
CReSA
UAB
IRTA


Universitat Autònoma de Barcelona

Pathology and diagnosis of nursery diseases

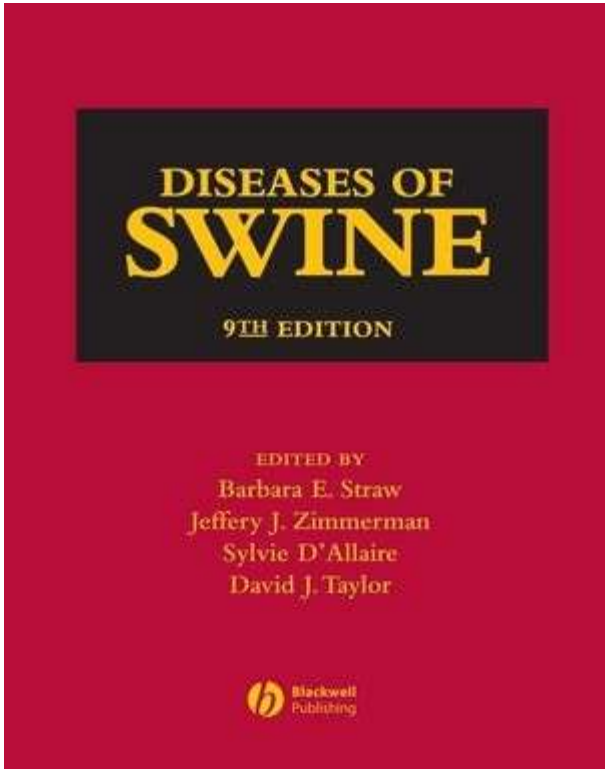
J. Segalés

CReSA
Centre de Recerca en Sanitat Animal

UAB
Universitat Autònoma de Barcelona

An important initial issue…

- **If you want to know all about pathology and diagnosis of pig nursery diseases… read it…**



The theory and the reality…

THEORY

- Etiology
- Pathogenesis
- Epidemiology
- Pathology
- Diagnosis
- Prevention and control

For a given (**<u>AVAILABLE</u>**)

REALITY

The theory and the reality…

- Books do not usually give the MULTIFACTORIAL view of the reality
- At the end, it is the task of the veterinarian to INTERPRET multifactoriality

"Although a diagnostic laboratory can help in identifying agents potentially involved in a disease outbreak or poor-production problem, the importance of infectious agents relative to other host, management, and environmental factors must be determined by the submitting veterinarian"

Gardner and Blanchard, 1999; Diseases of Swine, 8th Ed., p33

The role of pathology in pig diseases - real world

The "diagnostic chain"

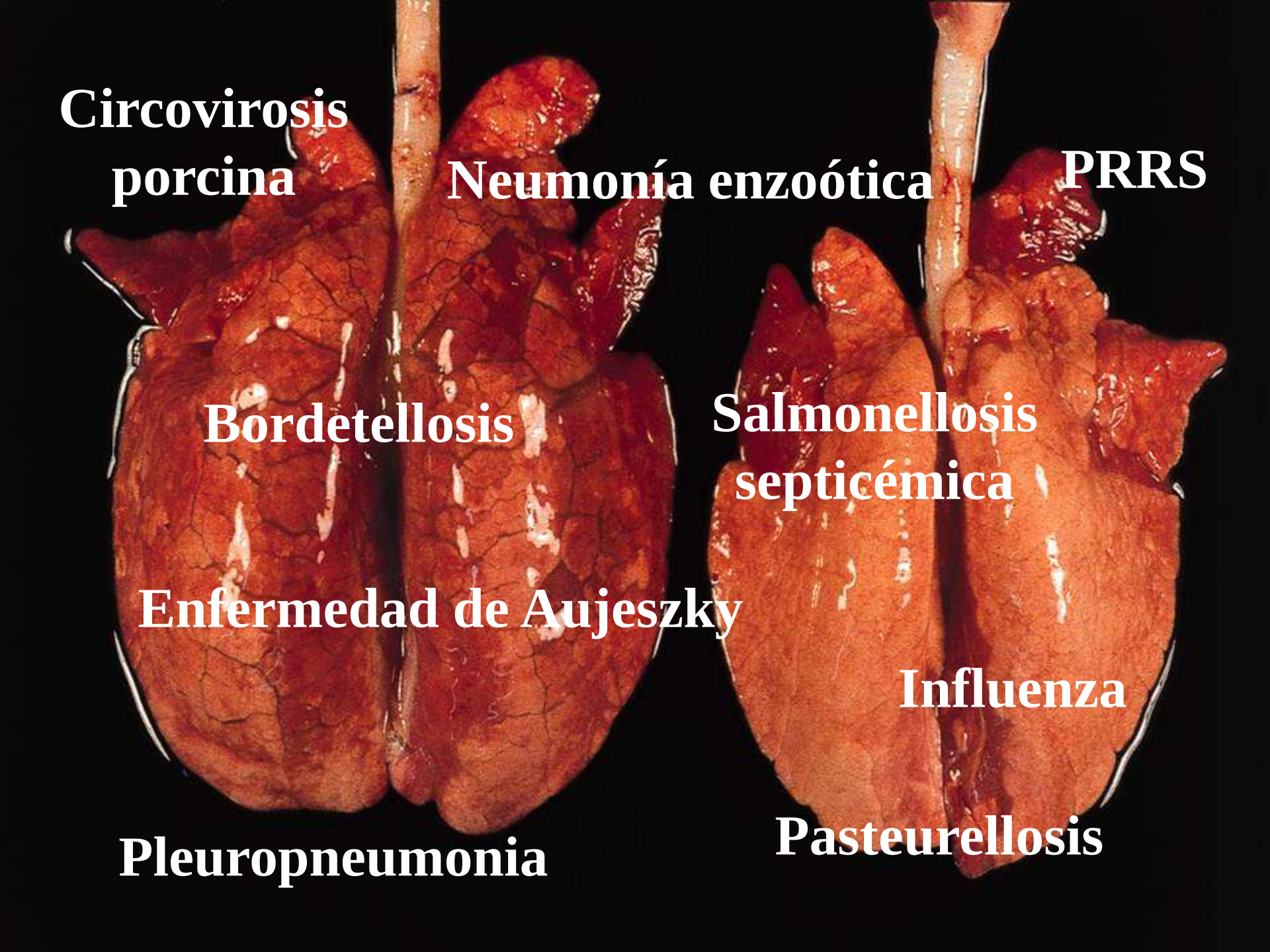
- Suspicion of a pathological condition (⇒ farmer)
- Visual confirmation of this condition at the farm (⇒ veterinarian)
- On-farm veterinary actions ⇒ diagnostic approach!!:
  - Diagnostic tools:
    - Clinical history and previous knowledge of the farm
    - Clinical signs observed during the visit (⇒ CLINICAL DIAGNOSIS)
    - NECROPSIES (⇒ PATHOLOGICAL DIAGNOSIS)
- To establish treatment actions that we **believe** will work ("DO SOMETHING STRATEGY")
- If the situation is complex enough, the veterinarian may **feel** that more analyses should be done and samples from necropsy will be taken and sent to a laboratory

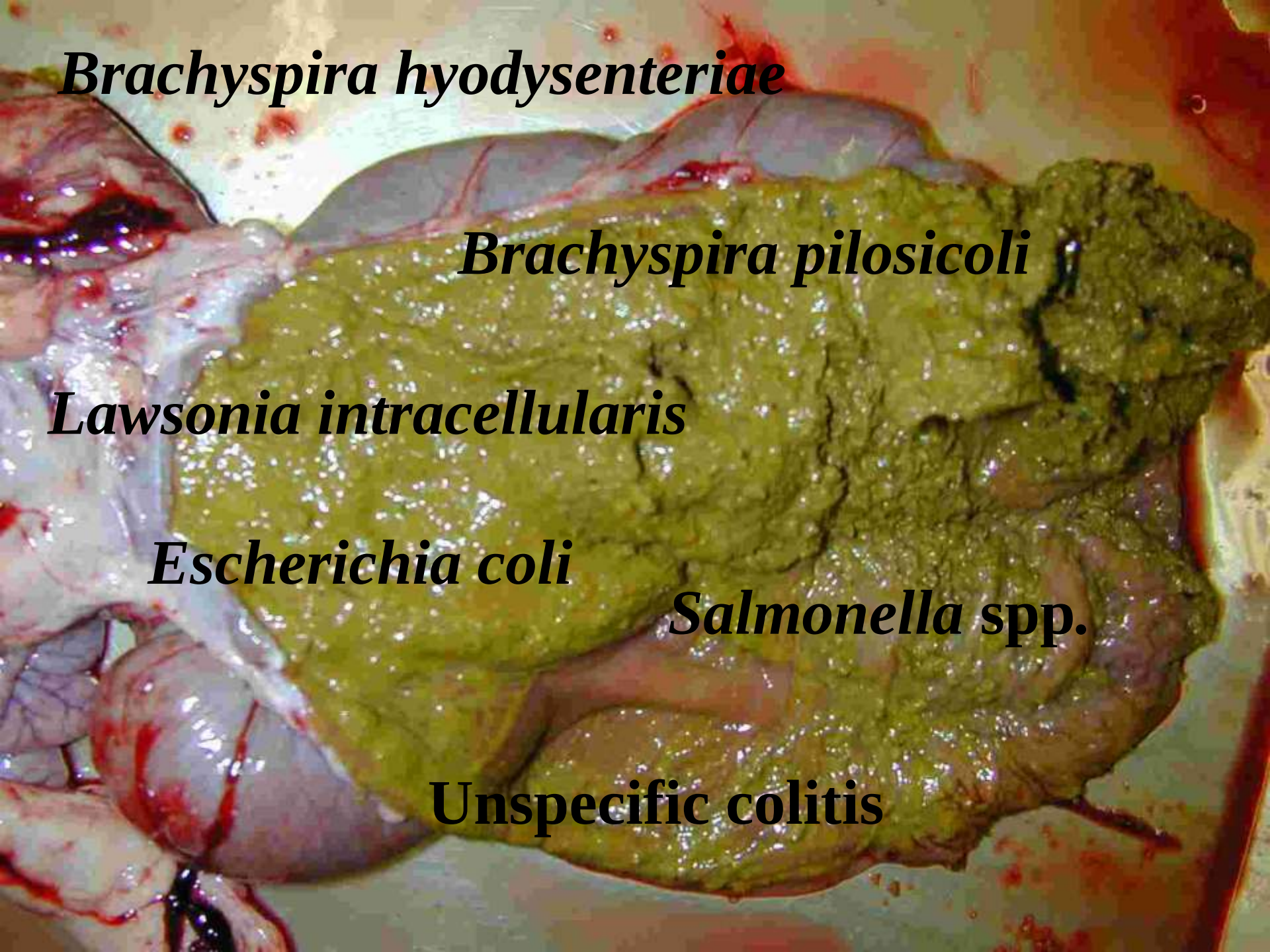
Necropsy and its interpretation

- Since the necropsy is a centr
  diagnostic chain, we ca
  "whatever pig"
- We should
  believe
  i problem

AND EVEN IN SUCH SITUATION, INTERPRETATION IS NOT EASY

PRESENTATIVITY

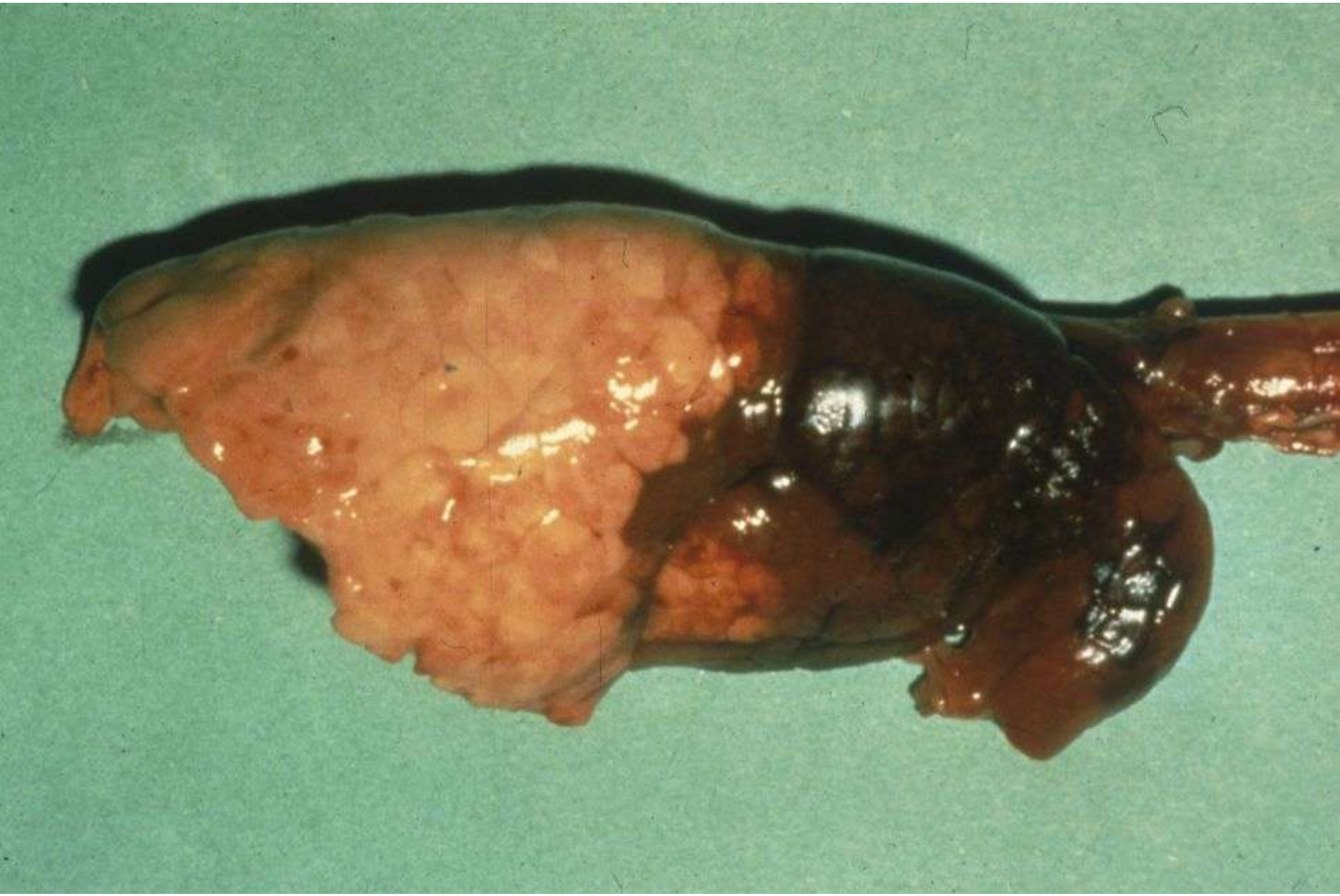

Circovirosis porcina
Neumonía enzoótica
PRRS
Bordetellosis
Salmonellosis septicémica
Enfermedad de Aujeszky
Influenza
Pleuropneumonia
Pasteurellosis

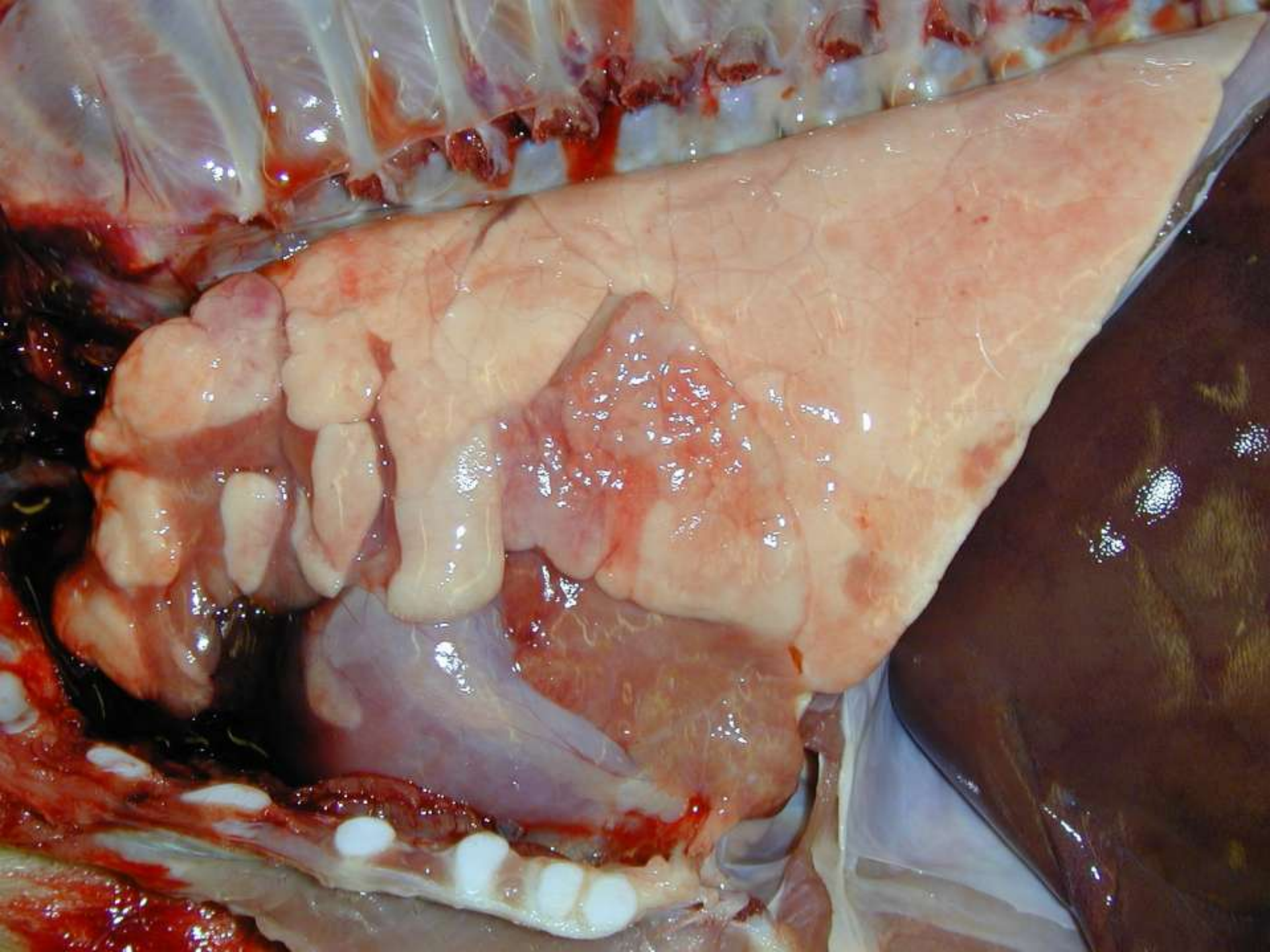

Brachyspira hyodysenteriae
Brachyspira pilosicoli
Lawsonia intracellularis
Escherichia coli
Salmonella spp.
Unspecific colitis

Objectives

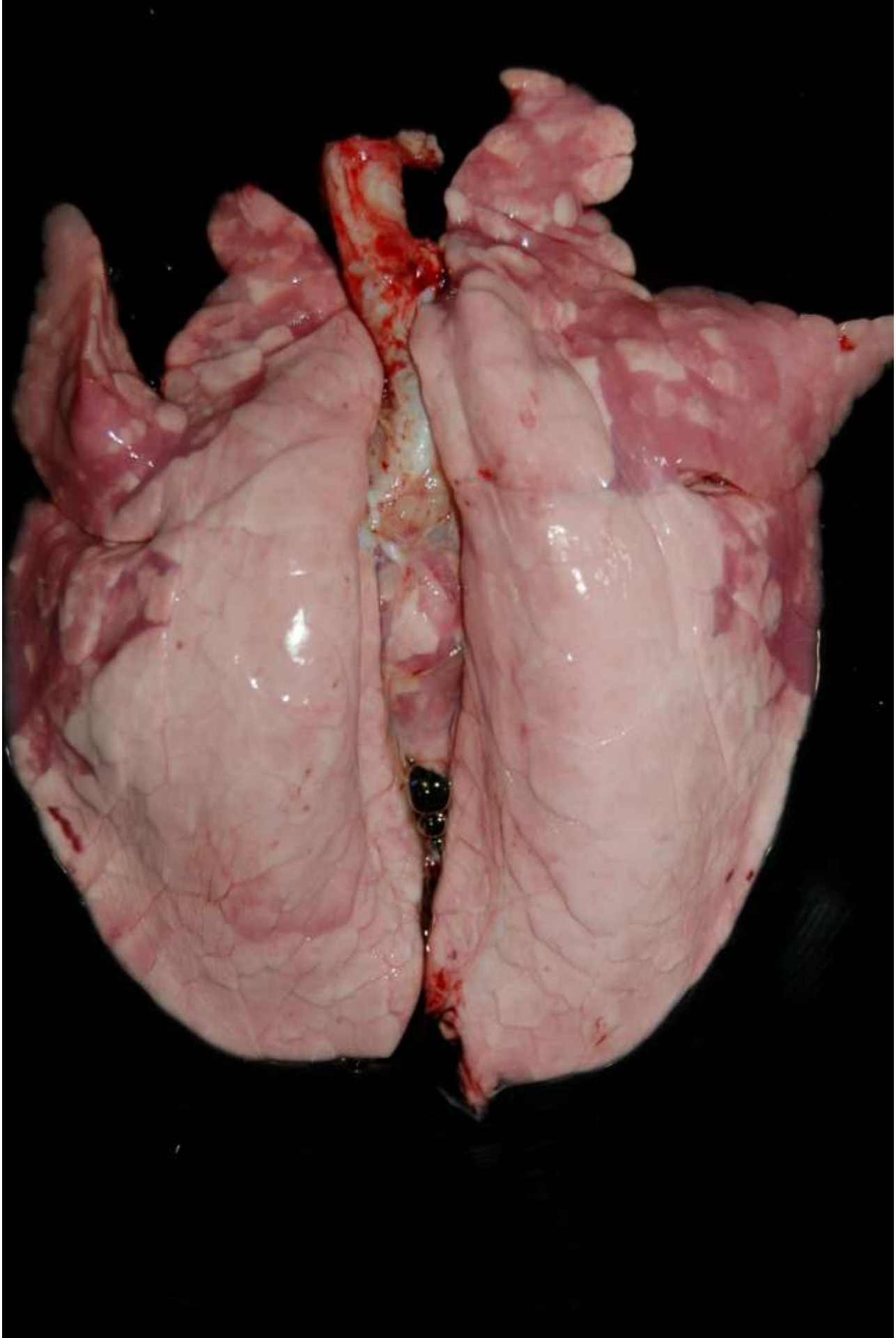
- To present and discuss usual pathological findings that can be seen in nursery pigs; emphasis on interpretation
- Diagnosis – clinical case

- Pastorella e bordetella

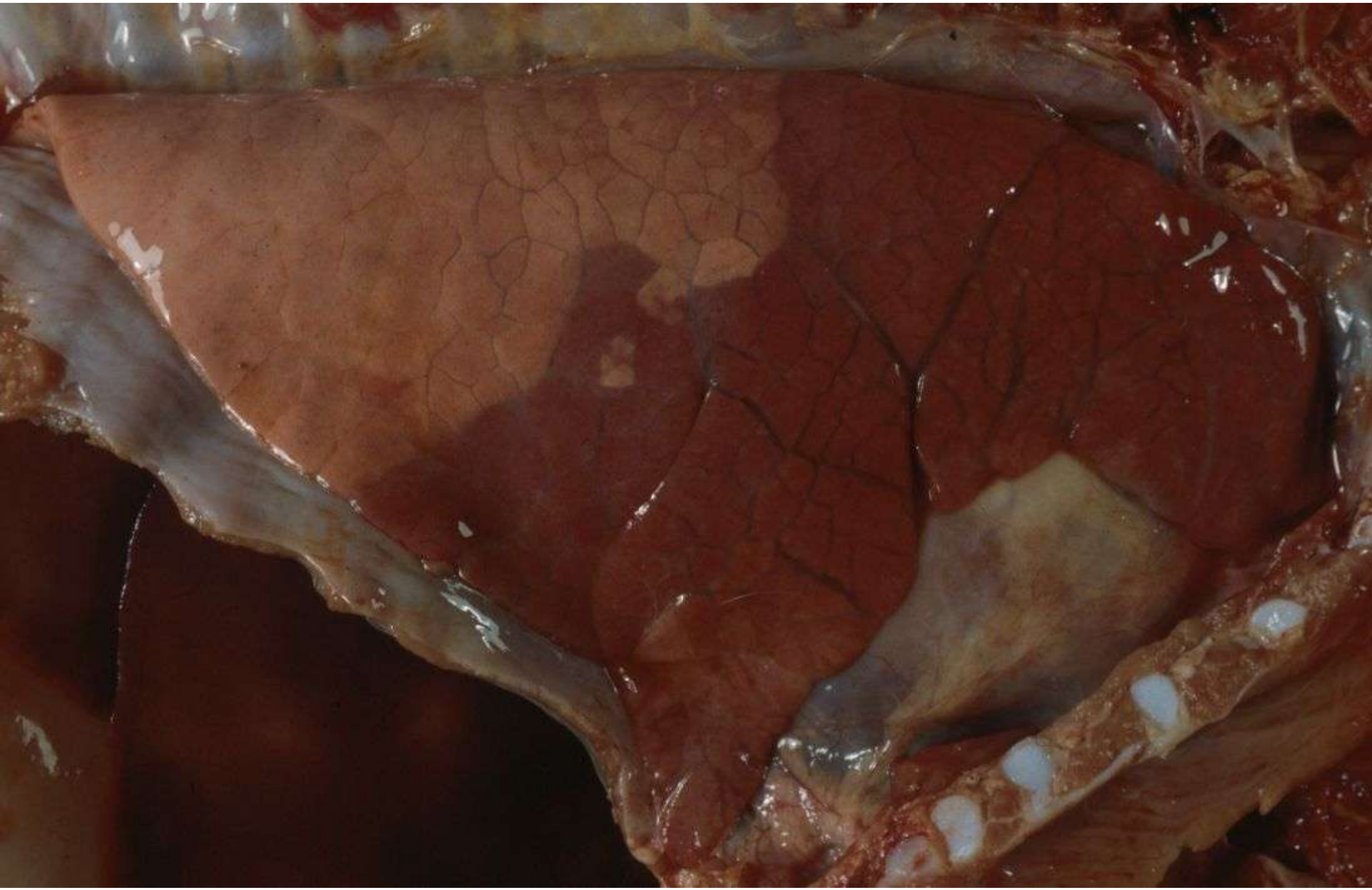




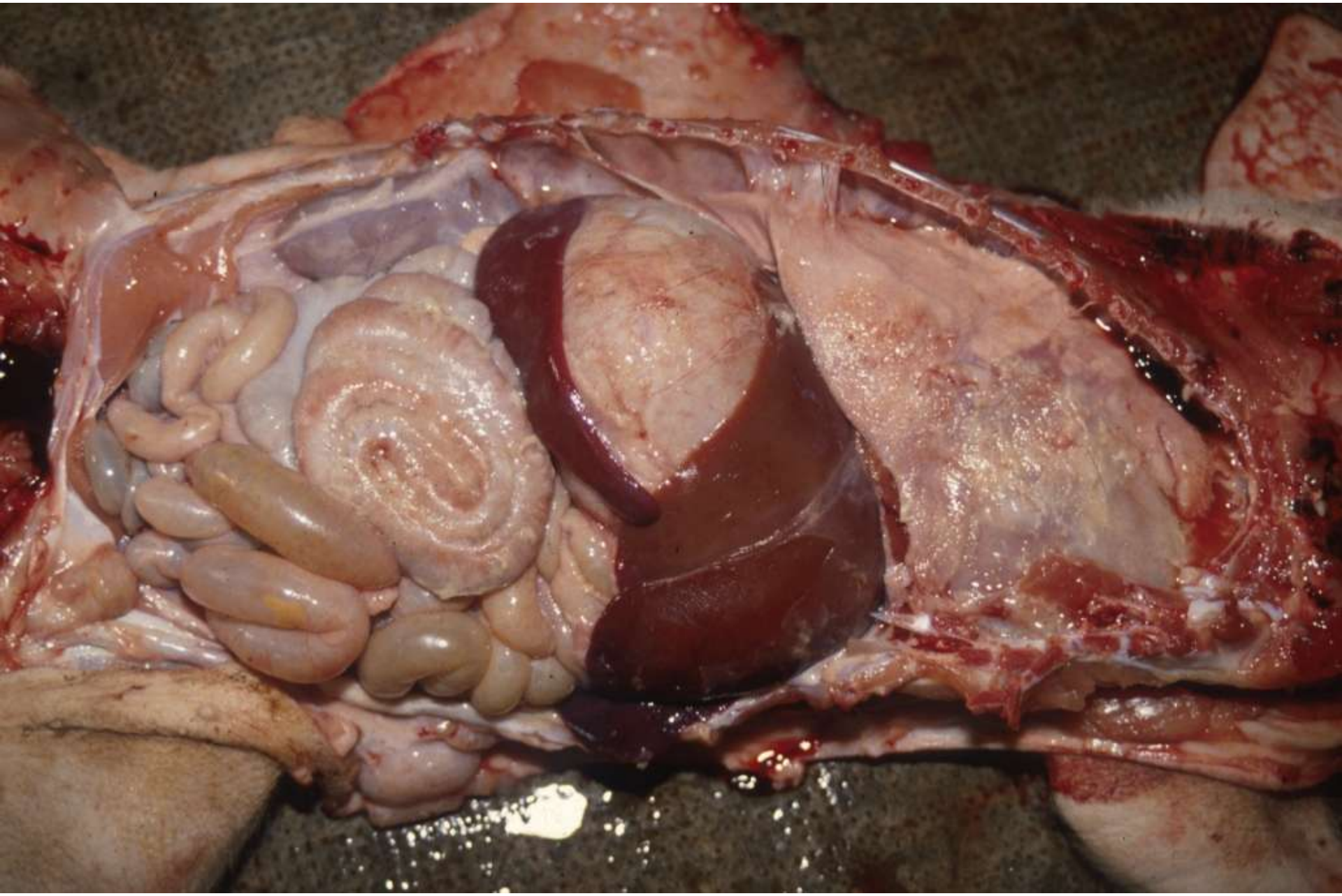
- influenza

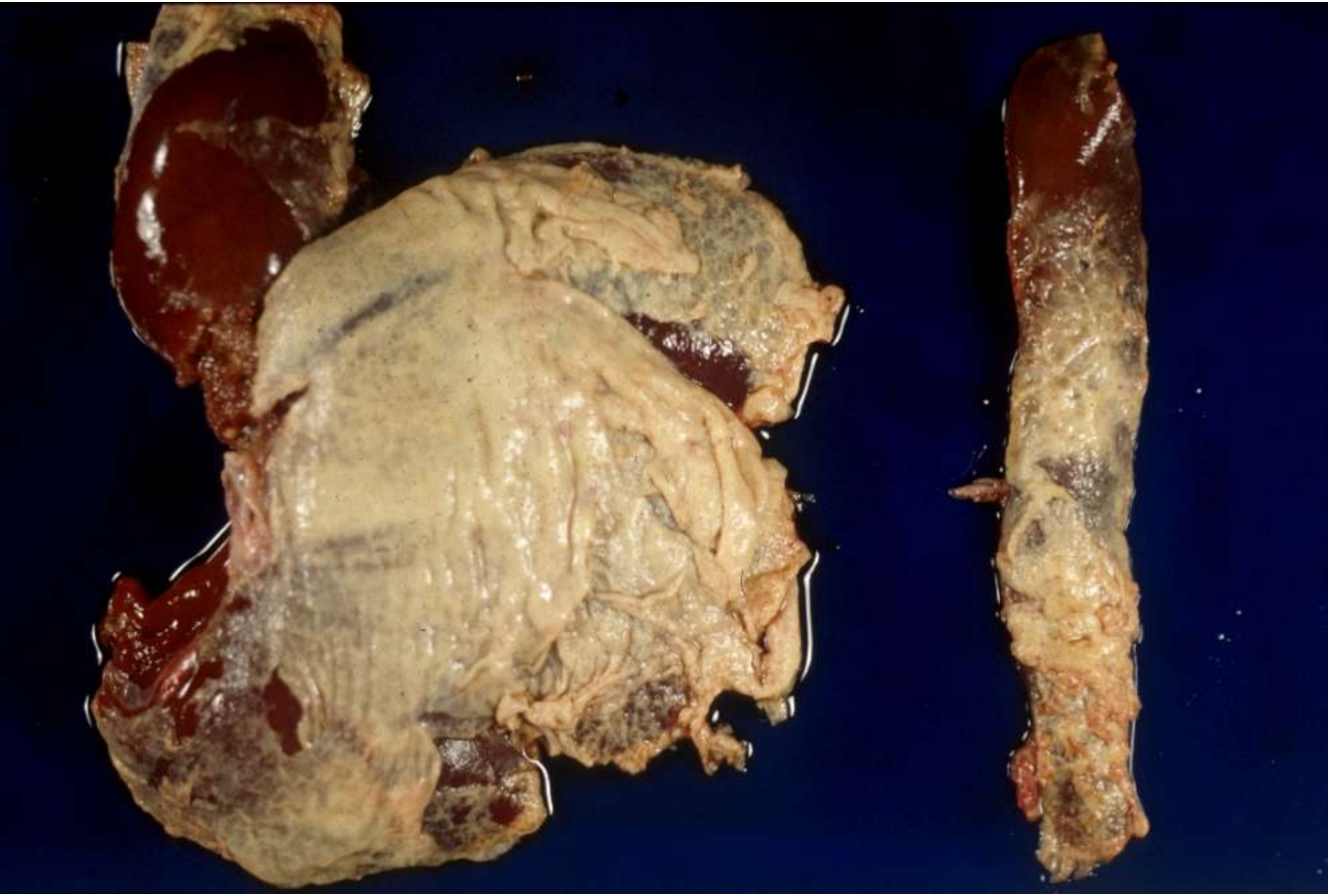


- pastorella

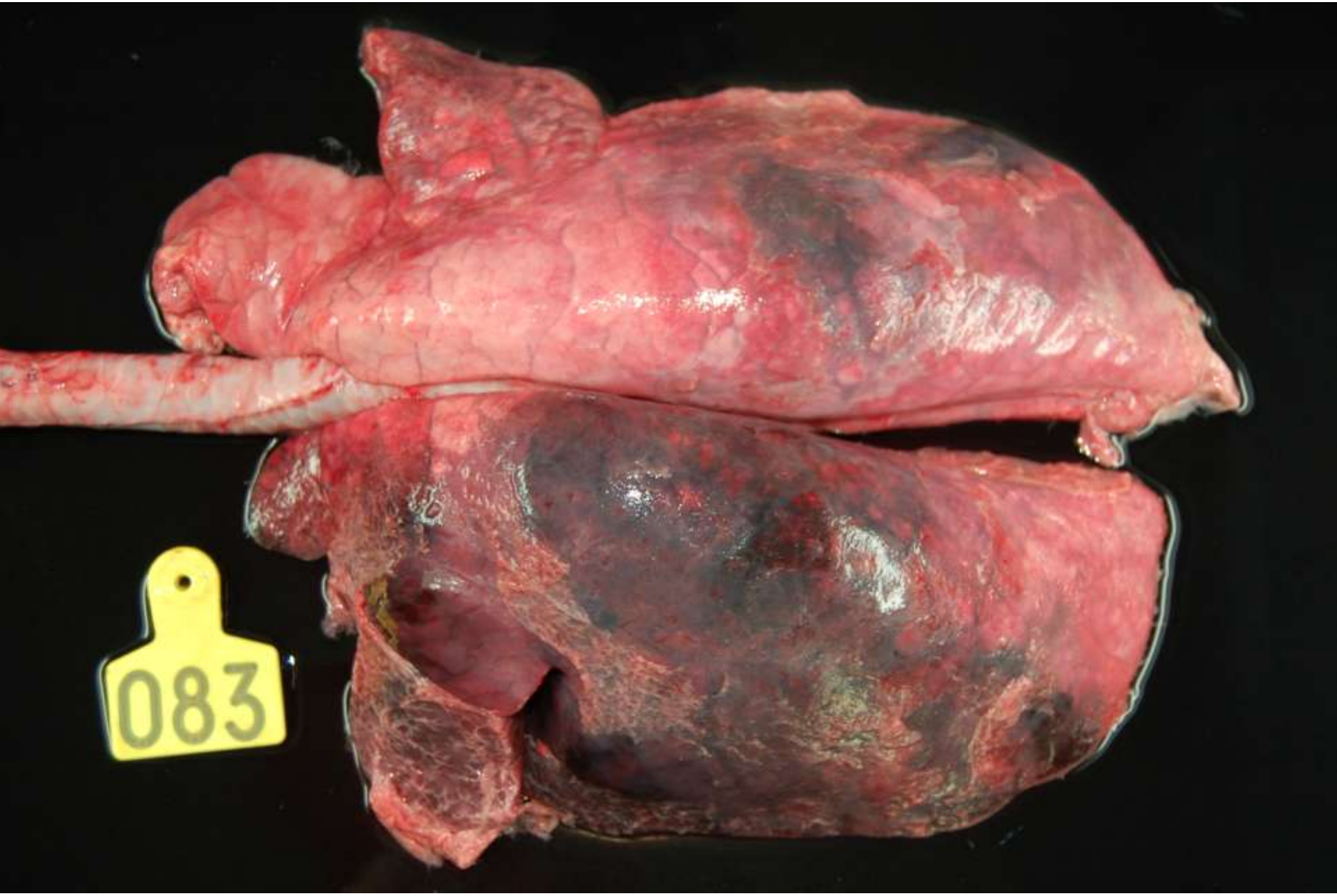


- H. parasuis
- Streptococco

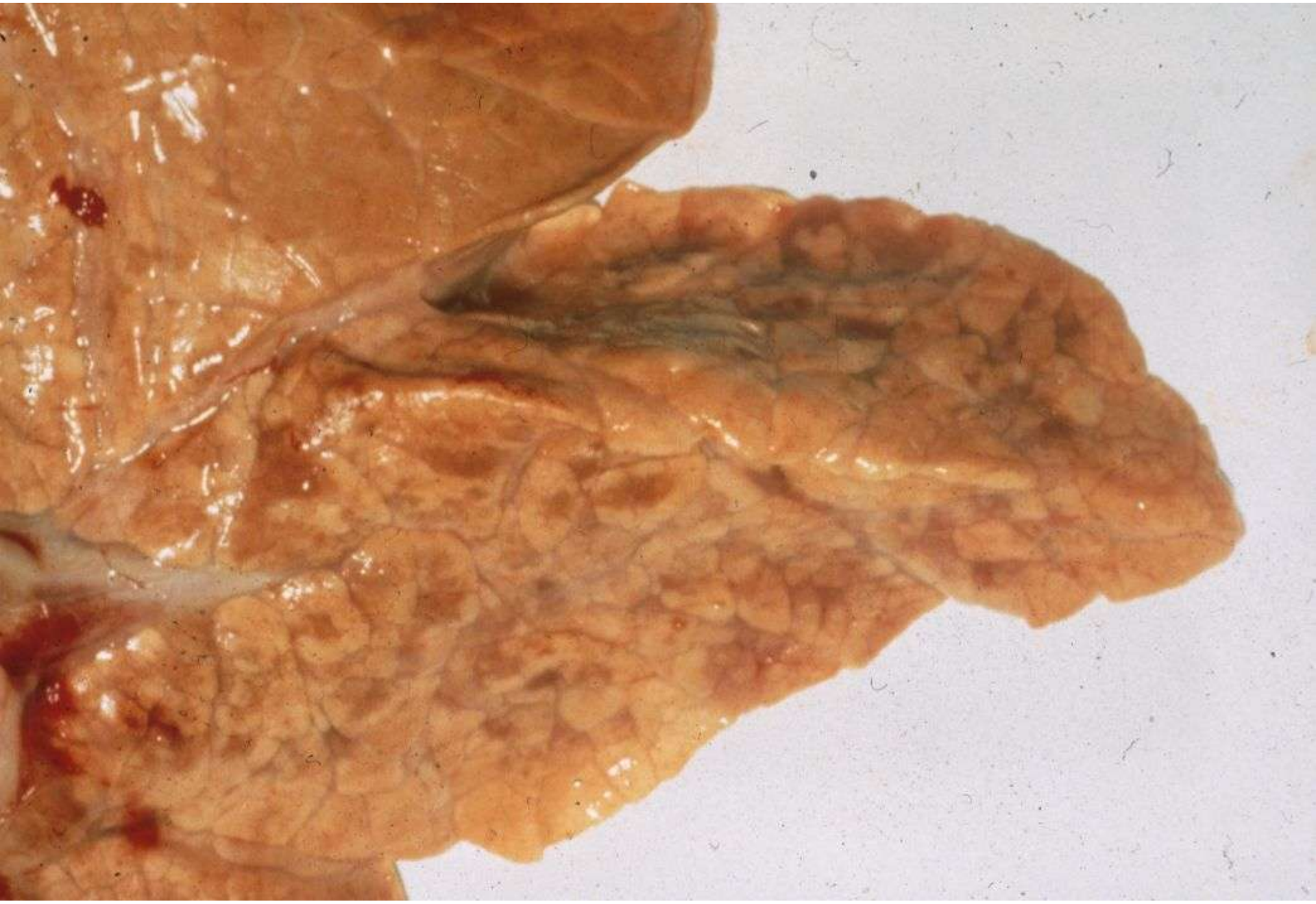


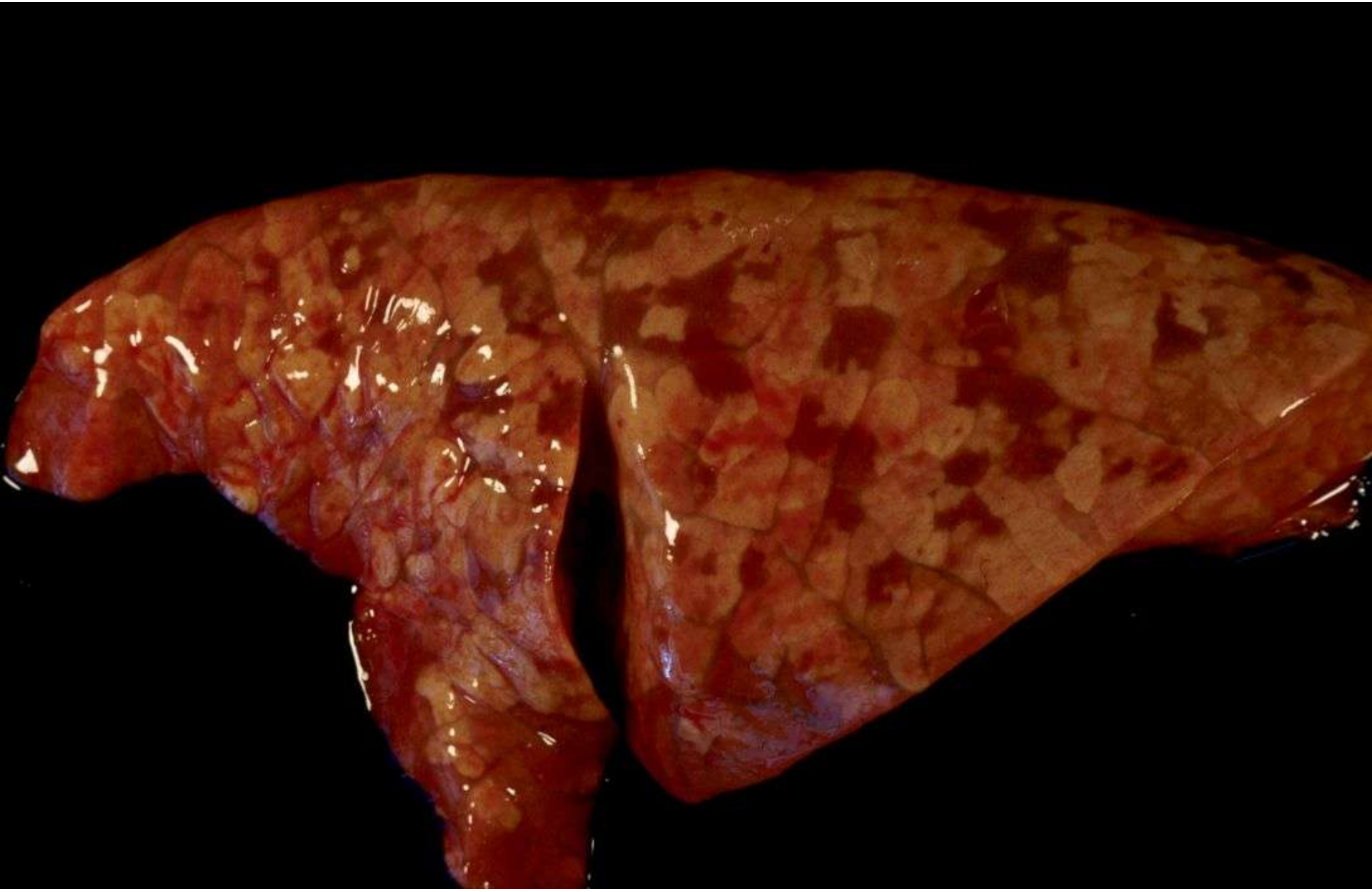


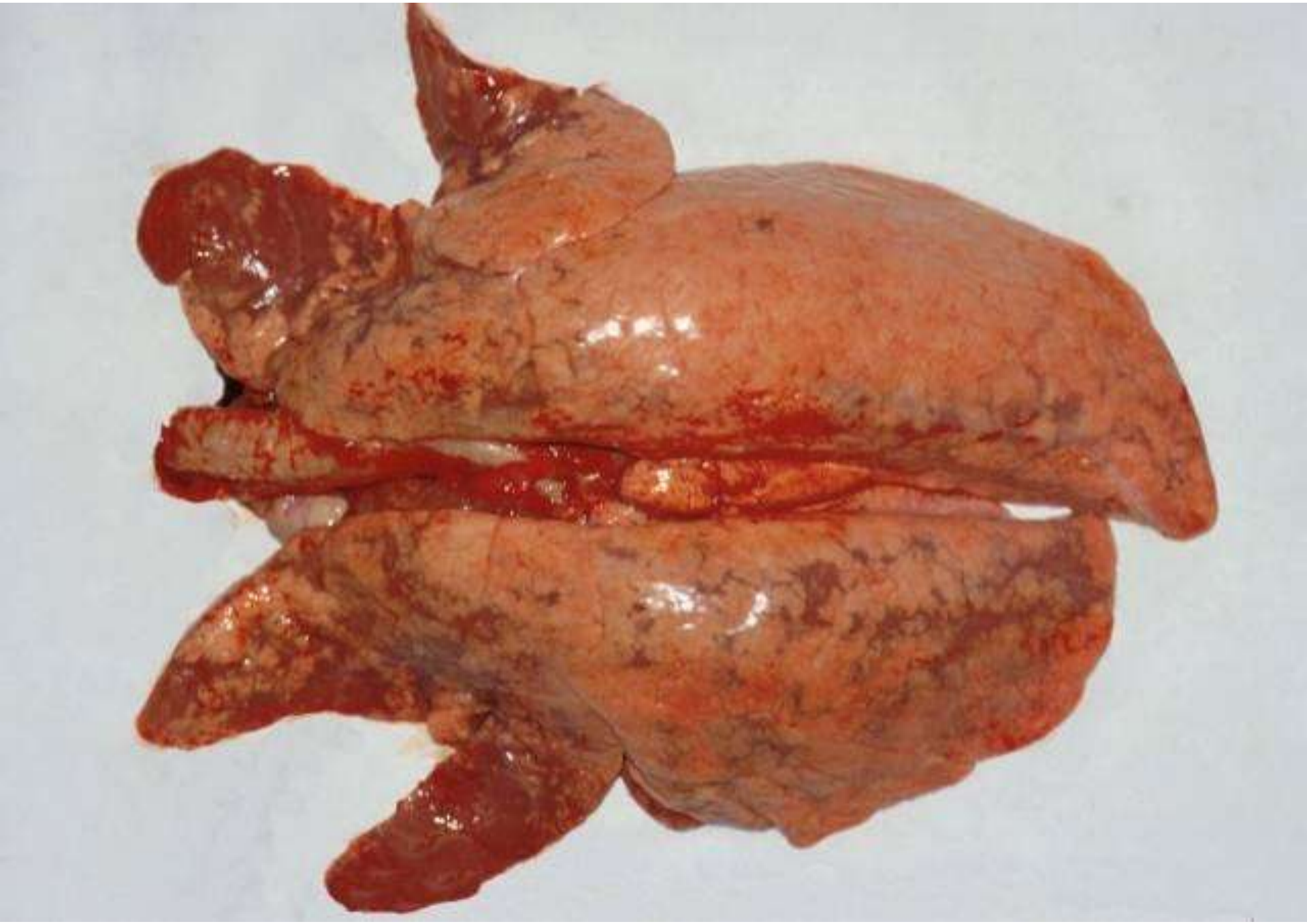
- A. pp


083

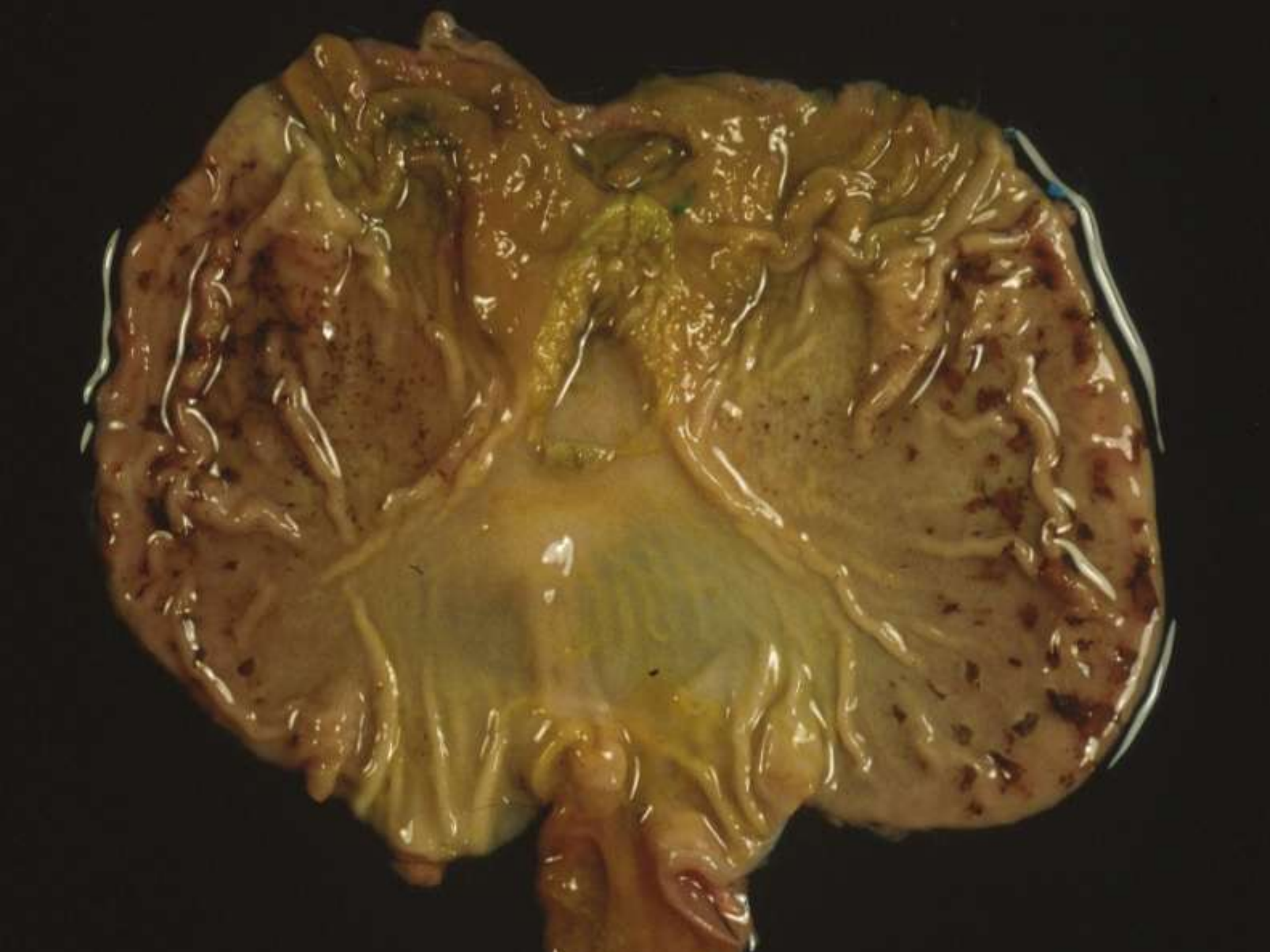
- Forme virali



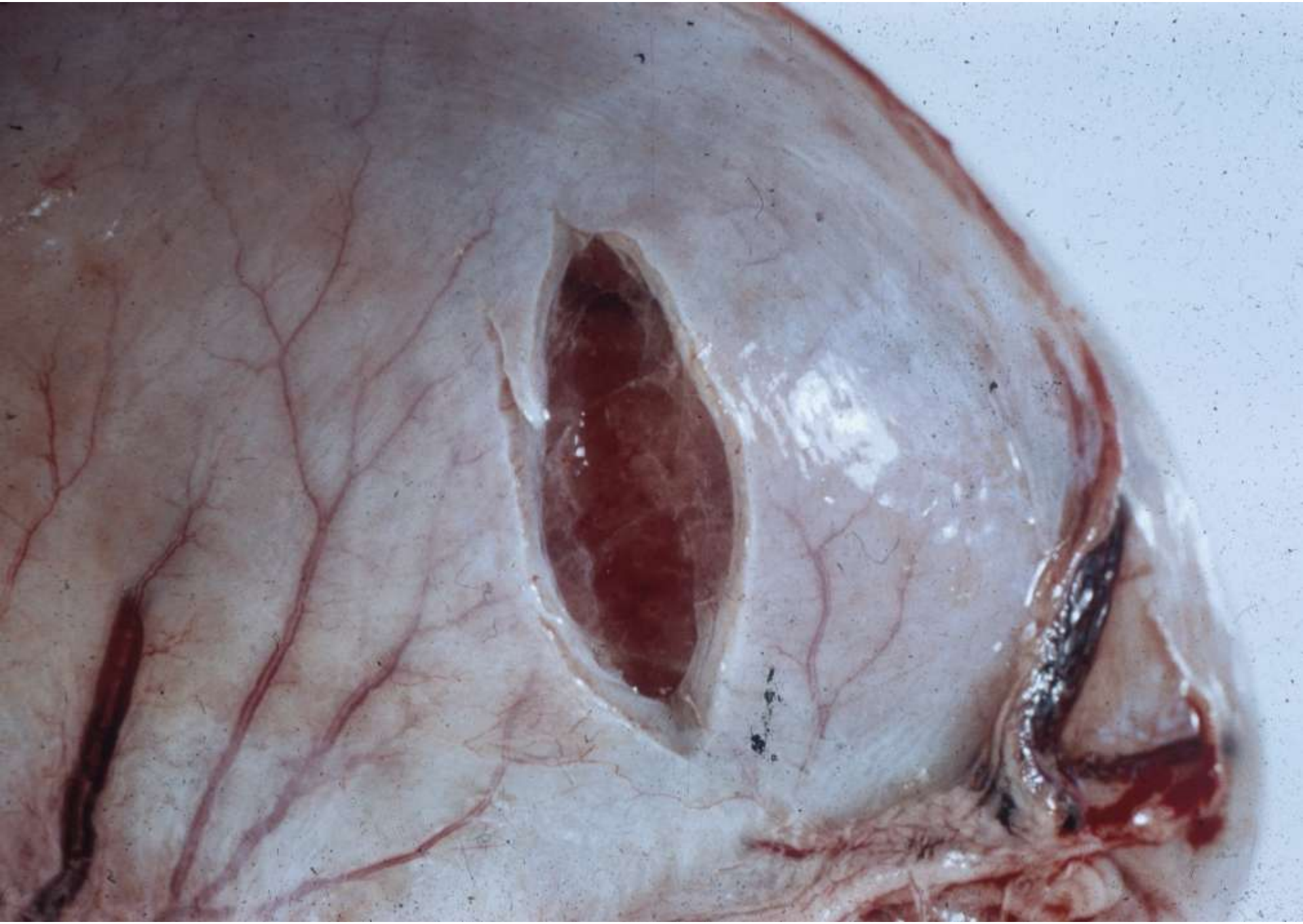




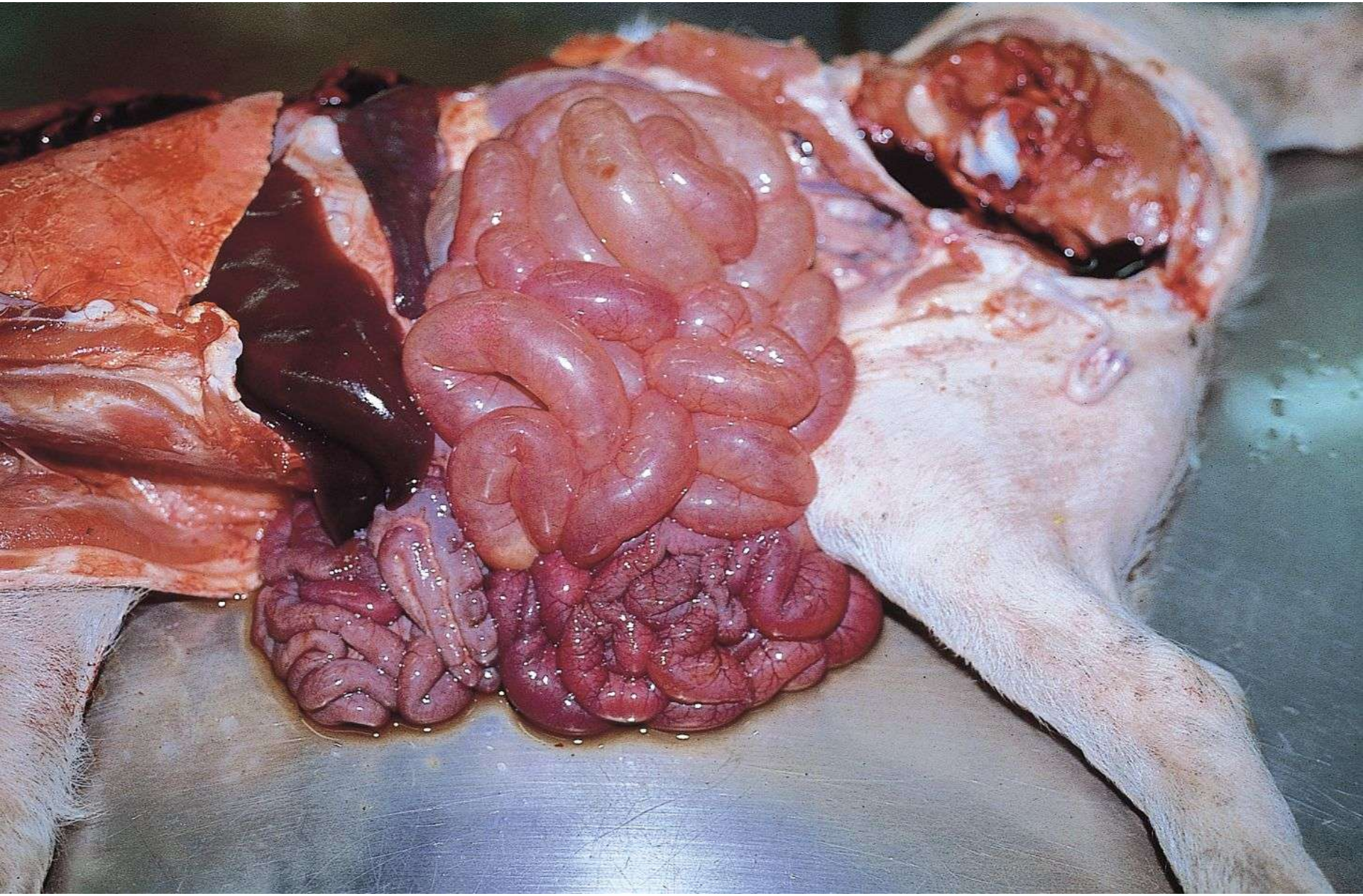
- Focolai necrotici al fundus da coli



- M edemi

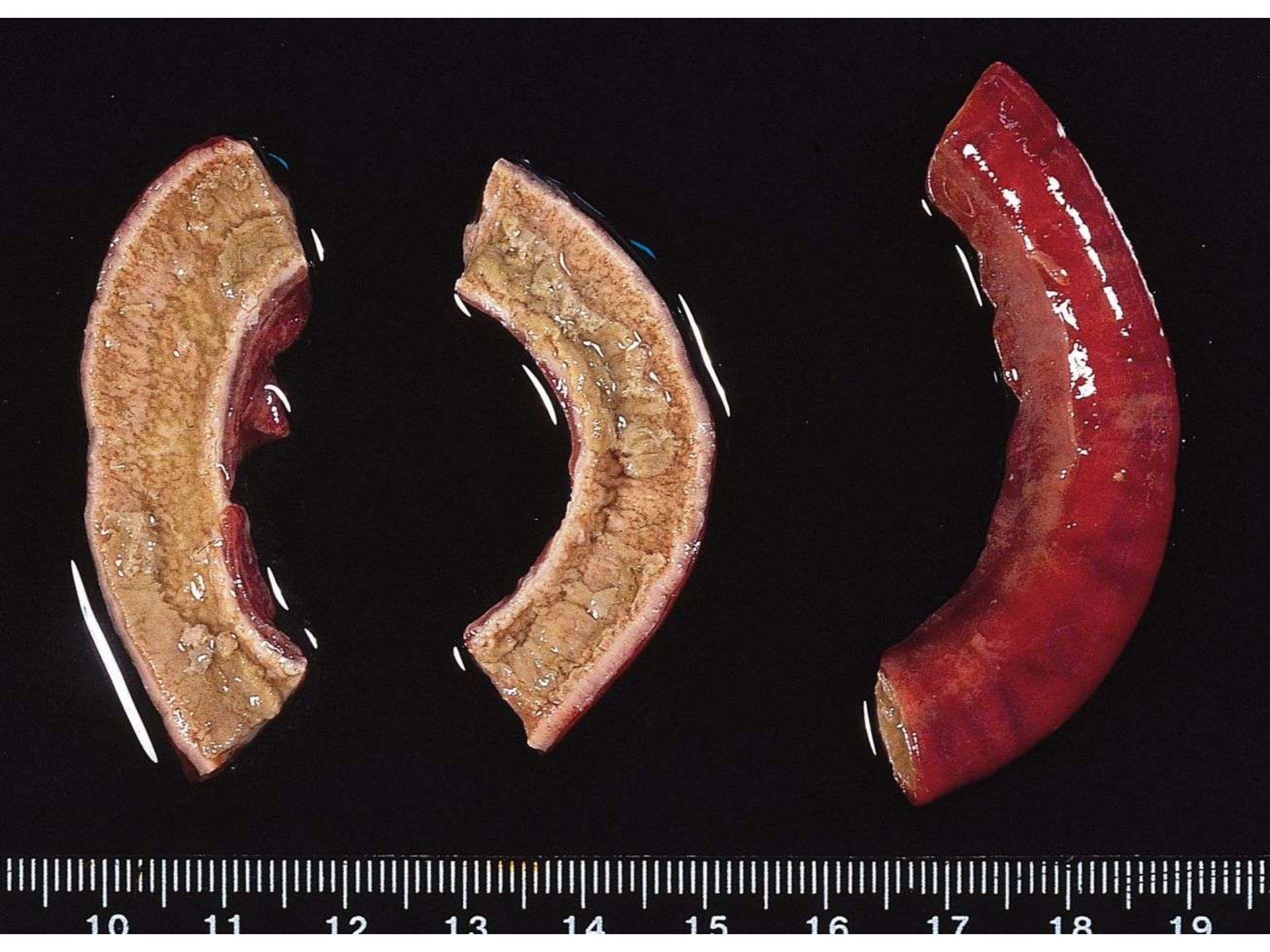


- torsione

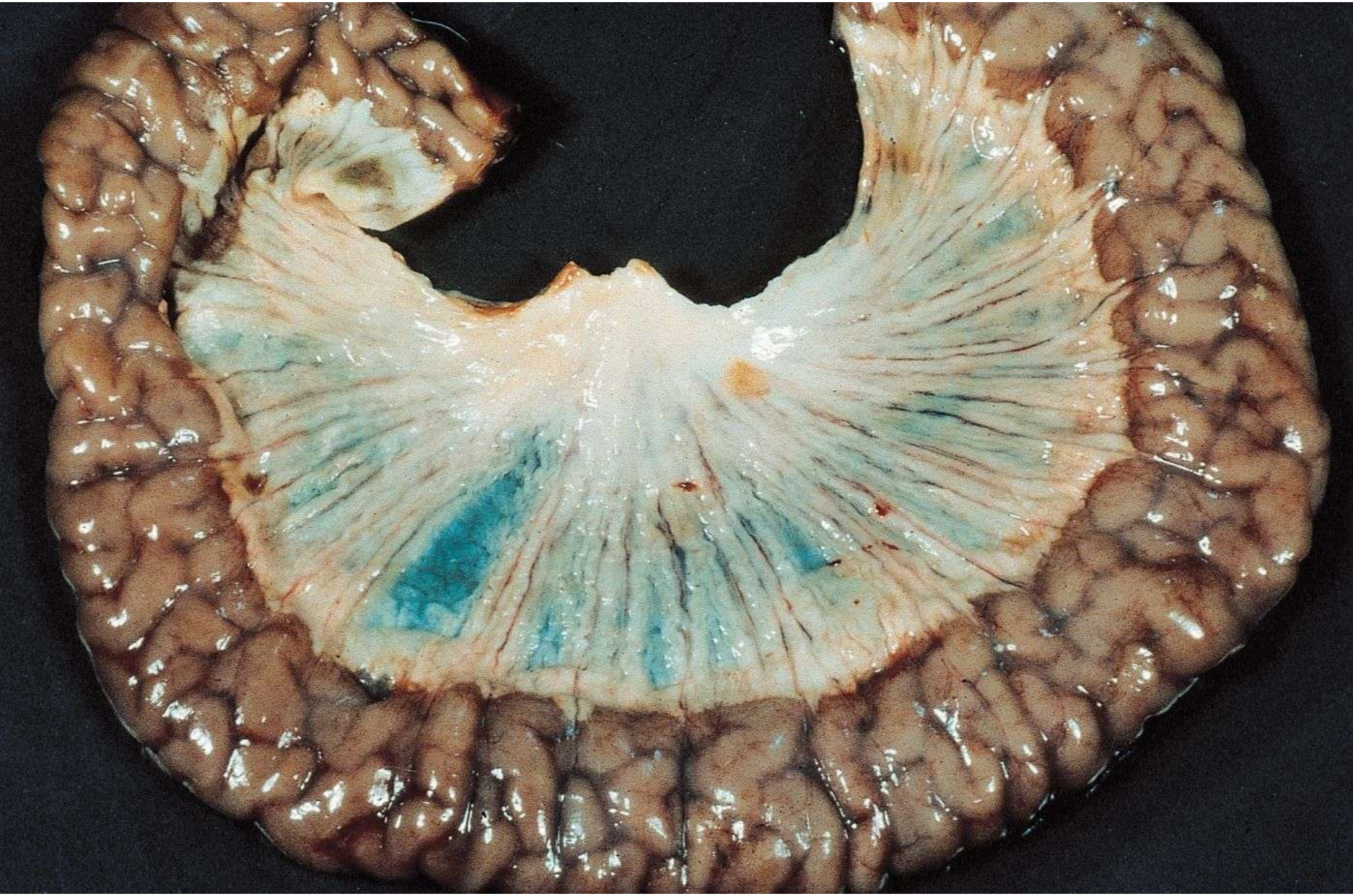


- M edemi

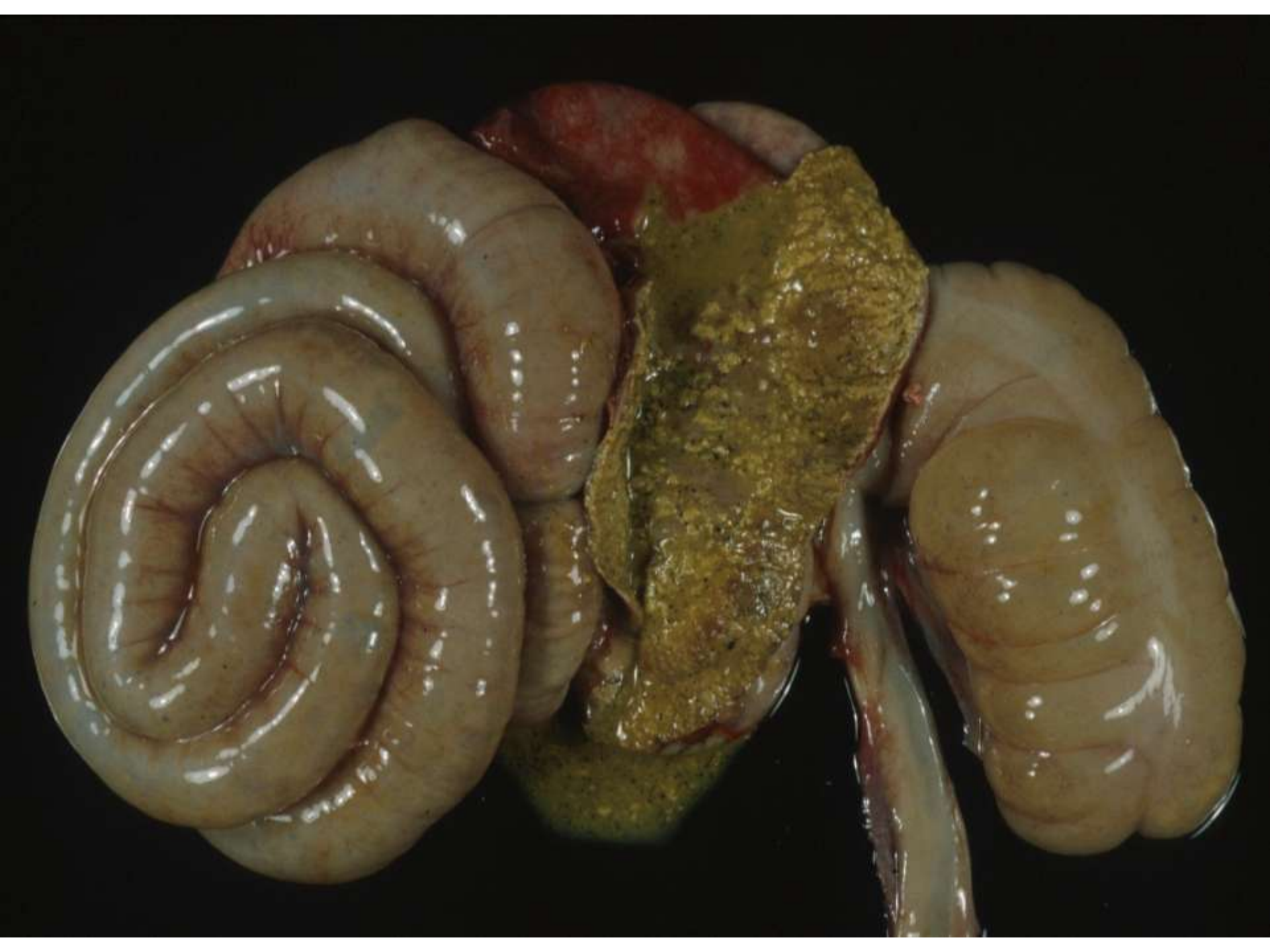
- coccidiosi

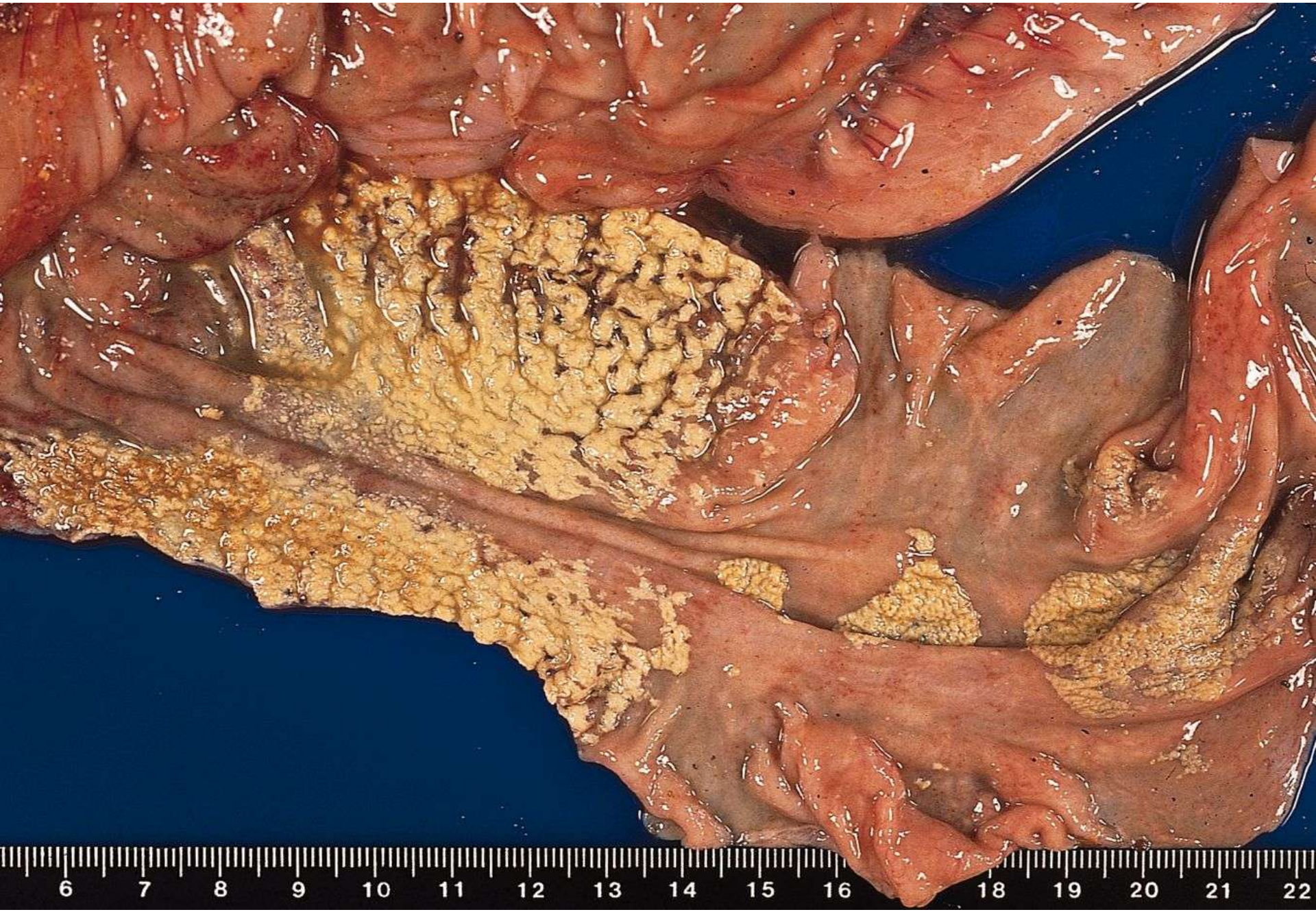

10
11
12
13
14
15
16
17
18
19

- lawsonia

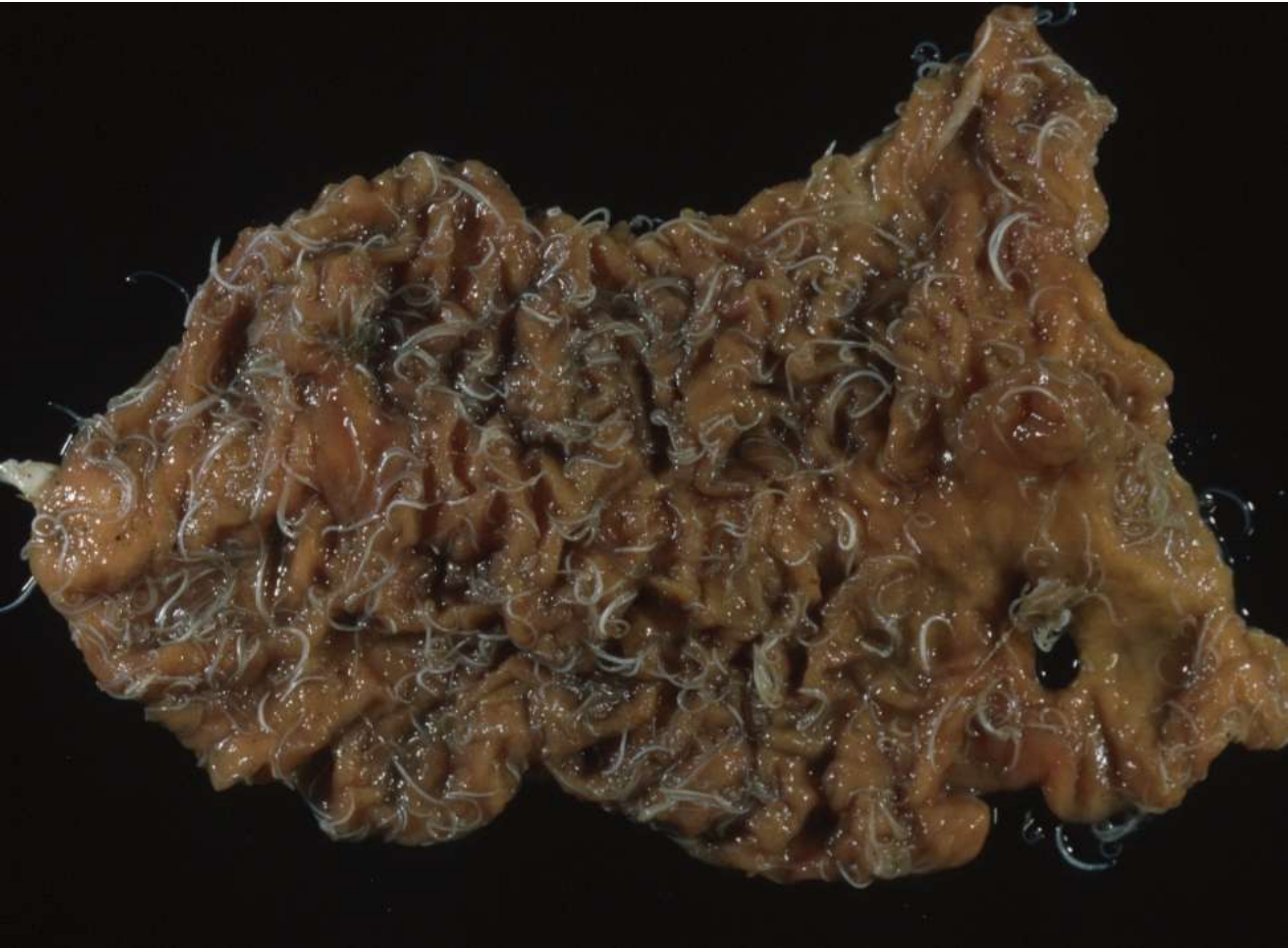


- salmonella

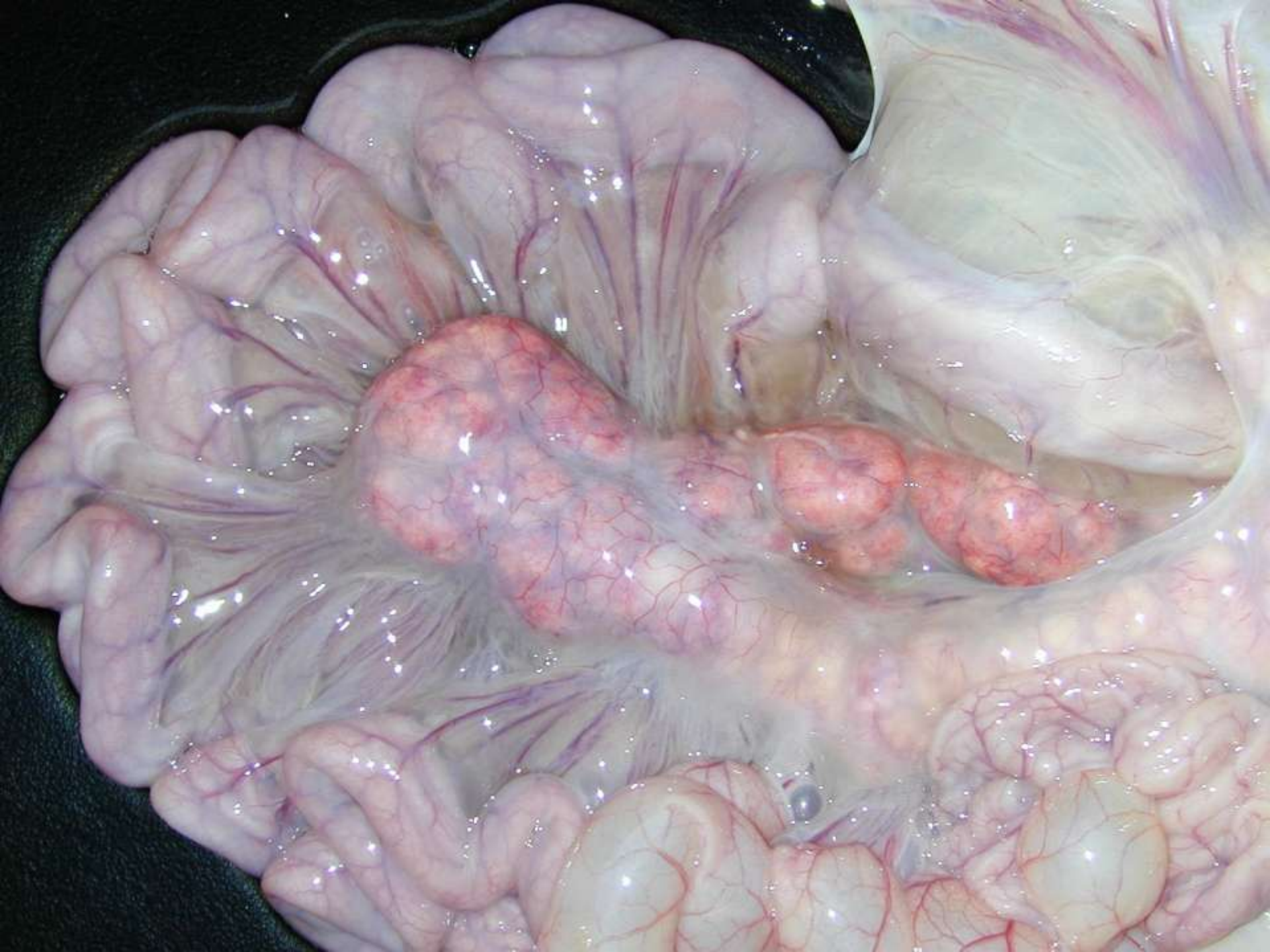



6
7
8
9
10
11
12
13
14
15
16
18
19
20
21
22

- trichuris

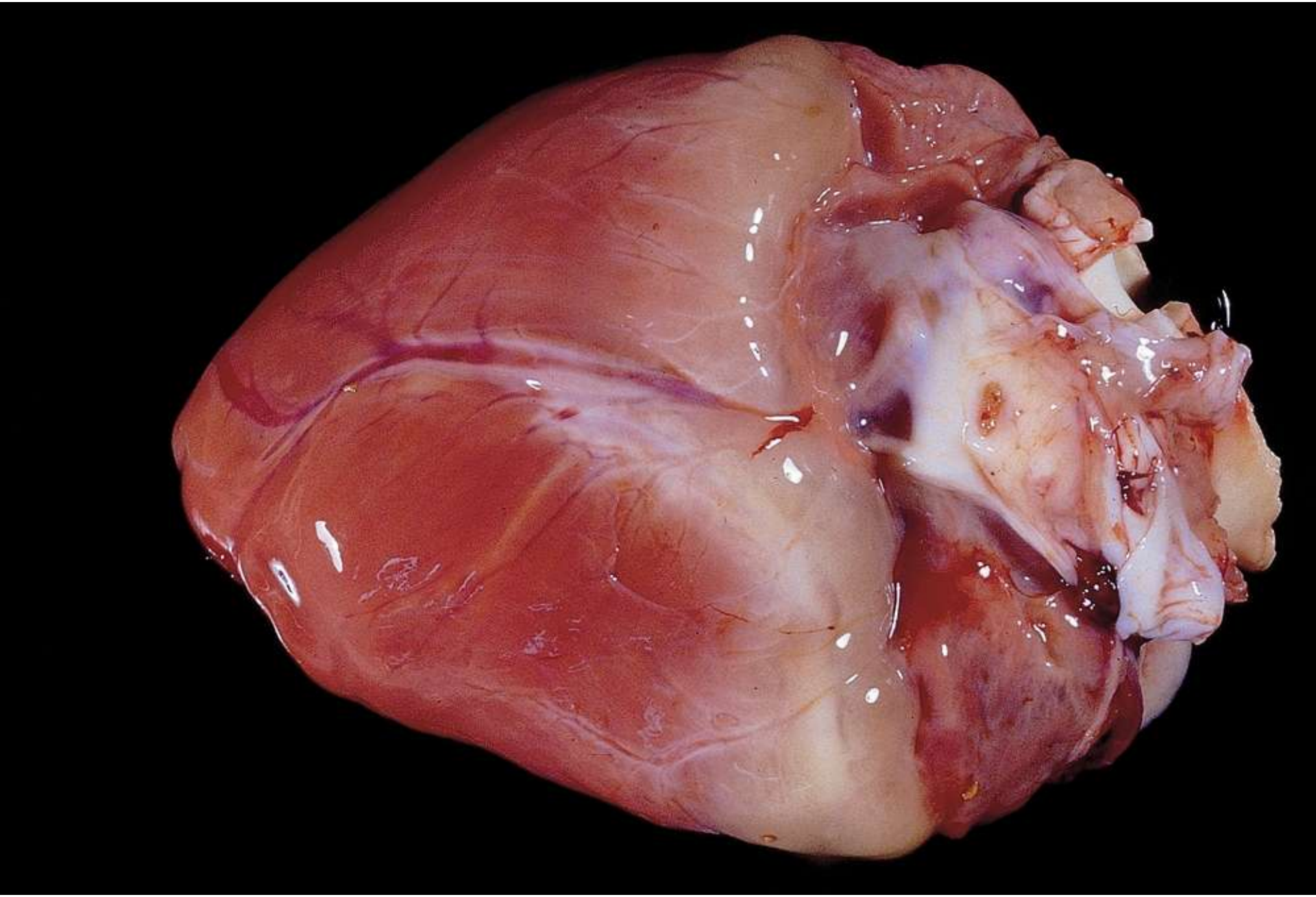


- Ipertrofia linfonodi da pcv

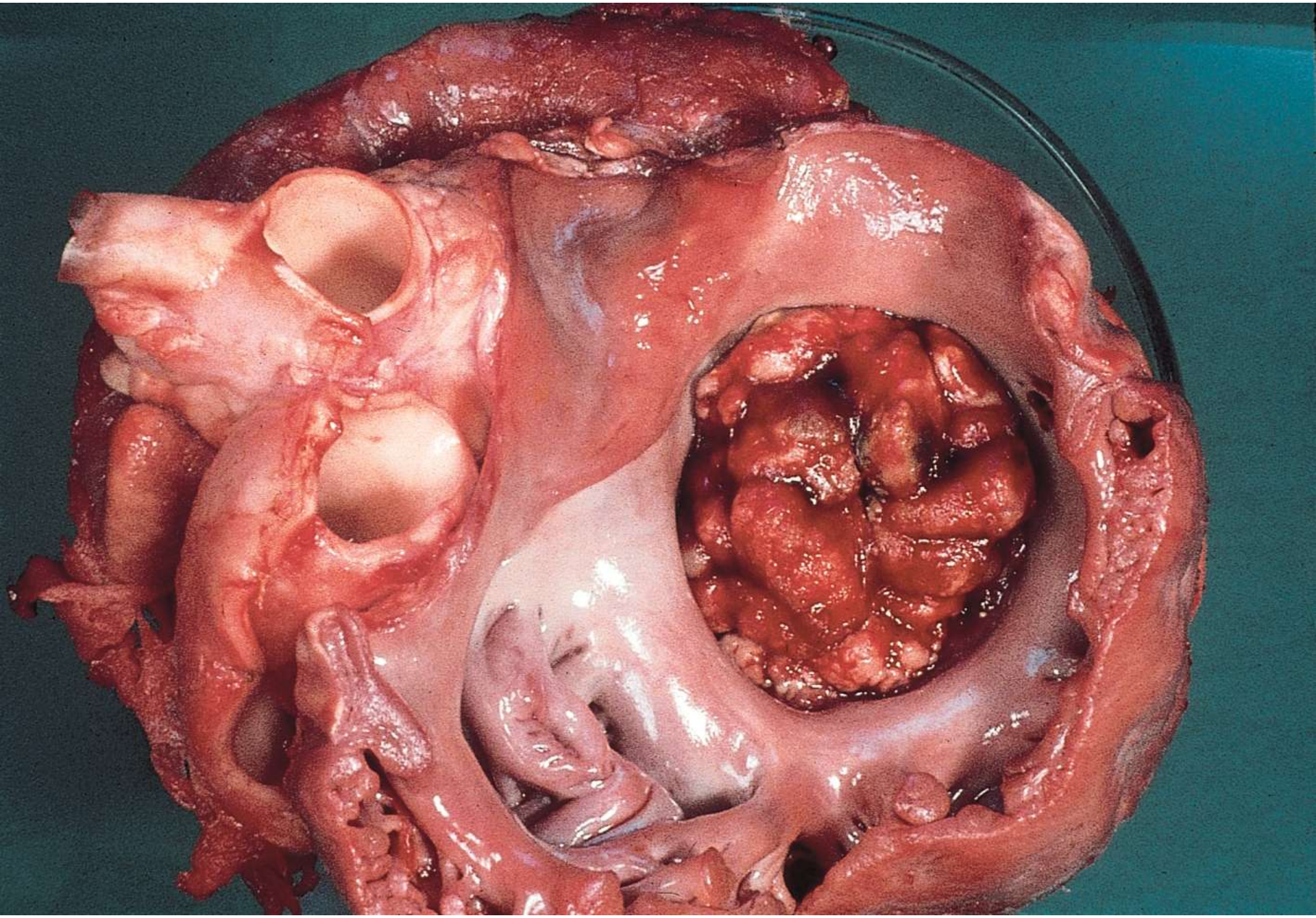


- epidermite

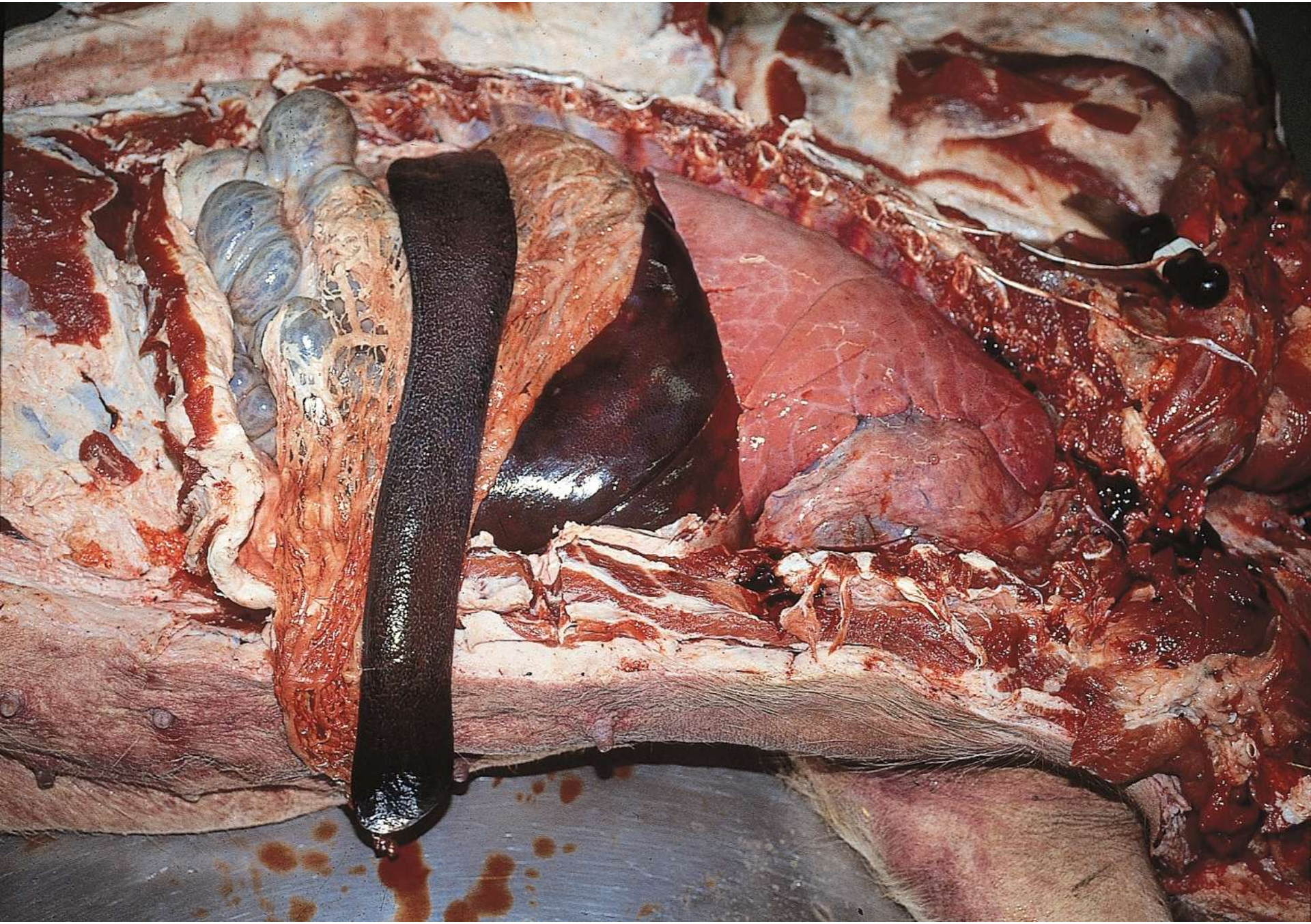
- Gelatina al posto del grasso nei casi gravi di deperimento



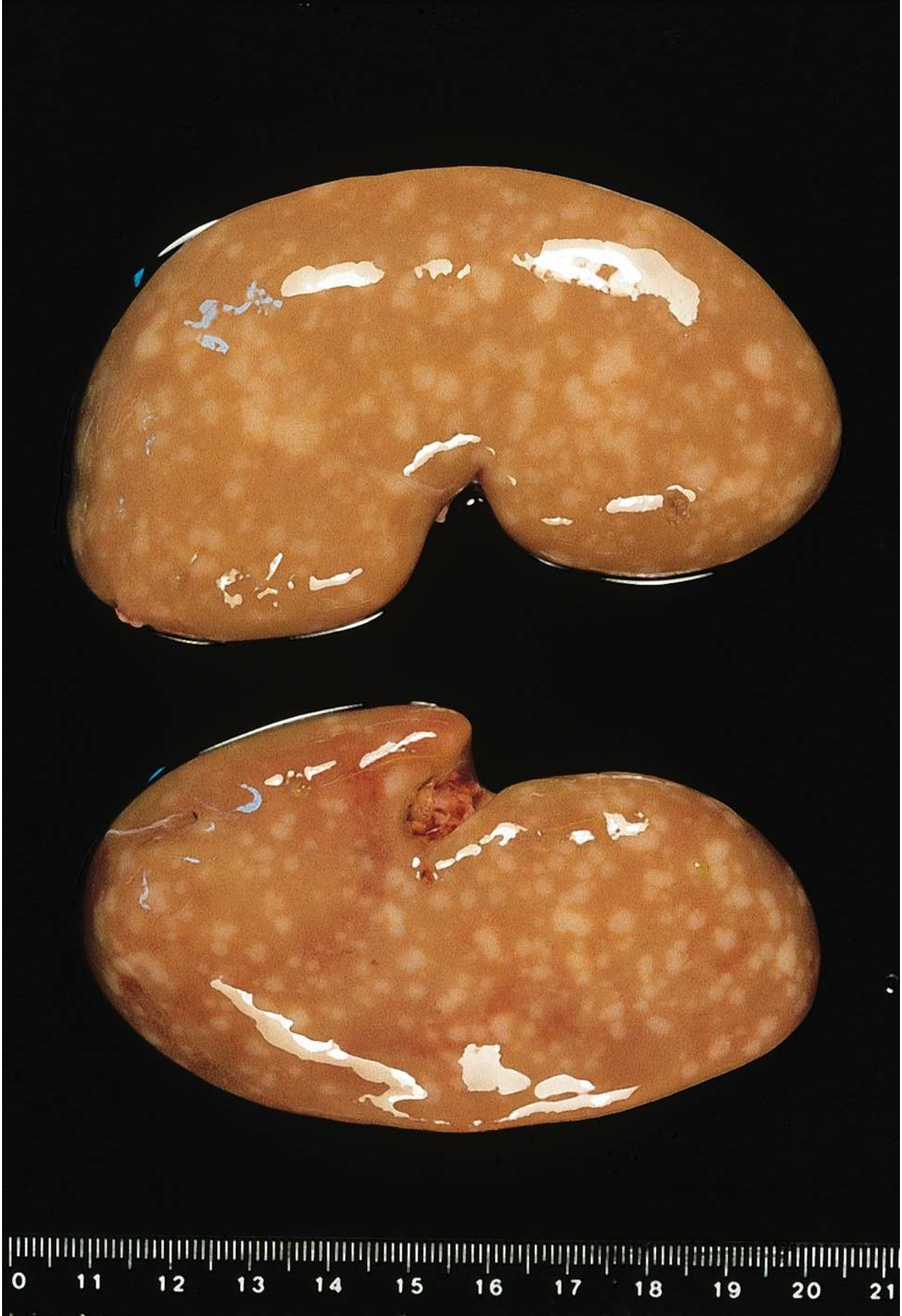
- Endocardite valv



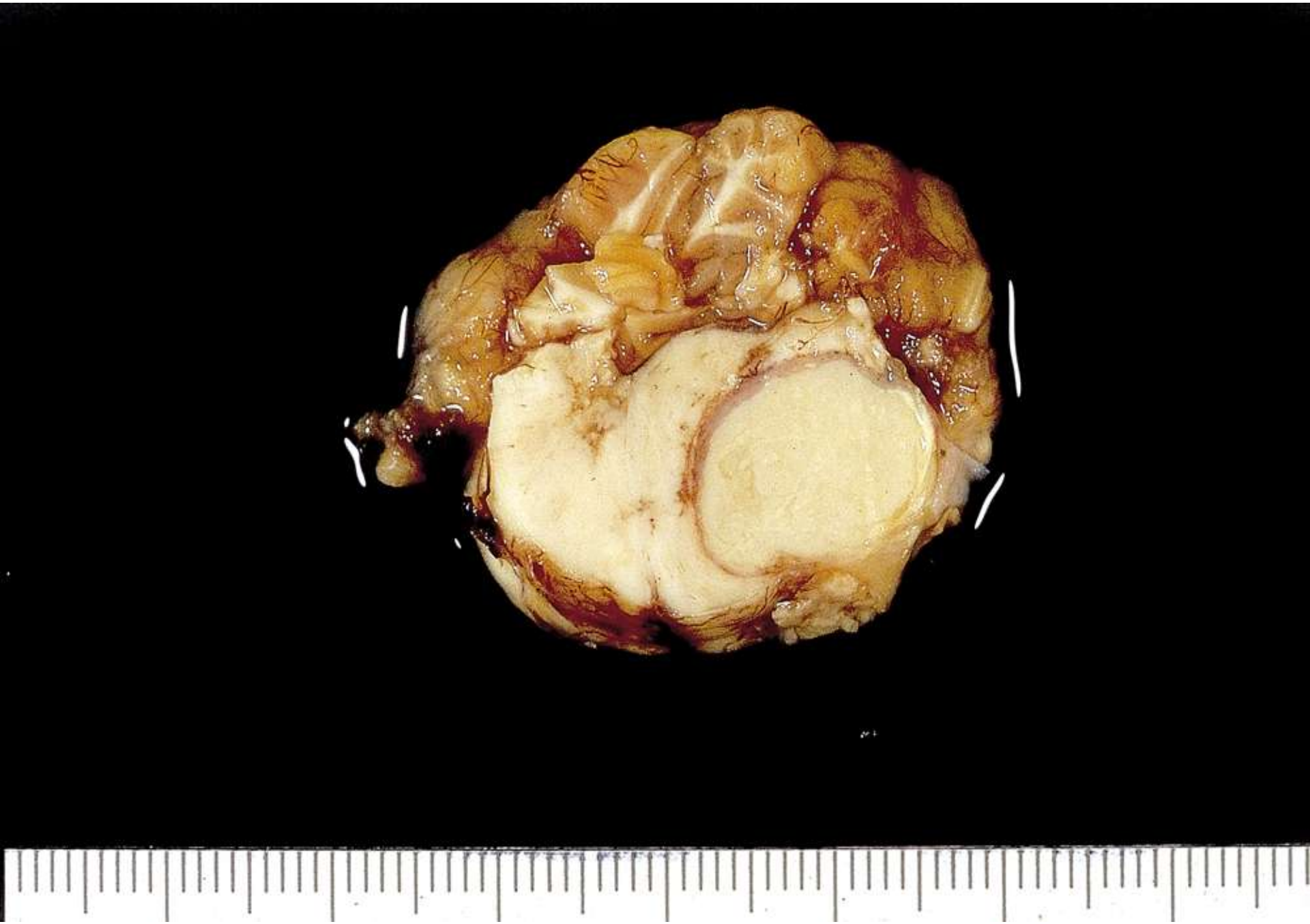
- Ipertrofia milza



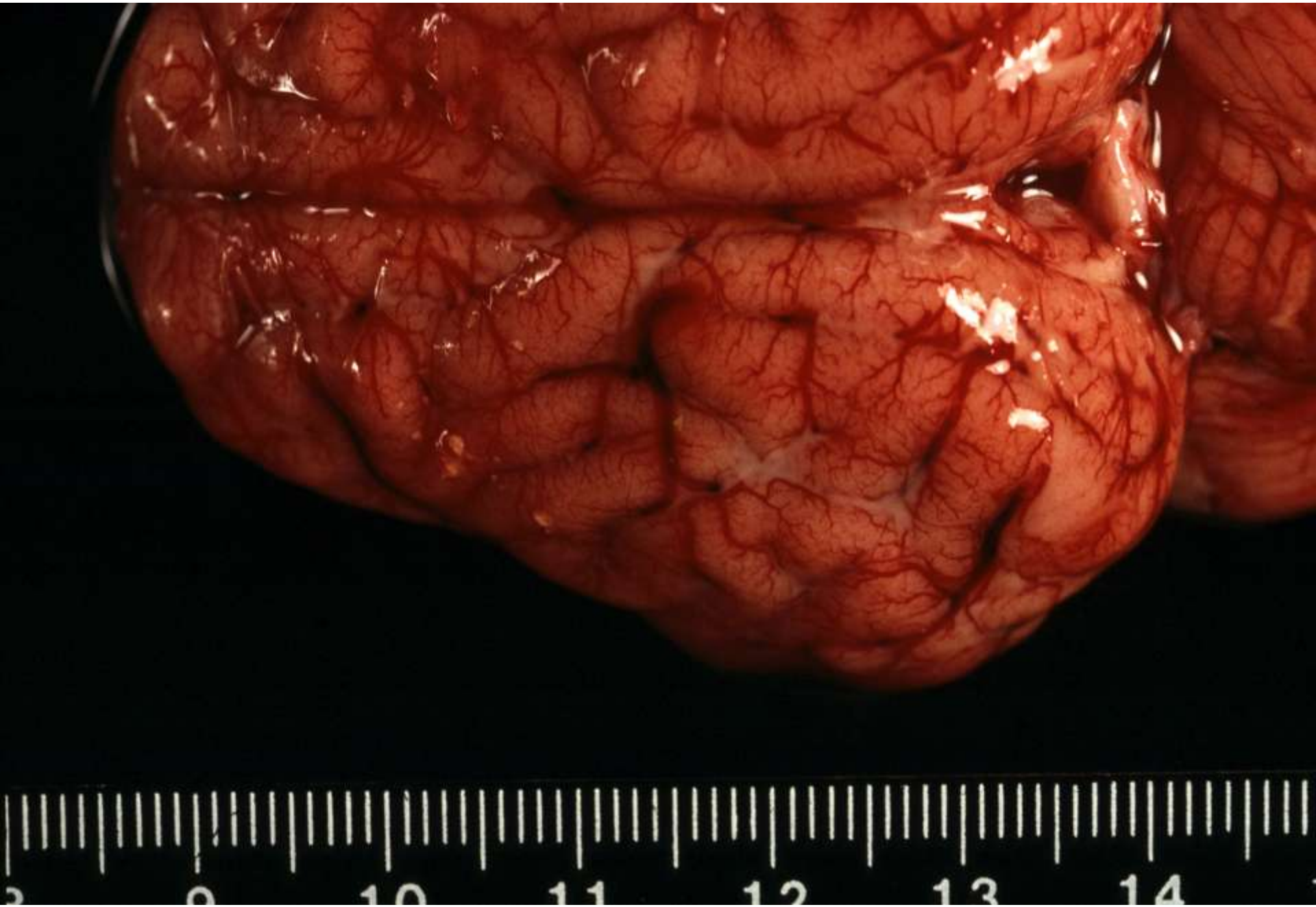
- Nefrite interstiz da pcv o leptosp


0
11
12
13
14
15
16
17
18
19
20
21

- Ascesso cerebrale



- meningite


10
11
12
13
14

Diagnostic elements

Diagnostic possibilities

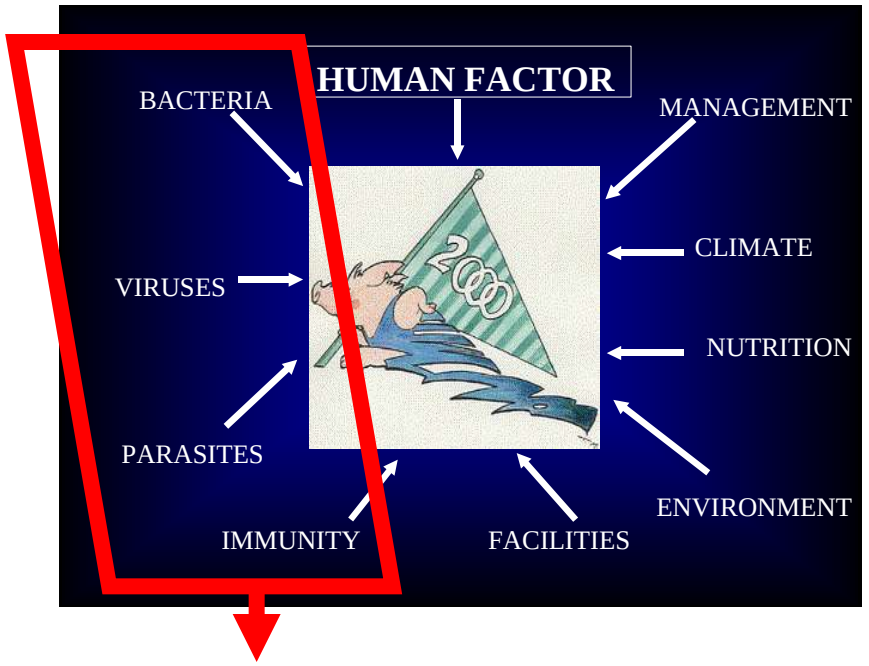
- Pressumptive clinical diagnosis
  - Pathological diagnosis
- Laboratorial analyses
  - Histopathology
  - Bacteriology (isolation / antibiogram)
  - Serology
  - PCR / RT-PCR / qPCR / sequencing

ON-FARM DIAGNOSIS

GLOBAL DIAGNOSIS

Global diagnosis

- **Compendium of the clinical and laboratorial diagnoses that allows us to detail the different components associated to the presence of a disease with the objective to counteract, balance or eliminate them**



Avoid too many expectations with laboratorial analyses…

- "laboratories tell us what they really tell us" (correct interpretation)

  but not
  "what we would like that they tell us"
  (the microorganism is the cause of my disease problem)
- This latter point must be decided by you once you have the results
- Your experience in interpreting laboratorial results is a key point

Interpretation of laboratorial results

- Depends on:
  - The reliability of the laboratorial technique by itself
  - Adequate sampling and submission of samples to the laboratory
- Since the veterinary practitioner cannot influence on the laboratorial testing by acting on the laboratorial technique, he/she must be very careful in those steps of sampling and submission
  - **This is the way in which veterinarian can provide reliability to the global diagnostic chain from-the-farm-to-the-laboratory**

Diagnostic approaches are as variable as problems in farms and as variable as veterinarians… let's see an example

CLINICAL CASE

LONG
ONE

SHORT
ONE

General characteristics of the farm

- 320-sow, farrow-to-finish operation located in North-eastern Spain (Farm A)
- All in-all out management
- Weaning at 22-24 days of age
- Facilities constructed in 1975, subsequent re-modelations
- 2 workers (no work division)
- Feeding produced in the farm

Sanitary status

- Aujeszky's disease virus (ADV)
  - 3 times/year in sows and boar
  - once in fattening pigs at 10 weeks of age
- Porcine parvovirus (PPV) and erysipelas: combined vaccine used at 10-15 days post-partum
- Seropositive sows against Mhyo, porcine reproductive and respiratory syndrome virus (PRRSV) and ADV gE
- No current knowledge on the serological status of nursery/fattening pigs

Fattening units

- Capacity to grow around 50% of the produced pigs
- Rest of the pigs are sold to another farm (Farm B) – one single source, fattening unit, in continuous flow

First notice of the problem

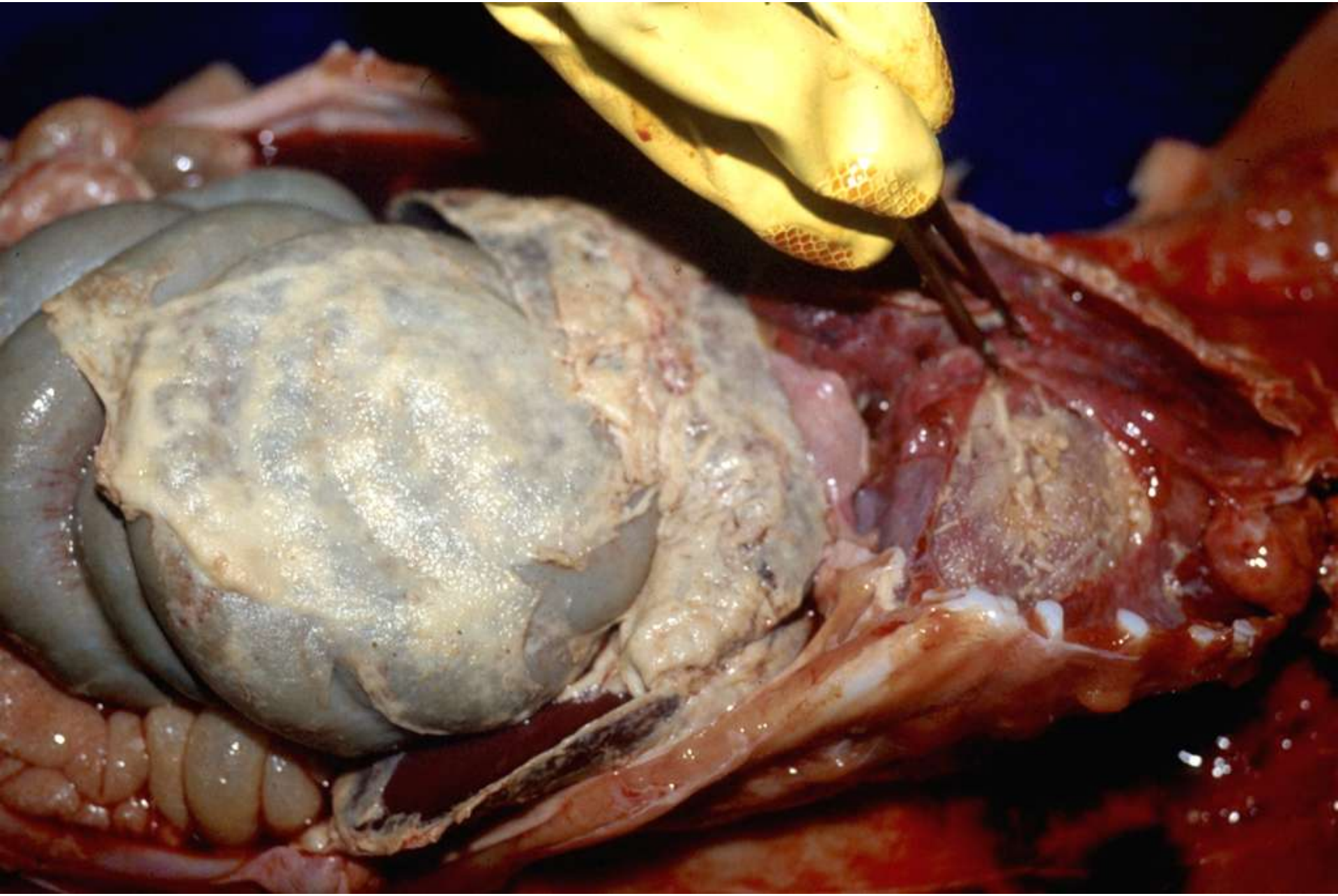
- Farm A owner phones the vet
- 6 to 8 week-old pigs with severe respiratory problems – dyspnea, thumping, but no cough or associated mortality
- Morbidity: 20-25%
- Severe complains from the owner of farm B: severe respiratory problems (Mb 30-35%) with associated mortality (sudden)
- Both cases: several antibiotics were used (amoxicilin, self-made antibiotic mixture) – no proper work

Vet's mind in front of the phone call…

1. It is a viral problem
2. It is a viral problem mixed with bacterial infections
3. It is a management and bad medication problem
4. Where did I leave the "Diseases of swine" book?

First visit at farm A (day 0)

- Late nursery pigs with fever, dyspnea, thumping, and stacking
- Few pigs with nervous clinical signs and arthritis
- High density of pigs per pen (<0.15 m^2/pig)
- One pig is necropsied by the veterinary practitioner: fibrinous polyserositis and arthritis
- No problems in breeding stock, farrowing or fattening pigs



What's your etiological diagnosis?

1. *Haemophilus parasuis* infection
2. *Streptococcus suis* infection
3. Bacterial septicaemia
4. All previous answers are correct

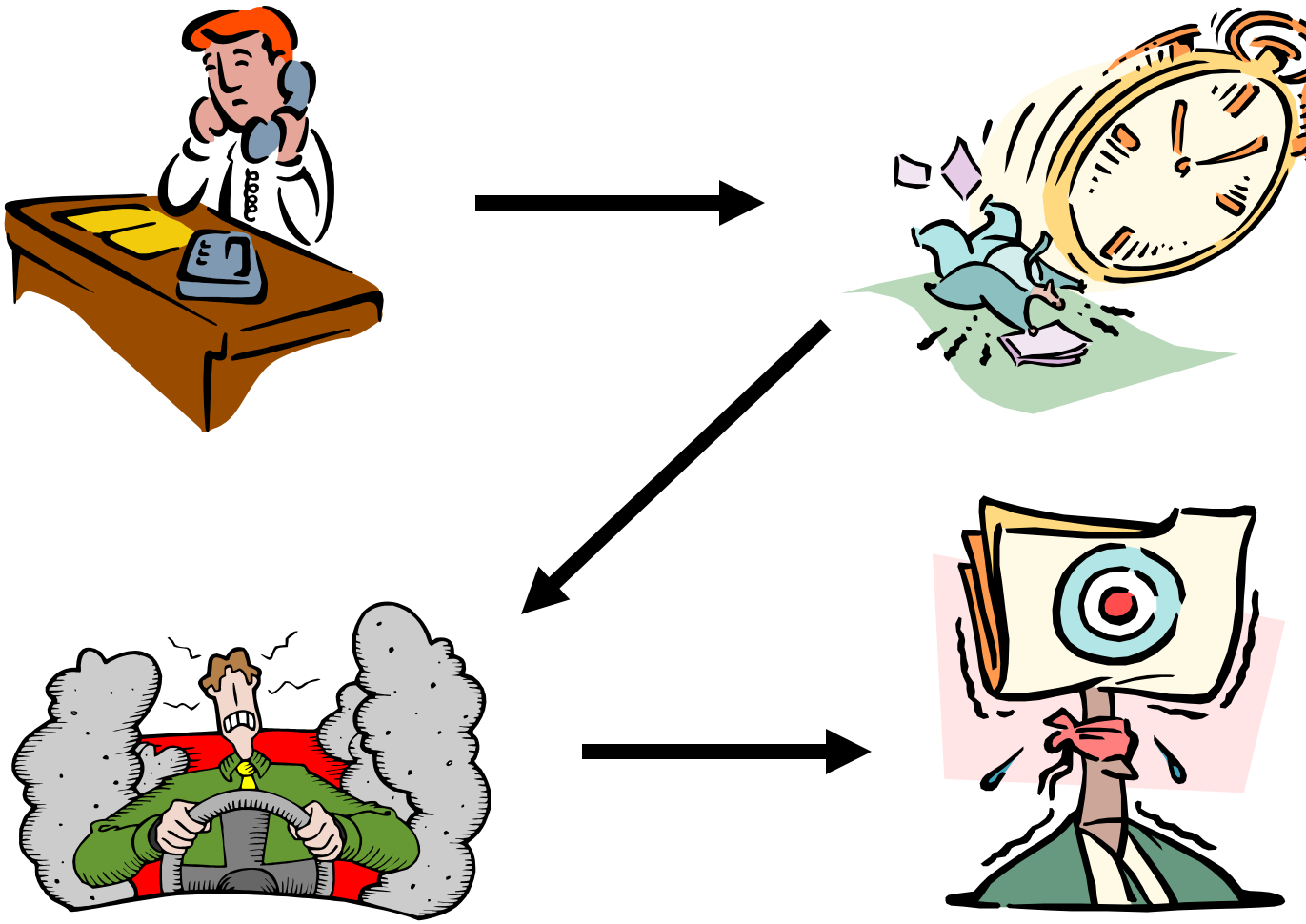
First approach

- Pressumptive clinical diagnosis: ***Haemophilus parasuis*** infection
- Measures:
  - 300-400 ppm of amoxicilin in feed
  - Injected amoxicilin in clinically affected pigs
  - Aspirin in water

All that glitters is not gold

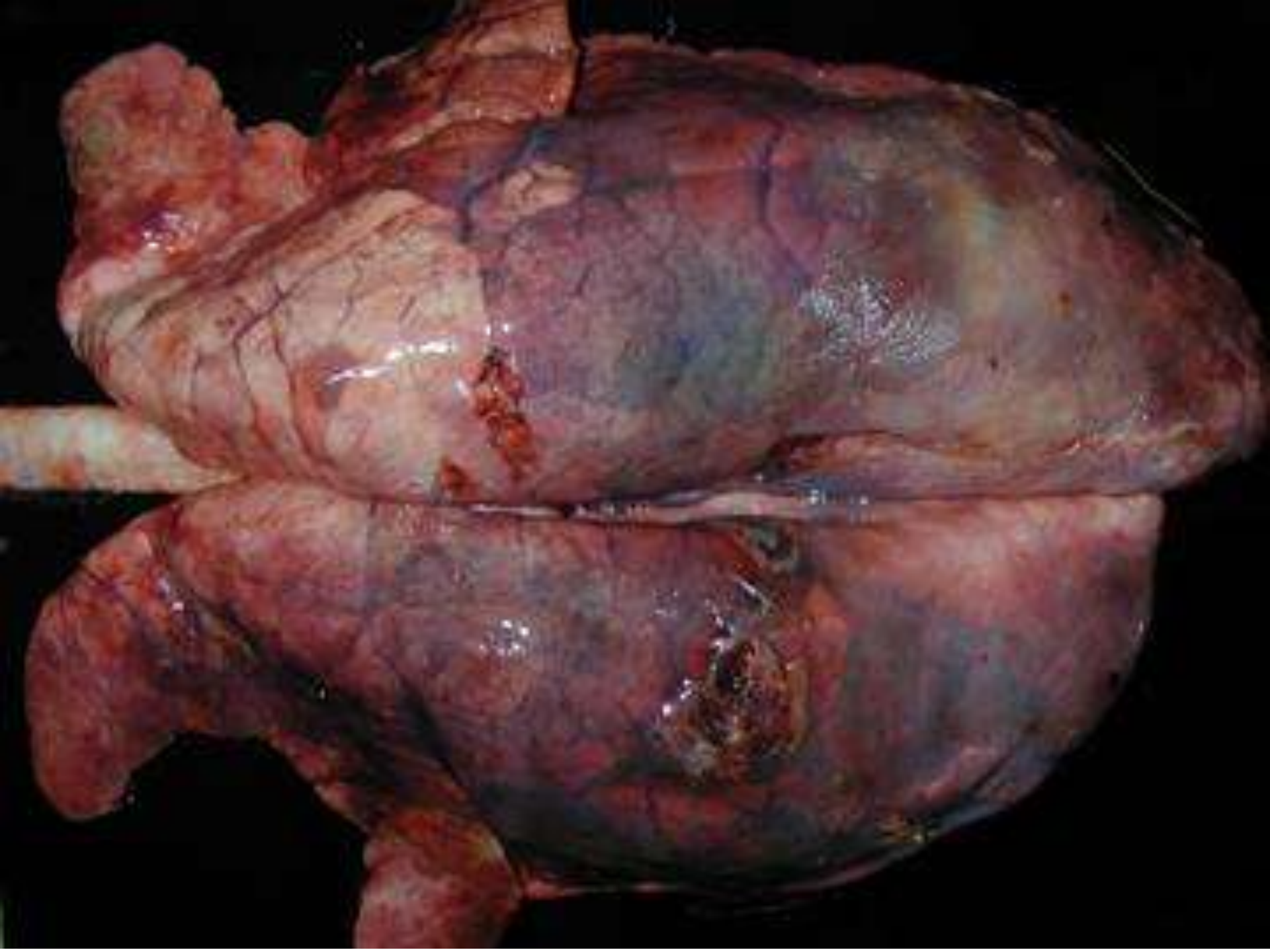
Just one pig was necropsied !!!

Day 7



Second visit at farm A and first visit at farm B (day 7)

- Farm A (6-10 wk-old pigs):
  - Same problems of the previous week, but 30-40% morbidity
  - Now with mortality (>5% in two days)
- Farm B (10-13 wk-old pigs):
  - 50% morbidity
  - 25% mortality in the oldest pigs
  - Necropsy of one pig: fibrino-necrotizing pleuropneumonia



Second approach

- Pressumptive clinical diagnosis: ***Actinobacillus pleuropneumoniae*** infection
- Measures (added):
  - Tilmicosin in feed (farms A and B)

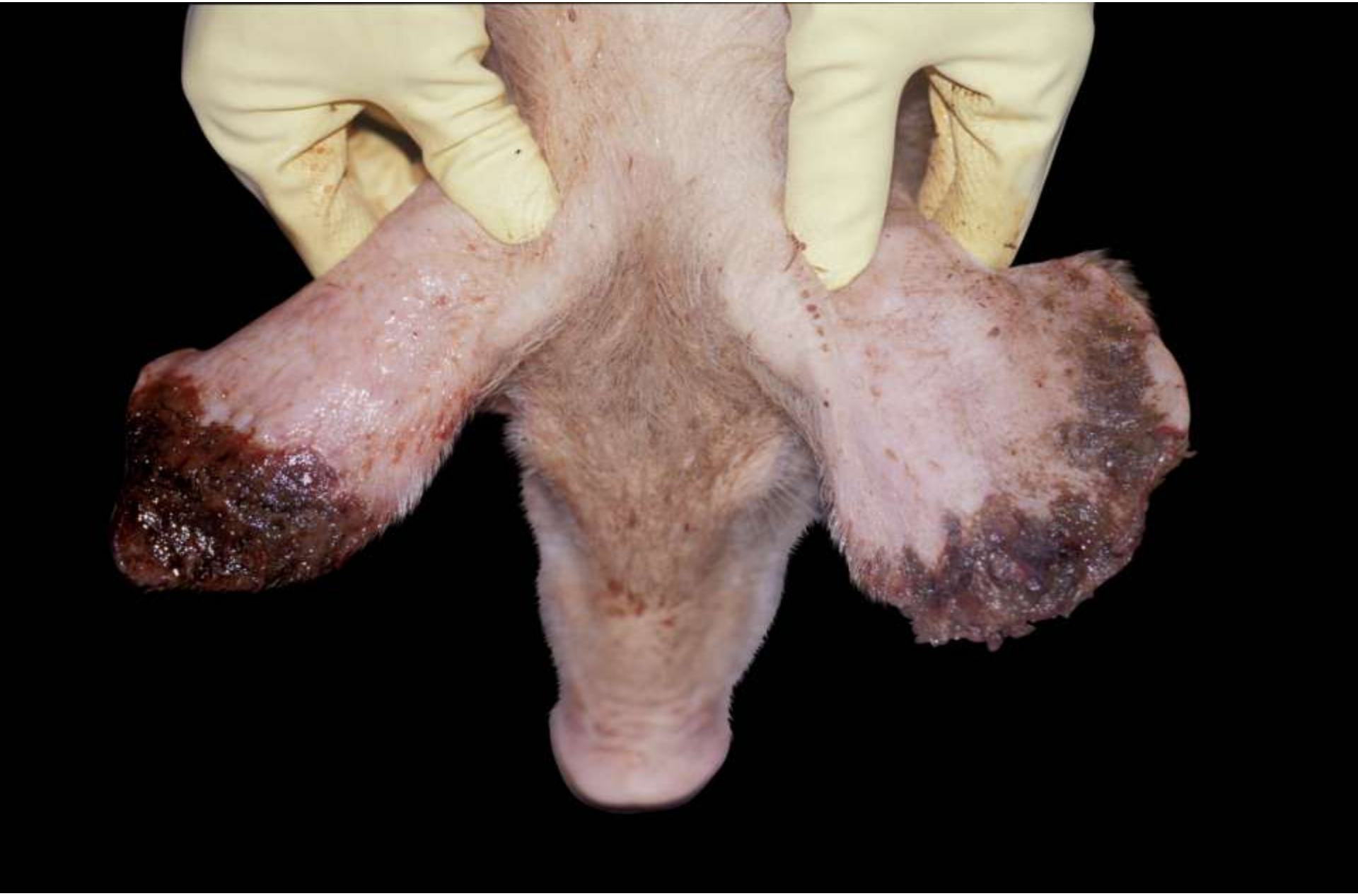
What should you do to establish the global diagnosis?

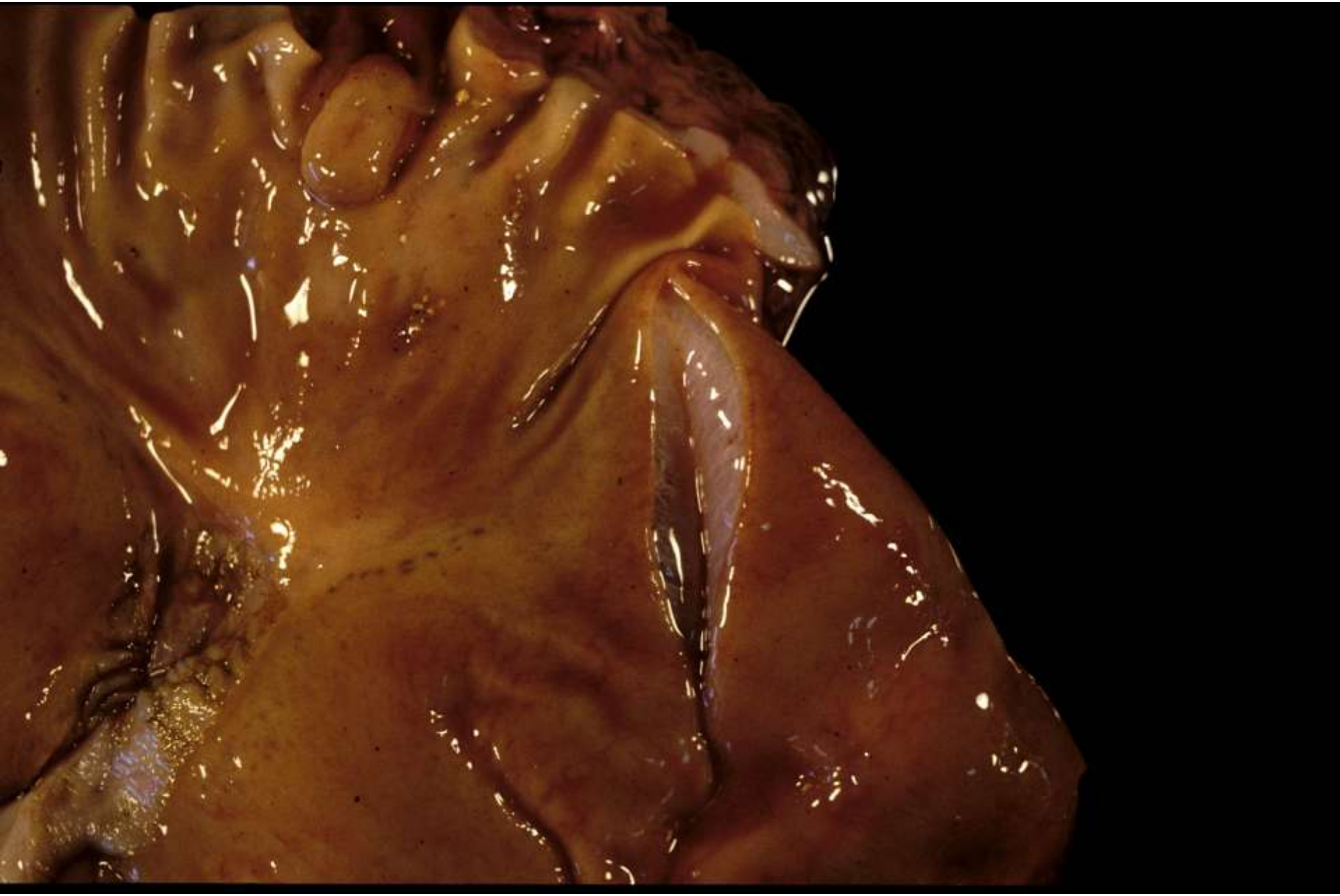
What they did…

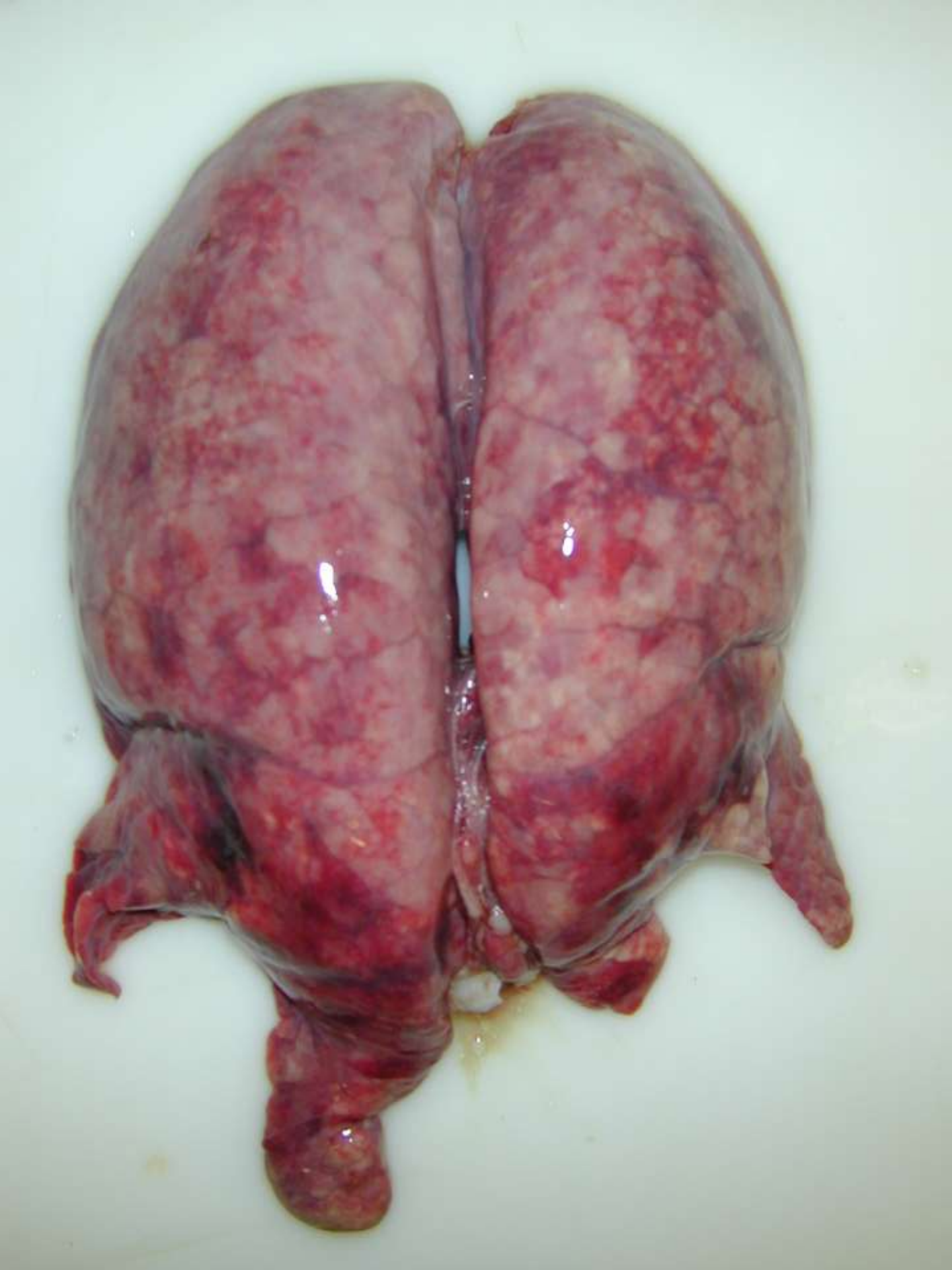
- To send 7 affected 2-month-old pigs from farm A to a diagnostic laboratory:
  - Necropsy
  - Histopathology
  - Bacteriology
  - Virology

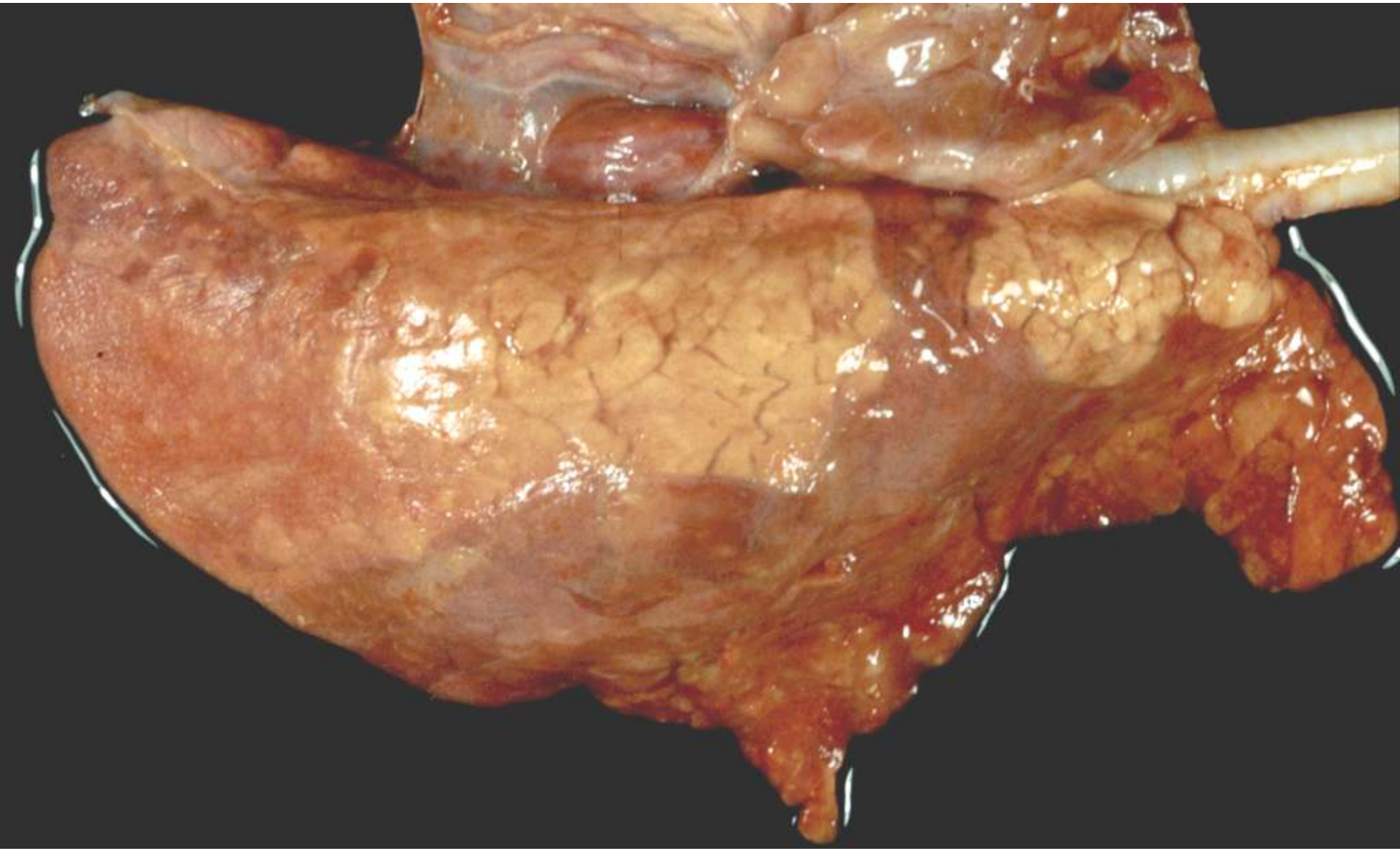
Gross lesions

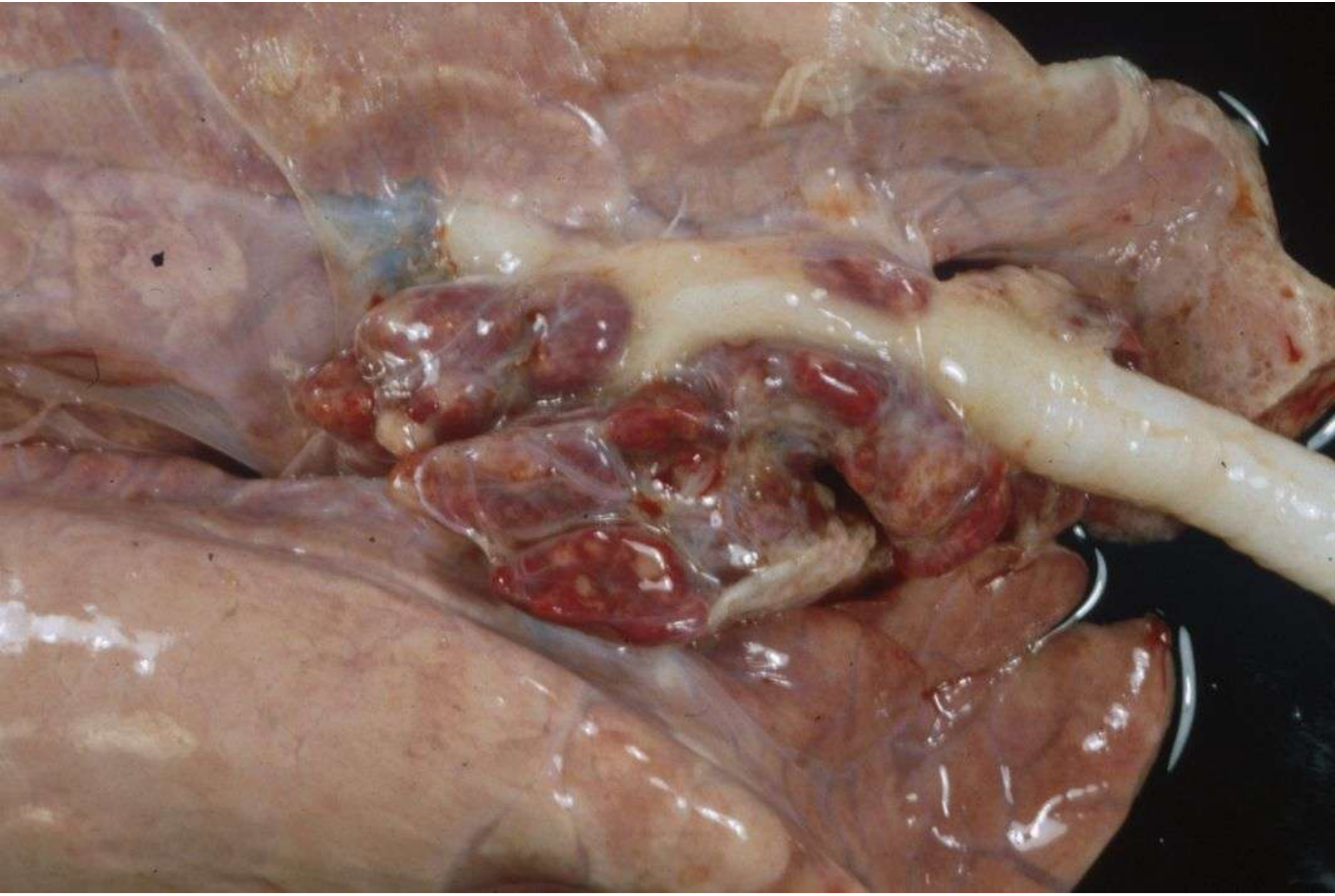
	PIG No.						
LESION	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Tip ear necrosis	+	-	-	-	-	+	-
Palpebral edema	-	+	-	+	-/+	+	-/+
Lymphadenopathy	-	+	-	+	-	-	+
Non-collapsed lungs	+	-	+	+	-	+	+
Pulmonary consolidation	+	+	+	+	-	-	-
Myocardial hemorrhages	-	-	-	-	+	-	-
Hidrotorax	-	-	-	-	+	-	-
Fibrinous polyserositis	-	-	+	-	-	-	-
Gastric wall edema	+	+	-	-	-	+	-
Fibrinous ileitis	+	-	-	-	-	-	-

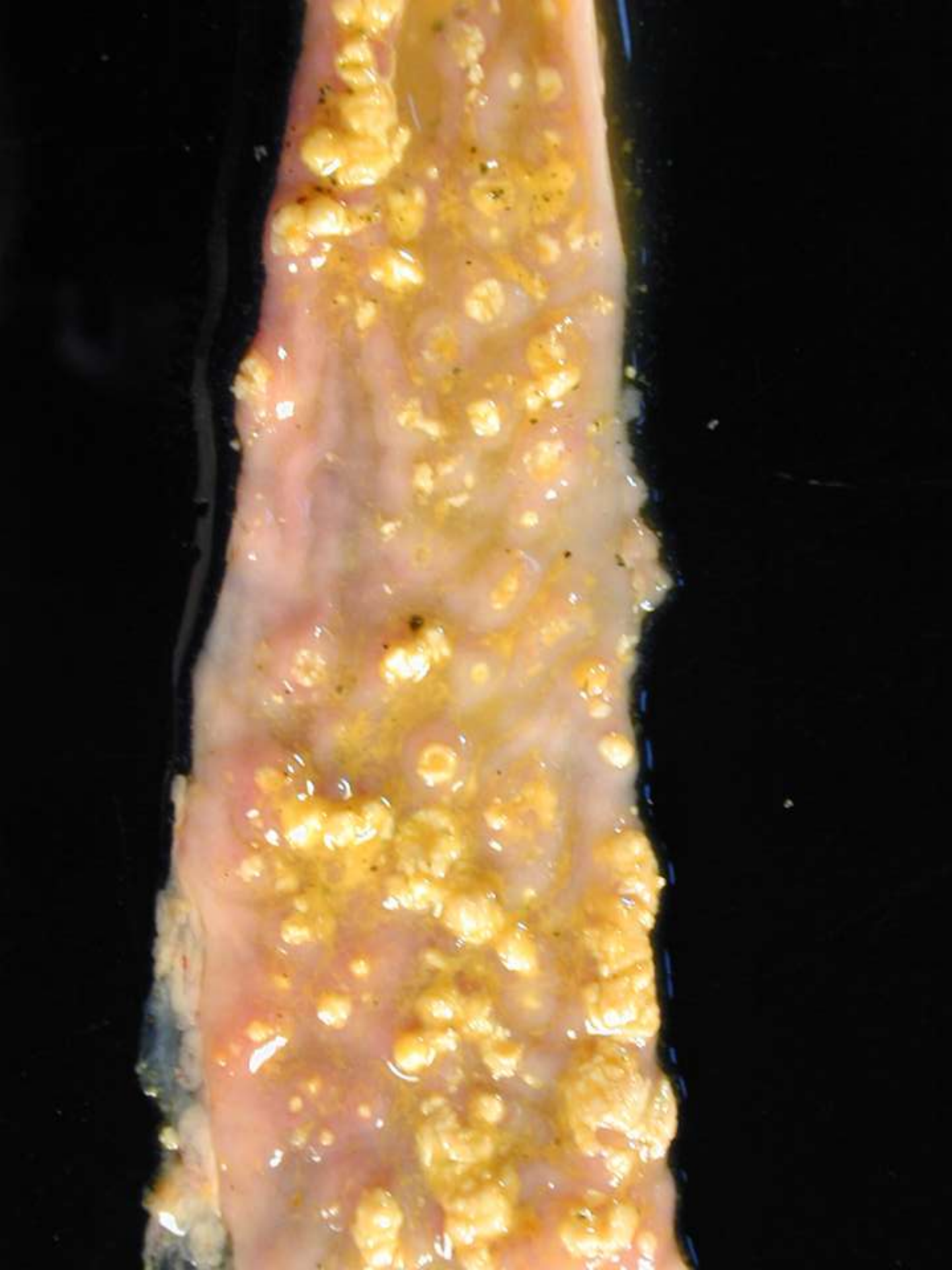












Gross lesions

1. Tip ear necrosis and polyserositis are compatible with bacterial septicaemia
2. Palpebral and stomach wall edema are compatible with edema disease
3. Lymphadenopathy and non-collapsed lungs are indicative of viral infection
4. All answers are correct

Gross lesions

- Fibrinous ileitis in 1 pig; this is compatible with:

1. *Lawsonia intracellularis* infection
2. *Salmonella typhimurium* infection
3. *Brachyspira hyodysenteriae* infection
4. All answers are correct

Gross lesions (conclusions)

- Oedema disease
- Viral disease
- Bacterial pulmonary disease
- Septicemic bacterial disease (*H. parasuis*)
- Myocardial lesions ?
- Fibrinous ileitis ?

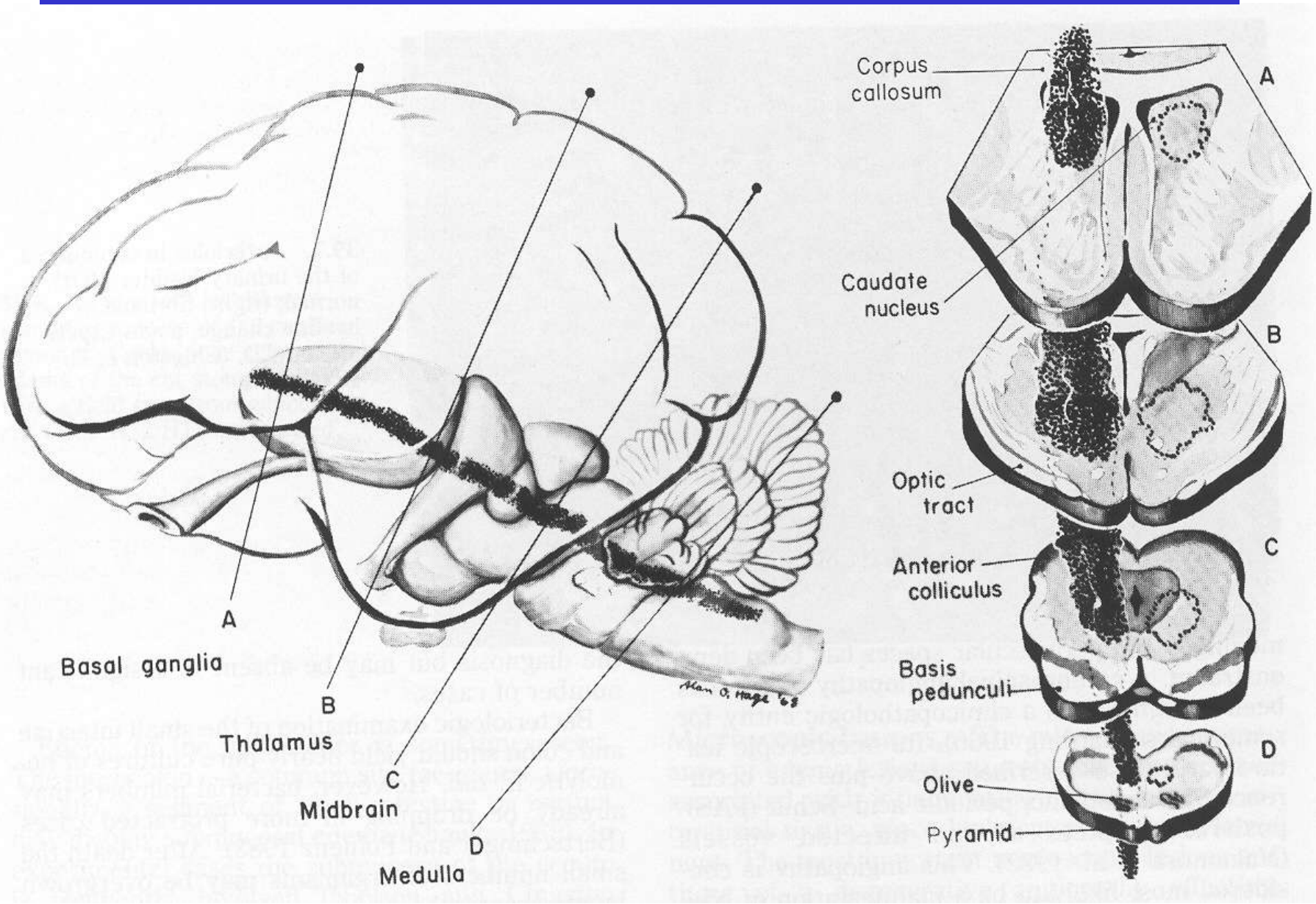
It was decided to maintain treatments

Laboratorial results – a week after

Histopathology

- No pigs showed typical microscopic CNS lesions of oedema disease; which are they?
  1. Non-suppurative meningoencephalitis
  2. Simmetric, bilateral mielomalacia of medullary ventral horns
  3. Suppurative encephalitis
  4. Simmetric, bilateral encephalomalacia of the brain stem

Oedema disease



Does the absence of microscopic findings discard oedema disease ?

1. Yes... They are pathognomonic and are always present
2. No... In a very few cases they are not present
3. No... They are rarely present in acute cases
4. No... Only pigs showing clear CNS clinical signs have these lesions

Histopathology

- Lymphocyte depletion together with histiocytic inflammatory infiltration of lymphoid tissues:
  1. PRRSV infection
  2. Porcine circovirus type 2 infection
  3. *Salmonella cholerae-suis* septicaemia
  4. Classical swine fever

Histopathological results

- Subacute interstitial pneumonia in pigs No. 1, 3, 4, 5 and 6
- Myocardial degeneration with hemorrhages together with centrolobular hepatic necrosis (pig No. 5)
- Fibrino-purulent meningitis (pig No. 3)

Viral pathogen detection

	PIG No.						
PATHOGEN	**1**	**2**	**3**	**4**	**5**	**6**	**7**
PRRSV	-	-	+	+	-	+	-
PCV2	+	-	+	+	-	+	+

Microbiology

- Small intestine of pigs No. 1, 2, 5 and 6
- Toracic swab of pig No. 3
- Meningeal swab of pig No. 3
- Lung samples were not taken !!
- Results:
  - β-hemolytic *Escherichia coli* (pigs No. 1 and 6)
  - Non-hemolytic *E. Coli* (pigs No. 2 and 5)
  - *Haemophilus* spp. (pig No. 3)

Antibiogram

Antibiotic	*E. coli* (1)	*E. Coli* (6)	*Haemophilus* (3)
Colistine	S	S	ND
Ceftiofur	S	I	ND
Apramicine	S	S	ND
Enrofloxacin	S	S	S
Sulf+Trim	S	S	ND
Neomicine	S	S	ND
Flumequine	S	S	ND
Lincoespectin	S	S	ND
Amoxicilin	R	R	S
Doxiciclin	R	R	ND
Ampicilin	ND	ND	S
Cefalexin	ND	ND	S
Gentamicin	ND	ND	I

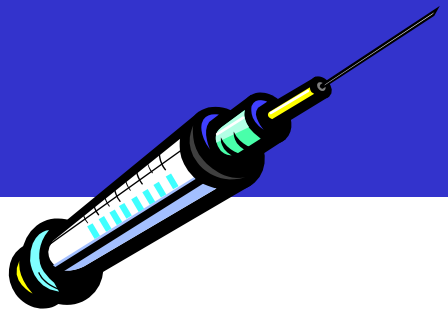
Lab results (conclusions)

- PRRS and PMWS
- Edema disease – postweaning colibacilosis
- Bacterial pneumonia
- Glässer's disease
- Possible Salmonellosis ?
- Possible Se/vit E deficiency ?

Third visit at farm A (day 16)

- No sudden death and CNS clinical signs are observed now
- Mean clinical picture includes growth retardation and respiratory distress
- Morbidity of 30-35%
- Rest of pigs apparently healthy
- Information on farm B: one batch finally had 50% morbidity and 35% mortality

Implemented changes



- Maintenance of amoxicilin (for Glässer's disease)
- Inclusion of colistin in feed (for oedema disease)
- To control vit E and Se levels in feed
- Management changes

Management changes

- To assess the correct pig density per pen (at least 0.7 m^2/pig in fattening units and 0.2 m^2/pig in nurseries)
- Habilitation of a “hospital facilities” for diseased animals (3 day medication; euthanasia if they not respond in 5 days)
- Use of boots and overall exclusive for the “hospital facilities”
- Foot-bath with disinfectant for each building entrance
- Since then, to clean pits and 7-10 days of empty period (instead of 3-4 days)
- Vaccination and revaccination against ADV

New visit to farm A (day 50)

- No problems in nurseries (mortality of 2% in the last batches)
- Last batch of fattening pigs had 4% of pigs in “hospital facilities”
- Farmer’s opinion: the improvement is very clear...

  But... He thought that

  “the enemy was still inside”

Some thoughts...

- Outcome of disease = Mixed pathogens and its interaction with management systems and facilities
- Difficulties to implement an effective therapy if strict management restructuration and appropiate follow up is not established
- Importance of lab analysis in mixed diseases (unique diseases in a farm are quite rare!!)

th

International Symposium on Emerging and Re-emerging Pig Diseases

Barcelona 12-15 June, 2011

www.emerging2011.com

THANK YOU VERY MUCH FOR YOUR ATTENTION!!!

General characteristics of the farm

- 3-site farm of 7,000 sows, located in Aragon (Spain)
- Seronegative against ADV
- Seropositive against PRRSV – “stable”
- Seropositive against Mhyo
- Good productivity, with moralities considered acceptable for all phases (14% in farrowing crates, 2% in nursery and 4% in fatteners)

Characteristics of the problem

- Respiratory problem in pigs at the end of the lactation period and during nursery (first half, mainly)
- Progressive loss of weight, dyspnea and coughing
- Mortality associated to loss weight; mortalities evolved rom 14 to 18% during lactation and from 2 to 4% in the nurseries

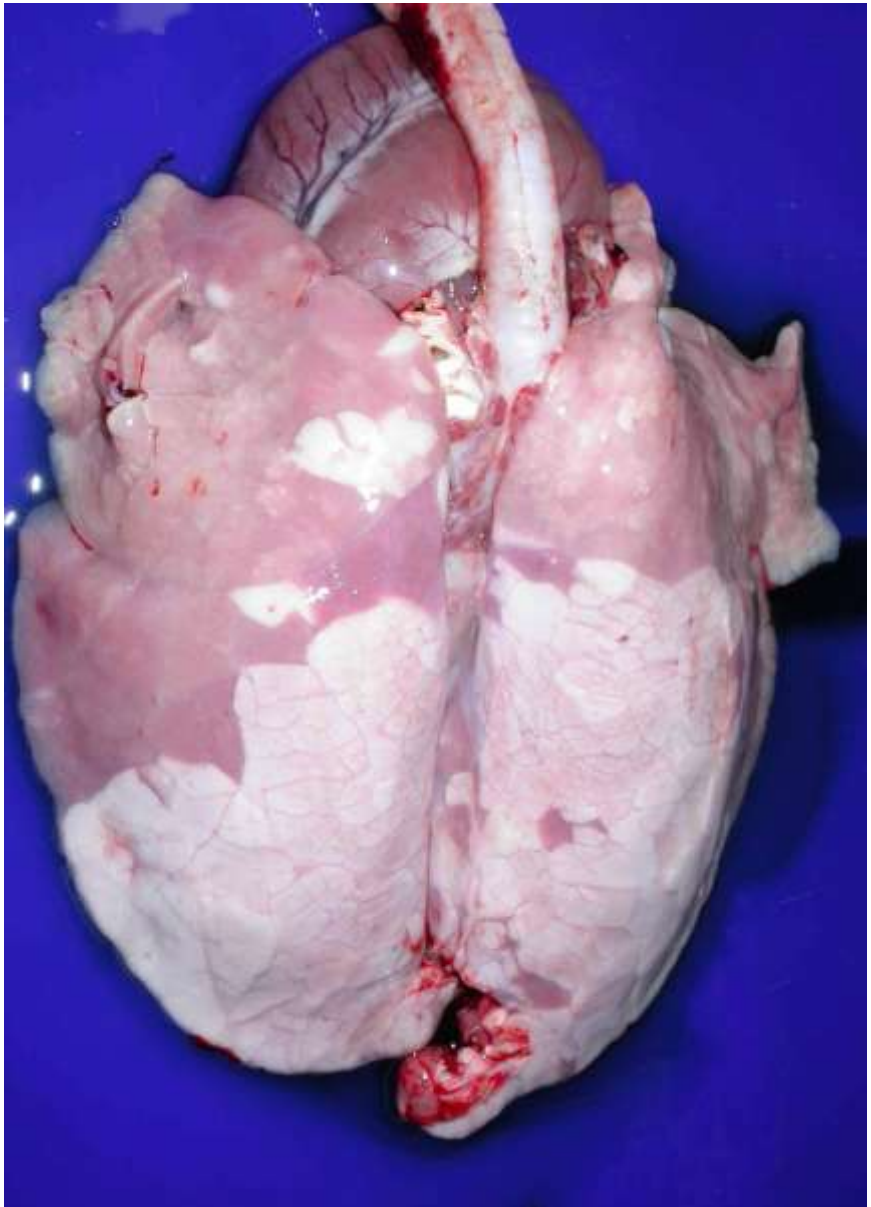
Coughing and dyspnea in lactating and nursery pigs… differential diagnoses?

1. Swine influenza virus infection
2. *Mycoplasma hyopneumoniae* infection
3. Management and environmental problems
4. All are correct

Characteristics of the problem

- Until that moment, only nursery pigs were necropsied; pulmonary craneo-ventral consolidation was observed
- 7 pigs were submitted for pathological and microbiological analyses
  - Four 3-week-old piglets
  - Three 4-week-old piglets

Lesion observed in all studied pigs



Which is your presumptive diagnosis?

1. *Mycoplasma hyopneumoniae* infection
2. Swine influenza virus infection
3. *Pasteurella multocida* infection
4. *Bordetella bronchiseptica* infection

Clinical case evolution

- Injectable antibiotic treatment is maintained (in those more severely affected pigs; amoxicilin) as well as doxiciclin in water
- Coughing and dyspnea is persisting, although to a lesser degree

Laboratorial results

- Pathological report:
  - All pigs showed:
    - Catarrhal-purulent bronchopneumonia
    - Broncho-interstitial pneumonia
- Bacteriology:
  - Lack of significant pathogens in 5 lungs
  - *Bordetella bronchiseptica* in one lung
  - *Bordetella bronchiseptica* and *Pasteurella multocida* in another lung

What can cause a broncho-interstitial pneumonia?

1. *Mycoplasma hyopneumoniae* and swine influenza infection
2. PRRS and swine influenza viruses
3. PCV2, PRRS and swine influenza viruses
4. *Bordetella bronchiseptica*, *Pasteurella multocida* and *Mycoplasma hyopneumoniae* infections

Laboratorial results

- PCR:
  - PRRSV: Negative
  - *Mycoplasma hyopneumoniae*: Negative
- Immunohistochemistry:
  - PRRSV: Negative
  - SIV: 2/7 positives

Global interpretation of results and evolution of the problem

- Final diagnosis established as SIV infection together with bacterial co-infections
- Difficulties to control the viral infection:
  - Very big far (7,000 sows) – subpopulations?
  - Immunization? Vaccine schedule?
- The case evolved towards a lesser problems, but during a quite long period (6-8 months), when it dissapeared – herd immunity?

th

International Symposium on Emerging and Re-emerging Pig Diseases

Barcelona 12-15 June, 2011

www.emerging2011.com

THANK YOU VERY MUCH FOR YOUR ATTENTION!!!