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A MATHEMATICAL MODEL FOR GOAT FARMS AFFECTED BY TWO STRAINS OF CAPRINE ARTHRITIS ENCEPHALITIS

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ABSTRACT

Following our previous investigation, [2], we formulate a new model for the Caprine Arthritis Encephalitis virus disease (CAEV), a disease first reported in 1974 affecting mainly goats, [1]. Among disease symptoms we find arthritis, pneumonia, mastitis, encephalitis, encephalomyelitis, from which the name. This causes an economic burden for the breeding because the infected goats are more vulnerable to further pathologies and produce less milk.

Several viral strains cause this pathology, belonging to the Small Ruminant Lentivirus group (SRLV). These are members of the genus Lentivirus of the family Retroviridae, [3]. Their name is lentiviruses, because they develop very slowly in time. Clinical signs appear only after several years of incubation. The most common of the 5 genotypes of SRLVs are genotypes A and B, with well-known associated diseases.

Genotype B is pathogenic and can be transmitted both vertically and horizontally, through the blood or the saliva of infectious adult goats.

The lentivirus genotype E can just be vertically transmitted. Its prototype is named the Roccaverano strain, from the place where it was first discovered. Goats infected by this genotype do not harm the breedings.

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We present and investigate a CAEV model in which both strains are present. The model allows only the endemic, the genotype E-free and the disease-free equilibria, connected via transcritical bifurcations. Eradication of the pathogenic genotype is possible by reversing the actual policy used nowadays by the farmers to combat the spread of this disease.

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