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COVID-19 Spiked Demand for High-Protein Whey, but is Growth Sustainable?



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Key Points:

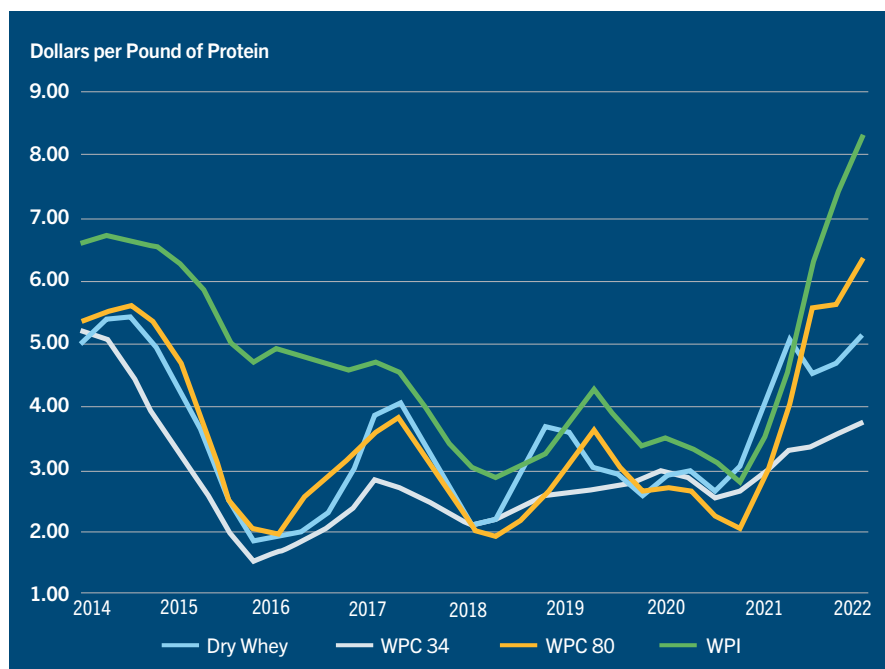
- The COVID-19 pandemic significantly altered the global whey market as health-conscious consumers’ demand for whey protein products surged alongside other nutritional supplements.
- Despite record cheese production in the U.S., the global market is short on whey products as global demand for protein accelerates.
- High-protein whey products like WPC-80 and WPI now command significant price premiums with the rapid increase in demand, making whey a more valued co-product for processors rather than a byproduct.
- However, in the long term, high-protein products like WPC-80 and WPI will become increasingly commoditized as processors shift production focus. Further-processed fractionated whey protein products are expected to become bigger value-drivers of the whey stream.
- High-protein whey products come with risks of increased price volatility inherent to niche and diverse product mixes and limited market players. To adequately meet the growing demand while covering this risk, dairy processors must invest in processing technologies that enable them to quickly adjust to market volatility.

Introduction

The U.S. is one of the world leaders in whey production and exports. Technological advances have created new value streams beyond commodity whey. In the last 20 years, whey has been transformed from a cheese-making waste byproduct often spread on farm fields as a low-value fertilizer to a highly valuable co-product, driven by rising global consumer demand for protein.

COVID-19 fundamentally altered the whey protein market. Demand for high-protein whey products surged as consumers in the U.S. and around the world became more aware of whey protein’s immune-enhancing properties, causing U.S. supplies to dwindle despite record large whey production. In its annual analysis of the sports nutrition and weight management industry,

EXHIBIT 1: Whey Valuations



Source: USDA, Blimling

Nutrition Business Journal reported that 36% of U.S. consumers reported they increased their protein powder intake during the pandemic and sharply increased their vitamin consumption, which persisted through 2021.

The renewed focus on health and physical fitness spurred by the pandemic has coincided with the long-term trends of rising demand for whey protein globally. This is especially true across Asia for infant formula, sports nutrition, high-protein snacks, and products for healthy aging to promote bone and muscle growth.

Industry experts anticipate significant market growth for whey protein to persist in the next 3-5 years. CoBank anticipates global annual market demand growth of 6%-7% for U.S. whey products for 2021-2026. Most of the supply growth will come from the U.S. because the other major dairy exporters, the EU and New Zealand, face supply constraints as their respective governments try to reduce cow numbers to meet sustainability initiatives on greenhouse gas emissions.

The U.S. currently is the global leader and exporter of high-protein whey products, producing 38% of the global supply of whey protein concentrate with 80% protein (WPC-80), with the EU following at 34% and Oceania at 12%, according to American Dairy Products Institute.

New technological advances in whey processing and significant profit margins on whey protein caused by the COVID-19 demand shift are expected to expedite investments and plant upgrades among dairy processors in the next 1-2 years. As a result of this capacity expansion, we expect WPC-80 and whey protein isolate at 90% protein

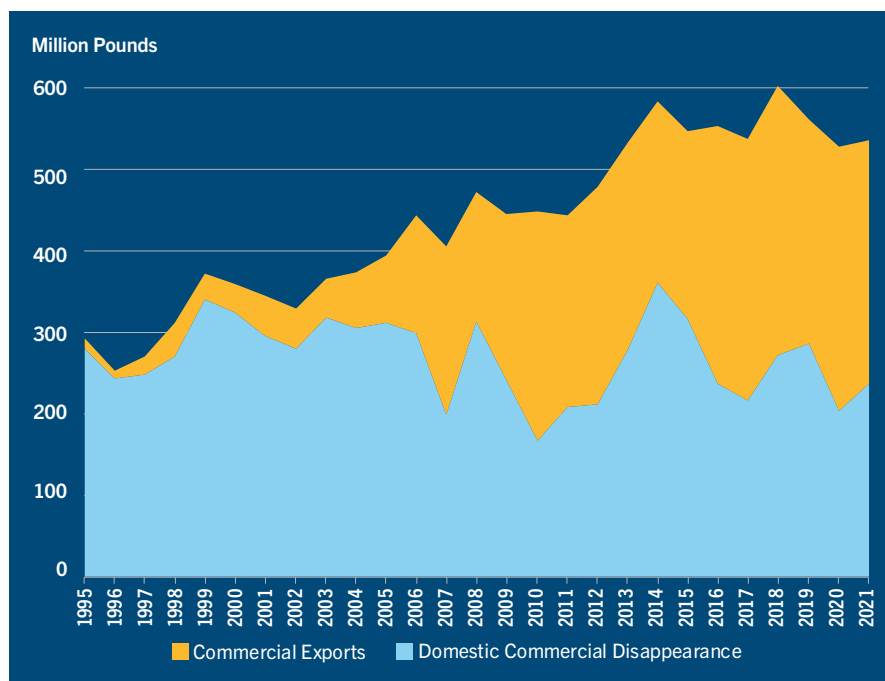
(WPI) to become commoditized longer-term, with still higher-value whey products like fractionates eventually becoming bigger value-drivers of the whey stream.

Protein Premiums Reach New Highs

The rapid change in demand for high-protein whey products like WPC-80 and WPI resulted in a breakout of prices in 2021 when WPC-80 and WPI enjoyed significant premiums to lower protein whey products like dry whey (12%-13% protein) and whey protein concentrate at 34% protein (WPC-34). This occurred even as cheese and whey production reached new record highs in the U.S. (*Exhibit 1*).

Low-protein dry whey prices have also followed in the price rally behind the high-protein whey products as production shifts away from dry whey to WPC-80 and WPI. Increased demand for dry whey and whey products like WPC-34 and permeate – a byproduct of WPC production – for inclusion in Chinese hog rations has also added further demand for U.S. whey.

EXHIBIT 2: U.S. Whey Protein Concentrate Demand



Source: USDA-ERS

The dual demand pull from animal feed and high-protein whey products has changed the economics of Class III milk price as increased whey prices alone accounted for a \$1.50/cwt increase in milk checks. Throughout 2021, dry whey futures on the CME rose 57% while cheese futures rose 29%.

Durability of Demand

High-protein whey has entered the mainstream as a super food for health-conscious consumers interested in muscle development, weight loss, and digestive health. Consumer demand only grew during the pandemic as the world became more aware of whey protein's immune-enhancing properties. In the meantime, demand for infant formula will likely continue its ascent as more women work globally as the middle class expands, particularly across Asia. And, an aging population globally is expected to continue the trend of older consumers demanding high-protein nutritional products for muscle development and to prevent bone loss.

In fact, extrapolating from USDA-NASS historical data on whey protein concentrate domestic demand and exports, CoBank forecasts demand for U.S. high-protein whey to grow at a compound annual growth rate of 6%-7% over the next five years, led mostly by demand growth in the export market (*Exhibit 2*).

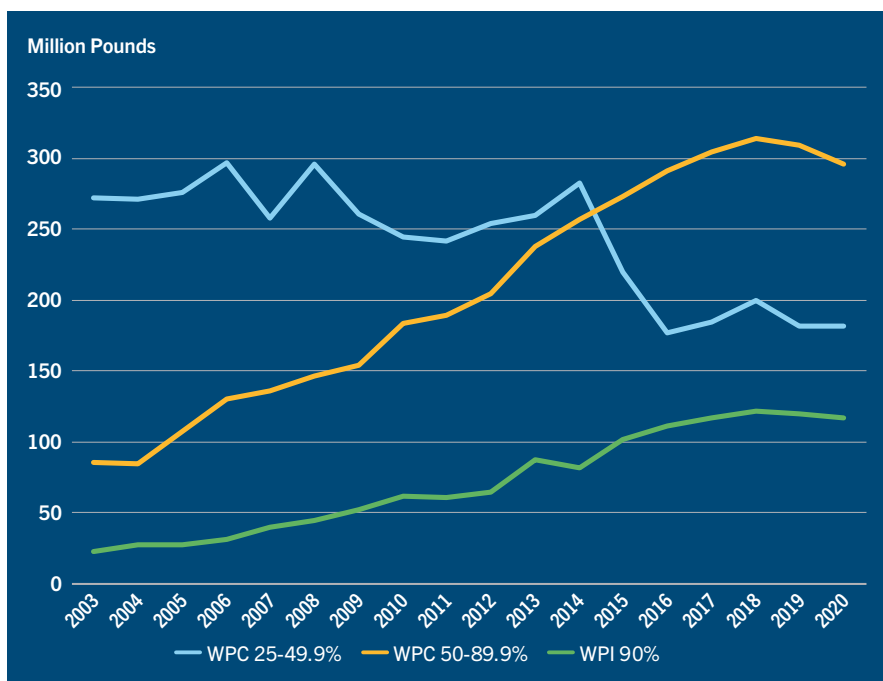
Grand View Research, meanwhile, forecasts the global sports nutrition market to expand at a CAGR of 10.9% from 2021 to 2028 as more consumers focus on self-care, preventive medication, and fitness. The Asia-Pacific region in particular is expected to see double-digit growth in sports nutrition with Euromonitor International forecasting the sports nutrition market in India

to grow at 22.8% CAGR by 2023. Demand for food ingredients like whey protein that are high in protein and low in sugar and fat is expected to follow.

Importantly, the demand for sports nutrition products is extending into consumer groups with little interest in sports but view protein drinks and snacks as healthier and convenient meal replacements. The higher protein content also offers consumers satiety to reduce hunger for weight loss. Immune system health has also become of greater concern during the COVID-19 pandemic, bringing more interest to whey that is rich in the amino acid cysteine, which boosts antioxidant levels and can support the immune system.

Plant-based alternative sources of protein like soy protein and pea protein are not expected to disrupt the whey protein market due to nutritional deficiencies compared to whey, which offers all the essential amino acids needed by the human body and are quickly digestible. Rather, plant-based alternatives fill niche

EXHIBIT 3: U.S. High-Protein Whey Production



Source: USDA-NASS

markets for consumers on vegetarian or vegan diets, or offer a lower-priced alternative as an ingredient to boost protein content for less health-conscious or more price-sensitive consumers.

Strategic Growth

Processors are responding with increased production of WPC-80 and WPI, while production of lower-protein whey products like dry whey and WPC-34 has atrophied as more of the whey stream becomes dedicated to high-protein products (*Exhibit 3*).

Total cheese and whey processing capacity in the U.S. is expected to increase by an estimated 10% in the next five years based on current announced expansion plans or greenfield projects. The substantial increase in whey production will result in all whey products including WPC-80 and WPI becoming increasingly commoditized. Processors will turn to whey protein fractionates like lactoferrin and alpha-lactalbumin – high-value whey products prized for their functional properties – as the next value drivers in the whey stream. Processors using membrane technology to capture whey proteins directly

from fresh milk to produce milk protein concentrate have added to the versatility and capacity of U.S. whey processing, but with major cheese and whey plant expansions slated to become operational in the next five years, whey proteins derived from the whey stream will be the dominant source of high-protein whey in the future.

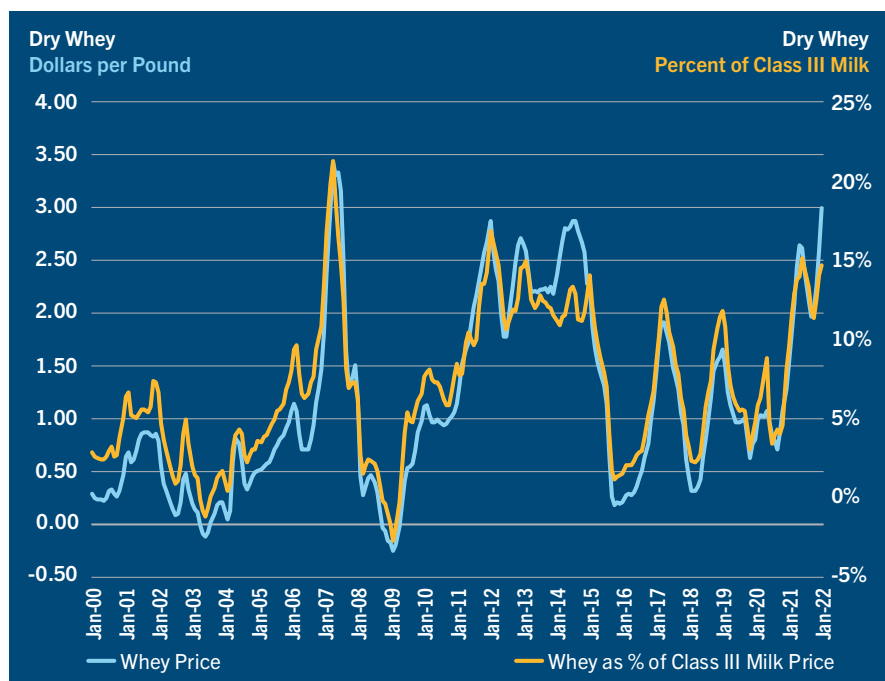
Not all processors will have the capability to capture the profits of high-value whey or fractionates due to the capital-intensive technology and high barriers to entry. The consolidated number of processors that can afford costly membrane technology will also be selling to a select group of food buyers, resulting in a different business

model compared to commodity dairy products: a model where long-term strategic relationships in the supply chain are needed. Prices in niche dairy markets can also be markedly more volatile, while price elasticities can be far greater for processors depending on a scarce number of major food manufacturers to buy their product.

U.S. whey processing capacity currently lacks flexibility due to minimal expansion in dry whey processing capacity in recent years. Current plant capacity that produces all varieties of whey products is limited due to high cost constraints of adding processing equipment, while recent investments in whey processing having been limited to high-protein products that generate higher returns.

The main risk to processors is the higher price volatility characteristic of smaller niche markets. New value-added and further-processed whey products will be meeting a narrower demand base, easily risking oversupply. The dairy industry of the future will need to meet growing demand needs for low-protein whey for both human consumption and animal feed, but also for

EXHIBIT 4: Whey Price vs. Whey as Percent of Class III Milk



Source: USDA-AMS Dairy Market News; Blimling and Associates, Inc.

high-protein whey for consumer products, which will require a variety of pricing structures and investments in new plant technology.

While high-protein whey will continue to grow in demand and offer higher returns, low-protein whey will still offer the appeal of stability and price hedging for processors. For processors in Federal Milk Marketing Orders (FMMOs) where dry whey factors into Class III prices, producing dry whey covers regulated milk costs and enables processors to hedge against potential volatility, whereas high-protein whey markets lack similar price stability (*Exhibit 4*).

Outlook

Today the U.S. has the most cheese and whey processing capacity in history with more expansion on the way. Major expansions in cheese and whey production in the years ahead will likely depress whey prices and

compress whey processing margins. Processors will be challenged to find new and innovative ways to invest in processing to add value to this new and growing whey stream, and will particularly focus on investing in high protein products. Processors using membrane technology to capture proteins from fresh milk will add processing capacity for high-protein products, but they will not be the major driver of expansion.

Whey production will be stratified across products and prices. This will require processors to invest in processing technology that enables flexibility in production for a variety of whey products, spanning dry whey to fractionated whey. High costs of membrane technology for the further processing of whey, though, will limit

growth opportunities to cheese and whey processors that have size, economies of scale, and the ability to partner with international processors and marketers who have proprietary whey technology.

Long-term, global protein demand growth is expected to persist well into the future. With consumers having discovered or are rediscovering the health benefits of whey protein following the COVID-19 pandemic, the U.S. dairy industry will be realigned to meet growing and diverse global protein needs. Cheese and whey processing capacity in the U.S. is expected to increase substantially in the next five years, positioning the U.S. to take advantage of this demand growth. Whey prices are expected to persist at historically strong levels until new cheese and whey processing capacity comes online and will remain an important contributor to producer milk checks as demand for high-protein whey grows globally. ■

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