

## Ultrafiltration may raise prices, cut shipping costs

ITHACA, NY — While "super cows" may be producing prodigious quantities of milk in the not too distant future, "super filters" may be separating that milk, slashing milk transport costs in half and refrigeration costs by one-third while producing a nutritious by-product that can be fed to cows.

That's not all: these super-fine filters, or ultrafiltration (UF), also can help boost cheese yields while dramatically cutting cheesemaking costs.

"Most important, however, UF allows a farmer to preprocess milk, making it a more valuable commodity to producers. As a result, farmers should be able to command a higher price for their milk," says Robert Zall, professor of food science in the New York State College of Agriculture and Life Sciences at Cornell University.

By separating milk on the molecular level down on the farm before shipping it, farmers, processors, and consumers can save millions of dollars, says Zall, one of the ultrafiltration pioneers in this country. He is wrapping up a 12-month project in Lodi, California, testing the viability and

reliability of ultrafiltration on a commercial dairy farm for the first time. The results are highly encouraging.

"It simply makes 'cents,'" Zall points out. "There's every reason to believe that UF will become very commonplace for the dairy industry."

Ultrafiltration is now new; cheesemakers in Denmark, Sweden, Ireland, and the Netherlands commonly use it in their dairy processing plants. Using it on the farm, however, is new.

Zall first tested the use of membranes on Cornell's 400-cow dairy research center in Harford, New York. Encouraged by the results, he decided to look at its feasibility, economics, and reliability on a 900-cow farm in California.

To follow up that work, Zall is working on the formation of a consortium that will include Cornell, New York State, the dairy industry, and the manufacturers of the UF equipment. The consortium will cooperate to install membrane technology on ten dairy farms, ranging in size from 60 to 300 cows, in New York to study the effects of Northeast climatic conditions,

economics, and added value of the preprocessed milk products.

So far, Zall's ultrafiltration units, which for New York's dairy farms would be about twice the size of an average hot water heater, have processed eight million pounds of milk that made more than 800,000 pounds of cheese. The cheese is no different in appearance or quality than those made from regular, non-UF milk.

To ultrafiltrate milk, the liquid is transferred right from the milking machine and quickly "blanched" or heated for 10 seconds at 163°F to stabilize it and "seal" the whey proteins. Then, it is cooled slightly and sent to the UF machine where it is circulated 30 times or more through the ultra-fine sieve that holds back proteins and fats while allowing water, salt, and milk sugars to pass through the filter.

By doing so, about half the water and milk sugar is taken out of milk — which is about 87 percent water anyway. That means that instead of having to ship 500 pounds of milk destined for cheesemaking, a farmer needs to ship and pay for transporting only 250 pounds. The liquid that is filtered out of milk, called the permeate, still contains

nutrients that can be fed to cattle, although Zall foresees using it someday as a valuable base to make flavored beverages for human consumption.

At a two-to-one concentration, the milk becomes concentrated by 50 percent by the fats and proteins being held back. The concentrate can make up to 50 percent more cheese than the same amount of unconcentrated milk, Zall points out. It also saves rennet costs and the fixed costs of producing cheese.

By heating the milk first, cheese yields can be increased as much as 5 percent in cottage cheese, 3 percent in cheddar cheese, and 2 percent in quarg cheese.

All told, Zall estimates that cheesemakers can save at least 69 cents per hundredweight (cwt.) of cheese while the farmer can save anywhere from 8 cents per cwt. to about 34 cents, based on hauling charges. The farther farmers must ship milk and the more that they have to pay for shipping, the greater the savings.

"Farmers can benefit much more, however, than just by saving

transport and refrigeration costs," Zall says. "They'll have the opportunity to 'tailor make' some milk components to fit automated food processing systems more easily. As a result, they'll be able to seek more money for providing on-farm processing services."

Approval by the Food and Drug Administration is still necessary to agree or confirm that the cheese made from ultrafiltration is no different from other cheeses. Zall expects FDA approval this year.

Zall predicts ultrafiltration units will be commonplace on farms in the near future. He points out that the system can be modified for any size dairy and that farmers should be able to earn suitable returns on their equipment investment.



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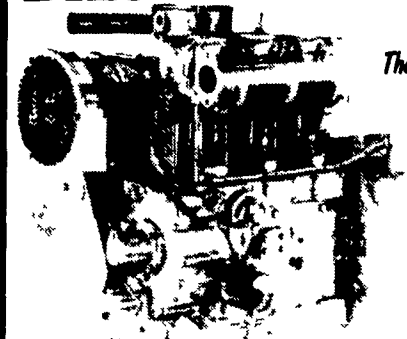
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