BLUETONGUE

ANIMAL GROUP AFFECTED	TRANS-MISSION	CLINICAL SIGNS	FATAL DISEASE ?	TREATMENT	PREVENTION & CONTROL
All ruminants: White-tailed deer, mule deer, bighorn sheep, camel, pronghorn, mountain goats, bisons, yak. Antibodies to the viruses reported from racoons, opossums, rhino, elephant, wild dog, lion, cheetah, spotted hyena. Virus isolated also from rodents.	Bites by the vector Gen. *Culicoides* Vectors: in Europe: generally *C. imicola* Also possible: Midges Blood transmission Sperm liquid of males only during viraemia Transplacental	Reported for several ungulate species: kudu, muntjac, Grant's gazelle, sable antelope, African buffalo, Ibex, hartebeest, Addax. (But several ungulate species infected experimentally didn't develop disease)	Only sometimes in domestic sheep and some cervid species	Symptomatic	*In houses* Insect control by nets and disinfection with pyretroids during disease outbreaks (but not realistic!) *in zoos* vaccination. Only under official directive!

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Susceptible animal groups
Ungulates, carnivores, rodents; Clinical disease only in domestic sheep, goats and reported in literature for several wild ungulate species: Kudu, Muntjak, Grant's gazelle, Sable antelope, African buffalo, Ibex, Hartebeest, Addax sensible. A wide range of domestic and wild ungulates that can act as virus reservoirs!

Causative organism
Family Reoviridae, Genus *Orbivirus*. Double-stranded RNA vector-borne virus, non-enveloped, characterised by a double capsid structure. 24 serotypes (1-24).

Zoonotic potential
None of the serotypes has been associated to human disease.

Distribution
World-wide in temperate and tropical climates; reported in free ranging wildlife only in U.S., Canada and Sardinia (Italy); differences in the distribution of serotypes over broad geographic areas; risk due to global warming and following introduction in new areas of exotic BT serotypes; 24 Serotypes distributed actually in: Africa: 1-16,18,19; Middle East: 1,3,4,10,12,16; U.S.A.: 2,10,11,13,17; Greece: 4,9;16; Italy: 2-9; Spain: 10; Tunis: 2; Australia: 1,20,21,15.

Transmission
Vectored by various species of *Culicoides* midges; seasonal occurrence of the disease in relation to seasonal patterns of vector activity; generally active during evening and night; virus replication in the vector organism.

Incubation period
In domestic sheep 7-16 days.

Clinical symptoms
In domestic sheep: congestion, oedema and haemorrhages especially of the oral and nasal mucosa; this

leads to excessive salivation and oedema of the lips and tongue; then oral ulcers, blood in saliva; sometimes oedema of the head region; after 6 days: foot lesions with congestion up to necrosis; muscular, gastrointestinal and lung involvement with related symptoms; Death within 10-15 days or slow recovery with economic loss.
In domestic bovines and goats: without apparent clinical signs; short hyperthermia; foetal malformation and abortion.
Wild hoofstock: symptoms range from sudden death to chronic disease; infections with BT virus do not always result in disease.
Think about BT as differential diagnosis when: swelling of the face/conjunctiva, anorexia, excessive salivation, nasal discharge, bloody diarrhoea, lameness, haemorrhage at the coronary band, ulcers and necrosis in the oral and nasal mucosa, respiratory distress, increased body temperature (40°C) paralleled to viraemia, sudden death.

Post mortem findings

Haemorrhagic disease in domestic sheep! Virus has high affinity to mucosa and blood vessel endothelia! Gross lesions are reported to progress with increasing duration of disease from oedema, haemorrhagic diathesis, to ulcers in the subcutis of the head and neck, muscle degeneration; lung oedema; petecchial and suffusive haemorrhages of the gastro-intestinal tract and heart are found; but also in testes, diaphragm, kidney, urinary bladder, pleura, peritoneum and many other tissues; erosion and ulcers of the buccal mucosa, tongue and forestomachs; corneal lesions; foot lesions. Microscopic findings are primarily haemorrhages, congestion and necrosis. Haemorrhages at the base of the pulmonary artery can be considered as pathognomonic!

Diagnosis

Domestic cattle develops generally subclinical disease when infected; sheep are very susceptible and show whole range of clinical symptoms.

1. AGID Test: identification of group-specific Ab within 14-28 days post-infection (serum)
2. SN in vitro: identification of type-specific Ab within 10-12 days post-infection (serum)
3. ELISA Monoclonal Ab vs. VP7 core-surface-protein (group-Ag for all serotypes)
4. Virus isolation: from whole blood in animal with hyperthermia, spleen and lymph nodes
5. PCR: from whole blood in animal with hyperthermia, spleen and lymph nodes

Material required for laboratory analysis

Blood, spleen, lymph nodes, liver. Eventually search for the virus in captured vectors.

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Treatment
Symptomatic.

Prevention and control in zoos
During an outbreak control of blood sucking insects by nets on doors and windows of indoor areas, evaluation of presence of vectors by insect traps, reduction of standing water in the zoo area. But it is quite difficult to obtain control!

Suggested disinfectant for housing facilities
Pyretroids for insect control.

Notification
Yes.

Guarantees required under EU Legislation
Council Directive 2000/75/EC 20 November 2000; specific provisions for the control and eradication of BT.

Guarantees required by EAZA Zoos
EC – EAZA Recommended Code of practice (SANCO/3880/2000) - Federation of Zoos Animal Transactions Policy: RUMINANTS: Certification from the local ministry of Agriculture or equivalent that no BT has occurred within a 15 km radius of the zoo within the previous 42 days.

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
Systematic serological control of all susceptible animal stock.

Conditions for restoring disease-free status after an outbreak

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References

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