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Market Impacts of High-Protein Whey Product Promotion

EXECUTIVE SUMMARY

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Summary Statement

Promotion of high-protein whey products increases both producer revenues and whey product manufacturer net margins under a wide variety of assumptions about growth rates for dairy products (including high-protein whey products), the availability of separated whey solids for processing, and other developments in US dairy markets. These conclusions are derived from a detailed dynamic simulation model that includes all major product sectors, comprehensive allocation of dairy components, and relevant dairy-related policies.

Project Objectives

Previous reports (e.g., Dryer, 2004) indicated potential benefits for dairy farmers from the promotion of high-protein whey products. Rapid growth in sales of these products has been observed in recent years as awareness of their functional and nutritional properties has increased. However, previous work did not address a number of possible concerns about promotion of high-protein whey products, particularly potential negative impacts on cheese markets. A more comprehensive and dynamic analysis was needed. The objective of this research project was to address the following two questions:

1) Will promotion of high-protein whey products increase dairy farmer revenues (the average milk price times the amount of milk sold)?
2) Will promotion of high-protein whey products increase whey product manufacturer net margins (revenues from product sales less input and processing costs)?

Because the magnitude of impacts on farmer revenues and manufacturer margins may vary with market conditions and other assumptions, an additional objective is to assess how these conditions affect the key outcomes (in particular, whether the direction of changes is affected).

Methods

Answering the above questions requires a comprehensive, integrated approach. Building on previous work, we developed a dynamic simulation model of the entire US dairy sector. This model has the following characteristics:

- 17 "final" and "intermediate" products[1], including four "dry" whey products. All the major uses of farm milk and farm milk supply are represented in the model. The four whey products are dry whey, lower-protein whey protein concentrates (WPC with average protein of 34%), high-protein WPC (protein content greater than 80%; hereafter referred to as WPC80+), and other (mostly lactose). The focus of this research is on the effects of promoting WPC80+ products.

[1] "Final" dairy products are either consumed directly by consumers or sold to non-dairy industry segments. "Intermediate" dairy products are those used in the manufacture of other dairy products (e.g., nonfat dry milk used in cheese making). Intermediate dairy product usage is often a large proportion of demand for dry products.

- A comprehensive representation of interactions between cheese manufacture (which is the principal source of whey solids for further processing into the four whey products) and whey product manufacture. This includes both physical linkages (explicitly accounting for the separated whey components required for manufacture of the whey products) and the impacts of promotion on cheese manufacturer and whey product manufacturer financial performance. Thus, our model accounts for how whey product promotion influences cheese markets.
- Complete representation of the dairy policies that can influence the outcomes of whey product promotion. These policies include classified pricing under federal and California marketing orders, price support under the Dairy Price Support Program, tariff and non-tariff trade barriers, and US export subsidies (for cheese, nonfat dry milk, and butter). Classified pricing is represented in detail because one of the principal expected impacts of whey promotion is to increase the dry whey price, Class III prices, and the farm milk price. Our model also accounts for the potential for increases in milk supplies to result in decreases in butter and nonfat dry milk prices (and therefore Class IV prices).
- Ability to evaluate various market conditions and other factors that may influence the effects of whey product promotion. One factor is how promotion influences substitution among whey product uses, either directly through greater awareness of functional properties, or indirectly through changes in product prices.
- Explicit supply and demand balance for separated whey solids. Because existing data from ADPI and NASS represent only about 50% of whey solids use, a complete picture of whey solids use is lacking. How easily whey solids can be switched from existing uses to manufacture of high-protein products is likely to influence the effects of promotion, so alternative assumptions about this process are examined with the model.
- The effects of alternative assumptions about growth in demand for other products (especially cheese—again, the main source of separated whey solids), increased domestic production of casein and milk protein concentrates (a number of plants for these products are expected to come online during 2006).

The model uses 2004 as a base year, and simulates outcomes during 2004 through 2009.

Scenarios

Because future market developments are almost always difficult to predict, it is common to use simulation models such as the one developed for this study to evaluate a number of different possible scenarios. Because sales of high-protein whey products will continue to grow either with or without promotional efforts, we assume that the principal effect of promotion will be to *increase the growth rate* of domestic (but not export market) sales of high-protein whey products. To evaluate the impacts of promotion, we compare the dairy farmer revenues and whey product manufacturer margins resulting from assumed growth rates with and without promotion. To undertake the analyses, we assume that a successful promotional campaign can be mounted, and also assume the impact that the promotional campaign will have on the growth rate of domestic sales. We do not model the process by which the promotional campaign influences sales, in part because the specific claims that would be part of the promotional effort and amount of expenditures are unknown.

Because various estimates have been developed for the future growth in sales of WPC80+ products, we analyze two possible sets of growth rates. Under a "slower growth" scenario, outcomes are compared for a 2.5% cumulative annual growth rate (CAGR) for domestic sales of WPC80+ without promotion and a 5.0% CAGR for domestic sales with promotion. In a "faster growth" scenario, a 4.0% CAGR for domestic sales of WPC80+ without promotion is compared

to an 8.0% CAGR for domestic sales with promotion[2]. For each of these two sets of growth rates, we examine a number of different market conditions. The scenarios examined include:

- *All Growth*. Assumes growth rates in demand for all products based on past growth rates and professional judgment. Alternative growth rates for WPC80+ are examined, as mentioned in the previous paragraph.
- *All Growth, with Cross-Price and Substitution Effects*. These scenarios are as in the "All Growth" case, but allow for substitution effects among whey products. As noted above, promotion may cause some substitution by whey product users, so that increases in WPC80+ sales may be somewhat offset by lower sales of other products. Increases in WPC80+ prices due to increased demand may also cause some switching among whey products. Both of these effects are examined with this scenario.
- *All Growth, with Casein and MPC Manufacturing*. These scenarios are as in the "All Growth" case, but assume that 7% of US casein and MPC demand will be manufactured domestically starting in 2006. The model does not currently include complete feedback effects for this; an exogenous "step increase" is included.
- *All Growth, with Cross-Price Effects, Substitution, and Casein and MPC Manufacture*. This is a combination of the All Growth, Cross Price and Substitution, and Casein and MPC Manufacturing scenarios.
- *All Growth, Tighter Separated Whey Markets*. This scenario is as in the "All Growth" case, but assumes that markets for separated whey solids are significantly tighter than in the "All Growth" scenario. This scenario tests the impact of assumptions about separated whey markets, for which the available information does not allow us to be certain.
- *All Growth, Slower Cheese Demand Growth*. This scenario is as in the "All Growth" case, but examines how slower growth in demand for cheese influences the outcomes of promotional activities.

Results

The results of the various scenarios are shown in Table 1. The results indicate that promotional efforts will increase dairy farmer revenues and WPC80+ manufacturer net margin regardless of the assumptions about growth rates or other market factors. The magnitude of the increases in these outcomes varies to a certain extent depending on scenario (i.e., the assumptions). In particular, the tighter separated whey markets and slower growth in cheese demand result in larger increases in farmer revenues due to promotion—but also in somewhat smaller increases in manufacturer net margin. In the most extreme case, where separated whey markets are tight and cheese demand growth is slow, the impacts of promotion on dairy farmer revenues are significantly larger than those reported in the table below. However, increases in whey product manufacturer net margins are relatively small in this case, and overall producer revenues (rather than the difference due to promotion) are lower compared to when cheese demand growth is more rapid.

[2] Because the geographic focus of the assumed promotional efforts is the US, export demand growth is assumed not to change with promotional activities.

Table 1. Summary of Impacts of WPC80+ Promotion on Farmer Revenues and Manufacturer Margins

Scenario, Outcome	Slower Growth of WPC80+	Faster Growth of WPC80+
	Cumulative Difference due to Promotion	
Dairy Farmer Revenues, $/million		
All Growth	+53	+88
All Growth, CPE and Substitution	+55	+93
All Growth, Casein and MPC Manufacturing	+54	+89
All Growth, CPE, Sub and Casein/MPC	+55	+92
All Growth, Tighter Separated Whey Markets	+56	+192
All Growth, Slower Cheese Demand Growth	+64	+131
WPC80+ Manufacturer Net Margin, $/million		
All Growth	+17	+25
All Growth, CPE and Substitution	+17	+24
All Growth, Casein and MPC Manufacturing	+17	+25
All Growth, CPE, Sub and Casein/MPC	+17	+25
All Growth, Tighter Separated Whey Markets	+10	+12
All Growth, Slower Cheese Demand Growth	+16	+24

Note: The slower growth column compares an assumed 2.5% growth rate without promotion to an assumed 5.0% growth rate with promotion. The faster growth column compares an assumed growth rate of 4.0% without promotion to an assumed 8.0% growth rate with promotion. All reported values are the cumulative differences with and without promotion over the six years from 2004 to 2009.

Results Summary

Two sets of assumption about rates of growth in WPC80+ are modeled: a more conservative estimate of moving from 2.5% to 5% as a result of domestic promotional efforts and a more aggressive estimate of promotion effect from 4% growth to 8%. The faster growth rate results in higher dairy farmer revenues and net margins for manufacturers. Under the most likely scenarios, dairy farmer revenues are projected to increase by $53 to $55 million with slower growth in WPC80+ sales and $88 to $192 million with higher growth rates. Margins for WPC80+ product manufacturers are projected to increase by about $17 million and $25 million under slow and fast growth assumptions, respectively.

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