

# Tuberculosis

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# T.B

Tuberculosis is a chronic infectious disease of man and animals caused by tubercle bacilli.

It may be acute or subacute, chronic

*Mycobacterium bovis* remains viable for over two years in carcasses frozen at  $-10^{\circ}\text{C}$ , 18 days in pickled meat and decomposed for 167 days.

**There are 3 types of tubercle bacilli concern man and animals**

- Bovine type (*M. bovis*).
- Human type (*M. tuberculosis*).
- Avian type (*M. avium*).

# Susceptibility

**Human** —susceptible to bovine and human type.

**Cattle** —susceptible to bovine type, rarely human type and avian type.

**Pig** —susceptible To avian type then bovine type, human type occasionally.

**Birds** —susceptible to avian and resist to human and bovine types.

## **Modes of infections**

alimentary, respiratory, genital, cutaneous and congenital.

The commonest modes of infection of the food animal are by way of the **digestive or respiratory tracts**.

# Acute miliary T.B

millet seed shape

evenly distributed foci have the same age, size and uniformity in their distribution.

Acute miliary T.B. may occur as a result of early or late generalization, which is characterized by presence of older lesion from the primary infection. The extension of disease occurs through lymphohaematogenous route, thus associated lymph nodes are affected

# breakdown tuberculous

characterized by dry cheesy masses interspersed with small haemorrhages, with erosion into the neighbouring lymph vessels and regional lymph node lesions.

. **This is known as stellate caseation**

- 1- Multiple lobular caseous pneumonia.
- 2- Acute acinonodular tuberculosis of the lung.
- 3- Caseous mastitis.
- 4- Caseous metritis.
- 5- Caseous pleurisy.
- 6- Caseous nephritis.
- 7- Caseous lymphadenitis.

# Tissue reactions

There are two types of tissue reactions

**1-Cellular or productive type:**

2-Exudative or humeral type.



**T.B. of different  
organs and  
tissues:**

# A-Lungs:

**1-Primary infection;**

**2-Chronic acino-nodular TB. of lung and lung cavitation:**

**3-Acute acino-nodular T.B. of lung;**

**4-Caseous pneumonia.**

**5-Acute miliary T.B. (early generalization):**

**6-Tuberculous tracheitis or laryngitis (nodules or ulcer):**



589

**589 Acute miliary tuberculosis – lung: cattle** Greyish tubercles could be seen disseminated in the lung, at the same stage of evolution both in the parenchyma and the interstitial tissue.

*Decision:* Total condemnation.

590



590 Acute miliary tuberculosis – lung: cattle The incision of the lungs revealed a multitude of small calcified caseous nodules in the parenchyma and in the interstitial tissue, which was distended due to excessive accumulation of air.

*Decision:* Total condemnation.



591 Tuberculosis (acute late generalization) – breakdown of body resistance – lung: cattle In the diaphragmatic lobe there are numerous nodules of various sizes and sharp limits, surrounded by a fibrous capsule. They consisted of a shiny tissue, with some caseous areas and subsequent calcification. The mediastinal lymph nodes were hypertrophic due to extensive calcified caseous lesions assuming aspects of breakdown of body resistance.

*Differential diagnosis:* Actinobacillosis.

*Decision:* Total condemnation.



597

597 Tuberculosis (acute late generalization) – breakdown forms – lung: cattle The parenchyma showed some calcified caseous lesions surrounded by small tubercles, isolated or in small groups. The lymph nodes presented old calcified lesions together with well-defined small tubercles corresponding to the lesions found in the lungs.

*Decision:* Total condemnation.

## B-Pleura :

1-. grapes disease

2- Caseous pleurisy

# F-Spleen:

## **Acute miliary T.B**

**the splenic substance is more commonly infected than the surface and usually indicates generalized infection.**

## **Mode of infection**

**Heamatogenous**

**Extension from Tuberculus periotenitis**

# **G- Kidney**

**haematogenous spread.**

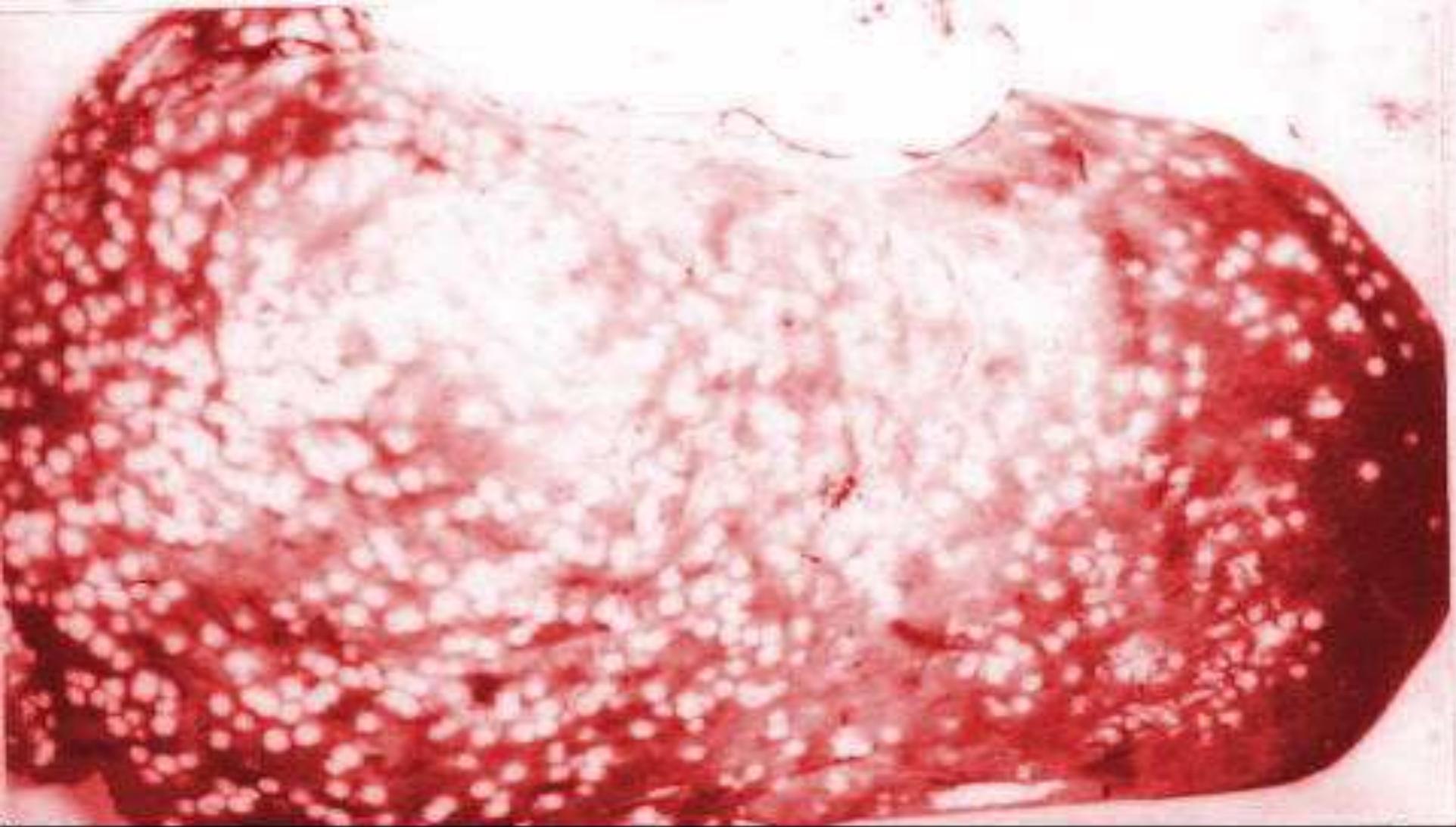
**Acute miliary T.B**

**Casous nephritis**

# E-Liver:

## ***The liver may become infected:***

- 1- In congenital tuberculosis, by direct infection via the umbilical vein.
- 2- Form primary intestinal tuberculosis, as the portal L. nodes receive direct afferent lymphatic from the duodenum.
- 3- By secondary infection of the intestine as following:  
Swallowing of massive doses of bacilli (due to breakdown of lung lesions) —infection of mesenteric L .nodes —portal vein —liver.
- 4- By secondary extension from tuberculosis of the peritoneum, intestine or mesenteric Lymph nodes.
- 5- Haematogenous spread.



### Tuberculosis (liver)

miliary tuberculosis (nodules of the same size and the same stage) in association with early generalization



**Liver (Sheep): Miliary tuberculosis**

**Multiple yellow, caseous or calcified nodules**



Tuberculosis  
chronic organ tuberculosis in the liver



508 Tuberculosis – spleen; cattle – Some of the small raised and pale areas which could be seen under the capsule were surrounded by a congestive halo. Incision revealed yellow necrotic nodules with central calcification.

*Differential diagnosis:* Actinobacillosis; Multiple abscesses.

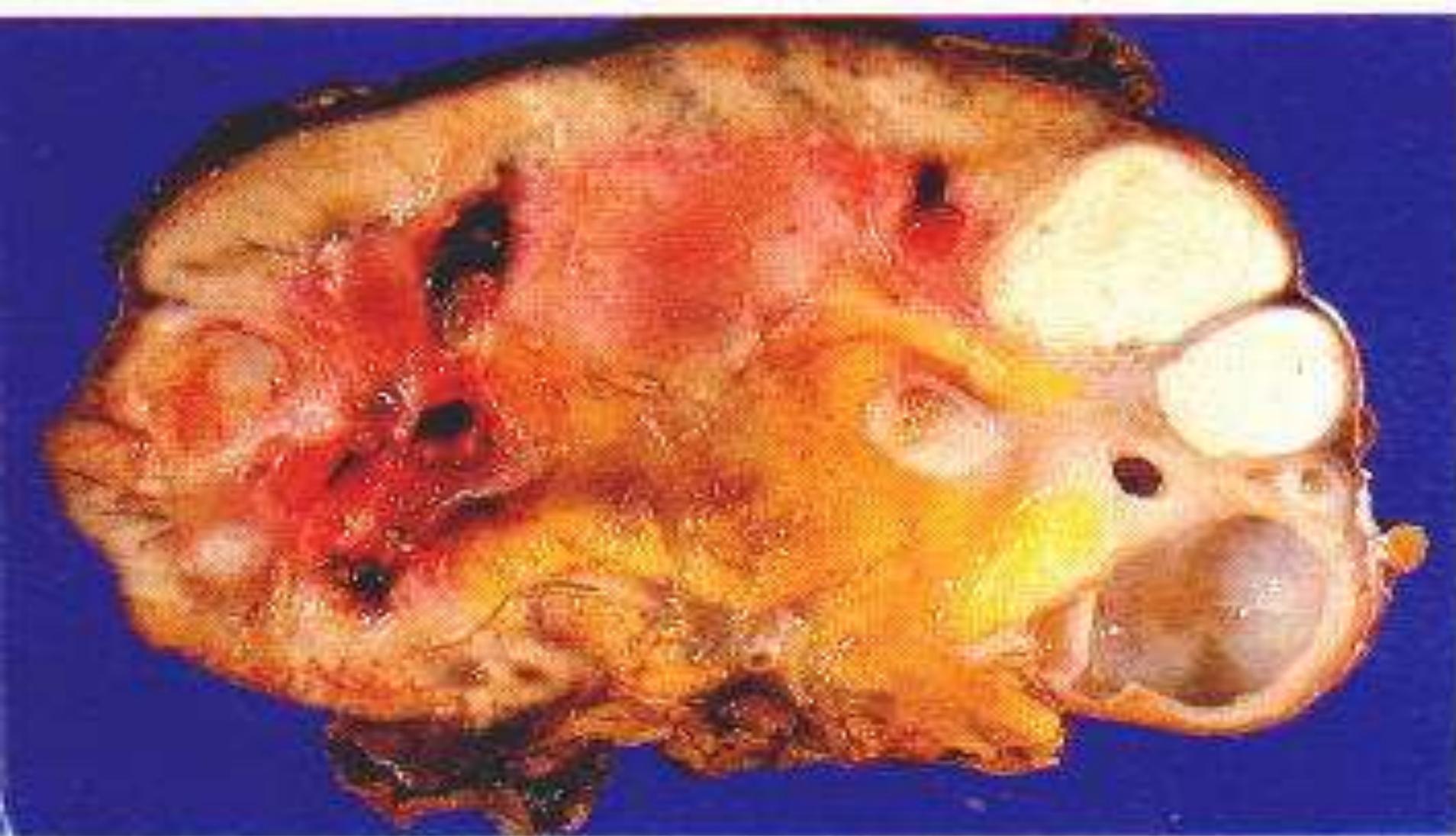
*Decision:* Total condemnation.

# G-Kidney

haematogenous spread.

**Acute miliary T.B**

**Casous nephritis**



## Tuberculosis (kidney)

Tuberculous renal cavitation partially filled with caseous necrotic mass



700 Tuberculosis (slow generalization of primary infection) – kidney: cattle A few caseous nodules, the size of a pea, were noticed in the cortex, less in number and greater in size than the nodules in acute miliary tuberculosis. The renal lymph nodes showed calcified caseous lesions.

*Differential diagnosis:* Focal interstitial nephritis of the calf; Metastasis of neoplasia.

*Decision:* Total condemnation.

# I-Bones and joints:

**In ox tuberculosis** is found most commonly in ribs and vertebrae, and is characterized by a local destruction of bone with the formation of yellow granulation tissue, together with a thinning of the cortex and spongy tissue of the bone.

**In the pig tuberculosis** of the bone may be seen in the bodies and spinal processes of the lumbar vertebrae and ischiopubic symphysis, the femur, may also be affected.

Tuberculosis of the lumbar vertebrae may be a cause of prolonged recumbence in sow. (**T.caris**)

## J-Central nervous system

Macroscopic caseous foci may be found in the cerebrum, cerebellum, midbrain or pons and rupture of such tuberculous **foci** may give also to diffuse tuberculous meningitis.

*Infection of C.NS indicates haematogenous spread*

# K-Skin

The lesions are hard, painless nodules varying in size up to that of a hen's egg, they may be single or multiple in a chain formation usually following the line of a subcutaneous lymphatic vessel.

The lesions are most commonly found on the limbs, particularly the fetlock, forearm, hock. and less frequently on the chest wall or shoulder.

The nodules consists of a fibrous wall, enclosing a caseocalcareous center but in other cases a thick yellow gelatinous pus, a dried material resembling powdered maize, or sometimes dry flake — like pellicles.

# M-Udder

Tuberculosis in udder may occur by the following ways:

- 1- By haematogenous spread.
- 2- By lymphatic extension from an abdominal lesions.
- 3- Via the teat (ascending infection)

# Forms of Tuberculous mastitis

## **a- Early stage**

Tubercle nodules are orange in colour comparing to the normal yellow colouration of the udder tissue.

## **b- Chronic diffuse granulomatous form**

*(Lobular infiltrated udder TB.)*

At first the cut surface shows reddish gray (orange brown) glistening fine hard nodules and the supramammary l .nodes are not affected.

Advanced case exhibits nodules at the first size projecting from surrounding interlobular connective tissue then caseation occurs slowly by cut surface a gray red coarse granular surface can be seen.

the supramammary l .nodes are not affected.

**c- Disseminating miliary udder T.B.:**

Small fatty nodules which undergo caseation and calcification, the supra mammary l .nodes is affected.

It is difficult to be recognized during “lactating period” because the lesions takes the same yellowish-white colour (**turbid udder tissue**) and project from the udder tissue

**d- Caseous mastitis;**

**Map like**, dry caseous mass with black spots beside non-caseated areas may be seen

the supramammary l .nodes are affected.

**e- Diffuse tuberculous glactophiritis:**

In which the change is confined to the milk ducts in all type of tuberculous mastitis.



155 Caseous tuberculous mastitis – udder; cow The incision of the udder showed caseocalcified nodules isolated or in small groups. In the mucosa of the teat and lactiferous sinus the nodules were more abundant. There was a breakdown of body resistance.

*Differential diagnosis:* Non-specific mastitis.

*Decision:* Total condemnation.



٩ ( حويصلة على نهاية حلمات الضرع في بغرة •

# N-Uterus

Tuberculous metritis may occur in the following ways:

1- The uterus may become infected during haematogenous spread.

2- It becomes infected from a tuberculous peritonitis.

3- Genital infection may arise from cervix with a bull affected-with tuberculosis of the penis, epididymis or testis.

Tuberculous metritis is characterized by yellow pinhead spots on mucous membrane, which becomes thickened and rigid, thus the tuberculous process sooner or later involves all the coats of **the uterus with sticky pus around the neck of cotyledons.**

## 0-Testis

Chronic tuberculous orchitis may be unrecognized, for being of a purely productive nature it shows a radiating, fatty and glistening appearance on section, while the regional lymph nodes are unaffected.

# JUDGEMENT OF TUBERCULOSIS

The aims of correct judgement are

***1- Prevention of infection to man.***

***2-A voiding unnecessary  
condemnation.***

***3-To differentiate between localized  
and generalized T.B.***

# Localized T.B.

- 1- If the disease is confined to one organ or one part without invasion of bacilli to circulation.
- 2- When the bacilli enter the portal veins forming miliary T.B. in liver with few miliary T.B. in lung.
- 3- If the lesion is present in the substance or capsule of an organ or associated Lymph nodes

## \* **Head**

If there is affection on submaxillary or retropharyngeal L. nodes-- condemn the head and tongue.

## \* **Organs and viscera**

They should be condemned if the lesions are present in capsule, substance or associated Lymph nodes.

## \* **Carcass**

The affected parts and the adjacent parts should be condemned.

# Judgement of carcass l. nodes in localized T.B.

## **A- L. nodes of fore quarter**

### ***1- Superficial cervical L nodes (prescapular):***

- It supplies the neck, shoulder, skin and forelimb.
- Condemn short fore quarter at 5th intercostal space.

### ***2-Axillary L. node:***

- Condemn short fore quarter at 5th intercostal space.
- If Axillary l. nodes are affected with any other l. nodes of fore quarter —condemn full forequarter at 9th intercostal space.

### **3- Caudal deep cervical, costocervical and cranial sternal L nodes:**

- Tuberculous lesions in one or more of these L. nodes without spread infection of carcass L. Nodes — condemn short fore quarter at 5th intercostal space.
- If tuberculous lesions is chronic & confined to one node and Axillary L. nodes is unaffected —\*condemn short fore quarter at 3th intercostal space & pass the shoulder.
- If Axillary L. nodes are affected beside one of these nodes condemn full fore quarter at 9th intercostal space.

### **4 -Intercostal l. nodes:**

- Condemnation of the chest wall or Oystering.

## **5- Sternal L nodes (Caudal sternal L nodes):**

- If only affected without parietal pleura —  
condemn the brisket and plate.

- If the pleura are affected —Condemn the  
whole chest wall.

brisket and plate.

—Condemn the

pleura.

—Stripping of the

—Oystering of  
fore quarter (removal of vertebrae, ribs and  
sternum from the outer muscles), intercostal  
muscles.

- If the Axillary I. nodes are affected —  
condemn full fore quarter at **9th** intercostal  
space.

## **6-Thoracic dorsal I. nodes (subdorsal):**

Oystering of the fore quarter.

## 7-T.B. In pleura:

- **Localized affection** without tuberculous or enlargement lesions in Lymph nodes —stripping of pleura or condemnation of chest wall
- **Diffuse affection**
  - 1- **Acute diffuse affection** —condemn full fore quarter at 11th intercostal space & diaphragm.
  - 2- **Chronic diffuse affection**
    - positive Axillary l. nodes** —condemn full fore quarter at 9 intercostal space.
    - negative Axillary l. nodes-** —Oystering of fore quarter (removal of vertebrae, ribs and sternum from the outer muscles), intercostal muscles.

## B- L. nodes of hindquarter

### ***1 -Iliac l. nodes:***

- If it is only affected & chronic lesion — condemn the rump steak.
- If other hindquarter l. nodes affected — condemn full hindquarter at 9th intercostal space.

### ***2-Lumbar l. nodes (lumbar aortic or paratuberal):***

- Localized affection —condemn the loin.
- Any other l. nodes of hindquarter show tuberculous lesion —condemn full hindquarter at 9th intercostal space.

### ***3-Popliteal l. nodes:***

- It is affected when tuberculous lesions are found in iliac and superficial inguinal or mammary lymph nodes.
- If popliteal l. nodes are affected — remove the affected hindquarter by incision midway between the l. nodes and hip joint.

### ***4-Ischiatic l. nodes:***

- If only affected —condemn the rump.
  - If accompanied by lesion in l. nodes of hindquarter —condemn hindquarter.

***5-Superficial inguinal or mammary l. nodes:***

- In the male —condemn the testis and scrotal fat.
- In the female —condemn the udder.

***6-Subiliac l. nodes (prefemoral):***

- If only affected —condemnation of thin flank.
- Any other l. Nodes of hindquarter shows tuberculous lesion — condemn full hindquarter at **9th** intercostal space

In pig:

***1-Superficial cervical L nodes  
(prescapular):***

- Condemn the head and fore quarter at **4th** intercostal space.

***2-Subiliac, superficial inguinal or  
mammary L nodes:***

- If localized affection in any one of these lymph nodes — condemnation of hindquarter between lumbar vertebrae and sacrum.

# Generalized tuberculosis :

necessitates total condemnation

- 1- Acute Miliary tuberculosis of both lungs with evidence of tuberculosis elsewhere.
- 2- Multiple and actively progressive lesions of tuberculosis.
- 3- Widespread tuberculous infection of carcass lymph nodes.
- 4- Diffuse acute lesions of tuberculosis of both the pleura and peritoneum associated with an enlarged or tuberculous carcass lymph nodes.
- 5- Active or recent lesions present in the substance of any two of the following: Spleen, kidney, udder, uterus, ovary, testicle, brain and spinal cord or their membranes, in addition to tuberculous lesions in the respiratory and digestive tracts;
- 6- Congenital tuberculosis in calves.
- 7- Localized T.B and emaciation

*I - Acute miliary tuberculosis of both lungs with evidence of tuberculosis elsewhere:*

characterized by the presence of a very large number of millet-sized tubercles, all of an equal age and size and uniformly distributed through out both lungs together and the lungs are enlarged & oedematus with miliary lesions in the visceral organs, particularly the kidneys and spleen..

## 2- Multiple and actively progressive lesions of tuberculosis:

**Multiple lesions** should be taken to denote the presence of a lesion in several organs or parts

- Indication that disease is both **active and progressive** may be assumed if:
  - a- There is evidence of congestion of the surrounding tissue.
  - b- The L. nodes draining the area of the lesion are enlarged and oedematous.
  - c- Several small millet-sized lesions are distributed around an older caseous focus
  - d- **Lesions are of the breakdown type**, characterized by the presence of dry caseous masses interspersed with blood spots and the associated L. nodes are enlarged and show miliary tubercles or stellate caseation

### *3- Widespread tuberculous infection of carcass l. nodes:*

comprise all the l. nodes of the body with the exception of the head, and those removed with the thoracic and abdominal organs during evisceration. They may drain the following:

**a- Muscles** —superficial cervical. Popliteal and Axillary lymph nodes.

**b- Organs** —renal l. node.

**c- Both muscles and organs** —iliac, ischiatic and lumbar l. node

**d- Skin** —subiliac (prefomeral) l. node

Widespread tuberculosis of the carcass l. nodes is assumed if there are lesions in two or more carcass lymph nodes in addition to two or more other l. nodes not confined either to the thoracic or to the abdominal cavity; lesions should be of acute, infiltrative and caseous nature.

*4-Diffuse acute lesions of tuberculosis of both the pleura and peritoneum associated with an enlarged or tuberculous carcass L nodes:*

- Acute tuberculous infection of the serous membranes takes the form of red velvety granulation, which may be spread over the greater part of the pleura and peritoneum.
- In a minority of cases such infection may be haematogenous in origin, and it may be associated with the presence of tubercle bacilli in the muscular tissue.



**5- Active or recent lesions present in the substance of any two of the following :**

**spleen, kidney**

**udder, uterus**

**ovary, testicle**

**brain and spinal cord**

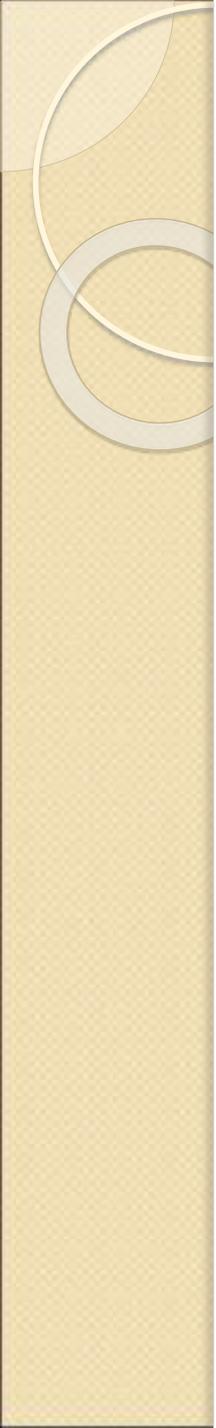
**or their membranes**

**in addition to tuberculous lesions in the respiratory and digestive tracts:**

## *6- Congenital tuberculosis in calves:*

### ***To ensure the affection to be congenital tuberculosis:***

- Lesion without calcification in splenic substance, liver, kidney and portal l. node.
- The age of calf should be less than or up to 14 days, because the tuberculous nodules take about 21 days for formation.



Thank you