BOVINE BABESIOSIS

ANIMAL GROUP AFFECTED	TRANS-MISSION	CLINICAL SIGNS	FATAL DISEASE ?	TREATMENT	PREVENTION & CONTROL
Bovine	Tick-borne	Fever, lethargy, diarrhoea, anaemia, haemoglobinuria icterus hyperaesthesia, convulsions, paralysis	Yes	Diminazene or imidocarb	*In houses* Tick control *in zoos* Tick control

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Susceptible animal groups
The most important species in cattle (*Babesia bovis*, *Babesia bigemina* and *Babesia divergens*) are in general more pathogenic in adult animals than in calves. Infection occurs equally in buffalo, bison and deer. *B.divergens* also in rodents and primates.

Causative organism
Several species belonging to the phylum of the Apicomplexa, order Piroplasmida, family Babesiidae; Pathogenic species are *B.bigemina*, *B.bovis* and *B.divergens*. Babesiosis has been dubbed piroplasmosis, tick fever, Texas fever, redwater. Other species, i.a. *Babesia major*, *Babesia occultans* are considered to be less or non pathogenic.

Zoonotic potential
B.divergens or *B.divergens*-like parasites (and the rodent parasite *Babesia microti* in the USA) are considered as emerging zoonoses often studied in association with other tick-borne infections such as Lyme disease and human granulocytic anaplasmosis/ehrlichiosis or in immunocompromised or splenectomised patients.

Distribution
B.bigemina and *B.bovis*: South and Central America, Europe, Africa, Middle East, Central Asia, Australia.
B.divergens: common *Babesia* sp. of cattle in Europe.
B.major: North Africa and Europe.

Transmission
Ticks of the genera *Boophilus*, *Rhipicephalus*, *Haemaphysalis* or *Ixodes* with transovarial transmission as a rule. Specificity for the definite host can be very strict and is decisive for the distribution; e.g. *B.bovis* and *B.bigemina* are mainly transmitted by the one-host *Boophilus* spp. where *Boophilus decoloratus* transmits *B.bigemina* but not *B.bovis*, for the latter *Boophilus microplus* is the main vector. *B.divergens* is transmitted by the 3-host tick, *Ixodes ricinus*. *Haemaphysalis punctata* is an important host of *B.major*. but it occurs equally in *Boophilus* sp. and in *Ixodes* sp.
Mechanical transmission is possible.

Incubation period
In general one to two weeks p.i. but this and the course of the infection depend on many factors: inoculum, age, breed and physiological status of the intermediate host. Adults are more susceptible than calves, European breeds and Zebu (except for *B.bovis*) more susceptible than African breeds, perinatal suppression and concomitant infections (e.g. *Anaplasma* (*Ehrlichia*) *phagocytophila* and *B.divergens*) are known to occur.

Clinical symptoms
Fever, lethargy, diarrhoea, haemolytic anaemia, tachycardia, haemoglobinuria and icterus are common features of acute infections. Chronic infections often without apparent haemoglobinuria. Acute *B.bovis* often develops in fatal cerebral babesiosis with hyperaesthesia, convulsions and paralysis due to aggregation of red blood cells in the cerebral capillaries and extravascular, following endothelial damage. No or little pathogenicity contributed to *B.major*. Recovered animals become carriers, without apparent clinical

symptoms, but with possibility to relapse under stress conditions. They also remain infective.

Post mortem findings

Icteric appearance of the tissues, splenomegaly, congested liver with distended gall bladder, kidneys congested and haemorraghic, subcutaneous and pulmonary oedema , sero-haemorraghic fluid in all cavities, urinary bladder with reddish or brownish urine (not in chronic babesiosis). In cases of *B.bovis* with nervous symptoms, petechiae and oedemateous congestion of the brain. Petechiae and ecchymosis in the epi- and myocard and the kidneys.

Diagnosis

Direct diagnosis: piriform merozoites in blood smears after staining (Giemsa after fixation) preferably from capillary blood (*B.bovis*) or at necropsy, in brain smears (*B.bovis*) where clumps of infected erythrocytes can be observed in microthrombi.
B.bigemina: relatively large merozoites round (2-3 µm) or irregular elongated shape (up to 5 µm), also in blood from the general circulation. Paired forms often in acute angle.
B.bovis: parasitaemias usually very low. Mostly annular vacuolised forms. Paired forms often in obtuse angle. Piroplasms measure 1.5-2 µm and are in the centre of the cells.
B.divergens: small merozoites ring-shaped or piriform, when paired in an obtuse angle 1.5-2 µm, often at the border of infected cells.
B.major: resembles *B.bovis*, centrally positioned, annular forms measure 1.8 µm, elongated (pear-) shaped forms 2.6-3.7 µm.
PCR and antibody detection assays. Immunofluorescent antibody test (IFAT) and slide-enzyme-linked immunosorbent assay (SELISA) are satisfactory but cross reactions between *Babesia* spp. do not allow speciation. Antigen slides are prepared from controlled infections in splenctomised bovines or from *Meriones* sp. (*B.divergens*).

Material required for laboratory analysis

Thin blood smears or EDTA-anticoagulated blood. When *B.bovis* is suspected preferably capillary blood has to be taken and for cerebral *B.bovis*, smears of brain capillaries.
Parasitaemias in latent infections are often too low to be detected, thick smears sometimes prepared from RBC just underneath the buffy coat and repeated sampling can improve detection.

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Relevant diagnostic laboratories

CODA, Groeselenberg 99, 1180 Brussel, Belgium

Treatment

Diamidine derivates are well tolerated and have good activity (1) Diminazene at 3.5 mg/kg b.w. i.m. curative and (2) Imidocarb at 1.2 mg/kg b.w. i.m. or s.c. curative or 3 mg/kg b.w. prophylactic (for 3 to 6 weeks).

Prevention and control in zoos

Tick control by acaricidal treatment or vaccination in domestic animals might be superfluous in a supposedly tick free environment of the zoo, but specific attention to tick prevention in imported animals is recommended.

Suggested disinfectant for housing facilities

Notification

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

References

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