



REPORT OF THE OIE AD HOC GROUP ON THEILERIOSIS¹

Paris, 8-10 February 2017

A meeting of the OIE *ad hoc* Group on theileriosis (hereafter referred to as the Group) was held at the OIE Headquarters in Paris from 8 to 10 February 2017.

1. Welcome, adoption of the agenda, appointment of chairperson and rapporteur

Dr Monique Eloit, Director General of the OIE, welcomed the Group. She stated that the Group's technical expertise would allow the OIE Specialist Commissions to propose to the OIE Member Countries an update of the *Terrestrial Animal Health Code (Terrestrial Code)* chapter on theileriosis.

Dr Eloit introduced Dr Gideon Brückner, President of the Scientific Commission for Animal Disease (hereafter the Scientific Commission), and Dr Stuart MacDiarmid, Vice-President of the Terrestrial Animal Health Standards Commission (hereafter the Code Commission), representing their respective commissions.

Dr Eloit thanked the experts for presenting the current global theileriosis situation to OIE technical staff. She indicated that it was the OIE's desire to offer continuous professional development to its staff to better understand the epidemiology and the context of relevant diseases or other topics of interest to OIE Member Countries.

Dr Gregorio Torres, Chargé de mission of the Sciences and New Technologies Department, reminded the experts that they had been selected based on their scientific expertise and that they were not representing their own countries or institutions. Prior to the meeting all experts signed a confidentiality agreement and a declaration of interests. Dr Torres emphasised that the discussions captured in the report would be attributed to the Group and not to the individual expert.

The representatives of the Specialist Commissions reminded the Group that the purpose of the *Terrestrial Code* was to set out standards for the improvement of terrestrial animal health and welfare and for safe international trade in terrestrial animals and their products. The amendments in the current chapter would be reviewed by the Specialist Commissions and then circulated for Member Countries' comments before being proposed for adoption by the World Assembly of OIE Delegates. The Group adopted the proposed agenda.

The meeting was chaired by Dr Frans Van Gool, and Dr Phil Toyé acted as rapporteur with the support of the OIE Secretariat.

The Agenda and List of Participants are presented as Appendices I and II, respectively.

2. Update on the current theileriosis situation in the world, including emerging *Theileria* spp. and disease control tools

The experts from South Africa, Kenya, and Italy and the Vice-President of the Code Commission provided updated information on the current global theileriosis situation. The experts discussed the situation, including epidemiology and impact, with special consideration to emerging *Theileria* spp., and on the occurrence of *Theileria orientalis* in Australasia. Diagnostic methods and available measures of control were also considered.

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 September 2017 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/>

3. Update *Terrestrial Code* Chapter 11.12 theileriosis

Article 11.12.1. General provisions

The Group discussed the need to expand the range of host species covered in the Chapter. The possibility of adding *Theileria* species that infect horses (*T. equi*) was discussed. Nevertheless, *T. equi* is already covered by another *Terrestrial Code* Chapter (12.7 – Equine Piroplasmosis). Since several differences in measures of control, epidemiology and trade implications exist, there was agreement that *T. equi* should be excluded from Chapter 11.12. The Group finally agreed that small ruminant theileriosis should be covered by this same chapter, since the provisions for bovine and small ruminant theileriosis would be mostly equivalent.

The Group reviewed the list of susceptible species and acknowledged that, while camels and some wild ruminants could be infected with *Theileria* spp., they are currently not considered to play a significant role in the epidemiology of the disease as related to trade. Thus, the Group decided to include only cattle, water buffalo, sheep and goats in the case definition. The title of the chapter was amended accordingly.

The Group reviewed whether any newly emerged or identified pathogenic strains or species of *Theileria* should be included in the case definition, and made reference to the listing criteria in the *Terrestrial Code* Chapter 1.2. The Group agreed that, for cattle and water buffaloes, *T. annulata*, *T. parva*, and some strains of *T. orientalis* satisfy the criteria 1, 2, 3 and 4b of Chapter 1.2. of the *Terrestrial Code*. The Group agreed that different strains exist for *Theileria* spp. Nonetheless, for *T. orientalis*, only *T. orientalis* Ikeda and *T. orientalis* Chitose strains match the listing criteria stated.

For small ruminants, it was agreed that only *T. lestoquardi*, *T. luwenshuni*, and *T. uilenbergi* satisfy the listing criteria 1, 2, 3 and 4b of Chapter 1.2. of the *Terrestrial Code*.

The Group emphasised that theileriosis should be considered as a tick-borne disease, while acknowledging that mechanical transmission may occur in the case of *T. orientalis*².

The Group noted that the incubation period for theileriosis could vary depending on factors such as *Theileria* species, host species, infective dose, and immunological status and usually range between 8 and 25 days^{3 4} but longer incubation periods were also described. The Group decided that, for the purpose of the *Terrestrial Code*, 35 days' incubation period should apply.

When identifying or confirming cases of theileriosis, the Group considered that results from a single assay type would not be sufficient, and thus epidemiological context should always be considered.

Article 11.12.2. Safe commodities

The Group discussed whether or not skins, hides, wool and fibre from an infected animal presents a risk when imported into a free country. These, if untreated, could still contain infected ticks. Thus, skins, hides, wool, and fibre should not be considered as safe commodities and dedicated articles were drafted accordingly.

The Group agreed to add the following to the list of safe commodities: meat, casings, milk and milk products, gelatine and collagen, bone, tallow, semen and embryos, hooves and horns.

Article 11.12.3. and 11.12.4. Country or zone free from theileriosis in cattle, water buffalo and in sheep and goats

The Group discussed the possibility of according free status to a country or zone depending on the affected species. The Group agreed that free status could be recognised separately for cattle and water buffalo theileriosis and for sheep and goat theileriosis.

² Hammer J.F., Jenkins C., Bogema D. & Emery D. (2016) Mechanical transfer of *Theileria orientalis*: possible roles of biting arthropods, colostrum and husbandry practices in disease transmission. *Parasites & Vectors*, **9**(1): 34.

³ Jenkins C. & Bogema D.R. (2016) Factors associated with seroconversion to the major piroplasm surface protein of the bovine haemoparasite *Theileria orientalis*. *Parasites & Vectors*, **9**:106

⁴ Jarrett W.F.H., Crighton, G.W. and Pirie H.M. (1969). *Theileria parva*: Kinetics of Replication. *Experimental Parasitology*, **24**, 9-15.

The Group agreed that free status should not be limited to a country and that the epidemiology of the disease allows free zones within countries to be established.

The Group agreed on the possibility of countries or zones to be recognised as historically free from theileriosis, and that Article 1.4.6. would apply.

The Group noted that ticks do not survive more than two years. This waiting period would be sufficient to declare a country free from theileriosis.

The Group emphasised that, in case ticks are not present in a country or zone, the introduction of an infected, test positive or vaccinated animal would not imply losing the free status.

In contrast to what is needed for other diseases transmitted by vectors that could travel over long distances (e.g. culicoides), the Group agreed that no special provisions for surveillance zones would be necessary.

The Group discussed the possibility of drafting a specific article on recovery of free status, and agreed that the implementation of eradication measures (such as stamping out) were not practical. The Group decided not to draft specific provisions for recovery of the free status.

Article 11.12.6. Recommendations for importation from countries or zones not free from theileriosis

The Group recognised that, since carrier status is common in vaccinated animals, these could still pose a risk of disease transmission. Vaccination was not considered as an appropriate risk mitigation measure for international trade.

The Group reached general agreement that importations of animals from non-free countries are safe provided that animals are isolated in *Theileria*-free establishment for a period at least equal to the incubation time, and that appropriate acaricide treatment is undertaken to ensure that no ticks are carried into the establishment and that ticks are not present on the animals at shipment. It was agreed that three days is the minimum time of protection of registered acaricides.

The Group discussed the feasibility of ensuring the absence of ticks in an establishment, and agreed that it would not be possible to ensure it. For this reason, it was decided to limit the requirements to the absence of the disease in the establishment for the previous two years and during the isolation period.

While acknowledging the limitations, in terms of sensitivity and specificity, of the diagnostic tests recommended in the *Terrestrial Manual*, the Group recommended that all animals should be tested with both serological and agent detection tests when importing animals from infected countries.

The Group agreed on the need for both an antibody and agent detection tests, since not all carriers show antibodies and not all infections result in carrier status.

The Group proposed that, to ensure that already infected animals are not introduced into the establishment, a serological test and an agent detection test would be needed at the time of entering the establishment.

The Group noted that 28 days might be needed for seroconversion and for agent detection in blood⁵. To ensure that animals that entered the establishment in the prepatent period are identified, an antibody test and an agent detection test would be needed 5 days before shipment.

The Group discussed the possibility of considering special provisions for newborn animals with maternal antibodies, and agreed that no special provisions should be mentioned in this article.

⁵ Katende J., Morzaria S., Toye P., Skilton R., Nene V., Nkonge C. & Musoke A. (1998) An enzyme-linked immunosorbent assay for detection of *Theileria parva* antibodies in cattle using a recombinant polymorphic immunodominant molecule. *Parasitol. Res.*, **84**: 408-41

Article 11.12.7. Recommendations for importation of skins and hides from cattle, water buffaloes, sheep, and goats from countries or zones not free from theileriosis

The Group discussed the mitigation measures that would ensure safe trade in skins and hides of cattle, buffaloes, sheep and goats. The Group agreed that, after death of the animal, the majority of ticks will leave the animals. However, the Group agreed that, if untreated, skins and hides could still contain infected ticks. General procedures, as normally applied in the processing of skins and hides, would be sufficient to ensure that no live ticks will be present on them, making trade safe. Other provisions, such as freezing these commodities at -20°C for at least 48h, would also ensure safe trade, and is currently applied for trophies by some Member Countries.

Article 11.12.8. Recommendations for importation of wool and fibre from sheep and goats from countries or zones not free from theileriosis

The Group discussed the mitigation measures that would ensure safe trade in wool and fibre from sheep and goats. The Group agreed that standard industrial procedures for treating wool (industrial washing and industrial scouring) would be adequate to ensure that no live ticks will be present in the wool and fibre. The storage of these commodities for periods of time at different temperatures, as it is applied for other diseases (e.g. FMD) was discussed but considered not sufficient. The exposure of wool and fibre to -20° for at least 48h, as it was proposed for skins and hides, was considered effective but not practical.

Article 11.12.9. Recommendations for importation of trophies derived from wildlife from countries or zones not free from theileriosis

The Group discussed the risk posed by the trade of trophies from susceptible wildlife species, and agreed that processing should be undertaken to ensure that no ticks are present on these commodities, as to ensure free trade.

Surveillance

The Group discussed whether there is a need for including specific provisions for surveillance, and agreed that there was no need for dedicated Articles, as the *Terrestrial Code* Chapter 1.4 *Animal health surveillance* and Chapter 1.5 *Surveillance for arthropod vectors of animal diseases* were sufficient.

4. Identify knowledge gaps and priorities on theileriosis

The Group identified potential aspects that can influence disease control and risk mitigation strategies. In particular, it was considered necessary to gain better understanding of:

- Diagnostic tests
 - Robust diagnostic specie-specific tests, in particular serological methods,
 - Encourage Member Countries laboratories to participate in proficiency test for diagnostics.
- Vaccines
 - Promote research for simple to produce and safer vaccines,
 - Developing transmission blocking vaccines, as developed for malaria or *Babesia*,
 - Vaccines which induce sterile immunity to minimise or eliminate the risk of vaccinated animals becoming carriers.
- Treatment (Chemotherapy)
 - Development of safer drugs for the treatment and prophylaxis of theileriosis, without creating carrier animals,
 - Development of safer acaricidal drugs,
 - Address the issue of resistance in both acaricides and treatment drugs.

- Gain better understanding of the epidemiology of *T. orientalis*.
- Gain better understanding of the epidemiology for small ruminants theileriosis.

The Group agreed on the need to update the Chapter 2.4.15. of the *Terrestrial Manual*, based on the previous discussion and on the fact that case definition for theileriosis now includes a larger number of Theileria or pathogenic Theileria species.

5. Any other issue

The Group shared the draft chapter and draft report with Prof Hong Yin (who was invited but could not attend), and considered his comments when drafting the amended chapter.

6. Finalisation and adoption of the draft report

The Group reviewed and finalised the draft report provided by the rapporteurs.

.../Appendices

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Agenda

1. Adoption of the agenda, appointment of chairperson and rapporteur
 2. Update on the current global situation of *Theileria* spp.
 - Current global situation. Epidemiology and impact, with special consideration to emerging *Theileria* spp.
 - The occurrence of *Theileria orientalis* in New Zealand
 - Diagnostic methods
 - Measures of control
 3. Update of the *Terrestrial Animal Health Code* Chapter 11.12 on Theileriosis
 4. Identify knowledge gaps and priorities on theileriosis
 5. Any other issue
 6. Adoption of the report
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