

Seroprevalence of Caprine Arthritis Encephalitis infection in goats from the Kukës district, Albania

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Abstract: This study aimed to evaluate the seroprevalence of caprine arthritis encephalitis (CAE) in goats from the Kukës district, Albania. Caprine arthritis encephalitis, caused by the caprine arthritis encephalitis virus (CAEV), is a chronic viral disease characterized by persistent inflammatory lesions and significant economic impact on goat farming. Although the disease is not zoonotic, continuous surveillance and preventive measures are essential to limit its spread and to better understand its epidemiology in Albania. Serological testing was conducted using the Maedi-Visna/CAEV Ab ELISA assay, which detects specific antibodies against CAEV. A total of 63 goat serum samples were randomly collected from two different herds in the Kukës district. The results revealed that 6 out of 63 tested goats were seropositive, corresponding to a seroprevalence of 9.5%, while 57 animals (90.5%) tested negative. These findings indicate a relatively low level of CAEV circulation in the studied area, comparable to observations reported in other regions of Albania, although regional variability remains evident.

In conclusion, the presence of seropositive animals in the Kukës district highlights the need for continued monitoring, implementation of control strategies, and broader epidemiological studies to prevent further spread of CAEV infection in the national goat population.

Keywords – caprine arthritis encephalitis, seroprevalence, ELISA, Kukës, Albania

I. INTRODUCTION

Caprine Arthritis Encephalitis (CAE) is an infectious disease affecting goats, characterized by lifelong persistence in infected animals.

This disease is caused by CAEV, a retrovirus which belongs to the genus Lentivirus of the family Retroviridae [1]. Infection from CAEV is characterized by encephalomyelitis in young goats and chronic arthritis in adults. Other clinical signs include mastitis, pneumonia and weight loss [2].

As a notifiable disease listed by the World Organisation for Animal Health (WOAH), CAE has significant economic implications for affected countries. From conducted studies, CAE infection has a high impact on milk production, both in quantity and quality. Infected animals produce less milk than healthy animals and the milk produced by them contains less lactose, fat, protein and a high number of somatic cells [3], [4],

[5]. CAEV infection can also have a significant impact on the establishment of trade barriers for animal germplasm [6].

II. MATERIALS AND METHOD

This study was conducted in the Kukës district, located in the north-eastern region of Albania (Figure 1).



Fig. 1. Map of Albania [7], indicating the Kukës district, where the goat blood samples were collected.

Blood samples were collected from goats belonging to two different herds. A total of 63 goats were randomly selected for sampling, including 50 animals from herd 1 and 13 animals from herd 2.

Blood samples were obtained via jugular venipuncture using 10 mL vacutainer tubes. Following collection, the samples were centrifuged at 3000 rpm for 5 minutes to separate the serum. The obtained sera were then stored at -20°C until serological analysis was performed.

Serological testing for the detection of antibodies against caprine arthritis encephalitis virus (CAEV) was carried out using the MVV/CAEV Indirect ELISA kit (IDvet, France). The assay enables the detection of antibodies against both Maedi-Visna virus (MVV) and CAEV and is based on antigenic peptides derived from the transmembrane (TM) proteins, specifically gp135 and p25.

The interpretation of results was performed according to the manufacturer’s instructions. Samples with a sample-to-positive (S/P) ratio $\geq 60\%$ were considered positive, those with $S/P \leq 50\%$ were considered negative, and samples with S/P values between 50% and 60% were classified as doubtful.

III. RESULTS

Blood samples collected from two randomly selected goat herds in the Kukës district were tested for the presence of antibodies against small ruminant lentiviruses (SRLV), including caprine arthritis encephalitis virus (CAEV), using the indirect ELISA method.

Out of a total of 63 goats tested, 6 animals were found to be seropositive, while 57 were seronegative. This corresponds to an overall seroprevalence of 9.5% in the studied population.

The 95% confidence interval (CI) for the estimated prevalence, calculated using the exact binomial (Clopper–Pearson) method, ranged from 3.6% to 19.6%, indicating some uncertainty due to the relatively small sample size. The detailed serological results are presented in Table 1.

Table 1. The ELISA serological results for CAE seroprevalence in Kukës district.

District	Negative (N)	Negative (%)	Positive (N)	Positive (%)	Prevalence (%)	95% CI*
Kukës	57	90.5	6	9.5	9.5	3.6% - 19.6%

*The 95% confidence interval for the overall prevalence was estimated using the exact binomial method (Clopper–Pearson)

Serological testing for Caprine Arthritis Encephalitis Virus (CAEV) using ELISA revealed seropositive animals in both of the two goat herds included in the study. This corresponds to a between-herd prevalence of 100%, indicating that all examined herds had at least one seropositive animal.

Within-herd prevalence varied between the two herds, with 10.0% in Herd 1 and 7.7% in Herd 2. The overall animal-level (individual) seroprevalence was 9.5%. The mean within-herd prevalence was 8.9%, reflecting a relatively low level of infection within the studied herds. These findings are reported in Table 2.

Table 2. Within-herd serological results of CAE prevalence in goat herds from the Kukës district.

	Herd Size	No. of tested animals	No. of positive	Within-herd Prevalence%	Mean within-herd Prevalence%
Herd 1	> 10	50	5	10	-
Herd 2	> 10	13	1	7.7	-
Total (2 herds)		63	6	-	8.9

IV. DISCUSSION

This study represents the first known report of CAEV seroprevalence in goats in the Kukës district, revealing an overall prevalence of 9.5%. These findings confirm the presence of the infection in the area and highlight potential implications for goat health and productivity.

Notably, the seroprevalence observed in Kukës is considerably lower than that reported in other studies from various regions of Albania. A prevalence of 92% has been reported in a herd from the Fushë-Krujë region [8]. In Korçë, prevalence values ranging from 23.1% to 57.1% have been documented [9], while other studies have reported values of 42.8% in additional herds from the same region [10]. Similarly, prevalence levels of 38.46% [11], 33.33% [12] and 22.4% [13] have been reported in Lezhë, Dibër and Shkodër, respectively.

The prevalence observed in Kukës (9.5%) is comparable to, though slightly higher than, that reported in the Elbasan region (7.6%) [14], suggesting a relatively low level of viral circulation in both areas. Collectively, these findings demonstrate that CAEV is present across multiple regions of Albania, often at substantially higher prevalence levels compared to Kukës. These differences highlight the marked geographical variability in CAEV epidemiology within the country, likely reflecting differences in herd management practices, animal movement, and biosecurity measures.

At the herd level, both examined herds in Kukës (100%) contained at least one seropositive animal, indicating that the infection is present in all surveyed herds. This estimate should, nevertheless, be interpreted with caution due to the limited number of herds included in the study. However, within-herd prevalence remained relatively low, ranging from 7.7% to 10.0%, with a mean within-herd prevalence of 8.9%. This pattern, characterized by low within-herd prevalence despite the presence of infection, suggests limited within-herd transmission and may reflect management practices that reduce virus spread, such as restricted contact between animals, controlled breeding, or partial implementation of biosecurity measures.

A similar epidemiological pattern was observed in the Elbasan region [14], where a relatively low overall prevalence (7.6%) was accompanied by a limited proportion of positive herds (18.5%) and generally low within-herd prevalence values. Although the herd-level prevalence differs between the two studies, both regions demonstrate that CAEV infection is present but not widely disseminated at high levels within herds. The overlap in confidence intervals and the relatively small sample sizes in both studies suggest that these regional differences should be interpreted with caution.

The relatively low prevalence observed in Kukës, as in Elbasan, may be indicative of early-stage or sporadic infection rather than established endemicity. Previous studies have shown that CAEV transmission is strongly influenced by management factors, including the introduction of infected animals, communal grazing, and the feeding of colostrum or milk from infected does [15], [16]. The low within-herd prevalence detected in this study may reflect reduced opportunities for such transmission pathways.

Overall, the findings of this study support the hypothesis that CAEV infection in Albania exhibits a heterogeneous and focal distribution, with some regions showing low-level circulation and others experiencing significantly higher infection burdens. The detection of seropositive animals in all examined herds in Kukës underscores the importance of continued surveillance and the implementation of targeted control measures. Early identification and management of infected animals, combined with improved biosecurity practices, are essential to prevent further spread and to limit the long-term economic impact of CAEV on goat production systems in Albania.

V. CONCLUSION

This study confirms the presence of Caprine Arthritis Encephalitis Virus (CAEV) in goat herds from the Kukës district, with an overall seroprevalence of 9.5%. Although the detected prevalence is relatively low, the identification of seropositive animals in the examined herds indicates that the infection is present and potentially established at the herd level. This pattern suggests a focal distribution of the virus, with limited within-herd transmission but a risk of further spread if appropriate control measures are not implemented.

The findings of this study, in comparison with previous reports from other regions of Albania, highlight the heterogeneous distribution of CAEV across the country. While some regions exhibit high prevalence levels, the Kukës district appears to be characterized by lower viral circulation. These differences emphasize the importance of region-specific surveillance and targeted epidemiological assessments.

In conclusion, continued monitoring and the implementation of preventive and control strategies are essential to limit the spread of CAEV infection. Measures such as regular serological screening, improved biosecurity practices, controlled animal movement, and farmer education should be prioritized. These efforts are crucial to reduce the long-term economic impact of the disease and to protect the health and productivity of goat populations in Albania.

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