COOPERATIVE EXTENSION WORK
IN
AGRICULTURE AND HOME ECONOMICS
STATE OF OKLAHOMA
D. P. TRENT, Director

OKLAHOMA AGRICULTURAL AND MECHANICAL COLLEGE AND UNITED STATES DEPARTMENT OF AGRICULTURE, COOPERATING

EXTENSION SERVICE
COUNTY AGENT WORK
STILLWATER, OKLAHOMA

Distributed in Furtherance of the Acts of Congress of May 8 *and June* 30, 1914

Chemical Dairy Sterilization

JOHN W. BOEHR
Extension Dairyman

PROTECT THE CHILD'S MILK

Circular No. 300 | 1933 | General Series 233

CHEMICAL DAIRY STERILIZATION

PURPOSE

Market demands require high standards of dairy sanitation from producers and manufacturers. Cleanliness is not sufficient but all objects coming in contact with milk must be thoroughly cleaned and also STERILIZED. In the modern dairy, only the utensils come in contact with the milk, so that clean and sterile machines, buckets, cans and bottles will practically assure high quality milk as far as bacterial contamination is concerned. To combat the germs so damaging to dairy products many methods have been tried. Airing or drying in the air has been considered a good method but not a true sterilizer. Scalding is used quite extensively, but has failed in thorough sterilization. Nearly all milk ordinances still recognize steam sterilization as effective. Steam is the most common form of sterilizer at the present date and milk plants, dairies and farm milk houses and practically all plants or places handling milk and dairy products are equipped with steam. However chemical dairy sterizilation has been proven to be a very efficient method at a low cost.

The purpose of this circular is to give simple instructions in preparing and using chemical sterilizers. This is done in response to requests of dairymen from various parts of the State. Furthermore the circular should help dairymen in our quality program.

Chemicals Suitable for Dairy Use

Very few chemicals are suitable for dairy uses. Due to poisonous properties and undesirable odors, most chemicals are unsuitable. However, one group of compounds is best suited for this use. The valuable Chlorine Sterilizers are odorless and will not poison in proper dilution. Many chlorine products are in use for dairy sterilizers.

1. The solution of sodium hypochlorite. Trade names of B K, Hypchlor, Germ X, Belle disinfectant and others are used for this product.
2. Solid form of sodium hypochlorite, sold under names of Diversol B K and H. T. H.
3. Bleaching powder, which is chloride of lime, also called Calcium hypochlorite.
4. Chloramine T, on the market in powder or tablet form, sold as Chloron, Santanime, Chlorazene, Sterilac, and Hoover 40.
5. Home prepared Chlorine disinfectant.

All these sterilizers have the same agent which kills bacteria, active or available chlorine. However this agent escapes readily; all of them gradually losing their sterilizing effect. Products from calcium compounds are more unstable than the sodium hypochlorites. So dairymen who use small quantities of disinfectant, use the more stable preparations.

How to Prepare Chlorine Sterilizers at Home

Secure a 3-gallon or larger earthenware vessel, a 12-ounce can of fresh chloride of lime (bleaching powder), containing at least 30% available chlorine, 2 gallons of water and a thoroughly cleaned stirrer. Dissolve the chloride of lime slowly in enough water to make a thin paste. Add enough water slowly to make 2 gallons of the solution, stirring constantly. Stir vigorously several times during the first three hours. Let this settle for six or more hours. Siphon or pour off the clear liquid into gallon jugs, fitted with cotton or cotton strainer pads in the mouth of the jug to keep out all solid particles. Throw away the sediment. Stop jugs tightly and store in a cool dark place. One pint of this stock solution to eight gallons of water may be mixed for immediate use. After using this, it should be thrown out and a fresh solution prepared for the next sterilization of utensils.

The difficulty with this disinfectant is its unstable nature, losing strength rapidly and an uncertainty as to amount of chlorine present. At least 50 parts of chlorine to the million of water is required to do the work in 60 seconds, when sterilizing buckets, separator parts and bottles immersed in the solution. However if spraying coolers or other equipment is done, a 200-part chlorine to the million of water is required.

A more stable solution is the following: As in the first solution, mix 12 ounces fresh chloride of lime with just 1 gallon of warm water, not over 120°F. In another vessel dissolve in a gallon of warm water 27 ounces of cystalline sal soda, also called washing soda. After a few minutes pour the sal soda solution into the stone jar containing the chloride of lime solution. Stir thoroughly several times during the first three hours. Let this settle for about 6 hours and siphon or pour off, strain or filter, store in gallon jugs in a cool dark place as in first solution. Use a pint of stock solution to 8 gallons of water for final sterilization. This is a much more stable and dependable solution and should have 200 parts of available chlorine to the million parts of water.

Testing for Chlorine Strength

It would be too risky to use these disinfectants and not be sure the solution is strong enough to destroy bacteria. Many failures are on record. So a simple test is possible to safeguard the dairyman. Secure 9 grams of C. P. sodium thio sulphate or Granular Hypo, a pint milk bottle, ¼ pound potassium iodide, ½ pound boric acid powder, a wide-mouth pint brown glass bottle. Dissolve the 9 grams of sodium thio sulphate in 6 ounces of boiling water. Place in pint milk bottle and add water which has been boiled to fill the pint bottle. Cover tightly. Make up a fresh mixture when yellow sediment forms. As a separate mixture, mix ¼ pound potassium iodide crystals with ½ pound boric acid powder. Keep dry and covered in brown bottle.

1. By using a clean pint milk bottle as a measure, pour a pint of the chlorine rinse water, as prepared for disinfecting milk utensils, into a clean quart bottle.
2. Add to this about a teaspoon full of the potassium iodide and boric

acid mixture, or just enough to give the solution a constant coloration after shaking the mixture.

3. Take a milk testing pipette and add gradually 17.6 cubic centimeters of the thio sulphate solution.

If this just destroys the color with the solution, 100 parts of chlorine per million of water are present. If a quart of the chlorine solution is used in the same amounts of other chemicals, more or less than 50 parts may be detected. In using a ½ pint portion of the chlorine solution, an exact discharging of the color will show 200 parts chlorine to a million of water.

A much simpler and dependable method of testing chlorine solutions is the use of the Chlorine Testing Set, manufactured by Diversey Mfg. Co., 53 Jackson Blvd., Chicago. This small kit costs $6.00.

How to Use Chlorine Solution

1. Cold chlorine rinse waters are most helpful.
2. Any cloudiness in chlorine solutions is unfavorable. Locate the trouble and make up a new, perfectly clear solution.
3. Only absolutely clean utensils and bottles should be dipped in this chlorine solution. Practically all dirt, films or grease is in the class of organic matter with the bacteria we hope to destroy. So any of this matter will rob the chlorine solution of its strength and bacteria will not be killed, even in a strong solution.
4. Utensils should be dried after sterilization. Many dairymen want the bottles and utensils free from chlorine before milk comes in contact with the receptacles although immediate filling of bottles after rinsing in chlorine solution will not harm flavor nor quality of milk. But rinsing in hot water or steaming utensils and bottles will remove chlorine and also heat them so they will dry quickly.

The cost is low for this chlorine disinfectant. A 12-ounce can of chloride of lime can be purchased for 20 to 25 cents and sal soda costs 15 cents per pound. So a gallon of stock solution requires between 18 to 20 cents worth of chemicals. However the testing chemicals, gallon jugs, stone jars, and additional equipment are extra expenditures, but may be held down to a minimum to enable dairymen to prepare an effective sterilizer at a low cost.