Bronchopneumonia

Definition of Bronchopneumonia

It is a usual term for inflammation of the lungs (alveolar parenchyma) and Bronchi .

How The infection reach the lung ?

- **Inhalation** : a- non infectious as dust and gases .
  b- infectious
  * Bacterial e.g. pasteurella, staph, pseudomonas.
  * Viral as Influenza, canine distemper.

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- **Hematogenus** : Infection reach the lungs through blood e.g. viruses, bacteria, parasites.

- **External** : Via penetrating objects from outside or traumatic reticulitis

Predisposing Causes

A. Decreased vitality and lowered body resistance .

B. Sudden change in weather .

C. Fatigue and shipping .

D. Exposure to cold climate .

E. Crowding of the animals .

F. Prolonged use of Antibiotics .

Stages of Bronchopneumonia

1) Stage of congestion.

Occurs after few minutes or hours (infection).

Gross

a. All cardinal signs of inflammation are present, as Lung is large, Edematous heavy and dark red.

b. On cut section, blood oozesc

2) **Stage of red hepatization (humeral exudate)**

this is reached in 2nd or 3rd day.

Grossly:

Affected areas are dark (congestion) and firm (fibrin) resembling the liver (hepatized) and the pseudomembrane start to form.

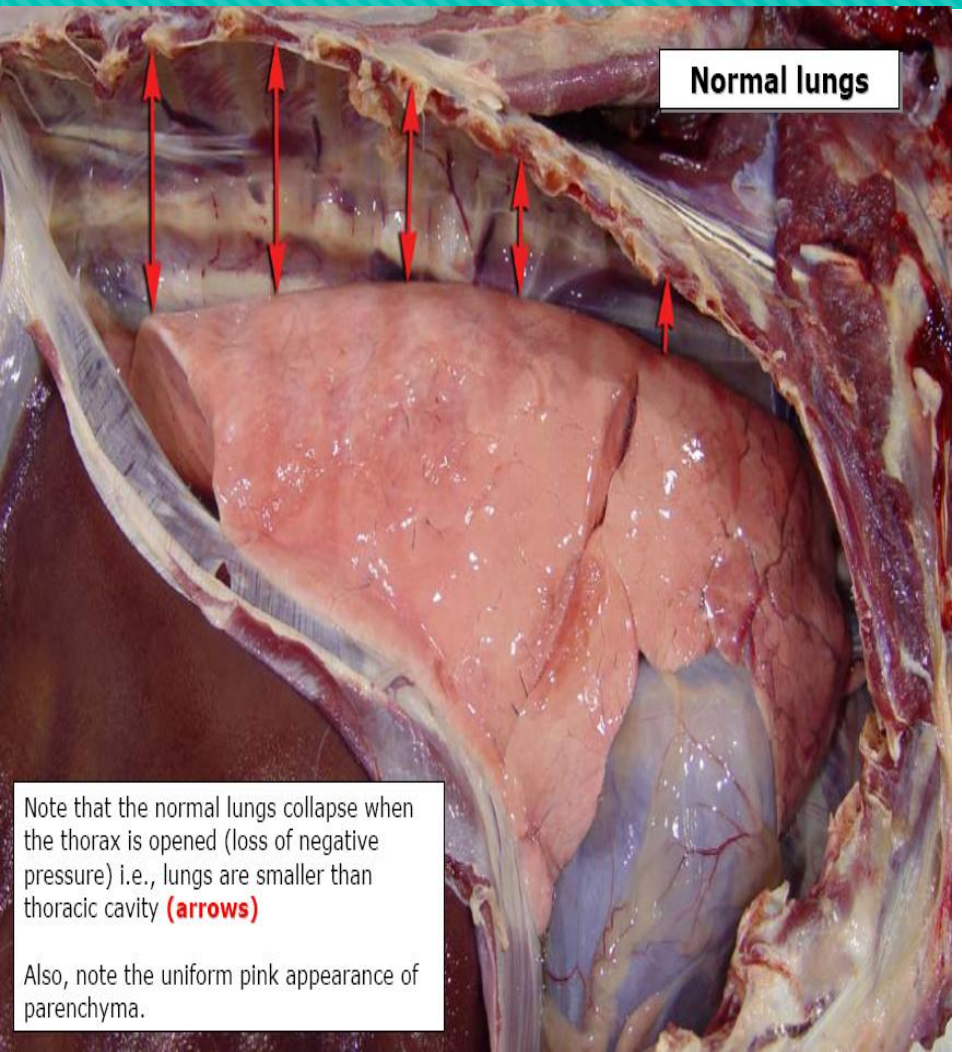
3- Stage of grey Hepatization (cellular exudates).

it appears 3-7 days

Grossly :

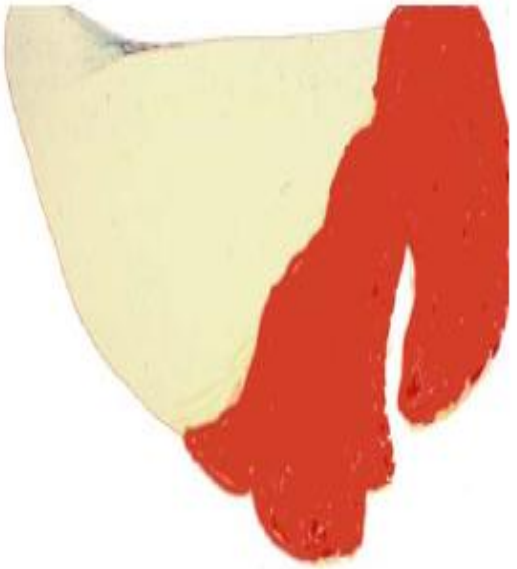
Lung is still consolidated but less red in color. The marbling appearance is due to the presence of solidified parts and other congested parts and the cut section is granular . **Floating test**, the affected part sinks in water.

The most recent classification of Bronchopneumonia



Suppurative Bronchopneumonia

Fibrinous Bronchopneumonia



1- **catarrhal or sappurative bronchopneumonia** :

it is inflammation of the lung where the initial site of inflammation is the bronchoalveolar junction; usually the lesion involves the cranioventral lobe and being lobular in distribution. It could be seen in all animals.

-**The cranioventral distribution of that type of pneumonia being due to ??**

1-Increase deposition of the infectious particle due to lowered defense in that region.

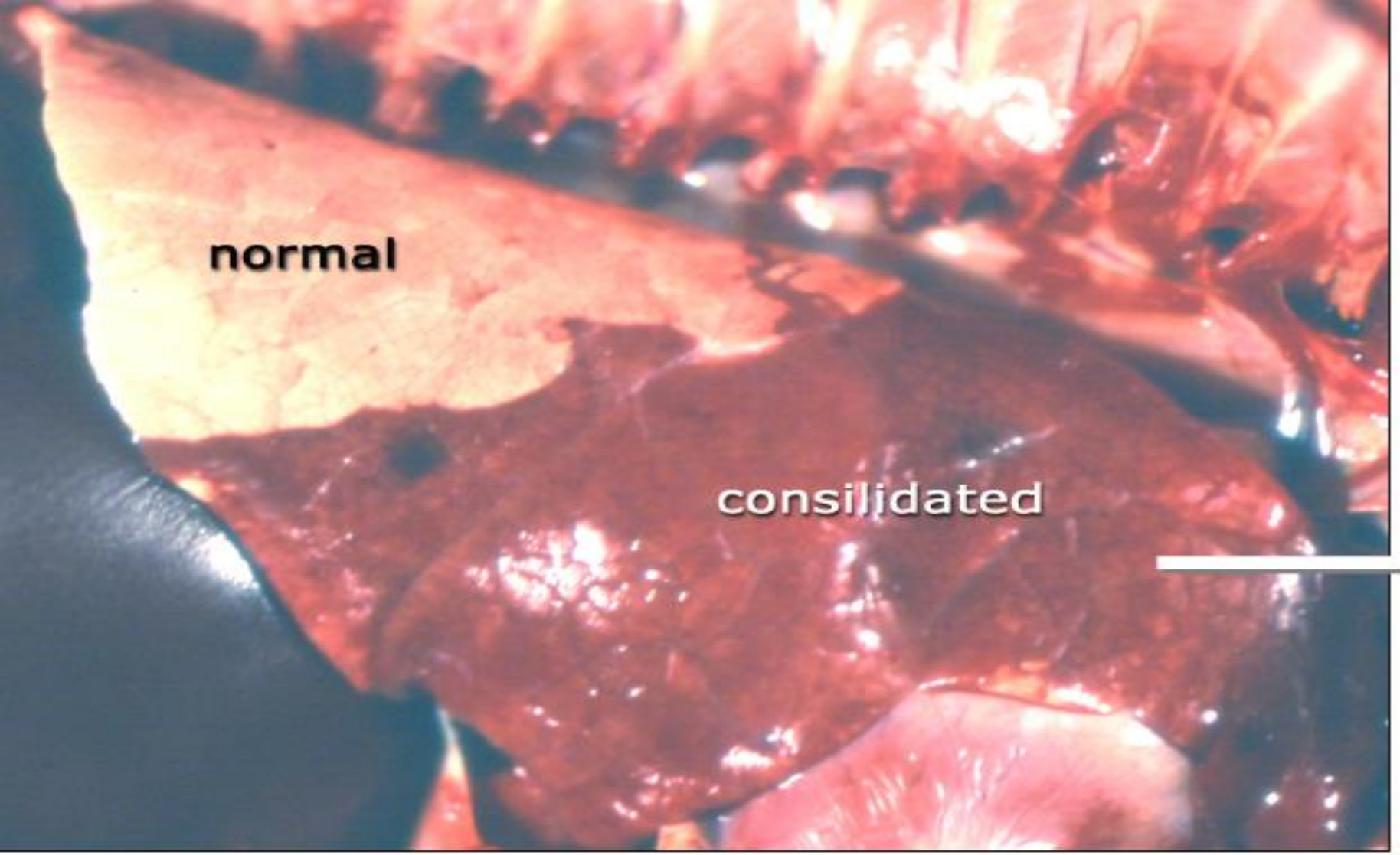
2-Gravitational influence impairing clearance of cranioventral region.

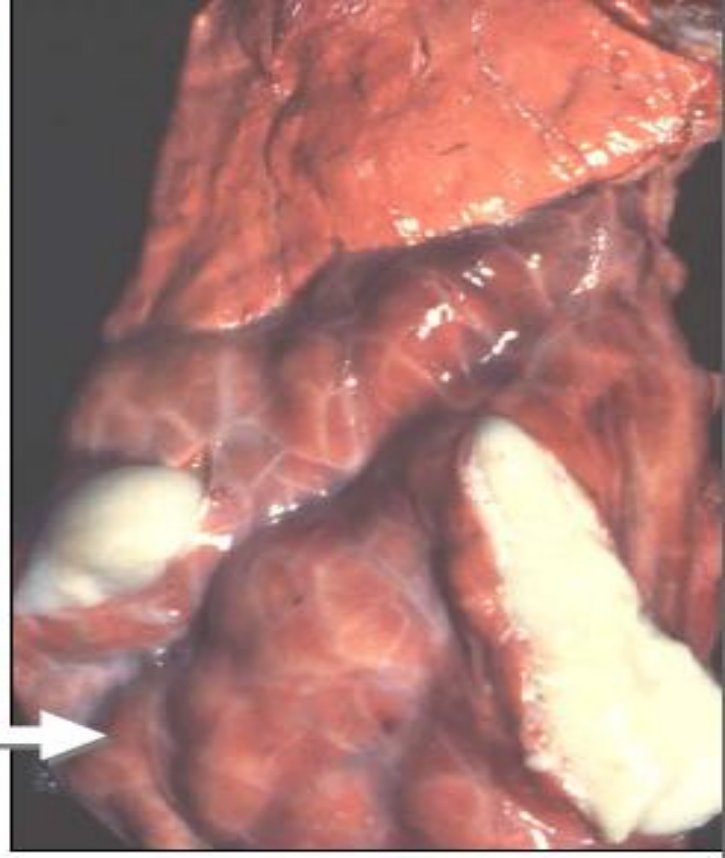
3-The smaller size of the ventral air spaces .

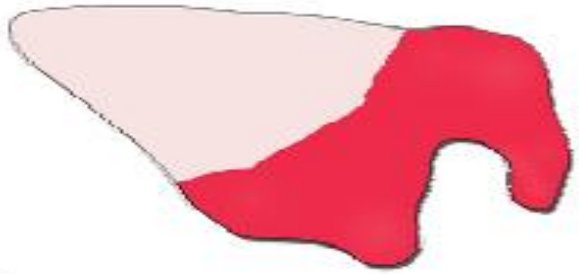
Suppurative Bronchopneumonia in a Calf / Diagram of distribution.

Note cranioventral distribution of inflammation. Bronchopneumonia, as the name implies, involves an active inflammatory response in bronchi, bronchioles and alveoli. The port of entry is always aerogenous. Bronchopneumonia is generally caused by low grade pathogens (bacteria/Mycoplasma) that usually do not produce severe tissue injury.

Although not always fatal, suppurative bronchopneumonia is often associated to poor growth, as is the case of enzootic pneumonia of calves, lambs and pigs.

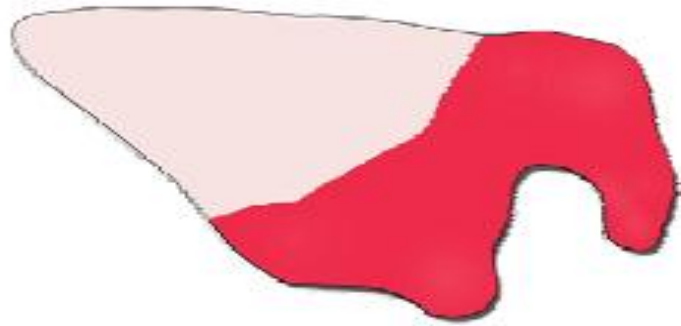






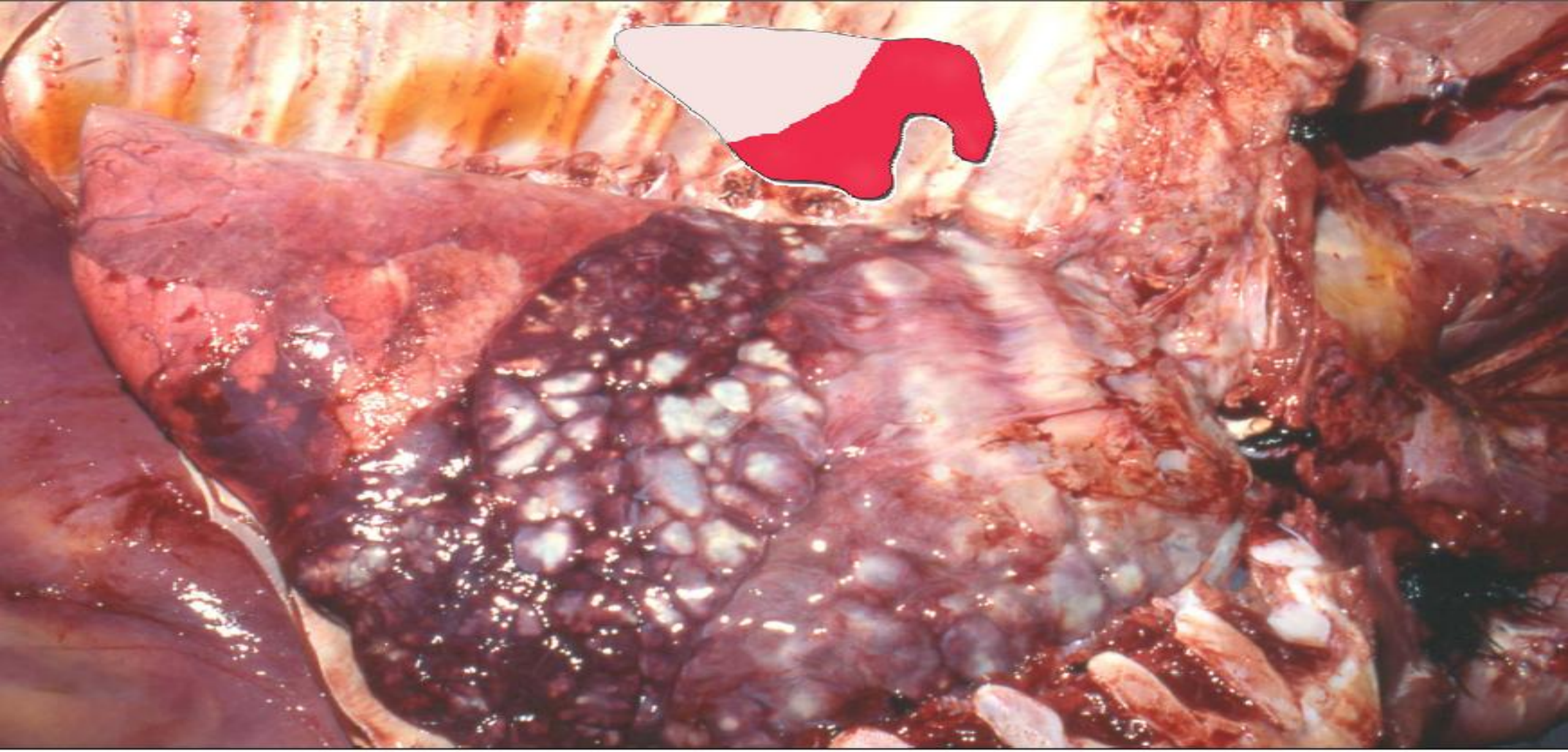
Suppurative Bronchopneumonia in a Calf / Diagram of distribution.

Another example of a suppurative bronchopneumonia. Note again, cranioventral consolidation while the caudal lung remains unaffected. The texture of consolidated lung would be firmer than normal. Typically, on cut surface purulent exudate could be expressed from bronchi (insert).



Suppurative Bronchopneumonia in a Pig / Diagram of distribution.

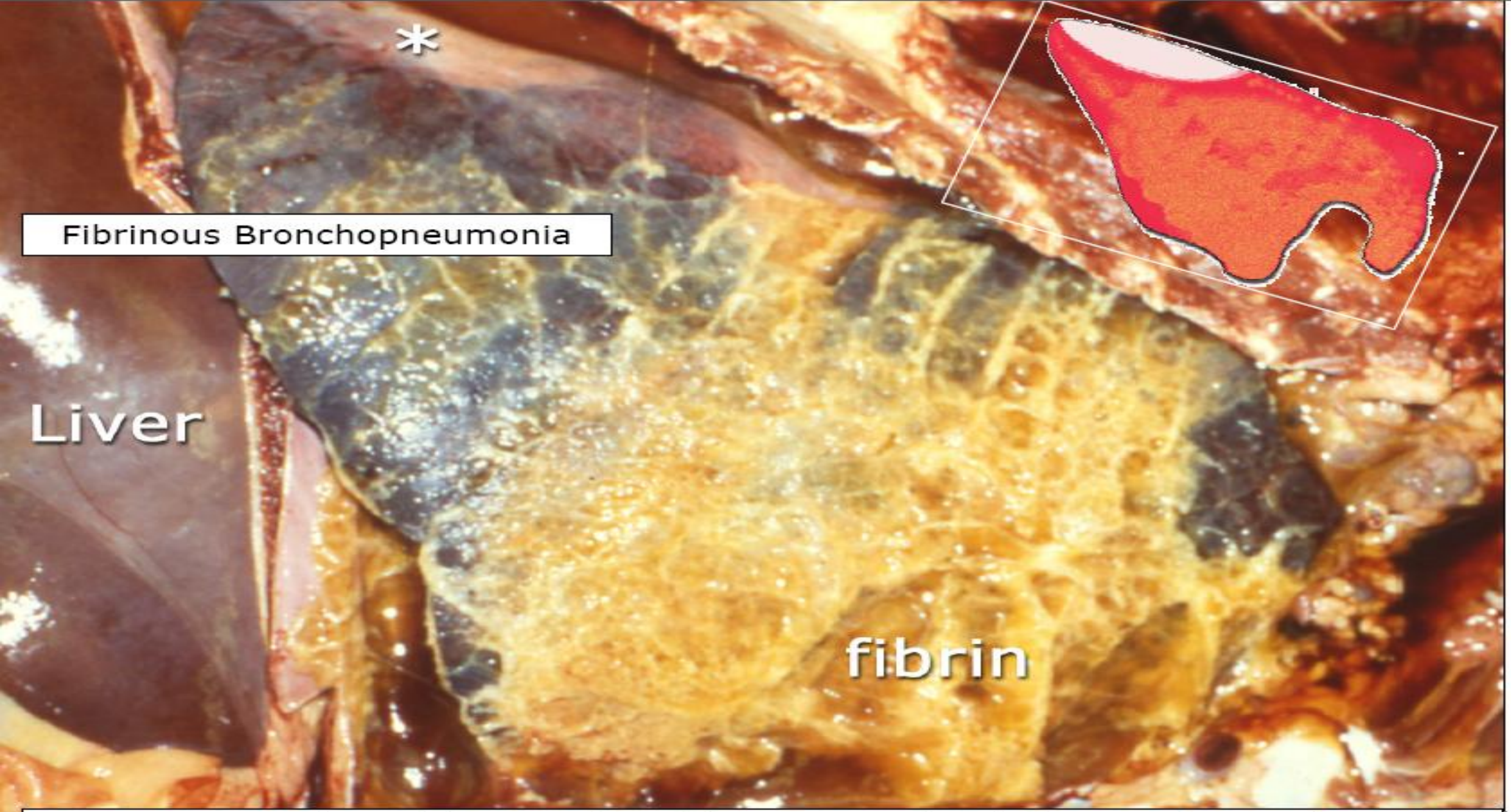
One more example of a suppurative bronchopneumonia. Note once again that the consolidation is restricted to the cranioventral lung while the caudal lung remains unaffected. There is also a lobular pattern typical of suppurative bronchopneumonia (see diagram). The texture of consolidated lung would be firmer than normal and on a cut surface purulent exudate could be expressed from bronchi. The more chronic the lesion, the more mucus in the exudate expressed from bronchi.



Pulmonary abscesses and bronchiectasis are two important sequels to suppurative bronchopneumonia. Note several large abscesses in the consolidated cranial and intermediate lobes. The caudal lobes are essentially normal. Histologically, abscesses are composed of a purulent core surrounded by connective tissue (pyogenic membrane).

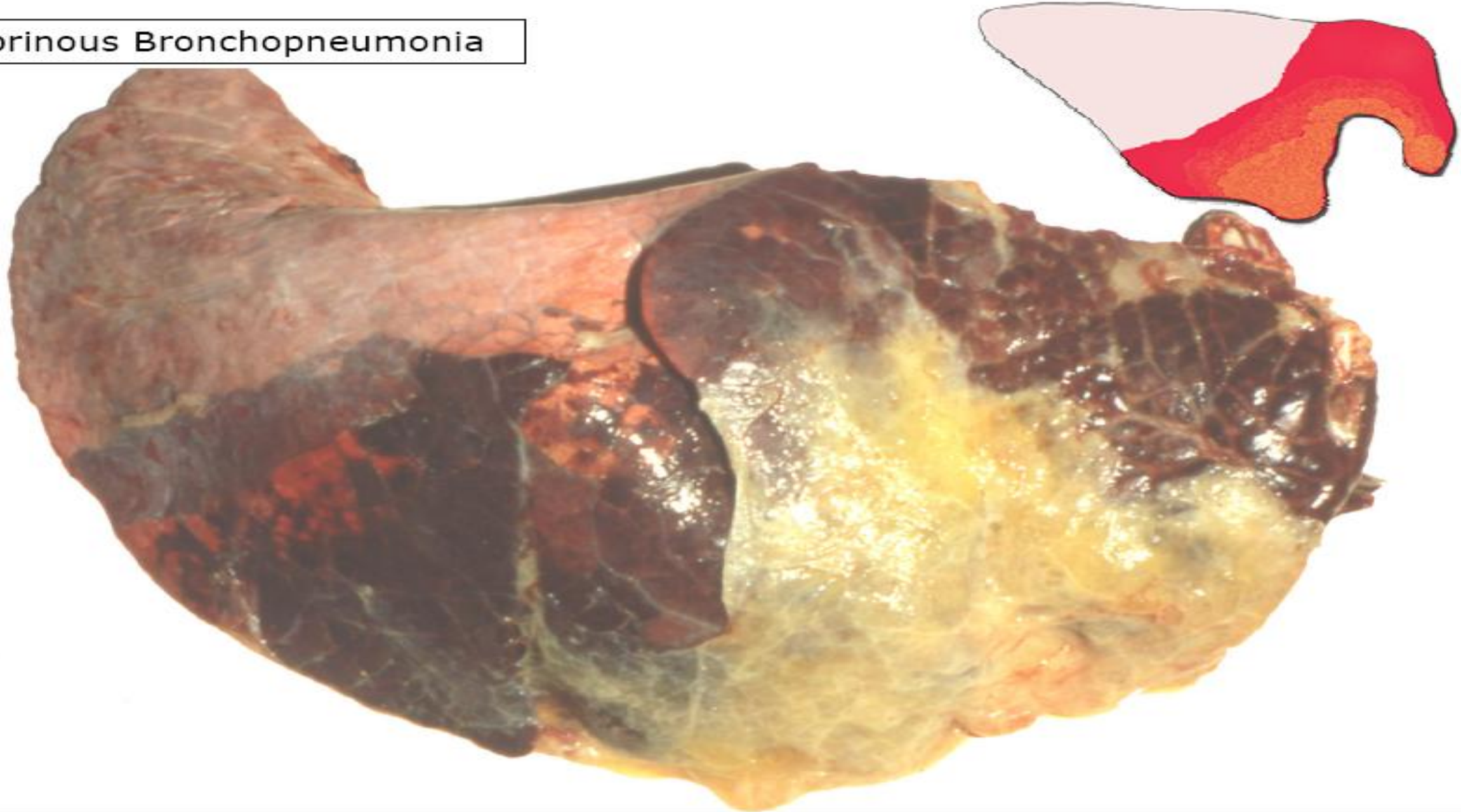
Fibrinous Bronchopneumonia

- predominant exudate fibrinous rather than neutrophilic.
- Also have a **cranioventral** distribution.
- The inflammatory process involves numerous contiguous lobules and so the entire lobe is affected.
- Causes:
  - ***Mannheimia* (*Pasteurella*) *haemolytica,***
  - ***Histophilus somni.***
  - ***Mycoplasma bovis.***
  - ***Mycoplasma mycoides ssp. mycoides***

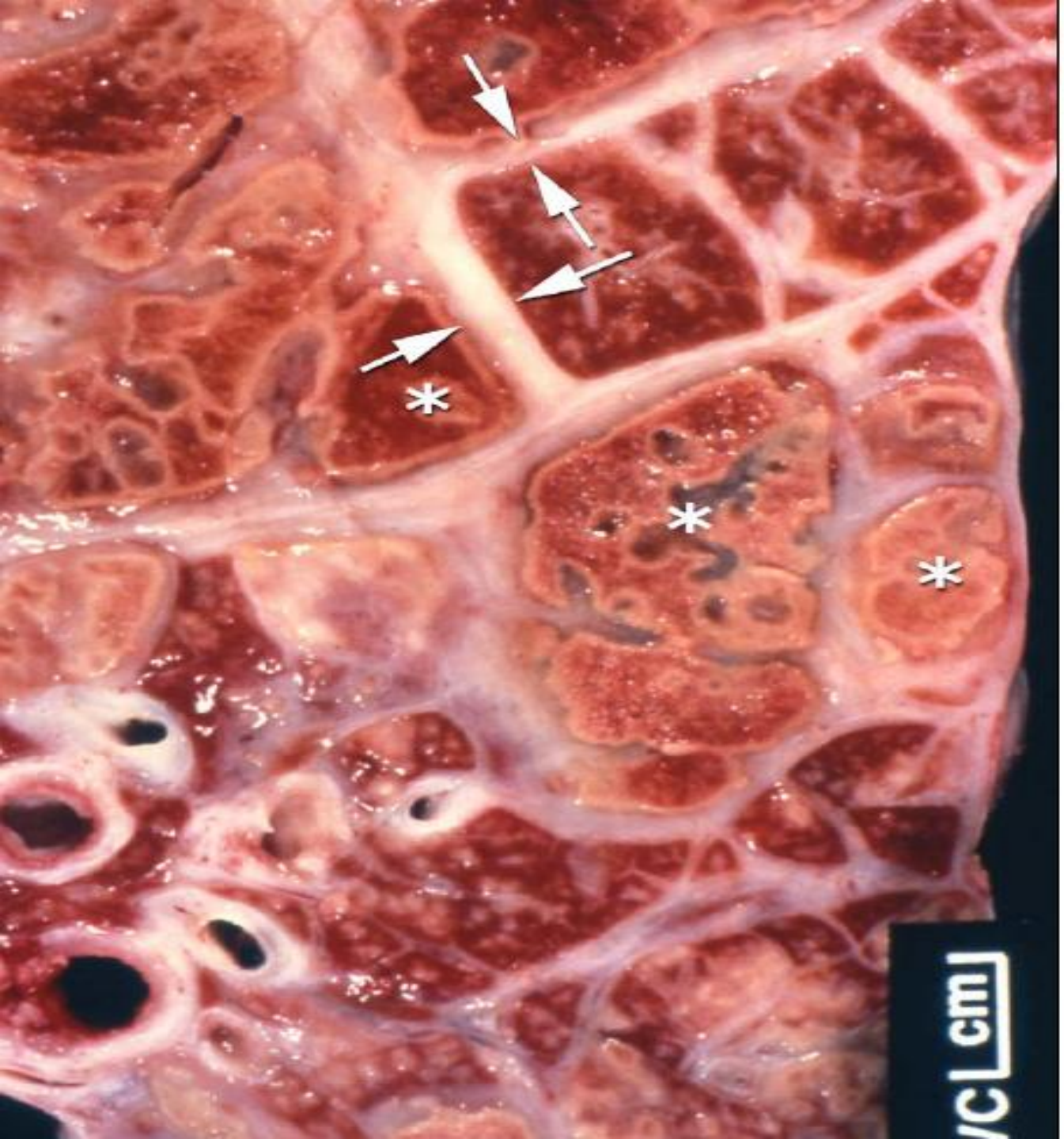


Note cranioventral consolidation. Affected lung is covered with fibrin. Only a small portion of the lung appears grossly normal (**asterisk**)

Fibrinous Bronchopneumonia



Note cranioventral consolidation. Affected lung is covered with fibrin. Only the dorsocaudal lung appears normal. The texture of consolidated lungs in fibrinous bronchopneumonia is typically hard.



- Highly pathogenic bacteria
- Toxins
- *Mannheimia haemolytica*
- *Haemophilus pleuropneumoniae*

Severe, fibrinous bronchopneumonia / Cut surface of lung / "Shipping Fever" / Bovine.

Fibrinous bronchopneumonia generally implies severe injury to the lung with leakage of fibrin into the airspaces.

On cut surface, fibrinous bronchopneumonia often has a mosaic appearance due to distention of the interlobular septa in areas of coagulation necrosis.

Note in this photograph a mosaic appearance of the lung. The **arrows** delineate distended interlobular septa that results from lymphatic thrombosis and edema.

Note also areas of coagulation necrosis caused by toxins of *Mannheimia haemolytica A1* (**asterisks**).

II- Types of pneumonia according to type of M.O.

- **1)viral pneumonia**

A- PPR

B- IBR

C- Adenovirus

D- Parainfluanza

E- HERPISVIRUS

F- ATHORE

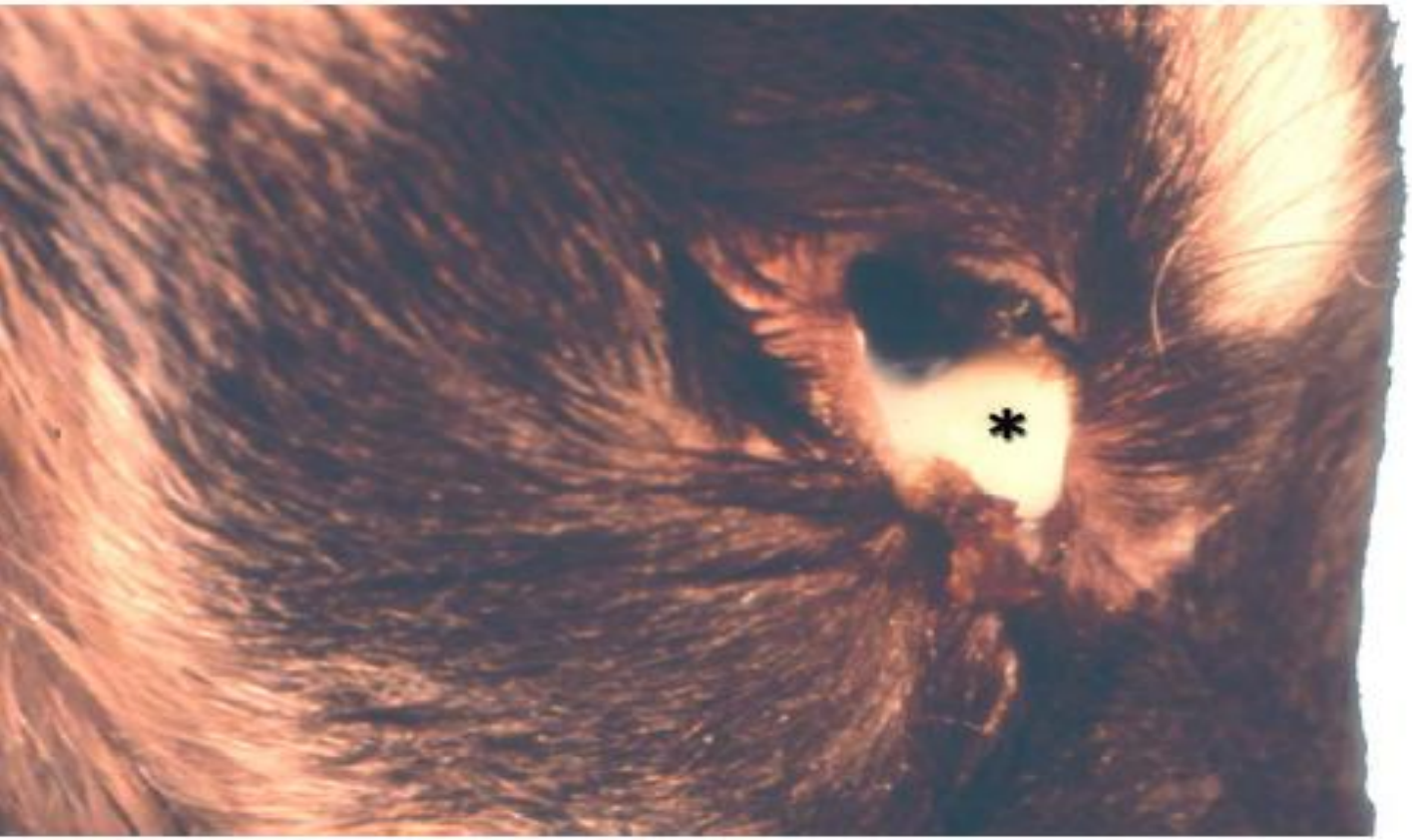
Equine / Viral pneumonia / Subacute, diffuse, severe, interstitial pneumonia.

Note prominent rib imprints on lung surfaces. The texture of this lung was elastic and edematous.

Viral infections are the most common cause of interstitial pneumonia in horses. Confirmation of the diagnosis would require histopathology or viral detection in the lung such as virus isolation, PCR or immunoperoxidase.

Most respiratory viral infections such as equine Influenza, equine viral rhinopneumonitis, adenovirus are characterized by mild clinical signs and transient interstitial pneumonia (flu-like disease). Its significance is largely by predisposing horses to secondary bacterial pneumonia.

Canine Distemper / Subacute, severe purulent conjunctivitis



Note purulent exudate on eyes (**asterisk**).

Canine Distemper is a worldwide, highly contagious disease of young Canidae (dogs, wolves, foxes, coyotes). It is caused by a Morbillivirus of the family paramyxoviridae antigenically related to the Measles Virus in humans and Rinderpest Virus in cattle (not present on the American Continent).

The clinical signs and lesions are multisystemic including conjunctivitis, rhinitis, bronchointerstitial pneumonia and enteritis (transient), skin macula (abdomen), and parakeratosis of skin (paws), enteritis, and finally encephalitis. The CNS lesions are the most life threatening changes.

The prevalence of Canine Distemper has been markedly reduced due to effective vaccination in most countries.

Superimposed bacterial and protozoal *(Toxoplasma gondii)* pneumonias are quite common in canine distemper.

2)Mycotic pneumonia

It is a form of bronchopneumonia caused mainly by

Aspergillus fumigatous, characterized by inflammatory exudates contain the mold.

- **Route of Infection:** Bronchogenic.
- **Gross :**

-The surface of the lesion is covered by yellowish or greenish moldy exudates or dry deposits under which the mucosa is inflamed and ulcerated.

3) Verminous or parasitic pneumonia

This type usually involves the diaphragmatic lobe and being chronic, the pneumonic areas showed low tendency of healing due to irritation of the parasite.

Causes.

- Strongyles and Metastrongeloid in horse,
- Dictyocaulus filariae in sheep and goat.
- D. viviparous in cattle and buffaloes.
- D. arnfieldi in horse and donkeys.
- Capillaria aerophila in dogs and cats

4) Bacterial pneumonia

Causes :

Pyogenic bacteria which circulate as microemboli and lodged in small blood vessel of the lung .

Gross lesion :

a. Multiple abscesses scattered throughout the lung lobes often with a white center and red hemorrhagic margin.

b. Pneumonic areas resemble bronchopneumonia but differ in that the foci spread out of the blood vessel not from the bronchi.

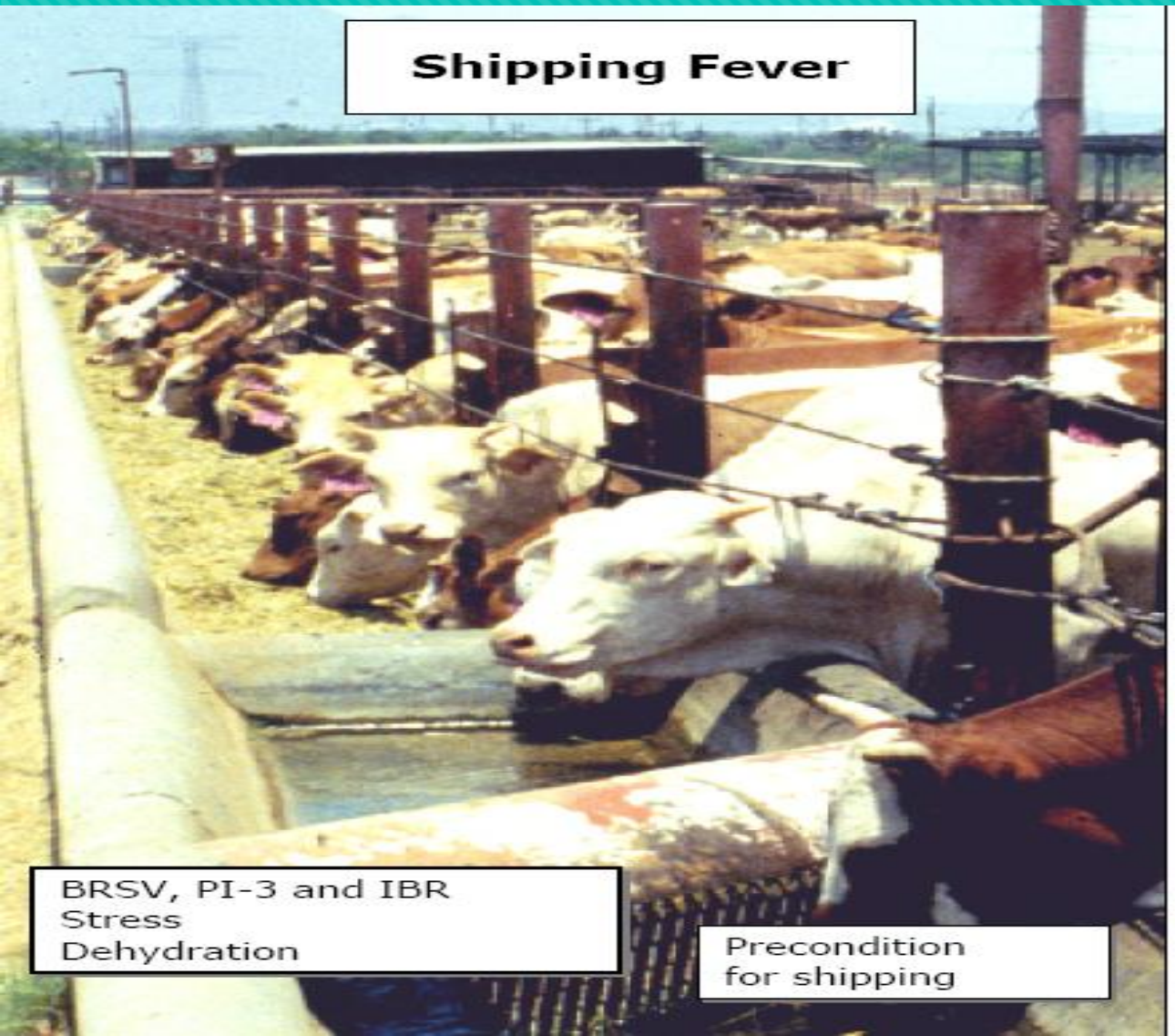
Enzootic Pneumonia of calves is a clinico-epidemiological term and chronic suppurative bronchopneumonia is the pathologic finding.

Enzootic Pneumonia of calves is a multifactorial disease predisposed by environmental factors (temperature, humidity, poor air circulation, crowding), stress, immune status, dehydration, viral infections (PI-3, Adenovirus, IBR, BRSV, etc.). Bacteria such as *Pasteurella multocida* (A, D), *Hemophilus somnus* , *Actinobacillus pyogenes*, Mycoplasmas (*M. bovis, M. dispar, Ureaplasma*, etc.) are commonly isolated from the lung. The port of entry is aerogenous.

Enzootic pneumonia, as the name implies, has a high morbidity but it generally has a low mortality since pneumonia involves only a small portion of the lung.

It is not unusual for young calves to suffer with diarrhea followed by pneumonia. The dehydration caused by diarrhea presumably impairs the respiratory defense mechanisms predisposing calves to enzootic pneumonia.

The most common cause in palestine



Bovine Pneumonic Mannheimiosis (Shipping Fever) is the number one cause of feedlot mortality in North America.

Shipping Fever is caused by *Mannheimia (Pasteurella) haemolytica A1* which is not considered a primary pathogen since it is normally present in the normal flora and it is effectively destroyed and cleared by the normal bovine lung.

When the defense mechanisms are compromised by viral infections (PI-3, BHV-1, BRSV viruses) or any stress factor, inhaled *M. haemolytica* colonizes the lung and causes a severe **fibrinous bronchopneumonia** and toxemia.

A powerful cytotoxin for ruminant leukocytes is produced by *M. haemolytica A1* which further compromises pulmonary defense mechanisms.

Shipping Fever

Gross lesions:

Fibrinous bronchopneumonia, fibrin on pleura, pleural effusions. The port of entry is aerogenous.

Note the cranioventral lung covered with a thick layer of fibrin. Consolidation involves over 60% of the total lung parenchyma. Affected lung has a hard texture on palpation.

Bacteriology:

Consolidated lung typically yields pure cultures of *M. haemolytica*. In outbreaks of Shipping Fever, it is required to determine the primary cause such as a virus, stress, management, etc. Only by reducing these predisposing factors the incidence of the disease could be also reduced. *Mannheimia (Pasteurella)* vaccines are of questionable value in field conditions. Viral vaccines and management practices aimed in reducing stress have a beneficial effect on the overall incidence of Shipping Fever in cattle.

Clinical signs :

- **Respiratory signs :**

1- cough , usually productive

2- tachypnea and respiratory distress

3- bilateral nasal discharge

4- exercise intolerance

5- expiratory wheeze

- **Systemic signs :**

1- anorexia

2- fever

3- weight loss

diagnosis

- 1-Asucultation on physical examination

A-Abnormal sounds may be most prominent over the ventral lung field.Expiratory(most common) crackles may be ausulted A-inspiratory (if bronchial component) and

C-Expiratory wheeze is an occasional finding.

D-diminish sounds are often noted over areas of consolidation

2-Thoracic radiography

-bronchopneumonia lesions are typically found in the cranioventral lung fields.

3-pulmonary specimens

A-Bronchoalveolar lavage

B-Transthoracic aspirates

C-lung biopsy

4- laboratory test (CBC) :

Neutrophilic leukocytosis

Differential Diagnosis

1-other forms of infectious pneumonia :viral , protozoa , mycotic

2-other form according to distribution : interstitial , embolic , granulomatus

3-Aspiration pneumonia

4-Pulmonary edema

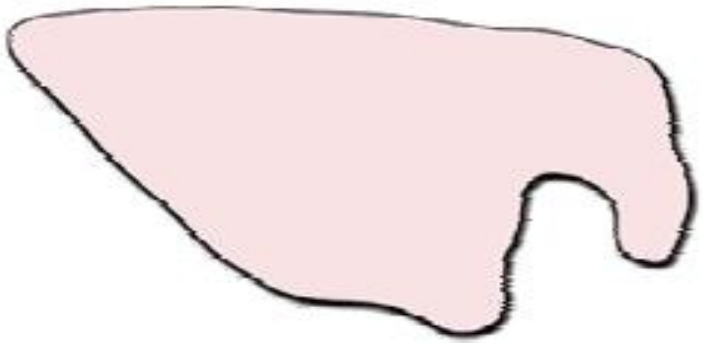
5-Pulmonary contusion

6-Infiltrative neoplasia

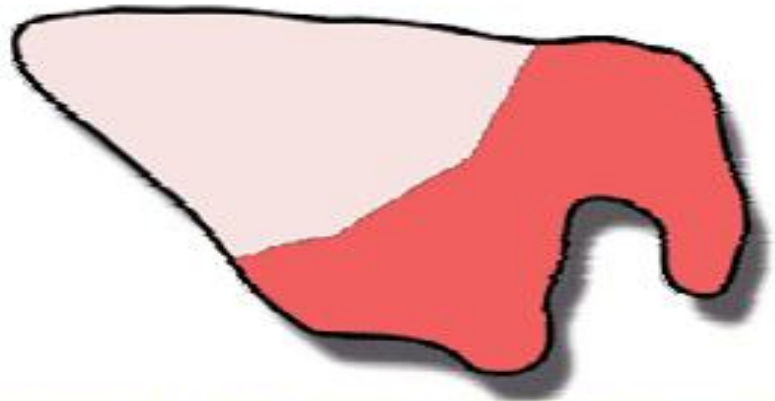
7-Chronic bronchial disease

8-Parasitic and eosinophilic pulmonary disease.

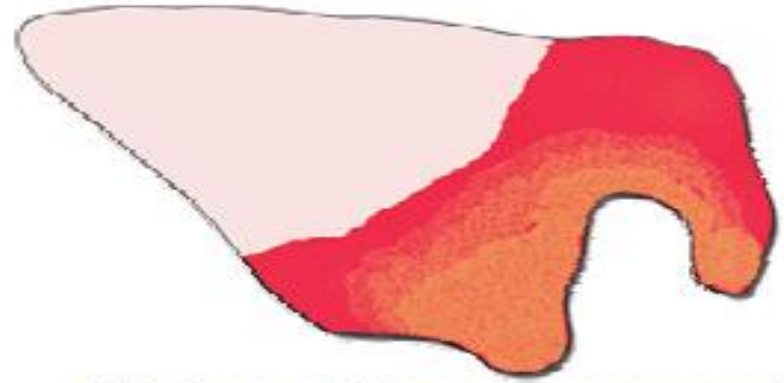
Distribution and Texture of Lesions in Pneumonias



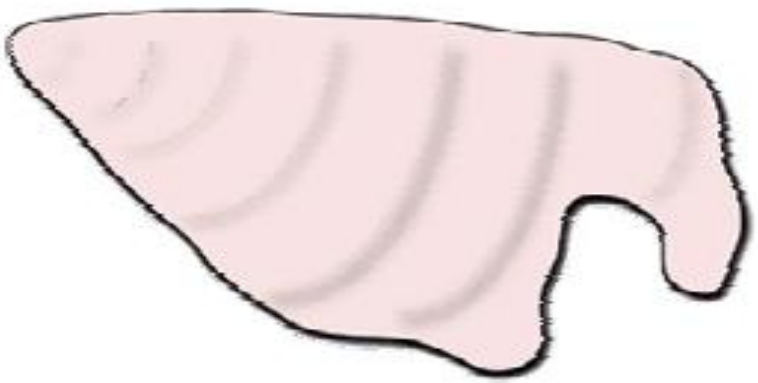
NORMAL



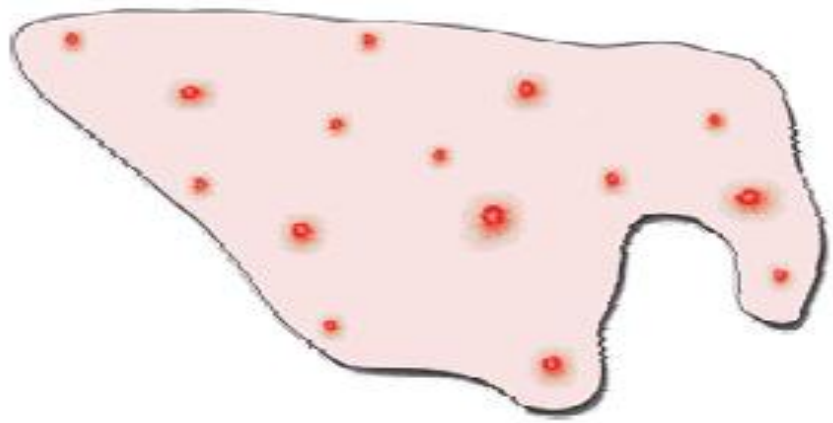
Suppurative Bronchopneumonia
Cranioventral and hard



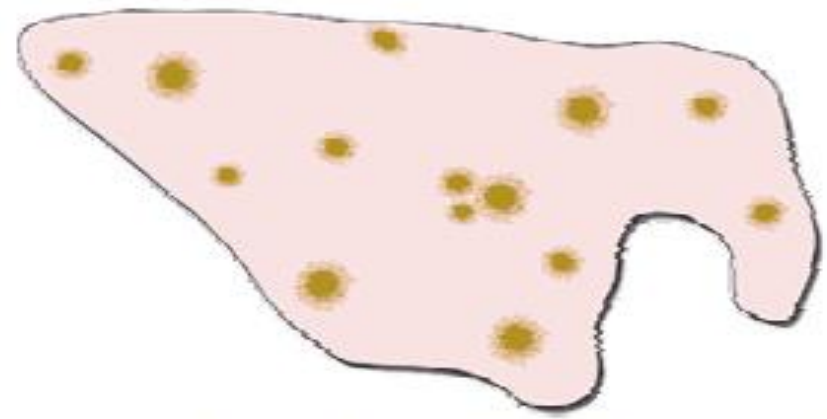
Fibrinous Bronchopneumonia
Cranioventral and hard



Interstitial Pneumonia
Difuse and Elastic



Embolic Pneumonia
Multifocal and nodular



Granulomatous Pneumonia
Multifocal and nodular

Protocol of Treatment :

Antibiotics :

Selection of antibiotic

1-Should be active against causative agent.

2. Should be able to achieve therapeutic concentration in diseased lung.

3. Must be approve for use in animals.

Antibiotic

1.Macrolide :

A. Tylosin 20mg\kg \ IM

B.Tulathromycin 2.5mg\kg \SC

2.Fluoroquinolone :

A.Enrofloxacin 5mg\kg\ SC

3.Fluorfenicol 20 mg\KG \ IM

4. Tetracyclin :

A. Oxytetracyclin 10 mg\kg\ IM

5.Lincomycine 10mg\kg + spectinomycine 20mg\kg\IM

Anti-inflammatory

Act by inhibition the inflammatory respond induced by infection organism .

1. Flunixin meglumine 1.1_ 2.2 mg\kg\ IV or IM
2. Phenylbutazone 2 - 4 mg\KG\IV or IM
3. Dexamethasone 0.1 -0.2 mg\KG\IV or IM

Bronchodilator

1.Beta-2-agonist

a. Salbutamol

2.Methylaxanthines

Theophylline 20mg\kg

Indication :

1-Use to relief bronchoconstriction.

2-Bronchoconstriction is an important component of the pathophysiology of many disease of lung and airway .

Expectorant

- Intended to support the body's mechanisms for clearing mucus from the respiratory tract.
- Effect by helping the cilia transport the mucus out of the lungs.

_ Bromhexine HCL 10 mg \kg \po

Protocol of Treatment use in collage and result

A. treatment

1.Lincomycine 10mg\kg + spectinomycine20mg\kg\ IM for 5d

2. flunixin meglumine 1.1mg\kg\ IM for 3d

3. Bromohexine HCL 10 mg\kg\ IM for 5d

4.Vitamin AD3E for 5d

B. result

1-Give very good prognosis

2-By auscultation The sound of lung covert from exaggerated vascular sound to vesicular sound.

Management and prognosis

- Isolate infected animal
- Very good ventilate area
- Good hygienic
- Prophylactic herd treatment
- Control of farm temperature and humidity
- Reduce stress

Thank for attention

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