

dairyfield®

HELPING PROCESSORS MANAGE THE CHANGING INDUSTRY



Davisco Foods is led by (left to right): Marty Davis, general manager of food ingredient companies; Stanley Davis, company founder; Mitch Davis, technical director of cheese and whey technology; Matt Davis, director of quality assurance; Mark Davis, president; and Jon Davis, general manager of the firm's cheese companies.

MASTER by Allison Bardic Explorers

■ *Davisco Foods' perpetual search for innovative products and technologies pays off.*

The family behind Minnesota's cheese and whey processing giant, Davisco Foods International, is committed to technical advancement and superior product quality. The company battle cry, the Davis clan insists, is growth through quality and innovation.

"Everything we do is to enable us to compete," explains Mark Davis, president of Davisco Foods and son of com-

pany founder, Stanley Davis. "To satisfy our customers, we must meet the economic and innovative demands of the market. We must do this through volume and new technologies."

Privately held Davisco Foods International has long been considered a pioneer in the dairy industry. Operating five dairy processing plants (cheese, whey and other dairy-based food ingredients) in South Dakota, Minnesota and

Idaho, the company produces more than 600,000 pounds of cheese daily and is an industry leader in whey protein isolate research.

The company's steady growth can be traced back to 1943 and Stanley Davis' decision to buy a stake in Minnesota's Saint Peter Creamery, later becoming the sole owner. While creameries throughout southern Minnesota began to consolidate in the 1950s, the St. Peter Creamery did not. Stan Davis stayed the course of independence, and his son Mark joined him in 1959. The Davis family merged with and later acquired the Le Sueur Cheese Company of Le Sueur, Minnesota in 1969.

Mark Davis defines this consolidation as a major turning point in the history of his company. "We were a powder butter operation and didn't know anything about cheese. They [Le Sueur Cheese Company] were invaluable in getting us into the cheese business," he notes. "The evolution of that part of our business has been extremely important to the success of our company."

More specifically, Le Sueur Cheese Company linked the Davis firm to the nation's leading cheese processor. At the time of the consolidation, the company was supplying cheese to Kraft Foods, a relationship that has grown and continues to be a vital element of Davisco Foods to this day. The company is, in fact, Kraft's largest supplier of industrial cheese for further processing into shreds, slices and other branded applications.

Saint Peter Creamery's relationship with Le Sueur Cheese also unleashed new opportunities related to whey processing. The profitable use of whey soon became a driving force in the dairy industry and another means by which companies could compete. "The industry quit dumping the whey on the gravel roads," jokes Davis. "And that's

MASTER Explorers

how it all began.”

The promise of whey processing intensified when a partnership with Nicollet Foods Products was established in 1970 — this plant had a dryer in place and became a second site for drying milk byproducts.

To further explore the category, Stanley Davis in 1983 acquired a creamery in Lake Norden, S.D. As events changed, the Davis family later turned this business away from traditional profit-making ventures in the dairy industry. The plant collected no milk, instead focusing on collecting whey from surrounding cheese facilities.

Another critical venture soon followed. In the early 1980s, Mark Davis learned of a Wales-based company marketing a higher value whey product. Davis fostered a positive business relationship with the firm, which ultimately led to Davisco Foods becoming the sole U.S. producer of the whey protein isolate. And in 1991, Davisco Foods — St. Peter Creamery, Le Sueur Cheese Company and Nicollet Food Products merged in 1986 to form Davisco Foods International — acquired the company.

Davisco Foods’ partnership with the European firm yielded perhaps the most significant advancement in the history of Davisco Foods: *BiPRO*. This whey protein isolate, unique beyond anything the industry had seen, has nutritional and food functionality attributes that seemed remarkable to many food processors of the time.

“We had our ups and downs and we had some successes that weren’t long-term because it (whey protein isolate) was a brand new product.”

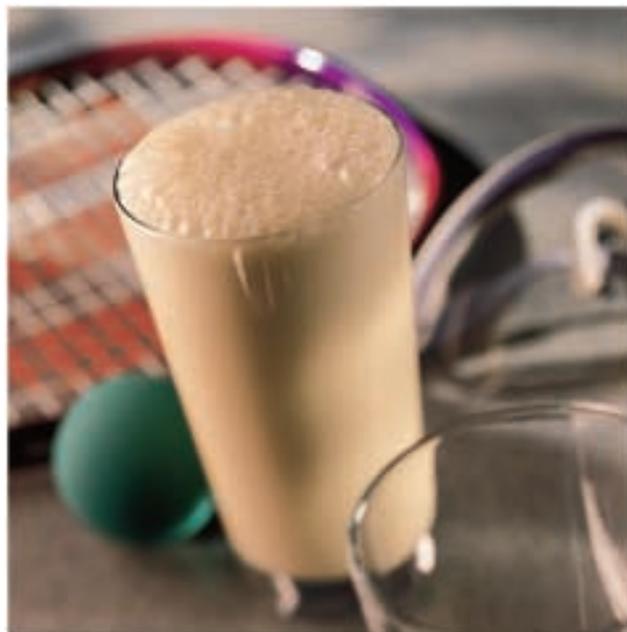
—Mark Davis, president

The separation technology tied to the development of *BiPRO* put Davisco Foods on the map. “At the time, protein concentration was becoming the trend of the day. There was a lot of interest in it,” recalls Mark Davis. “The Welsh company was struggling because they didn’t know anything about processing. We constructed a plant with the necessary sophistication in 1984. We didn’t change the basic technology. It was just a matter of process control, automation and more emphasis on technology. Eventually, the people on the international front became disinterested because of the many struggles of a startup company. Our Le Sueur operation became the focal point of the whole venture — producing the product and later becoming the marketer as well.

“We had our ups and downs and we had some successes that weren’t long-term because it was a brand new product,” Davis continues. “People were unfamiliar with it. It was a single-site production facility, and nobody wants to commit a whole range of products to an ingredient that can only be produced in one place. We had all of those issues to overcome.”

Davisco Foods took the foundation built in partnership with the Welsh firm and expanded it into what later became Davisco Foods’ ingredient business.

“That’s when we really began for the first time a sales, marketing and product development organization,”



Davisco Foods is the world’s largest manufacturer of whey protein isolates. Its high purity proteins and protein fractions are used in large part for medicinal food and nutritional applications.



PHOTOS COURTESY OF DAVISCO FOODS

explains Marty Davis, general manager of Davisco Foods’ food ingredient companies. “We were focused mostly on the production and business development aspects of the business. After the acquisition, we developed applications and process technology to create different ingredients and built an ingredient company as a result. We added food scientists as part of a growing sales staff. Up until then, whey products for the most part had been sample sold. We turned to developing uses through applications science. At the time, quite rare for a whey manufacturer.”

Today’s Davisco Foods has overcome the many challenges of developing and commercializing a unique and sophisticated technology. The company is renowned as the world’s largest manufacturer of whey protein isolates. It

Family VALUES

■ *Third generation Davisco Foods continues the tradition that began more than 50 years ago.*

Mark Davis, president of Davisco Foods International, is keenly aware of the challenges related to passing a family business down from generation to generation.

He is, in fact, the second-generation captain of the vessel known as Davisco Foods. His father, Stanley Davis, laid the groundwork for the company more than 50 years ago when he bought a stake in a small creamery in his rural hometown of St. Peter, Minnesota. Today's company has made tremendous strides since then. Davisco Foods now consists of five dairy processing plants in South Dakota, Minnesota and Idaho and sales of nearly \$400 million.

Mark Davis' sons have all opted to pursue careers in the family business. Among the Davis management team players are Mitch Davis, manager of the family's dairy farm enterprises and technical director of cheese and whey technology; Martin Davis, general manager of Davisco's food ingredient companies; Jon Davis, general manager of Davisco's cheese companies; and Matt Davis, director of quality assurance. Daughter Julie (Davis) Rydeen, chose the vocation of raising five kids while supporting the family business through her involvement as an active shareholder in the company.

What are the challenges related to pass-

ing on this legacy?

"Identification of the fact that time is marching on, admitting that to yourself," concludes Mark Davis. "Finding out who should occupy what position, who should be responsible for what area, is also a challenge. When it's not a family business, you make assignments and that's it. People either succeed or they don't. In a family business, it's not that simple. The individuals, in the case of four siblings, have their own ideas about the way things should be done. They have their own goals and their own assessments of what their abilities are and everybody's got to work that out.

"Like anything, as time goes on, new approaches have to take place. Traditional

practices and procedures aren't easily overcome. That's another one of the challenges. Why change or modify what's always been successful. There are always a lot of questions. But as it's a challenge — questioning, rethinking — it also leads to improvements and better ways of accomplishing the same goals. The more things change, the more they stay the same."

And what of Mom's role? "Family businesses are great in many ways, but they do have some tough days in between" Marty Davis adds. "The most difficult job in a family business is probably that of the Mother. Our Mother is a good ear for all of us and we would be lost at times without her support and counsel." *df*



Davisco Foods' steady growth can be traced back to 1943 and Stanley Davis' decision to buy a stake in Minnesota's St. Peter Creamery, later becoming the sole owner.

PHOTO COURTESY OF DAVISCO FOODS INTERNATIONAL

manufactures high purity proteins and protein fractions for medicinal food and nutritional applications.

These products are created through a process of isolation and concentration unique to Davisco Foods. Through this process, the proteins derived from the cows' milk are made individually available, without altering their natural purity or nutritional level.

Among other factors, increased health awareness and a growing demand for nutraceutical products are driving growth in the market for whey protein ingredients.

"This sector of our business is driven

by both functionality in a food system and nutritional efficacy," says Marty Davis. "These proteins either have nutritional or medicinal applications or they contribute to the functionality of a food system."

As a result, "Whey protein is frequently used in health beverages for the elderly who may have digestive problems or other body taxing suppression to their system," Davis adds, noting that sports nutrition is another major driver in the whey protein industry. "Whey protein is a muscle builder. It's an excellent protein source, that, when in its purest form has no flavor. That's

one of the advantages of our protein. It provides a high protein material for the user without altering the flavor of the beverage."

To capitalize on these trends, Davisco Foods' Jerome Cheese Company was chosen as the site for a new whey processing facility in 1998. While the addition of Jerome Cheese Company to Davisco Foods' plant lineup more than doubled the company's total cheese capacity, the \$26 million, 70,000-square-foot whey plant became the largest whey protein isolates facility in the world.

The commercial challenge to isolat-

ing whey proteins from milk is producing enough quantity at a reasonable price to create an economically viable food ingredient. To compensate for these requirements, the company leverages its high volume cheese-producing facilities to make commercial quantities of whey protein isolates and isolate fractions.

Meanwhile, alternative proteins continue to create additional challenges for the whey protein market. Whey protein manufacturers like Davisco Foods are, therefore, seeking ways to better customize their proteins for nutraceutical applications and to emerge from behind the shadow of the more popular soy proteins, adds Marty Davis.

For example, Davisco Foods has developed a hydrolyzed whey protein isolate known as BioZate, which has functional and nutritional applications in a range of nutraceutical products and also may have blood pressure-lowering properties. The company recently announced the results from a clinical study on the effects of whey protein hydrolysates on conscious, unrestrained spontaneously-hypertensive rats (SHR). Results indicated that single oral administration of BioZate, at doses of 75 or 150mg/kg, significantly reduced mean arterial blood pressure from one to seven hours after administration. The study also showed that blood pressure returned to initial levels within 24 hours after administration.

Amid these and other discoveries related to whey protein isolates, the competitive whey protein marketplace continues to thrive. There are, in fact, five major competitors in the isolate arena.

"The market demand has allowed for everybody to compete," observes Marty Davis. "That is changing, however. The market will be over-supplied again. It happened about three years ago, and we sustained our position, in some cases, by

dropping our prices. Not the method of choice, but a forced option.

"As our product line grew in the marketplace and the demand grew — mostly in sports nutrition — competitive supply increased," he explains. "We decided we were not going to give up our position in the marketplace. We lowered our prices where we found it necessary, and today we continue to supply the majority of the isolate market. It's a category we feel we have to protect even when it's not as lucrative as we would like it to be every year. So we will continue to do that. The next step in whey protein isolates' journey will likely include becoming an established category. The isolate products will eventually become an industry category, and a more common product. Production will continue to increase."

To increase the marketability of whey protein isolates, Davisco Foods has founded the Whey Protein Institute, a separate company-funded entity. The program will include a Web site, a network of technical support and a marketing plan to promote increased awareness and demand of whey protein among the general public.

"We believe it will be to the benefit of all in the industry if we do the proper job. Whey protein needs to become a household name," stresses Marty Davis. "And by that I mean that my mother, like most novice food nutrition consumers, brings up soy protein all the time. Whey protein doesn't have the same recognition and it should. Whey protein wins on all the facts. It's nutritionally better, it's functionally better, its flavor is better, and it comes from wholesome, natural cow's milk. The consumers have no idea. The dairy industry fails miserably on the marketing and education of this whole category. The soy folks whip us every day on this, and they don't even have the

winning product technically. Our goal here is to increase consumer awareness of the category known as whey protein."

The company also operates a sales and applications science center in Minneapolis where staff studies the

"We think we need a fourth cheese plant just for what we do today, and if we get to the point where we build a fourth one, we'll probably say to ourselves that we need a fifth one. Our infrastructure demands it and growth is critical in this industry."

—Jon Davis, general manager of Davisco's cheese companies

effects of whey protein isolates and isolate fractions when applied to various food systems.

To further uncover additional opportunities related to whey protein processing, Davisco Foods has begun to study the effects of biotechnology in regard to stimulating a mother cow to produce more valuable milk components. The Davis family is building a 2,500-cow farm at its Le Sueur Cheese and Ingredient Company in Le Sueur, Minn., to learn more about these components of milk. In addition, the facility will provide a milk supply for the Le Sueur cheese-making operation.

"It's a learning experience," concludes Mark Davis. "We don't have animal agricultural backgrounds, so we're trying to learn that business. We also want to encourage people to get into dairy farming. It's a declining industry in Minnesota, and we hope that people will think that what we are doing is a good and profitable way to make a living — something that they would like to pursue."

Davisco Foods' contract manufacturing group provides another ingredient outlet for the company, namely spray drying. Recent emphasis has focused on diversifying spray dryer technologies to include such things as foam drying, agglomerating and instatizing. The specialty drying business grew from \$0 in sales in 1990 to about a \$9 million in 2000.

"It's a small business, but the margins are better. If you run a good custom processing operation, it can be economically worthwhile," says Marty Davis. "We can also apply some of those tech-

"Whey protein needs to become a household name. The dairy industry fails miserably on the marketing and education of this whole category ... Our goal here is to increase consumer awareness of the category known as whey protein."

—Marty Davis, general manager of Davisco's food ingredient companies

nologies to our protein product. We do all our own instatizing and foam drying in Le Sueur, whose facility houses one of the custom drying dryers. Lake Norden Food Ingredient Company, meanwhile, houses the other contract manufacturing dryer.”

Though whey protein isolates have elevated Davisco Foods to worldwide status, the company’s bulk cheese and cream sales continue to generate the lion’s share of its revenue. Production teams at Davisco Foods’ Le Sueur- and Jerome-based plants create various stirred curd cheddars including no-fat and low-fat varieties, enzyme-modified cheeses and other customer-specified varieties.

The company prides itself on delivering cheeses with consistent flavor, texture and quality to customers including some of the world’s leading cheese processors, distributors and developers. And although Davisco Foods is not a branded cheese marketer, the company is a well-respected provider of cheese as a raw material for retail- and foodservice-based products.

As the company continues to focus on growth, its cheese-making operations are continually diversifying in terms of types of cheese produced and packaging formats. Whether Davisco Foods’ cheese plants — Jerome Cheese Company and Le Sueur Cheese Company — are turning out 500-pound barrels, 640s or 40-pound blocks, the goal remains the same: adapt to the meet the ever-changing demands of the marketplace.

“We’re looking at other types of cheeses to take better advantage of the marketplace for cheese across the board instead of our limited category [cheddar-type cheeses] which amounts to about 45 percent of the market,” adds Jon Davis, general

manager of Jerome Cheese Company. “We went through one stage of diversification in terms of packaging [see Plant Story], and now we’re looking at what types of cheese we should produce at all of our facilities.”

To that end, Davisco Foods is building a mozzarella cheese processing plant along with Land O’ Lakes at its Lake Norden Food Ingredient Company location in South Dakota. Upon completion, the facility will process two million pounds of milk a day, ultimately increasing to five million pounds and mirroring the Jerome operation. Davisco Foods believes South Dakota and the surrounding region have the potential to achieve and sustain a competitive position in the dairy marketplace both in terms of production and processing.

“We believe that South Dakota is a good region to be in. Fortunately, so do our friends at Land O’ Lakes [Davisco and Land O’ Lakes announced the joint study for building a cheese plant in South Dakota late last year]. It’s the next opportunity,” says Marty Davis. “People in the industry probably think we’re crazy to build a big cheese operation there, but I would tell you that in 1992 there were those who told my Dad that he was crazy to go to Idaho. They don’t remember that now...but they did. We will try to do the same thing we did in Idaho, with one of the key differences being that we will be an integral part of growing that milk shed. We are actually going to be building a dairy farm.”

In addition, Jon Davis suggests that Davisco Foods will someday need to build a fourth plant to satisfy market demands. “I think it’s in the minds of all of us, whether we build in Idaho, New Mexico, California or someplace else,” he adds.

“We think we need a fourth cheese plant just for what we do today, and if we get to the point where we build a fourth one, we’ll probably say to ourselves that we need a fifth one. Our infrastructure demands it and growth is critical in this industry.”

On the international front, Davisco Foods’ business primarily falls into the whey protein category. About 40 percent of the company’s major whey sales are distributed overseas, while specialty products comprise 25 to 30 percent.

The company’s specialty whey products have been distributed in Asia for about 20 years, including a long-term partnership with Japan.

“The best thing for our quality department and the quality of our products was Japan,” says Marty Davis. “Twelve years ago my father took me to Japan with him on one of his visits. I quickly became aware of what he forever had been preaching to us. The Japanese demand superior quality in every way. If we want to continue growing there, quality must be number one. We did, and it is!”

Other promising markets include Mexico, where Davisco Foods established an office three years ago. “I think we’ll look to Eastern Europe next,” adds Davis. “European subsidies limit us on commodity product sales in all of Europe. If we have unique specialty products we can go into Europe and be successful. The downside is you grow competition quickly. The European dairy companies are out there finding out what you’re doing in their market. They find out how, they get working on it, and they’re pretty good competition.” **df**

PLANT PROFILE

Protein by Allison Bardic POWERHOUSE

■ *Davisco Foods' Jerome, Idaho-based processing plant turns out massive quantities of high quality cheese and whey protein isolate.*

There's a strong correlation between those who consider themselves risk-takers and those who have a leg up on their competition.

Consider Davisco Foods International. Some industry observers thought the company's founding Davis family was crazy when it settled on Jerome, Idaho as the site for a new cheese plant back in 1993, but today, Idaho's milk-producing Magic Valley is home to Jerome Cheese Company, the state's largest single processing plant. Boasting 205,000 square feet on 21 acres of land, this standout facility incorporates automation and stringent quality standards to produce a diverse lineup of cheddar-type cheeses including no-fat and low-fat varieties, enzyme-modified cheeses and other customer-specified varieties, as well as whey products.

Most of the company's business has been built on a relationship with Kraft Foods in which Jerome Cheese Company manufactures bulk quantities of cheese for the leading branded cheese marketer's further-processing needs.

"Our cheese was an ingredient supply to Kraft, and that company is still a substantial part of what we do — a critical portion of our cheese sales," explains Jon Davis, general manager of Davisco's cheese companies. "We provide an industrial ingredient in the form of cheese in either 500-pound barrels, 640s or 40-pound blocks. Those ingredients are turned into shreds, slices and other

cheese processing applications. They are used as a raw material for all kinds of retail- and foodservice-based products."

Upon opening its doors, Davisco Foods' Jerome-based cheese and ingredient plant provided a local market and cut costs for local milk producers, who were previously hauling their milk out-of-state for long distances.

"Building here has contributed to growing milk production in Idaho because previous to that a lot of milk was leaving the area. Now the producers have a local market and as a result, increased milk production," notes Mark Davis, president of Davisco Foods International. "You talk to the producers here, and they're always optimistic. They're always thinking ahead about how to

become more profitable."

Inside Jerome Cheese Co.π

Jerome Cheese Company's plant, operating 24 hours a day seven days a week, is designed to ensure high product quality. Construction has focused on the control of people, air and product flow. Hallways, for example, eliminate contact between those employees charged with raw milk receiving and those in the cheese packaging room.

Over the years, Davisco Foods has continued to augment the facility with the latest technology and skilled technicians. The plant was engineered with expansion in mind, reflecting the long-term goals of Davisco Foods International. "Over time, we've added equipment and



Davisco Foods' \$26 million, 70,000-square-foot whey facility is the largest whey protein isolates plant in the world.

PLANT PROFILE



Davisco's Jerome, Idaho-based plant produces about 50,000 pounds of whey solids a day. Its protein isolates are used in medicinal foods, nutritional supplements and other food systems.



Jon Davis, general manager of Jerome Cheese Co., and Dairy Field Editor Allison Bardic view the exterior of the Idaho-based cheese and ingredient company. Boasting 205,000 square feet on 21 acres of land, Jerome Cheese is Idaho's largest single processing plant.



Automated cheese vats produce a vat of cheese every 20 minutes. A PLC with a menu of recipes for all Jerome Cheese varieties controls such variables as pump speeds, flow rates, volume, cook time, cook temperature and culture.

processes," affirms Jon Davis. "We started processing about two million pounds of milk a day, and now we process five-and-a-half million

pounds of milk a day with about 160 employees. We grew with the local milk shed. We started with 120,000 square feet, and now we are at 205,000. We've added equipment to diversify our product mix and reduce our labor. We have a lot more support people performing a lot more functions."

Many of Jerome Cheese Company's employees are categorized as computer support personnel. "We have many technicians who are constantly maintaining this equipment," adds Davis, stressing that the fully automated facility is dependent upon technically adept employees. "We also have about 20 full-time maintenance technicians."

Davisco Foods will continue increasing Jerome Cheese Company's product volume and diversity with the aid of new equipment, predicts Davis. "For example, we used to just make barrel cheese, but as a result of the milk pricing dynamics, our product mix wasn't able to make us milk price competitive with 40-pound block manufacturers. This exposed our milk supply, and in order to reverse that, we have invested in the flexibility in both of our cheese plants

to be able to produce whichever type of cheese is providing the best return. We can produce 40-pound blocks, 640s or any type of barrel. We've done that to stay ahead of the curve, and I think a lot of the industry is doing the same. We must diversify our cheese production flexibility to stay competitive."

Milk, most of which comes from dairy farms within 35 miles of the Jerome Cheese Company plant, arrives by tankers and is sampled manually and by an in-line sampling system for fat, protein, lactose, total solids and antibiotics. Jerome Cheese buys more than five million pounds of milk a day from some 65 dairy producers.

"We don't have contracts with our milk producers," notes Mark Davis. "We've always felt that if we can't keep them satisfied, we didn't want them to feel like they had to be with us until a certain time. We want them to have a choice. If we're not keeping them happy, someone else should. We've always believed that's the fair way to do business."

Maintaining positive relationships with milk producers is, in fact, a cornerstone to Davisco Foods' success. "Our corporate culture starts at the farm. It always has," adds Mark Davis. "In the early days of the company, my

PLANT PROFILE



Jerome Cheese Company manufactures bulk quantities of cheddar-type cheeses for such branded cheese marketers as Kraft Foods.

Dad recognized the whole focus was on having enough milk to support our investment. He always stressed the importance of the producer. As the industry has evolved, it has become a two-edged sword. You must have the milk, but you also must have innovative products and innovative technology. The competition and the intensity of the business has changed in that you obviously still must have the milk, but you must also do something value-added to the milk or you can't compete. In addition, you must have quality. As a result, these are the areas we focus on in our facilities."

Upon acceptance at the receiving area, milk is unloaded from the tankers by PLC-controlled pumps and routed to one of eight 500,000-pound raw milk storage silos where it is held for less than 12 hours, then routed through HTST (High Temperature Short Time) plate pasteurizers with a capacity of 210,000 pounds an hour. The company plans to increase pasteurization capacity to 250,000 pound an hour, adds Jon Davis. A PLC controls such pasteurization variables as time, temperature, flow rate and pressure.

Fat content of pasteurized milk is adjusted via two separators, which

skim the fat out. Cream is forwarded to a balance tank while skim milk is routed to an 85-foot-high vacuum evaporator where its water content is reduced. The evaporator removes about 60,000 pounds of water an hour, creating condensed skim milk. The mechanical vapor recompression method pulls the water out of the milk with the help of a fan operating at about 2,600 rpms.

"As a result, we've reduced our hydraulic load on the rest of the factory by about 28 to 30 percent," explains Jon Davis. "We remove this 60,000 pounds of water from the skim milk, and we forward it to a silo so it doesn't have to go through the rest of the process. If we have 200,000 pounds of milk coming in, we only have 140,000 going to the cheese plant."

The remaining 60,000 pounds of water are introduced to the company's water supply and used for cleaning and sanitation purposes.

The condensed skim milk and cream are combined to create cheddar cheese. Specifically, the milk flows into one of nine automated cheese vats, each producing a vat of cheese every 20 minutes. A PLC with a menu of recipes for all Jerome Cheese vari-

eties controls such variables as pump speeds, flow rates, volume, cook time, cook temperature and culture. Lactic bacteria strains are supplied from a culturing system with automatic temperature and pH control.

"Basically, the milk goes through the process, is pasteurized, rennet is added, calcium is added, we apply heat and agitation and we produce the cheese curd," summarizes Jon Davis, noting that the company is experimenting with two new demo vats which ultimately will increase plant capacity.

Each vat makes about 7,000 pounds of cheese. The continuous-batch process takes 70 minutes depending on the type of cheese being produced. Old-style open cheese tables are also housed in the Jerome facility to turn out low-volume items when required.

During the cheese-making process, the milk is split into two streams of milk components: the curds and the whey.

Curd is pumped from the vats to a draining belt where it is agitated by rake arms, whey (whose composition is 93 percent water) is drained off and salt is added. After proper curd development, curd is conveyed by an air transfer system to the packaging department.

The cheese curds are pumped into cheese towers where any remaining whey is removed. Jerome Cheese Company manufactures about 400,000 pounds of cheese a day. After the cheese is formed in the towers, it is barreled, covered and weighed.

The plant houses two storage coolers, including a 30,000-square-foot addition that went on-line in 1997. The latest cooler addition was completed few months ago and holds about six million pounds of product.

All finished product inventory, which is turned around every 10-to-12 days, is managed by an automated bar-code system. Third party carriers deliver finished product directly to Jerome Cheese Company's customers

PLANT PROFILE

from three shipping docks.

Whey Processing Prowess

Only about half the components of milk are used for making cheese. To use its cheese byproducts, Jerome Cheese Company was chosen as the site for a new whey processing facility in 1998. While the addition of Jerome Cheese Company to Davisco Foods' plant lineup in 1991 more than doubled the company's total cheese capacity, the \$26 million, 70,000-square-foot whey facility became the largest whey protein isolates plant in the world.

As the curds are undergoing processing, the whey is alternately held in two storage tanks prior to pasteurization. The liquid whey is routed through centrifugal clarifiers to remove any remaining fine cheese particles, then passes through four membrane plants that perform a vari-

ety of functions.

Davisco Foods' proprietary ion exchange technology produces whey protein isolates and whey protein fractions with what the company says is the highest purity content ever achieved. The ion exchange isolation process begins by separating specific proteins from the whey's minerals, lipids and carbohydrates through a combination of nanofiltration, microfiltration and ultrafiltration.

The condensed deproteinized whey is crystallized, agitated, then spray-dried. In the end, the Jerome plant produces upwards of 300,000 pounds of whey solids a day. The pure protein stream is ultrafiltered to remove water, then spray-dried and packaged for delivery to food manufacturers all over the world.

"We have a separation technology factory, we can separate just about

anything," concludes Marty Davis. "We utilize whey as our substrate for separation at present. We're developing medicinal ingredients through separation and purification, and we're betting that there are opportunities for further purification and modification of these milk proteins that come from the cow."

Singly or in combination, Davisco Foods' whey protein isolates are used in medicinal foods, nutritional supplements and other food systems. To uncover additional opportunities in whey protein processing, Davisco Foods is beginning to study the effects of biotechnology as it relates to stimulating a mother cow to produce more valuable milk components.

"One of the key separation processes to gain the substrates that we have gained is the cheese-making," stresses Marty Davis. "Cheese-making

Davisco Foods' Cheese & Ingredient Companies

Eighty to 85 percent of Davisco Foods International's revenue is generated by cheese and cream sales, while 15 to 20 percent is attributed to ingredient sales.



Le Sueur, Minn.

Processes 1.8 million pounds of milk a day with 130 employees. Products include bulk cheddar-type cheeses and whey protein isolates. Also houses a custom spray-drying operation.



Jerome, Idaho

Processes five-and-a-half million pounds of milk a day with 160 employees. Products include bulk cheddar-type cheeses and whey protein isolates.



Lake Norden, S.D.

Employing 80 people, this food ingredient company in early 2002 will transition to a mozzarella cheese processing and ingredient processing facility. Will begin as a 2 million pounds of milk a day plant and someday expand to 5 million pounds of milk a day. Davis family



will also build a 2,500 Jersey cow farm near the site in 2001 to provide a milk source and biotechnology study center. Also houses a custom spray-drying operation.



Whey Protein Institute

Separate enterprise to promote, educate and stimulate awareness regarding whey proteins and their nutritional and functional value. Effort to bring whey protein to the forefront of consumer awareness and develop it as a household "name" and critical source of medicinal and nutrition value to the consumer.



Davis Family Farms

Initiative for the development of large-scale dairy production farms in the upper Midwest. Efforts are for the revitalization and expansion of profitably run, large-scale milk production operations with environmentally sound technology. Operates two 500-cow farms at present and is in the process of building a state-of-the-art 2500-cow all Jersey milk production farm.

PLANT PROFILE



An in-house laboratory carefully monitors product quality.

is a critical separation technology. We've done an important separation step in the cheese vat, then we take these components, protect them from processing alterations and take this stream to a technology where we can further separate. I think it's easy for people to forget that whey protein is milk protein and the first separation that occurs is in the cheese vat. That's one of the critical steps in which we differentiate the type of protein in milk, nutritionally and functionally."

Additionally, the Davis family is building a 2,500-cow farm near its Le Sueur Cheese and Ingredients Company in Le Sueur, Minn., to learn more about the components of milk in addition to providing a milk supply for its cheese-making operation. "My brother Mitch is heading

up our entire milk production enterprise, and we consider this initiative to be vital to our future," says Marty Davis.

Quality Connection

Complementing Davisco Foods' cheese and whey protein processing operations is a strong commitment to quality programs, which the Davis family defines as "rigid" and a driver of its company's success.

"We focus intently on quality, and we're very hands-on as far as quality goes," explains Marty Davis, noting, for example, that the company spends nearly an additional \$750,000 a year on powder packaging [compared to the standard packaging investment per pound in the industry] to achieve the highest quality delivery of its

goods. "I don't think we ever attain the highest level of quality possible, which is what we strive for. That puts constant pressure on us and our plants to always work toward improving in that area. Quality is the single most critical factor in our business. My Dad has always stressed that fact."

Davisco Foods will not release product to customers unless it meets its own analytical standards. "My brother Matt, [Davisco's director of quality assurance] watches this like a hawk. We won't release it, even on secondary criteria [non food-safety specifications] and if a customer wants the product anyway, that company's quality people must sign a waiver accepting the product — not the purchasing folks. If it involves a food safety condition, the waiver won't even do it. In that situation, the product will not be released even at the customers demand. We are very strict about that, and it's not something we have to baby-sit," adds Davis. "It is intrinsic in our people as a culture, and if we went outside those boundaries, I think our plant people would feel deceived. That's how strongly they feel about these policies. We've gotten it in their makeup, whether they're a warehouse manager, a lab technician or anyone else in the plant environment." df