



## Long-term infection of goats with bluetongue virus serotype 25



Andrea Vöggtlin<sup>a,1</sup>, Martin A. Hofmann<sup>a,1</sup>, Christoph Nenniger<sup>a</sup>, Sandra Renzullo<sup>a</sup>, Adolf Steinrigl<sup>b</sup>, Angelika Loitsch<sup>b</sup>, Heinzpeter Schwermer<sup>c</sup>, Christian Kaufmann<sup>d</sup>, Barbara Thür<sup>a,\*</sup>

<sup>a</sup>Institute of Virology and Immunology (IVI), Sensemattstrasse 293, CH-3147 Mittelhäusern, Switzerland

<sup>b</sup>Austrian Agency for Health and Food Safety (AGES), Institute for Veterinary Disease Control, Robert-Koch-Gasse 17, A-2340 Mödling, Austria

<sup>c</sup>Swiss Federal Veterinary Office, Schwarzenburgstrasse 155, CH-3003 Liebefeld, Switzerland

<sup>d</sup>Vector Entomology Unit, Institute of Parasitology, Vetsuisse Faculty, University of Zürich, Winterthurerstrasse 266a, CH-8057 Zürich, Switzerland

### ARTICLE INFO

#### Article history:

Received 20 March 2013

Received in revised form 30 May 2013

Accepted 10 June 2013

#### Keywords:

Bluetongue virus serotype 25

Toggenburg Orbivirus

Goat

Persistent infection

### ABSTRACT

Toggenburg Orbivirus (TOV) is the prototype of bluetongue virus serotype 25 (BTV-25). It was first detected in goats in Switzerland in 2008. The virus does not induce clinical signs in infected goats. In field samples viral RNA could be detected only in goats and never in other ruminants. BTV-25 RNA was repeatedly detected for more than one year in the blood of goats from a single flock in Principality of Liechtenstein. Since viral persistence over such a long period has never been reported for bluetongue, blood samples from 110 goats and 2 sheep of that flock were collected during a period of up to two years and analyzed for the presence of BTV-25 RNA and antibodies. Most of the animals which tested positive for BTV-25 RNA, remained positive during the whole investigation period. Moreover, five of these goats were BTV-25 RNA positive over a period of 19–25 months. A weak antibody response against BTV VP7 was commonly observed. As BTV-25 cannot be propagated in any culture system, the presence of virus could only be demonstrated in samples by viral RNA detection using RT-qPCR. To address the question of infectivity of the virus in blood from long-term positive animals, goats were experimentally infected with this blood. Viral replication was demonstrated by increasing RNA amounts. Thus, our findings provide evidence that BTV-25 can persist much longer in an infected host than known so far for other BTV serotypes. Hence, persistence of infectious BTV represents an additional important factor in BTV epidemiology.

© 2013 Elsevier B.V. All rights reserved.

## 1. Introduction

Bluetongue (BT) is a vector-borne disease of ruminants which is transmitted by *Culicoides* biting midges (MacLachlan et al., 2009). Bluetongue virus (BTV) belongs to the genus *Orbivirus* within the family *Reoviridae* (Attoui et al., 2011). Currently, 26 serotypes of BTV are known (Maan

et al., 2011). BTV can infect domestic and wild ruminants, although clinical signs are mostly seen in sheep and some species of deer (Lefevre et al., 2008; MacLachlan et al., 2009). In general, BTV-infected goats do not show any or only mild clinical signs (Backx et al., 2007; Dercksen et al., 2007).

In 2008 Toggenburg Orbivirus (TOV), a new BTV serotype tentatively classified as serotype 25 (BTV-25), was detected in healthy goats in the Toggenburg region of Switzerland (Hofmann et al., 2008b). Up to now the virus can neither be propagated in cell cultures, embryonated chicken eggs nor in mouse brains (Planzer et al., 2011). However, reverse genetics experiments showed that

\* Corresponding author. Tel.: +41 31 848 92 51; fax: +41 31 848 92 22.  
E-mail address: [barbara.thuer@ivi.admin.ch](mailto:barbara.thuer@ivi.admin.ch) (B. Thür).

<sup>1</sup> These authors contributed equally to this paper.