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PREVALENCE OF CAPRINE ARTHRITIS ENCEPHALITIS VIRUS IN ASSOCIATION WITH CLINICAL ARTHRITIS IN SIX PRODUCTION FARMS OF FRENCH ALPINE GOATS IN NORTH-WESTERN CROATIA

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SUMMARY

Prevalence of Caprine Arthritis Encephalitis Virus (CAEV) and occurrence of clinical arthritis were investigated on 543 goats of French Alpine breed on six intensive production farms in North-Western Croatia. The aim of the study was to determine seropositivity to CAEV and to examine the occurrence of clinical arthritis in relation to CAEV seropositive goats. All goats were examined clinically and presence of arthritis was noted. The blood samples were tested for antibodies against CAEV using the immunoenzyme test. All collected data were cross-classified in two-way contingency tables. Of the total number of goats, CAEV was serologically confirmed in 50.8% and 31.6% of all goats were diagnosed with clinical arthritis. CAEV seropositive goats were 21.9% and they also expressed clinical signs of arthritis. Statistical tests confirmed positive association between clinical arthritis diagnosis and seropositivity to CAEV with Phi coefficient of 0.25 ($P < 0.01$). Results suggest that serious eradication programs should be introduced in north western Croatian goat herds, but also that further investigations in all Croatian herds should be conducted and measures should be applied on all herds.

Key-words: seropositive, ELISA, lentivirus, small ruminants, health

INTRODUCTION

CAEV is a slow, progressive and incurable disease of goats spread around the world (Peterhans et al., 2004). Because of its ability for cross-infection between goats and sheep, the virus is classified in Small Ruminant Lentiviruses (SRLV) group (Leurox et al., 1995). Infected goats may stay in a state of unapparent infection for life and spread the virus, or develop various clinical forms such as: arthritis, synovitis, neurological dysfunctions, indurations of udder, chronic interstitial pneumonia, and general wasting (Blacklaws et al., 2004). CAEV is considered to be an immunological disease causing indurations of target organs and the udder is one of the main routes of virus spreading (Desport, 2010). Virus spreads primarily through herds by vertical transmission from dams to kids by colostrum and milk or via feeding kids with unpasteurized colostrum/milk from infected goats. Also, virus can be spread by horizontal transmission through cohabitation of infected and uninfected goats

(Rowe and East, 1997), transmission less investigated: in utero, contact with the vagina of an infected doe during parturition, via infected blood, with equipment and milking machines or iatrogenic (Adams et al., 1983; Rowe et al., 1991, 1992; Rowe and East, 1997). French Alpine goat production is dominant in Croatia and is concentrated in North Western Croatia. First herds of French Alpine breed were imported to Croatia two decades ago. Historically it was present in this area for two decades, when first herds were imported. CAEV was previously investigated in herds of North-Western Croatia by Čač et al. (1996) who noted prevalence of 4.7% on sample of 1290 goats. We wanted to determine CAEV prevalence in the studied farms today, and evaluate if clinical

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arthritis occurring in herds of French Alpine goats is connected exclusively to CAEV infections.

MATERIALS AND METHODS

We conducted the research on 543 goats of French Alpine breed from six production herds in North Western Croatia during the year 2013. Chosen farms were large (more than 50 goats), operating continuously from the first French Alpine goat import, enclosed without animal introduction from other herds, and registered in breeding program. Because of that fact we consider that it was possible to investigate how CAEV prevalence raised in separate enclosed production units. All animals were kept under intensive milk production conditions, had similar diet, with access to open area and were milked twice a day by machines. All of the goats from each farm were studied, and the sample did not include goats culled due to low production, illness or infertility. Kids in all six examined herds were not separated from dames, so they fed by suckling. All goats were clinically examined. The examination included assessment of general conditions and gait, as well as inspection of the carpal joints and the presence of clinical arthritis (cold swelling and stiffness with lower mobility) and it was noted bilaterally. Animals with a score of >7 cm between carpal circumference and metacarpal circumference in at least one joint were considered clinically affected. Animals with a score of <5 cm were considered clinically healthy (asymptomatic) (Bertoni et al., 1994). We collected samples of blood from the jugular vein during the first half of the lactation. The virus was diagnosed using the serological immunoenzyme test CHEKIT CAEV/MVV (IDEXX, Switzerland) by the official method for diagnostic of CAEV in Croatia and suggested as method by OIE (2007). The data was cross-classified in two-way contingency tables. Association between CAEV seropositivity and the occurrence of clinical arthritis were measured using Chi-square and Fisher's exact test in FREQ procedure of SAS programme (SAS, 2004).

RESULTS AND DISCUSSION

CAEV prevalence

Recorded total CAEV prevalence of 50.8% of the all examined French Alpine goats is even higher than the CAEV prevalence of 6–47% reported in other countries (Peterhans et al., 2004). CAEV was recorded in all six examined herds. Prevalence of CAEV recorded in a preceding study by Čač et al. (1996; 2000) at the same area on the sample of 1290 goats, was substantially lower, only 4.7%. This research showed that it had significantly increased during the last two decades. Horizontal transmission of the CAEV virus might lead to cross - species transmission. Although CAEV is typical for the goats in intensive production systems, possible horizontal transition could also endanger the valuable autochthonous goat breeds (Croatian white and Croatian spotted goat),

especially in conditions of cohabitation in mixed flocks of goats and sheep (Pisoni et al., 2005).

Clinical arthritis

Out of the entire clinically examined population, clinical arthritis was diagnosed in 31.6% of the animals. Large percentage (21.9% out of 31.6%) was CAEV seropositive and also expressed clinical signs of arthritis. Such a high prevalence of clinical arthritis in CAEV seropositive goats was not found in other research (Grewal et al., 1986; Torres-Acosta et al., 2003). Importance of the vertical transmission and the lack of serious eradication measures resulted in rapid increase of the CAEV prevalence during the period with no CAEV control program. Furthermore, genetics of the animals or the virus strain could explain this result (Bertoni and Blacklaws, 2010).

Positive association between clinical arthritis occurrence and seropositivity to CAEV was confirmed in the examined number of samples, with Phi coefficient of 0.25 ($P < 0.01$). This result indicates that CAEV could be the main reason for the clinical representation of the arthritis (Smith and Sherman, 2009). Clinical arthritis was found in 9.6% of the whole sample but CAEV was not confirmed. The reason for this may be that not all goats express detectable serum antibodies (Contreras et al., 2003; Leitner et al., 2008), or due to other possible different cause of arthritis such as mycoplasmas infection (Naglić and Šoštarić, 1995).

CONCLUSIONS

High percentage of serologically confirmed arthritis in the examined number of samples suggests that a serious CAEV eradication program should be introduced as obligatory measure in goat herds in Croatia. Additionally, these results indicate that the occurrence of clinical arthritis could also be reduced by this program. Furthermore these results indicate that the occurrence of clinical arthritis could also be reduced by this program because 21.9% of seropositive goats manifested clinical arthritis.

The high representation of clinical arthritis in the CAEV seropositive cases implies that further investigation of the virus strain is needed to explain it. Moreover, the presence of clinical arthritis in goats without CAEV reveals the need for further investigation of other possible causes.

Although the production of French Alpine goats in Croatia developed rapidly over the last two decades, replacement feeding or pasteurization of the colostrum and the milk for kids as well as the eradication of CAEV through separation of kids from the infected dames will be expensive and labour intensive. Control system should consider additional economic analysis based on specific production values of CAEV positive and negative goats such as lifetime lactation amount, lactation

per parity, protein or fat content and productive years in the herd or cull rate.

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