

VMRD-cELISA as a potential alternative test for the serological surveillance of the Swiss CAEV eradication campaign

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Key words

CAEV, VMV, MVV, Visna, Maedi, SRLV, eradication, ELISA, serology, diagnostic

Aim of the study

The serological and virological analysis of a mixed flock of sheep and goats revealed that goats infected with small ruminant lentiviruses (SRLV) subtype A4 did not produce antibody detectable by the so-called cELISA (Caprine Arthritis-Encephalitis Virus Antibody Test Kit, cELISA – VMRD, Inc., Pullman, USA), whereas the infected sheep did so and this antibody was detectable with similar efficiency in cELISA and Idexx ELISA (L. Cardinaux et al. *Vet Microbiol* 2013, 162:572-581).

In this project, we tested the consistency of this observation by screening sera obtained from sheep of different breeds and from different geographical locations and from goats living in different epidemiological situations such as in a CAEV pre- or post- eradication-phase. The main goal of this project was to evaluate the potential benefits of using the c-ELISA as a first screening tool to support the Swiss CAEV eradication campaign. In view of the decision of the federal veterinary authority to focus the CAEV eradication campaign exclusively on goats infected with SRLV B viruses, the requirements for such a test were set as: High sensitivity and specificity in detecting SRLV B infected goats and low sensitivity for SRLV A infected goats.

Material and methods

Sera from an ongoing eradication program (n=1053) were obtained from Dr. Alexander Tavella, who is coordinating a recently started eradication program in the Trentino - Alto Adige / Südtirol. Additionally, we tested 184 well-defined sheep sera from our routine diagnostic activity. Finally, we re-tested 713 goat sera classified as western blot positive during the 2011-2012 general survey.

Results and significance

The 1053 sera obtained from Dr. Tavella revealed that in this particular epidemiological situation the cELISA performs as well as the Idexx ELISA, routinely used in our surveys. Taking the Idexx ELISA as gold standard, the cELISA showed a sensitivity of 86%, a specificity of 99%, a positive predictive value (PPV) of 97% and a negative predictive value (NPV) of 96%.

The analysis of the 184 sheep sera showed a drastically different picture. Compared to the Western Blot results, the sensitivity of the cELISA was 44%, the specificity 88%, the PPV 51%, while the NPV was 85%, suggesting that the cELISA was even less sensitive than the WB that already showed a sensitivity of only 23% compared to the Idexx ELISA. Therefore, the cELISA is definitively not suitable for the serological survey of SRLV infected sheep in Switzerland.

In the last panel of sera, 109 out of 713 sera classified as Western Blot positive in the general survey were positive in cELISA, with 108 being positive in Idexx ELISA as well. Of the remaining 604 sera, 94 were negative in both cELISA and Idexx ELISA, whereas 510 Idexx ELISA positive sera resulted negative in cELISA. Of these sera, 321 were reported as SRLV A positive, whereas 160 could not be assigned to a particular SRLV subtype by the SU5 ELISA. These results strongly suggest that the use of the cELISA as a primary screening tool would save a relevant number of Western Blot confirmatory tests and may well suit our needs. In the light of the 29 SRLV B positive sera missed by the cELISA a caveat remains. Five out of these 29 sera were outright false negative cELISA results. Considering the fact that SRLV serological diagnosis is predominantly focused on the flock status rather than individual animals, the use of cELISA would considerably reduce the costs of a potential surveillance without jeopardizing its efficiency.

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