Veterinary Scientists Prove That One Type Of Mastitis Can Be Controlled Successfully

O. W. Schalm

Research in recent years has demonstrated that at least one form of mastitis can be cured.

Several species of bacteria have been incriminated as causative agents of mastitis. For practical consideration, two organisms, **Streptococcus agalactiae** and **Staphylococcus aureus**, are the principal offenders.

These organisms are widespread in the udders of present-day herds and frequently both are encountered in the same quarter. However, each is capable of causing mastitis by itself.

Bacteriological studies on individual milk samples from approximately 3,000 dairy cows in California revealed the fact that slightly more than 50 per cent of the cows harbored inherent disease-producing bacteria in one or more of their quarters.

The bacterial organism **Streptococcus agalactiae** lives on the surface of the milk channels, and in the course of its growth, the secreting cells are injured and become incapable of producing normal milk. Often, owing to special attention, other than treatment, the symptoms recede and the milk reverts to an apparently normal condition. However, the infection persists and at any time a serious flare-up of mastitis may again occur. As high as 85 per cent of the cows that become infected with **Streptococcus agalactiae** continue to harbor the organism throughout life unless treatment is given.

The organism **Staphylococcus aureus** also lives on the surface of the milk channels. In addition, it is capable of penetrating the tissues and causing deep abscesses. In animals where the invasion of the tissues is rapid and extensive, severe injury results. The affected quarters become cold and turn black or blue, a condition known as "blue bag" or "gangrenous mastitis." The cow may die or, if she survives, the gangrenous tissue later drops off and a long period of convalesence follows.

Diagnosis

To control mastitis, it is necessary to detect all of the infected cows in a herd so that they may be properly segregated and treated. Certain "barn tests" have been advocated: using a strip cup for examination of the first streams of milk for clots, shreds, or other abnormalities; testing the first milk with a color indicator to determine whether it is acid or alkaline; and, palpation of the milked-out udder for scar tissue.

These tests depend for positive results on the existence of sufficient tissue damage to render the milk or the udder tissues abnormal. Since the extent of injury to the udder varies with the stage of infection, these tests fall short of the goal of detecting all of the infected animals in a herd. Their efficiency as indicators of mastitis can be greatly increased, however, by using two or more of them in combination to test the herd at frequent intervals.

A more accurate procedure for finding the infected cows is to make a bacteriological analysis of the milk of each animal for the specific identification of streptococci and staphylococci.

The Hotis test, readily made by veterinarians and laboratory technicians, furnishes a simple method for the detection of **Streptococcus agalactiae** in milk.

For the Hotis test, the teats must be washed clean and then disinfected with a chlorine solution. Approximately one-half an ounce of milk is drawn into a sterile screw-capped vial containing a small quantity of bromcresol purple solution. The sample is placed in an incubator at body temperature for 16 to 20 hours, during which time bacteria multiply and alter the appearance of the sample.

The Hotis test will select as high as 85 per cent of the quarters infected with **Streptococcus agalactiae.**

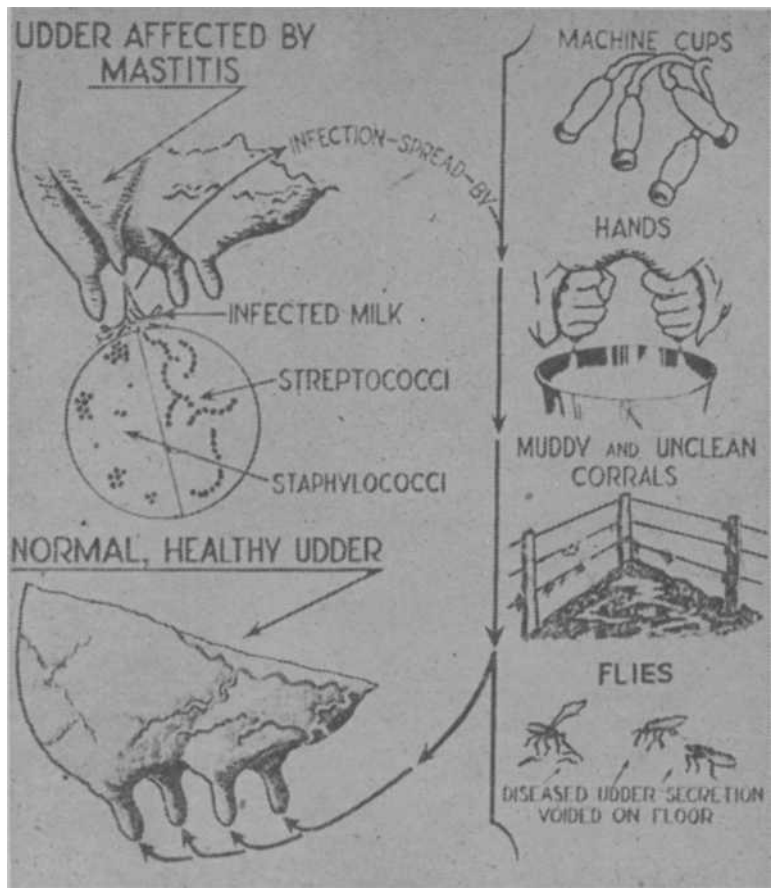
Many cows infected with staphylococci may also be detected by certain changes in the Hotis samples and by microscopic examination of stained smears prepared from the incubated milk.

Treatment

Streptococcus agalactiae is quite susceptible to treatment with penicillin. Cows infected with this organism should be placed at the end of the milk-line and all infected quarters should be treated by intramammary infusions of penicillin.

For udders producing less than 40 pounds of milk per day, each infected quarter should receive 25,000 units of penicillin in 50 cc (cubic centimeters) of distilled water or saline solution once a day until four injections have been made.

For udders producing over 40 pounds of milk per day, 50,000 units per injection, in either 50 cc or 100 cc of diluent, should be given. There is some evidence to indicate that 100 cc of diluent will increase the percentage of cures.



How chronic mastitis is spread.

During treatment, milking twice a day is continued as usual. To prolong the stay of penicillin in the udder, a milking may be omitted after the last injection has been made.

Ten to fourteen days after treatment, milk samples for Hotis and microscopic tests should again be taken.

All treated quarters which are now negative for **Streptococcus agalactiae** should be retested in a month. If they are still free of this streptococcus, it is relatively certain that a complete cure has been produced.

Quarters which continue to shed the organism after treatment should be retreated using twice the quantity of penicillin employed in the first series of injections.

If after a second series of injections, a quarter continues to shed **Streptococcus agalactiae,** it may be dried off by not milking it, but daily injections of 50,000 units of penicillin should be given for the first five days after milking has been discontinued.

Staphylococcus aureus injections are much more resistant to treatment. Therefore, quarters showing mastitis which are known to be infected with **Staphylococcus aureus** should be treated, using a minimum of 50,000 units given four times at 24-hour intervals.

A routine bacteriological test should be made on all cows at least every three months after the treatment program has been completed. It is necessary to follow this practice in order to be certain that **Streptococcus agalactiae** does not spread throughout the herd again.

Any quarter showing mastitis between herd tests should be treated immediately, using 50,000 units of penicillin in 50 cc of diluent daily for four days. This dosage is recommended since it will not be known whether the mastitis is caused by **Streptococcus agalactiae** or **Staphylococcus aureus.**

Management Practices

The most frequent causes of mastitis are mismanagement and bacterial infection. When faulty management practices are superimposed on a herd infected with bacteria capable of causing mastitis, impairment of the afflicted mammary glands is rapid and extensive.

In some dairy herds, the cows are stimulated to let down their milk, as a result of washing or manipulation of the teats, as much as 20 minutes to an hour before they are actually milked.

When milking is finally started, the flow from the udder is slow. To compensate for this, the milking machines are left on for 10, 12, and even 15 minutes, or the vacuum is increased.

These faulty milking practices contribute to an irritation of the mammary tissue and pave the way for the destructive effects of mastitis.

Proper milking requires (1) that the cow be content; an uneasy or frightened cow cannot assist in the removal of the milk from her udder; (2) that the teats and udder be prepared by washing and massaging only immediately before milking is to take place; massage stimulates the let-down of milk, a reaction which lasts only about seven minutes; (3) that the act of milking be carried out rapidly and thoroughly.

When milking machines are used, the vacuum should not be increased beyond the recommendation of the manufacturer. Rubber teat cup liners showing deterioration should be replaced.

Barns, corrals, and pastures should be inspected for loose barbed wire and other obstacles which might injure the udder. Shelter sheds with deep bedding should be provided. Exposure to mud and cold aggravates existing udder infections and favors a rapid spread of the disease.

O. W. Schalm is Professor of Veterinary Science and Veterinarian in the College of Agriculture Experiment Station.

New Strains of Wheat

(Continued from page 1)

has been completed and all of our important varieties are now available in the bunt resistant form.

Stem Rust

Stem rust has always been a threat to wheat production in California. Resistant varieties offer the only practical solution of this problem. The production of such varieties long has been the goal of plant breeders but for many years they were generally unsuccessful for want of a suitable rust resistant parent.

Relief came when E. S. McFadden, a private breeder in South Dakota, released Hope wheat, which he had selected from a cross between Marquis wheat and Yarslov emmer. It proved to be highly resistant to most the known races of stem rust.

In 1929 we began a backcross with White Federation and Baart, our two most widely grown varieties. However it is done, it takes about 15 crop years to breed a new variety of wheat. At Davis we are fortunate that we can grow two crops a year, harvesting in June, planting in July, harvesting in October, and planting in November or December.

Thus in 1938 we made our first increase of Baart 38 and White Federation 38, which were available for commercial planting in 1939. These combined resistance to both stem rust and bunt.

As soon as time and facilities were available we brought Big Club, Poso, and Ramona into the rust breeding project.

Hessian Fly

In the meantime a similar breeding project was undertaken in cooperation with Bureau of Entomology looking toward the production of a Hessian fly resistant Big Club. This insect is a serious pest only in a few localities in California.

Finally resistance to stem rust, bunt, and Hessian fly were merged into a single variety which was released as Big Club 43.

White Federation 38, Baart 38, Poso 44, and Ramona 44 are varieties resistant to stem rust and bunt, as is Big Club 43, but they are not resistant to Hessian fly.

Sonora 37, Pacific Bluestem 37, Onas 41, Bunyip 41, Federation 41, and Escondido 41 are additional varieties resistant to bunt.

Only one Hessian fly resistant variety is available at the moment, but it is the one most generally grown in the fly infested area.

This area now is entirely planted to Big Club 43 with the result that the fly has almost disappeared—which may prevent us from developing a fly resistant Poso because we depended on natural infestation in that region to enable us to make our selections.

Expectations Justified

All of the above varieties were released to growers without benefit of yield trials. Yield data have been collected subsequent to their release which have justified our procedure.

The most extensive yield trials have been conducted with Baart 38 and White Federation 38. These were made possible by the cooperation of the United States Department of Agriculture.

The two varieties have been tested against their prototype at 17 stations in eight western states which represent a wide range of conditions under dryland and irrigation. In more than 200 paired comparisons when rust was not present there was no significant difference in their yield. Of course in the presence of rust the resistance strains out yielded the old ones. Other differences were small and insignificant.

Extending Resistance

With susceptible varieties the threat of stem rust was constantly present. Fortunately, it did not always develop but when it did, it seemed to strike almost overnight and could be as devastating as a fire.

The existence of races of diseases is a constant threat to disease resistant varieties. If the proper race of bunt or stem rust should appear in California our new varieties would become susceptible.

We now have other good sources of bunt and stem rust resistance which we are transferring to California varieties so that they will be more useful if and when they are needed.

Fred N. Briggs is Professor of Agronomy and Agronomist in the Experiment Station, Davis.

BOOKS

For the Desk of the Farme

California Agriculture. Edited by C. B. Hutchison.

In one inclusive volume about soils crops, livestock, and the protection o plants and animals from pests an diseases, the authors—and there ar several—trace the history of, and dis cuss the social and economic develop ment, of California's agriculture fro the time of the arrival at San Dieg in 1769 of the original cattle herd t the current production of more tha 200 commercially important crops.

California's agricultural productio list includes 35 field crops, 68 fruits 86 vegetable crops, and a large num ber of seed crops, drug plants, an condiments. Added to these are a least 40 different commercial live stock, poultry, and honeybee enter prises, to make a grand total of mor than 200 different crops of agricul tural importance.

The specialized farming that pro duces this wealth calls for exper knowledge—of soils, their productiv characteristics and deficiencies—o the varieties of crops and animals their adaptability and marketabl qualities—of plant and animal nutri tion, plant fertilizer and water re quirements—of the most effectiv means of protecting plants and ani mals against attacks by insect pest and diseases.

For the knowledge that offers th solution to many of the problem raised by nature, and by man himself California agriculture often ha turned to science. The story of th search by science for the answers t those problems, the failures and th successes, makes the book good read ing.

Table of Contents

The Historical Background of Cali fornia Agriculture, by Frank Adam

Wealth Pyramiding in the Produc tion of Livestock, by George H. Har and collaborators.

The Rich Pattern of Californi Crops, by Warren P. Tufts and col laborators.

Protecting Plants from Their Ene mies, by Ralph E. Smith and collabo rators.

Exploring the Soils of Californi by Hans Jenny and collaborators.

The Economic and Social Structu of California Agriculture, by M. R Benedict.

Abstracts of New Publications

The following are abstracts of ne publications recently issued at th College of Agriculture:

ADOBE CONSTRUCTION, by D. Long, revised by L. W. Neubaue Bulletin 472, Nov., 1946 (63 pages).

Adobe construction is adequate strong, lasting and inexpensive be practical for the building of res dences and small structures. Th bulletin tells the prospective builde about the particular problems en countered and methods needed whe earth is used as a building materia

CALIFORNIA BEEF PRODUC TION, by H. R. Guilbert and G. Hart. Circular 131, November, 19 (157 pages).

Not intended for once-over read ing, this circular is a technical refer ence book of up-to-date informatio on beef-cattle raising, includi solutions to some of the proble involved.

PROPAGATION OF FRUI PLANTS, by C. J. Hansen and E. Eggers. Circular 96, revised Octobe 1946 (62 pages).

Ample illustrations demonstra methods of propagation for bot temperate-zone and subtropic fruits, in addition to details of speci treatment required.

INVESTIGATIONS WITH DD AND OTHER NEW INSECTICIDE IN 1945. A Progress Report prepar in the Division of Entomology a Parasitology. Circular 365, Novemb 1946 (108 pages).

Results of research to date, chie on the use of DDT to control inse attacking agricultural crops, are corded in this publication. The rep also covers investigations of s other promising insecticides as sab dilla, D-D, DDD, and EBD.

These, and other publications, available without cost at the Colle of Agriculture.