

Infectious Diseases

Infection is an invasion of body tissues with microorganisms which multiply and cause cell damage with the production of toxins, and, usually, a high temperature and an antigen-antibody response.

Infectious diseases (bacterial, viral, fungal, protozoal and parasitic) are responsible for most losses in the food animals throughout the world and are, therefore, of great economic importance. Viral diseases, in particular, are capable of affecting large numbers of animals and spreading very rapidly. Along with certain bacterial disease they are endemic (present at all times) in some countries.

Control measures include accurate diagnosis, detailed epidemiological and laboratory investigations, quarantine and movement control, treatment or slaughter of affected stock, burial/burning of affected carcasses, cleansing and disinfection of premises, proper disposal of contaminated materials, including feed, water, wildlife, etc., vaccination of susceptible animals and sound husbandry measures, including the breeding of resistant livestock.

Each disease will be described under the headings: identification (I), occurrence (O), infectious agent (IA), reservoir (R), mode of transmission (MT), clinical findings (CF), pathology (P), diagnosis (D) and judgement (J).

Judgement

Authority is given in some countries, e.g. the USA and Canada, to condemn on ante-mortem examination. These cases include those dead on arrival and moribund animals and all conditions requiring total Carcase condemnation at post-mortem inspection. Eventual judgement of Carcase meat and offal is based on all the accumulated evidence – the history of the animal, clinical signs, post-mortem

lesions and any laboratory results. Decisions on post-mortem inspection, like systems of inspection, vary in different countries. For example, while only three categories of decisions are allowed in the United Kingdom - (a) *fit for human consumption*, (b) *totally unfit for human consumption* and (c) *partially condemned* – other countries adopt extra categories: *utilization of heat treatment and freezing for infected and contaminated meat, the use of inferior meat fit for human consumption, and the approval of meat as fit for human consumption but restricted in distribution*, all three categories being under official supervision.

The following *judgement* symbols (Disposition Codes) are used, with modifications, according to the Codex Alimentarius Commission Report on Meat Hygiene, Rome. 1993:

Ante-mortem:

T Totally condemns.

R Retain for rest and treatment.

S Treat as suspect.

Post-mortem:

A Approve as fit for human consumption.

T Totally unfit for human consumption.

D Partially condemn.

K Conditionally approve as fit for human consumption (Kh, heat treatment. Kf, freezing or heat treatment).

I Meat showing minor deviations from normal but fit for human consumption.

L Approved as fit for human consumption with distribution restricted to limited areas.

D are not applicable.

Not applicable, e.g. in total condemnation the columns referring

BACTERIAL DISEASE

Actinomycosis ('lumpy jaw') actinobacillosis ('wooden tongue').

I. (Identification) both diseases are chronic, suppurative conditions in which granulomatous lesions are formed in bone (actinomycosis) or soft tissues (actinobacillosis). Cattle, pigs and sheep are most commonly affected with horses and mules

O. (Occurrence) Worldwide in distribution.

IA. (Infectious agents) Different species of *actinomycosis* and *Actinobacillosis* are involved in the production of these granulomas (probably in association with pyogenic and other bacteria) and have been isolated from various other conditions.

R. (Reservoir) *A. bovis* and *A. lignieresii* are normal inhabitants of the mouth, the latter also occurring in the bovine rumen.

MT. (Mode of transmission) the bacteria gain entrance through wounds caused either by teeth defects or sharp objects like barley awns or foreign bodies.

CF. (Clinical findings) Actinomycosis enlargement of mandible or maxilla, at first Painless but later painful with presence of lesions described below. Salivation, chronic indigestion, bloats, diarrhea depraved appetite and losses of condition are found in both conditions.

P. (Pathology) *Actinobacillosis* - in *cattle* them lesion confined to the mandible or maxilla, especially the former, which becomes inflamed (osteomyelitis), rarefied and thickened ('*lumpy jaw*').

In *man actinomycosis* may occur in the jaw, thorax or abdomen (liver), the lesions taking the form of indurated fibrous areas containing pus. These may form sinuses which reach the surface.

In *sheep*, lesions up to 8cm in diameter occur on the nose, face and lower jaw but the tongue is not usually affected. There is an associated lymphadenitis, the cranial and cervical lymph nodes being enlarged.

D. (Diagnosis) yellowish Sulphur should be crushed between two microscope slides and fixed. Stain one slide with Gram's stain and another with modified Ziehl-Neelsen stain. With Gram the organisms appear as a Gram-positive central filamentous mass surrounded by a Gram-negative zone of radiating clubs which represent deposited lipoid material With Z-N stain the clubs are acid-fast and the mycelial mass non-acid-fast (also Culture, serology).

J. (Judgement)

Carcase: Lesions confined, to head e.g ,to ahead A.

Extensive lesions, T.

Viscera: Lesions confined, e.g., to ahead A.

Extensive lesions, T.

Diseased or affected parts / organs: D.

Approval (A) is subject to satisfactory condition of carcass with no evidence anaemia or degenerative changes. If head is condemned, tongue is also condemned

ANTHRAX

(Malignant pustule, Splenic fever malignant oedema, wool sorters' disease, Malignant Ragpickers')

I. A usually acute or septicaemic infective *zoonosis* which may occur in a chronic form, especially in the big. The disease also affects other wildlife such as elephant, hippopotami, buffalo, lechwe, impala and zebra. All domestic animals are susceptible, although goats and horses are less commonly affected. *Bacillus anthracis*, a Gram-positive encapsulated, spore-forming, non-motile rod 4-8].lm x 1-1.5].lm. A facultative anaerobe, it is one of the largest of the pathogenic bacteria and very resistant in its spore form. Spores, which are formed in the presence of sufficient oxygen, can resist heat for long periods (dry heat at 140°C for 1-3 h and moist heat at 140°C for 5-10 min). Spores never occur in tissues, only when the

bacteria are shed, e.g. from nose, mouth and anus of affected animal and when grown on artificial media. Animals, as listed above. The spores of anthrax can survive for as long as 3 years or more.

MT. Infection occurs through ingestion, inhalation or via the skin. Ingestion of contaminated water and food, e.g. meat, bone meal or other foods and soil, is a common mode of transmission. Inhalation anthrax is due to the inhalation of spores. Skin infection is due to contact with the tissues of affected animals, contaminated materials (hair, wool, hides, skins, etc., and products made from them).

J. (Judgement)

Carcase: T.

Viscera: T.

(Included are affected and in-contact animals and all contaminated meat and offal.)

The meat from anthrax carcasses is dangerous to man and other animals. Carcasses must not be opened. The carcass must be destroyed along with *all* contaminated material.

Procedure when anthrax is detected

Steps must then be taken to dispose of the carcass by burning or deep burial along with disinfection. Opening or moving of carcasses is prohibited. Natural orifices should be packed with tow or cotton wool and the animal's head covered with sacking. Discharged blood should be absorbed with sawdust, earth or peat, all being eventually destroyed by burning. The detection of anthrax during dressing represents a very serious situation - all further dressing and slaughter should be stopped and the affected and contiguous carcasses, offal and blood condemned. All equipment, e.g. knives, steel, saws, shovels, etc., involved in the handling of infected material must either be destroyed by burning or thoroughly disinfected (e.g. hot 5% sodium hydroxide, 10% formaldehyde).

Brucellosis

BRUCELLOSIS (undulant fever, contagious abortion! Bang's disease, Malta fever, Mediterranean fever)

1. A specific contagious disease of major importance of cattle, goats, pigs sheep, and occasionally horses and man. The disease has also been recorded in bison! deer, elk, moose, other wild animals and dogs. The disease is associated with abortion, retained placenta and sterility in the female and infection of accessory sex glands with infertility in the male.

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O. Brucellosis is a *zoonosis* of man importance in most countries of the world.

IA. *Brucella abortus*, a very small aerobic (but can only grow in the presence of 5-10% CO₂)! non-motile, non-capsulated . non-sporing.

MT. Direct and indirect contact with infected uterine discharges, blood! fetuses and fetal membranes. Mechanical vectors probably play a part in the transmission of infection. Large numbers of bacteria are present in infected cattle during abortion. Water, milk and feeding stuffs are often contaminated.

Infection takes place ingestion, inhalation and through the skin and mucous membranes.

P. Lesions are rarely diagnostic The *placenta* is usually edematous with cotyledons dull and granular in early stages. Later stages appear as yellowish granular necrotic plaques on the fetal cotyledons with the remainder opaque and leathery in appearance.

The fetus is oedematous with blood-stained fluid in the body cavities, focal necrosis and granuloma in various organs, bronchopneumonia and sometimes meningitis. The mammary gland and supramammary lymph nodes usually harbour the bacilli and may be indurated and diffusely inflamed. In males the scrotum is

enlarged and indurated. A thickened tunica vaginalis due to fibrous tissue formation may compress or replace the testes. There may be necrosis of the contents with rupture to the surface. Epididymitis, especially involving the tail, with oedema and fibrosis, are evident.

D. While symptoms and lesions may indicate the possibility of brucellosis, they are not diagnostic.

Action to be taken in meat plant

While attention to personal hygiene, sterilization of equipment, etc., is of paramount importance for all abattoir staff, it is essential where brucellosis cases and *Brucella* reactors are handled. *Great care has to be taken when handling and dressing known brucella cases.*

J. Cattle:

Carcase, A.

Viscera, A.

Diseased organs, e.g. udder, uteri, lymph nodes, testes, seminal vesicles, etc., D.

If *B. melitensis* is suspected, T or Kh, depending on prevalence and as economically feasible, is advocated.

CASEOUS LYMPHADENITIS (CLA)

I. A chronic disease of sheep and goats, and less horses, cattle, pigs, poultry, water buffalo and other wild ruminants in which are formed in lymph nodes and sometimes in internal organs. Human beings, particularly shearers, are occasionally affected.

O. Worldwide, especially where there are large populations of sheep and goat.

IA *Corynebacterium pseudotuberculosis*(ovis), a small polymorphic, Gram-positive non-motile, aerobic/facultative anaerobic. Nonsporting and non-capsulate rod found in soil and materials contaminated with pus.

R. Infected animals, soils and contaminated materials.

MT. Via skin wounds, including shearing, docking and Castration wounds. Through contamination with purulent material from ruptured abscesses in infected animals.

P. Enlargement of one or more of the superficial lymph nodes, especially of the head or neck.

D. Diagnosis is based on clinical signs and the isolation of *C. pseudotuberculosis* from pus.

J. Carcase: A, T or D depending on extent of infection and carcasses condition.

Viscera: A, T or D.

Clostridial diseases

These are usually acute or per acute toxemia caused by members of the genus *Clostridium*, which are large, Gram-positive, spore-bearing rod-shaped bacilli.

Bacillary haemoglobinuria

I. An acute highly fatal toxemia of cattle, and less commonly, sheep, pigs and dogs in which there is high fever, jaundice, haemoglobinuria and necrotic infarcts in the liver.

IA. *Clostridium haemolyticum* (*Cl. novyi* Type D). This organism can persist in contaminated soil and carcasses for long periods, besides being a normal commensal of the gut.

MT. Via ingestion of contaminated material.

CF. Disease is of short duration and animals may be found dead. If found alive - fever, depression, abdominal pain, suspension of rumination, dysentery, shallow respirations, jaundice and urine dark red.

P. Rapid onset of rigor mortis. Anaemia, Often oedema of subcutaneous tissues with blood stained fluid in body cavities. Haemorrhagic enteritis with bloody contents. Raised anemic infarcts in liver. Kidneys pale and friable and showing petechial haemorrhage.

D. Presence of haemoglobin in urine and anaemic infarct especially in liver.

J. Carcase and viscera: T.