

Technical Talk Newsletter – July 2014 # 3



Inhibitors in milk

Inhibitors in milk include the obvious ones, antibiotics, sterilant and detergent residues. But what about other sources of inhibition?

Here is a summary of other sources of milk inhibitors:

Nisin

Raw milk contains lactococci. If favourable conditions for growth occur then high numbers will result. Some *Lc. lactis* strains produce the antibiotic nisin. Nisin is a broad spectrum antibiotic and if produced it will inhibit some starter cultures. Providing there is adequate control of temperature during the production, storage and distribution of milk nisin production should not be a problem.

Free fatty acids

Free fatty acids are present at low concentration in freshly drawn milk. Their concentration may increase due to the activity of milk lipase or microbially produced lipases. *Pseudomonas* species if permitted to grow in refrigerated milk will produce lipases and high concentrations of free fatty acids. However, such milk normally contains a total bacterial count in the region of 1×10^7 cfu/mL.

Fatty acids are inhibitory to lactococci and in particular to *Lc. lactis* subsp. *cremoris*. However, relatively high levels of fatty acids are required; 0.1% butyric, decanoic, hexanoic and oleic acid were required for the inhibition of *Lc. lactis* subsp. *cremoris*. Such high concentrations of free fatty acids do not normally occur in modern hygienically produced milk that has been held at correct storage temperatures.

Natural indigenous antimicrobial proteins

The ability of raw milk to inhibit the growth of many bacterial species has been known for many years and one of the earliest reports was authored by Hesse in 1894. Jones and his co-workers around 1920 termed the heat labile inhibitors in milk as 'lactenins'. Recent work has shown that these inhibitors include:

- Lactoperoxidase-thiocyanate-hydrogen peroxide (LP) system
- Immunoglobins (from colostrum)
- Lysozyme
- Lactoferrin
- Vitamin binding proteins
- Bioactive peptide



So how do you tell if natural inhibitors are present in the milk?

It's quite easy. Most natural inhibitors are sensitive to heat and so an easy way to determine if they are present is by heating the milk to destroy the inhibitor and re-testing the sample. Here's how it's done:

- Heat the milk (500 +/- 100uL) to between 82oC - 100oC for 3 minutes and allow to cool to around 0oC - 15oC before re-testing. Don't forget to include your positive and negative controls as well
- Any negative result after the heat step indicates that the suspect positive results were caused by a natural inhibitor.

Now that I have explained about the types of inhibitors, stay tuned for my next issue where I'll talk about the differences between rapid tests and the broad spectrum inhibition test.

David

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