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REPORT OF THE MEETING OF THE OIE *AD HOC* GROUP ON ANIMAL AFRICAN TRYPANOSOMOSES[1]

Paris, 15 – 17 January 2019

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The second meeting of the OIE *ad hoc* Group on Animal African Trypanosomoses (hereafter referred to as the Group) was held at the OIE Headquarters in Paris from 15 to 17 January 2019.

1. Opening of the meeting

Dr Matthew Stone, Deputy Director General of the OIE for International Standards and Science, welcomed the Group members, the representative from the Scientific Commission for Animal Diseases (Scientific Commission) and the president of the Terrestrial Animal Health Standards Commission (Code Commission).

Dr Stone commended the Group for the progress made at its first meeting in March 2018, and indicated that the objective of this meeting was to finalise the draft chapter of the Terrestrial Animal Health Code (*Terrestrial Code*) on "Infection with animal trypanosomes of African origin excluding infection with *Trypanosoma evansi* and *T. equiperdum*".

Dr Stone also thanked the experts for their commitment and for the work done in preparation of the meeting, in particular for assessing the different animal trypanosomes of African origin against the listing criteria of Chapter 1.2 of the *Terrestrial Code*.

The Group was reminded that they were nominated by the OIE Director General according to their internationally recognised expertise and geographically balanced representation, but they were not representing their own countries or institutions. Experts were asked to declare any actual or potential conflict of interest and to respect the confidentiality of the standard setting process.

2. Appointment of the chairperson and rapporteur, and adoption of the agenda

The meeting was chaired by Dr Rob Bagnall, and Dr Vincent Delespaux was appointed as rapporteur with the support of the OIE Secretariat. The draft agenda was adopted by the Group.

The adopted agenda, and list of participants are presented as Appendices I and II, respectively.

3. Consideration of the feedback provided by the Scientific Commission, the OIE Wildlife Working Group and the OIE Headquarters secretariat

The Group took note of the feedback provided by the Scientific Commission, the OIE Wildlife Working Group and the OIE Headquarters secretariat on the outline and content of the draft chapter proposed during the first meeting of the *ad hoc* Group.

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[1] Note: This ad hoc Group report reflects the views of its members and may not necessarily reflect the views of the OIE. This report should be read in conjunction with the February 2019 report of the Scientific Commission for Animal Diseases because this report provides its considerations and comments. It is available at: http://www.oie.int/en/international-standard-setting/specialists-commissions-groups/scientific-commission-reports/meetings-reports/

4 Finalisation of the *Terrestrial Animal Health Code* Chapter 8.Y. *Infection with animal trypanosomes of African origin*

Article 8.Y.1. General Provisions

The Group assessed the different species of animal trypanosomes of African origin against the listing criteria of Chapter 1.2. of the *Terrestrial Code*. The Group took note of the scientific evidence available and agreed that *T. vivax*, *T. congolense, T. simiae* and T. *brucei* matched the listing criteria. The Group made a remark to indicate that T. *congolense* includes *T. congolense* savannah, *T. congolense* forest *and T. congolense* Kilifi.; while *T. brucei* includes *T. brucei brucei, T. b. rhodesiense* and *T. b. gambiense*.; and *T. simiae* includes *T. simiae* Tsavo.

The Group also agreed on the fact that *T. godfreyi* does not match point 4 of Article 1.2.2. of the *Terrestrial Code* and therefore, should not be included in the case definition of this draft article. The Group's detailed assessment of the different species against the listing criteria of Chapter 1.2. of the *Terrestrial Code* is included as Appendix III.

The Group discussed whether other species of animal trypanosomes of African origin (*i.e. T. uniforme* and *T. suis)* should also be assessed against the listing criteria. It concluded that the current scientific information on these pathogens indicates that they are rarely reported, have limited distribution and cause limited impact and therefore do not play a significant role in the epidemiology of the disease. However, despite not being included in the case definition for the purpose of this chapter, it was recommended that *T. godfreyi*, *T. uniforme* and *T. suis* be considered in the surveillance system due to their potential interference in the diagnosis of the disease due to latent co-infection.

The Group emphasised that, under field conditions and with the current routine diagnostic methods, it may not always be possible to differentiate the species of trypanosomes involved in the infection. In these circumstances, the identification of any trypanosomes of the subgenuses Duttonella, Nannomonas and Trypanozoon in susceptible animals should be reported to the OIE as infection with animal trypanosomes of African origin.

The Group agreed that the presence of genetic material specific to the pathogen(s) detected in a sample from a clinically affected animal, or epidemiologically linked to a confirmed case, should also be considered as a case of trypanosomosis.

The Group highlighted the zoonotic aspect of *T. brucei gambiense* and *T. brucei rhodesiense*, which are responsible for human African trypanosomosis, also known as sleeping sickness.

Article 8.Y. 3. Country or zone free from infection with animal trypanosomes of African origin

The Group took in consideration the feedback provided by the Wildlife Working Group and noted that, in the presence of vectors, wildlife can play a significant role in the epidemiology of the disease. The Group clarified that it does not seem possible to achieve and maintain freedom only in domestic animals when the infection is present in wildlife in the presence of competent vectors in the same area. Thus, the Group decided to remove the provisions for the declaration of freedom in domestic and captive wild animals and to only consider freedom under historical grounds or if the disease is not present in all susceptible animals in a country or zone.

The Group took note of the potential risk of disease introduction via the importation of live animals from infected countries, even if the appropriate risk mitigation measures were correctly implemented in the country of origin, due to the possible reactivation of the parasitaemia at destination after a situation of stress such as transport (Desquesnes, 2004)[2]. It also assessed the biological and economic consequences of introducing infected animals in a free country via international trade. To eliminate the residual risk of introducing the disease in a free country or zone via the importation of animals from an infected country or zone, even of risk mitigations measures were implemented at origin as described in the draft Article 8.Y.6., the Group decided to draft specific provisions to be implemented at the quarantine station at destination and before releasing the animals (*i.e*. clinical observation, quarantine and laboratory testing).

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2 Desquesnes M. (2004). Livestock trypanosomes and their vectors in Latin America. OIE (World Organisation for Animal Health, Paris, France, p. 27. ISBN: 92-9044-634-X

Article 8.Y.3 bis Compartment free from infection with animal trypanosomes of African origin

The Group took note of Chapter 4.3. and 4.4. of the *Terrestrial Code* and agreed that the compartmentalisation concept could also be applied to animal trypanosomes of African origin.

It was pointed out that susceptible animals, in the free compartment, should be protected against the vectors by the application of an effective biosecurity management system and that the surveillance should be implemented in accordance with the Chapter 1.4. and the draft Articles 8.Y.13 to 8.Y.16.

Article 8.Y.4 Recovery of free status

The Group continued the discussion initiated during its previous meeting on the need to require serological tests, in addition to the treatment for the recovery of freedom after an incursion.

The Group noted that specific serum antibodies could last up to 6 months after an appropriate treatment is applied so the presence of serum antibodies would not necessarily indicate the presence of an ongoing active infection. It was agreed that the absence of antibodies in previously infected animals would provide additional evidence for the effectiveness of the treatment and therefore for the complete elimination of the parasites.

The Group concluded that, for the recovery of the free status after an incursion, the affected animals need to be either killed, slaughtered or treated. The official re-establishment of the free status should happen only after affected animals and exposed, susceptible animals (i.e. herdmates) have undergone monthly repeated serological and pathogen detection tests until both tests are negative for six consecutive months.

The Group agreed to provide specific surveillance recommendations for the recovery of freedom in the surveillance articles.

Article 8.Y.6. Recommendations for the importation of live animals from an infected country or zone

The Group took note of the concern expressed by the Scientific Commission about the recommendations to implement risk mitigation measures in the country or zone of destination. It was noted that for international trade, the *Terrestrial Code* mostly recommends measures to be implemented and certified at the exporting country.

The Group considered that the likelihood of importing an infected animal would be quite low after implementing the previously suggested risk mitigation measures in the country of origin (*i.e.:* quarantine, serological test, transport in vector-protected vehicle and clinical observation). It was also noted that importing *Trypanosoma spp.* infected animals into a free country or zone would have significant biological and economic consequences. However, the consequences would be less adverse if infected animals are imported into an already infected country or zone.

The Group decided to recommend mitigation measures to address the residual risk caused by a potential reactivation of parasitaemia after a period of stress during transport and at destination only in countries or zones that want to gain or maintain their free status (see above -draft Article 8.Y.3-). These recommendations would not apply for the importation of live animals into countries or zones not considered free.

The Group discussed at length the Scientific Commission's request to consider the merit and feasibility of providing recommendations for the importation of susceptible animals from infected countries or zones directly to slaughter. The Group assessed that, in the presence of competent vectors at destination, the risk of spreading the disease would not be negligible, even if the animals go directly to the slaughterhouse. The Group agreed that this type of movement would be considered safe only if the animals travel in vector-protected vehicles and if the animals are also protected against the vectors at the slaughterhouse. However, these recommendations were not considered practical. The Group concluded that the provisions of Article 8.Y.6. should apply when animals are imported directly to the slaughterhouse.

Article 8.Y.13. to Article 8.Y.16. Surveillance

The Group emphasised that the general purpose of surveillance should be (i) the demonstration of the absence, (ii) the early detection, or (iii) the measurement and monitoring of the prevalence and distribution of infections with animal trypanosomes of African origin in a country, zone or compartment;

Sentinel animals

The Group recognised the value of using sentinel animals as part of a surveillance system. It was noted that, in addition to using sentinel livestock units, the investigation of clinically suspect cases in highly susceptible animals such as dogs, donkeys or horses[3] could also be considered as part of the sentinel system.

Vector surveillance

The Group took in consideration the provisions of Chapter 1.5. and agreed to draft some specific vector surveillance recommendations for animal trypanosomoses of African origin.

The Group pointed out that, in the areas where cyclical transmission plays a role, the demonstration of absence of tsetse flies could support the claim for freedom. It was also noted that trapping vectors is one of the most reliable means to gather vector-related information. It was stressed that vector collection tools should be adapted to the local ecological conditions, species and group of the vectors.

The Group recommended that, when sentinel animals are used, vector surveillance should also be carried out at the same location.

Additional surveillance procedures for the recovery of the free status

The Group agreed that active surveillance should be implemented when a country or zone wants to recover the free status after an incursion. The target population for surveillance should include establishments located near or with epidemiological links to the outbreak, as well as screening the animals used to re-populate the affected establishments.

5. Assessment of *T. evansi* and *T. equiperdum* against the criteria described in Chapter 1.2. of the *Terrestrial Code*

The Group assessed *T. evansi* and *T. equiperdum* against the criteria described in the *Terrestrial Code* chapter 1.2.

The Group noted the challenge for the detection and laboratory diagnosis of *T. equiperdum* due to the low parasitaemia and the chronic nature of the disease. However, it was pointed out that reliable means of diagnosis exist and are described in the *Terrestrial Manual*. Therefore, *T. equiperdum* fulfils the criteria 3 of Chapter 1.2 of the *Terrestrial Code*.

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3 (1) Cherdchutham, W., Desquesnes, M., Yangtara, S. & Jittapalapong, S. (2012) Clinical observations and efficacy of diminazene diaceturate and melarsamine hydrochloride for the treatment of surra in horses in Thailand. *Proceedings of the first Regional Conference of the Society for Tropical Veterinary Medicine (STVM): A change in global environment, biodiversity, diseases and health; 18-21 June 2012, Phuket, Thailand.*, 25.
(2) Desquesnes, M., Holzmuller, P., Lai, D.H., Dargantes, A., Lun, Z.R. & Jittaplapong, S. (2013) *Trypanosoma evansi* and surra: a review and perspectives on origin, history, distribution, taxonomy, morphology, hosts, and pathogenic effects. *Biomed Res Int* **2013**, 194176. DOI: 10.1155/2013/194176.
(3) Gill, B. (1977) Trypanosomes and trypanosomiases of Indian livestock. *Indian Council of Agricultural Research, Edit. ICAR, New Delhi, 1977, A booklet* (first edition), 137 pages.
(4) Rjeibi, M.R., Ben Hamida, T., Dalgatova, Z., Mahjoub, T., Rejeb, A., Dridi, W. & Gharbi, M. (2015) First report of surra (*Trypanosoma evansi* infection) in a Tunisian dog. *Parasite* **22**, 3. DOI: 10.1051/parasite/2015004.
(5) Faye D, Pereira de Almeida PJL, Goossens B, Osaer S, Ndao M, Berkvens D, Speybroeck N, Nieberding F, Geerts S (2001). Prevalence and incidence of trypanosomosis in horses and donkeys in the Gambia. Vet Parasitol 101:101–114.
(6) Snow WF, Wacher TJ, Rawlings P (1996) Observations on the prevalence of trypanosomosis in small ruminants, equines and cattle, in relation to tsetse challenge, in the Gambia. Vet Parasitol 66:1–11.
(7) A. Sow, I. Sidibé, M. Kalandi, A. Bathily, N. P. Ndiaye, M. Ouédraogo, M. M. M. Mouiche & G. J. Sawadogo (2012). Biochemical changes induced by natural infection of trypanosomosis in Burkinabese local donkey breeds. Comp Clin Pathol DOI 10.1007/s00580-012-1579-2.

Regarding *T. evansi*, the Group took note of the report of human cases in some people that lacked a functional trypanolytic factor, apolipoprotein L1 (APOL1) (Joshi et al, 2005, Truc et al, 2013)[4] but also in an apparently healthy individual, with normal APOL1 enzymatic activity (Van Vinh et al., 2016)[5]. The Group discussed the impact and public health implication of the findings and finally concluded that *T. evansi* also fulfils the criteria 4a of Chapter 1.2.

The Group concluded, that, based on the current scientific knowledge, *T.evansi* and *T. equiperdum* match the listing criteria and recommended to include them in the OIE List.

The detailed assessments are included as Appendix IV.

6. Other matters

The Group noted the need for detailed guidance for tsetse flies surveillance and agreed on the need to develop specific guidelines considering the existing probabilistic models to demonstrate absence of tsetse flies.

The Group also discussed the purposes of the different diagnostic methods described in the *Terrestrial Manual* Chapter 2.4.17. It emphasised that the recommended methods for agent detection should be:

(i) The thin stained smear because of its specificity to identify the sub-genus or species but noting its low sensitivity;

(ii) The hematocrit centrifugation technique because of its sensitivity, but noting its low specificity (sub-genus or less);

(iii) Molecular techniques because they are sensitive and highly specific. However, they may not be able to detect latent infections with low parasitemia.

The recommended method for antibody detection is the ELISA which presents a very high sensitivity to detect the immune contact of the host with the parasites, however, the interpretation of the results should consider the possible cross-reactions amongst pathogenic trypanosomes and *Leishmania* spp.

The Group noted that the *Terrestrial Manual* Chapter 2.4.17 was adopted in the absence of a *Terrestrial Code* chapter on animal trypanosomes of African origin. The Group advised that the *Terrestrial Manual* Chapter 2.4.17. should be amended to clearly indicate the fitness for purpose and limitations of the different laboratory diagnostic methods and to ensure correct alignment between the two chapters.

Finally, the Group briefly brainstormed to identify some knowledge gaps that, when addressed, may contribute to the improvement of the international standards and therefore the control of the disease. It is worth noting that, due to other priorities during this meeting, the Group was not able to conduct a prioritization exercise aimed at creating a comprehensive list of knowledge gaps. The following aspects were identified:

- Better understanding of the epidemiological role of other species of animal trypanosomes (*T. uniforme, T. suis* and *T.godfreyi*);
- Development of a standarised methodology to demonstrate local or regional environmental freedom from tsetse flies;
- Development of pan-trypanosomes antibody detection ELISA;

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4 Joshi, PP, Shegokar VR, Powar RM, Herder S, Katti R, Salkar HR, Dani VS, Bhargava A, Jannin J, Truc P., (2005). Human trypanosomiasis caused by *Trypanosoma evansi* in India: the first case report. Am J Trop Med Hyg.;**73(3)**, 491-5. Truc,P, Buscher,P, Cuny,G, Gonzatti, MI, Jannin, J, Joshi, P, Juyal, P, Lun,Z-R, Mattioli, R, Pays, E, Teixeira,MMG, Touratier, L, Vincendeau, VP and Desquesnes,M. 2013. Atypical Human Infections by Animal Trypanosomes. PLoS Neg Trop Dis. **7(9)**, e2256.

5 Van Vinh Chau N., Buu Chau L., Desquesnes M., Herder S., Phu Huong Lan N., Campbell J.I., Van Cuong N., Yimming B., Chalermwong P., Jittapalapong S., Franco J.R., Tue N.T., Rabaa M.A., Carrique-Mas J., Thanh T.P.T., Tran Vu Thieu N., Berto A., Thi Hoa N., Van Minh Hoang N., Canh Tu N., Khac Chuyen N., Wills B., Tinh Hien T., Thwaites G.E., Yacoub S. & Baker S., (2016). A clinical and epidemiological investigation of the first reported human infection with the zoonotic parasite *Trypanosoma evansi* in Southeast Asia. *Clin. Infect. Dis.*, **62**, 1002–1008. doi:10.1093/cid/ciw052

- Treatment decision guidelines, based on diagnostic tests;

- Epidemiology of trypanocidal drug resistance and genetic marker for trypanocidal drug resistance;

- Better understanding of the drivers for the persistence of cyclically-transmitted trypanosomes after the cyclical vector is eliminated, and the role of mechanical vectors in the epidemiology of the disease in areas where tsetse flies have been eliminated.

7. Adoption of the report

The *ad hoc* Group reviewed the draft report provided by the rapporteur and agreed to circulate it electronically for comments before the final adoption.

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…/Appendices

Appendix I

MEETING OF THE OIE *AD HOC* GROUP ON ANIMAL AFRICAN TRYPANOSOMOSES
Paris, 15 – 17 January 2019

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Agenda

1. Opening of the meeting
2. Appointment of chairperson and rapporteur, and adoption of the agenda
3. Consideration of the feedback provided by the Scientific Commission, the OIE Wildlife Working Group and the OIE Headquarters secretariat
4. Finalisation of the *Terrestrial Animal Health Code* Chapter 8.Y. *Infection with animal trypanosomes of African origin*
5. Assessment of *T. evansi* and *T. equiperdum* against the criteria described in Chapter 1.2. of the *Terrestrial Code*
6. Other matters
7. Adoption of the report

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Appendix II

MEETING OF THE OIE *AD HOC* GROUP ON ANIMAL AFRICAN TRYPANOSOMOSES
Paris, 15 – 17 January 2019

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Assessment of the different species of animal trypanosomes of African origin against the listing criteria of Chapter 1.2. of the *Terrestrial Code*

Assessment of infection with *Trypanosoma brucei* sspp (including *T. brucei brucei*, *T. b. rhodesiense* and *T. b. gambiense*, but excluding *T. evansi* and *T. equiperdum*) according to the criteria provided in the OIE *Terrestrial Animal Health Code* Chapter 1.2. Criteria for the inclusion of diseases, infections and infestations in the OIE list, Article 1.2.2.

The criteria for the inclusion of a disease, infection or infestation in the OIE list are as follows:

1) International spread of the pathogenic agent (via live animals or their products, vectors or fomites) has been proven.

Yes X No □

Scientific rationale:

T. brucei sspp are mainly transmitted by biological vectors (tsetse flies), occasionally by mechanical vectors (tabanids, stomoxes and other haematophagous dipters) and *via* live animals and their products (fresh blood, meat, carcass etc) and possibly including using fomites such as needles (serial injections). *T. brucei* sspp may be found in 36 African countries. So far, *T. brucei* sspp have not been able to spread out of Africa, due to very limited mechanical transmission, it is considered to be mostly tsetse dependant for transmission and sustainable enzootic/endemic situation.

AND

2) At least one country has demonstrated freedom or impending freedom from the disease, infection or infestation in populations of susceptible animals, based on the provisions of Chapter 1.4.

Yes X No □

Scientific rationale: Only 36 African countries, so far, have been found infected by *T. brucei* sspp infection(s). Thus all other countries are free of autochtonous infection.

AND

3) Reliable means of detection and diagnosis exist and a precise case definition is available to clearly identify cases and allow them to be distinguished from other diseases, infections or infestations.

Yes X but No □

Scientific rationale:

Reliable means of detection and diagnosis exist and a precise case definition is available to clearly identify *T. brucei* infection and/or disease, and allow them to be distinguished from other infections and/or diseases, however, it must be stated that:

1) In animals, *T. brucei* sspp belong to a disease complex called Nagana, which is due to infection by one or several species of *Trypanosoma* including *T. vivax, T. congolense* and *T. brucei* sspp, consequently, the disease Nagana does not necessarily require species identification to be identified itself;

2) in *Trypanosoma* infections, species identification is not always possible due to (i) limited sensitivity: when the parasitaemia is too low, species identification is not possible; and (ii) limited specificity of the diagnosis tools making sometimes difficult to distinguish species or subspecies of Trypanozoons (e.g. *T. brucei* sspp from *T. evansi* and *T. equiperdum*). However, a positive molecular identification is reliable.

AND

4a) Natural transmission to humans has been proven, and human infection is associated with severe consequences.

Yes X No □

Scientific rationale:

Two sub-species of *T. brucei* can infect humans *T. b. gambiense* and *T. b. rhodesiense*; they are responsible for a disease most often fatal (Büscher et al., 2017); diagnosis is crucial and not always reliable, although strongly needed due to the toxicity of treatments, especially for the meningo-encephalitic phase of the disease (stage 2). For *T. b. rhodesiense*, the existence and epidemiological relevance of the animal reservoir has been clearly demonstrated (Fèvre et al., 2001; Büscher et al., 2017), while for *T. b. gambiense* the epidemiological relevance of the existing animal reservoir is still unclear (Büscher et al., 2018).

OR

4b) The disease has been shown to have a significant impact on the health of domestic animals at the level of a country or a zone taking into account the occurrence and severity of the clinical signs, including direct production losses and mortality.

Yes X No □

Scientific rationale:

T. brucei sspp infection is of a medium prevalence in cattle, but it can affect a large range of other domestic and wild hosts; it is one of the 3 *Trypanosoma* species responsible of the disease complex "Nagana", *T. brucei* sspp are considered to have the lowest impact on animals compared to *T. vivax* and *T. congolense*, however, their real pathogenicities are poorly documented in livestock, probably hidden by the other 2 parasites mentioned, and, also because experimental handling of human pathogens is feared. Because of their zoonotic potential, control of *T. brucei* sspp infections in livestock should be a priority, even if their pathogenicity is considered to be lower than those of *T. congolense* and *T. vivax*. Because they belong to a disease complex, the knowledge of the individual impact of *T. brucei* sspp on livestock is limited, however, loss in milk, meat and manure production in cattle, horse, sheep and goats, are expected, similarly to other salivarian *Trypanosoma* species infections.

OR

4c) The disease has been shown to, or scientific evidence indicates that it would, have a significant impact on the health of wildlife taking into account the occurrence and severity of the clinical signs, including direct economic losses and mortality, and any threat to the viability of a wildlife population.

Yes □ No X

Scientific rationale:

Although some infections are commonly found in wildlife, *T. brucei* sspp are not suspected to be of significant impact on wildlife, but the latter has a potential role of reservoir of the parasite.

Conclusion regarding *T. brucei* sspp:

Does *T. brucei* sspp match the listing criteria that are described in the *Terrestrial Animal Health Code* Chapter 1.2.2

Yes X No ☐

Summary Conclusion:

Based on criteria 1, 2, 3 and 4b, *Trypanosoma brucei* sspp fulfill all criteria to be included in the OIE list; however a remark must be made on criteria 3; if reliable means of detection and diagnosis do exist, and a precise definition case is available to clearly identify cases**, they do not always allow to distinguish *T. brucei* sspp infections from other *Trypanosoma* infections, and, sometimes, from other infections**, due to limits in sensitivity and specificity of diagnosis tools. However, a positive molecular identification is reliable.

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Assessment of infection with *T. congolense* (*T. savannah, T. forest, T. kilifi*) according to the criteria provided in the OIE Terrestrial Animal Health Code Chapter 1.2. Criteria for the inclusion of diseases, infections and infestations in the OIE list, Article 1.2.2.

The criteria for the inclusion of a disease, infection or infestation in the OIE list are as follows:

1) International spread of the pathogenic agent (via live animals or their products, vectors or fomites) has been proven.

Yes X No □

Scientific rationale:

The trypanosomes pathogenic to livestock in Africa (*Trypanosoma congolense*, *Trypanosoma vivax*, and *Trypanosoma brucei*) are mainly cyclically transmitted by vector tsetse (*Glossina*) (Desquesnes and Dia, 2003) .

Where the hosts, vectors and parasites are present in a same area, the disease is present. Displacement of hosts (infected or not) or vectors (infected or not) by changes in ecological conditions or passive transport will spread the disease in the concerned zones**.**

(Allsopp et al., 2004; Radwanska et al., 2018)

AND

2) At least one country has demonstrated freedom or impending freedom from the disease, infection or infestation in populations of susceptible animals, based on the provisions of Chapter 1.4.

Yes X No □

Scientific rationale:

As opposite to the first point, when hosts, vectors and parasites are not present together in an area, the disease will not be present or will disappear quickly. The eradication of the vectors in a specific zone will lead to the disappearance of the disease.

(Allsopp et al., 2004; Cecchi et al., 2014)

AND

3) Reliable means of detection and diagnosis exist and a precise case definition is available to clearly identify cases and allow them to be distinguished from other diseases, infections or infestations.

Yes X No □

Scientific rationale

The identification of the parasite in a host is pathognomonic for the disease. Trustable molecular methods are available.

(Geysen et al., 2003; Odongo et al., 2016; Tran et al., 2014)

AND

4a) Natural transmission to humans has been proven, and human infection is associated with severe consequences.

Yes □ No X

Scientific rationale:

T. congolense has a broader range of hosts including livestock and game animals but is generally accepted to be non-infective to humans. It should however be mentioned that a mixed *T. b. gambiense/T. congolense* infection has been reported in a human (Truc et al., 1996 in: Radwanska et al., 2018)

OR

4b) The disease has been shown to have a significant impact on the health of domestic animals at the level of a country or a zone taking into account the occurrence and severity of the clinical signs, including direct production losses and mortality.

Yes X No ☐

Scientific rationale:

Trypanosoma (Nannomonas) *congolense* is probably the most prevalent and widespread pathogenic trypanosome in Sub-Saharan Africa, being found in ruminants, pigs, dogs and other domestic animals throughout the tsetse belt (Peacock et al., 2012).

T.congolense is responsible for the most important form of animal African Trypanosomoses in domestic animals such as bovines, equines, sheep, goats, camels and pigs (Ford, 1971)

T congolense is the most important trypanosome affecting cattle in Africa. There are many different strains that vary in their virulence. As the disease progresses, animals develop a marked anaemia, hair coat becomes lustreless and stary, there is severe loss of bodily condition manifesting as sunken eyes, prominent vertebrae and ribs, wasted gluteal and crural muscles. In chronic cases reproduction is affected with calves failing to reach sexual maturity. Death may occur within a few weeks but usually takes months to a year.

The impact of the disease is supported by enough scientific data

(Allsopp et al., 2004; Shaw et al., 2014)

OR

4c) The disease has been shown to, or scientific evidence indicates that it would, have a significant impact on the health of wildlife taking into account the occurrence and severity of the clinical signs, including direct economic losses and mortality, and any threat to the viability of a wildlife population.

Yes ☐ No X

Scientific rationale:

Wildlife is known to be a reservoir for *T. congolense* but does not impact significantly the health of the games. It is, however, risky to breed livestock in the vicinity of a game reserve.

(Chitanga et al., 2013; Van den Bossche et al., 2011)

Conclusion regarding *T. congolense*:

Does *T. congolense* match the listing criteria that are described in the *Terrestrial Animal Health Code* Chapter 1.2.?

Yes X No ☐

Summary Conclusion:

Animal African Trypanosomoses caused by *T. congolense* should be included in the *Terrestrial code*

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Assessment of infection with *T. godfreyi* according to the criteria provided in the OIE *Terrestrial Animal Health Code* Chapter 1.2. Criteria for the inclusion of diseases, infections and infestations in the OIE list, Article 1.2.2.

The criteria for the inclusion of a disease, infection or infestation in the OIE list are as follows:

1) International spread of the pathogenic agent (via live animals or their products, vectors or fomites) has been proven.

Yes X No □

Scientific rationale:

Trypanosoma (Nannomonas) godfreyi is primarily confined to wild and domestic suids and is transmitted by tsetse flies in sub-Saharan Africa. Where the hosts, vectors and parasites are present in a same area, the disease is present. Displacement of hosts (infected or not) or vectors (infected or not) by changes in ecological conditions or passive transport will spread the disease in the concerned zones.

(McNamara et al., 1994; Gibson et al, 2001, Stevens and Brisse, 2004; Auty et al., 2012)

AND

2) At least one country has demonstrated freedom or impending freedom from the disease, infection or infestation in populations of susceptible animals, based on the provisions of Chapter 1.4.

Yes X No □

Scientific rationale:

T. (N) godfreyi was first isolated in *Glossina mortisans submortisans* in The Gambia and has also been shown in Tanzania and Zimbabwe. Experimentally, *T.godfreyi* causes sub-acute infection in warthogs. As opposite to the first point, areas free of hosts, vectors and parasites are free of the disease. The eradication of the vectors in a specific zone will lead to the disappearance of the disease.

(McNamara et al, 1994;Stevens and Brisse, 2004)

AND

3) Reliable means of detection and diagnosis exist and a precise case definition is available to clearly identify cases and allow them to be distinguished from other diseases, infections or infestations.

Yes X No □

Scientific rationale:

The identification of the parasite in a host is pathognomonic for the disease. A DNA probe specific for a *T.* godfreyi repeat (satellite) sequence is available.

(Masiga et al., 1996; Auty et al., 2012;Gibson et al. 2001,; Malele et al., 2003)

AND

4a) Natural transmission to humans has been proven, and human infection is associated with severe consequences.

Yes □ No X

Scientific rationale:

No reference is available about cases of transmission to human

OR

4b) The disease has been shown to have a significant impact on the health of domestic animals at the level of a country or a zone taking into account the occurrence and severity of the clinical signs, including direct production losses and mortality.

Yes ☐ No X

Scientific rationale:

The presence of the parasite has been mainly reported in its invertebrate host in Sub-Saharan Africa, with few reports of in wildlife and domestic suids. It is mildly pathogenic (subacute disease in experimentally infected piglets)

(Stevens and Brisse., 2004; Auty et al., 2012, Hamill et al, 2013)

OR

4c) The disease has been shown to, or scientific evidence indicates that it would, have a significant impact on the health of wildlife taking into account the occurrence and severity of the clinical signs, including direct economic losses and mortality, and any threat to the viability of a wildlife population.

Yes ☐ No X

Scientific rationale:

Wildlife is known to be a reservoir for *T. godfreyi*, but the parasite does not impact significantly the health of wild suids.

(Stevens and Brisse., 2004; Auty et al., 2012, Hamill et al. 2013)

Conclusion regarding *T. godfreyi*:

Does *T. godfreyi* match the listing criteria that are described in the *Terrestrial Animal Health Code* Chapter 1.2.?

Yes ☐ No X

Summary Conclusion:

Animal African Trypanosomosis caused by *T. godfreyi* should not be included in the Terrestrial Animal Health Code

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Assessment of infection with *Trypanosomo simiae* (including *T.simiae tsavo*) according to the criteria provided in the OIE Terrestrial Animal Health Code Chapter 1.2. Criteria for the inclusion of diseases, infections and infestations in the OIE list, Article 1.2.2.

The criteria for the inclusion of a disease, infection or infestation in the OIE list are as follows:

1) International spread of the pathogenic agent (via live animals or their products, vectors or fomites) has been proven.

Yes X No ☐

Scientific rationale:

Trypanosoma (Nannomonas) simiae is primarily but not solely confined to wild and domestic suids and is transmitted by tsetse flies in sub-Saharan Africa. It is the only species of trypanosome that is extremely pathogenic to domestic pigs, in which it causes acute and fatal disease outbreaks of short duration. Its name derives from its description from experimentally infected monkeys.
Where the hosts, vectors and parasites are present in a same area, the disease is present. Displacement of hosts (infected or not) or vectors (infected or not) by changes in ecological conditions or passive transport will spread the disease in the concerned zones.

(Hoare, 1972) (Claxton *et al.*, 1992) (Stevens & Brisse, 2004)

AND

2) At least one country has demonstrated freedom or impending freedom from the disease, infection or infestation in populations of susceptible animals, based on the provisions of Chapter 1.4.

Yes X No ☐

Scientific rationale:
T. simiae infection(s) have only been found in Sub-Saharan Africa. Thus all other countries are free of autochtonous infection.

AND

3) Reliable means of detection and diagnosis exist and a precise case definition is available to clearly identify cases and allow them to be distinguished from other diseases, infections or infestations.

Yes X No ☐

Scientific rationale:

Several studies based on the biochemical characterization of this species have better differentiated it from *T. congolense*. Gashumba et al. (1986), made a preliminary comparison of *T. simiae* and *T. congolense* based on the electrophoresis of six isoenzymes. All the enzymes showed different profiles between the two species. These results were reinforced by the observations by Sidibé (1996) based on 18 enzymatic systems and 24 RAPD primers. Species-specific probes for *T. simiae* show that the satellite DNA of *T. simiae* is distinct from that of *T. congolense* and other Salivarian trypanosomes (Majiwa and Webster, 1987).
Garside et al. (1995) had previously shown in that the *T. simiae* and *T. godfreyi* species of the subgenus Nannomonas do not possess the glutamic acid gene.
(Gashumba *et al.*, 1986) (Sidibé, 1996) (Majiwa & Webster, 1987) (Garside & Gibson, 1995)

AND

4a) Natural transmission to humans has been proven, and human infection is associated with severe consequences.

Yes ☐ No X

Scientific rationale:

No reference is available about cases of transmission to human

OR

4b) The disease has been shown to have a significant impact on the health of domestic animals at the level of a country or a zone taking into account the occurrence and severity of the clinical signs, including direct production losses and mortality.

Yes X No ☐

Scientific rationale:

T. simiae is the only species of trypanosome that is extremely pathogenic to domestic pigs, in which it causes acute and fatal disease outbreaks of short duration.
(Stevens & Brisse, 2004)

OR

4c) The disease has been shown to, or scientific evidence indicates that it would, have a significant impact on the health of wildlife taking into account the occurrence and severity of the clinical signs, including direct economic losses and mortality, and any threat to the viability of a wildlife population.

Yes ☐ No X

Scientific rationale:

Wildlife is known to be a reservoir for *T. simiae*, available evidence does not indicate that it has a "significant impact on the health of wildlife taking into account the occurrence and severity of the clinical signs, including direct economic losses and mortality, and any threat to the viability of a wildlife population".

(Claxton *et al.*, 1992)

Conclusion regarding *T. simiae*:

Does *T. simiae* match the listing criteria that are described in the *Terrestrial Animal Health Code* Chapter 1.2.?

Yes X No ☐

Summary Conclusion:

Animal African trypanosomosis caused by *T. simiae* should be included in the Terrestrial Animal Health Code

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Assessment of infection with *Trypanosoma vivax* according to the criteria provided in the OIE *Terrestrial Animal Health Code* Chapter 1.2. Criteria for the inclusion of diseases, infections and infestations in the OIE list, Article 1.2.2.

The criteria for the inclusion of a disease, infection or infestation in the OIE list are as follows:

1) International spread of the pathogenic agent (via live animals or their products, vectors or fomites) has been proven.

Yes X No □

Scientific rationale:

T. vivax is transmitted by biological vectors (tsetse flies), mechanical vectors (tabanids, stomoxes and other haematophagous dipters) and *via* live animals and their products (fresh blood, meat, carcass etc), and by fomites such as needles (serial injections). Originating from Africa where it is found in 37 countries, *T. vivax* was introduced to Latin America where its geographical spreading is continuing nowadays. It has a potential for further expansion to other geographical areas, including Europe and Asia.

AND

2) At least one country has demonstrated freedom or impending freedom from the disease, infection or infestation in populations of susceptible animals, based on the provisions of Chapter 1.4.

Yes X No □

Scientific rationale:

Europe, Asia, Australia and North America are free of *T. vivax* infection.

AND

3) Reliable means of detection and diagnosis exist and a precise case definition is available to clearly identify cases and allow them to be distinguished from other diseases, infections or infestations.

Yes X No □

Scientific rationale: Reliable means of detection and diagnosis exists, and a precise case definition is available to clearly identify *T. vivax* infection and/or disease, and allow them to be distinguished from other infections, however, it must be stated that:

3) *T. vivax* belongs to a disease complex called Nagana, which is due to infection by one or several species of *Trypanosoma,* including *T. vivax, T. congolense* and *T. brucei* sspp*,* consequently, the disease Nagana does not necessarily require species identification to be identified itself;

4) A positive identification using clear blood smears or species-specific molecular tools allow to clearly identify cases, however, in *Trypanosoma* infections, species identification is not always possible due to limited sensitivity, when the parasitaemia is too low. Consequently, in areas of possible mixed infections, distinction of *T. vivax* from *T. evansi* infection (for example in buffaloes in Latin America) is not always possible. Similarly, distinction of *T. vivax* from *T. congolense* and Trypanozoon infections in Africa.

AND

4a) Natural transmission to humans has been proven, and human infection is associated with severe consequences.

Yes □ No X

Scientific rationale:

Only one case of human infection was reported in 1917; *T. vivax* is not zoonotic and must be considered only as a mammal restricted parasite.

OR

4b) The disease has been shown to have a significant impact on the health of domestic animals at the level of a country or a zone taking into account the occurrence and severity of the clinical signs, including direct production losses and mortality.

Yes X No ☐

Scientific rationale:

T. vivax infection is highly prevalent especially in cattle, but it can also affect a wide range of other domestic and wild hosts; it is the most prevalent *Trypanosoma* sp. in Africa and Latin America, due to high parasitaemia and thus very efficient mechanical transmission by biting flies (including tsetse flies in Africa) and must be considered as a first priority for control, even if its pathogenicity is considered to be lower than that of *T. congolense*. *T. vivax* infections are responsible for important loss in milk, meat and manure production in cattle, horse, sheep and goats, including buffaloes in Latin America.

OR

4c) The disease has been shown to, or scientific evidence indicates that it would, have a significant impact on the health of wildlife taking into account the occurrence and severity of the clinical signs, including direct economic losses and mortality, and any threat to the viability of a wildlife population.

Yes ☐ No X

Scientific rationale:

Although the infection is sometimes found in wild antilopes, *T. vivax* is not suspected to be of importance in wild life, but the latter has a potential role of reservoir of the parasite.

Conclusion regarding *T. vivax*:

Does *T. vivax* match the listing criteria that are described in the *Terrestrial Animal Health Code* Chapter 1.2.?

Yes X No ☐

Summary Conclusion:

Based on criteria 1, 2, 3 and 4b, *Trypanosoma vivax* fulfills all criteria to be included in the OIE list; however a remark must be made on criteria 3; if reliable means of detection and diagnosis do exist, and a precise definition case is available to clearly identify cases, they do not always allow to distinguish *T. vivax* infection from other *Trypanosoma* infections, and, sometimes, from other infections, due to limits in sensitivity of diagnosis tools. However, a positive identification is reliable.

It must be stated that another *Trypanosoma* species, very closely related to *T. vivax* has been described in the subgenus Duttonella: *T. uniforme*; however, very few reports on this parasite are available, so its prevalence is considered to be low, if ever. The potential pathogenic effects of *T. uniforme* on its mammalian hosts are considered close to those of *T. vivax*, however, due to limited reports, and possible misidentifications, it is suggested that *T. uniforme*, if ever identified, be considered as a variant of *T. vivax*.

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Appendix IV

Assessment of *T. evansi* and *T. equiperdum* against the criteria described in Chapter 1.2. of the *Terrestrial Code*

Assessment of infection with *Trypanosoma equiperdum* according to the criteria provided in the OIE Terrestrial Animal Health Code Chapter 1.2. Criteria for the inclusion of diseases, infections and infestations in the OIE list, Article 1.2.2.

The criteria for the inclusion of a disease, infection or infestation in the OIE list are as follows:

1) International spread of the pathogenic agent (via live animals or their products, vectors or fomites) has been proven.

Yes X No □

Scientific rationale:

T. (T.) equiperdum (Doflein, 1901 is the causative agent of dourine, it is generally transmitted by coitus between members of the Equidae family (horses and donkeys) (Stevens and Brisse, 2004). Seven dourine outbreaks were reported in Italy in 2011 (Pascucci et al, 2013). Epidemiological investigation of one of the outbreaks led to a Friesian stallion (index case) that had contacts with an infected mare, which had been imported from the Netherlands in 2009 (Calistri et al.,2013).

AND

2) At least one country has demonstrated freedom or impending freedom from the disease, infection or infestation in populations of susceptible animals, based on the provisions of Chapter 1.4.

Yes X No □

Scientific rationale:

Dourine has a wide geographical distribution, and it has been considered endemic in North Africa, the Middle East, Eastern Europe, South America and Indonesia. Outbreaks in Italy (2011) were controlled by veterinary authorities (Pascucci et al, 2013; Calistri et al.,2013). New *T. equiperdum* strains have been reported in Venezuela (Sanchez et al, 2015), Ethiopia (Hagos et al, 2010) and Mongolia (Suganuma et al., 2016). North America has reported freedom of the disease and Oceania is free of the disease (Claes et al, 2005).

AND

3) Reliable means of detection and diagnosis exist and a precise case definition is available to clearly identify cases and allow them to be distinguished from other diseases, infections or infestations.

Yes X No □

Scientific rationale:

Pathological lesions (oedematous plaques) are observed mainly in the reproductive organs, in the nervous system, and on the skin and are still considered as characteristic clinical sings of dourine, although they have been occasionally found in equids infected with *T. evansi*. Detection of **T. equiperdum**, by parasitological/molecular techniques, is usually difficult even in dourine positive equids, due to the low parasitemias in the blood or tissue fluids and the chronic nature of the disease. In addition, differential diagnosis of *T. evansi* in areas where surra is presenter lies on PCR based on kDNA maxicircle sequences, since

T. evansi lacks kDNA maxicircles. However, akinetoplastic strains of *T. evansi* have been described (Carnes et al, 2013). A highly sensitive real time PCR test has been used to detect *T. equiperdum* in tissues and fluid samples of naturally infected horses (Pascucci et al, 2013). The complement fixation test (CFT) and the indirect fluorescence antibody test (IFAT) are the OIE recommended tests for *T. equiperdum* infection (OIE, 2018). The complement fixation test (CFT) was used in North America in the successful campaign for the eradication of dourine (*Trypanosoma equiperdum* infection).

AND

4a) Natural transmission to humans has been proven, and human infection is associated with severe consequences.

Yes ☐ No X

Scientific rationale:

No infection of humans by *T. equiperdum* has been reported to date.

OR

4b) The disease has been shown to have a significant impact on the health of domestic animals at the level of a country or a zone taking into account the occurrence and severity of the clinical signs, including direct production losses and mortality.

Yes X No ☐

Scientific rationale:

There is no vaccine available for dourine (Gizaw et al, 2017) and infections with *T. equiperdum* have been considered incurable (Gillingwater et al., 2007), especially in the neurological stages (Hébert et al et al., 2018). If untreated, dourine is often fatal (Gizaw et al, 2017). Over 50% mortality rates have been reported for highly valued horses (breeders) and the disease can have devastating effects on the equine industry (Sidney et al. 2013). In Mongolia, where the prevalence of dourine was estimated at 7.6 and 6.7%, by CFT and ELISA, respectively, horses comprise 5.9% of the total livestock and horse meat production value per annum was estimated at approximately 48 million US$, in 2013 (Davaasuren et al, 2017; Gizaw et al., 2017)

OR

4c) The disease has been shown to, or scientific evidence indicates that it would, have a significant impact on the health of wildlife taking into account the occurrence and severity of the clinical signs, including direct economic losses and mortality, and any threat to the viability of a wildlife population.

Yes ☐ No X

Scientific rationale:

Dourine has been shown to affect only horses, mules and donkeys. Zebras have tested positive by serology, but there is no conclusive evidence of infection (Brun et al 1998).

Conclusion regarding *T. equiperdum*:

Does *T. equiperdum* match the listing criteria that are described in the *Terrestrial Animal Health Code* Chapter 1.2.?

Yes X No ☐

Summary Conclusion:

T. equiperdum, as well as *T. evansi* have evolved from *T. brucei* in multiple occasions. *T. equiperdum* strains have been divided in two or more clades of distinct evolutionary origin (Carnes et al., 2013, Claes et al, 2015, Cuypers et al.,2017). Newly isolated *T. equiperdum* strains from outbreaks in Italy and in Mongolia have been reported (Pascucci et al, 2013, Suganuma et al, 2016).

Genomic and genetic studies have demonstrated that *T. equiperdum* has evolved at least once from *T. brucei* strains in Eastern Africa (Carnes et al., 2013, Cuypers et al, 2017). *T. evansi* and *T. equiperdum* are considered diskinetoplastic parasites because they have lost part (*T. eq*) or all the maxicirle kDNA (*T. ev*). Some authors have proposed that *T. evansi* and *T. equiperdum*, as the causative agents of *dourine,* be considered as sub-species of *T. brucei* (Lun et al. 2008, Lai et al, 2010, Carnes et al, 2013).

Based on criteria 1, 2, 3 and 4b, *T. equiperdum* fulfills all criteria to be included in the OIE list, however, confirmation of *Trypanosoma equiperdum* infection and dourine requires an overall evaluation of the clinical signs, positive parasitological and molecular identification and serological tests, as well as epidemiological data to distinguish infections with *T. equiperdum* from other *Trypanosoma* sspp. of the Trypanozoon sub-genus.

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Assessment of infection with *T. evansi* according to the criteria provided in the OIE *Terrestrial Animal Health Code* Chapter 1.2. Criteria for the inclusion of diseases, infections and infestations in the OIE list, Article 1.2.2.

The criteria for the inclusion of a disease, infection or infestation in the OIE list are as follows:

1) International spread of the pathogenic agent (via live animals or their products, vectors or fomites) has been proven.

Yes X No □

Scientific rationale:
Trypanosoma (Trypanozoon) evansi (Steel, 1885; Babiani, 1888) is the first pathogen mammalian trypanosome to be described by Evans in 1880 (Hoare, 1972). *T. evansi* is mechanically transmitted by biting diptera *(Tabanus* and *Stomoxys* sspp.), vampire bats, live animals or by their contaminated products (fresh blood, meat, carcass, etc), as well as by serial injections with infected needles. *T. evansi* infects a wide range of wild and domestic animal species, including camels, horses, donkeys, capybaras, buffaloes, cattle, goats, sheep, dogs and small rodents causing the disease known as Surra (Desquesnes et al, 2013, Desquesnes et al, 2013 a). Hence, the movement of infected animals, their products, vectors or fomites can spread the diseased between countries.

AND

2) At least one country has demonstrated freedom or impending freedom from the disease, infection or infestation in populations of susceptible animals, based on the provisions of Chapter 1.4.

Yes X No □

Scientific rationale:

T. evansi has not been reported in North America and Australia and is currently not present in continental Europe. *T. evansi* is present in Central and South America, North Africa, and Asia and has been occasionally reported in Europe (Desquesnes et al, 2009, Gutierrez et al, 2010).

AND

3) Reliable means of detection and diagnosis exist and a precise case definition is available to clearly identify cases and allow them to be distinguished from other diseases, infections or infestations.

Yes X No □

Scientific rationale:

Clinical signs are not pathognomonic for Surra caused by *T. evansi*. A comprehensive list of confirmatory tests appears in the OIE terrestrial manual chapter 2.1.21 (OIE, 2018): microscopic examination of blood films, smears or biopsies, HCT, rodent inoculation, PCR, CATT, ELISA, among others. Parasitological and serological methods are used to identify *T. evansi* in acute or chronic infections. The sensitivity of serological methods based on VSG RoTat 1.2 is dependent on the expression of the specific VSG and varies with the host species. In multi-*Trypanosoma* spp. areas, serological cross-reactivity will limit the interpretation of the diagnostic tests. Evaluation of various primers that have been used to diagnose *T. evansi* infections by PCR showed that the TBR1/2 primers (Masiga et al., 1992) are the most sensitive and specific (Fernandez et al, 2009, Pruvot et al, 2010, Ashour et al., 2013). The EVAB and VSG Ro.Tat1.2 primers have been successfully used to identify the most abundant, *T. evansi* type A, as well as the type B present in dromedary camels, in Kenya and Ethiopia (Njiru et al, 2006, Birhanu et al. 2016) . Identification of *T. evansi* by PCR will be limited at low parasitaemia levels, especially in the chronic phase and in low-susceptibility hosts. In addition, diagnosis of naturally infected host material may require several PCR assays due to the genetic diversity of *T. evansi* (Kamidi et al, 2017) and the possibility of multiple infections by various *Trypanosoma* spp.

AND

4a) Natural transmission to humans has been proven, and human infection is associated with severe consequences.

Yes X No ☐

Scientific rationale:

In general terms, humans possess innate immune mechanisms of protection (ApoL-1) against *T. evansi* and other trypanosomes. However, cases of "atypical human trypanosomosis" (a-HT) caused by *T. evansi* have been reported in patients that lack a functional trypanolytic factor and more recently (Joshi et al, 2005, Truc et al, 2013), in a previously healthy individual, with no Apo-L1 deficiency (Van Vinh et al., 2016). Clinical signs in humans infected with *T. evansi* are often transient, but some patients require treatment and the disease can be fatal. Further studies and surveillance must be carried out to assess its impact on humans.

OR

4b) The disease has been shown to have a significant impact on the health of domestic animals at the level of a country or a zone taking into account the occurrence and severity of the clinical signs, including direct production losses and mortality.

Yes X No ☐

Scientific rationale:

T. evansi infection is highly prevalent in camels and horses but it also affects other domestic and wild mammals in Asia, Africa and South America (Desquesnes et al, 2013, 2013a). Variation in virulence and pathogenicity of *T. evansi* isolates and strains, as well as the susceptibility of various hosts have been reported (Desquesnes et al, 2013). Further studies are needed to evaluate the direct and indirect economic impact(treatment and vector control) of *T. evansi* infections in domestic hosts (Desquesnes et al, 2013a)

OR

4c) The disease has been shown to, or scientific evidence indicates that it would, have a significant impact on the health of wildlife taking into account the occurrence and severity of the clinical signs, including direct economic losses and mortality, and any threat to the viability of a wildlife population.

Yes ☐ No X

Scientific rationale:

Almost all mammals have been shown to be susceptible to *T. evansi* infections, including wild carnivores, hunting dogs, deer, rabbits, wild pigs and rodents (Desquesnes, 2004). Wildlife clearly plays a role as reservoir for *T. evansi*, but the impact of these infections on the health of wildlife has not been clearly established.

Conclusion regarding *T. evansi*:

Does *T. evansi* match the listing criteria that are described in the *Terrestrial Animal Health Code* Chapter 1.2.?

Yes X No ☐

Summary Conclusion: Based on the OIE criteria for inclusion, trypanosomosis caused by *T. evansi* infection, known as surra or various local names, complies with criteria 1, 2, 3 and 4b and should be included in the OIE list of diseases.

Genomic and genetic studies have demonstrated that *T. evansi* has evolved from multiple *T. brucei* strains in various occasions, acquiring the ability to be mechanically transmitted (Carnes et al., 2013, Cuypers et al, 2017, Kamidi et al., 2017). Some authors have proposed that *T. evansi* and *T. equiperdum*, the causative agents of d*ourine,* be considered as sub-species of *T. brucei* (Lun et al. 2008, Lai et al, 2010, Carnes et al, 2013). *T. evansi* and *T. equiperdum* are considered diskinetoplastic parasites because they have lost part (*T. eq*) or all the maxicirle kDNA (*T. ev*). Akinetoplastic strains of *T. evansi* have also been described. Based on their minicircle, *T. evansi* strains have been further classified as type A or B (Njiru et al, 2006, Birhanu et al, 2016, Carnes et al., 2013). Some authors have recently proposed revising the taxonomy for *T. evansi* and other members of the Trypanosoma genus, since the term sub-species refers to groups of populations within the species "that are geographically and genetically differentiated" (Kamidi et al, 2017). On the other hand, Molinari and Moreno (2018) and Radwanska et al (2018) have recently proposed the "proper application of the principles of biological nomenclature" and the consequent nomenclature change of *T. evansi* for Surra-causing strains of *T. evansi evansi.*

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