Sophie Roelandt was born on the 20th of November 1979 in Izegem (Belgium). After her high school studies with majors in science and mathematics at the Onze Lieve Vrouw Ter Engelen Instituut (a.k.a. 't Fort, Kortrijk, Belgium), she commenced the study of Veterinary Medicine at Ghent University in 1997. She obtained the degree of Veterinary Surgeon (MSc) in 2003 with high distinction.

Sophie then spent 6 years in the United Kingdom, first in small animal practice and later conducting a small animal clinical internship at Liverpool University. This was followed by a second Masters in Wild Animal Health at the Royal Veterinary College and the Zoological Society of London (London, United Kingdom). This MSc WAH degree was obtained with merit in 2008 and was followed by a clinical internship at the Dubai Falcon Hospital and at the Sharjah Zoo and Arabian Wildlife Center (early 2009, United Arab Emirates).

In 2009, Sophie returned to Belgium to work as a scientific researcher at the Veterinary and Agrochemical Research Centre (CODA-CERVA), first in the Wildsurv Project and later at the epidemiological unit ERASURV. She is currently involved in laboratory test evaluation, risk assessments and surveillance of notifiable and zoonotic veterinary infectious diseases. This epidemiological research is conducted in close cooperation with the Belgian Federal Agency for the Safety of the Food Chain (FASFC-FAVV-AFSCA), and together with many other (inter)national and regional research institutes and universities.

Sophie obtained the Certificate of Veterinary Epidemiology at Ghent University in 2010, with high distinction. She is currently a member of the Belgian College of Veterinary Surgeons (NGROD No. 3904), a Member of Belgian Wildlife Disease Society (BWDS), vice-president of the Flemish Society for Veterinary Epidemiology & Economics (FSVEE), and a resident of the European College for Veterinary Public Health (ECVPH).

As part of her government research work (2009-2016), Sophie has been involved in the epidemiological design and analysis of three studies on Tick-borne Encephalitis Virus (TBEV) surveillance in sentinel animal species. The methods and results of these studies are the subject of this PhD thesis. Sophie Roelandt is author and co-author of multiple scientific publications on TBEV and other veterinary epidemiology topics. On several occasions, she has presented and illustrated her research results at (inter)national scientific conferences.
U wordt vriendelijk uitgenodigd voor de openbare verdediging van het doctoraal proefschrift van

Dierenarts Sophie Roelandt

Titel van het proefschrift:

**Questing for Tick-borne Encephalitis Virus in Belgium using Veterinary Sentinel Surveys and Risk Factor Mapping**

De verdediging zal plaatsvinden op vrijdag 17 juni 2016 om 16.30 uur in het Kliniekauditorium D van de Faculteit Diergeneeskunde Universiteit Gent Salisburylaan 133, Merelbeke

Na de verdediging volgt een receptie en een walking dinner in de Salons Roskam, waarop u vriendelijk wordt uitgenodigd

Indien u de receptie/walking dinner zult bijwonen in de Roskamstraat 38, 9820 Merelbeke, gelieve dit telefonisch (0474/860.934) of per mail (sophie.roelandt@coda-cerva.be) te melden vóór 13 juni 2016.

**Samenvatting van het proefschrift**

**Tick-borne Encephalitis (Virus) - TBE(V)** - has become a considerable public health risk in many European countries. TBE is also reported in Europe’s canine and equine population.

The literature review in the introduction (Chapter I) aims to highlight important features of TBE(V) epidemiology, the clinical course, the diagnostics and the surveillance possibilities for this tick-borne flavivirus. It was discussed why Belgium is at risk for TBE(V) emergence and why active and national veterinary surveillance should be of benefit to public health. In the first serology study, in Belgian dogs (Chapter III), one animal (0.11%) tested seropositive in the seroneutralisation test (SNT), of which the clinical history could not explain exactly where and when TBEV infection was acquired. It was shown that the cut-off for the commercial IgG ELISA protocol could possibly be decreased to increase the sensitivity of the test for canine sera. It was concluded that it would be prudent to further validate and standardize this ELISA test.

In the cattle serology study (Chapter IV), 17 Belgian animals were seropositive and six more had borderline results. The accuracy of the SNT was confirmed in WNV SNT (flavivirus cross-reactivity), Rabies virus SNT (aspecific inhibitors), ELISA-tests and in a mouse inoculation experiment. The IgG ELISA seemed to have a low accuracy in cattle and no big improvement could be made to this particular protocol by changing the cut-off in this species. The overall bovine TBEV-seroprevalence in the targeted area was estimated between 2.61 and 4.29% based on the SNT results.

In the frame of the Flemish wildlife surveillance, a serological screening was performed on sera from Flemish wild boar (Chapter V) in order to detect TBEV-specific antibodies. Seven wild boars were seropositive and showed moderate to high SNT-titers - three had borderline results. Seroprevalence was estimated around 4.20%. Other Flaviviridae (CSF, WNF, LIV) were excluded and thirteen available tonsils tested negative in TBEV RT-PCR. The IgG ELISA protocol showed low sensitivity and good specificity. For early detection screening purposes the ELISA cut-off might be lowered, resulting in improved sensitivity at the cost of specificity. This study showed potential TBE(f)-voci in Flanders’ wild boar range.

In Chapter VI, risk mapping for TBEV in Belgium was performed using the observations in this thesis. Besides these veterinary results obtained, 9 inconclusive but suspected human patients were added. Using different spatial layers such as host, vector, landscape and meteorological data, it was attempted to map TBEV risk factors for Belgium. Using a simple qualitative model it could be shown that seropositive animals and humans have been found in the tentatively defined TBE “at risk” zones.

The current evidence “pro” TBEV-presence is indirect and was obtained from the three veterinary serological studies in this PhD (Chapter VII). Based on Roelandt et al. (2011; 2014; 2016) and complementary knowledge from two other Belgian sentinel studies in roe deer, TBEV has been present in Belgium from at least 2010 onwards (Chapter VII).

The results and recommendations are discussed in Chapter VII. Experiences with TBEV diagnostic tests, SNT and IFA are advised for veterinary surveillance in a low prevalence country. International cooperation and collection of more reference samples for would be beneficial for veterinary test/ELISA validation. The three selected sentinel species (dogs, cattle and wild boar) were found suitable for different surveillance components. Specific veterinary surveillance designs were proposed, which should lead to sufficient data collection for predictive modelling and risk mapping in the future.

Remaining gaps are the lacking knowledge on the burden of disease and causes of viral encephalitis in humans in Belgium as well as the absence of virus isolated from presumed Belgian endemic foci. Considering the likely presence of TBEV in Belgian wildlife, better surveillance, testing and awareness of this disease should be advocated in the medical sector. Actions were proposed to fill these gaps.