

SEROLOGICAL SURVEY OF CAPRINE ARTHRITIS-ENCEPHALITIS VIRUS INFECTION IN A SOUTHEASTERN ROMANIAN FARM

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Abstract

Caprine arthritis-encephalitis (CAE) is a goat viral disease caused by a lentivirus belonging to the Family Retroviridae, Subfamily Orthoretrovirinae, group VI. CAE virus (CAEV) and Maedi-Visna virus (MVV) are included in the group of small ruminant lentiviruses. The virus induce a persistent infection by incorporation of the CAEV genome into the DNA of host cell. The monocyte-macrophage cells are the main target of this virus. In clinical cases were described arthritis, mastitis, pneumonia, weight loss and encephalitis. A high percentage of CAEV-infected goats will not express the clinical signs of the disease. The majority of the animals remains asymptomatic but the virus is still present and the sheep and goats can transmit the virus through milk, colostrum and respiratory secretions. One of the confirmatory diagnosis methods of CAEV is the serological test, which is highly suitable in the term of cost.

The aim of research was the investigation of CAEV-Ab presence by enzyme-linked immunosorbent assay (ELISA) in goats that showed symptoms associated with CAE to determine the prevalence of CAEV in farm.

It were collected 78 serum samples from a goat farm with a total of 120 animals in south-eastern Romania. The symptoms associated with CAE were arthritis in young animals, mastitis and encephalitis in adults. The serum samples were tested with the IDEXX CAEV/MVV Total Ab Test according to the manufacturer's instructions. Thirty samples (38.46%) were ELISA-positive and forty-eight samples (61.54%) were negative. In group of positive goats 93.33% were female 2 years old and 6.67% were male 4 years old.

In conclusion, a high prevalence of CAEV-infection in the farm (38.46%), proved by serological investigation (active surveillance by ELISA-Ab exams), have been associated with low clinical cases of CAE, and this supports the claim that the most CAEV infected animals remains asymptomatic.

Key words: CAEV, MVV, ELISA, rapid testing method.

INTRODUCTION

Caprine arthritis-encephalitis virus (CAEV) is a goat viral disease caused by a Lentivirus in the Family *Retroviridae*, Subfamily *Orthoretrovirinae*, group VI (single-stranded RNA) (Larruskain and Jugo, 2013).

The Group of Small Ruminant Lentiviruses (GSRLVs) has two related viruses: *Caprine arthritis-encephalitis virus (CAEV)* and *Maedi-Visna virus (MVV)* (Larruskain and Jugo, 2013). *Lentiviruses* are RNA viruses that are replicated in a host cell via the enzyme reverse transcriptase to produce DNA from its RNA genome. The viral DNA is integrated in the DNA of the cell host and induce a persistent infection (Kurth and Bannert, 2010).

Monocyte-macrophage lineage is the main line for which this virus is tropic (Rea-Boutrois et al., 2008; Barquero et al., 2013).

The main clinical features of CAE diseases are leukoencephalomyelitis in kids, chronic polyarthritis and indurative mastitis in adults, pneumonia, weight loss and encephalitis, but a high percentage of CAEV-infected goats will not exhibit signs of the disease. Most of the infected animals are asymptomatic despite the presence of the virus (Patton et al., 2012).

In such status of infection, the goats can spread the virus through milk, colostrums and respiratory secretions. Economic losses attributed CAEV infection are quite high especially in countries where the goats breeding is intensive and a lot of goat offspring will be slaughtered each season due to arthritis. (Peterhans et al., 2004).

Specific prophylaxis for CAEV is not available. The priority in the control of CAE is to get a rapid and certain diagnostic tool, to shorten the timetable of the eradication of infection, to

discover the infected goats as soon as the antibodies could be detected after exposure (Turin et al., 2005), long time before the clinical disease onset. In order to detect CAEV virus infections may be used various kinds of methods, based on the detection of antibodies or on the detection of the virus (Blacklaws et al., 2004).

The isolation CAEV in cell cultures is time consuming and even is risking to fail because, some cell lines are restrictive for the replication of virus or are not expressing ECP. So, the methods as virus isolation on cell culture cannot be used extensively.

The PCR protocols failed to furnished reliable results: the large heterogeneity of SRLV and the small viral load are one of the reasons. Moreover, some positive PCR goats did negative serology, suggesting the use of PCR protocols to complement serology results (Reina et al., 2009).

Therefore, usually, CAEV virus infection diagnosis is made by serological methods such as enzyme-linked immunosorbent assays (ELISA), agar gel immunodiffusion (AGID) tests. The GSRLVs are closely related viruses having antigenically cross-reactive structural proteins (Gogolewski et al., 1985), and for this reason the current serological methods don't have ability to differentiate small ruminant lentiviruses (Saman et al., 1999).

One of the confirmatory diagnosis methods of CAEV, the enzyme-linked immunosorbent assays (ELISA), is highly suitable in term of cost and is proved to be more sensitive than AGID test for the detection of CAEV antibodies (Oem et al., 2012).

In this study, our goal was to check by ELISA the CAEV seroprevalence in a contaminated goat farm where clinical cases of disease are present.

MATERIALS AND METHODS

In order to establish seroprevalence of *CAEV* in goats, 78 serum samples were collected from a goat farm with 120 animals.

The farm is located in south-eastern Romania and was previously confirmed with CAE (serological and clinical cases).

The serum samples were tested using the *IDEXX CAEV/MVV Total Ab Test* according to

the manufacturer's instructions.

Briefly, sera samples to be tested were diluted and incubated in the wells of the microplates, previously coated by manufacturer with the viral antigen (only the wells of the even-numbered columns).

If antibodies specific to CAEV/MVV were presents in the serum sample, the antigen-antibodies complexes will form and antibodies bind in the wells.

After washing, a secondary antibody linked to peroxidase, directed to goat IgG will bind to the immune-complex. After washing, the TMB substrate will be added to the wells and, where the immune-complex is present then the peroxidase transforms the substrate from a blue compound into a yellow one, after blocking with a stop solution.

The optical densities are read at 450 nm (OD.450) and values are corrected and validated against positive and negative control supplied by manufacturer.

According the French Reference Laboratory for CAEV/MVV (AFSSA Niort, France) the sensitivity of the *IDEXX CAEV/MVV Total Ab Test* is 100% and the specificity is 99.8%.

RESULTS AND DISCUSSIONS

In this study the serum samples from a CAEV-positive farm were tested by ELISA technique. From the 120 goats of the flock they have been tested 60% - 78 serum samples: 30 samples were positive, meaning 38.46% and 48 samples were negative, respectively 61.54% (figure 1).

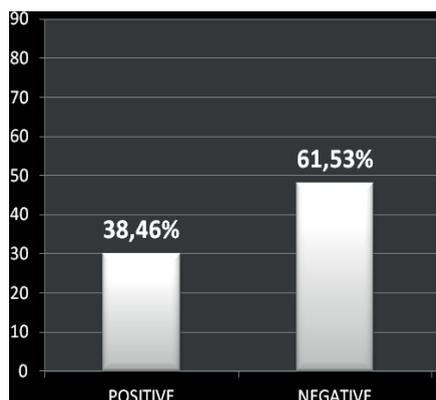


Figure 1. Prevalence of seropositive and seronegative results of ELISA in a goat farm from south-eastern Romania

From the 30 positive goats 93.33% (28 goats) were female, all of them under 2 years old, and 6.67% were male (2 males), all of them younger than 4 years old.

The registered seroprevalence is correlated with a history of clinical cases of CAE, showing symptoms associated with CAEV: arthritis in young animals, mastitis and encephalitis in adults.

The results obtained in this study highlight a higher prevalence in researched farm 38.46% than the results obtained in other studies in which the prevalence of CAEV was 23.7% in the Southern regions of Korea, 7.69% in the Northern, 1.26% in Spain and Italy (Saman et al., 1999; Oem et al., 2012).

Despite those differences, considering the performances of the kit, the age of the goats and the presence of the associated symptoms of the disease, these are reliable results.

CONCLUSIONS

High prevalence of *CAEV*-infection in the farm (38.46%), proved by serological investigation (active surveillance by ELISA-Ab exams), have been associated with low clinical cases of CAE, and this supports the claim that the most *CAEV* infected animals remains asymptomatic. Keeping longer a *CAEV* infected animal in a herd, will increase both, seroprevalence and the number of subjects with symptoms.

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