Canterbury Chamber of Commerce

Agricultural Bulletin

Chlorine Disinfectants for the Dairy Farmer

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It has long been recognised that a disinfectant which could be used for sterilising dairy utensils would be of distinct advantage to the dairyman. In the past chemical sterilisation has not been practised to any extent owing to the fact that most of the substances available are either poisonous, corrosive or taint the milk. Within recent years chlorine disinfectants have been used in Europe and America with satisfactory results. For these reasons the efficiency of some of the chlorine compounds was tested at the Canterbury Agricultural College, and the results of this test, together with other information relating to the use of the disinfectants is presented in this Bulletin.

Cleaning Utensils.

The thorough cleansing and sterilising of appliances and utensils is one of the important operations on the dairy farm. The cleansing is easily done provided plenty of water is available, but it should not be done carelessly. All vessels must be washed first in cold water to remove the milk, and then in hot water containing some cleansing powder such as washing soda. If the milk were not first removed with cold water it would coagulate when heated and stick to the sides of the vessels. But a clean vessel is not necessarily a sterile one. Sterilisation means the destruction of all bacterial life, and water accomplishes this only when it is boiling hot or in the form of live steam. If boiling water or steam is available it is the most efficient and cheapest method for sterilising most dairy equipment. There are, however, some appliances which cannot be effectively treated with boiling water or steam. In this case, and in the case of farms where boiling water is not available in sufficient quantity, chemical sterilisation with suitable disinfectants is to be recommended.

Chlorine Disinfectants.

Chlorine has long been used for sterilising drinking water. It is a most suitable disinfectant for sterilising dairy utensils, because when used in the strength recommended it is non-poisonous, non-corrosive, does not taint the milk, and is easily handled.

There are three chemical compounds which are chiefly used as chlorine disinfectants. They all act by liberating free chlorine gas, and it is this gas which kills the bacteria. The chlorine is continually escaping from most of them, so they gradually lose their sterilising power—some more quickly than others. These chemical compounds are:—

1. Calcium hypochlorite or bleaching powder.
2. Sodium hypochlorite.
3. Chloramine T.

1. Calcium Hypochlorite.—Sold in powder form, and when fresh contains about 30 per cent. of chlorine. It is not very soluble in water and forms a heavy deposit of lime which can be removed by allowing a solution to settle. The chlorine readily escapes from the powder and from a solution, with the result that it loses its strength fairly rapidly, and only fresh solutions made from fresh powder should be used. A strength of one ounce to two gallons makes a good disinfectant, but it is not reliable. Bleaching powder is more commonly used in a mixture with boric acid or washing soda, the addition of which make a more suitable disinfectant. Two reliable mixtures are given below:—

Mixture No. 1. Bleaching powder ¼lb, boric acid ¼lb, water 2 gallons.

This mixture should be well stirred, allowed to stand in a covered container overnight and the clear liquid poured off in the morning. It should be made up once a week in the summer time, but less frequently in the cooler months and should be kept in well-corked jars in a cool dark place. It can be used in a strength of 1 in 20, but stronger solutions may be necessary if the bleaching powder or the solution is not fresh. Ten gallons of the diluted mixture should not cost more than twopence.

Mixture No. 2 (from the "N.Z. Journal of Agriculture"). Bleaching powder 1lb, washing soda 4lb, salt 6oz, water 1 gallon.

Dissolve the soda in one gallon of hot water. Allow to cool, then add the salt and bleaching powder. Agitate at intervals for one hour, cover and allow to settle. Pour off the clear fluid and keep well corked in a dark jar. For sterilising machine cups, utensils, etc., use half pint to four gallons of water. Make up a fresh lot each week.

The two following compounds are more stable, and therefore more reliable disinfectants:—

2. Sodium Hypochlorite.—This is a more stable compound than bleaching powder, but still loses its chlorine so that fresh solutions have to be made up, but not so frequently as with bleaching powder. It is usually sold in liquid form containing 10 per cent. of chlorine and should be used in a strength of 1 fluid ounce, i.e., one tablespoonful to 10 gallons or a dessertspoonful to 4 gallons of water.

3. Chloramine T.—This is the most stable of all the chlorine compounds. It is usually sold in powder form and contains 12.5 per cent. of chlorine. A good disinfecting solution is obtained by mixing 1 ounce to 10 gallons of water.

Commercial preparations containing calcium hypochlorite, sodium hypochlorite or chloramine T. are on the market. They should be used in strengths recommended by the makers, and their value depends on stability of the chlorine and on their purity.

Some Results.

In order to test the efficiency of the home-made mixtures recommended above, as well as the sodium hypochlorite and the chloramine T, buckets and cans were first thoroughly washed in cold water and then in hot water at 160 deg. F. Two hours later sets of two buckets each were rinsed for one minute with half a gallon of each disinfectant and a set of control buckets was rinsed with clean water. The buckets were then drained for half an hour and equal quantities of sterile water poured into each. The number of bacteria in samples of this water were determined. The results, which are the average of four trials, are given below:—

Treatment	Number of Bacteria per c.c.
Control (ordinary washing, no sterilisation)	1634
Fresh home-made mixture, No. 1 full strength	15
Fresh home-made mixture, No. 1 half strength	27
Fresh home-made mixture, No. 1 1-10th strength	36
Fresh home-made mixture, No. 1 1-20th strength	40
Fresh home-made mixture, No. 2 ½ pint to 4 gallons ..	176
Fresh home-made mixture, No. 2 ½ pint to 2 gallons ..	40
Chloramine T.	48
Sodium hypochlorite	27

It is evident that most of the disinfectants used in the trial reduced the bacterial numbers in the utensils by over 90 per cent. The large number of bacteria in the control buckets demonstrates the fact that hot water at 160 deg. F. in which the buckets are usually washed has no sterilising effect.

Method of Using the Disinfectants.

It must be realised at the outset that chemical sterilisers are of no value for sterilising dirty utensils. The chlorine will kill only those bacteria with which it comes in contact. Bacteria protected by a laver of fat or casein are not destroyed. Therefore, before treatment the utensils must be thoroughly washed and scrubbed. Owing to possible contamination in the interval between milkings, it is better to disinfect the utensils just before milking. The solution can be run through the machines and separator and the buckets and strainers rinsed. The left-over solution will do for washing udders, hands and finally used up to wash benches and floors.

The use of disinfectants, although assisting in the production of clean milk, will not eliminate the care and cleanliness which are necessary on a dairy farm, but will be of distinct assistance in so far as clean milk production depends on sterile utensils.

Other Uses.

Many antiseptic and disinfectant preparations on the market at the present time are recommended for such ailments as abortion, vaginitis, mammitis, and other troubles, and although many of them serve a useful purpose and are quite reliable, yet many of them show no advantage over the preparations referred to in this Bulletin.

In the control of outbreaks of abortion, vaginitis, mammitis, etc., reliable antiseptics and disinfectants are indispensable. The spread of disease from cow to cow or from man to cow is far too often the result of failure to use antiseptics or disinfectants. Many extensive outbreaks of mammitis have been traced to insufficient sterilisation of utensils, milkers' hands, machine cups and discharges. Evil-smelling discharges from cows that have aborted or retained after birth not only endanger the bacterial content of the milk supply and its keeping quality, but may prove harmful to human beings. The common practice of syringing out the genital passage of affected animals is a very valuable procedure to adopt in the control of disease and clean milk production. Few farmers, however, realise that harmful effects can result from the use of unsuitable antiseptics or disinfectants, which are of an irritant or poisonous nature. Many cases of sterility, both temporary and permanent have been traced to the use of strong or unsuitable antiseptics for drenching or syringing cows.

The use of the chlorine preparations recommended in this Bulletin is strongly advocated in view of their non-irritant and non-toxic properties. For syringing out cows and bulls in herds where abortion is present, for the disinfection of hands and udder in mammitis outbreaks and for the sterilisation of evil-smelling discharges that frequently encourage the spread of disease and the contamination of the milk supply, they are to be strongly recommended.

The Keeping Quality of Milk.

Milk is an ideal medium for the growth of bacteria, and its keeping quality is largely dependent on the number and kind of these organisms which it contains. At ordinary temperatures they multiply rapidly, and when present in large numbers considerably reduce the keeping quality of the milk. The development of bad tastes and odours is caused by bacteria commonly found in dung and soil, and such bacteria in milk indicate dirty conditions which render the milk suspicious from the point of view of health. Unhealthy cows, diseased udders, dirty milkers, dusty and unclean surroundings and appliances have all been shown to affect the quality of the milk by introducing harmful bacteria or by increasing their numbers. Chlorine disinfectants will play an important part in securing those clean, sterile and hygienic conditions which are so essential in the production of clean fresh milk, free from disease producing bacteria, and of good keeping quality and taste. This clean milk should be cooled quickly to 38deg. F to prevent the multiplication of any bacteria which may be present.

Copies of this Bulletin may be obtained from the Secretary, Canterbury Chamber of Commerce, P.O. Box 187, Christchurch.

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