Technical note

Preliminary survey for antibodies against caprine arthritis-encephalitis virus (CAEV) using recombinant GAG proteins: studies among small ruminant populations in north-eastern Nigeria

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Abstract

A total of 1000 serum samples were obtained from small ruminants in Maiduguri, Borno state, Nigeria and tested for the presence of antibodies against caprine arthritis-encephalitis virus (CAEV) using enzyme-linked immunosorbent assay (ELISA) based on p17 and p28 recombinant GAG proteins. The distribution of the sera tested was as follows: 900 serum samples collected at slaughter from 700 goats and 200 sheep in the municipal abattoir as well as 100 sera obtained from 50 each of goats and sheep in four different flocks under the semi-intensive system of animal husbandry. All the animals sampled were aged \( \geq 2 \) years and had no previous contact with imported stocks. It was observed that none of the sera had antibody against CAEV. The need to impose strict quarantine as well as the practice of testing and slaughtering of positive animals imported from CAEV endemic areas into Nigeria for breeding are suggested to prevent the introduction of the disease into the country. © 2000 Published by Elsevier Science B.V. All rights reserved.

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1. Introduction

Caprine arthritis-encephalitis virus (CAEV) infection continues to be a source of considerable economic losses to goat industries and has a world wide distribution (Adams et al., 1984; Grant et al., 1988; Rimstad et al., 1994; Storset, 1996). The majority of animals in a given farm may be infected and transmissions occur mainly through colostrum and milk as well as by intimate contact (Adams et al., 1983; Ellis et al., 1983). Economic loss due to CAEV infection are largest in countries with intensive animal husbandry. The disease has not been considered important in most parts of Africa where the extensive nomadic husbandry system is being practiced. Nevertheless, these regions continue to import animals from CAEV endemic areas for improved animal breeding.

No report is available on the prevalence of CAEV infection among small ruminant populations in Nigeria. This could be partly due to poor virus
surveillance, lack of knowledge on the recognition of the disease, and absence of suitable diagnostic techniques for the detection of infection. There is therefore the need to determine the status of CAEV infections among the abundant small ruminant populations in this environment. In Nigeria, goats rank next to cattle as a source of animal protein for human consumption. The bulk of these animals are kept by the nomads mostly under an extensive husbandry system. There is therefore the need to determine the epidemiological status of CAEV in this environment using a relatively sensitive diagnostic tool.

The agar gel immunodiffusion (AGID) test has been the basis of CAEV serology for more than a decade, but preparation of antigen is expensive and time consuming. An ELISA based on detection of antibodies against the CAEV GAG proteins has been developed (Smith and Johnson, 1988; Saltarelli et al., 1990) and recently against recombinant proteins (Rimstad et al., 1994). The technique has been found to be more sensitive than the AGID test and could be useful in extensive serological surveys for CAEV. In this study, an attempt was made to determine the prevalence of antibodies to CAEV using the purified recombinant viral GAG proteins based on ELISA.

2. Materials and methods

2.1. Study area

Maiduguri, Borno state is situated in the sudano-sahelian zone of north-eastern Nigeria where the majority of the livestock populations are reared by nomads. The sudano-sahelian nomads are the custodians of 95% of the 13.9 million heads of cattle, 90% of the 22.1 million sheep, 85% of the 34.5 million goats, and over 100,000 camels confined to the northern part of the country (Nigeria Livestock Resources Survey, 1996) and represent a human population of over 2 million. The Maiduguri municipal abattoir serves as the major slaughter house for the majority of the animals from different parts of Borno state with an average annual slaughter of over 150 thousand animals (Ahmed et al., 1993). The abattoir is supported by a nearby animal market which serves as a steady source of supply of slaughter animals. Animals are brought to the animal market from different parts of the state and from the neighboring countries of Cameroon, Niger and Chad Republic (Anon, 1980).

2.2. Animals and sampling procedure

A total of 1000 blood samples were obtained from indigenous sheep and goats in Maiduguri, Nigeria. The distribution of the samples was as follows: 900 blood samples were randomly collected at slaughter from 700 goats and 200 sheep in the municipal abattoir by obtaining samples from every 5th animal slaughtered; 100 samples were obtained by venipuncture from 50 each of randomly selected goats and sheep in four different ‘backyard flocks’ under the semi-intensive system of animal husbandry. All the animals sampled were aged ≥2 years and had no previous contact with imported stocks. The blood was allowed to clot and centrifuged at 1000×g for 10 min and serum was separated by aspiration and stored at −20°C until tested.

2.3. Virus antigen and control sera

CAEV recombinant proteins p17 and p28 as well as the control sera (positive and negative) were obtained from Dr. E. Rimstad’s Laboratory at Norwegian College of Veterinary Medicine, Oslo, Norway. The details about the synthesis of the recombinant proteins and control sera have been described elsewhere by Rimstad et al. (1994).

2.4. Serological examination

The sera were tested for presence of antibodies against CAEV recombinant proteins p17 and p28 essentially by an ELISA as described previously by Rimstad et al. (1994). The evaluation of results of the ELISA was also carried out using the method of Rimstad et al. (1994).

3. Result

A total of 1000 serum samples from goats and sheep were tested for presence of antibodies against CAEV using the ELISA based on recombinant GAG proteins p17 and p28. None of the sera tested had antibody to CAEV.
4. Discussion

Caprine arthritis-encephalitis virus (CAEV) infects mostly goats and has a global distribution (Adams et al., 1984). Economic losses due to the disease are largest in countries with intensive husbandry as revealed by results obtained from Kenya and Mexico where 4–5% of the goats under the semi-intensive husbandry were reported to be infected (Adams et al., 1984); while a 50% prevalence rate was recorded in California (USA) where intensive husbandry is generally being practiced (East et al., 1987). In countries with less intensive husbandry, and where the kids directly suckle their dams only, the risk of infection is less (Adams et al., 1984; East et al., 1987). In this study, none of the sera tested had antibodies to CAEV recombinant GAG proteins. This could be explained by (1) in Nigeria, the bulk of goats and sheep continue to be reared by nomads under the extensive system of animal husbandry, the practice of which does not predispose the animals to infection and spread of the disease, (2) little improved animal breeding programme is presently practiced in Nigeria. This programme usually necessitates the importation of proven high quality animals (probably from CAEV endemic areas) to enhance the performance and productivity of the indigenous flocks. This practice could in some cases results in importation of infections including CAEV from endemic areas, (3) goat kids reared under extensive husbandry by nomads usually suckle their mothers only — a practice which prevents the spread of CAEV infections from pooled infected milk fed to kids in buckets or bottles, and (4) the possibility of genetic differences between the African strain of CAEV and the California strain from which the gene was cloned for the expression of the recombinant proteins used in this study. Differences in the genetic composition between viral strains could affect the outcome of their gene products as well as the specificity of antibodies produced against the individual strains. Nevertheless, the husbandry systems being practice in north-eastern Nigeria at the moment would not permit the spread of the disease which could explain the absence of antibodies recorded in this study.

The laboratory diagnosis of CAEV infections is usually based on the detection of specific antibodies to the virus in serum. Since the ELISA employed in this study has been found to be relatively more sensitive than the AGID test (Zanoni et al., 1989; Heckert et al., 1992; Rimstad et al., 1993), the results obtained could be an indication that north-eastern Nigeria is presently free from CAEV infection. Consequently, it is suggested that the importation of animals from CAEV endemic areas should be restricted and quarantine as well as testing and slaughtering of positive animals should be enforced to prevent the introduction of the disease into the region or country. In addition, the possibility of genetic differences between geographical strains of CAEV should be taken into consideration when preparing gene products for use in the development of diagnostic techniques.

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References

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