HOW DOES IT WORK?

Like any other filtration process, microfiltration is based on passing through membrane components that are smaller than the membrane pores and retaining the components that are larger than the membrane pores. The portion that is retained is called the retentate and typically represents up to 5% of microfiltered milk. The remaining portion that passes through the membrane is called the permeate. Retentate will contain majority of somatic cells, bacteria and spores while permeate will have undetectable levels of these present if starting with good quality raw milk. Small part of the skim milk components, especially large protein clusters can also be retained, making the retentate slightly higher in protein than the permeate. The amount of protein retained in the retentate is strongly determined by membrane pore size.

APPLICATION

Microfiltration is typically performed on skim milk to avoid retention and loss of fat, as well as improve capacity and effectiveness. Skim milk is also typically heated before microfiltration and a membrane of 1.4 micrometers is used. While lower temperatures and smaller membrane pore sizes can be used, these can all have a negative effect on filtration effectiveness and loss of milk solids.

WHAT IS THIS USED FOR?

Microfiltration is used to remove somatic cells, bacterial cells and bacterial spores from raw milk while maintaining the structure of milk components. A different type of microfiltration is also often used to concentrate milk components.

ASSESSMENT OF EFFECTIVENESS

Multiple studies have found microfiltration to be very effective at removing bacteria and spores from milk. The effectiveness of microfiltration depends on a number of factors that include, but are not limited to: e.g., bacteria/spore concentration in raw milk and membrane fouling. Microfiltered milk needs to be subjected to pasteurization if it is to be consumed as fluid milk. For this reason, post-pasteurization contamination of the product could negate the positive effects of microfiltration.

REGULATORY IMPLICATIONS

There are currently no regulations aimed directly at microfiltration for use in dairy processing. However, there is a proposed rule to the FDA to permit the use of ultrafiltered and/or microfiltered milk to make cheese and cheese products.

Want more information on this or other novel technologies? Contact Aljosa Trmcic (at543@cornell.edu) in the Milk Quality Improvement Program or visit our website at https://foodsafety.foodscience.cornell.edu/mqip/.

Technology scouting and evaluation of new processing technologies for New York dairy has been funded by the National Dairy Council and the New York State Dairy Promotion Advisory Board, dairy farmers dedicated to the production, manufacture and distribution of quality dairy products.