At the first dormant pruning, one limb was bent and tied flat along the wire in each direction. Upright shoots developed from these horizontal limbs, and eight to ten were selected for the permanent framework. These limbs were headed at about 4 feet during the next winter. After the third growing season, the limbs were headed at 6 feet. The fourth dormant season, the trees were headed at 7 feet—about the height a man can reach from the ground to thin and pick the fruit.

Rows running north and south allow the most uniform light exposure on both sides with the hedge type planting. Cultivation is in one direction, similar to grapes.

Advantages of this system of training include not only the saving of labor costs through the removal of the ladder, but the possibilities of mechanized pruning, thinning and picking. This mechanization would require only ordinary vehicles to transport workers through these operations—not mechanized shakers and catching frames. Non-tillage by controlling weeds with oil sprays may also be a possibility with this type of planting. These trees are only five years old, however, and another five years of testing may be necessary before recommendations on this practice can be made to plum growers.

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Milk Quality and MASTITIS CONTROL

Milk has been long recognized as a particularly nourishing and adaptable food, but was limited in use until production and quality controls were instituted about 50 years ago. The good reputation of milk as a highly nutritious, high quality food is firmly established today but it must be continually guarded and strengthened. This article reviews the effects of mastitis on milk quality and discusses the value of quality control testing programs as they affect dairymen, manufacturers and consumers.

ONE OF THE PRINCIPAL quality control procedures for milk has been the bacterial count which was instituted primarily to control contamination from outside sources and to insure good sanitation and refrigeration. These goals have largely been realized and the well operated, mastitis-free dairy today will have bacterial counts of only a few thousand or less.

Although mastitis has seldom been responsible for counts of 75,000 or over, it may very well be responsible for counts of 10,000, 20,000, or 30,000 which are now often regarded as undesirable. As mastitis causing bacteria increase in numbers, so do the protective leukocytes (white blood cells) which migrate into the udder. These leukocytes increase in parallel with the bacteria up to a point. Thereafter, the increase in leukocytes becomes overwhelming to the point that bacterial growth will be almost entirely prevented. Under these conditions, a bacteria count could falsely indicate milk of superior quality which in reality contained udder secretions almost entirely of an inflammatory nature.

It has become obvious that milk needs to be checked for quality as it comes from the cow as well as for the care in handling it receives between milking and marketing. Public health agencies are therefore becoming increasingly interested in measuring leukocyte numbers in milk since they are the most accurate indicator of mammary inflammation available today.

Screening tests

Because the actual leukocyte counts are time consuming, a variety of screening tests have been devised. Most commonly used are the catalase test, the modified Whiteside test, and the California Mastitis Test (CMT). Each of these tests gives a rough estimate of the number of leukocytes present in the milk. The catalase test depends upon the release of oxygen from hydrogen peroxide by the enzyme catalase found in the nuclei of cells. Therefore, the more cells, the more gas. In the Whiteside reaction a thickening and a precipitate occur in the presence of excessive leukocytes when five drops of milk are mixed on a glass plate with one or two drops of 4 percent NaOH (sodium hydroxide). With the CMT test, a precipitate and gel will form in the presence of excessive cells when the milk and reagent are mixed together. The reaction occurs between the reagent and the DNA (deoxyribonucleic acid) in the nuclei of cells.

Originally used to detect mastitic quarters or cows, it has now been found that these tests are equally effective in testing the mixed herd milk from cows or from tanks. The quality level of the milk of any dairy can therefore easily be checked. Milk from a relatively few cows with severe active mastitis will alter the milk of a whole tank sufficiently to be readily detected by these screening tests.

Application of tests

The use of one screening test or another is being adopted by health departments in important milk sheds throughout the country. The tests are used in a manner

very similar to the bacteria counts. Dairies with milk not meeting minimum standards of quality are warned and, after a time, milk may be barred from the market until it is brought up to standard. Experience to date in areas where screening tests are used has demonstrated that a general upgrading of milk quality results.

Tests at the dairy

The screening tests are also very valuable to the dairyman and his veterinarian in solving the local problem. By testing bulk tanks, daily or at any chosen intervals, the dairyman can get an excellent idea of the quality of his milk. In the absence of specific operational changes the bulk tank scores for a given dairy tend to remain fairly constant from day to day.

If a quality problem exists, the individual cows can be tested (the CMT is generally regarded as the most practical on-the-farm test). By withholding the milk of high reactor cows from the tank, the remainder of the milk will almost always be acceptable again in the market. This enables the dairyman to market most of his milk while he and his veterinarian deal with the high reactors and develop a workable mastitis control program for the herd.

Many dairymen are finding it highly desirable to have monthly CMT tests run on their cows in conjunction with the Dairy Herd Improvement Association production testing program. This program offers a continuous record of individual cows as well as the herd status. By following the trends of reactions dairymen are able to see the results of their mastitis control programs and are able to spot trouble before it becomes extensive. Effects of changes in management or equipment operation can often be spotted early by changes in the CMT score. A milking machine part which has become defective, or a milker doing a poor job, are sometimes detected as a consequence.

As already pointed out mastitis is accompanied by an outflow of leukocytes into the milk. Their presence in excess in milk always indicates an inflammatory response to injury—whether it be mechanical, infectious, or a combination of both.

Such milk, which is considered of poor quality, not only contains the products of inflammation, but is of significantly reduced nutritional value as well. Work at the School of Veterinary Medicine and elsewhere has shown significant reductions of solids-not-fat (SNF) percentages in milk having positive CMT reactions. Reductions of SNF (chiefly lactose and casein) in excess of 20% can be seen in milk having the stronger CMT 3 scores. Cows whose mixed milk reacts at this level are also likely to be losing more than 20% of their total production from mastitis. The total loss of the valuable casein and lactose in such animals is therefore approaching 40%. Considering that the tank milk of some dairies reacts at this level, and that the milk from many will react at the CMT 2 level, the tremendous losses from low production and from low SNF can be visualized.

The great progress of the dairy industry makes mastitis control all the more important to assure the profitable production of milk with the highest nutritional quality and freedom from undesirable levels of bacteria and leukocytes.

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HELMINTHOSPORIUM LEAF BLIGHT

of Forage Sorghums in Southern California

E. C. HOFFMAN • V. W. BROWN • A. O. PAULUS

HELMINTHOSPORIUM LEAF BLIGHT, caused by the fungus *Helminthosporium turcicum*, was first noted on sudan leaves in San Bernardino and San Diego counties in 1956. Tests conducted in San Bernardino County in 1954 showed Sudan 23 and Piper to be the highest yielding varieties. At that time, they were outyielding Tift by about 20%. Consequently, most sudan acreage during this period was planted to the susceptible variety, Sudan 23. Characteristic symptoms of the Helminthosporium disease on sudangrass are elongated, linear lesions. The lesions are water soaked at first, and then turn brown to straw color. Under conditions favorable to the disease in San Bernardino and San Diego counties, entire leaf blades are killed.

Control of Helminthosporium leaf blight by seed treatment was considered impractical because infected volunteer plants are common near sudan fields. Consequently, varieties that have shown some resistance to the disease in other areas were initially recommended.

During 1958 through 1961, trials were conducted in San Bernardino and San Diego counties to evaluate resistance to the Helminthosporium fungus and to determine the yielding ability of several open-pollinated sudan varieties, several sudangrass-sorghum hybrids, and two varieties of millet. In each case, the plots were two rows 50 feet long, replicated four times. All plots were sprinkler-irrigated, a practice which appears to enhance development of the disease. The disease rating used was 1 to 5, with a "1" rating having a trace of the disease on the leaves, and a "5" rating indicating severe leaf damage. In most cases, the disease rating was the average of at least two observations made during the growing season. Disease ratings in June and July were always lower than those made in August and September, since the disease progressed as the season advanced. Results of the 1958 through 1960 trials are shown in table 1.

In San Bernardino County, observations only were made in 1959–60. Although Lahoma and Sweet Sudan showed resistance, relative growth of these varieties was very poor. As a result, Tift was recommended, with Greenleaf as an alternative variety.

The millets Gahi No. 1 and White Proso were also included in the 1960 tests in San Bernardino County. They appeared quite resistant to leaf blight—substantiating extensive observations of tests conducted in the southern United States. Millets are high forage yielders, and more extensive tests should be conducted to evaluate their adaptability. Sudo-Sorghum demonstrated moderate susceptibility in the same test.

In San Bernardino County in 1961,