



## BOVINE ANAPLASMOSIS

ANIMAL GROUP AFFECTED	TRANSMISSION	CLINICAL SIGNS	FATAL DISEASE ?	TREATMENT	PREVENTION & CONTROL
Bovine	Tick-borne & mechanical	Erythrocyte Anaplasmosis (E.A.): fever, anaemia, icterus. Leukocyte Anaplasmosis (L.A.): drooping ears, nervous symptoms	E.A.: <i>A.marginale</i> in naïve cattle older than 9 months. Benign in wild ruminants <i>A.centrale</i> : benign L.A.: clinical disease is rare	E.A.: imidocarb Oxytetracycline L.A.: Aureomycine Chlortetracycline	<i>In houses</i> Tick control  <i>in zoos</i> Tick control

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<b>Susceptible animal groups</b> <i>A.marginale</i> and <i>A.caudatum</i> : healthy calves younger than 9 months have innate resistance and cattle living in an endemic region (regular challenge) develop naturally acquired immunity. Wild ruminants (antelope, buffalo, deer, eland) can function as reservoirs i.e. without clinical disease. <i>A.centrale</i> can produce mild disease in cattle but is usually benign as is <i>A.bovis</i> except for naïve cattle (exotic breeds imported in endemic regions or a carrier introduced into a naïve herd).	
<b>Causative organism</b> Proteobacteria; Order Rickettsiales; Family Anaplasmataceae Anaplasmosis of erythrocytes (Gall Sickness): <i>Anaplasma marginale</i> , <i>Anaplasma centrale</i> and <i>Anaplasma caudatum</i> . Anaplasmosis of leucocytes (Tropical Bovine Ehrlichiosis or mononuclear/agranulocytic anaplasmosis): <i>Anaplasma (Ehrlichia) bovis</i>	
<b>Zoonotic potential</b> The above mentioned Anaplasmataceae are not infective to man. Some authors suggested renaming the agent of European Ehrlichiosis of ruminants ( <i>Ehrlichia phagocytophila</i> ) as <i>Anaplasma phagocytophilum</i> which is probably the agent of Human Granulocytic Ehrlichia.	
<b>Distribution</b> Erythrocyte Anaplasmosis has a worldwide distribution in (sub-) tropical regions and is still spreading even in temperate regions: occasional outbreaks are reported in Canada. Leucocyte Anaplasmosis occurs in Africa, the Mediterranean, India, South America and the Caribbean.	
<b>Transmission</b> Principal vectors are ixodid ticks ( <i>Boophilus microplus</i> is the main vector for E.A. but other species of the genera <i>Rhipicephalus</i> , <i>Dermacentor</i> , <i>Haemaphysalis</i> , <i>Hyalomma</i> and <i>Ixodes</i> can transmit <i>Anaplasma</i> spp. In addition, iatrogenic and mechanical transmission by insects (i.a. <i>Tabanus</i> spp. <i>Stomoxys</i> spp.) is possible. Principal vectors of <i>A.bovis</i> are <i>Amblyomma variegatum</i> , <i>Rhipicephalus appendiculatus</i> and <i>Hyalomma excavatum</i> .	
<b>Incubation period</b> Prepatent periods vary from 20 to 40 days (L.A.) and from 2 to 6 weeks but it can be much longer, up to 100 days (E.A.).	
<b>Clinical symptoms</b> <i>A.marginale</i> : usually subacute to chronic evolution acute disease sometimes observed in older animals especially in dairy cows of non-indigenous breeds. Fever is indicative for the onset of disease; duration is variable (from 1 to 44 days irregularly peaking). Severe anaemia but icterus is rather discrete and usually at the end of the acute phase and the start of convalescence. Decreased appetite; alternating constipation and	

diarrhoea.

*A. bovis*: acute disease is also often stress related. Anorexia, fever diarrhoea, swollen preparotid lymph nodes leading to swollen drooping ears; nervous signs: incoordination and agitation.

**Post mortem findings**

*A. marginale*: the general appearance is dominated by anaemia caused by erythrophagocytosis i.e. pallor of mucous membranes and muscles. Effusions in the body cavities and pulmonary oedema. The liver is swollen, yellowish-brown with centrilobular degeneration and distended gall bladder, containing an enormous quantity of viscous dark- green bile (Gall Sickness). The spleen and lymph nodes are enlarged; petechial haemorrhages on the kidneys and the heart (epi- and endocard). The contents of the omasum are dry and impacted.

*A. bovis*: Congestion of the liver and kidneys; the spleen has a granular consistence; hypertrophy of the lymph nodes e.g. the ear sign is caused by the swollen preparotid lymph node.

In acute cases, hydropericard can be observed and even exudates in the pleural and peritoneal cavities; petechiae on the myocardium and the arteries and congestion of the brains.

**Diagnosis**

Erythrocyte Anaplasmosis: The diagnosis based on the clinical symptoms or the lesions found at autopsy is not very specific and must be confirmed by direct microscopy or by immunodiagnosis.

In acute cases 10 to 50 % of the red blood cells can be infected. They are easy to observe in smears stained with (May-Grünwald) Giemsa unless at the peak of phagocytosis, when most of the infected rbc are removed from the circulation. Once erythropoiesis has started, basophilic granules and Howell-Jolly bodies in erythrocytes have to be differentiated from *Anaplasma* organisms.

In subacute or chronic cases, microscopy is more difficult or even impossible. Then serological tests (CFt, IFAt, Elisa and card agglutination tests) and PCR are indicated to detect carriers.

Leucocyte Anaplasmosis: bloodsmears: monocytosis (10 to 20 %) with vacuolar degeneration of some monocytes (dif. diagnosis with Heartwater – *Ehrlichia ruminantium*) with (rarely) or without rickettsiae and eosinopenia;

Serological: of little use i.a. because of cross-reactions with *Ehrlichia ruminantium*.

**Material required for laboratory analysis**

Erythrocyte anaplasmoses: thin bloodsmears or EDTA-prepared bloodsamples – DNA diagnosis: whole bloodspots on filterpaper Whatman Nr. 3 or 4.

*A. bovis*: punction of lymph nodes, squash preparations of lung or liver tissues: *A. bovis* in macrophages can be observed but samples to be taken immediately after death. DNA diagnosis: buffy coat spots on filterpaper Whatman Nr. 3 or 4.

**Relevant diagnostic laboratories**

ITM Veterinary Department 155 Nationalestraat, B-2000 Antwerp

**Treatment**

Erythrocyte Anaplasmosis: The treatment of choice is imidocarb: at 3 mg/kg b.w. administered s.c. or i.m. it has a curative and preventive effect (up to 4 weeks) and does not interfere with the development of immunity. An additional benefit is its activity against babesiosis. L.A oxytetracycline (Terramycine L.A.): at 20 mg/kg i.m has a curative effect. Sterilization by 4 injections of 20 mg/kg with an interval of 3 days is possible but does not always happen. After sterilization, immunity persists for about 8 months.

*A. bovis*: Aureomycine (5 to 10 mg/kg i.v. for 5 days) or chlortetracycline (4-5 mg/kg i.v. for 5 days) peni-strepto has no activity.

**Prevention and control in zoos**

Avoid introduction of animals from an endemic region into a naïve herd, especially with older animals. Tick control by acaricidal treatment and protection against biting flies in case of erythrocyte Anaplasmosis. Immunization against *A. marginale* with i.a. attenuated strains or inactivated strains or of *A. marginale* or with *A. centrale* is possible albeit not always of practical importance for zoos; commercial vaccines might be available but cross immunity against different strains can be a problem.

**Suggested disinfectant for housing facilities**

**Notification:** Notifiable disease in France

**Guarantees required under EU Legislation**

**Guarantees required by EAZA Zoos**

**Measures required under the Animal Disease Surveillance Plan**



Measures required for introducing animals from non-approved sources

Measures to be taken in case of disease outbreak or positive laboratory findings

Conditions for restoring disease-free status after an outbreak

Contacts for further information

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