its abdomen towards the prosector. Perform a thorough external examination of the skin, hooves, eyes, ears, nostrils, mouth and external genitalia. Palpate the joints and legs.

Write down any lesions or changes:

- Is the hair coat rough or shiny?
- Are there any skin lesions (redness, swelling, crusts, pustules, etc.)?
- Is there nasal or ocular discharge?
- Are there ulcers in the mouth, on the gingiva or tongue?
- Are the dorsal spinal processes showing or is the animal fat and in good flesh?
- Is the perineum stained with blood or diarrhea?
- Are the joints swollen?
- Is there swelling and redness of the coronary band above the hooves?
- Are the hooves cracked, worn, or smooth?

2. OPENING THE CARCASS -

a. Make a stab incision with the tip of the knife into the right axilla. Extend the skin excision cranially, cutting through the subcutaneous tissue and dermis so as not to dull the knife, just to the right of midline, to the chin, and caudally to the perineum, dorsal to the genitalia.

b. Reflect the skin on the right side. Reflect back completely the right front and rear legs by cutting the muscles and tendons, disarticulating the hip joint and severing the muscular attachments of the scapula.

c. Expose the abdominal cavity by carefully cutting the fascia and muscles along the last rib and along the back, then reflecting the tissue back. Pull up on the abdominal wall when cutting to avoid entering the stomach or intestines. The superficial inguinal lymph nodes will be revealed and can be examined for size and color.

d. Remove the ribs by cutting through the costalchondral junctions near the sternum. Dissect 2 or 3 ribs at a time and break them dorsally towards the vertebra to remove them. Note how difficult or easy it was to break the ribs as a general test of bone strength.

3. THORACIC CAVITY

a. With the ribs removed, the right lung lobes are in view. To view the left lung lobes and heart, free the tongue by cutting the muscles and ligaments. Grasp the tongue and pull it down and back. The tonsils are now exposed. Observe the tonsils for ulcers and hemorrhage. Collect one tonsil for cultures. Collect the other tonsil for histopathology. Cut through the joints of the hyoid bones of the neck. Dissect free the tongue attached to the trachea and esophagus. While applying tension, cut the pleura, mediastinum, and great vessels away from the vertebral bodies and body walls. Transect the aorta and esophagus at the diaphragm. The "pluck" – tongue, esophagus, trachea, lung and heart – is now removed and placed loosely back in the chest cavity.

b. Gently palpate the lungs for firmness (pneumonia). Assess the capacity of the lungs to fill the chest cavity. Normal lungs should collapse and be soft and pink. Lungs with pneumonia can be either firm and consolidated, or rubbery and fail to collapse, or any combination. Take 3 or 4 sections of lung with pleura including lobes with different lesions or appearance for histopathology. Take a large section of affected lung lobe with airways suitable for swabbing for cultures. Open some airways and examine for increased mucus or pus.

c. Examine the tracheobronchial lymph nodes, sternal lymph nodes, and submandibular lymph nodes. Note if they are enlarged or hemorrhagic. Collect lymph nodes for cultures and slice some thinly for histopathology.

d. Slice the pericardium and observe the contents. Collect excessive pericardial fluid in a syringe or swab the surface of the epicardium. The pericardial sac should be easily removable from the heart surface. Any resistance is abnormal.

e. Slice through the heart muscle and open the chambers. The heart should be one uniform color and the internal and external surfaces should be smooth.

4. EXTREMITIES

a. Skin the legs and open the joints by bending the joints then cutting through the ligaments and muscles.

b. The synovial fluid should be clear and viscous. The articular surfaces of the bones should be smooth.

5. HEAD

a. Remove the head from the neck at the atlantooccipital joint, flexing the head and neck to find the joint. Insert the knife into the joint and cut the ligaments, dura, and spinal cord.

b. If a saw or axe is not available to remove the skull and access the brain, plunge a bacterial culture swab through the foramen magnum into the brain and meninges.

6. ABDOMINAL CAVITY

a. In the abdominal cavity, sample the liver for cultures and histopathology. Cut the histopathology sections of the liver thinly.

b. Examine the gastrohepatic and gastrosplenic lymph nodes.

c. Reflect the stomach dorsally to expose the spleen. Sample the spleen for cultures and histopathology.

d. Reflect the intestines dorsally or ventrally to expose the kidneys. The kidneys should be uniform in color and the length of approximately 4 or 5 vertebrae. Sample the kidneys for cultures and histopathology.

e. Examine the sublumbar and iliac lymph nodes.

f. Find the blind end of the cecum. Follow it cranially to the ileocecal junction. Cut the ileum as it enters the cecum. Examine the mucosal and serosal surface of the ileum. Is the wall of the intestine thick? This may be ileitis if stretching of the intestine gently does not remove the thickened folds. Sample the ileum for parasites and for histopathology.

g. Cut several sections of the jejunum for cultures and histopathology. Cut open several loops of the spiral colon. Examine the mucosal and serosal surfaces and the contents, taking sections for cultures and histopathology.

h. Open the stomach along the greater curvature. Examine the contents. Check the cardia (the opening of the esophagus into the stomach) for hyperkeratinization or ulceration. Check the wall thickness for edema or hemorrhage.

7. RECORDS

Record the findings along with the clinical signs and list your differentials diagnoses or concerns. Be sure to include a history of vaccinations and treatments if they are known.

This is but one protocol of many that exist for the necropsy of pigs. As with any skill, practice will improve your ability to recognize significant lesions and obtain a diagnosis.

8. SAMPLING AND SUBMISSION RECOMMENDATIONS:

A. Fixation –
    1) Section samples no more than 1cm thick to ensure adequate fixation.
    2) Always use buffered 10% formalin
    3) Don't put frozen samples into formalin (wait until they thaw completely)
    4) Use a ratio of 10 parts formalin to 1 part tissue
    5) Fix gut tissues within 15 minutes of death for optimal preservation.
    6) Fixed issues from an individual pig can be pooled in a single container.

B. Shipping –
    1) Package and identify specimens from pigs individually.
    2) Package fresh tissues from the individual pigs separately as follows: brain, lymphatic tissues (tonsil, lymph nodes), thoracic organs, abdominal parenchymal organs (liver, kidney, spleen), small bowel, large bowel, other individual tissues of interest (e.g. joints, skin).
    3) Ship in leak-proof containers.
    4) Enclose paperwork in waterproof packaging.
    5) Chill fresh tissues prior to shipment.
    6) Include frozen gelpacks with the shipment to keep tissues chilled.
    7) Consider the possibility of shipping delays due to weekends or holidays when deciding to ship fresh tissues.

SAMPLE COLLECTION FOR SPECIFIC DISEASE ENTITIES

There are several situations in which the clinical signs suggest a specific disease entity. For example, pigs that are circling or unable to rise may have a neurological disease. Pigs with diarrhea likely have an enteric disease.

The following pages review the specific samples and variations of the necropsy that will be useful for the diagnosis of specific diseases. Details on laboratory procedures are included for your information.

Porcine Respiratory Disorders- Specimen Collection

Animal Selection - 3 euthanized pigs with typical signs, acutely affected and untreated (if available)
OR 3 freshly dead pigs.
Sample submission – Package and identify specimens from pigs individually.

Porcine Respiratory Disorder		
TISSUE/SAMPLE	FRESH (chilled – not frozen)	FIXED (10% buffered formalin)
Serum	5 ml	
Swabs	Caudal nasal passage	
Nasal turbinate	Rostral half of snout	1 cm thick cross-section
Lung	6 X 6 X 6 cm – 2 specimens per pig with visible airways	3 specimens per pig from affected areas with different gross appearance (2 X 2 X 1 cm)
Lymph nodes	Mandibular, sternal, tracheobronchial, mesenteric, and superficial inguinal	Mandibular, sternal, tracheobronchial, mesenteric, and superficial inguinal
Tonsil	½	½
Heart	4 X 4 X 4 cm piece	2 X 2 X 1 cm including L and R ventricles and septum
Liver	4 X 4 X 4 cm piece	2 X 2 X 0.5 cm
Kidney	Half of a kidney	0.5 cm slice through center
Spleen	5 cm piece	

NOTE: Samples should include areas of lesions if present.

Porcine Respiratory Disorders - Laboratory Procedures

Etiologic agent/Disease	***Laboratory Procedures***
Actinobacillus pleuropneumoniae	Histo, bact, and serotyping
Actinobacillus suis	Histo, bact
Arcanobacterium pyogenes	Histo, bact
Ascaris suum larval migrans	Histo
Bordetella bronchiseptica	Histo
Cytomegalovirus (Inclusion body rhinitis)	Histo (PCR)
E. coli	Histo, Bact
Foreign body pneumonia (dust)	Histo
Haemophilus parasuis	Histo, bact, PCR
Mycoplasma hyopneumoniae	Histo, PCR, serology
Pasteurella multocida	Histo, bact
Porcine respiratory coronavirus	Histo, serology (PCR)
PRRSV	Histo, PCR, VI, serology, IHC, genetic sequencing
PRV	Histo, FA tonsil, VI, serology
Salmonella spp.	Histo, bact, IHC
Streptococcus suis	Histo, bact
Swine influenza virus	Histo, PCR, VI, IHC, immunoassay(Directigen™), genetic sequencing, serology
Type 2 porcine circovirus	Histo, PCR

Porcine Diarrhea (birth to four weeks) - Specimen Collection

Animal selection - 3 euthanized pigs with typical signs, acutely affected and untreated (if available)
OR 3 freshly dead pigs.
Sample submission - Package and identify specimens from pigs individually.

Porcine Diarrhea		
TISSUE/SAMPLE	FRESH (chilled – not frozen)	FIXED (10% buffered formalin)
Serum	5 ml	
Brain	Cut brain in half longitudinally, slightly off the midline. Submit larger half fresh/chilled.	Fix the smaller half in formalin.
Tonsil	½	½
Lung	5 X 5 X 5 cm piece	2 X 2 X 1 cm
Liver	4 X 4 X 4 cm piece	2 X 2 X 0.5 cm
Kidney	Half of a kidney	0.5 cm slice, including cortex and medulla.
Spleen	5 cm piece	1 cm piece
Jejunum	10 cm segment	2 sections, 2 cm long, unopened
Ileum	10 cm segment	1 section, 2 cm long, unopened
Mesenteric lymph node	Entire lymph node	1 cm piece
Spiral Colon	Approximately ¼ to ½ of colon bagged separately from small intestine	2 sections, 2 cm long, unopened
Fluid contents from cecum or colon	5 ml in leakproof container	

NOTE: 1. Fix intestine within 15 minutes of death for best preservation.
2. Samples should include areas of lesions if present.

Porcine Diarrhea (birth to four weeks) – Laboratory Procedures

Etiologic Agent	***Laboratory Procedure***
Coccidia	Histo, parsitology
Clostridium difficile	Histo, toxin ELISA on feces, bact*
Clostridium perfringens	Histo, bact (anaerobic), PCR for toxin genes
Cryptosporidium	Histopath, parasitology
Enterococcus durans	Histo, bact
E. coli	Histo, bact, FA, PCR for pilus and toxin genes
PRRSV (weak-born pigs with diarrhea)	Histo, PCR
Rotavirus	Histo, EM, IHC, ELISA
Salmonella spp.	Histo, bact, IHC, serotyping
TGEV	Histo, EM, IHC, PCR

*Bacterial culture of *Clostridium difficile* requires special conditions. Please call the laboratory prior to submission.

Porcine Diarrhea (one month and older) - Specimen Collection

Animal selection - 3 euthanized pigs with typical signs, acutely affected and untreated (if available)
OR 3 freshly dead pigs.

Sample submission – Package and identify specimens from pigs individually.

Porcine Diarrhea		
TISSUE/SAMPLE	FRESH (chilled – not frozen)	FIXED (10% buffered formalin)
Serum	5 ml	
Brain	Cut brain in half longitudinally, slightly off the midline. Submit larger half fresh/chilled.	Fix the smaller half in formalin.
Tonsil	½	½
Lung	5 X 5 X 5 cm piece	2 X 2 X 1 cm
Liver	8 X 8 X 4 cm piece	2 X 2 X 0.5 cm
Kidney	Half of a kidney	0.5 cm slice, including cortex and medulla.
Spleen	10 cm piece	1 cm piece
Jejunum	15 cm segment	2 sections, 2 cm long, unopened
Ileum	15 cm segment	2 sections, 2 cm long, unopened
Mesenteric lymph node	Entire lymph node	1 cm thickness piece
Spiral Colon	2 10 cm segments (bagged separately from small intestine)	2 sections, 2 cm long, unopened
Fluid contents from cecum or colon	10 ml in leakproof container	

NOTE: 1.Fix intestine within 15 minutes of death for best preservation.
2. Samples should include areas of lesions if present.
3. Examine pars esophagea of stomach for ulceration.
4. Examine the colon and rectum grossly for whipworms.

Porcine Diarrhea (one month and older) – Laboratory Procedures

Etiologic Agent	*Laboratory Procedure*
Brachyspira spp.	Histo, PCR, darkfield microscopy, bact
Coccidia	Histo, parasitology
Cryptosporidium	Histo
E. coli	Histo, bact, FA, PCR
Giardia sp.	Parasitology
Lawsonia intracellularis	Histo, PCR, IHC
Rotavirus	Histo, EM, IHC
Salmonella spp.	Histo, bact
Sulfates/water quality	Water analysis
TGEV	Histo, IHC, EM
Yersinia spp.	Histo, bact.

Porcine Neurological Disorders - Specimen Collection

Animal selection – 3 euthanized pigs with typical signs, if available; OR 3 freshly dead pigs.
Tissue submission - Package and identify specimens from pigs individually.

Porcine Neurological Disorders		
TISSUE/SAMPLE	FRESH (chilled – not frozen)	FIXED (10% buffered formalin)
Serum	5 ml	
Cerebrospinal fluid	2 ml if indicated	
Swabs of: 1) meninges 2) brain	1) Swab meninges immediately after exposed; 2) Plunge swab through one cerebral hemisphere into a lateral ventricle.	
Brain	Cut brain in half longitudinally, slightly off the midline. Submit larger half fresh/chilled.	Fix the smaller half in formalin.
Spinal cord	If clinical signs indicate, submit 5 cm segment of the lumbosacral and cervicothoracic cord.	If clinical signs indicate, submit 5 cm segment of the lumbosacral and cervicothoracic cord.
Lymph nodes	½ of the sternal, tracheobronchial, mandibular, superficial inguinal, and mesenteric.	½ of the sternal, tracheobronchial, mandibular, superficial inguinal, and mesenteric.
Tonsil	½	½
Lung	5 X 5 X 5 cm pieces. For each different gross lesion, submit a specimen area that includes a 0.3 cm diameter bronchial. If similar gross lesions throughout, submit two specimens.	2 X 2 X 1 cm sections (2 or 3) – include gross lesion if present
Pleura or pericardium	Swabs or fluid if indicated.	
Heart	4 X 4 X 4 cm piece	2X 2 X 1 cm section
Liver	4 X 4 X 4 cm piece	2 X 2 X 0.5 cm.
Kidney	Half of a kidney	0.5 cm slice, including cortex and medulla.
Spleen	5 cm piece	1 cm piece
Jejunum	10 cm segment	2 sections, 2 cm in length
Ileum	10 cm segment	1 section, 2 cm in length.

Porcine Neurological Disorders - Laboratory Procedures

Etiologic Agent/ Disease	*Laboratory Procedure*
1. *Haemophilus parasuis* meningitis	Histo, bact, PCR
2. *Streptococcus suis* meningitis	Histo, bact
3. Edema disease/F18 E. coli enteritis	Histo, bact ileum
4. *E. coli* meningitis	Histo, bact
5. PRRSV	Histo, VI, PCR, Serology
6. Water deprivation ("salt toxicity")	Histo, Toxicology (brain sodium)
7. PRV	Histo, FA on tonsil, VI
8. Enterovirus polioencephalomyelitis (Teschen/Talfan)	Histo (cord), VI
9. Hemagglutinating encephalomyelitis virus	Histo, VI
10. *Arcanobacterium pyogenes*	Histo, bact
11. Arsenic toxicity	Histo, toxicology (liver)
12. Selenium toxicity	Histo, toxicology (liver)

Porcine Abortion - Specimen Collection

A. Optimum specimens (chilled):

1. 3 intact fetuses and placenta each from affected litters or different parities – include the freshest fetus
   Note: If there are mummified fetuses, submit nine mummies, 3 smallest, 3 medium and 3 largest.
   Freezing the fetuses is acceptable if they cannot be sent immediately to the laboratory.
2. Sow serum (5 ml) - If attempting to diagnose PRRSV, sera are best collected when sows are acutely affected (3 to 7 days off-feed and febrile). Sows are usually not viremic at the time of abortion.

B. Porcine abortion - alternate specimens –		
TISSUE/SAMPLE	FRESH (chilled – not frozen)	FIXED (10% buffered formalin)
Heads	3	
Thoracic Fluid	2 ml	
Stomach content	3ml	
Lung	3	3 samples: 1 cm x 1 cm x 1cm
Heart	3	3 samples: 1 cm x 1 cm x 1cm
Liver	3	3 samples: 1 cm x 1 cm x 1cm
Kidney	3	3 samples: 1 cm x 1 cm x 1cm
Spleen	3	3 samples: 1 cm x 1 cm x 1cm
Placenta	3	3 specimens 3cm x 3cm
Superficial Inguinal Lymph Nodes	3	3 samples
Mummies (intact; if available)	9 (see above)	

Note: Pooling tissues from multiple fetuses is acceptable.

Porcine Abortion – Laboratory Procedures

1. Histopathology
2. Bacterial culture
    a. Lung,
    b. Stomach contents
    c. +/- Placenta (cultures are attempted if the placenta is fresh and not contaminated with feces).
3. Immunology
    a. Thoracic fluid - IgG/IgM
4. Serology (sow serum)
    a. *Leptospira sp*
    b. Parvovirus
    c. PRRSV
    d. Others as requested
5. PCR
    a. PRRSV and PCV2
        i. Sow serum
        ii. Fetal tissues: Lung, thymus, lymph node, heart, kidney, brain, spleen.
    b. Parvovirus
        i. Lung from mummified fetuses.
6. Immunohistochemistry
    a. *Leptospira sp*.
        i. Kidney
7. Toxicology
    a. Carboxyhemoglobin (for carbon monoxide exposure)
        i. Fetal heart blood.

Porcine Bacterial Septicemia- Specimen Collection

Animal Selection - 3 euthanized pigs with typical signs, acutely affected and untreated (if available)
OR 3 freshly dead pigs.
Sample submission – Package and identify specimens from pigs individually.

Porcine Septicemia		
TISSUE/SAMPLE	FRESH (chilled – not frozen)	FIXED (10% buffered formalin)
Serum	5 ml	
Whole blood	3 ml in EDTA	
Swabs	Brain, epicardium, joint (periarticular tissue including synovium)	
Brain		
Lung	6 X 6 X 6 cm – 2 sections per pig with visible airways	3 pieces per pig from affected areas with different gross appearance (2 X 2 X 1 cm
Heart	4 X 4 X 4 cm piece	2 X 2 X 1 cm including L and R ventricles and septum
Liver	4 X 4 X 4 cm piece	2 X 2 X 0.5 cm
Kidney	Half of a kidney	0.5 cm slice through center
Spleen	5 cm piece	
Lymph nodes	mandibular, sternal, tracheobronchial, mesenteric, and superficial inguinal	mandibular, sternal, tracheobronchial, mesenteric, and superficial inguinal
Ileum	10 cm segment	2 cm segment

NOTE: 1. Samples should include areas of lesions if present.
2. Pigs dying from some bacterial infections my have acute meningitis but no gross thoracic or abdominal visceral lesions.

Bacteria commonly associated with porcine septicemia include *Actinobacillus suis*, *Erysepilothrix rhusiopathiae*, *E. coli*, *Haemophilus parasuis*, *Leptospira sp.*, *Salmonella spp.* and *Streptococcus suis*.

Porcine – Unexpected Death

Animal selection - 3 freshly dead pigs.
Sample submission – Package and identify specimens from pigs individually.

Formalin fixed tissues
As for respiratory and enteric diseases.

Fresh specimens
As for respiratory and enteric diseases.

NOTE – Pay special attention to the position of the intestines *in situ.* Examine the root of the mesentery for a partial or complete torsion. The **l**arge intestines (cecum and spiral colon) should be on the **l**eft side and the small intestines (jejunum) should be on the right side in a normal pig.

NOTE – If ventilation failure is suspected, collection of blood in EDTA (purple-top tubes) from live, affected animals may be submitted for carboxyhemoglobin in an attempt to confirm exposure to high levels of carbon monoxide. The remainder of the poisonous gases cannot be detected routinely in dead animal tissues. Submission of animals suspected to have died from ventilation failure is usually done to rule-out any other causes of unexpected death, such as septicemia, intestinal torsions, etc.

Porcine – Mulberry Heart Disease

Animal selection - 3 euthanized pigs with typical signs, acutely affected and untreated (if available)
OR 3 freshly dead pigs.
Sample submission – Package and identify specimens from pigs individually.

Formalin fixed tissue

1. Heart – include areas of myocardium with gross hemorrhage (cut through entire wall thickness)
2. Lung – (2 X 2 X 1 cm)
3. Liver – (2 X 2 X 0.5 cm)

Fresh specimens

1. Liver (4 X 4 X 4 cm) - bact, toxicology (Vit E and Sel.)
2. Lung (4 X 4 X 4 cm) – bact

Other considerations: See unexpected death.

Porcine – Unthrifty Nursery Pigs (Wasting)

Animal selection - 3 euthanized pigs with typical signs, acutely affected and untreated (if available)
OR 3 freshly dead pigs.
Sample submission – Package and identify specimens from pigs individually.

Formalin fixed tissues
As for enteric and respiratory disorders.

Fresh specimens
As for enteric and respiratory disorders.

Additional considerations

1. Whole unclotted blood (EDTA blood) for CBC, RBC morphology
2. Serum for chemistry profile
3. Liver for trace mineral and vitamin E analysis
4. Duodenum with pancreas

NOTE: Examine stomach for ulceration of the pars esophagea

Porcine – Skin Disorders

Antemortem sample selection

1. Skin scrapings of the affected areas (those with crusts, pustules, blisters, redness or swelling) from several pigs.
2. Swabs of the skin lesions from several pigs.

Animal selection - 3 euthanized pigs with typical signs, acutely affected and untreated (if available)
OR 3 freshly dead pigs.
Sample submission – Package and identify specimens from pigs individually.

Postmortem sample selection

Formalin fixed tissues

1. Several pieces of skin (2 X 2 cm) including normal skin beyond the edges of lesions.
2. Other organs with gross lesions

Fresh specimens

1. Skin – several pieces (3 X 3 cm) (NOTE – if contaminated with feces, clean and blot dry before submitting).
2. Liver – (4 X 4 X 4 cm) – for toxicology, including zinc
3. Superficial lymph nodes draining the affected skin areas
4. Kidneys, lungs.
5. Other organs with gross lesions,

NOTE - If mange is suspected, include external ear canal by cutting off the ear and submitting.
NOTE - If the complaint is “purple ears,” follow the submission guidelines for septicemias.
NOTE – Consider the potential for Foreign Animal Diseases in cases with vesicles involving the mouth, nose or feet.

Porcine Arthropathy / Lameness

Animal Selection - 3 euthanized pigs with typical signs, acutely affected and untreated (if available)
OR 3 freshly dead pigs.
Sample Submission – Package and identify specimens from pigs individually.

Antemortem Samples:

1. Whole blood in EDTA.
2. Serum.
3. Joint fluid.

Postmortem Specimen Collection

1. Small Pigs: Intact joints (clean skin thoroughly before placing in whirl-pak bag).
2. Larger Pigs:
    a. Joint swabs - vigorously swab the synovial membranes – two swabs per joint.
    b. Synovial membrane – submit the "un-swabbed" pieces both chilled (not frozen) and in formalin.
    c. Affected bones – submit chilled.
    d. Spinal cord – if clinical signs indicate spinal cord malfunction, submit 5 cm segments pieces both chilled (not frozen) and in formalin of the lumbosacral and cervicothoracic cord.

NOTE: Check for breaking strength of ribs. Examine articular, weight-bearing surfaces of the stifle, hock, shoulder, elbow, and hip joints for evidence of degenerative joint disease/osteochondrosis.