

A LABORATORY WHIRLER FOR DETERMINING COUNTS OF THERMODURIC ORGANISMS IN RAW MILK SUPPLIES.

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SUMMARY.

A laboratory whirler which permits the rapid performance of thermoduric counts on milk samples is described. The method is faster and more convenient than the orthodox roll-tube count and yet retains all the advantages of roll-tube counting.

INTRODUCTION.

The periodic occurrence of high counts of thermoduric organisms in some Queensland milk supplies has presented a problem in milk quality control work in this State. While health standards dictate that pasteurized milk shall contain not more than 50,000 organisms per millilitre, due attention must be paid to the numbers of organisms surviving pasteurization. When these numbers become excessive, improvement can be obtained by counting the thermoduric organisms in each farmer's supply and by conducting the necessary follow-up work on farms.

The large number of milk samples to be dealt with in work of this nature has caused some difficulty in the laboratory. The plate count was considered to be out of the question, since it is laborious, requires a large amount of equipment and overtaxes incubator space when large numbers of plates are involved. A solution to the problem has been obtained by the construction of a laboratory whirler which enables 300-400 counts to be done in tubes in a working day.

DESCRIPTION OF APPARATUS.

The whirling apparatus is featured in Figure 1. It has three vertical spindles, all running in ball bearings and covered with rubber to provide a friction drive of rubber on to rubber. The central spindle is directly coupled to the vertically-mounted motor. The two lateral spindles run in frames which can be adjusted into or out of drive with the central spindle by turning a knurled thumb screw. At the bottom of each lateral spindle is attached a rubber stopper which spins the tube by seating into its top.

Through each lateral frame slides a vertical stem situated behind the spindle. This stem is free to move vertically but is prevented from rotating by a ball-in-slot arrangement. It supports a foot plate bored with a half-inch hole to act as a simple bearing in which the bottom of the tube spins under water.

This stem is spring loaded above to keep the tube constantly and gently pressed upwards against the driving rubber stopper. Sufficient vertical movement is provided to enable the foot plate to be easily and quickly lowered for the replacement of tubes.

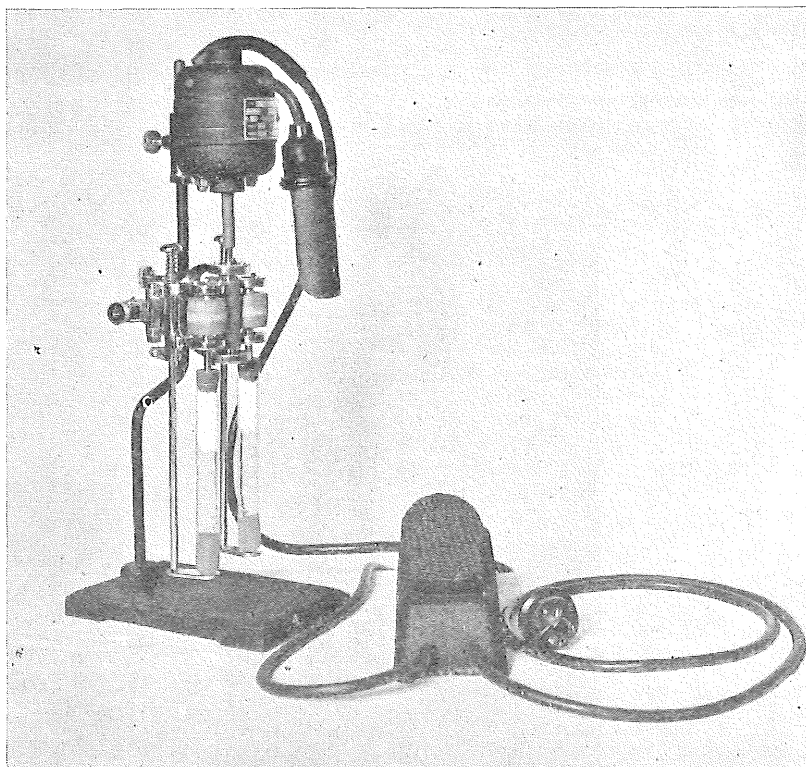


Figure 1.

Photograph of Whirler with Tubes in Position.

The whole apparatus is mounted on a sturdy stand on which it can be raised or lowered to the required height and to allow the vessel of water in which the tubes spin to be placed in position.

A small sewing machine motor operating on 240 v. A.C./D.C. and using 80 watts has provided ample driving power. This motor, when purchased, was equipped with a foot-type speed regulator which has been used with advantage to give the optimum speed of whirling.

METHOD OF PERFORMING COUNTS.

The media—tryptone, dextrose, yeast extract milk agar of the American Public Health Association (1948)—is dispensed in 4-5 ml. quantities in 6 in. \times $\frac{3}{4}$ in. tubes plugged with an abbreviated cotton wool plug. Following autoclaving, the tubes should be covered to guard against contamination through the smaller cotton wool plug during storage.

After the media is melted and cooled to 45 deg. C., the tubes are inoculated with the sample of milk previously laboratory pasteurized. Inoculation is by a standard loop, calibrated gravimetrically to deliver .01 ml. The neck of the tube and the cotton wool plug are flamed and the plug pushed down almost half an inch into the tube. The tubes are then placed in the whirler and whirled for 10-15 seconds in cold water. The high-speed whirling action thoroughly mixes the inoculum with the medium and throws the medium up on to the walls of the tube in an even layer before it quickly sets. Two spun tubes of media are shown in Figure 2. Tubes are incubated for 48 hours at the temperature employed for plate counting for pasteurized milk.

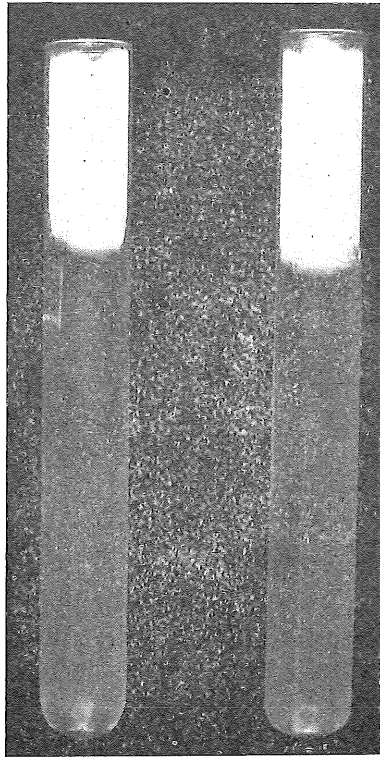


Figure 2.

Tubes After Whirling.

It is not necessary to count all tubes following incubation, for with a little practice the laboratory staff can quickly separate the tubes into three lots:—those well below the standard count of 50,000 per ml., those well above the standard, and those which approximate the standard. It is in the latter group only that colonies need to be counted. Experience has shown that some very bad milks can be observed after incubation for 24 hours.

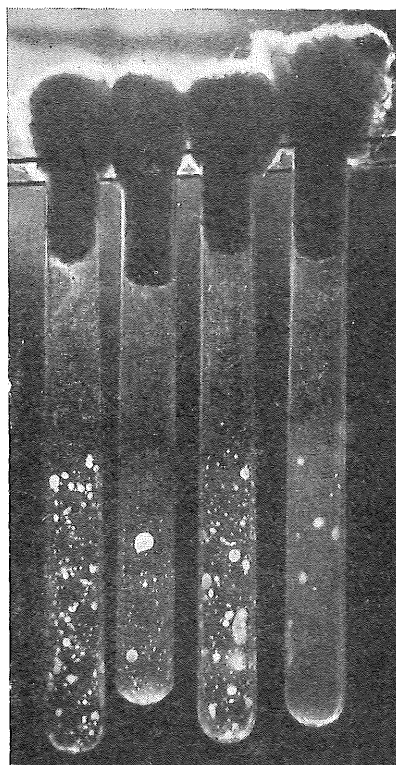


Figure 3.

Tubes Showing Bacterial Development After Incubation.

ADVANTAGES OF THE METHOD.

The method is convenient and requires no great technical skill. Its advantages are twofold, viz. :—

- (1) It permits of considerable speed, enabling large numbers of samples to be tested in a short period. A working rate of 80 samples per hour has been found to be a convenient speed for two operators.
- (2) There is an appreciable saving in glassware, incubator space and media. Petri dishes, pipettes and diluent are not required, the only glassware necessary being two tubes for each sample. The whirled tubes can be incubated in baskets, thus requiring much less incubator space than plates. About half the quantity of media is required as is necessary for the plate count.

The only additional item of equipment required is the standard loop. It is in connection with this piece of apparatus that the method suffers its greatest disadvantage, viz., its loss of accuracy. This loss, however, can be kept small

if care is taken in the way the loop is used in inoculating. It should be withdrawn vertically from the milk and always at the same speed. In practice the error is accommodated by not penalising milks which approximate the arbitrary standard of 50,000 thermoduric organisms per millilitre.

REFERENCE.

AMERICAN PUBLIC HEALTH ASSOCIATION AND ASSOCIATION OF OFFICIAL AGRICULTURAL CHEMISTS. 1948. Standard methods for the examination of dairy products. 9th ed New York: American Public Health Association.