

Article for *Food Quality Magazine*

Counting Bugs Quickly

How rapid quality testing could mean the difference between selling milk or throwing it away before it even reaches the consumer

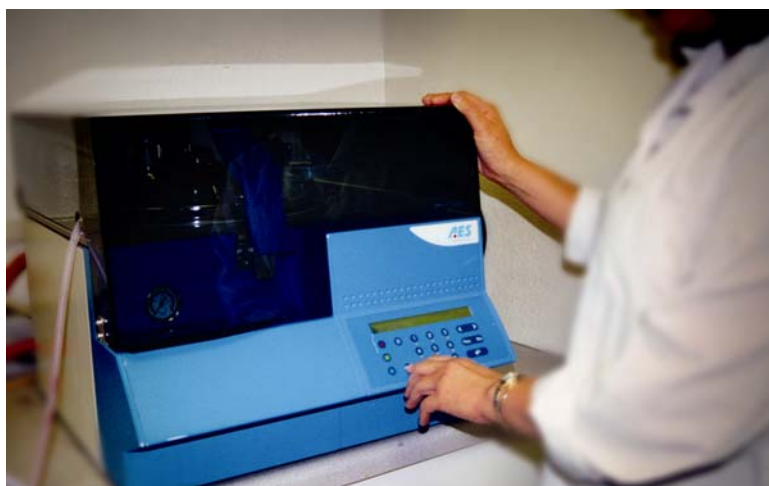
By

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According to the US Department of Agriculture billions of pounds of milk are destroyed every year – why is that? Well one reason is the milk's past its sell by date and another is it's infected by potentially harmful microbes. As a supervisor in a busy contract dairy testing lab, my primary concern is to get it checked out rapidly so manufacturers have the maximum chance of shifting milk off the shelf and onto your breakfast cereal.

In recent years quality checking has been made considerably easier with the innovative automation that has come on the market. For instance, at one time we would sterilize and then pour molten agar into petri dishes using our own two hands. If we were quick enough we could perhaps make around 100 plates an hour, now with an AES S8000 media sterilizer integrated to an APS300 plate pourer (Microbiology International, Frederick, MD) we can make over 700 plates an hour just by loading the sterilizer and walking away.



AES S8000 media sterilizer

CHECKING OUT SHELF LIFE

On the testing side we have developed our own rapid method for determining shelf life of pasteurized milk. This analysis utilizes a specially prepared agar plate for detecting very low concentrations of microorganisms. With this procedure we can spot milk, which only has a shelf life of ten days within 20 hours. We can also predict how many days the milk will be in good condition if stored at 45° F and how long its shelf life is if kept at 50°F. This helps plant management determine which batches of milk need to be transported and put on sale first. The technique provides a second report in 48 hours stating the quantity of Psychrophilic bacteria (these break down milk proteins to produce putrid off flavors) as well as potentially harmful Pseudomonas, Coliforms and Mesophilic bacteria. This report promptly alerts dairy plants to potential problems such as mastitis within a particular herd.

COUNTING MICROBES – THE EASY WAY

The biggest single time saver in our lab is the automated colony counter. To produce colonies we dispense our milk samples onto an agar plate using a WASP spiral plater (Microbiology International).



WASP spiral plater

After a day, the microbes on our plates begin to grow as distinct colonies and this is when we determine their numbers using a ProtoCOL automated colony counter (Microbiology International). The system's camera produces a digital image of the plate; its integrated software counts the colonies from the image and then automatically produces results on screen in only a few seconds. Before we used it, we would put plates on a light box, mark colonies with a pen and record the figures in a notebook. This could take anything up to 15 minutes per plate. You can imagine how long it would take nowadays to process the 5000 samples of milk we test every

month! If you do the math it is around 1200 hours, which is the equivalent of 178 working days just to count colonies as opposed to under two working days with automation.



ProtoCOL automated colony counter

WOULD WE GO BACK?

In the nine years my husband, Eduardo and I have been running I and A Lab, automation, especially of colony counting is key to ensuring only nine licensed staff can quickly and easily perform the seemingly impossible task of processing 5000 samples each month. Some microbiologists are concerned about the accuracy of automated colony counting – well we're not and neither is the State of California Department of Food and Agriculture (DFA), which has licensed all our microbiologists. Folks ask me would you ever go back to manual counting and my reply to them is would you go back to a typewriter after using a computer?

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