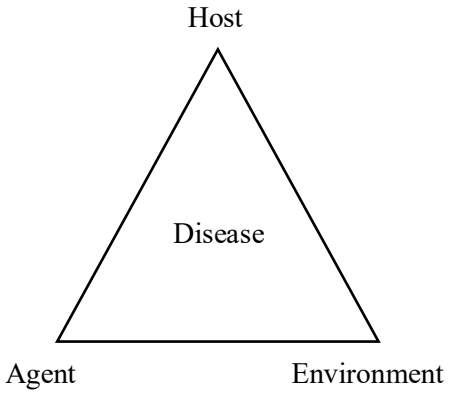
The Epidemiologic Triad of Infectious Diseases

Dr Rameshwar Giri, Training Officer, AHTCS

The epidemiologic triangle or triad is the traditional model of infectious disease causation. The triad has three components: an external agent, a susceptible host, and an environment that brings the host and agent together, causing disease.

Disease is the result of complex interactions (some would say imbalance) between the triad of the agent (toxic or infectious), the host and the environment. The components of this interaction differ depending upon the specific circumstances of each group of affected animals. Particularly for livestock, this triad is strongly influenced by husbandry and management x) factors, which are often the most important. For vector-borne xi) diseases, vector factors are also linked to the other factors. [1]. A vector is an organism which transmits infection by conveying the pathogen from one host to another without causing disease itself, which may be part of the infectious process. [3].



Agent

Agent originally referred to an infectious microorganism:

i) Bacteria
ii) Virus
iii) Protozoa
iv) Parasite
v) Fungi
vi) Mycoplasma

Generally, these agents must be present for a disease to occur. That is, they are necessary but not always sufficient to cause disease. The following factors of agent play important role in causing disease:

i) Infectious dose
ii) Genetic stability
iii) Host range
iv) Environmental hardiness
v) Virulence (microbial)
vi) Infectivity (microbial)
vii) Toxicity (poisons)

Host factors

Host factors influence an individual's exposure, susceptibility, or response to a causative agent. Some of the important host factors are given below:

i) Race
ii) Breed
iii) Age
iv) Sex
v) Anatomical structure
vi) Nutritional status
vii) Immunologic status
viii) Presence of disease or medications
ix) Behavior (e.g. mutual grooming, dominance, pica)
x) Production status (e.g., lactating vs. non-lactating)

xi) Reproductive status (e.g., pregnant vs. non-pregnant, sterile vs. fertile)
xii) Genetics

Environmental factors

Environmental factors affect the agent and provide opportunity for exposure of host to agent. Generally, environmental factors include:

i) Animal stocking density
ii) Animal movement between groups
iii) Housing (e.g. ventilation, sanitation)
iv) Environmental conditions (e.g. temperature, humidity, wind velocity, precipitation)
v) Nutrition (protein, energy and macromineral and micromineral adequacy)

Agent, host, and environmental factors interrelate in a variety of complex ways to produce disease. [2]. Their balance and interactions are different for different diseases. A common mistake is to focus on only one aspect of the triad for disease control or prevention and to overlook the others. [1]. We must look at all three components and analyze their interactions to find practical and effective prevention and control measures of infectious diseases.

References:

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