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SEROLOGICAL SURVEY OF CAPRINE ARTHRITIS-ENCEPHALITIS VIRUS INFECTION IN SIBIU COUNTY, ROMANIA

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Abstract

Caprine arthritis-encephalitis (CAE) is an economically important viral disease of goats, caused by a single-stranded RNA lentivirus belonging to the Retroviridae family, Orthoretrovirinae subfamily. CAE virus (CAEV) infection is widespread among dairy goats in most industrialized countries. Clinical disease in goats includes encephalitis in kids, chronic arthritis, inflammatory mastitis and progressive respiratory disease in adults. Transmission of CAEV occurs generally via colostrum and milk consumption, but horizontal transmission also contributes to disease spread. Most goats infected remain virus positive for life, generally asymptomatic and can develop CAE months to years later.

The aim of the study was to investigate the seroprevalence for CAEV infection in goat herds in 6 villages from Sibiu: Arpașu de Jos, Avrig, Cârțișoara, Laslea, Porumbacul de Jos, Șelimbăr. A number of 15,947 serum samples were collected over a 3 year period. All samples were analyzed using a commercial Agar Gel Immunodiffusion (AGID) test. The results have shown that the overall seroprevalence was higher 9.06% in the last year of the study than in previous two years 3.54% and 2.29%. The biggest difference was found in Laslea with 17 positive samples (1.63%) in the first year and 86 positive samples in the 3rd year (14.90%).

The result of the study provides useful information on animal health and herd management factors. Proper prevention and control measures should be taken in order to prevent infection spreading and economic losses due to CAEV infection in the coming future.

Key words*: CAE, AGID, seroprevalence.*

INTRODUCTION

Caprine arthritis-encephalitis (CAE) was first described in the United States by Cork et al., in 1974, while the causal virus was first isolated in the same country from the synovial fluid of an arthritic goat (Crawford et al., 1980). Caprine arthritis-encephalitis has emerged as a significant and costly disease of goats (Smith & Sherman, 2009).

CAE is produced by a single-stranded RNA lentivirus belonging to the family Retroviridae. The retroviridae consist of non-oncogenic viruses that produce multi-organ disease characterized by long incubation periods and persistent infection (Balbin & Mingala, 2017). In general, goats with CAE virus (CAEV) do not show clinical signs of infection and detection of specific antibodies is the only test that shows the infection. The development of a clinical disease may take several months to years, probably due to very low seroconversion (Balbin & Mingala, 2017; Kaba et al., 2009). The infection causes slow and persistent inflammatory diseases characterized by synovitis, polyarthritis, mastitis and pneumonia in adult goats and encephalomyelitis in kids (Kaba et al., 2009; Lofstedt, 2016). Monocyte/macrophage lineage is the main target for the virus. In these cells, virus replication is closely associated with the differentiation and maturation of monocytes to macrophages (Kaba et al., 2009).

CAEV is transmitted by direct contract via colostrum (lactogenic transmission) and by horizontal transmission through respiratory secretions (OIE, 2017). Live animal trade represents a major risk in the diffusion of CAEV from one herd to another (APHIS, 2007).

Infection with CAEV in goats from Romania has been reported (Gurău et al., 2015; Enache et al., 2017). The ideal method of confirming the diagnosis of caprine arthritis encephalitis is the combination of clinical and serological methods. Nevertheless serology is the most cost-efective method for diagnosing (Spînu & Șandru, 2017). Agar gel immunodiffusion test (AGID) and enzyme-linked immunosorbent assay (ELISA) are considered sufficiently reliable to be used in control programs. The control of CAE infection could be made by

serological methods (ELISA or AGID). Both tests are considered sufficiently reliable for use in control programs. AGID test is reported to be more specific but less sensitive than the ELISA (Lofstedt, 2016). PCR can become a detection test in rigorous eradication programs to determine the infectious status of animals that cannot be diagnosed with serological certainty (Spînu & Șandru, 2017).

There are no vaccines available for CAE (Reina et al., 2013). Control programs remain the only approach to avoid infection and most control programs focus on elimination of infected animals and their progeny (Minguijon et al., 2015; Perez et al., 2010).

The aim of the study was to investigate by AGID the serological prevalence of CAEV infection in goat herds from a semi-intensive goat raising area located in Sibiu county.

MATERIALS AND METHODS

A number of 15,947 serum samples were collected over a 3 year period and analyzed using a commercial Agar Gel Immunodiffusion (AGID) test. The samples were taken randomly from goat herds from 6 villages from Sibiu county: Arpașu de Jos, Avrig, Cârțișoara, Laslea, Porumbacul de Jos, Șelimbăr (Fig. 1).

All samples were analyzed using a commercial Agar Gel Immunodiffusion (AGID) test (Porquer Montpellier, France) according to the manufacturer's instructions.

The analysis of collected data was realized using commercially available spreadsheet software (Excel 2007).

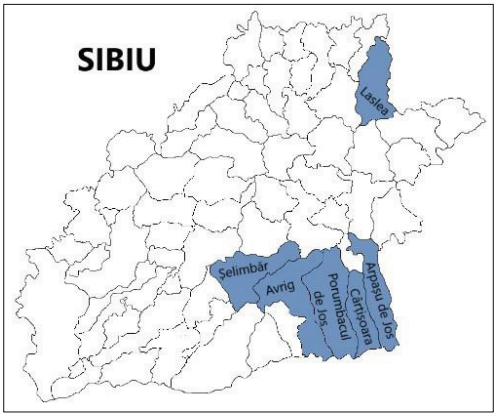

Figure 1: Assay-sampling from all 6 villages from Sibiu

RESULTS AND DISCUSSIONS

The distribution of the results obtained in all 6 villages is presented in table 1.

A total of 129/5621 (2.29%) serum samples were positive for CAEV in the AGID in the 1st year. Seropositive animals were present in 5/6 villages, indicating widespread infection. In the 2nd year the number of positive samples increased 275/7766 (3.54%).

The results have shown that the overall seroprevalence was 9.06% higher in the last year of the study than in previous two years in which values of 3.54% and 2.29% were recorded. The highest difference was found in Laslea with 17 positive samples (1.63%) in the first year and 86 positive samples in the 3rd year (14.90%).

Two main CAE developmental patterns were observed in the studied flocks. From year one to year three, in 50% of the locations, there was a steady, from 2 to 10 fold increase, of the positive animals (from 3.29 to 6.46% and 0.81 to 10.67% respectively), while in the other 50%, a sudden of 2 to 5 fold increase (3.32 to 8.09% and 0.0 to 5.82%, respectively), was noticed (Fig. 2).

These data supported the impact of differentiated raising systems' and biosecurity measures' implementation in various flocks. The movement of animals among dairy farms might increase the risk to introduce infected goats and cause higher seroprevalence in those farms.

At national level, the seroprevalence (38.46%) reported by Gurău et al. (2015) is much higher, due to the restricted area (Brăila County) of the analyses carried out by they authors.

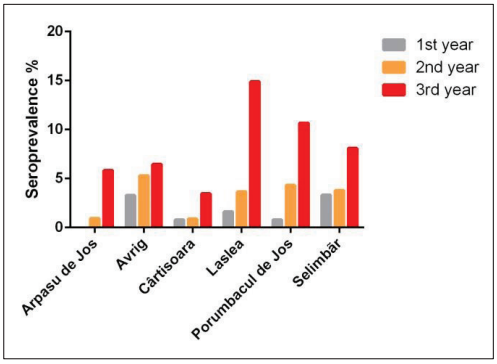

Figure 2: Comparison of the CAEV seropositive goats in all 6 villages from Sibiu

Table 1: Distribution of CAEV seropositive samples according to the herd origin

Villages	Results								
	1st year			2nd year			3rd year		
	Samples	+	%	Samples	+	%	Samples	+	%
Arpașu de Jos	341	0	0	1277	12	0.94	361	21	5.82
Avrig	1701	56	3.29	1622	86	5.30	526	34	6.46
Cârțișoara	254	2	0.79	337	3	0.89	116	4	3.45
Laslea	1042	17	1.63	2111	77	3.65	577	86	14.90
Porumbacul de Jos	866	7	0.81	994	43	4.33	300	32	10.67
Șelimbăr	1417	47	3.32	1425	54	3.79	680	55	8.09
TOTAL	**5621**	**129**	**2.29**	**7766**	**275**	**3.54**	**2560**	**232**	**9.06**

CONCLUSIONS

The obtained data provided useful information on the influence of herd health management factors in controlling the spreading of CAE in the selected flocks. Proper prevention and control measures must be designed to prevent further economic losses due to CAEV infection in the area.

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