Milk Protein Ingredients in Canada: A Perspective

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■ Introduction

The use of new milk protein ingredients, and more recently of milk protein isolates, in the production of dairy products in Canada has created quite a debate in the Canadian dairy industry. The increasing use of fractionated milk proteins by processors, some of them imported, has been seen as a threat by some producers. Discussions between industry stakeholders (producers and processors) have been unsuccessful at reaching consensus on this issue.

What are Milk Protein Ingredients?

Milk protein ingredients can be divided into three main categories:

- total milk protein products
- casein products
- whey products

Total Milk Protein Products

Total milk protein products refer to ingredients that closely maintain the same proportion of the two types of protein, casein (≈ 80%) and whey (≈ 20%) found in raw milk. This category includes skim milk powder (SMP), milk protein concentrates (MPC) and milk protein isolates (MPI). SMP, MPC and MPI are obtained by evaporation, ultrafiltration or diafiltration from skim milk.

It is essentially the increasing proportion of proteins compared to other components that distinguishes these ingredients from one another.

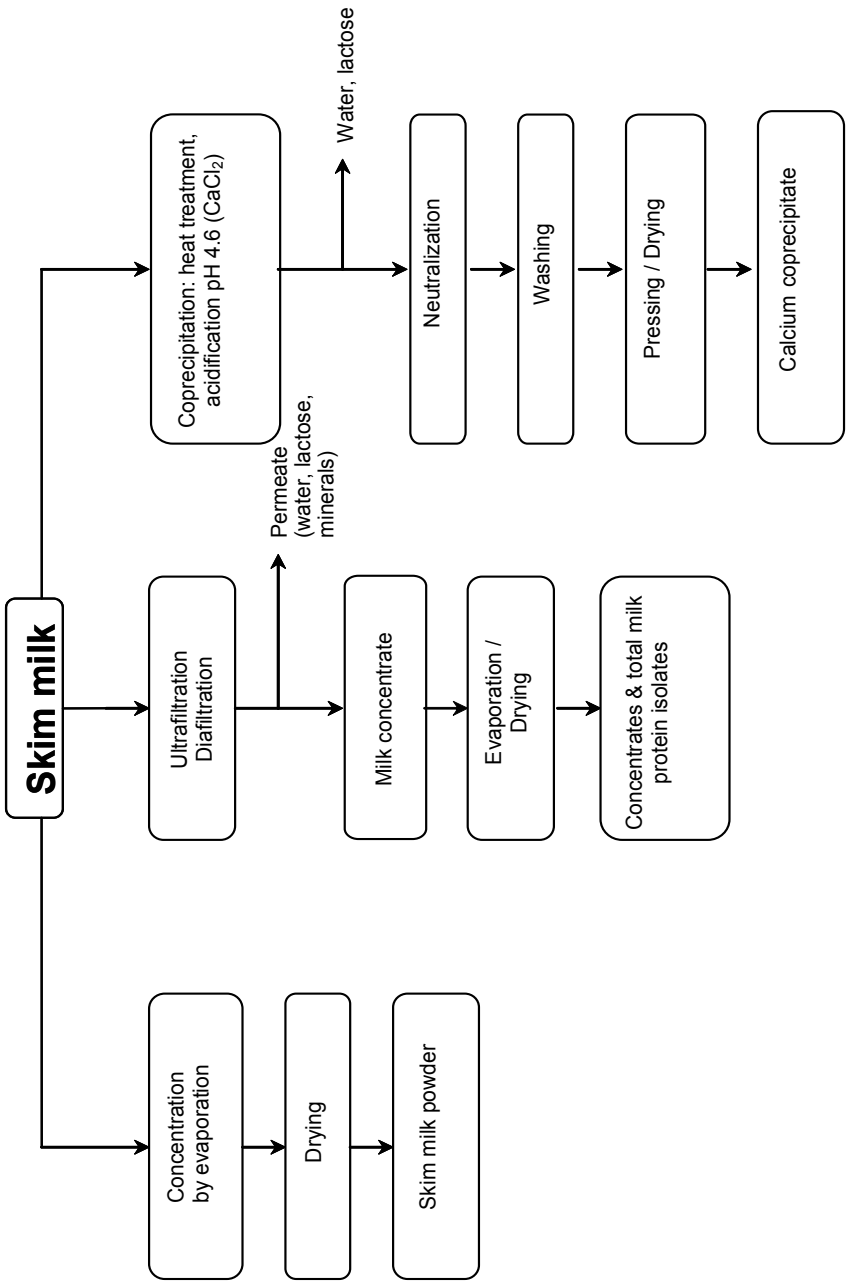


Figure 1. Production process for SMP, MPC and MPI

Table 1. Composition of Total Milk Protein Products

	Proteins (% max)	Humidity (% max)	Lactose (% max)	Fat (% max)	Minerals (% max)
SMP	35	3-5	51	1	7.7
MPC	50-87.5	3-5	1-40	1-2	4-7
MPI	87.5 +	3-5	1-4	1.5	3-7

Casein Products

This category includes different types of casein and caseinates, the major milk protein found in milk. Unlike the production process for total milk protein ingredients, caseins and caseinates are obtained through acidification or by the addition of rennet.

Table 2. Composition of Casein Products

	Protein (%)	Humidity (%)	Lactose (%)	Fat (%)	Minerals (%)
Acid Casein	87	10	0.2	1.5	2
Rennet Casein	80	12	0.2	1.5	7
Sodium Caseinate	92	4	0.2	1.5	4
Calcium Caseinate	91	4	0.2	1.5	4.5

Whey Products

This category includes different type of whey, the minor milk protein found in milk; whey powder, whey powder concentrates (WPC) and whey powder isolates (WPI). Historically, whey had little value but recent advances in research and technology have found new value-added applications for this protein.

As in the case of total milk proteins, the production process of WPC, WPI, and whey powder is essentially one of ultrafiltration, diafiltration or evaporation. Once again, it is the increasing proportion of proteins compared to other components that distinguishes whey powder from WPC and WPI.

Table 3. Composition of Whey Products

	Protein (%)	Lactose (%)	Humidity (%)	Fat (%)	Minerals (%)
Liquid whey	0.8	4.9	93.2	0.15	0.31
Whey powder	12	70	4.0	1.0	8.0
WPC 35	35	46	4.5	3.2	8.0
WPC 80	80	3.5	4.0	7.5	2.9
WPI	90	1.0	4.0	1.0	3.0

■ Utilization of Milk Protein Ingredients in Canada

In Canada, MPC and MPI are mostly used in the production of dairy products. The attraction of MPC/MPI for dairy processors is that they can be formulated to meet specific functional product requirements. The lower lactose content of these protein sources is especially suited for cheese and yogurt processing.

Whey powder, WPC and SMP are primarily used in the animal feed sector followed by dairy products. WPI is mainly used by the nutraceutical industry followed by the animal feed sector.

Utilization of caseins is evenly split between dairy products and the nutraceutical industry while caseinates are mainly used by the nutraceutical industry and the animal feed sector.

While current utilisation data suggests that the food and feed industries are the greatest users of milk protein ingredients, there are opportunities to increase the use of these ingredients in other sectors. These sectors include:

- Sport Nutrition Products (whey powder drinks, power bars)

- Cosmetics (skin lotion, milk soaps)
- Textiles (milk protein fibers)

■ World and Canadian Production.

Canada is a relatively small player in the production of milk protein ingredients other than SMP and whey powder. Companies from Oceania and Europe dominate these markets. Most prominent among them is the New Zealand dairy cooperative Fonterra, which is actively pursuing the development of these products.

Table 4. World Production of Some Milk Protein Ingredients

	World Production	Major Producers
MPC/MPI	≈100,000 MT	New Zealand, Ireland, Netherlands, Denmark Germany
Caseinates	≈130,000 MT	New Zealand, Netherlands, Denmark France
WPC/WPI	≈340,000 MT	United States, European Union, New Zealand

Source: USITC, Conditions of Competition for Milk Protein Products in the U.S. Market, 2004

There is no reliable data on the production of total milk protein products in Canada other than for SMP and whey powder. This said, it is generally acknowledged that Canada's larger processors have the technological infrastructure to produce most total milk protein and whey products. Other smaller companies, such as Vitalus Nutrition Inc. specialize in the production of milk protein ingredients.

■ Canadian Trade Regime for Milk Protein Ingredients

In Canada, some milk protein ingredient imports are controlled through a tariff-rate quota (TRQ). This is the case for SMP, MPC and whey powder. Tariff-rate quotas limit the amount of products that can be imported every year and assess relatively high over-quota duties for quantities above the TRQ. It must be noted that the Import for Re-export Program administered by the Department of Foreign Affairs and International Trade allows imports of

controlled dairy products above the TRQ if they are ultimately re-exported.

Table 5. Milk Protein Ingredients Under TRQ

	Tariff-Rate Quota (Tonnes)	Over-quota tariff
Skim Milk Powder (SMP)	0	201.5%, but not less than $2.01/kg
Whey Powder	3,198	208%, but not less than $2.07/kg
Milk Protein Concentrate (MPC)	Up to 4,345	270%, but not less than $3.15/kg

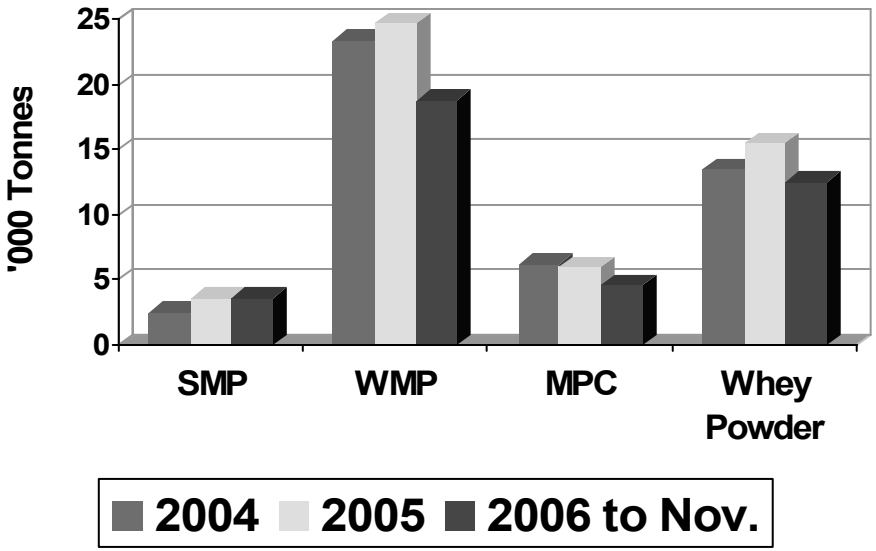
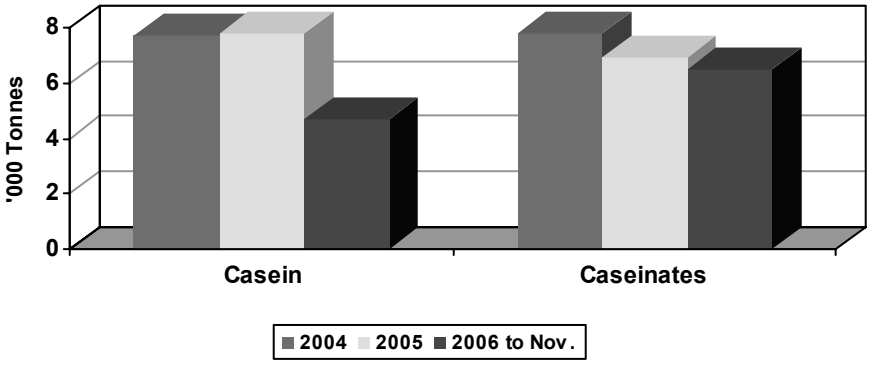


Figure 2. Canadian Imports of Some Milk Protein Products

Other milk protein ingredients are not controlled with TRQ and come in freely or with a low duty rate. This is the case for whey products other than in powder form, casein, caseinates and MPI.



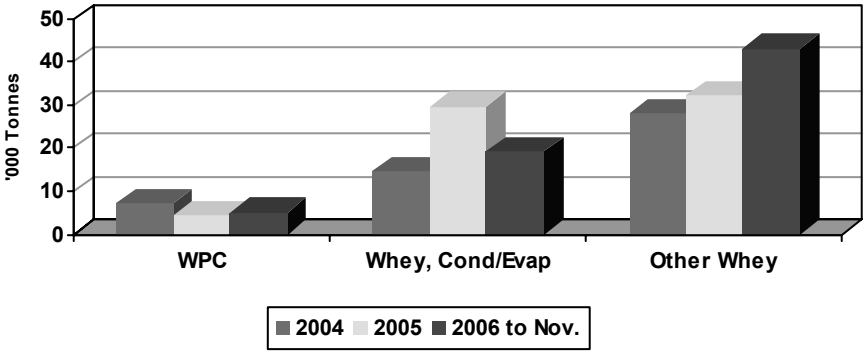


Figure 3. Canadian Imports of some Milk Protein Products

Conclusion

- Fractionation and concentration of milk into its protein components is increasingly replacing traditional milk protein sources such as skim milk powder. This trend will only increase in the future.
- The Canadian dairy industry is somewhat lagging behind other countries in the production of these new milk protein ingredients.
- The Canadian dairy industry should seize the opportunities presented by the growing demand for products made with new milk protein ingredients.

References

Study of the Market Potential for Proteinic Dairy Ingredients in Canada, Paul Paquin, 2004.

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