Surra (Trypanosoma evansi) Fact Sheet

1. Disease overview

Trypanosoma evansi is a flagellated protozoan parasite that causes the disease surra. It infects a wide range of wild and domestic animals. Among domestic species, the most affected vary by region but commonly include horses, camels, cattle and buffalo. Transmission is primarily mechanical by hematophagous flies. Iatrogenic transmission can occur, and carnivores may become infected by ingesting infected meat (Spickler, 2024; WOAH, 2013b).

Surra is a WOAH-notifiable disease, listed in the EU AHL under categories D and E.

2. Agent

T. evansi is a unicellular flagellated protozoan parasite, belonging to the family *Trypanosomatidae*, genus *Trypanosoma*, section Salivaria. The parasite is morphologically characterized as a thin bloodstream trypomastigote with small terminal kinetoplast, but there are some akinetoplastic strains. Strains from different geographical areas and various host sources are morphologically indistinguishable. The trypanosomes measure 14–33 µm in length with a width of 1.5–2.2 µm. They possess a free flagellum and a small sub-terminal kinetoplast. *T. evansi* multiply in their mammalian hosts by longitudinal, binary fission (Brun et al., 1998; Desquesnes et al 2013a).

3. Geographical Distribution

T. evansi has a wide geographical distribution and been reported in Africa, Central and South America and Asia, with infections being reported in most South American and Asian countries. Sporadic introduction into Europe, particularly in the Canary Islands and France have also been reported (Aregawi et al 2019; Desquesnes et al 2013a). According to World Animal Health Information System (WAHIS) data (Figure 1), the agent was not reported in the EU in the last 5 years. Up to date maps based on WAHIS are available in the online version of the Disease Profile (accessible via the button in the top right corner).

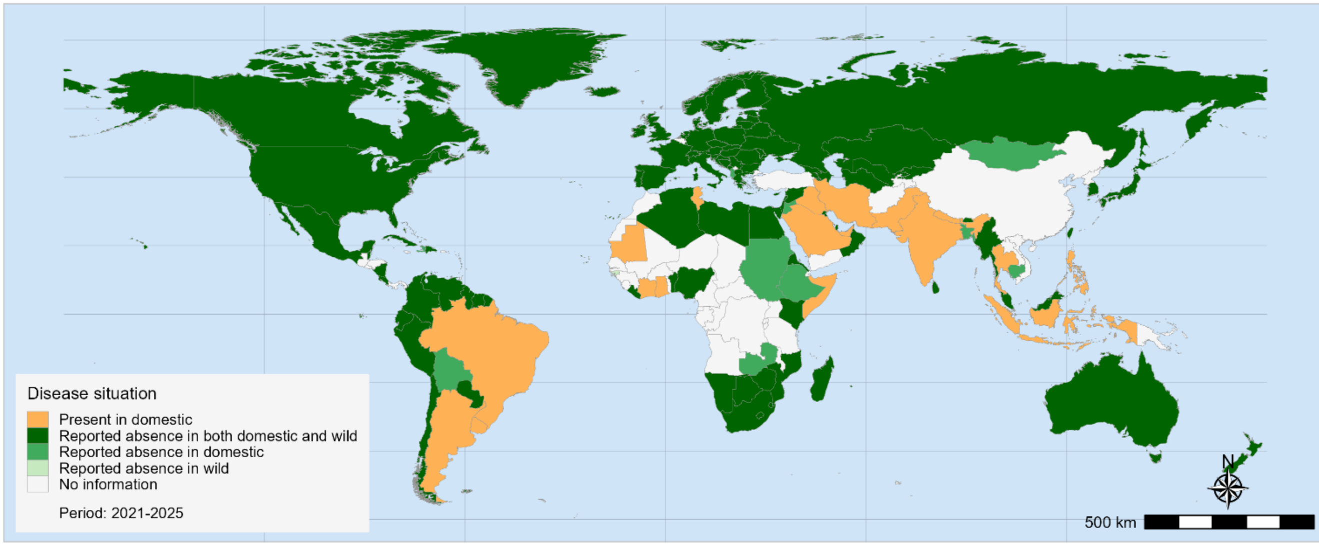


Figure 1. Geographical distribution of *Trypanosoma evansi* detected events (2021-2025), as reported to WOAH.

4. Animal hosts

4.1. Susceptible hosts

Based on epidemiological knowledge of host–pathogen–vector interactions and outbreak reports, *T. evansi* has a wide range of vertebrate hosts with the most important being ruminants, camelids and horses, whereas pigs and humans are considered dead-end hosts. However, other susceptible species have been identified by the EFSA's systematic literature review (SLR), with the summary provided in Table 1.

Table 1. Susceptible host species of *Trypanosoma evansi*.

The systematic literature review reported in the *T. evansi* disease profile, identified the following susceptible species (updated until 31/12/2025, for references see online disease profile)
FIELD
Epidemiological studies carried out in the field **Pathogen was detected in the following animal species:** • Bovidae: *Bos taurus, Capra hircus, Ovis aries, Bubalus bubalis* • Camelidae: *Camelus bactrianus, Camelus dromedarius* • Canidae: *Canis lupus familiaris* • Equidae: *Equus caballus* **Antibodies were detected in the following animal species:** • Bovidae: *Bos taurus* • Camelidae: *Camelus dromedarius* **Outbreaks reported to WOAH included the following species:** • Bovidae: *Bos taurus* • Canidae: *Canis lupus familiaris* • Equidae: No species specified
EXPERIMENTS
Experimental studies demonstrated infection in: • Bovidae: *Bos taurus, Capra hircus, Ovis aries, Bison bonasus, Bubalus bubalis*

- Camelidae: *Camelus bactrianus, Camelus dromedarius*
- Equidae: *Equus caballus*, *Equus caballus* × *Equus asinus* (Mule)
- Suidae: *Sus scrofa domesticus*

4.2. Clinical Signs

Outcomes of a systematic literature review on clinical signs in 23 domestic ruminant and 11 equid study groups are displayed in Figure 2. Most study groups for both categories showed generic clinical signs.

T. evansi is mostly pathogenic for camels and horses and has high economic relevance for water buffalo in Asia. Frequent clinical signs include fever (can appear intermittently), anaemia, pale mucous membrane, loss of appetite and weight. Nervous signs, abortion, cachexia and death (mostly camels and horses) can be also observed. Overall, there is a large variety in the intensity of the expression of clinical signs depending on the host species and geographical location (SRL; Desquesnes et al 2013a; Kim et al 2024).

4.2.1. Incubation Period

The systematic literature review identified studies in buffaloes, camels, cattle, dromedary and sheep, all with a median incubation period of 1-2 days. In goats, the median incubation was also 2 days, but clinical signs could take up to 6 months to develop. Clinical signs lasted up to 2 months in sheep and cattle (all references from the SRL are available in the online version).

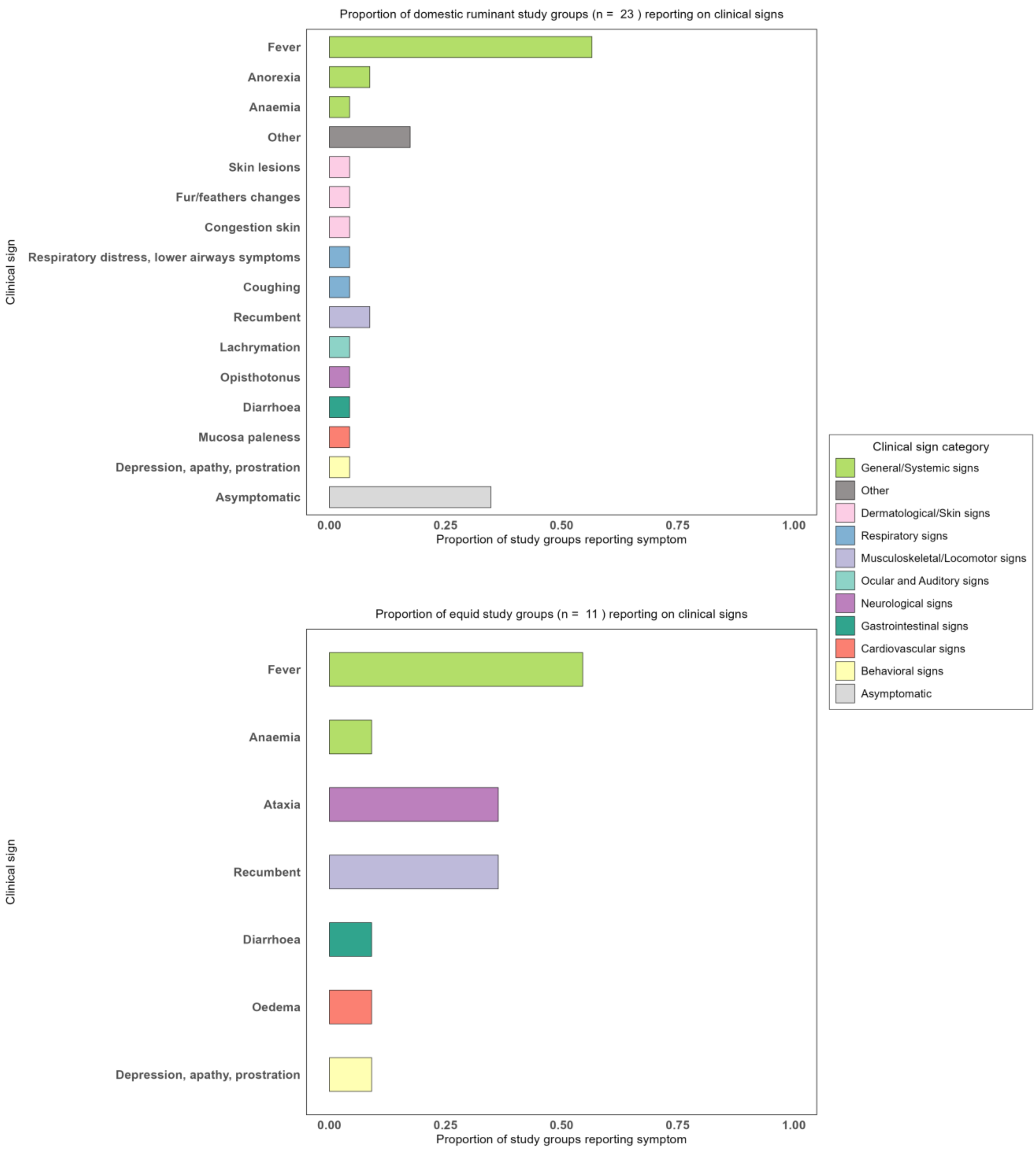
4.2.2. Morbidity and case fatality

Overall, high morbidity (>50%) and often high case fatality are expected in outbreaks affecting camels and horses, with fatalities close to 100% in acute untreated cases. Typically, chronic disease with lower case fatality is expected in cattle and buffalo, but production loses can still be substantial. Disease in other domestic species such as goats, sheep, pigs and dogs can range from subclinical to fatal (Aregawi et al 2019; Desquesnes et al 2013a; b).

In experimental studies median fatality rates as high as 100% for donkeys and camel have been reported. Median case fatality was also high for sheep and cattle (75%). In goats, the median fatality was 57%, but varied by animal group, and could reach 100%. Experimental studies in dromedary showed lower rates (median 10%), and no mortality was observed in horses (all references from the SRL are available in the online version).

4.2.3. Zoonotic Potential

T. evansi is a zoonotic disease, with human infection being rare and incidental (Joshi et al 2005; Desquesnes et al 2013b).



Study group count per domestic ruminant species: Sheep n = 10; Cattle n = 4; Goat n = 4; Water buffalo n = 4: Buffalo n = 1. Study group count per equid species: Horse n = 7; Ass n = 4. Camelid study groups not visualised due to small sample size (Camel n = 1; Dromedary n = 1). The SLR was updated until 31/12/2025, for references see the online disease profile.

Figure 2. Clinical signs reported in the main hosts of *T. evansi*.

5. Transmission

T. evansi is transmitted mechanically, primarily by biting flies. For more information on vector distribution, visit the Vector section in the online disease profile.

Following feeding from an infected host, the parasites survive for a few hours in the mouthparts of the vector, therefore transmission takes place only when the vectors feed on new susceptible hosts within a short period of time (Desquesnes et el 2013b). Iatrogenic transmission has been also associated with mechanical spread of *T. evansi* (Kim et al 2024).

T. evansi can also locate extravascularly, which can lead to infection of carnivores by eating infected meat. Vampire bats (*Desmodus rotundus*) can both become infected with T. evansi but also act as vectors, able to transmit the parasite mechanically via their saliva (Desquesnes et al 2013b; Ramirez et al 2014).

Transplacental transmission of experimentally infected ewes was demonstrated. In addition, *T. evansi* DNA was detected in milk/colostrum from these ewes and used to orally infect mice, demonstrating potential transmission of *T. evansi* via this route (Campigotto et al 2015).

6. Diagnostic tests

WOAH recommended tests (WOAH, 2025) for detection of the parasite are based on parasitological techniques involving direct microscopic examination of wet or dry-stained thick or thin blood films and the buffy-coat/microhaematocrit centrifugation technique (HCT). Detection of DNA by PCR or parasite specific antigen using ELISA tests are also tests that confirm presence of the agent. Among all these tests, DNA detection by PCR has the highest sensitivity (78% – 98%). The Se of the antigen Elisa test was around 79% (SRL). Parasitological techniques have been shown moderate to low Se (39% to 71%) (SRL; Holland et al 2001; Monzon et al 1990).

Serological methods such as ELISA, Immunofluorescence Assay (IFA) and the card agglutination test (CATT) are also recommended by WOAH. These tests have high Se (81 - 95%) and specificity (>95%) when applied in serum samples from camels or horses (SRL; Camoin et al 2019).

Table 2 presents data on the sensitivity and specificity of diagnostic tests collected through EFSA's systematic literature review; reported values correspond to the median sensitivity and specificity when multiple study groups investigated the same test and are only included when explicitly stated in the publications.

Table 1. Median sensitivity and specificity of tests to detect *T. evansi*/ *T. evansi* antibodies reported in literature included in the systematic literature review.

Target	Test	Species	Sensitivity	N animal groups	Specificity	N animal groups	References
Antigen	ELISA	Cattle and camel	79%	1	99%	1	Rudramurthy et al. 2018
Antigen	ELISA	Dromedary	42.3%	2	100%	1	Sadek et al. 2021; Singh et al. 2004
Antigen	ELISA	Water buffalo	80.0%	1	100%	1	Nguyen et al. 2014
Antigen	Latex agglutination test	Camel	79.4%	2	99.5%	2	Hassan et al. 2005; Ngaira et al. 2003
Nucleic Acid	Dry-LAMP	Dromedary	82.7%	1	-	-	Salim et al. 2018
Nucleic Acid	Loop-mediated isothermal amplification (LAMP)	Pig	45.0%	1	100%	1	Thekisoe et al. 2005
Nucleic Acid	PCR	Cattle	99.1%	2	90%	2	Freire et al. 2025; Maharana et al. 2019
Nucleic Acid	PCR	Dog	100%	3	100%	3	Kaur et al. 2025; Azhahianambi et al. 2018
Nucleic Acid	PCR	Dromedary	100%	4	100%	2	Sadek et al. 2021; Ali et al. 2011; Singh et al. 2004; Njiru et al. 2004
Nucleic Acid	PCR	Equines	100%	1	94%	1	Devi et al. 2017
Nucleic Acid	PCR	Pig	33%	1	100%	1	Thekisoe et al. 2005
Nucleic Acid	PCR	Water buffalo	77.9%	2	100%	1	Parashar et al. 2015; Holland et al. 2001
Parasite	Blood smear	Dromedary	16.7%	1	100%	1	Sadek et al. 2021
Parasite	Thick blood smear	Camel	80%	1	100%	1	Hassan et al. 2005
Parasite	Thin blood smear	Camel	80%	1	100%	1	Hassan et al. 2005
Parasite	Thin blood smear	Cattle	73.7%	1	97.3%	1	Albohiri et al. 2025
Parasite	Thin blood smear	Dromedary	76%	3	100%	2	Selim et al. 2022; Ali et al. 2011; Singh et al. 2004
Parasite	Thin blood smear	Pig	24%	1	100%	1	Thekisoe et al. 2005
Parasite	Wet blood smear	Camel	80%	1	100%	1	Hassan et al. 2005
Parasite	Wet blood smear	Dromedary	62.2%	2	100%	1	Ali et al. 2011; Singh et al. 2004
Parasite	Wet blood smear	Water buffalo	25.1%	1	-	-	Holland et al. 2001
Parasite	Buffy coat	Cattle	14.3%	1	99.7%	1	Kengradomkij et al. 2025
Parasite	Buffy coat	Dromedary	100%	1	100%	1	Ali et al. 2011
Parasite	Buffy coat	Water buffalo	38.6%	1	-	-	Holland et al. 2001
Parasite	Direct microscopic examination	Cattle	34.6%	1	97.2%	1	Uzcanga et al. 2016
Parasite	Microhaematocrit centrifugation technique (mHCT)	Cattle	37.2%	2	97.7%	2	Kengradomkij et al. 2025; Uzcanga et al. 2016
Parasite	mHCT	Goat	92.7%	1	100%	1	Tejedor Junco et al. 2011
Parasite	mHCT	Pig	38%	1	100%	1	Thekisoe et al. 2005
Parasite	mHCT	Water buffalo	69.6%	1	-	-	Holland et al. 2001
Parasite	Mini-anion-exchange centrifugation technique	Water buffalo	64.1%	1	-	-	Holland et al. 2001
Parasite	Mouse inocolation test	Pig	65%	1	100%	1	Thekisoe et al. 2005

Parasite	Mouse inocolation test	Water buffalo	74%	1	-	-	Holland et al. 2001
Antibody	Card agglutination test (CATT)	Buffalo	77.4%	2	99.4%	2	Birhanu et al. 2015; Davison et al. 1999
Antibody	CATT	Camel	78.8%	2	99.9%	2	Rogé et al. 2014; Ngaira et al. 2003
Antibody	CATT	Cattle	77.5%	2	95.6%	4	Birhanu et al. 2015; Rogé et al. 2014; Reid et al. 2003
Antibody	CATT	Dog	-	-	100%	2	Birhanu et al. 2015; Rogé et al. 2014
Antibody	CATT	Dromedary	83%	5	99.6%	4	Selim et al. 2022; Boushaki et al. 2019; Birhanu et al. 2015; Ali et al. 2011; Njiru et al. 2004
Antibody	CATT	Equihnes	100%	1	95.6%	2	Birhanu et al. 2015; Sumbria et al. 2014
Antibody	CATT	Horse	-	-	100%	1	Rogé et al. 2014
Antibody	CATT	Sheep	100%	2	96.3%	2	Birhanu et al. 2015; Rogé et al. 2014
Antibody	CATT	Vicugna	-	-	100%	1	Birhanu et al. 2015
Antibody	CATT	Water buffalo	73.8%	1	76.9%	1	Rogé et al. 2014
Antibody	CATT	Zebu	30.7%	1	61.4%	1	Singla et al. 2015
Antibody	ELISA, competitive	Equines	71.7%	1	99%	1	Mizushima et al. 2018
Antibody	ELISA	Buffalo	78%	4	88.5%	4	Kumar et al. 2022; Davison et al. 1999
Antibody	ELISA	Camel	98.9%	1	98.9%	1	Tran et al. 2009
Antibody	ELISA	Cattle	95%	7	97.7%	7	Thi Nguyen et al. 2025; Kumar et al. 2022; Jaimes-Dueñez et al. 2019; Kundu et al. 2013; Reid et al. 2003
Antibody	ELISA	Dromedary	100%	5	100%	5	Bossard et al. 2023; Kumar et al. 2022
Antibody	ELISA	Equines	91.3%	7	61.5%	7	Kumar et al. 2022; Kumar et al. 2016; Reyna-Bello et al. 1998
Antibody	ELISA	Pig	100%	2	97.5%	2	Kumar et al. 2022
Antibody	IgG ELISA	Buffalo	89%	1	95%	1	Davison et al. 1999
Antibody	ELISA, indirect	Cattle	76.2%	2	91%	2	Uzcanga et al. 2016
Antibody	ELISA, indirect	Dromedary	91%	1	95%	1	Boushaki et al. 2019
Antibody	ELISA, indirect	Equines	97.5%	1	100%	1	Camoin et al. 2019
Antibody	LFIA	Buffalo	98.8%	1	94.4%	1	Birhanu et al. 2015
Antibody	LFIA	Cattle	-	-	89%	1	Birhanu et al. 2015
Antibody	LFIA	Dog	-	-	96%	1	Birhanu et al. 2015
Antibody	LFIA	Dromedary	97.8%	1	95.8%	1	Birhanu et al. 2015
Antibody	LFIA	Equines	-	-	100%	1	Birhanu et al. 2015
Antibody	LFIA	Sheep	100%	1	96.3%	1	Birhanu et al. 2015
Antibody	LFIA	Vicugna	-	-	83.8%	1	Birhanu et al. 2015
Antibody	Latex agglutination test	Camel	92.2%	1	98%	1	Rogé et al. 2014
Antibody	Latex agglutination test	Cattle	-	-	96.8%	1	Rogé et al. 2014
Antibody	Latex agglutination test	Dog	-	-	100%	1	Rogé et al. 2014
Antibody	Latex agglutination test	Horse	-	-	100%	1	Rogé et al. 2014
Antibody	Latex agglutination test	Sheep	100%	1	100%	1	Rogé et al. 2014
Antibody	Latex agglutination test	Water buffalo	68%	1	100%	1	Rogé et al. 2014
Antibody	Microsphere-based immunoassay	Horse	97.9%	1	96%	1	Verney et al. 2022
Antibody	Sandwich ELISA	Dromedary	92%	1	-	-	Pathak et al. 1993

7. Prevention and control

7.1. Vaccination

There are no vaccines available against *T. evansi*.

7.2. Treatment

Trypanocidal drugs, such as diminazene diaceturate (DA), isometamidium chloride (IC), Cymelarsan and Quinapyramine sulphate, are used for treatment. Overall, the efficacy varies with host species, parasite strain/isolate, dose used and treatment regimen, with some resistance patterns (low efficacy), which may be associated with some specific isolates reflecting regional drug tolerance (Mekonnen et al 2018; and references from the SRL available in the online version).

8. References

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