



**Stephen Raab**  
Chemical Engineering  
University of Notre Dame

## Company Background

Davisco Foods International, Inc. is a dairy processing company headquartered in Le Sueur, Minnesota. Davisco began operations in 1943, when company founder Stanley Davis purchased the St. Peter Creamery in order to make butter. Today, the company produces a wide variety of dairy products, ranging from cheese to whey protein and other food ingredients. In 1969, Davisco began to manufacture cheese for what is today Kraft Heinz Company. Since then, Davisco has expanded, and now maintains facilities in Le Sueur, Minnesota; Jerome, Idaho; and Lake Norden, South Dakota.



*“Working with Davisco and MnTAP was a unique experience that allowed me to develop a project from inception to completion. I learned about the workings of a food production plant and then applied that knowledge to assist the company in achieving its financial and environmental goals.” ~ SR*

## Project Background

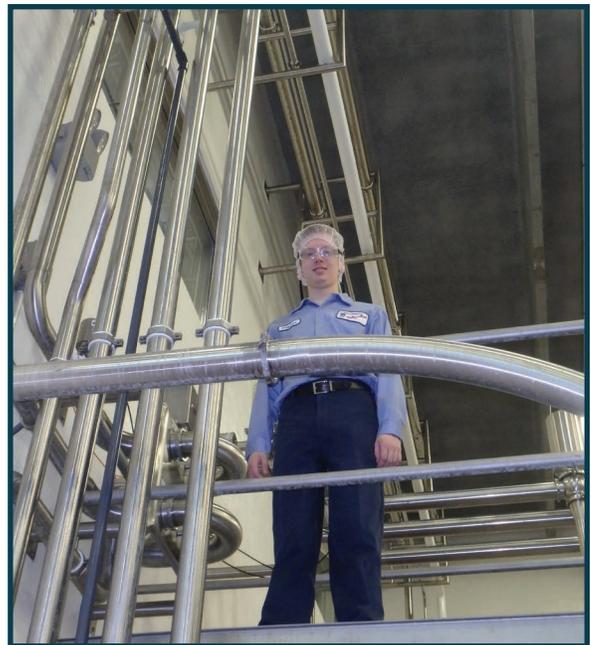
At the Davisco-Le Sueur plant, milk is received, pasteurized, and drained of cream to factory specifications. This milk is then sent to production vats and a starter culture is added, causing it to curdle. The resulting cheese curds are then drained of whey, removed from the vats, and packaged into boxes and barrels before being shipped to customers. The whey left over from the cheese making is filtered to remove the valuable products it contains. The remaining water is then purified for reuse in the factory, while the filtered product is sent to be dried. The wet product contacts a stream of hot air that instantly vaporizes any water present. The air, which contains some product, is then vented from the factory. As it leaves the plant, the air is sprayed with water droplets that scrub the remaining product from the air.

at the facility; the company would therefore see lower charges assessed for wastewater treatment. Not only will this give Davisco an economic advantage, it would also align with the company’s commitment to environmental stewardship.

## Incentives To Change

In collaboration with the Department of Energy, Davisco has developed an Energy Savings Initiative aimed at reducing energy, water use, and greenhouse-gas emissions by 25% over a five-year period.

In Davisco’s current cheese packaging system, a substantial amount of cheese is lost during packaging. This cheese could be recovered and sold as product and at the same time not contribute to the biochemical oxygen demand





to spill out of the top of the barrel. A higher fill extension would knock this cheese back into the barrel, retaining salable product and preventing BOD.

### Recalibrate Automation of Feeder Arm

When a barrel is filled, a mechanical feeder arm brings the next barrel into position. The auger dispensing cheese curds frequently keeps rotating during this transition, spilling cheese trapped in the auger bit. If the feeder arm were reprogrammed to advance only after the auger had begun rotating, this cheese would instead be captured, allowing it to be sold for full price instead of contributing to BOD.

Each day, approximately 184.64 pounds of cheese lands on the floor. If all floor cheese were captured, Davisco could gain over \$34,000 annually in sales as well as additional savings due to reduced BOD loading. Looking only at the recommendations from this internship, Davisco has the potential to gain over \$7,000 in income and realize additional savings from reduced BOD loading.

### Adapt Scrubber System to Feed from COW Water

The scrubber system currently uses water purchased from the city. Adapting it to use surplus condensate of whey (COW) water from the water polisher would reduce the amount of water needed to be purchased each day, and it would also lower the volume of water being sent to the pretreatment plant. It is estimated that implementing this change could save the company about \$23,130 per year.

## Solutions

### Install Metal Catch Pans Beneath Production Towers

At present, much of the floor cheese associated with the block formers is generated upon leaving the tower, when cheese that is not incorporated into the blocks falls to the floor of the facility. Metal pans beneath the towers will catch falling cheese, allowing it to be dumped into tote bins on the floor. The resulting “undergrade” cheese can then be sold for a reduced price. The captured cheese will not contribute to biochemical oxygen demand (BOD), reducing cleaning costs and potential fees.

### Place Additional Undergrade Totes Along the Conveyor Belt

Loosely-packaged blocks of cheese spill additional cheese as they are transported from the towers to the sealing apparatus. Placing plastic undergrade totes along this route could capture much of this cheese, allowing it to be sold and neutralizing its BOD contribution.

### Adopt Improved Fill Extensions on Fiber Barrels

Barrels of cheese are filled from above by a hopper. As the barrel approaches the end of a filling cycle, cheese tends



Recommendation	Annual Reduction	Annual Savings	Status
Install Metal Catch Pans Beneath Production Towers	7,100 lb	\$3,650	Recommended
Place Undergrade Totes Along Conveyor Belt	270 lb	\$180	Approved
Recalibrate Automation of Feeder Arm	1550 lb	\$2,940	Implemented
Adopt Improved Fill Extensions of Fiber Barrels	130 lb	\$320	Recommended
Adapt Scrubber System to Feed from COW Water	4,625,000 gallons	\$23,130	Recommended