



Livestock Disease: Cause and Control

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The livestock industry is extremely important to the economy of Oklahoma and includes not only commercial producers of meat or milk, but also purebred breeders and small producers with a few animals. The success of any type of livestock operation is closely related to the disease level of the animals.

Losses due to disease originate in many ways. Some are obvious, such as death, medication costs, and condemnations at the processing plant. Others are sometimes less obvious, such as poor growth, poor production, poor feed conversion, and downgrading.

The purpose of this fact sheet is to acquaint livestock producers with some basic facts about diseases, their spread, and ways to minimize losses.

Disease Principles—Nature and Cause of Disease

Disease is an alteration of the body or body organs which interrupts or disturbs the body's function. Such disturbances often are recognized by detectable alterations of body functions.

Etiology is the study of disease causes. A disease often results from a combination of two or more causes: (1) the indirect or predisposing factors which may lower the animal's resistance and (2) the direct or determining factors which produce the actual disease.

Predisposing causes of disease are referred to frequently as "stress" factors. Stress factors include chilling, poor ventilation, overcrowding, inadequate feeding and watering space, overmedication, etc. Times to be particularly aware of stress are at shipping and weaning.

Direct causes of disease are: (1) bacteria, (2) viruses, (3) parasites, (4) fungi, (5) nutritional deficiencies, (6) chemical poisons, and (7) unknown causes.

Infectious diseases are the greatest threat to livestock health. They are caused by bacteria, viruses, rickettsia and fungi. Some protozoan diseases behave much as infectious diseases and often are considered as such. Correctly, they should be classed with the other parasitic illnesses.

When living agents such as bacteria enter the body and multiply, they cause a disturbance of function, and disease occurs. Disease is caused by the chemical toxins (poisons) produced by invading organisms. At one time some scientists believed that microorganisms caused disease by mechanical objection of vessels or tissue spaces. This theory has been disproved, and it is now clear that damage is caused by chemical substances. But in some protozoan diseases, such as coccidiosis, mechanical damage to tissues is an important factor.

All contagious diseases are infectious, but not all infectious diseases are contagious. A contagious disease is one that is transmitted readily from one individual or group of animals to another. An infectious disease is one produced by living organisms. Most infectious diseases of animals are

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contagious; however, a few, such as aspergillosis, are not.

The ability of an organism to cause disease in a host is known as its virulence or pathogenicity. Many microorganisms unable to cause disease under most conditions may cause disease under certain conditions. Therefore, such microorganisms would be considered pathogenic in that particular host under the existing conditions. On the other hand, some organisms almost always are pathogenic and produce disease when they enter the body of a susceptible host. Some will invade the body of only one species of birds or animals and are said to be specific for that particular species. For example, infectious bronchitis virus will cause disease only in the chicken. Other organisms affect a large number of species. For example, some of the *Salmonella* organisms affect a large variety of species, including reptiles, rodents, domestic animals, poultry, and man.

The ability of an organism to cause disease is not a fixed characteristic. It depends upon many factors, such as the ability to invade tissues and produce chemical toxin. Often pathogenicity can be altered intentionally. This characteristic has been used in developing some vaccines. Variation in pathogenicity of organisms also partially explains why the same disease may present different forms and degrees of severity.

How Infectious Diseases Are Spread

Some common ways infectious diseases are introduced into and spread within herds or flocks are:

1. Introduction of diseased animals.
2. Introduction of healthy animals that have recovered from disease but are still carriers or can still transmit the disease to other animals.
3. Contact with inanimate objects that are contaminated with disease organisms (trucks and trailers, feeders, waterers, etc.).
4. Contact with carcasses of dead animals that have not been disposed of properly.
5. Impure water, such as surface drainage water.
6. Rodents and free-flying birds.
7. Mosquitoes. Insects-fowl pox and encephalitis are commonly transmitted by mosquitoes.
8. Shoes and clothing of persons who move from farm to farm.
9. Contaminated feed and feed bags.
10. Contaminated premises through soil, old litter, or bedding.
11. Airborne organisms, which do not spread far through the air, but this source of infection can be a strong factor in heavily populated livestock areas.

Body Defenses Against Disease

The body has a well-developed defense mechanism that must be understood and utilized in controlling infectious diseases. Immunity is the ability to resist infection; however, this ability can be overcome under certain conditions. Resistance is used interchangeably with immunity.

An animal has two types of protective mechanisms: (1) those that hinder or prevent invasion of organisms, and (2) those that combat agents which invade the body.

Mechanisms that hinder or prevent invasion of organisms include the intact skin and mucous membranes, which create a direct barrier; secretions, such as mucus, which tend to dilute and wash out invading organisms; and cilia (hair-like projections on some mucous membranes), which, with wave-like action, move foreign material out of such structures as the trachea (windpipe).

Mechanisms that combat agents invading the body include white blood cells and circulating antibodies.

Immunity (resistance) is outlined as follows:

1. Innate or inherited
 - a. Species
 - b. Racial (strain or breed)
 - c. Individual
2. Acquired
 - a. Active
 - i. Resulting from having the disease
 - ii. Stimulated by vaccination with dead or living disease agents
 - b. Passive
 - i. Injection of antiserum
 - ii. Transferred from dam to offspring

While inherited immunity is important, acquired immunity is a more controllable reaction that can be used intentionally by the producer. Acquired immunity is the reaction the producer hopes to stimulate by the application of vaccines. The purpose of vaccines is to stimulate an active production of antibodies by safe means. Active immunity depends upon the production of antibodies within the body of each individual. Antibodies are proteins associated with globulin fraction of the blood serum. Antibody production is not understood completely, but antibodies apparently are produced by various organs such as the liver, spleen, and bone marrow. In general, antibodies are specific for the organism that stimulated their production; thus, immunity to one disease ordinarily does not imply immunity to others.

Passive immunity is the transfer of antibodies from the individual in which they are produced to another individual. This may be done by the injection of serum collected from an immunized individual. Antibodies also are transferred from the dam to the offspring at birth. Such passive immunity is an important consideration in vaccination programs.

Manifestations of Disease

Detectable signs of disease are known as symptoms. Visible changes in the size, color, shape or structure of an organ are known as lesions. Loss of body weight, decreased

production, reduced feed consumption, droopiness and lameness are some symptoms. An enlarged liver, tumor on the intestine, or abscess in a lung are examples of lesions.

Many symptoms are general; they usually are seen in any diseased individual. Examples are droopiness, loss of appetite, labored breathing, nasal discharge and diarrhea.

Herd or Flock Health Management

Sanitation is a much-used but poorly defined word. The usual implication is that sanitation is a universally understood practice that may be applied to prevent all diseases. This concept often leads to misunderstanding and disappointment. Good sanitation in relation to one disease actually may provide conditions for the development of other diseases. Although many good sanitation measures always should be applied, others must be based on the nature of specific diseases. The ambiguity surrounding the term "sanitation" can be avoided by using the expression "management and sanitation for disease prevention." This phrase then would be defined as all practices, specific and nonspecific, that the livestock producer applies to prevent disease or reduce severity and economic loss from diseases.

A standard disease prevention program that can apply on all farms does not exist. But there are some basic principles that always should be observed. The following practices aid in disease prevention:

1. Consult a veterinarian before planning a health program.
2. Select a well-known, reliable source from which to purchase animals, one that can supply healthy stock, inherently vigorous and developed for a specific purpose.
3. Keep animals separate according to source and age groups. To mix animals is an invitation to trouble.
4. Follow an "all-in, all-out" program.
5. Select a reliable commercial feed, or if farm mixing is done, mix carefully according to a dependable formula.
6. Provide an adequate supply of wholesome water. Avoid water-ing from surface tanks, streams, or ponds.
7. Carry out a precise vaccination schedule for each herd or flock. Work out the vaccination program with disease authorities in each state or local area.
8. Discourage persons other than the caretaker or essential personnel from visiting the barns and lots. This would include vehicular traffic.
9. Observe animals frequently for signs of disease, and if a disease problem develops, obtain an early, reliable diagnosis and apply the best treatment, control, and eradication measures for that specific disease.
10. Dispose of all dead animals by burning, deep burying, or disposal pit. This phase of management often is overlooked.
11. Maintain good records relative to flock or herd health. These should include vaccination history, disease problems and medication.

Many facts of disease prevention are acquired only through experience and a well-rounded grasp of modern animal husbandry.

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