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**SEROPREVALENCE OF CAPRINE ARTHRITIS ENCEPHALITIS VIRUS  
AMONG THREE DIFFERENT GOAT BREEDS**

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**ABSTRACT**

Seroprevalence of caprine arthritis-encephalitis virus (CAEV) in Qassim Region, Saudi Arabia, was determined for the first time in three different breeds of goats at different age groups using competitive ELISA kit (cELISA). The overall seroprevalence was 10.75 % (86/800), with seropositivity 19.33% (58 /300) in Saanen goats, 8.00 % (16/200) in Damascus goats and 4.00 % (12/300) in Aardi goats. Seroprevalence was significantly different ( $P < 0.05$ ) between the three goat breeds. Also, age group over 25 months (17.93 %) showed significantly higher seroprevalence ( $P < 0.05$ ) than those of 15 – 24 months old (5.73 %) in all goat breeds. Bucks had a significantly higher ( $P < 0.05$ ) frequency of infection (25.76 %) than does (9.40 %).

**Keywords: Caprine Arthritis-Encephalitis Virus, Seroprevalence, Saanen Goats,  
Damascus Goats, Aardi Goats; Competitive ELISA, Monoclonal Antibodies**

**INTRODUCTION**

Caprine arthritis-encephalitis virus (CAEV) is a single stranded RNA-lentivirus of the family Retroviridae. Subfamily lentivirus responsible for several slowly developing, often fatal diseases in man and animals. It cause persistent infection in goats and the virus was very similar to maedi-visna of sheep [1, 2].

The disease has been reported worldwide. In Europe, the disease has been reported with a variable prevalence rate ranges from 12.1 - 56.8% [3]. In the Middle East, CAEV infection was reported in Syria, Jordon and Turkey; the prevalence rates ranged from 0.8 to 12.5% [4].

Most goats infected with CAEV become asymptomatic carriers. Viral transmission usually occurs horizontally through the ingestion of viral-infected goat milk and/or colostrum [5]. Vertical transmission continues to be unclear [6]. Viral transmission between goats and sheep has been reported [1].

Infected goats show one or more of five major clinical forms usually associated with CAEV infection including polyarthritis, interstitial pneumonia, mastitis, and progressive weight loss in adult goats, as well as encephalitis in younger kids [7].

The objective of this study was to determine seroprevalence of CAEV infection among three different goat breeds in Qassim district, Saudi Arabia. This study would help in putting a strategy for controlling CAEV in goats in Qassim district, Saudi Arabia.

## MATERIAL AND METHODS

### Study Area

The present study was initiated by the observations of clinical signs of polyarthritis, interstitial pneumonia, mastitis, progressive weight loss in adult goats at Qassim Veterinary Clinic, Qassim University. The study was designed to include goats of three different breeds at different age groups in five different herds.

### Sample Size

A total of 800 goats from five different herds, of three different breeds: Saanen, Damascus and Aardi. These were classified into two different age groups (Table 1).

### Clinical Examination

Every goat was clinically examined for signs of polyarthritis, interstitial pneumonia, mastitis, progressive weight loss in adult goats that could suggest the infection with CAEV (Figure 1 & 2). A questionnaire was completed for each case and it included general information on the husbandry practices, the origin of animals and history of clinical signs compatible with those experienced with CAEV infection. It also included the breed, age and sex of the goat.

### Collection of Blood Samples

Blood was taken from the jugular vein from each goat into plain blood tubes to obtain serum. Serum was stored at  $-20^{\circ}\text{C}$  within 12 hours of collection according to the method described by [8].

### Detection of CAEV Antibodies

A commercially available competitive ELISA kit (cELISA) (VMRD Inc., Pullman, WA, USA) of 100% sensitivity and 96.4% specificity [9] was used to evaluate all the collected sera for anti-CAEV surface envelope (SU) antibodies. Microtiter plates of 96-well coated with CAEV-63 SU were captured by monoclonal antibodies (MAb) F7-299. Horseradish peroxidase-conjugated MAb GPB74A was added. The kit included

standard positive and negative control goat sera. Competitive ELISA test was performed according to Washington Animal Disease Diagnostic Lab. Manual, 2010, [10]. Seroprevalence was determined by dividing the number of seropositive goats by the total of samples taken [11].

### Statistical Analysis

Statistical analyses were performed using SPSS software Version 10 (SPSS Inc., Chicago, IL, USA).

### RESULTS

As shown in **Table 2**, 86 of the 800 goats included in this study were seropositive (10.75%). The seroprevalence among Saanen breed, Damascus breed and Aardi breed was 19.33 % (58/300), 8.00 % (16/200) and 4.00 % (12/300) respectively. Goats older than 25 months age showed the highest prevalence for caprine arthritis-encephalitis virus 17.93 % (59/329); while the seroprevalence of those of age group 15 – 24 months was 5.73 % (27/471). The prevalence among bucks was 25.76 % (17/66) while that of does was 9.40 % (69/734).

### DISCUSSION

This is the first study determining seroprevalence of the CAEV in goats population in Qassim region, Saudi Arabia. The seroprevalence, among goats, found in the studied area (10.75 %) was higher to the

1.9 % reported previously for sheep in Saudi Arabia by [12].

The mean CAE seroprevalence reported in this study (10.75%) was nearly similar to that recorded for goats in Syria, 12.1% and Spain, 12.1% [3]; and lower than that reported in Australia, 56.8%; Norway, 42%; Switzerland, 42%; USA, 31% and Italy, 23.6% [13]. On the contrary it was significantly higher than that reported in Mexico, 5.6%; Germany, 6.4%; Brazil, 8.2%, Jordan, 8.9%; New Zealand, 9.3% and Saudi Arabia, 1.9%; [4, 7, 12, 14].

Statistically, a significant difference was observed in this seroprevalence in the three studied breeds of goats (**Table 2**). Saanen and Damascus breeds had the highest seroprevalence rate, these goat breeds were imported from Switzerland and Syria which have high seroprevalence rate of CAEV. This agreed with the concern that, CAEV usually reports after importation of breeding stocks by goat farmers, with the aim to enhance productivity of the indigenous goat breeds, without monitoring for CAEV by the governmental authorities [14]. This could explain the high seroprevalence rate of CAEV in these breeds when compared to that of the Aardi breed indigenous in Saudi Arabia. Goats older than 25 months of age were more likely to be CAEV seropositive (**Table 2**). Similar finding have been reported by [15, 16] who indicated that

CAEV prevalence increased with age up to 3 years; other studies suggested that CAEV infection occurs in goats older than one year with the same magnitude [17].

Bucks had a significantly higher frequency of infection (**Table 2**) and this agreed with the data recorded by [7] in Brazil.

This trial has confirmed that, seroprevalence of CAEV in Qassim region follows a common pattern described elsewhere in Kenya [18] and Jamaica [19], the prevalence of CAEV is more common in animals in contact with imported goats [20]. As the Kingdom of Saudi Arabia imports live animals from various parts of the world, goats should have an official negative certification to CAEV before it was imported.

## CONCLUSION

The information obtained on seroprevalence in this study is considered an important first step towards the establishment of strict control and eradication measures against CAE since no effective vaccine is available [21, 22]. The results of presence of CAEV in Saudi Arabia indicates the importance to control the disease and prevent importation of positive reactors into the country. Furthermore, viral transmission between goats and sheep, [23] highlights the importance of monitoring sheep imports to Saudi Arabia as part of the integral plan of control and eradication of CAE.

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Table 1: Goats used in CAEV Seroprevalence Modified

Age Range (month)	Breed										Total		
	Saanen		Damascus		Aardi						♂	♀	Total
	♂	♀	♂	♀	Herd 1		Herd 2		Herd 3				
15 – 24	16	161	8	103	5	57	6	68	4	43	39	432	471
Older than 25	10	113	6	83	3	35	3	23	5	48	27	302	329
Total	26	274	14	186	8	92	9	91	9	91	66	734	
	300		200		300						800		

Table 2: Seroprevalence of CAEV in Relation to Goat's Breed, Age and Sex

Parameters		Total Numbers (n)	Positive Numbers (n)	Negative Numbers (n)	Positive (%)
Breed	Saanen	300	58	242	19.33*
	Damascus	200	16	184	8.00*
	Aardi	300	12	288	4.00
	Total	800	86	714	10.75
Age/ month	15 – 24	471	27	444	5.73
	Older than 25	329	59	270	17.93*
	Total	800	86	714	10.75
Sex	Bucks	66	17	67	25.76*
	Does	734	69	665	9.40
	Total	800	86	714	10.75

NOTE: \*Significant High Seroprevalence ( $P < 0.05$ )



Figure 1: Polyarthritis in Saanen Goat

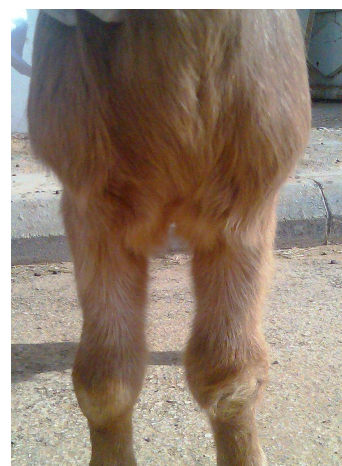


Figure 2: Polyarthritis in Damascus Goat