Bovine mastitis is inflammation of the milk-secreting gland or udder of the dairy cow. Micro-organisms (micro meaning “small” or “tiny”, and organisms meaning “living things”) are the usual cause of inflammation in the udder.

The most common mastitis-causing micro-organisms are bacteria: Streptococci, staphylococci, and coliforms. Other organisms include various gram negative and gram positive bacteria, fungi (yeasts and molds), algae (prototheca) and mycoplasmas.

Signs of mastitis may be put into two groups: Clinical—that which is obvious to the naked eye, or subclinical—that which cannot be detected by visual examination.

The clinical type of mastitis accounts for only a small portion of total infections, and is manifested by clots, pus, swelling, or heat. Dairymen often are unaware of the extent of infections in their herds without using some other means of detection such as somatic cell counts or laboratory culture.

Somatic cells (soma means body) come from the body's defense mechanisms against infection. These cells are mainly white blood cells or leucocytes sent to the site of the infection or injury by the body's defense mechanism.

The purpose of these cells is to eliminate foreign particles such as bacteria by engulfing them, breaking them down by enzymes, and ridding the host's body of them. Often this mechanism is adequate to rid the host of disease-causing organisms before they can multiply enough to cause an infection.
When quantities of somatic cells accumulate in one area, it may become obvious by the formation of pus. When there are fewer numbers in the udder, they must be detected by testing procedures.

Somatic cells are our best indicator of udder health or, more specifically, the level of infection or irritation in the udder. Somatic cells may be detected either at cow-side by the California Mastitis Test or by laboratory techniques. The Wisconsin Mastitis Test, Di-

Bovine Mastitis

Udder edema and mastitis in Jersey cow.
rect Microscopic Somatic Cell Count, or electronic equipment manufactured for this purpose are a few of the common techniques used.

Diagnostic laboratory culture of milk for micro-organisms is important because it identifies the types of bacteria or organisms causing the infections. Prognosis, control measures, and antibiotic therapy depend upon the causative agent.

**Two Types of Organisms**
The source of mastitis-causing organisms may be divided into two groups: Those that are contagious, such as *Streptococcus agalactiae, Staphylococcus aureus*, and mycoplasma, and those that are environmental such as coliforms and streptococcal species.

The contagious organisms do not survive well in the environment and require the host (cow) as a reservoir. These organisms are spread from cow to cow, often during the milking process.

On the other hand, environmental organisms readily survive in the environment. Dirty, wet environments are conducive to bacterial growth and, when the numbers of organisms are high, chances for them to cause mastitis increase. Good management practices are extremely important in the control of all types of mastitis.

Treatment responses of mastitis infection by antibiotics are variable. Mastitis may be caused by a variety of micro-organisms. Therefore, it is important to know which organism is causing the infection for proper antibiotic treatment.

Some organisms, such as *Streptococcus agalactiae*, respond readily to a broad spectrum of antibiotics. Other organisms such as yeast, prototheca, nocardia, and mycoplasma are refractory (or resistant) to most if not all antibiotics and, therefore, do not respond to or may be worsened by antibiotic therapy.

Infections due to types of bacteria, such as *Staphylococcus aureus*, streptococcus species, and coliforms, fall somewhere in between; they may respond to certain antibiotics but not to others. Laboratory tests for resistance patterns are helpful in these situations.

Antibiotics should never be used indiscriminately. Excessive use of antibiotics may cause development of resistant strains of some bacteria.

**Loss Estimates**
Researchers have attempted to assign a lost dollar value
due to mastitis to the average dairyman. Figures of between $150 to $200 per cow per year in a herd are estimated losses. Using these figures, mastitis costs the owner of a 100-cow herd between $15,000 and $20,000 each year.

Most of these losses are due to decreased milk production, as an infected udder does not produce to its potential. Mastitis may cause up to 20 percent lower milk production, or more in severe cases. Other dollar losses are due to antibiotic and treatment costs, discarded milk, and death or premature culling.

Public health significance of mastitis has been greatly reduced by pasteurization. However, consumers of raw, unprocessed milk are candidates for infections associated with bacteria from mastitis milk.

Human Group B strep, not unlike *Streptococcus agalactiae*, has been isolated from human infections. A direct link to the dairy industry has not been found in these cases, but caution should be advised when working with or drinking raw milk from infected animals. Subclinical mastitis—the kind you cannot see—is probably the most dangerous since the milk looks normal but bacteria are present, often in high enough numbers to be significant.

**Quality Affected**

Milk quality is affected by mastitis. As the somatic cell level increases, the nutritive substances of milk—such as lactose, total protein, casein, solids not fat, total solids, fat, calcium, phosphorus, and potassium—all decrease. Undesirable components such as immunoglobulins, lipase, sodium chloride, trace minerals and whey protein all increase.

Cheese manufacturers have also discovered that milk containing high somatic cell levels and undesirable components will yield less cheese per pound than higher quality milk.

This review is intended only to scratch the surface of a complex, multi-faceted disease. Many factors influence the incidence of mastitis: Environmental sanitation, housing, nutrition, milking systems, and milking procedures are a few. It is not the interest here to guide one in management of mastitis, but only to make the reader aware of the complexity of the disease, its cause, control, and cure. Said best in the words used by many in the mastitis field: “Prevention is the key to mastitis control.”