

MATHEMATICAL MODEL OF ANTHRAX EPIZOOTIC IN THE ABSENCE OF ANIMAL MIGRATION

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Anthrax is a dangerous anthroponozoonotic disease that is controlled by veterinary and human medicine specialists.

The process of monitoring the epizootic situation in the world, and in Ukraine in particular, determining the number of disadvantaged points and accounting for stationary anthrax outbreaks should be a priority.

To keep the epizootic situation regarding anthrax under control and to predict its behavior in the future in modern conditions, it is necessary to turn to mathematical modeling of anthrax processes.

International sources have accumulated rich experience in the formation of mathematical models for both monoinfections and anthrax coinfection.

Mathematical modeling is an important component of the process of monitoring and controlling infectious diseases of humans and animals within the concept of "One health" (OIE).

As a working model for the description of anthrax in the regions of Ukraine, we chose a model in the absence of animal migration, which is essentially a system of linear difference equations and contains a component of the description of the animal population N_t .

where r is the intrinsic growth rate and K is the carrying capacity.

The system of difference equations describes the susceptible animals - S_t , the infected animals - I_t , the environmental contamination, defined as the number of anthrax spores ingested by an animal in one day - A_t , the number of carcasses of animals that have died of anthrax C_t :

where

α - the nonnegative constant contamination decay-rate representing the death of spores or their removal from the environment

β - contamination decay rate representing the death of spores or their removal from the environment

γ - virulence,

δ - constant rate at which the total animal population feed on the carcass,

η_i - transmission rates infected animals,

η_c - transmission rates of carcass of animals,

μ - natural mortality rate.

This choice will allow to move to the next model with a diffusion component, taking into account the migration of animals, and describe anthrax in Ukraine for a long time.