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Swine Diseases in Cambodia:

reducing the risk of disease, preventing, and treating pig diseases in Cambodia



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COMMON DISEASES OF CAMBODIAN PIGS

- **Viral diseases**
  - Foot and Mouth Disease (FMD)
  - Classical Swine Fever (CSF) caused by a pestivirus
  - Pseudorabies (PRV) or Aujesky's
  - Porcine Circo Virus (PCV)
  - Swine Influenza Virus (SIV)
  - Porcine Reproductive and Respiratory Syndrome (PRRS)
  - Porcine Epidemic Diarrhea (PED)
  - Transmissible Gastroenteritis (TGE)
- **Bacterial diseases**
  - Salmonella
  - Pasteurella
  - Mycoplasma
  - *Escherichia coli (E. coli)*
  - *Streptococcus suis*
  - Erysipelas
  - Lawsonia (ileitis)
- **Parasites**
  - Intestinal worms
  - Lice and/or mange
  - Coccidiosis

NEW DISEASE OF CAMBODIAN PIGS - 2019

?

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NEW DISEASE OF CAMBODIAN PIGS - 2019

African Swine Fever (ASF)

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African swine fever in China, Mongolia, Vietnam and Cambodia since August 2018

VIRAL VS. BACTERIAL AND PARASITIC DISEASES

- Remember that viral diseases allow the virus to live inside the cells where antibiotics can't reach them, so viral diseases typically do not respond to antibiotic therapy.
- The best way to avoid losses from viral diseases are to prevent them through biosecurity and vaccination strategies
- Bacterial disease can respond to antibiotic therapy if the bacteria is sensitive to the antibiotic being used. However, prevention through proper biosecurity is better. Some bacterial organisms can also be prevented with vaccine.
- Parasites will cause unthriftiness, poor growth rates, and even death if left untreated.

VIRAL VS. BACTERIAL AND PARASITIC DISEASES

- Why do antibiotics work against bacterial diseases, but not viral diseases?

VIRAL DISEASES

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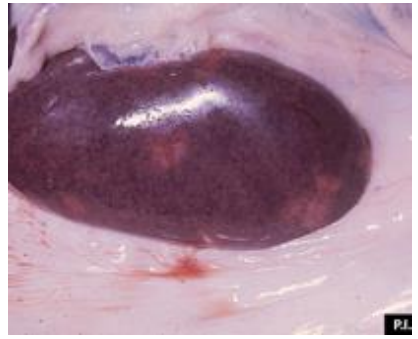
AFRICAN SWINE FEVER (ASF)

- **Etiology:** ASF virus (an asfarviridae)
- **Transmission:** transmission between wild pigs, soft ticks and domestic pigs. Spreads via direct contact, ticks, infected meat.
- **Clinical signs:** high fever, abortions, death, bloody nasal discharge or diarrhea
- **Gross lesions:** Hyperemia of the skin, hemorrhagic lymph nodes and organs, friable spleen.
- **Treatment:** None
- **Prevention:** Biosecurity to prevent introduction. STOP feeding food waste. There is currently NO VACCINE to prevent this disease. It does not affect other animals or people.

Above: bloody nasal discharge
Above right: hyperemia of skin
Right: pig kidney with petechial hemorrhages



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CLASSICAL SWINE FEVER (CSF)

- **Etiology:** CSF virus (a pestivirus, also known as Hog Cholera)
- **Transmission:** highly contagious when in contact with body fluids of infected animals. The virus survives months in salted or smoked pork. Feeding of meat scraps increases risk.
- **Clinical signs:** High fever in large numbers of dull, lethargic, inappetent pigs with conjunctivitis, walking reluctantly with a swaying movement. Sudden deaths in younger piglets.
- **Gross lesions:** Pinpoint hemorrhages on kidney and tonsils, spleen, hemorrhagic lymph nodes
- **Treatment:** None
- **Prevention:** Biosecurity to prevent introduction and vaccine use in areas that the virus is active.

Hemorrhagic spleen to the left and lymph nodes to the right.

Kidney with pinpoint hemorrhages above; acute death with high fever, left.

FOOT AND MOUTH DISEASE (FMD)

- **Etiology:** FMD virus (an aphthovirus)
- **Transmission:** highly contagious when in contact with body fluids of infected animals, incubation is 18 hours to14 days and affects all cloven hooved animals, but especially cattle and pigs.
- **Clinical signs:** sudden onset of severe lameness that spreads to other pigs, fever, vesicles (blisters) in mouth and around feet.
- **Gross lesions:** Blisters just above hoof and on snouts of pigs. Cattle and sheep have blisters and mucous nasal discharge.
- **Treatment:** None
- **Prevention:** Biosecurity to prevent introduction and vaccine use in areas that the virus is active.

Above: blisters at hoof bed.
Above right: FMD in cattle.
Right: Blister on snout of affected pig.

AUJESKY'S (PSEUDORABIES)

- **Etiology:** herpes virus
- **Transmission:** The virus can remain hidden in nerves of the pig for long periods of time and then be reactivated. Once introduced into a herd the virus usually remains there and it can continually affect reproductive performance. The virus can survive for up to three weeks outside the pig. It is often fatal to dogs, sheep, and sometimes cattle causing "mad itch" making it look like rabies. Pigs do not show these signs.
- **Clinical signs:** Fever, nervous system signs, pneumonia, abortions, stillborns, and low viability piglets.
- **Gross lesions:** Necrotic small spots on liver in newborn piglets, pneumonia, necrotic tonsils, hemorrhagic pulmonary lymph nodes.
- **Treatment:** None
- **Prevention:** Biosecurity to prevent introduction and vaccine use in areas that the virus is active.

Pneumonic lesions in the lung are not specific for PRV, but if seen with necrotic livers in piglets and CNS signs, PRV would
be suspected.

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PORCINE CIRCOVIRUS TYPE 2 (PCV2)

- **Etiology:** Circovirus
- **Transmission:** highly contagious when in contact with body fluids of infected animals.
- **Clinical signs:** Wasting, weight loss, ill thrift, or failure to thrive, pneumonia, porcine dermatitis and nephropathy syndrome (PDNS). Affected pigs often do not recover.
- **Gross lesions:** Enlarged inguinal lymph nodes, pneumonia, PDNS.
- **Treatment:** None
- **Prevention:** Vaccine is usually an effective strategy. Pigs must be vaccinated early (often at weaning time) in order to be effective. Biosecurity to prevent introduction is always a good idea.

Thin, poor performing pig in a group to left top and bottom. PDNS, below.

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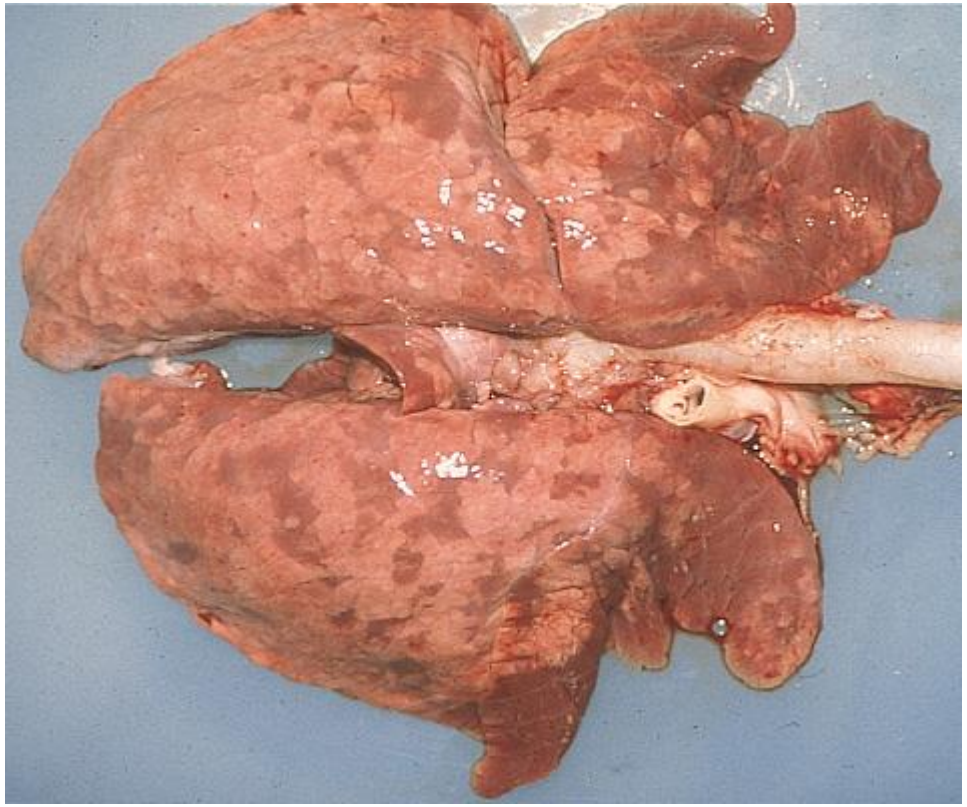
SWINE INFLUENZA VIRUS (SIV)

- **Etiology:** Influenza A virus, several serotypes
- **Transmission:** highly contagious when in contact with body fluids of infected animals and aerosol.
- **Clinical signs:** High fevers, inappetence, coughing. Pigs look they are going to die, but usually don't if other diseases don't complicate matters.
- **Gross lesions:** Diffuse pneumonia of the lungs.
- **Treatment:** None, most subside is 7-10 days. May need to treat for secondary bacterial pneumonia that can follow.
- **Prevention:** Vaccine is often not an effective strategy because of the many strains of the virus and immunity is short-lived. Biosecurity to prevent introduction is always a good idea.



Typical SIV infected lung. The pneumonia looks bad, but will heal if not complicated with other diseases.

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PORCINE REPRODUCTIVE AND RESPIRATORY SYNDROME (PRRS)

- **Etiology:** Arterivirus
- **Transmission:** highly contagious when in contact with body fluids of infected animals and aerosol. Especially easily spread in boar semen.
- **Clinical signs:** Variable depending on the strain of virus. High fevers, inappetence, coughing. Sometimes see “blue ear”. Increased abortions, mummies and stillborns in sows. Also see weak born piglets often born early.
- **Gross lesions:** Aborts, mummies, stillborns. Growing pigs become much more susceptible to other diseases due to the damage to the pigs’ immune system.
- **Treatment:** None, breeding will be adversely affecting until herd immunity stabilizes.
- **Prevention:** Vaccine is usually not an effective strategy because of the many strains of the virus. Biosecurity to prevent introduction is always a good idea.

Increased abortions, stillborns, mummies, weakborn pigs. Growing pigs are unthrifty and susceptible to other diseases. Only some strains show “blue ear”.

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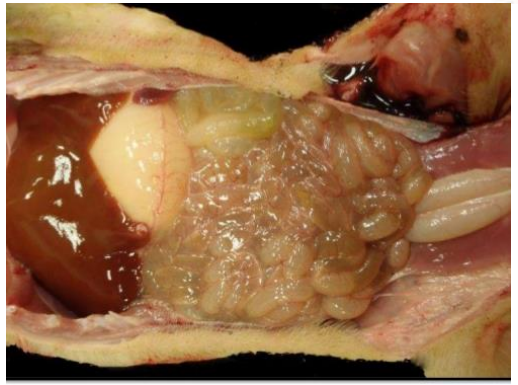
PORCINE EPIDEMIC DIARRHEA (PED) & TRANSMISSIBLE GASTROENTERITIS (TGE)

- **Etiology:** Both are caused by a coronavirus
- **Transmission:** highly contagious when in contact with body fluids of infected animals.
- **Clinical signs:** Rapidly spreading, profuse, watery, diarrhea in pigs of all ages, but high death losses in neonatal piglets.
- **Gross lesions:** Very thin intestinal walls.
- **Treatment:** None
- **Prevention:** Vaccination has not been very effective. Feedback of infected feces back to sows before day 100 of gestation can help booster immunity for future litters, but is not without risk. Biosecurity to prevent introduction is always a good idea.



Watery diarrhea in neonatal pigs, often resulting in dehydration and high death losses. Intestinal walls are thin.

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BACTERIAL DISEASES

SALMONELLA

- **Etiology:** *Salmonella species,* but mostly *S. cholerasuis* and *S. typhimirium*
- **Transmission:** By direct contact from feces of an infected pig or through infected uncooked meat.
- **Clinical signs:** Affects growing pigs, usually 12-14 weeks of age. Sudden septicemia and pneumonia which may occur with *S. choleraesuis* may result in fever, inappetence, respiratory distress, depression, coughing, red skin and poor doing pigs. The skin of the extremities (i.e. tail, ears, nose and feet) become blue. Foul-smelling watery diarrhea which may be blood stained, is a common feature. Infections with *S. typhimurium* usually are manifest by diarrhea only.
- **Gross lesions:** Pneumonia, purple extremities, diarrhea.
- **Treatment:** Antibiotics are often helpful if given early.
- **Prevention:** Improved sanitation and rodent control, no feeding of uncooked garbage. Vaccination can be effective.

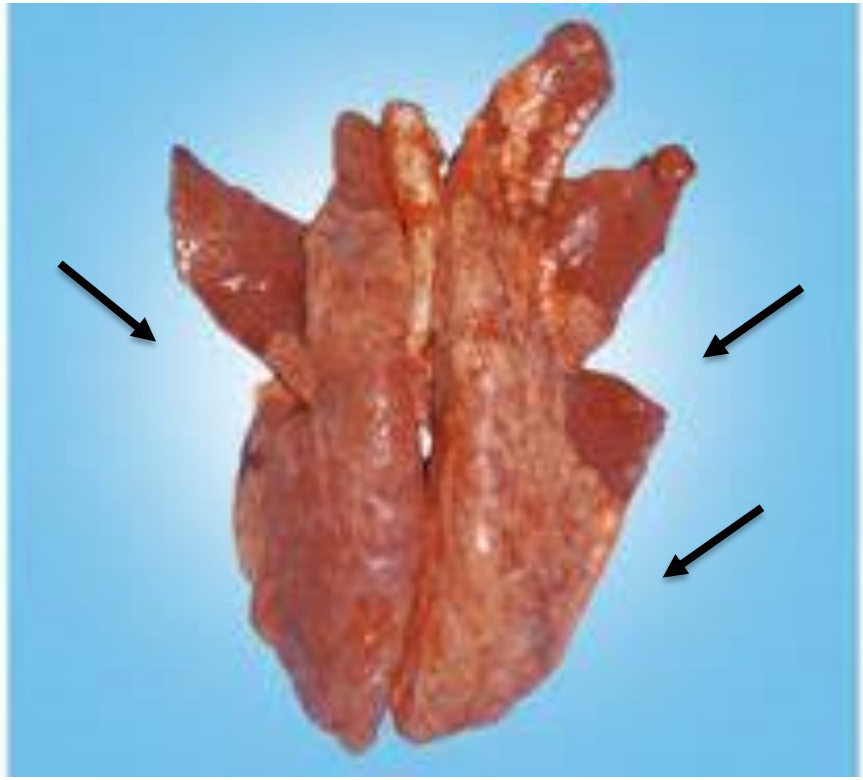
PASTEURELLA

- **Etiology:** Pasteurella multocida, a bacteria that is often involved as a secondary infection following another insult to the lungs, frequently mycoplasma.
- **Transmission:** spread via nose to nose contact with infected animals.
- **Clinical signs:** Exudative pneumonia producing wet, heavy cough.
- **Gross lesions:** Lungs and airways are filled with fluid. Combined with other pathogens, it can cause Atrophic Rhinitis (twisted snouts).
- **Treatment:** Antibiotics are very effective if the organism is sensitive and treatment is early.
- **Prevention:** Key is controlling other infections, especially mycoplasma. Vaccine is available, but money may be better spent vaccinating against mycoplasma first.

Left: Atrophic rhinitis (twisted snout)
Below: Pneumonia fills lungs with fluid.

MYCOPLASMA

- **Etiology:** *Mycoplasma hyopneumoniae*
- **Transmission:** Direct contact with infected animals or some aerosol transmission.
- **Clinical signs:** Dry cough, usually 8-12 weeks of age. Worse if combined with PRRS, SIV or other respiratory infections.
- **Gross lesions:** Cranioventral pneumonia as pointed out by the black arrows in the picture.
- **Treatment:** Antibiotic therapy is often helpful.
- **Prevention:** Vaccine is usually a fairly effective strategy to reduce clinical signs. Vaccine does not prevent the disease. Biosecurity to prevent introduction is always a good idea.



Cranioventral (lower front) lobes of the lung are the only parts affected as depicted by the black arrows.

ESCHERICHIA COLI (E.COLI)

- **Etiology:** *Escherichia coli*, a bacteria
- **Transmission:** Direct contact with feces of infected animal or through garbage feeding.
- **Clinical signs:** Watery diarrhea that often kills by dehydrating the animal. Neonates and newly weaned pigs are the most susceptible.
- **Gross lesions:** Watery diarrhea, dehydrated piglets.
- **Treatment:** Antibiotics are very effective if used early in the infection.
- **Prevention:** Vaccine can be a fairly effective strategy for sows to prevent infection in newborns by boosting sow immunity prior to farrowing. Increased sanitation and keeping the newborn pigs from having access to older pigs helps.

Watery diarrhea with a high pH.

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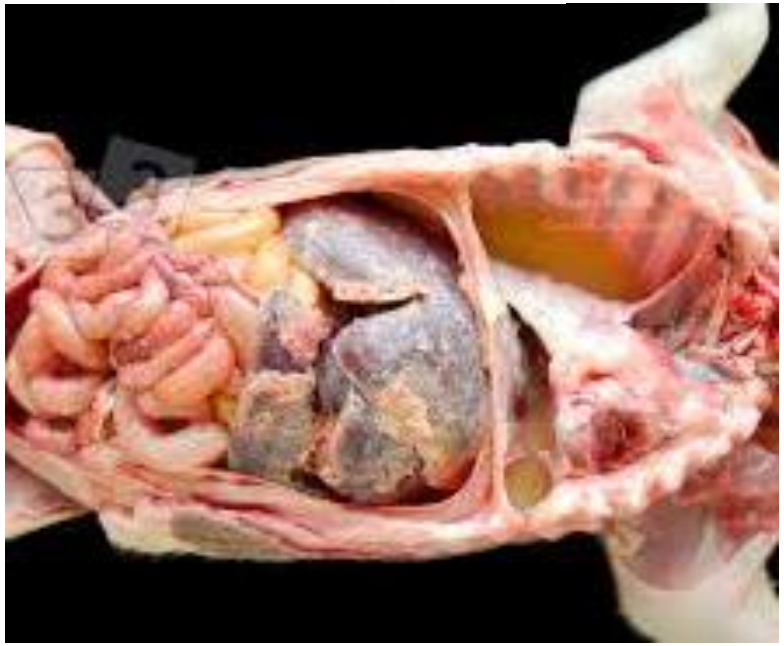
STREPTOCOCCUS SUIS (S. SUIS) & HEMOPHILUS PARASUIS (HPS)

- **Etiology:** *Streptococcus suis* or *Hemophilus parasuis* (HPS; also called Glasser's Disease)
- **Transmission:** direct contact with infected animals.
- **Clinical signs:** Meningitis causing ataxic or down on side and paddling pigs, sometimes swollen joints, coughing, or just acute death in young pigs.
- **Gross lesions:** Swollen joints, pneumonia, excess fibrin production (especially with HPS)
- **Treatment:** Antibiotic treatment is usually effective if pigs are identified and treated early.
- **Prevention:** Vaccine is generally not very effective. Biosecurity to prevent introduction is always a good idea. Improved sanitation helps.

Left: Piglet with swollen joints from S. suis
Below: Fibrin as a result of a HPS infection.



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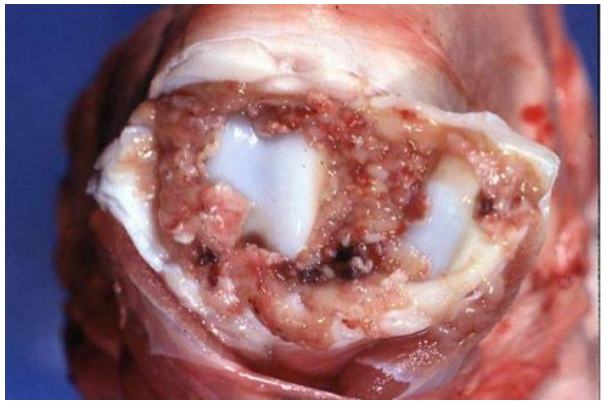
ERYSIPELAS

- **Etiology:** *Erysipelas rhusiopathiae*
- **Transmission:** Direct contact with infected animals.
- **Clinical signs:** Sudden increase in lamenesses in market age pigs often accompanied by diamond shaped, red, raised skin lesions (more easily seen on white pigs).
- **Gross lesions:** Skin lesions and proliferative joints. (see photos)
- **Treatment:** Antibiotic therapy is usually very effective if identified and treated early
- **Prevention:** Vaccine is usually a fairly effective strategy. Biosecurity to prevent introduction is always a good idea.



LAWSONIA (ILEITIS)

- **Etiology:** *Lawsonia intercellularis*
- **Transmission:** Direct contact with feces of infected animals.
- **Clinical signs:** Ranges from acute bloody diarrhea and sudden death to loose mucoid diarrhea with loss of body condition over time.
- **Gross lesions:** Diarrhea in growing pigs. Necrotic lining of the terminal part of the small intestine (ileum). See photos to right.
- **Treatment:** Antibiotic therapy is usually very effective if identified and treated early
- **Prevention:** Vaccine is usually a fairly effective strategy. Biosecurity to prevent introduction is always a good idea. Making sure growing pigs have access to feed and water at all times helps.

PARASITIC DISEASES

INTESTINAL WORMS

- **Etiology:** Roundworms (ascarids) and whipworms (trichuris) are the most common
- **Transmission:** Direct contact with feces that contain eggs from previously infected animals.
- **Clinical signs:** Wasting, weight loss, ill thrift, or failure to thrive, coughing (from larval migration through the lungs).
- **Gross lesions:** Visible signs of worms, milk spots on the liver (scars from larval migration), mild pneumonia lesions.
- **Treatment:** Treat with a labeled dewormer.
- **Prevention:** Keep pigs off dirt, thoroughly clean concrete floors between groups of pigs. Purchase pigs from sellers with good prevention programs in place.

Above: Roundworms in pig small intestine. Right: lung and liver damage due to roundworm migration. Below: whipworms in large intestine of pig.

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LICE AND MANGE

- **Etiology:** *Hematopinus suis* (lice) and *Sarcoptes scabiei* (mange mite)
- **Transmission:** highly contagious when in direct contact with infected animals
- **Clinical signs:** Extreme itchiness which causes the pigs to rub leading to thick skin or open sores from the rubbing.
- **Gross lesions:** Lice are visible on the pigs, mange causes thick, irritated skin, but the mange mites are visible with a microscope.
- **Treatment:** Treat with a labeled parasiticide.
- **Prevention:** Do not allow access to infected pigs.

Above and right: Lice
Below and right: Mange

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COCCIDIOSIS

- **Etiology:** Small parasites *Isospora suis* (most common) or *Eimeria sp*.
- **Transmission:** Direct contact with feces of infected animals.
- **Clinical signs:** Diarrhea, wasting, weight loss, ill thrift in young piglets.
- **Gross lesions:** Diarrhea, fibrinonecrotic lining of lower small intestine and large intestine.
- **Treatment:** Antibiotics will not cure coccidiosis, but may help with secondary infections.
- **Prevention:** Treating pigs with toltrazuril orally PRIOR to infection is effective. Sanitation is needed, especially on solid concrete floors. Thoroughly clean all manure between groups of litters.

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ROLE PLAY:

YOU ARE THE SWINE VETERINARIAN
I AM THE PIG PRODUCER

SITUATION 1:

I AM GOING TO BUY 10 WEANED PIGS TO GROW OUT. WHAT SHOULD I DO TO **PREVENT** DISEASE?

SITUATION 1:

I AM GOING TO BUY 20 WEANED PIGS TO GROW OUT. WHAT SHOULD I DO TO **PREVENT** DISEASE?

- Buy pigs from a healthy source
- Preferably, buy from only ONE source
- Transport the pigs in a clean, disinfected carrier
- Do not expose them to any other pigs
- Vaccinate against preventable diseases in your area
- Have antibiotics on hand or access to them to treat bacterial diseases early
- Feed them appropriately for their age/size to keep them healthy

BIOSECURITY

- Transport of pigs to the farm
- Proximity to other pigs (pigs on same farm, neighbors)
- Ability to isolate sick pigs
- PEOPLE entering the pig area (you, neighbors, VAHW, veterinarian, pig buyer)
- Shared equipment (syringes, needles, scales)
- Feed delivery
- Feeding of food waste
- Selling of pigs (pig buyer, other pigs, trailer)

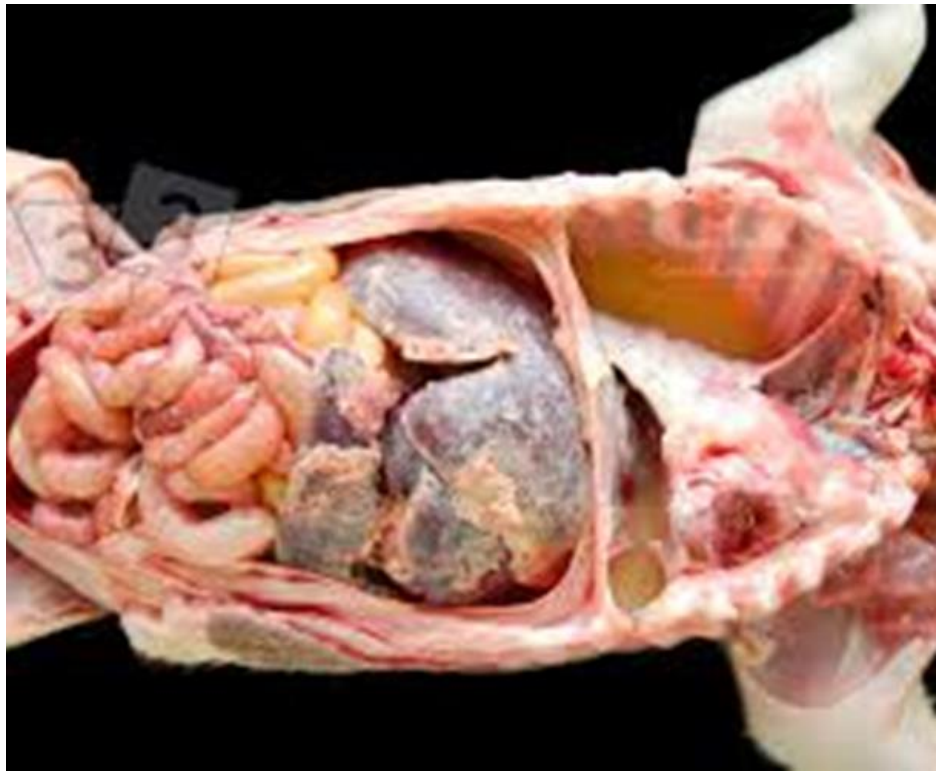
VACCINES AVAILABLE FOR GROWING PIGS

- Foot and Mouth Disease (FMD)
- Classical Swine Fever (CSF)
- Pseudorabies (PRV) or Aujesky's
- Porcine Circo Virus (PCV)
- Swine Influenza Virus (SIV)
- Porcine Reproductive and Respiratory Syndrome (PRRS)
- Porcine Epidemic Diarrhea (PED)
- Transmissible Gastroenteritis (TGE)
- Salmonella
- Pasteurella
- Mycoplasma
- *Escherichia coli (E. coli)*
- *Streptococcus suis*
- Erysipelas
- Lawsonia (ileitis)

THE BEST MEDICINE IS PREVENTION

SITUATION 2:

1 OF MY 20 PIGS DIED AND 2 MORE ARE SICK, WHAT SHOULD I DO?



SITUATION 2:

1 OF MY 20 PIGS DIED AND 2 ARE SICK, WHAT SHOULD I DO?

- Post mortem on pig that died to attempt to classify the problem – fluid and fibrin around lung and heart and in the abdomen.
- Isolate the sick pigs
- Re-evaluate the rest of the pigs
- Is antibiotic therapy warranted?
- Do I have any information about diseases in the area?

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DIAGNOSTICS:

WHAT IS POSSIBLE VS. WHAT IS AVAILABLE

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POST MORTEM:

WHAT CAN WE LEARN?

- We can learn to identify gross lesions that help up identify whether the problem is respiratory, gastrointestinal, parasitic, or systemic. All you need is a sharp knife and some gloves.

OTHER DIAGNOSTIC TOOLS:

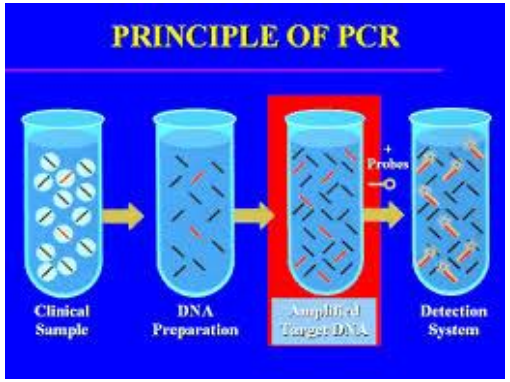
WHAT IS POSSIBLE?

- PCR (Polymerase Chair Reaction)
- ELISA
- IFA
- Bacterial culture
- Histopathology
- Fecal floatation
- Cytology, for example, skin scraping

PCR:

THE MOST POWERFUL DIAGNOSTIC TOOL WE HAVE

- We use PCR to detect specific virus or bacteria in samples of tissue, blood, or saliva
- A positive PCR indicates the presence of the virus or bacteria we are testing for
- We use it to diagnose disease or monitor for disease-free status
- Samples must be collected with care to avoid cross-contamination
- Fast, accurate $30/sample



ELISA:

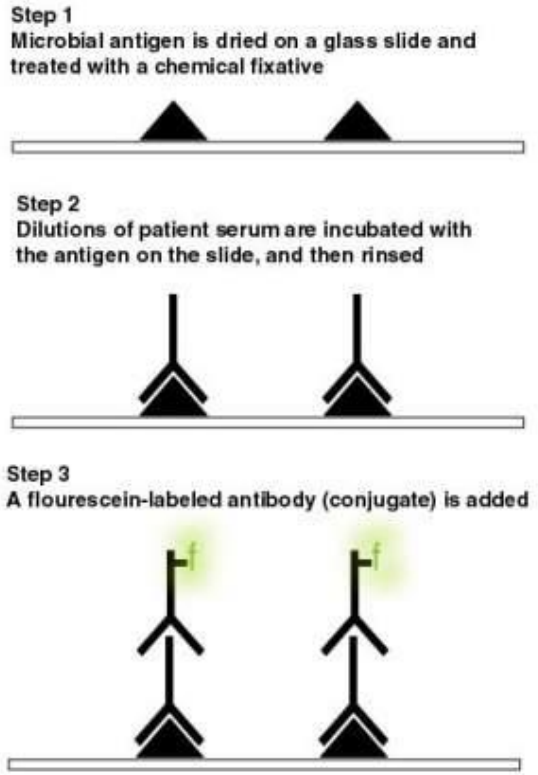
MONITORING EXPOSURE

- An ELISA tests for the presence of antibody to a particular organism
- A + ELISA means the animal had exposure to the organism we are testing for and now have antibodies for it. It does NOT mean the pathogen is present at that time.
- Cheap, fast way to monitor a population.
- Cost is ~$4/sample

IFA (INDIRECT FLUORESCENT ANTIBODY):

MONITORING EXPOSURE

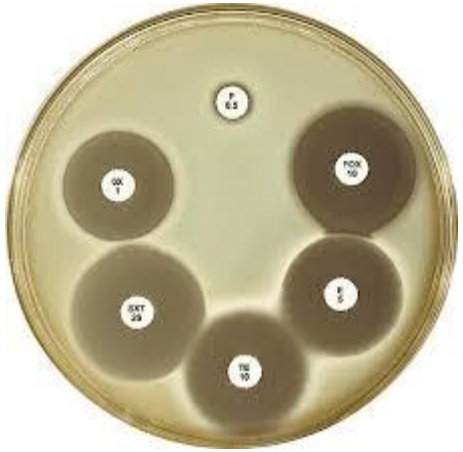
- Like the ELISA, IFA also tests for the presence of antibody to a particular organism
- A + IFA means the animal had exposure to the organism we are testing for and now have antibodies for it. It does NOT mean the pathogen is present at that time.
- This is more expensive and slower than ELISA, but more specific and less false positives
- Cost is ~$12/sample



BACTERIAL CULTURE:

CAN BE DONE WITH MINIMAL INVESTMENT

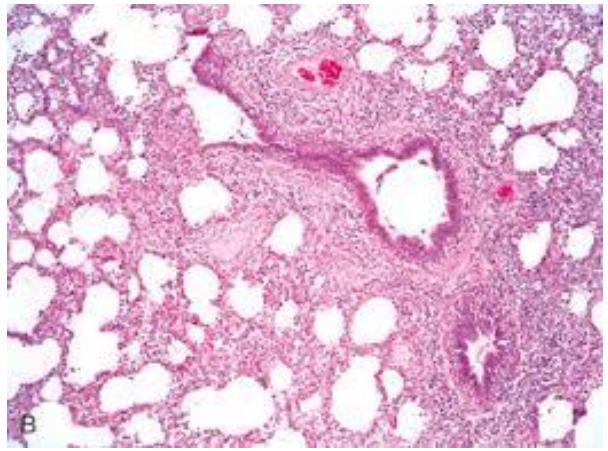
- If a bacterial pathogen is suspected, we can culture in our own lab
- We can use a positive culture to run an antibiotic sensitivity.
- Cost is ~$10/sample



HISTOPATHOLOGY

LOOKING AT PATHOLOGY AT A CELLULAR LEVEL

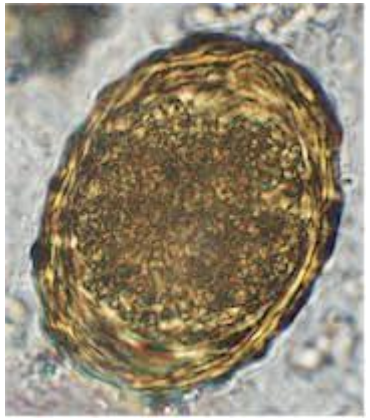
- Useful for defining some disease
- Example – mycoplasma vs. PRRS vs. SIV respiratory
- Example – E.coli vs. rota vs. TGE
- Problem: slow to process, we usually can't wait for results to decide on a treatment plan
- Cost ~$20-50 depending on the number of tissues prepped



PARASITOLOGY

FECAL

- Useful for proving parasitic issues: roundworms, coccidiosis, etc…
- Cost is ~$7/sample



CYTOLOGY

SKIN SCRAPING

- Useful to show mange
- Cost is ~$10/sample

SITUATION 3:

I SOLD 7 PIGS AND KEPT 2 GILTS TO BREED TO RAISE MY OWN PIGS.

WHAT SHOULD I VACCINATE THEM AGAINST?

HOW SHOULD I GET THEM BRED?

SITUATION 3:

- Pre-breeding vaccination
- Pre-farrowing vaccination
- Feedback – parvo, rota, E.coli
- Breeding - natural service vs. AH

VACCINES AVAILABLE FOR GROWING PIGS

- Foot and Mouth Disease (FMD)
- Classical Swine Fever (CSF)
- Pseudorabies (PRV) or Aujesky's
- Porcine Circo Virus (PCV)
- Swine Influenza Virus (SIV)
- Porcine Reproductive and Respiratory Syndrome (PRRS)
- Porcine Epidemic Diarrhea (PED)
- Transmissible Gastroenteritis (TGE)
- Salmonella
- Pasteurella
- Mycoplasma
- *Escherichia coli (E. coli)*
- *Streptococcus suis*
- Erysipelas
- Lawsonia (ileitis)

VACCINES AVAILABLE FOR BREEDING ANIMALS

- Leptospirosis
- Parvo virus
- Erysipelas
- E.coli
- Rota virus
- Clostridium

HOW ARE WE GOING TO GET THE SOWS BRED?

- Do you own a boar?
- Natural service vs. AI?

SITUATION 4:

BOTH SOWS BECAME PREGNANT. WHEN THEY FARROWED, THERE WERE 10 PIGLETS BORN ALIVE FROM EACH, BUT ONE SOW HAD 2 MUMMIES, AND ANOTHER HAD A STILLBORN PIGLET.

WHAT SHOULD I DO?

SITUATION 4:

THIS IS WITHIN ACCEPTABLE LIMITS IN LITTER-BEARING ANIMALS.

SITUATION 5:

ONE OF THE LITTERS OF PIGLETS HAS SCOURS AND THE SOW DOESN'T SEEM TO BE LACTATING VERY WELL. WHAT SHOULD I DO?

SITUATION 5:

- Sow
  - Is she eating?
  - Fever?
  - Retained pigs? Vaginal discharge?
  - Does she have access to feed and water?
- Piglets
  - Watery scour? Can we measure the pH?
  - Is antibiotic warranted?
  - Do we need supplemental nutrition?

SITUATION 6:

ONE OF THE LITTERS HAS 3 LAME PIGS IN THE SAME LITTER. JOINTS ARE VISIBLY SWOLLEN.

SITUATION 7:

MY PIGS ARE READY FOR MARKET NEXT WEEK. TODAY ONE BIG PIG DIED SUDDENLY. WHAT SHOULD I DO ABOUT THE REST OF THE PIGS?

SITUATION 8:

I AM CURRENTLY OUT OF PIGS, BUT CAN BUY SOME WEANED PIGS FOR A GOOD PRICE. ASF IS SPREADING IN CAMBODIA, SHOULD I GET SOME PIGS OR NOT?