

**DRAFT**

# **Compliance Guideline for Training Establishment Employees under the New Swine Slaughter Inspection System**

Food Safety and Inspection Service  
U.S. Department of Agriculture

DRAFT

This draft guideline is designed to help establishments that choose to operate under the New Swine Slaughter Inspection System (NSIS) train their employees to sort and remove animals affected with diseases or other conditions that would render them unfit for slaughter before FSIS ante-mortem inspection and to identify and remove defects on carcasses and parts before FSIS post-mortem inspection.

USDA-FSIS

# Compliance Guideline for Training Establishment Carcass Sorters in New Swine Slaughter Inspection System (NSIS)

## Table of Contents

I.	PURPOSE .....	5
II.	BACKGROUND .....	5
A.	Does NSIS change how inspection program personnel (IPP) perform ante-mortem inspection? .....	5
B.	Does NSIS change humane handling verification or requirements? .....	5
C.	Does NSIS change how FSIS performs post-mortem inspection?.....	6
D.	Is this version of the guideline final? .....	6
E.	How can I comment on this guideline?.....	6
III.	GUIDANCE FOR ESTABLISHMENT EMPLOYEE SORTER TRAINING PROGRAMS .....	7
A.	Training Program Elements.....	7
IV.	Components of an effective ante-mortem sorting program .....	8
A.	Pre-sorting prior to arrival: .....	8
B.	Sorting on Premises: How to conduct an effective ante-mortem sorting program .....	9
C.	Ante-mortem conditions requiring removal and identified for discard .....	9
D.	Ante-mortem conditions for holding market hogs in the “Subject” pen; further sorting by the establishment lead sorter; and final inspection by the FSIS PHV: .....	10
E.	Summary: Outcomes of sorting .....	13
F.	Foreign animal diseases (FADs).....	14
G.	Establishment Record keeping required by NSIS during ante-mortem sorting.....	14
H.	Denaturing requirements .....	14
V.	COMPONENTS OF AN EFFECTIVE POST-MORTEM SORTING PROGRAM .....	15
A.	Preparation and Proper presentation of Carcasses and Parts.....	15
B.	Normal Carcass and Parts Photos .....	15
VI.	MAINTAINING IDENTITY OF CARCASSES AND PARTS .....	23
A.	Carcasses and Parts Intended for Food .....	23
B.	Carcasses and Parts Intended for Discard (Not Food).....	23
VII.	SORTING FOOD SAFETY CONDITIONS AT SLAUGHTER.....	23
A.	Septicemia.....	23
B.	Toxemia.....	25
C.	Pyemia.....	27

D.	Cysticercosis of Swine (Pork Measles) .....	28
E.	Contamination with Feces, Ingesta, or Milk .....	29
III.	OTHER CONDITIONS REQUIRING SORTING.....	29
A.	Abscess.....	29
B.	Arthritis .....	30
C.	Pericarditis .....	32
D.	Pleuritis .....	33
E.	Pneumonia .....	34
F.	Peritonitis.....	35
G.	Gastroenteritis .....	36
H.	Nephritis.....	37
I.	Uremia.....	41
J.	Tuberculosis (TB).....	41
K.	Parasites Not Transmissible to Man .....	42
1.	Stephanuriasis (Swine Kidney Worms) .....	42
2.	Ascarids (Roundworms) .....	44
L.	Miscellaneous Skin Conditions.....	44
M.	Diamond Skin –Skin Form of Swine Erysipelas .....	46
N.	Fractures, Bruises, and Injuries, Septic and Non-Septic .....	47
O.	Melanomas vs. Melanosis.....	48
P.	Icterus (Jaundice) .....	50
Q.	Embryonal nephroma .....	51
R.	Malignant Lymphoma .....	52
S.	Odors; Undetermined; Sexual Odor of Swine.....	55
T.	Pale Soft Exudative Pork (PSE) .....	55
U.	Over-scald .....	55
V.	Classical Swine Fever (Hog cholera).....	56
W.	Brucellosis in Feral or Other Swine Classes.....	56
IV.	REFERENCES .....	57

DRAFT

## **I. PURPOSE**

This compliance guideline would help swine slaughter establishments train their employees to conduct the live animal and carcass sorting activities that are required under the New Swine Slaughter Inspection System (NSIS).

## **II. BACKGROUND**

The Food Safety and Inspection Service (FSIS) is proposing to amend the Federal meat inspection regulations to establish a new voluntary inspection system for market hog establishments called NSIS. Under NSIS, establishments will assume more responsibility for the production of safe products, primarily through the sorting and removal of animals affected with diseases or other conditions that would render them unfit for slaughter before ante-mortem inspection and the identification and removal of defects on carcasses and parts before post-mortem inspection. The Agency believes that training establishment sorters is important to ensure that they are able to properly perform their duties under NSIS. FSIS has developed this draft guideline to assist establishments in the training of their sorters. This draft guideline is based on the training that FSIS provides to its inspection personnel. The Agency is posting this draft guidance material on the FSIS Web site:

<http://www.fsis.usda.gov/wps/portal/fsis/topics/regulatory-compliance/compliance-guides-index>.

This draft guideline explains how establishments can meet FSIS requirements regarding sorting activities under the proposed NSIS and represents FSIS's current thinking on this topic. FSIS requests comment on this draft guidance. If necessary, FSIS will revise this document in response to any comments received and will issue updated guidance at the time that it publishes any final rule resulting from the proposed rule to establish the NSIS. Establishments may begin to use this guidance after FSIS publishes a final rule to establish the NSIS.

### **A. Does NSIS change how inspection program personnel (IPP) perform ante-mortem inspection?**

No. FSIS IPP will continue to inspect 100% of all market hogs presented for ante-mortem inspection by the establishment. The NSIS will not affect the regulations that prescribe animal disposition procedures. Per [FSIS Directive 6100.1](#), the PHV continues to make one of the following dispositions for these segregated livestock:

1. Passed for normal slaughter;
2. Passed for slaughter but tagged, or handled, as a U.S. Suspect animal (9 CFR 309.18 (a)). In addition, swine slaughtered in a dehairing operation must also have a tattoo applied when identified as a US Suspect (9 CFR 309.18 (b)); or
3. Condemned and tagged as a U.S. Condemned animal (9 CFR 309.18 (c)).

### **B. Does NSIS change humane handling verification or requirements?**

No. FSIS IPP will continue to verify the proper and humane handling of all animals on premises including market hogs not presented for inspection. NSIS provides opportunity for more humane handling verification. For compliance information on humane slaughter please refer to the FSIS Compliance Guide for a Systematic Approach to the Humane Handling of Livestock:

<https://www.fsis.usda.gov/wps/wcm/connect/da6cb63d-5818-4999-84f1-72e6dabb9501/Comp-Guide-Systematic-Approach-Humane-Handling-Livestock.pdf?MOD=AJPERES>

### **C. Does NSIS change how FSIS performs post-mortem inspection?**

As with traditional inspection, FSIS continues to perform 100% carcass by carcass inspection on each head, viscera, and carcass. After sorters have identified conditions for removal, FSIS inspects each carcass and viscera to assure the establishment's sorting decisions meet regulatory requirements and that the carcasses and parts are fit to bear the marks of inspection. FSIS IPP have the authority to retain carcasses and stop the line under NSIS.

### **D. Is this version of the guideline final?**

No, this is a draft guideline. As mentioned above, FSIS requests comments on the draft guidance. The Agency will publish a revised guideline when it publishes a final rule resulting from the proposal to establish the NSIS.

### **E. How can I comment on this guideline?**

FSIS is seeking comments on this draft guideline. All interested persons may submit comments regarding any aspect of this document, including but not limited to: content, readability, applicability, and accessibility. FSIS will update these guidelines in response to any comments that it receives and as needed to reflect the most current information available to FSIS and stakeholders. The comment period will be 60 days.

Comments may be submitted by either of the following methods:

1. Federal Rulemaking Portal: This Web site provides the ability to type short comments directly into the comment field on this Web page or attach a file for lengthier comments. Go to <http://www.regulations.gov> and follow the online instructions at that site for submitting comments.
2. Mail, including CD-ROMs, and hand- or courier-delivered items: Send to Docket Clerk, U.S. Department of Agriculture, Food Safety and Inspection Service, Patriots Plaza 3, 1400 Independence Avenue, SW, Mailstop 3782, Room 8-163A, Washington, DC 20250-3700.
3. Instructions: All items submitted by mail or electronic mail must include the Agency name, FSIS, and docket number FSIS-2016-0017. Comments received in response to this docket will be made available for public inspection and posted without change, including any personal information to <http://www.regulations.gov>.

### III. GUIDANCE FOR ESTABLISHMENT EMPLOYEE SORTER TRAINING PROGRAMS

#### A. Training Program Elements

This draft guideline recommends training elements and inspection standards that FSIS has found effective in training FSIS inspectors to identify live animals and carcasses affected with condemnable conditions. Market hog establishments may use this information to train establishment employees that will conduct sorting activities under NSIS.

Proper training is important to establishment sorters' ability to make sorting decisions on animals, carcasses, and parts. Under NSIS, FSIS inspectors will continue to inspect all carcasses and parts and take regulatory control actions if necessary. If establishment sorters do not make correct sorting decisions, IPP will continue to retain carcasses for veterinary disposition; stop the production line; identify and verify restoration of contaminated carcasses or parts; issue non-compliance records. Under NSIS, the PHV will continue to have the authority to direct the establishment to reduce the line speed to ensure that the establishment is able to maintain process control and that the online carcass inspectors are able to conduct a carcass-by-carcass inspection.

A single training method or program may not be applicable to all establishments. Individual establishments should design training programs consistent with the operational conditions in their establishment.

FSIS recommends that each establishment develop a standardized training program for its sorters to properly identify live animals and carcasses and parts exhibiting condemnable conditions and to ensure that such live animals and carcasses and parts are not used as human food. FSIS recommends the following types of training as effective elements of a sorter training program:

**Classroom** training is a lecture type presentation that provides essential information for sorters to be able to:

- Recognize and name common parts of market hog carcasses and organs;
- Recognize and name common conditions affecting market hog carcasses and viscera;
- Differentiate among normal, localized, and generalized conditions affecting market hog carcasses and viscera;
- Determine the disposition of each carcass and viscera and take appropriate actions to ensure removal and disposal of unwholesome and unfit carcasses, parts, or viscera to ensure they cannot be used as human food; and
- Create records documenting establishment sorting.

**NOTE:** An exam or self-assessment for trainees may be helpful to measure and quantify understanding and comprehension of training.

**Wet lab** is a training activity that provides trainees with practical application of what they have learned in classroom training. Features include:

- Using real examples of carcasses and parts –both normal and abnormal;
- Performing hands-on practice prior to beginning normal duties online to identify carcass conditions and make dispositions;
- Assure carcass and parts sorting decisions are correct and
- Recording actions.

**On the job training** is to practice what has been learned in lecture including:

- Performing sorting at production rates;
- Identifying carcass, parts, and viscera dispositions;
- Receiving real time feedback from supervisors; and
- Taking appropriate actions as determined necessary.

**Follow up sessions** (called correlations) are to reinforce previous learning. Features include:

- Conducting these sessions at a set regular frequency,
- Discussing regularly standardized procedures to make decisions to identify and properly dispose of carcasses and parts on a continuous basis at production rates; and
- Describing reasons for making dispositions and appropriate actions.

**Continuous monitoring** of individual employee performance to maintain skill level

#### **IV. Components of an effective ante-mortem sorting program**

##### **A. Pre-sorting prior to arrival:**

1. Pre-sorting on the farm.
  - a. Establishment purchase specifications
  - b. Treatment records
  - c. Animal health
  - d. Biosecurity procedures
2. On farm certification programs
  - a. Pork Quality Assurance Program;
  - b. Common Swine Industry Audit;
  - c. Truckers Quality Assurance Programs;
  - d. Improvest™ Certification
3. Herd history. Under NSIS, establishments are encouraged to begin their sorting by collecting and utilizing their previous slaughter data of each supplier, as well as producer data such as farm records, feeding programs, herd certification programs, and farm biosecurity programs to ensure only healthy market hogs are delivered to



the establishment. Systematic use of rigorous on farm sorting procedures, purchase specifications, and herd certifications will further assure that chemical, physical and biological hazards, including chemical hazards from violative residues, are not brought to the establishment. On farm programs may be used by the establishment to support, in the establishment's HACCP system, ante-mortem and post-mortem sorting procedures.

## **B. Sorting on Premises: How to conduct an effective ante-mortem sorting program**

1. Familiarity with behavior of normal healthy market hogs.
2. Observe market hogs in motion; look for:
  - a. Alertness: Healthy market hogs are aware of their surroundings and actively investigate the environment and their pen mates when initially unloaded or placed in pens. During lairage, market hogs will be recumbent and resting for the majority of the time;
  - b. Locomotion: Healthy market hogs bear weight equally on all four legs and walk freely;
  - c. Body condition: Healthy market hogs are full fleshed, with fat and muscle completely covering the ribs, backbone and hips.
  - d. Body functions: Healthy market hogs pass clear to pale yellow urine and formed yellow to greenish to brown stools, depending upon their diet. Market hogs may vomit due to motion sickness, so occasional vomiting in an otherwise healthy market hog should not be cause for concern.
3. Observe market hogs at rest; look for:
  - a. Alertness: Healthy market hogs retain awareness of what is going on around them when resting and often vocalize when disturbed;
  - b. Respirations: Healthy market hogs display regular, rhythmic breathing;
  - c. Skin color: Healthy market hogs will have a white to pink uniformly colored skin (if not pigmented).

## **C. Ante-mortem conditions requiring removal and identified for discard**

1. Dead;
2. Moribund: animals in the act of dying. Look for inactivity, loss of awareness of surroundings, abnormal skin color (blotchy or blue discolorations), irregular (gasping) respirations, frothy mouth and / or nasal discharge, unable to rise and walk;
3. Central nervous system diseases. Look for seizures, convulsions, abnormal gait (circling, dizziness, loss of balance), difficulty swallowing, abnormally excited or aggressive behavior, abnormal sexual behavior (constantly mounting and riding other animals);
4. Febrile. Market hogs are defined as febrile when their body temperature is 106.0 F or higher. Look for loss of activity and awareness, reddish or bluish skin discoloration in white hogs, increased respirations, difficulty breathing, reluctance to get up from a recumbent position, and / or lameness.



Market hogs showing darkening of the abdomen or cyanosis of belly and ears; very depressed; Typical of market hogs in a moribund or dying condition:

Signs include:

1. Depressed, reluctant to move, cold dark ears, legs, belly;
2. Inability to rise; paddling;
3. Moribund;
4. Dehydration.

**D. Ante-mortem conditions for holding market hogs in the “Subject” pen; further sorting by the establishment lead sorter; and final inspection by the FSIS PHV:**

1. Fatigued or non-ambulatory market hogs. Fatigued market hogs appear normal at first but tire and become recumbent. Some fatigued market hogs suffer from muscle cramps and will vocalize and shake until they lay down. If isolated and allowed to rest, recovered fatigued market hogs are eligible for slaughter pending final sorting and FSIS inspection. If any market hogs become non-ambulatory disabled after ante-mortem inspection, establishments would be required to move them to the “Subject” pens for re-inspection by FSIS PHVs.
2. Overheated market hogs. Market hogs do not control their body temperatures well during warm weather and may overheat during inclement weather. Look for rapid, panting respirations, reddish skin discoloration, and lack of activity. These animals may be held for recovery and passing for slaughter, pending further sorting and final PHV inspection.
3. Market hogs of uncertain status at the time of initial sorting. If establishment sorters are unsure about the health status of a market hog or its eligibility for production into human food they should place the pigs in a pen that will be subject to further sorting by the establishment’s lead sorter, and final inspection by the FSIS PHV. Conditions include abnormal body swellings, lameness, skin discolorations, scabs, wounds, coughing, sneezing, and abnormal body discharges (bloody urine, diarrhea, vaginal discharges, vomiting). Establishment sorters are encouraged to place any questionable market hog into a pen where they can be held for further sorting at a later time by the establishment’s lead sorter and receive final inspection by the FSIS PHV.



### **Arthritis**

#### **Signs:**

1. Enlargement of one or more joints;
2. Abnormal locomotion;
3. Variable temperature—depending upon stage of disease and ambient temperature. Temperature may range from very high to subnormal; each case will have to be independently assessed by the PHV;
4. Painful or abnormal stance and movement;
5. Reluctance to move or stand;
6. Depression;
7. Poor wasting condition;
8. Infected navel in young animals.

Special Note: Transport injury (i.e., sore feet)—this also can result from market hogs being raised on concrete and must be distinguished from arthritis (See 9 CFR 309.2, 309.4, and 309.9)



## Figure Acute Erysipelas

### Signs:

1. Fever;
2. Reluctant to move; nonambulatory;
3. Swollen joints;
4. Sudden death;
5. Diffuse areas of purple raised, red diamond skin.

Sorters are to identify animals with signs of fever and signs of acute erysipelas for discard. Market hogs with less severe signs suggesting a localized condition can move to the subject pen for closer evaluation and sorting. Eligible market hogs may be presented to the PHV for ante-mortem inspection.



## Abscess

### Signs:

1. Swellings may be evident in various parts of the animal;
2. Typically, abscesses of any size may be seen near the jowl, ham, hock, shoulder.



## Abscess/Hernia/Prolapse/Injury

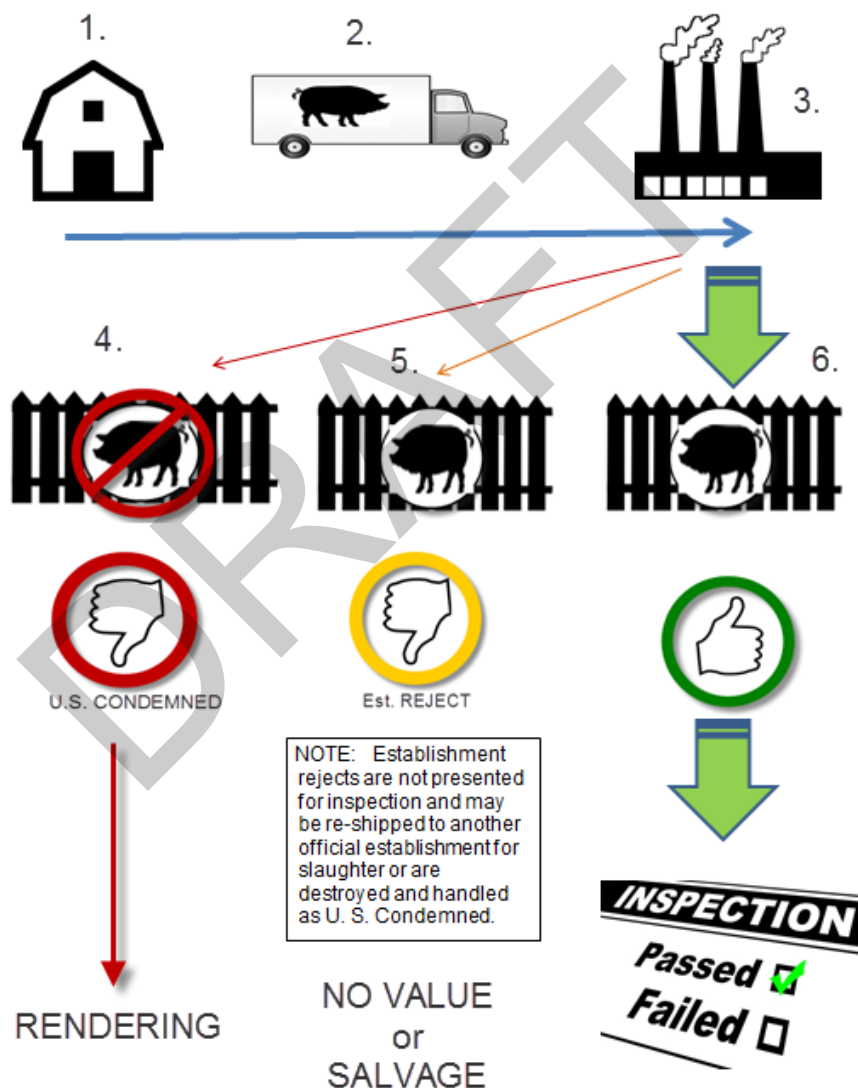
1. Depression or lethargy;
2. Variable temperature—from very high to subnormal;
3. External wounds:
  - a. Scirrhus cord (funiculitis);
  - b. Umbilical abscess, tail-bite lesions, or infected open wounds.
4. Swollen joints;
5. Subcutaneous abscesses;
6. Poor wasting condition.



### E. Summary: Outcomes of sorting

1. Normal healthy market hogs presented for FSIS ante-mortem inspection;
2. Market hogs identified for removal are humanely euthanized (if necessary), denatured, and disposed of;
3. Plant rejects (underweights, overweights, cryptorchids, market hogs otherwise not meeting establishment purchase specifications) that are moved to another inspected establishment for slaughter only;
4. Market hogs that are held for further sorting in the "Subject" pen by establishment lead sorter and final inspection by the PHV.

Typical Ante-mortem Flow of Swine under NSIS



## **F. Foreign animal diseases (FADs)**

FSIS has a cooperative agreement with APHIS for conducting FAD surveillance during FSIS inspections. As part of NSIS, establishments are required to report any animal showing a condition suggestive of a FAD or other reportable conditions to the FSIS PHV. The FSIS PHV will inspect for and make the final determination about whether the condition should be reported to APHIS. Conditions associated with FADs and other reportable conditions include:

1. Sudden, unexplained death loss in a large number of market hogs that were previously observed as healthy,
2. Sudden, unexplained fever in a large number of market hogs,
3. Sudden, unexplained severe lameness in a large number of market hogs,
4. Vesicles (blister – like structures) or ruptured vesicles on the nose and in between the toes;
5. Large numbers of market hogs with diarrhea;
6. Signs of central nervous system disease;
7. Maggot infestations.
8. Additional information about FADs and other reportable conditions may be found at the APHIS Website: <https://www.aphis.usda.gov/aphis/ourfocus/animalhealth/animal-disease-information> or by calling your APHIS Area Veterinarian In Charge: [https://www.aphis.usda.gov/vs/nahss/swine/csf/CSF\\_PM\\_2007\\_AppendC\\_Directory.pdf](https://www.aphis.usda.gov/vs/nahss/swine/csf/CSF_PM_2007_AppendC_Directory.pdf)

## **G. Establishment Record keeping required by NSIS during ante-mortem sorting**

1. Records documenting dead market hogs identified, denatured, and disposed of. This record must be provided to FSIS in order to fulfill FSIS reporting obligations;
2. Records documenting sorting activities. These records will vary depending upon how the establishment conducts its sorting activities (HACCP, Sanitation SOP, or pre-requisite programs) within its HACCP system.

## **H. Denaturing requirements**

NSIS requires all dead and discarded market hogs to be identified (using a tag, tattoo or other unique identification) and denatured prior to disposal even if the establishment has on-site tanking facilities. Denaturing is required to be incorporated into the establishment's HACCP system.

All carcasses of swine dead and discarded (i.e. destroyed) by the establishment before ante-mortem inspection at an official establishment participating under NSIS are to be immediately denatured with crude carbolic acid, or cresylic disinfectant, or a formula consisting of one part FD&C No. 3 green coloring, 40 parts water, 40 parts liquid detergent, and 40 parts oil of citronella or any other proprietary material approved by the Administrator in specific cases. When such carcasses are dressed (e.g. skinned), the carcass is to be denatured, it shall be freely slashed before the denaturing agent is applied, except that, in the case of dead animals that have not been dressed, the denaturant may be applied by injection. The denaturant must be deposited in all portions of the carcass or product to the extent necessary to preclude its use for food purposes.

## **V. COMPONENTS OF AN EFFECTIVE POST-MORTEM SORTING PROGRAM**

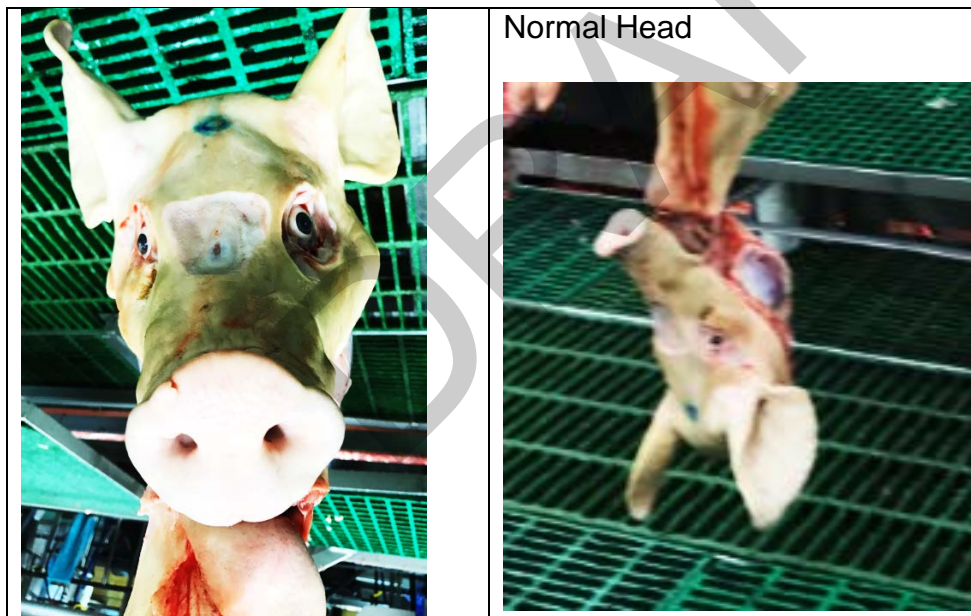
### **A. Preparation and Proper presentation of Carcasses and Parts**

Prior to sorting and inspection, establishment employees can remove surface contamination (e.g. feces, ingesta, or milk) on market hog carcasses in a sanitary manner unless retained by IPP for PHV. Trimming of carcass defects or blemishes (e.g. hair and minor bruises) is allowed for any defects not affecting disposition of the carcass or part.

To operate at maximum efficiency, establishment employees are to present heads, viscera, and carcass in a consistent and uniform manner to allow sorters to methodically examine and sort head, viscera, or carcass prior to FSIS inspection.

### **B. Normal Carcass and Parts Photos**

Establishment personnel should be familiar with normal market hog carcasses and parts.





Normal Lungs, aorta, and lymph nodes.



Healthy Hearts; slashed and washed



Healthy liver, gall bladder, stomach; spleen and intestines.

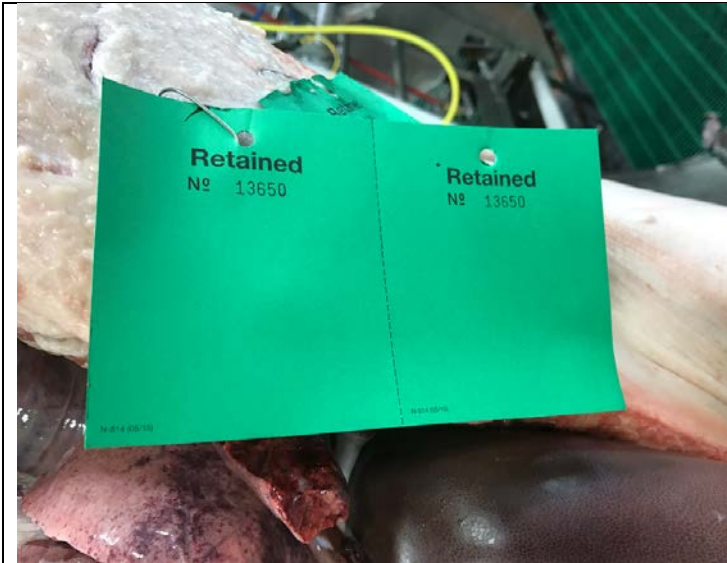




Healthy viscera



Healthy mesenteric lymph node chain draining the intestines



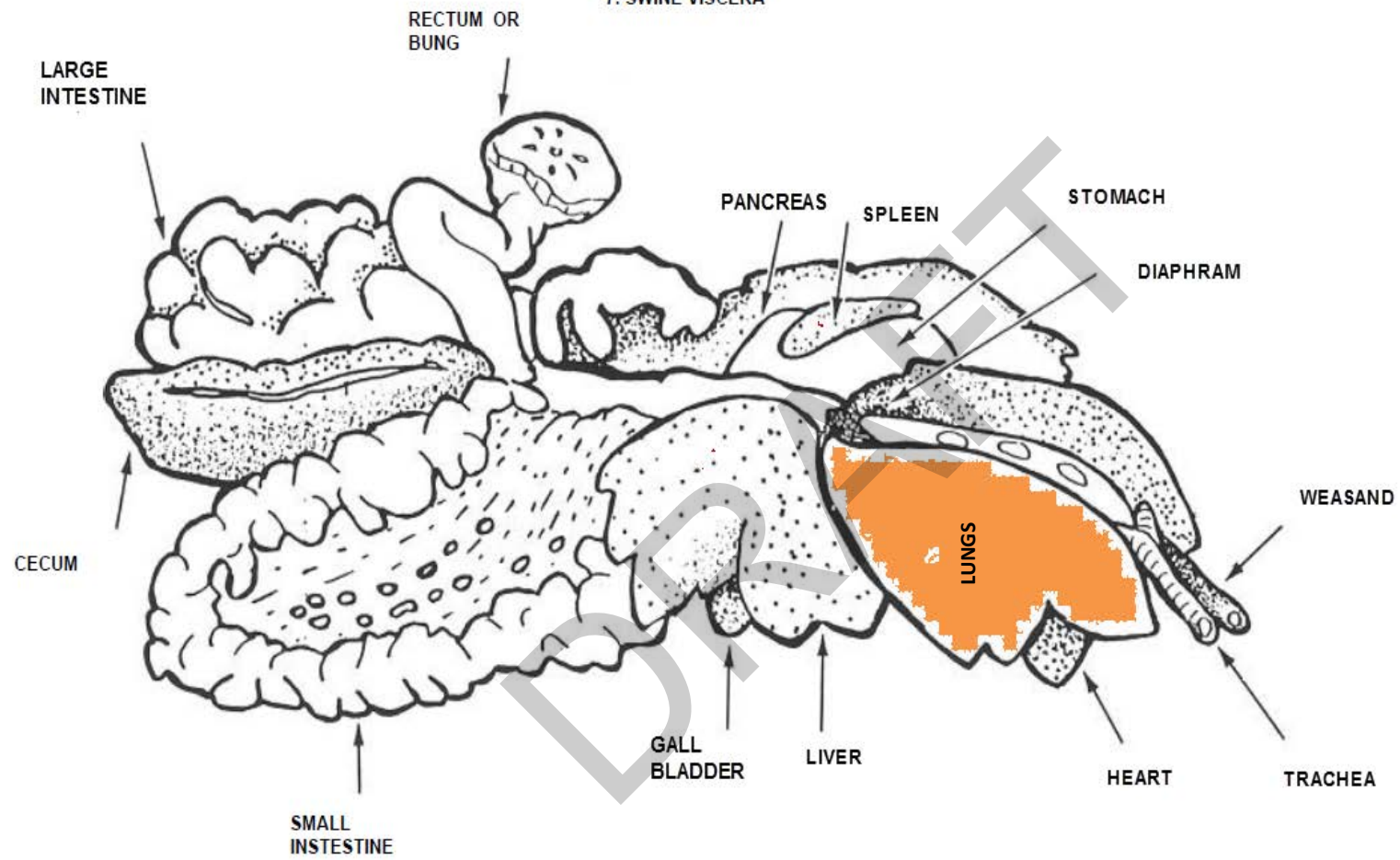
Carcass tracking system



Carcass tracking system:

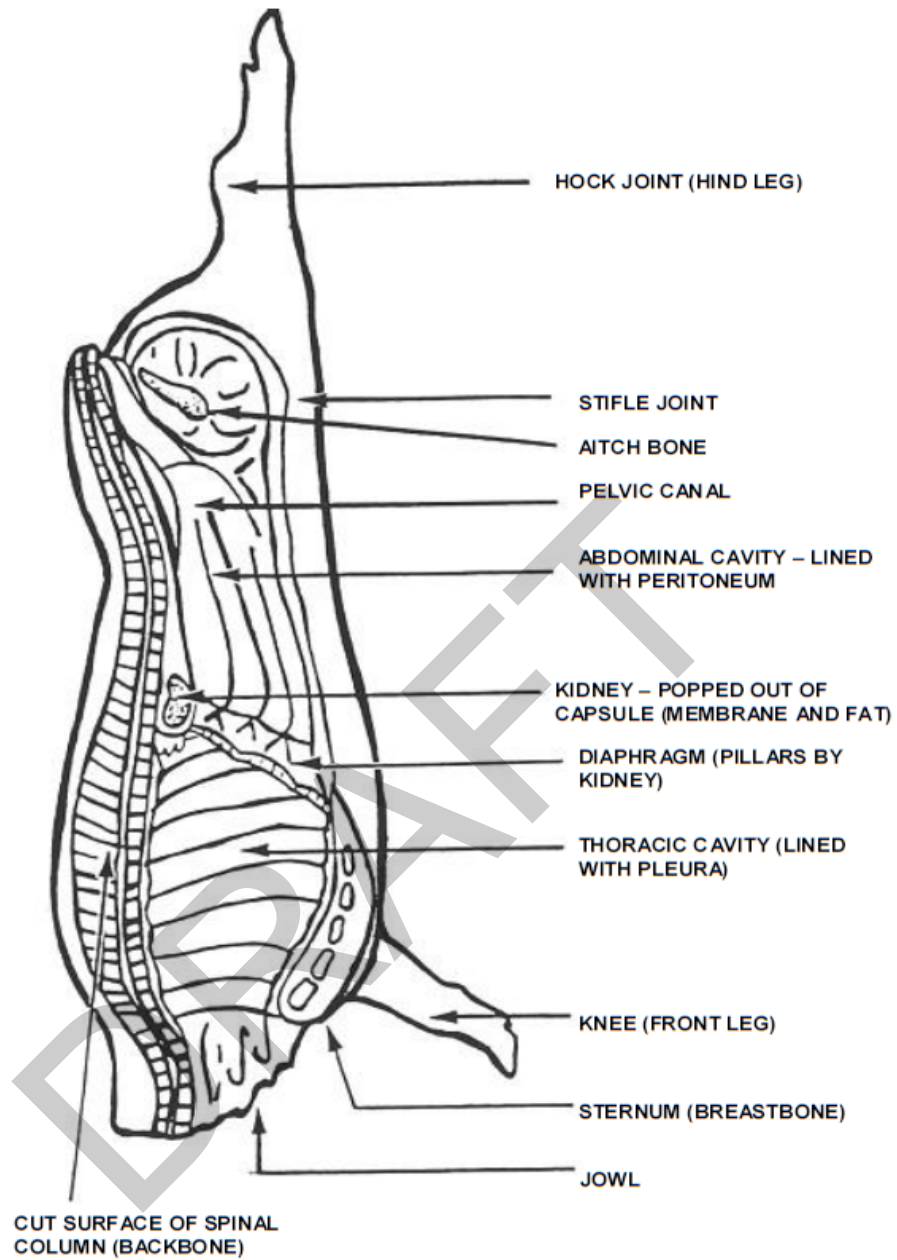
1. Carcass Number;
2. Time; and or
3. Tattoo

7. SWINE VISCERA





## 6. SWINE CARCASS - INSIDE

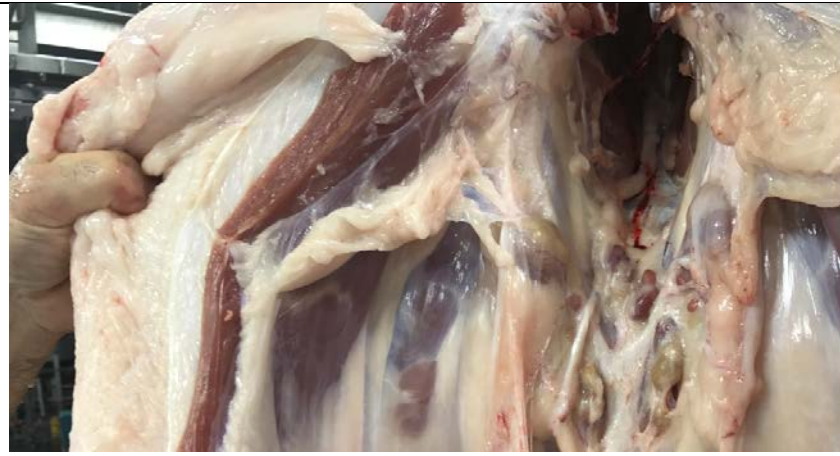




Normal Healthy Market Hog Carcass;

(Left) Pre-evisceration carcass with head attached:

(Right) Post evisceration carcass after removal of head and splitting; kidneys exposed.



Healthy market hog carcass showing pelvic canal, lower abdominal wall, leaf lard, and iliac lymph nodes.



Healthy kidneys in split carcass with capsule removed.



Thoracic inlet of healthy market hog split carcass showing ribs, vertebrae, sternum, and lymph nodes.

## **VI. MAINTAINING IDENTITY OF CARCASSES AND PARTS**

### **A. Carcasses and Parts Intended for Food**

Establishment sorters must maintain identity of carcass and associated head and viscera until the carcass, head, and viscera receive final inspection. The establishment must demonstrate that they are able to retrieve the associated head and viscera of any carcass retained at the final rail or any time before.

### **B. Carcasses and Parts Intended for Discard (Not Food)**

Establishment sorters are required to identify carcasses and parts of that passed ante-mortem inspection (i.e. passed for slaughter) and intended for discard before post-mortem inspection. Establishment personnel are to immediately denature all carcasses and parts of slaughtered livestock removed as unacceptable by plant sorters on-site, even if establishments have tanking facilities, to ensure that the carcasses and parts are properly disposed of and never enter commerce. Unless designated as naturally inedible (e.g. lungs) and normal, denaturants used by the establishment to identify carcasses or parts intended for discard and the collection of inedible parts in suitably marked containers for animal food must comply with denaturants or procedures used under traditional inspection under 9 CFR parts 325. and 416.

## **VII. SORTING FOOD SAFETY CONDITIONS AT SLAUGHTER**

Establishment sorters are expected to identify, sort, and mark for disposal market hog carcasses and all associated parts with the following food safety conditions:

1. Septicemia, Toxemia, Pyemia
2. Cysticercosis
3. Feces, Ingesta, and Milk Contamination

### **A. Septicemia**

Septicemia is a food safety condition caused by the presence of pathogenic microorganisms spread through the entire carcass by way of blood or lymphatics. Not all signs listed below will be present in every animal with septicemia.

#### **Post-mortem signs:**

1. Dark and blood filled (i.e. congestion) organs or organs Infected wounds or dark bruises;
2. Pin-point to blotchy hemorrhages (most noticeable in kidneys, heart, lungs, spleen, and serous surfaces typically 0.125 to 1.0" or greater in dimension);
3. Generalized lymphadenitis; (multiple, congested, inflamed, or enlarged lymph nodes) Lymph nodes tend to be less inflamed but more enlarged 1-2 weeks after infection develops. Multiple lymph nodes are enlarged and cut surface of lymph nodes may be reddened or pale with a rough surface;



4. Pale degeneration of tissues or organs; Carcass is thin, pale (anemic), organs are pale in color.
5. Blood that fails to clot;
6. Yellow to bloody fluid in abdominal and or thoracic cavities;
7. Injection sites (recent);
8. Edema or other evidence of acute generalized inflammation;
9. Hemorrhages under the skin, organs, and body surfaces;

**Disposal:** Sorters are to identify, sort, and mark for discard carcasses showing any sign of septicemia.

**NOTE:**

- (1) Generalized, acute lymphadenitis (hemorrhage and early enlargement of lymph nodes) alone is enough for discarding a carcass for septicemia.
- (2) A carcass manifesting any degree or form of septicemia is never passed.
- (3) Petechial hemorrhages on a normal kidney alone in a healthy carcass are not conclusive evidence of septicemia. Carcasses with true septicemia will show signs in multiple areas or systems.



Hemorrhagic lymph node associated with septicemia; Generalized lymphadenopathy may be hemorrhagic or enlarged or both.





Carcass showing signs of septicemia involving multiple organs; Note hemorrhages and swelling of membranes covering heart, and organs themselves.



Swollen enlarged kidney with hemorrhages and scars compatible with a septicemia

## B. Toxemia

Related to septicemia, toxemia (i.e. toxins *in the blood*) is a food safety condition caused by the circulation of toxins produced by pathogenic microorganisms or resulting from the death of microorganisms or tissues by way of the blood or lymphatics. Not all signs listed below will be present in every animal with toxemia.

### Post-mortem signs:

1. Petechial or ecchymotic hemorrhage (most noticeable in kidneys, epicardium, lungs, and serous surfaces);
2. Generalized, acute lymphadenitis;
3. Pale enlarged organs; large or shrunken spleen;
4. Pale degeneration of tissues or organs;
5. Pigmentation of fat; slight icterus and/or anemia;

6. Presence of areas of tissue necrosis, red-brown to yellow color to tissues and organs and fat.
7. Above changes associated with decomposing tissue (e.g. splenic torsion, liver or lung necrosis, or dead autolyzing fetus.)

**Disposal:** All carcasses and parts with any signs of toxemia are to be identified, sorted, and marked for discard.

Note: Signs of toxemia can appear in varying degrees in carcasses with septicemia. A septicemia, a toxemia, or both may simultaneously occur in cases of diseases like septic mastitis, metritis, or arthritis.

DRAFT

## C. Pyemia

Pyemia (i.e. pus forming bacteria in the blood) is a food safety condition. Pus forming bacteria from wounds or injuries enter the bloodstream and form abscesses in the lungs, joints, or throughout the body.

### Post-mortem signs:

1. Infected wound; swollen joint or joints with any of the following:
2. Multiple abscesses in lungs with changes in visceral organs;
3. Hemorrhages in lungs, and visceral organs; Small abscesses (1mm) in lungs are recent and do not have capsules.
4. Degeneration of tissues or organs with multiple small abscesses in lungs
5. Multiple enlarged or inflamed or swollen lymph nodes.

### Special Notes:

- (1) Neoplasia may appear as a large abscess with a thick capsule seen with old localized abscesses.
- (2) Tuberculosis may appear as a purulent gritty abscess in certain situations.
- (3) Although a pyemia may have caused them, multiple, localized, encapsulated abscesses about the body should not be confused with an active pyemia.

**Disposal:** *All carcasses with pyemia (9 CFR 311.16 and 311.17) are discarded as evidenced by:*

1. Presence of generalized or multiple large or small abscesses via blood or lymph circulation.
2. Abscesses associated with lesions of septicemia as outlined in septicemia post-mortem findings.



Micro-abscesses in heart, joint; spleen, and kidney suggesting a pyemia.

#### D. Cysticercosis of Swine (Pork Measles)

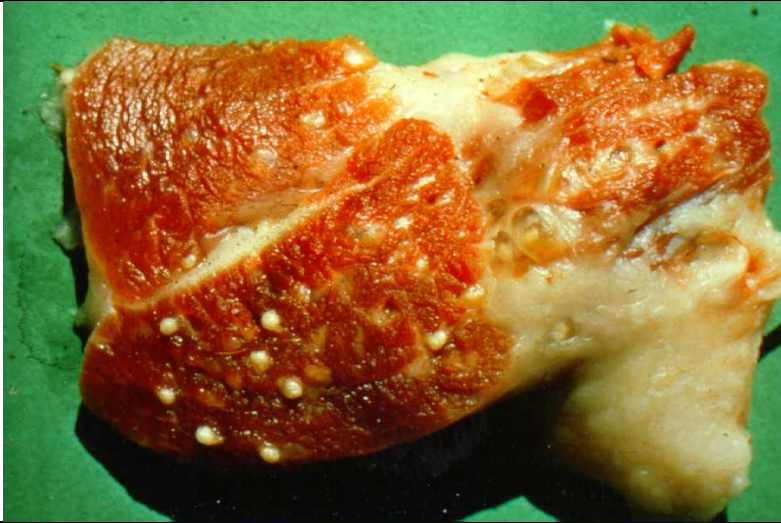
*Cysticercosis* (pork measles) is a parasitic condition transmissible to man and therefore, of public health concern. Cysticercosis cysts are the larval form (i.e. cysts) of the tapeworm *Taenia soleum*. Cysticercosis is very rare in market hogs raised under modern and hygienic animal production methods but could reappear at any time depending on the supplier. Cysticercosis is a reportable disease (i.e. requires notification of APHIS). Cysticercosis should be considered any time multiple small cysts are observed in large muscle cuts, heart, diaphragm, weasand. In pork, the heart seems to be the most common site (9 CFR 311.24).

##### Post-mortem signs:

1. Muscle is edematous or discolored;
2. One to several dozen cysts in muscle of heart, tongue, esophagus (i.e. weasand), or carcass;
3. Grape-like clusters in tissue underneath the tongue or attached to heart;
4. Cysts may occasionally be found in fat and viscera.

**Disposal:** Carcasses are discarded depending on the extent of lesions and condition of carcass. Carcasses are discarded unless handled under FSIS restrictions. See 9 CFR 311.24. Lead establishment sorter should contact the PHV for assistance whenever cysts are observed in any organ or muscles.





**Figure 1 - Pork Measles (Cysticercosis) - Cysts in Muscle**



**Figure 2 - Heart muscle showing live cysts.**

#### **E. Contamination with Feces, Ingesta, or Milk**

Refer to descriptions in [FSIS Directive 6420.2](#).

### **III. OTHER CONDITIONS REQUIRING SORTING**

This section provides guidance relative to the most common abnormal conditions seen in market hogs that are not directly associated with food safety but require sorting, trimming, or disposal depending on the nature, degree, or extent of the condition.

#### **A. Abscess**

Abscesses in the lymph nodes must be differentiated from granulomas (e.g. tuberculosis [TB]) and malignant lymphomas. Abscesses in the neck or jowl may originate from old injection

sites. Abscesses in the spine may originate from previously infected tail-bite wounds. Abscesses in swine typically have a thick wall surrounding a yellow creamy pus filled center. Pus can be pinkish to white in color depending on the agent. Abscesses may be found anywhere on the carcass, joint, bone, or visceral organ (9 CFR 311.14). Abscesses in the lung often result walling off of a lung lobe destroyed by pneumonia. Abscesses must be differentiated from pyemia where pyogenic microorganisms are distributed by the blood.

**Post-mortem signs:**

1. Abscesses in various parts of the carcass or organs;
2. Abscess capsules may be thin (active; recent) or thick (more chronic). Pus may have any texture and color is mostly yellow, rarely red-brown, greenish-white to white in color;
3. Enlarged lymph nodes identified as localized, acute or chronic, reactive, or edematous lymphadenitis draining the affected area.

**Disposal:**

**Heads:**

When sorters find slight abscesses in market hog heads, they are to identify the abscess and associated lymph nodes for trimming prior to inspection (9 CFR 311.14).

**Carcass:**

Carcasses affected with localized abscesses are identified for disposal and presented for inspection prior to discarding (9 CFR 311.16). Carcasses affected with multiple abscesses to the extent that all of them could not be removed with a high degree of certainty are to be discarded.

Carcasses not meeting the criteria for discard may be presented for inspection after identification of or removal of affected parts under inspection supervision.

**Special Notes:**

Multiple isolated abscesses in an otherwise healthy carcass is not to be confused with pyemia

Abscesses may be mistaken for other conditions:

- (1) Large old tumors may have a necrotic center. Old lymphomas may have a dry bright yellow center up to 1" in diameter that may appear as an old chronic abscess.
- (2) Fungal granulomas and classic TB may appear as a thick or grainy abscess of 1-3mm in size. All granulomatous (grainy abscess) abscesses or lesions should be held for further examination by the PHV.
- (3) Non-TB abscess in the jowl often has scar tissue surrounding the lymph node. Contamination from abscesses in the head or neck abscess must be trimmed and discarded under inspection supervision.

**B. Arthritis**

Arthritis is the inflammation of joint tissues that may be traumatic (blood joint fluid) or infectious in origin.

**Post-mortem signs:**

:

1. Enlarged joints;
2. Reactive or congested regional lymph nodes that drain the affected joint;
3. Degeneration of tissues or organs;
4. Associated lesions of another septic condition that may have predisposed to arthritis;
5. Character of exudate in joints:
  - Increased amount of joint fluid
  - Blood-tinged joint fluid
  - Cloudy Red to yellow orange joint fluid.

**Special Notes:**

(1) Increased amount of joint fluid is often associated with injury such as being confined on concrete or being hauled long distances to market. Often this fluid is clear but may show signs of fresh blood when associated with trauma. Fresh watery bloody joint fluid without evidence of creamy, fibrinous or purulent exudate would be more indicative of trauma than infection.

(2) As far as carcass disposal is concerned, the type of exudate present in the joints is not the primary consideration; whether or not the condition is generalized (systemic) is of most public health importance.

**Disposal:**

Sorters are to identify any carcass with arthritis and showing septic or other systemic or generalized poor condition for discard (9 CFR 311.7)

Carcasses with localized arthritis not meeting the above criteria for discard may be presented for inspection after identification of or removal of affected parts under inspection supervision.

**Special Notes:**

(1) The tarsal (hock) joints of market hogs carcasses affected with localized arthritis may be removed on the pork cut if the joint is bone solid without evidence of pus or tracks.

(2) Discard of carcasses is not based on the number of affected joints but the condition of the joints. If the arthritis is localized and can be removed by trimming, the joint should be condemned and removed along with draining lymph nodes and the carcass passed for food.

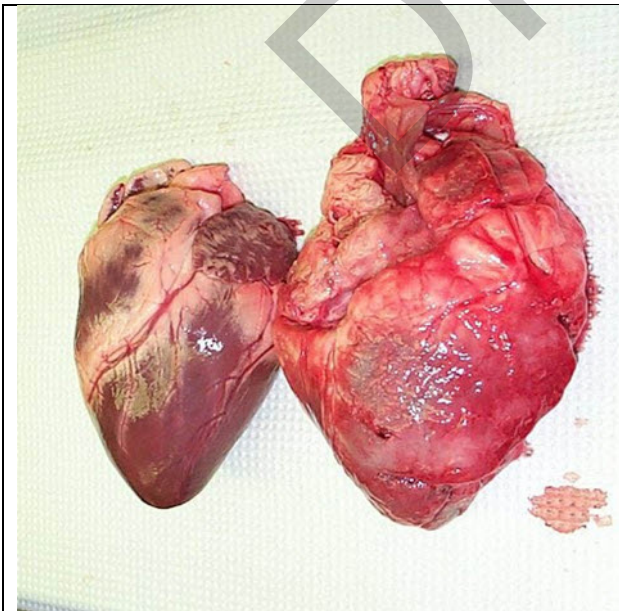
(3) Avoid opening arthritic joints on the carcass. This is done to avoid inevitable contamination of edible product with joint exudate. (9 CFR 311.7)



Inflammation of Hock Bone or Joint- abscess or arthritis likely; Pyemia possible

### C. Pericarditis

Pericarditis is an inflammatory condition of the heart sac (pericardium) that is usually due to an infectious agent. When limited to the heart (i.e. localized) and chronic (adhesions of the pericardial sac to the surface or wall of the heart), the heart and pericardium is identified for discard and the remaining carcass and parts are presented for inspection.



Normal heart next to an enlarged heart with a mild inflamed heart surface with epicarditis or pericarditis (multiple surfaces).

**Post-mortem signs:**



1. Adhesions of pericardium and pleura covering ribs or lungs – normal to inflamed red in color.
2. Sero-fibrinous or fibrinous pericarditis or epicarditis (shaggy heart);
3. Edema of body tissues and fluid accumulations (ascites, pleural effusion);
4. Putrefactive odor of cut-surface of pericardial, abdominal, or thoracic lesion.

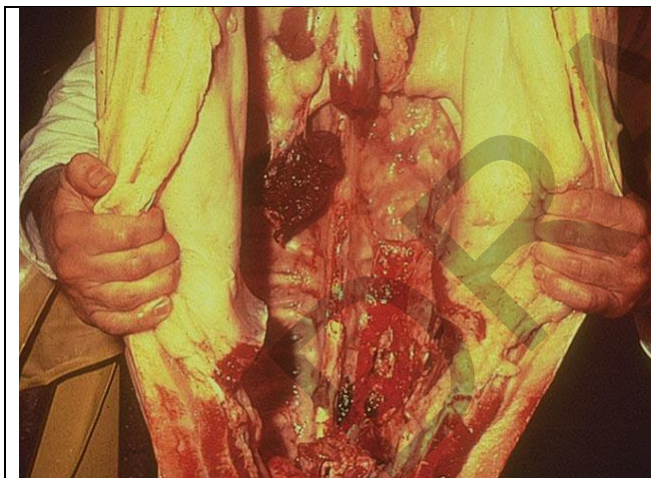
Post-mortem disposition (9 CFR 311.16)

**Disposal:** Sorters are to identify carcasses with reddened (inflamed) or bloody pus on heart sac associated with multiple other carcass changes for disposal. Carcasses not meeting the criteria for discard may be presented for inspection after identification of or removal of affected parts under inspection supervision.

Note: Inflammation of the heart valve(s) is “endocarditis” and may be associated with septicemia, pyemia, or previous pneumonia.

#### D. Pleuritis

Pleuritis is an inflammatory condition of the pleural (lung and ribs) lining due primarily to infectious agents. It is often associated with pleuritis.



Notice normal and inflamed lungs attached to ribcage.

#### Post-mortem signs:

1. Adhesions between lungs, heart and ribs;
2. Fluid in the chest cavity;
3. Reddened to enlarged lymph nodes within the chest;

Special Note: Pleuritis can be associated with pneumonia or be a separate entity.

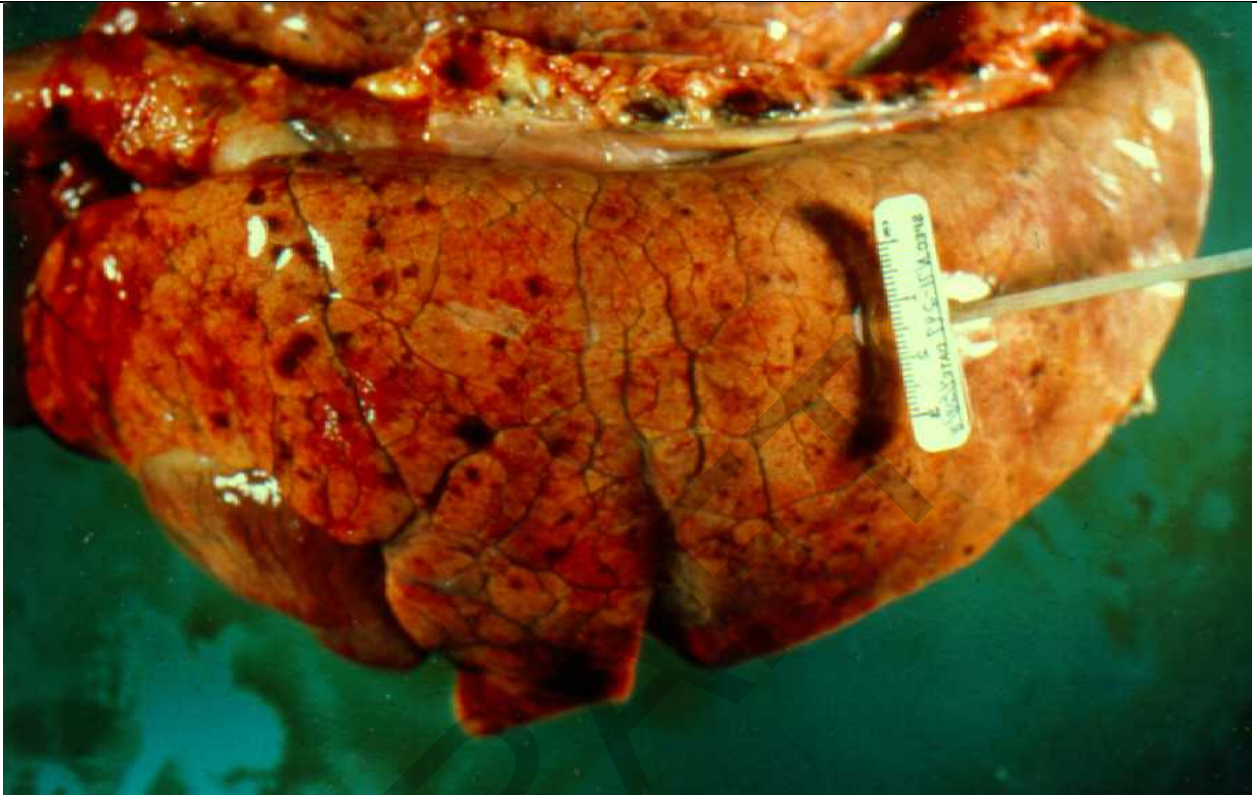
**Disposal:** Sorters are to identify the following carcasses for discard:

1. Extensive, reddened lungs and surface of the ribs;
2. Same with reactive or congested (reddened) lymph nodes draining lungs; heart, and ribs and body;

Carcasses with localized, chronic or healed adhesions may be "peeled out".

## E. Pneumonia

Pneumonia is an inflammatory condition of the lungs that may be caused by infectious agents, parasites, physical trauma, or foreign material inhalation.



Pulmonary hemorrhage, edema - Check for signs of septicemia

### Post-mortem signs:

1. Lungs may be reddened to grayish in color;
2. Lymph nodes draining lungs may be swollen, hemorrhagic, or enlarged;
3. Changes in color, size, or shape of liver, spleen, and kidneys;
4. Hemorrhages (spots) on lungs, kidneys, viscera, or carcass;
5. Consolidation of lung lobe into a thick walled abscess; or
6. Parasites.

**Disposal:** Sorters are to identify for discard any and all carcasses with signs of acute, systemic or generalized pneumonia including:

1. Heavy, red, inflamed lungs with reactive inflamed lymph nodes;
2. Red, inflamed adhesions on ribs;
3. Changes in color, size, shape of kidneys; spleen, viscera;
4. Pale or anemic carcass
5. Marked pulmonary necrosis (abscess) with associated toxemic changes.

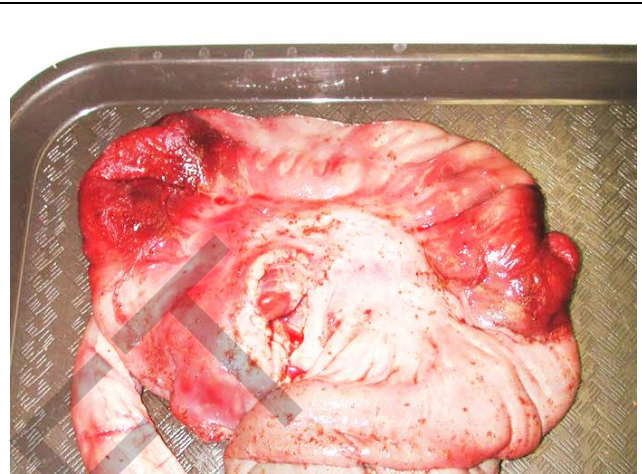
Carcasses not meeting the criteria for discard may be presented for inspection after identification of or removal of affected parts under inspection supervision.

## F. Peritonitis

Peritonitis is a common condition marked by inflammatory processes affecting the peritoneal lining which is usually caused by infectious agents although it can be initiated by intraperitoneal medications, ruptured bladder, or other irritants.



Notice the discoloration of the leaf lard suggesting a peritonitis.



Here is an inflamed and distended loop of intestine with congested mesenteric lymph nodes from a carcass that may have an associated peritonitis.

### Post-mortem signs:

1. Gastroenteritis - pathologic hemorrhage in stomach, intestines, abdominal organs, or walls;
2. Generalized, acute lymphadenitis;
3. Degeneration of tissues or organs;
4. Accumulation of fluid in abdominal cavity.



**Disposal:** Sorters are to identify for discard carcasses with the following

1. When there is an acute diffuse peritonitis without generalized changes;
2. Peritonitis associated with generalized changes.

Carcasses not meeting the criteria for discard may be presented for inspection after identification of or removal of affected parts under inspection supervision.

### **G. Gastroenteritis**

Gastroenteritis is Inflammation of stomach or intestine.



Notice the enlarged, darkened, blood filled loops of intestine and enlarged darken spleen.

### **Post-mortem signs:**

1. Inflammation of stomach or intestine and draining lymph nodes;
2. Dark, blood-filled intestinal loops;
3. Gangrenous stomach or intestine;

4. Intestinal emphysema (foamy intestines)
5. Thickened “garden-hose” intestine.

**Disposal:** Sorters are to identify for discard any carcass where there is:

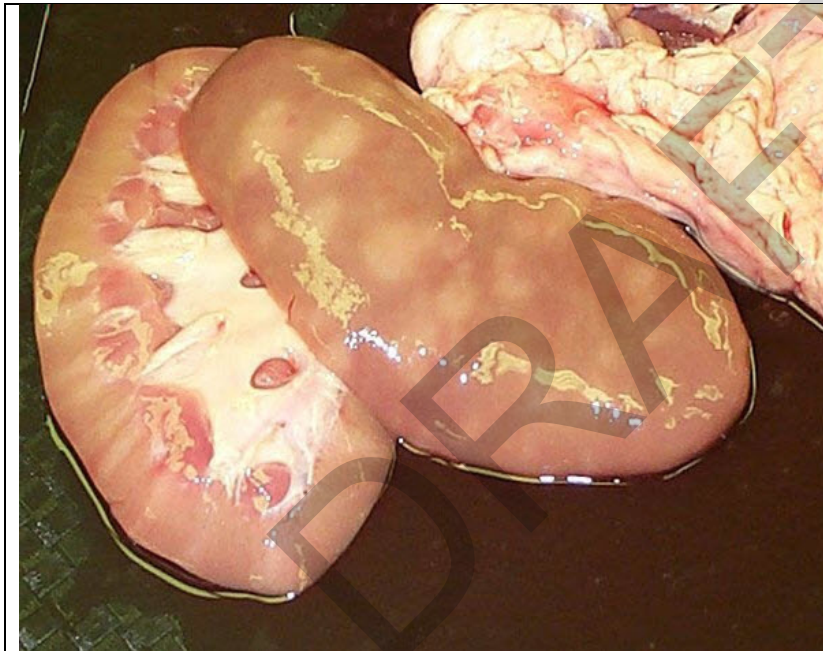
1. Acute, extensive hemorrhagic or gangrenous enteritis
2. Any degree of gastroenteritis with generalized (systemic) changes.

Carcasses not meeting the criteria for discard may be presented for inspection after identification of and removal of affected parts under inspection supervision.

**Special Note:** Sorters should notify the PHV whenever multiple carcasses from the same lot show signs of gastroenteritis.

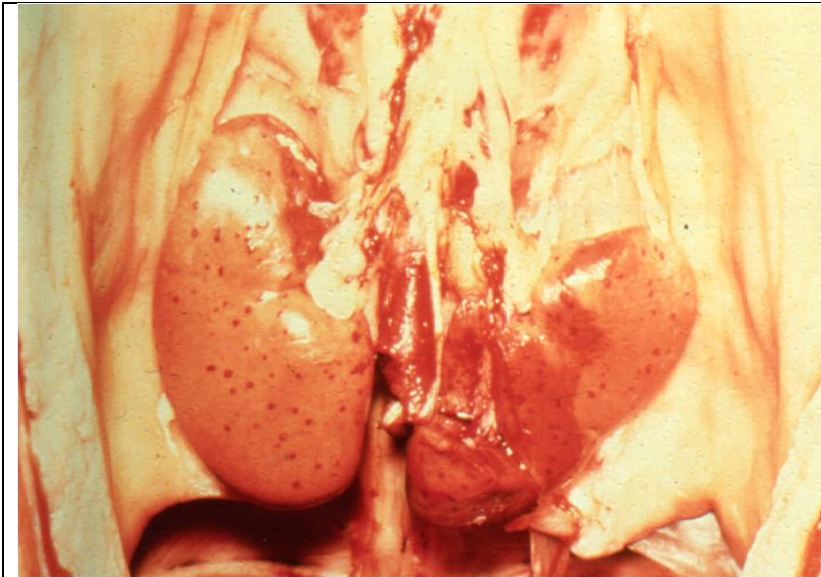
## H. Nephritis

Nephritis is an inflammatory condition of the kidneys. Etiologies may include infectious agents, parasites, or toxins.



Notice the raised pale plaques on the surface of the swollen edematous kidney. Notice the striations that run from the center to the outer cortex of the kidney.

Kidneys have white spots raised or flattened and show up as white streaks on cut surface. To differentiate from lymphoma, look for evidence of lymphoma in other tissues. Laboratory assistance may be required.



Acute interstitial nephritis – a type of inflammation of the kidneys from bacteria in blood or urinary tract. Check for evidence of septicemia in carcass

Notice the pale enlarged kidneys with hemorrhages on the surface. Look for changes in lymph nodes and other organs in the carcass.



Chronic interstitial nephritis – Look for anemia or uremia in carcass

1) Carcasses with chronic interstitial nephritis—white, firm, depressed, or pitted kidneys—should be passed for food, if there are no generalized changes (anemia; uremia) , after condemnation of and removal of abnormal tissues.



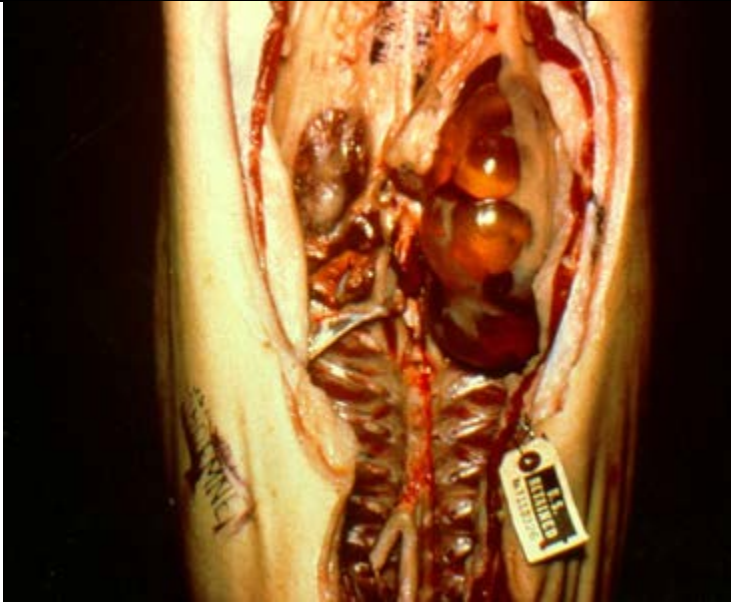


Pyelonephritis – Chronic inflammation of the ureter and kidney; Kidney virtually destroyed – Check carcass for anemia and uremia



Benign Embryonal Nephroma; a congenital kidney tumor

Congenital kidney tumor in swine (i.e. embryonal nephroma). Trim and pass.



Carcass with Cystic Kidneys and Normal Kidney Tissue

(2) Hydronephrosis and extensively cystic kidneys do not warrant condemnation of the carcass in the absence of uremia when no generalized changes are present. All abnormal tissues should be condemned and removed.

Hydronephrosis--one of both kidneys literally become a "bag of water". Normal kidney tissue is replaced by fluid. There is generally no effect upon the carcass. Affected kidneys are removed and condemned.

#### Post-mortem signs:

1. Inflammation, enlargement, pathological hemorrhage, or change of color in kidney;
2. Multiple abscesses of entire kidney;
3. Pyelonephritis-- accumulation of pus in the ureters and into the kidney;
4. Degeneration of tissues, organs, and lymph nodes;
5. Carcass and tissue edema from protein loss in blood;
6. Uremic odor of carcass, indicating uremia;

Special Note: Certain conditions should not be confused with primary nephritis:

- (1) Kidney worms;
- (2) Urinary obstructions (kidney or bladder stones);
- (3) Infarcts;
- (4) Neoplasms (See embryonal nephromas and malignant lymphomas);
- (5) Cystic water filled kidneys;
- (7) Traumatic injuries;
- (8) Depressed white areas—scars resulting from previous infarcts or nephritis.

**Disposal:** Sorters are to identify for discard carcasses with:

1. Nephritis (acute or chronic) associated with generalized lesions or disease;
2. Pyelonephritis (dilated ureter and kidney) associated with generalized changes;



### 3. Uremia associated with any stage or type of nephritis.

Carcasses not meeting the criteria for discard may be presented for inspection after identification of or removal of affected parts under inspection supervision.

#### I. Uremia

Uremia literally means urine in the blood. Uremia may occur when the kidneys acutely fail to remove nitrogen (ammonia) waste materials in the blood. This can occur after kidneys are temporarily or permanently damaged after total destruction of the kidneys over time.

##### Post-mortem signs:

1. Hydrothorax;
2. Ascites or edema in the abdominal cavity;
3. Fluid in all body tissues with lack of inflammatory process;
4. Nephritis or pyelonephritis;
5. Peritonitis;
6. Cystitis;
7. Kidney stones;
8. Hydronephrosis;
9. Carcass edema and reddening;
10. Uremic odor to muscles;
11. Ruptured urinary bladder with peritonitis.

##### Special Notes:

- (1) If there is evidence of a localized urine odor in tissues, this area should be trimmed
- (2) It is possible that a ruptured bladder can result from faulty dressing procedures. Such contaminated areas should be thoroughly trimmed and condemned.

**Disposal:** Sorters are to identify for discard carcasses with uremia associated with any stage or type of nephritis. Carcasses not meeting the criteria for discard may be presented for inspection.

#### J. Tuberculosis (TB)

Swine tuberculosis is an increasingly rare condition associated with the ingestion of pathogenic acid-fast organisms, almost exclusively identified as *Mycobacterium avium*. *M. avium* is known to be ubiquitous in the environment. The most recent infections have been historically associated with exposure to organic bedding and birds. FSIS slaughter data has shown the prevalence of *M. avium* in market hogs has steadily decreased. It is believed such a decrease can be attributed to the lack of exposure to organic bedding and birds and improved biosecurity methods associated with modern production practices raising market hogs indoors. Establishment management, sorters, and IPP cannot make the same assumptions when market hogs are raised under other circumstances (e.g. free range).

Sorters should be aware that TB lesions are most likely to be found in one or more parts of the carcass referred to as the "primary seats". The primary seats of TB lesions in the market hog carcass are the mandibular, the mesenteric, and the bronchial lymph nodes. TB lesions in

swine have historically been identified through the incision of the mandibular lymph nodes and palpation of mesenteric, portal, and bronchial lymph nodes.

### **Post-mortem Signs:**

1. Increasingly rare, TB granulomas typically appear in incised lymph nodes as small grains of sand or small abscesses 0.5-2 mm in diameter;
2. When found in the mesenteric lymph nodes, they may appear as small abscesses just below the surface of the mesentery along the mesenteric lymph node chain.

**Disposal:** Sorters are to identify carcasses where heads with TB lesions in mandibular lymph nodes were identified for disposal. After discarding the head and identification of the carcass that a presumptive TB lesion in the head was found, such identification should alert viscera sorters to perform closer examination of the mesenteric lymph nodes for evidence of TB. If lesions are found in the mesenteric lymph nodes, the sorters should identify the carcass and viscera for closer examination by the lead sorter. Carcasses with generalized TB lesions as demonstrated with lesions in 3 primary seats or outside of the primary seats (e.g. in muscle, joint, or organ) are to be discarded. If lesions are located in two or more primary sites, the carcass and viscera must be held for further sorting. Upon inspection, a carcass with TB lesions in two primary sites may be passed for cooking (i.e., Passed for Cooking only). Depending on the distribution of lesions, upon inspection, the PHV may pass for cooking or condemn the carcass and all parts (9 CFR 311.2). The PHV can assist with the final disposition of any TB carcass.

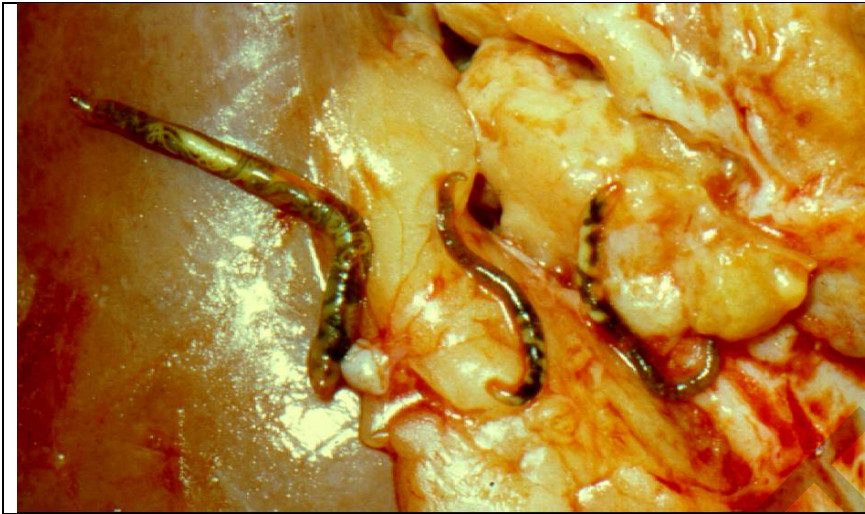


A lymph node showing multiple diffuse TB lesions

### **K. Parasites Not Transmissible to Man**

1. Stephanuriasis (Swine Kidney Worms)

Stephanuriasis is a rare parasitic condition due to the presence of *Stephanurus dentatus* in the carcass tissues. This condition is most likely seen in swine raised outdoors in the South Atlantic and South Central parts of the United States. This parasite is not known to be transmissible to man.



Kidney Worms

#### Post-mortem signs:

1. Adult kidney worms

Lesions include:

- a. Pelvic inlet, pelvic and femoral canal
- b. Abdominal lining
- c. Muscle-primarily loin and ham muscles
- d. Organs-primarily kidney, liver, pancreas, spleen, and lungs
- e. Brownish-lemon color of skin and fat
- f. See Figure 10 above.

#### Special Notes:

(1) The larvae migrate to tissues surrounding the kidneys, form cysts and abscesses, and develop to adulthood. The area around the kidneys often appears reddish-brown, and the cysts contain a creamy to reddish-brown colored substance. It is even possible to palpate cord-like masses in the kidney fat, which are tracts made during migration.

(2) In the liver, there are sometimes multiple extensive orange-tan hemorrhagic areas, with the liver parenchyma later taking on a mahogany color. Usually abscessation occurs where the larvae have been trapped. Also, severe scarring results where abscessation has occurred.

Post-mortem disposition

**Disposal:** Sorters are to identify carcasses for discard when a parasitic infestation is associated with generalized disease, such as uremia or septicemia. Carcasses with numerous or extensive lesions are to be discarded. For moderate infestations, carcasses may be passed for cooking after extensive trimming. Detailed examination is needed.

Note: FSIS training describes detailed examination procedures for this condition. Consult the PHV when this condition is suspected. When a carcass is retained for stephanuriasis on regular inspection, the PHV may find it necessary and helpful to perform the following examination:

- (1) Re-examine the carcass and organs by incision into the liver, lungs, spleen, pancreas, kidney, and areas surrounding the kidney region.
- (2) Upon finding numerous lesions during (1), make a lengthwise incision into each ham and loin. If no lesions are found, no further incisions are necessary. Check in particular the femoral and pelvic canal.
- (3) If abscesses are found in the loin, make additional incisions into the loin and ham. Check all body cavities.

See 9 CFR 311.25 for additional conditions affecting the disposal of carcasses infested with parasites not known to be transmissible to man. Carcasses that do not meet the criteria for discard, and are not eligible for cooking, may be presented for inspection after identification of or removal of affected parts under FSIS inspection supervision.

## 2. Ascarids (Roundworms)

Adult roundworms, *Ascaris suum*, may be observed in the intestines, bile ducts, and gall bladders of market hogs. Larval migration of ascarids causes "milk spots" on pork livers and damage to lungs. "Slight" scarring may be trimmed (spotting the liver). More than slight evidence of ascarids requires the liver to be condemned. (9 CFR 311.25(a))

Affected intestines with infestations of roundworms are identified for discard. Carcasses not meeting the criteria for discard or eligible for cooking may be presented for inspection after identification of or removal of affected parts under inspection supervision.

## L. Miscellaneous Skin Conditions

Skin conditions are varied and many are very nonspecific, including conditions such as dermatitis, erythema, urticaria, and photosensitization.

### Post-mortem signs:

1. Dermatitis;
2. Mange; Sarcoptic, scabs with general areas of reddened, itchy or thickened skin;
3. Generalized lymphadenitis;
4. Tissue or organ degeneration;
5. Petechiae or ecchymotic hemorrhages in tissues, organs, or skin;

Special Notes: There are conditions that might be confused with skin disease:

- (1) Market hogs over-scalded as a result of being in the scald vat for too long or at too high a temperature;
- (2) Erythema and bruising caused by improper ante-mortem handling;
- (3) Frost-bite;
- (4) Hemophilic infection, fungal infections;
- (5) Vesicular diseases (FMD, SVV)
- (6) Swine Circovirus.

**Disposal:** Sorters are to identify for discard market hog carcasses with extensive skin lesions and associated generalized or systemic changes. Carcasses not meeting the criteria for discard may be presented for inspection after identification of or removal of affected parts under inspection supervision.



Ringworm (fungal dermatitis)



Vesicles (Blisters) - Of vesicular diseases, Foot and Mouth Disease (FMD) vesicles (blisters) on snout; Check tongue, feet, nipples. FMD is a foreign animal disease (FAD).

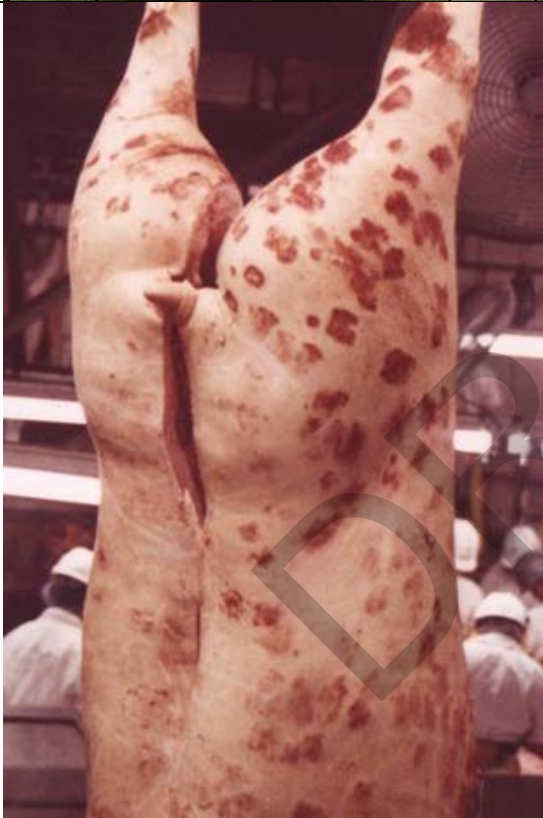


### M. Diamond Skin –Skin Form of Swine Erysipelas

Erysipelas is a disease of market hogs caused by the organism *Erysipelothrix rhusiopathiae*. A chronic form of erysipelas is recognized as “diamond skin” disease.



Diamond shaped skin lesions



Diamond shaped skin lesions



Diamond shaped skin lesions

### Post-mortem Signs:

:

1. Diamond Skin lesions, which may vary from acute to chronic.
2. Arthritis;
3. In acute disease, generalized lymphadenitis;
4. Petechial hemorrhage may be noticeable in lungs, kidneys, heart, or on outer surfaces;
5. Degeneration of tissues or organs;
6. Vegetative valvular endocarditis;

**Disposal:** Sorters are to identify for discard carcasses with the following signs (9 CFR 311.5 and 311.6):

1. Numerous deep dark diamond skin lesions;
2. Petechial hemorrhages in the kidneys;
3. Hemorrhagic and congested lymph nodes;
4. Degeneration of organs;

Carcasses not meeting the criteria for discard may be presented for inspection after identification of or removal of affected parts under inspection supervision.

Special Note: "Diamond skin" is a common name for chronic stages of erysipelas in market hogs with chronic diamond skin lesions. When the lesions are limited to just the skin, as often the case, the skin lesion may be trimmed, and the carcass may then be represented for inspection.

### N. Fractures, Bruises, and Injuries, Septic and Non-Septic

#### Post-mortem signs:

1. Bruises, injuries, or fracture with hemorrhage into the tissues and involving regional or carcass lymph nodes;
2. Septic or toxic changes to organs;
3. Gangrene, strong odor;
4. Injection lesions;
5. Bruise showing hemorrhagic regional lymph nodes;
6. Brownish or dark discoloration of body tissues over whole carcass;
7. Post-mortem rib fractures.

## Disposal:

Sorters are to identify for discard, carcasses showing:

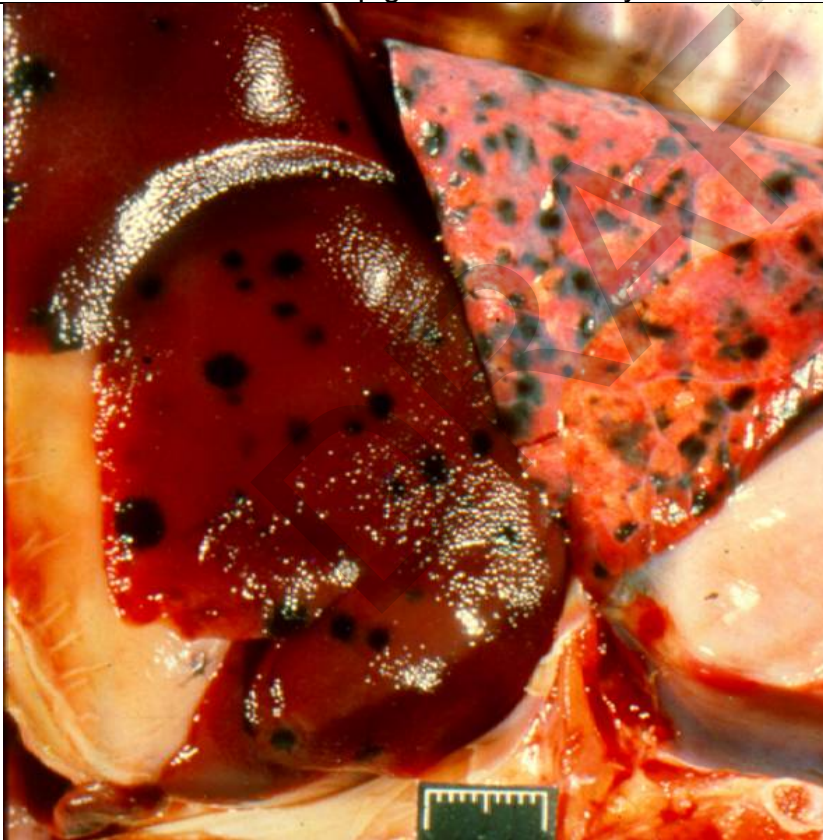
1. Extensive, generalized bruising, discoloration that cannot be removed by trimming;
2. Septic Bruising or injuries that show associated systemic changes of septicemia or toxemia.

Carcasses not meeting the criteria for discard may be presented for inspection after identification of or removal of affected parts under inspection supervision. Small localized superficial bruises or post-mortem fractures may be removed from the carcass by trimming before or after final inspection subject to written procedures acceptable to the PHV.

Note: Post-mortem fractures have no evidence of hemorrhage near the fracture site. Post-mortem fractures, slight bruises, and healed rib fractures can be removed on the cut floor. Contact the PHV for specifics relative to procedures in your establishment.

## O. Melanomas vs. Melanosis

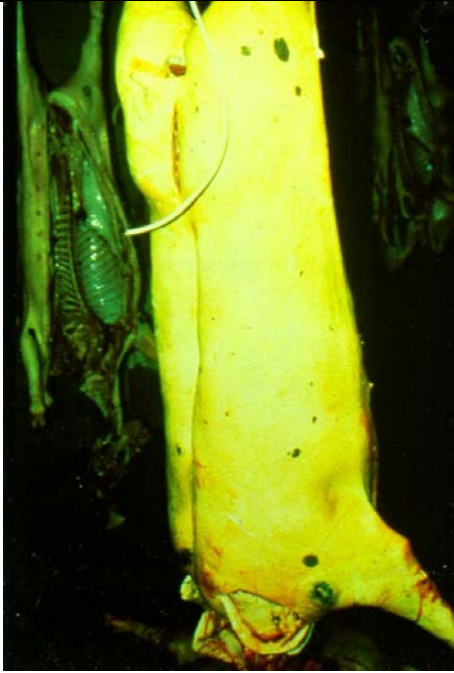
Melanin is a normal black pigment of the body.



Melanosis (Pigmentation) of lung and liver tissue;

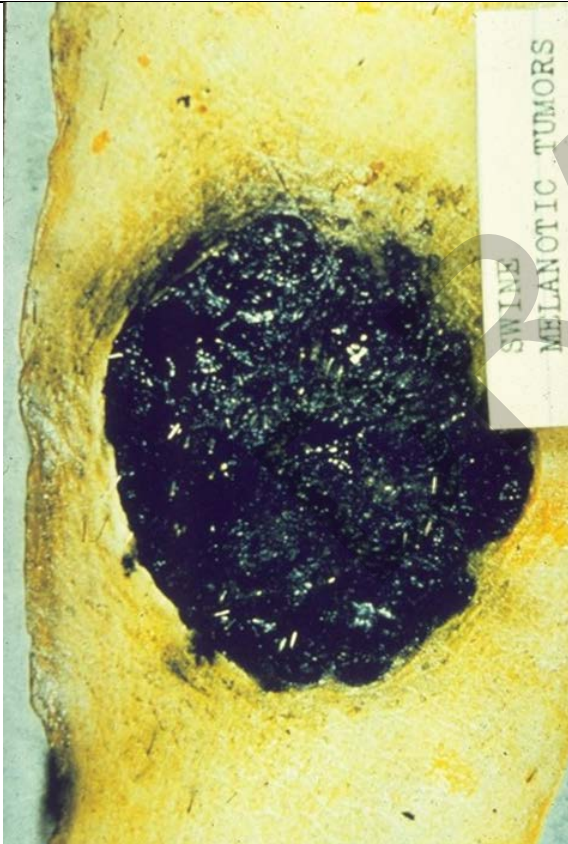
Melanosis is excessive melanin deposits or deposits in abnormal locations. Melanosis typically can be found in the lungs, spinal dura, skin, or lymph nodes draining other melanomas or melanin pockets. Such deposits must be removed from product for human food purposes.





Carcass with melanotic skin lesions; check all draining lymph nodes!

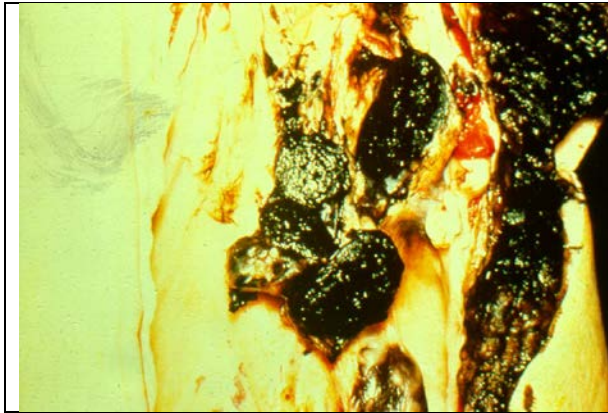
Black tumors may be seen in the skin of any species. In market hogs these most often might be seen at the base of the ears, mid-back, tail-head and flanks. Certain breeds of market hogs are particularly prone to have melanosis and melanotic tumors. Laboratory analysis can be helpful in differentiating the benign and malignant melanomas.



Melanoma (benign or malignant tumor)

Melanomas are tumors consisting of melanin producing cells. Malignant tumors show evidence of metastasis in draining lymph nodes. Melanoma is a neoplasia of the naturally occurring melanocytes in the skin. Benign lesions (melanocytomas) and malignant lesions (malignant melanoma) occur, and these must be differentiated from melanosis. Laboratory analysis can help.





Pigmentation of lymph nodes; possible tumor

### Post-mortem signs:

1. Melanin pigment in lungs, liver; lymph nodes, or other organs;
2. Melanin in skin;
3. Melanin in sclera of eye;
4. Melanin associated with inflammation;
5. Metastasis (i.e. multiple tumors) to regional lymph nodes;
6. Metastasis to the lungs;
7. Metastasis to the liver, spleen, and other internal organs.

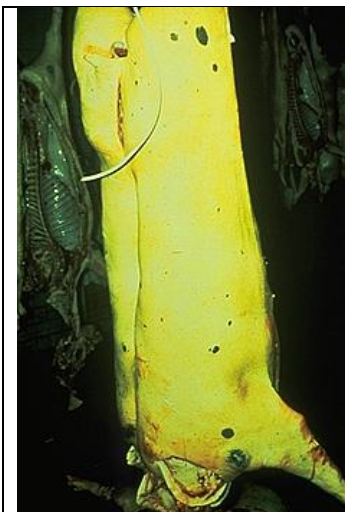
**Disposal:** Sorters are to identify for discard carcasses with:

1. Generalized pigmentary deposits (9 CFR 311.13);
2. When melanin cannot be removed or its removal is impractical, or when it renders a carcass, organ, or part unfit for human food, the affected carcass, organ, or part shall be condemned.
3. If there is evidence of abnormal tumor growth (i.e. metastasis) or that the general condition of the animal has been adversely affected by the size, position, or nature of the tumor(s) (9 CFR 311.11(a)).

Special Note: Slight melanin deposits in spinal cord sheath (meninges) are normal. When including surface of the bones, the pigmented tissue must be removed as its appearance does not meet consumer expectations. Uniform melanin deposits over or in circumscribed skin areas of market hogs are not required to be removed unless they are tumorous or smeary.

### P. Icterus (Jaundice)

Icterus represents an abnormal accumulation of yellowish bile pigments associated with breakdown of the blood and stored in liver cells or gall bladder.



Notice melanotic patches of skin on carcass. Check draining lymph nodes and viscera for evidence of melanosis or metastasis.

### Post-mortem signs:

1. Degenerative changes in liver (e.g. pale, enlarged) and/or darkened spleen.
2. Lemon-yellow discoloration of connective tissues that are normally very white or pale including:
  - a. Sclera (white part) of the eye;
  - b. Tendons,
  - c. Pleura (lining of the chest cavity);
  - d. Peritoneum (lining of the abdominal cavity);
  - e. Omentum (tissue that extends from the stomach to the adjacent organs in the abdominal cavity);
  - f. Cut surface of abdominal wall fat;
  - g. Joint surfaces, or
  - h. Mesentery (fold of tissue attaching small intestines to the body wall).

**Disposal:** Sorters are to identify for discard carcasses that are icteric (9 CFR 311.19). Carcasses not meeting the criteria for discard are not icteric and may be presented for inspection. Such pigmentation may be from other causes.

NOTE: Arrangements to hold icteric carcasses in the cooler pending final disposition are made with the PHV.

### Q. Embryonal nephroma

Embryonal nephromas are rough fibrous raised tumors of the kidney. Generally, they are benign tumors and occur more commonly in young animals. Carcasses not meeting the criteria for discard may be presented for inspection after identification of or removal of affected parts for disposal under inspection supervision.



Benign Embryonal Nephroma; a congenital kidney tumor

Congenital kidney tumor in swine (i.e. embryonal nephroma). Trim and pass.

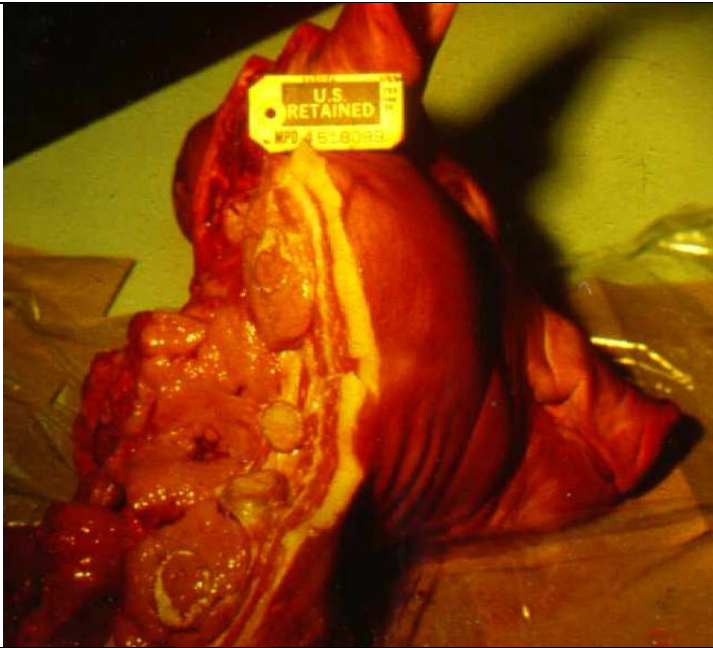
## R. Malignant Lymphoma

Lymphoma is a neoplastic condition of the lymphocytes and is by its very nature considered to be malignant. There are many manifestations of the disease, which allows it to be confused with other disease processes such as granulomas, abscesses, or other types of neoplasia.

### Post-mortem signs:

1. Gross enlargement of one or more lymph nodes with uniformly pale moist surface;
2. Gross enlargement of lymph node with a large yellow necrotic center; (e.g. mandibular lymph nodes or lymph nodes of the thoracic inlet);
3. Gross enlargement of lymph nodes with a dark red center;
4. Gross enlargement of liver and spleen;
5. Focal or diffuse neoplastic growth or plaques on pleural ribs wall or peritoneal (i.e. inside abdominal wall).

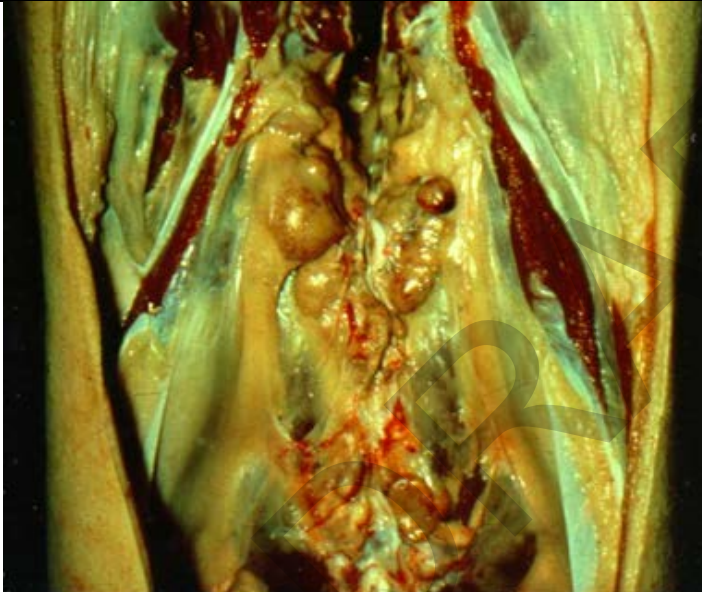
**Disposal:** Sorters are to indicate for discard any carcass with any evidence of malignant lymphoma (9 CFR 311.11(b)). Regardless of the extent and distribution of the lymphoma, any evidence of lymphoma requires that the entire carcass and viscera be discarded.



Notice large lymph nodes with smooth surface indicative of malignant lymphoma in the head;

Some carcasses with malignant lymphoma may exhibit lymph nodes in the neck exhibiting a yellow necrotic center like a hard-boiled egg;

Check remainder of carcass. Carcasses with any evidence of malignant lymphoma are condemned.



Enlarged malignant lymphoma in renal lymph nodes inside carcass



Malignant Lymphoma in mesenteric lymph nodes

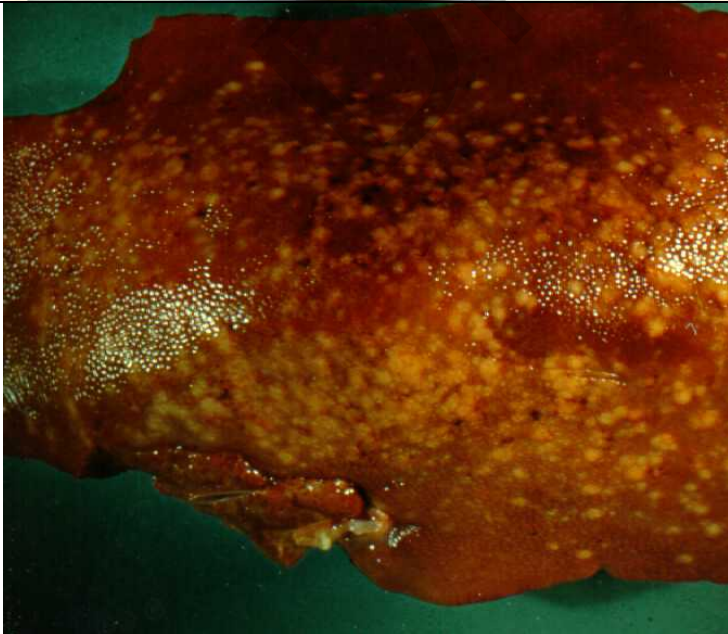




Malignant lymphoma infiltrating kidney in several locations; Notice several raised bumps or plaques; Lesions are often found on ribs, diaphragm, and abdominal organs



Notice the smooth appearance of lymphoma on cut surface. The normal outer lymph node and center are obliterated with many tumor cells.



Malignant Lymphoma infiltration of enlarged liver

## **S. Odors; Undetermined; Sexual Odor of Swine**

The carcass of a barrow market hog with retained testicular tissue can exhibit a characteristic sexual odor. It is rarely seen in market hogs less than 6 months of age. When present, there is a distinct pungent odor to the tissues.

NOTE: Boars and stags are not typically eligible for slaughter under NSIS

### **Post-mortem Signs:**

1. Any sex odor of carcass or viscera of any market hog;
2. Chemical or medicinal odors;

**Disposal:** Sorters are to identify for discard any carcass that exhibits a pronounced odor (9 CFR 311.20).

### **NOTE:**

- (1) A warm carcass should be considered to have a pronounced odor if the odor emanates toward you when you are several inches from the carcass.
- (2) If the odor is less than pronounced, you will normally have to get very close to the carcass to search out the odor.
- (3) Carcasses with a sexual odor that is less than pronounced may be passed for use as human food, as either cooked comminuted product or for rendering as lard.
- (4) Sorters may find background information in FSIS Directive 6100.8 regarding Improvest™ market hogs and sexual odor useful.

## **T. Pale Soft Exudative Pork (PSE)**

### **Post-mortem signs:**

Affected muscle tissue appears pale soft and watery in appearance. Tissue may have a slight sour smell.

**Disposal:** Lesions may appear in one or more large muscles to varying degrees. Depending on the nature, degree, and extent of the lesions, the carcasses may be presented for inspection, sorted for trimming, or identified for discard. The cut surface may have a sour odor to it. Market hog carcasses not meeting the criteria for discard may be presented for inspection after identification of or removal of the most severely affected parts showing evidence of severe degeneration under inspection supervision. Mild forms of PSE are histologically normal and suitable for further processing. Seek guidance from the PHV.

## **U. Over-scald**

**Post-mortem Signs:** Carcasses showing signs of being over-scalded will have a cooked appearance and will usually have varying degrees of mutilation and contamination of tissues with scald vat water.

**Disposal:** Carcasses not meeting the criteria for discard may be presented for inspection after identification of or removal of contaminated parts (e.g. broken skin) under inspection supervision.

## **V. Classical Swine Fever (Hog cholera)**

Classical Swine Fever (Hog Cholera) is a reportable FAD disease not found in the USA since 1978. Should hog cholera reappear, multiple signs of fever and illness will be seen at ante-mortem and post-mortem. Such animals are expected to reach the subject pen and handling by the PHV and requires subsequent notification of the PHV and APHIS prior to slaughter.

## **W. Brucellosis in Feral or Other Swine Classes**

Swine Brucellosis is rarely found in confinement raised market hogs. Swine brucellosis may be found in other classes of swine especially mature breeding swine or feral swine. Swine brucellosis is a potential disease of public health concern and occupational health. Human infections are associated with exposure to reproductive organs (e. g. uterus, testicles). Brucellosis has few post mortem lesions.

**NOTE:** Should an establishment desire to slaughter other classes of swine (e.g. sows, boars, and feral swine) under NSIS, a hazard analysis and a waiver are required. To address workplace safety and other requirements, each waiver will specify such additional requirements.

## IV. REFERENCES

### **FSIS**

1. [FSIS Slaughter Inspection Training](http://www.fsis.usda.gov/wps/portal/fsis/topics/inspection/workforce-training/regional-on-site-training/slaughter-inspection-training)  
<http://www.fsis.usda.gov/wps/portal/fsis/topics/inspection/workforce-training/regional-on-site-training/slaughter-inspection-training>
2. [PHV Disposition Guide](http://www.fsis.usda.gov/wps/wcm/connect/347a0e1f-d496-40c0-bf40-b505929ffb0e/PHVt-Multi_Species_Disposition_93.pdf?MOD=AJPERES)  
[http://www.fsis.usda.gov/wps/wcm/connect/347a0e1f-d496-40c0-bf40-b505929ffb0e/PHVt-Multi\\_Species\\_Disposition\\_93.pdf?MOD=AJPERES](http://www.fsis.usda.gov/wps/wcm/connect/347a0e1f-d496-40c0-bf40-b505929ffb0e/PHVt-Multi_Species_Disposition_93.pdf?MOD=AJPERES)
3. [FSIS Beginning PHV Inspection Training](http://www.fsis.usda.gov/wps/portal/fsis/topics/inspection/workforce-training/regional-on-site-training/public-health-veterinarian/public-health-veterinarian)  
<http://www.fsis.usda.gov/wps/portal/fsis/topics/inspection/workforce-training/regional-on-site-training/public-health-veterinarian/public-health-veterinarian>
4. [FSIS FAD training \[http://www.fsis.usda.gov/wps/wcm/connect/2afa4f5f-e7df-479c-9058-55aecc60d145/PHVt-Reportable\\_Foreign\\_Animal\\_Diseases.pdf?MOD=AJPERES\]](http://www.fsis.usda.gov/wps/wcm/connect/2afa4f5f-e7df-479c-9058-55aecc60d145/PHVt-Reportable_Foreign_Animal_Diseases.pdf?MOD=AJPERES)
5. [FSIS Federal Code of Regulations, Sections 309-311 \[9 CFR 309-311\]](http://www.ecfr.gov/cgi-bin/text-idx?SID=4632a5415489f65b789aea7bbc069bea&mc=true&tpl=/ecfrbrowse/Title09/9cfrv2_02.tpl#300)  
[http://www.ecfr.gov/cgi-bin/text-idx?SID=4632a5415489f65b789aea7bbc069bea&mc=true&tpl=/ecfrbrowse/Title09/9cfrv2\\_02.tpl#300](http://www.ecfr.gov/cgi-bin/text-idx?SID=4632a5415489f65b789aea7bbc069bea&mc=true&tpl=/ecfrbrowse/Title09/9cfrv2_02.tpl#300)
6. [FSIS Directive 6000.1 - Responsibilities Related to Foreign Animal Diseases \(FADs\) and Reportable Conditions](#)
7. [FSIS Directive 6100.1 – Ante-mortem Directive](#)
8. [FSIS Directive 6100.2 - Post-mortem Directive](#)
9. [FSIS Directive 6420.2 - Livestock Zero Tolerance Directive](#)
10. [FSIS Directive 6240.1 - TB Directive and related materials](#)
11. [FSIS Directive 6100.8 - Instructions for Verification of IMPROVEST® Hogs](#)  
[\[http://www.fsis.usda.gov/wps/portal/fsis/topics/regulations/directives/6000-series\]](http://www.fsis.usda.gov/wps/portal/fsis/topics/regulations/directives/6000-series)

### **APHIS**

#### [APHIS Animal Disease Training](#)

- <https://www.aphis.usda.gov/aphis/ourfocus/animalhealth/animal-disease-information>

#### [APHIS Veterinary Service Points of Contact](#)

- [https://www.aphis.usda.gov/animal\\_health/downloads/sprs\\_contact/field\\_office\\_contact\\_info.pdf](https://www.aphis.usda.gov/animal_health/downloads/sprs_contact/field_office_contact_info.pdf)
- 

### **Scientific or Academic**

#### [Office International des Epizooties \(OIE\) Sites](#)

- <http://www.oie.int/en/animal-health-in-the-world/animal-diseases/>



Iowa State Center for Food Safety and Public Health

- <http://www.cfsph.iastate.edu/Species/swine.php>
- <http://www.cfsph.iastate.edu/pdf/foot-and-mouth-disease-pocket-guide-swine>



<http://askfsis.custhelp.com/>

FSIS/USDA  
[www.fsis.usda.gov](http://www.fsis.usda.gov)  
2016

DRAFT