

The Implications of Existing Milk Marketing Trends in Canada: A Counterfactual Analysis



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The Issue

As of the spring of 2016, the dairy industry is faced with a crowded agenda of urgent matters. The Trans Pacific Partnership (TPP) Agreement, once ratified, allows additional imports of a wide range of dairy products including cheeses, fluid milk, and related products. While the increases in imports under TPP are stretched over several years, the import schedules in most products are front-end loaded with most of the increases in the tariff rate quotas (TRQs) in the first 5-7 years. In the Comprehensive Economic Trade Agreement (CETA) between Canada and the EU, the major increase in TRQ imports is in cheese. In both agreements, the arrangements call for the extension of the zero tariff and no TRQ on imports of milk protein isolates (MPI) to all members of the TPP and to the EU, whereas the US has had this access since 2008.

If these were the only pressures in the trade picture facing Canada, the industry could probably adjust over a number of years to absorb the extent of these changes. However, Canada is also facing the loss of export market access for dairy products- some immediately, and total loss of access by 2021- under the WTO Nairobi Agreement. It is also labouring under a structural surplus of skim solids in the form of skim milk powder (SMP), with a growing market for butter and butterfat in products that exacerbates the structural surplus issues for skim. Today, the dairy industry operates with imminent threat of mass dumping of skim milk, day to day.

This policy note explores the apparent implications of current milk marketing trends under the existing milk marketing system. It is counterfactual, in that material changes to the system are being contemplated and, in some cases, adopted. The policy note concludes by considering the benefits of pricing mechanisms that allow for dairy exports that do not attract subsidy. It

focuses on quota adjustments, and follows a previous policy note relating to potential price adjustments under Class 6 and other policy adjustments¹

Current Context

Canada is producing a structural surplus of skim milk solids in the form of skim milk powder (SMP). With its limitations on dairy exports, the surplus of SMP has grown to 79,200 tonnes in the 2014-15 dairy year based on Canadian Dairy Commission (CDC) surplus purchases. According to CDC records, in 2014-15 54,300 tonnes of surplus skim were sold into the animal feed market, 13,100 tonnes exported as SMP, and an additional 11,800 tonnes of SMP were embedded in other dairy products, including milk protein concentrates.

The surplus of skim milk solids arises because overall milk production levels are set annually to clear the domestic market on butterfat, adjusted for imports, exports and changes in stocks. Since butterfat and skim solids are produced in fixed proportions in milk, the market balance based on butterfat can create either a surplus or a deficit in skim milk solids. Exacerbating the current surplus is the open entry into Canada for diafiltered milk and its dried equivalent milk protein isolate (MPI), which, because of its lower price, can substitute for skim milk solids in the Canadian market. The diafiltered milk/MPI imports have grown rapidly over the past several years, increasing seven-fold since 2008. The demand for butterfat across all milk classes in

¹ See *Understanding the Dynamics of Milk Pricing and Revenue in a Time of Change* Agri-Food Economic Systems Independent Agri-Food Policy Note, May 2016
<http://www.agrifoodecon.ca/uploads/userfiles/files/milk%20pricing%20briefing%20note%20may%2018%202016.pdf>

Canada has been growing an average of about 1.85 million kilograms each year from 2003-04 to 2014-15. The result is a persistent and growing surplus of skim milk solids in Canada.

The WTO Nairobi Agreement (December 2015) raises another dimension beyond the two major trade agreements. Canada agreed to remove all export subsidies immediately (as of 1 January 2016), with the caveat that if Canada eliminates all export subsidies on dairy products sold to developing countries starting in 2016, some export subsidies could remain in place until the end of the year 2020. The only export subsidies that Canada maintains are for dairy products, an arrangement that stems from the WTO Agreement of 1994. This 1994 agreement provides Canada with two binding limits on most dairy product exports: the maximum value of the export subsidy outlays, and the maximum volume of exports each (dairy) year (Table 1).

Table 1: Export Subsidy Limits for Dairy Products

| Product | Maximum Outlays (\$'000) | Maximum Volumes ('000 tonnes) |
|-----------------------|--------------------------|-------------------------------|
| Butter | 11,025 | 3,500 |
| Skim Milk Powder | 31,149 | 44,953 |
| Cheese | 16,228 | 9,076 |
| Other Milk Products | 22,505 | 30,282 |
| Incorporated Products | 20,276 | na |

In recent years, it has been the value of the export subsidy outlays that has been the binding constraint, so the volume of exports under subsidy remains considerably less than the maximum volume of exports to which Canada has agreed in the WTO. The Nairobi Agreement goes further. It indicates that if Canada chooses to meet the requirements for extending export subsidies to the end of 2020, the maximum volume of subsidized exports cannot exceed the average exports that attracted subsidy in the three-year period 2003-05 (Table 2). Additionally, both WTO volume and outlay criteria would also have to be met.

Table 2: Maximum Volume of Exports, Nairobi Agreement (tonnes)

| | |
|---------------------|--------|
| Butter | 774 |
| SMP | 10,708 |
| Cheese | 4,003 |
| Other Milk Products | 10,598 |

Based on Canada's past notifications of export subsidy volumes of SMP, the maximum volume under the Nairobi Agreement is 10,708 tonnes (the average of the three dairy years, 2003-04 to 2005-06), effective in the next dairy year. This is substantially less than the actual volume of SMP exported under subsidy in 2014-15 (13,100 tonnes)². So Canada stands to lose about 2,400 tonnes of SMP export access for the next five years, and then to lose all of this export access.

Metrics of Adjustment

This background enables an exploration of the structural surplus of skim solids in Canada and the effects of waiting until the end of 2020 dairy year for adjustment to the loss of subsidized exports. To do so, the following assumptions are adopted:

² It remains unclear whether the calendar year or the dairy year will be used to calculate export subsidy outlays and volumes. However, "Canada does not possess reliable statistics regarding its subsidized dairy exports for the marketing years 2000/01 to 2002/03 because exports that were considered subsidized were not tracked separately from non-subsidized exports." (From G/AG/N/CAN/55, Notification of Export Subsidies to WTO). As a result, dairy years are used for the analysis.

In most agreements that specify years, the use of a commodity year may be used instead of the calendar year. The year in the agreement then refers to the commodity year beginning during that year. In this case, it is assumed that the 2003-05 average will be taken as the three dairy years, 2003-04 to 2005-06 (August-July). To note, the Nairobi Agreement does not indicate that all export subsidies must end by 31 December 2020; it states only that "export subsidies shall be eliminated by the end of 2020".

- The demand for and disappearance of milk and milk products in Class 1 (fluid milk), is assumed to be independent of the utilization of butterfat in Classes 2-5.
 - While some changes in average butterfat content in fluid products have taken place over the years, there have not been major changes in the shares of butterfat and skim solids across the fluid and Classes 2-5 divide.
- The utilization of butterfat in Classes 2-5 will continue to increase at the average growth rate in the period 2003-04 to 2014-15.
 - Although alternative methods can be used to estimate the skim solids arising from each kilogram of butterfat in Classes 2-5, this relationship (skim solids per kilogram of butterfat) has been quite stable over the period 2011-12 to 2014-15, following greater variation in earlier years.
- Imports of diafiltered milk/MPI will stay at 2014-15 levels, i.e., 27.9 thousand tonnes.
 - This is a very strong assumption. While possible that MPI imports will stabilize at current levels, continued increases over the next 5-6 years will further crowd out skim solids produced in Canada, increasing the surplus skim solids market in Canada, well above the estimates below.
- The animal feed market for skim solids is saturated at 2014-15 levels (54,300 tonnes); that is, no growth is assumed in this market.
 - The 54,300 tonnes of skim solids sold in the animal feed market is the highest level in recent years. It represents by far the lowest priced skim components in the milk market. Growth beyond this level will clearly stretch and potentially outrun processors' drying capacity. The possibility exists that some livestock growers could arrange to utilize the product in liquid form, but this would require new investment by the livestock industry and is probably limited to a local phenomenon near processing plants.

- The sum of the weights of protein and other solids derived from milk is equivalent to the weight of SMP.
- The ratio of skim solids to butterfat used to calculate the skim solids from Classes 2-5 is 2.023, the annual average over the years 2011-12 to 2014-15.
- Processors will not significantly change utilization shares of dairy products made from milk.

Using the butterfat utilization in Classes 2-5 from 2003-04 to 2014-15, we can estimate its growth rate in butterfat demand/disappearance in these classes and use this rate of growth to estimate the butterfat production through 2021-22.³ We can start with the knowledge that the structural surplus of SMP (protein plus other solids) was 79,200 tonnes, based on CDC removals. We also know that beginning in 2016-17, the maximum level of SMP exports will be no more than 10,708 tonnes, and the other exported products will be capped at current or lower levels, under the combined WTO export limitations and the WTO Nairobi agreement.

Empirical Estimates

Total dairy exports of SMP equivalent in 2014-15 were 24.9 million kilograms;⁴ disappearance from Class 5(d) was 26.5 million kilograms, very close to the SMP equivalent exports reported by CDC.⁵ For the categories of SMP, cheese, other milk products and incorporated products, the amount of exports was at or very near current WTO export limitations. As a result, based on current prices, the maximum allowable exports under the Nairobi Agreement will be no more (and likely less) than the 24.9 million kilograms exported in 2014-15. Starting in the 2021-22 dairy year (at the latest), these exports will no longer be permitted.

The projected growth in butterfat utilized in Classes 2-5 is 1.85 million kilograms per year, with consequent growth in protein and other solids of about 3.76 million

³ The method was to regress the annual butterfat disappearance on a linear time trend for the years 2003-04 to 2014-15.

⁴ Canadian Dairy Commission Annual Report, 2014-15.

⁵ From AAFC Canadian Dairy Information Centre.

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kilograms each year. As a result, by 2020-21, there will be 22.6 million kilograms of additional skim solids that cannot be absorbed domestically compared to 2014-15 levels (Table 3).

In 2021-22 there will be 26.3 million kilograms of additional skim solids, but no opportunity to export any product that attracts an export subsidy. This is on top of the 24.9 million kilograms that cannot be exported and must be absorbed domestically, for a total of 51.23 million kilograms of additional non-fat milk solids that must clear the domestic market. With this level of growth in butterfat disappearance and associated skim production, it can be anticipated that the dairy processing industry will run out of drying capacity for skim milk powders long before 2021-22.

In Tables 4 and 5, reductions in growth of production are explored. Even with an annual increase in butterfat utilization of just 1.0 million kilograms (rather than 1.85 million kilograms) of butterfat, there remains about seven and a half million kilograms of skim solids without a market by 2020-21.

Further exploration indicates that annual reductions in butterfat production of three million kilograms per year on a sustained basis would be required to eliminate the structural surplus entirely. That is, non-fat solids production would be entirely absorbed in the Canadian market, without any product going to the animal feed market. This would be equivalent to setting the supply-demand balance using non-fat milk solids instead of butterfat demand and disappearance- a *de facto* skim quota.

Implications

While crude, the analysis illustrates the true nature and potential magnitude of the imbalance in the Canadian dairy market, within the current market structures and pricing. Recall that the calculations are based on halting imports of diafiltered milk/MPI at current levels. Continued growth in these imports simply makes the results more severe.

Several options come to mind to address this imbalance. Clearly, importing butter instead of meeting butterfat demand/disappearance with production in Canada is a possibility. The other obvious option is to find export markets for non-fat milk solids or other value added products using these solids at world prices that do not attract export subsidies. Finding additional markets within Canada for the structural surplus of non-fat milk solids is also a possibility- although remote because of the large volumes involved- and surely many of these have already been sought. The animal feed market may be able to absorb more over time; however, the projections suggest that a more than doubling of this market demand would be required and sustained over time.

Building the capacity to produce ultrafiltered milk and MPIs in Canada to offset or displace imports of these products may offer some relief, although the quantities required to rebalance the domestic market may be in excess of Canada's capacity to absorb the quantities required. Finally, even an annual decline in butterfat production by three million kilograms will not eliminate the need to move milk solids into the feed market, nor would it be enough to displace diafiltered/MPI imports at current levels.

In general, only two realistic paths are evident: either a steady and sharp annual reduction in butterfat production (through decreases in quota), coupled with butter imports, or finding an acceptable means to export skim products without attracting subsidy. In the former alternative, total milk production would be reduced, prices could probably remain at near existing levels, with a concomitant reduction in farm revenue. Per unit quota values may rise or remain close to current levels, although aggregate value of quota is likely to fall.

Enabling exports of skim products without attracting subsidy would allow the structural surplus to be removed from the Canadian market at world prices, with the potential for increased revenue by substituting exports of skim for domestic animal feed use. The price of skim for animal feed in 2014-15 was \$0.78/kg (Class 4m), compared about \$1.80/kg for skim in Class 5d exports.

Other measures have been proposed to ameliorate the structural surplus: blocking imports of MPI and strict adherence to the product compositional standards. Attempting to block imports of diafiltered milk/MPI, particularly from the US, raises issues of impairment of access by the US into the Canadian market, and could prove very costly in terms of Canada's restricted access to the American market for a range of products, far beyond agricultural products, in response to blocking diafiltered milk/MPI imports.

Moreover, blocking diafiltered milk/MPI imports from the US is not a solution to the Canadian market balance problem. Imports of MPI from the US were 27.9 thousand tonnes in 2014-15, far less than the adjustment required in the structural surplus of skim.

A more feasible alternative to reducing diafiltered milk/MPI imports would be arrangements allowing dairy processors access to domestic skim product at world prices to compete effectively with diafiltered milk/MPI imports. Equally, restricting the use of diafiltered milk/MPI in cheese manufacture by strict adherence to the cheese (and possibly other products) compositional standards would likely not be sufficient to significantly alter the structural surplus of skim powder. At most, this quantity can be expected to be about the current level of MPI imports.

Conclusion

The Canadian dairy market is now badly out of balance. This is the product of export limits, more porous border controls- especially on skim-based products- capacity to process skim milk into SMP and other products that has not kept up with volume growth, and a growing butter/butterfat market linked to a butterfat production quota. Left as it stands, it is locked in a perverse adjustment model, in which the quota adjustment to increases in demand for butterfat will result in the industry drowning itself in skim milk.

Broadly speaking, producers are not excited by the prospect of dairy exports, and even less excited by the prospect of export prices. Some may be prepared to

accept material shrink in quotas to avoid the spectre of world prices and associated volatility.

However, this analysis suggests that the required shrink in quota could be profound, and require the importation of significant volumes of butter. The optics of a milk supply management system dependent upon imports to operate effectively would not inspire public confidence. The signal sent to the dairy processing segment of producer willingness to significantly shrink the market to avoid price concessions is singularly negative. The logical adjustment for processors to a shrinking milk supply is to close dairy plants. Indeed, as processors begin to disinvest and close plants in response to a shrinking market, producers will begin to lose control over volumes that can be marketed as the limits on producer market access could be defined by available plant capacity rather than quota as traditionally operated.

Finally, while pricing and quota are formally separate in milk supply management, when confronted with large adjustments it will become evident that this separation is artificial. The scenarios outlined here, based on existing trends and structure, will logically lead to very large surpluses, probably resulting in costs of landfill or other disposal, payable by producers. Attempting to retain the current milk class/component pricing surface in the face of very large surpluses will prove increasingly difficult.

This analysis is presented as a counterfactual, as the dairy industry is well aware of, and has very advanced discussions on an ingredient strategy that addresses precisely these issues. Ontario has already implemented a milk Class 6 program consistent with the ingredient strategy to address these, Manitoba plans to implement in the new dairy year 2016-17, and other provinces may adopt this as well or a national agreement on an ingredient strategy (similar to Class 6) may occur. In the interim, the CDC has expanded availability of 4m milk to make ultrafiltered milk (liquid MPC).

Our estimates elsewhere suggest that a national class 6 program that absorbs skim in classes 4 and 5(d) would only have small impacts on the blend price, dependent upon the ability of the "upcharge" pricing to isolate and limit world skim prices from other domestic classified

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prices⁶. Other analyses of the anticipated impact of Class 6, or the alternative to a Class-6 like program, have not yet been made public.

At this point, perhaps the biggest risk to resolution of the structural skim surplus issue in milk supply management is the lack of unity among producers. The system is provincially fragmented by design, but ideas and attitudes do not need to be so. As some provinces move independently toward Class 6 initiatives, some of the accepted constants of the system- such as regional pools and provincial quota shares- will become strained, and perhaps even buckle, leading to a weaker marketing system and into unprecedented territory for market collaboration.

This should cause all concerned to consider the risks of an ingredient strategy, but equally the stark realities of the status quo.

⁶ Understanding the Dynamics of Milk Pricing and Revenue in a Time of Change Agri-Food Economic Systems Independent Agri-Food Policy Note, May 2016

**Table 3 Projected Structural Surplus in Skim Milk Solids from Milk Classes 2-5
at 1.85 million Kgs Annual Growth in Butterfat***

| Dairy Year | Butterfat Disappearance | Skim Solids Produced | Cumulative Growth in Skim Solids | Actual and Projected Structural Surplus | Animal Feed Use | Exported Skim Solids | Excess Skim Solids with No Market | Structural Surplus as % of Skim Solids |
|------------|-------------------------|----------------------|----------------------------------|---|-----------------|----------------------|-----------------------------------|--|
| | million kilograms | | | | | | | % |
| 2014-15** | 231.62 | 472.61 | 0.00 | 79.20 | 54.30 | 24.90 | 0.00 | 16.8 |
| 2015-16 | 233.47 | 476.38 | 3.76 | 82.96 | 54.30 | 24.90 | 3.76 | 17.4 |
| 2016-17 | 235.32 | 480.14 | 7.52 | 86.72 | 54.30 | 24.90 | 7.52 | 18.1 |
| 2017-18 | 237.17 | 483.90 | 11.29 | 90.49 | 54.30 | 24.90 | 11.29 | 18.7 |
| 2018-19 | 239.02 | 487.66 | 15.05 | 94.25 | 54.30 | 24.90 | 15.05 | 19.3 |
| 2019-20 | 240.87 | 491.42 | 18.81 | 98.01 | 54.30 | 24.90 | 18.81 | 19.9 |
| 2020-21 | 242.72 | 495.19 | 22.57 | 101.77 | 54.30 | 24.90 | 22.57 | 20.6 |
| 2021-22 | 244.58 | 498.95 | 26.33 | 105.53 | 54.30 | 0.00 | 51.23 | 21.2 |

* Skim Solids to Butterfat ratio based on the average actual values for Milk Classes 2-5 in 2011-12 to 2014-15

** Actual 2014-15 data from AAFC Canadian Dairy Information Centre, and Canadian Dairy Commission Annual Report 2014-15

**Table 4 Structural Surplus of Non-fat Milk Solids
Under Various Growth Rates for Butterfat**

| | -3.00 | -1.50 | 0.00 | 1.00 | 1.85 |
|---------|-------------------|-------|-------|-------|--------|
| | Million Kilograms | | | | |
| 2014-15 | 79.20 | 79.20 | 79.20 | 79.20 | 79.20 |
| 2015-16 | 73.10 | 76.15 | 79.20 | 81.23 | 82.96 |
| 2016-17 | 67.01 | 73.10 | 79.20 | 83.26 | 86.72 |
| 2017-18 | 60.91 | 70.06 | 79.20 | 85.30 | 90.49 |
| 2018-19 | 54.81 | 67.01 | 79.20 | 87.33 | 94.25 |
| 2019-20 | 48.72 | 63.96 | 79.20 | 89.36 | 98.01 |
| 2020-21 | 42.62 | 60.91 | 79.20 | 91.39 | 101.77 |
| 2021-22 | 36.53 | 57.86 | 79.20 | 93.42 | 105.53 |

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Table 5 Excess Non-fat Solids with No Available Market*

| | Annual Change in Butterfat Disappearance (million Kgs) | | | | |
|---------|--|--------|-------|-------|-------|
| | -3.00 | -1.50 | 0.00 | 1.00 | 1.85 |
| | Million Kilograms | | | | |
| 2014-15 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2015-16 | -6.10 | -3.05 | 0.00 | 2.03 | 3.76 |
| 2016-17 | -12.19 | -6.10 | 0.00 | 4.06 | 7.52 |
| 2017-18 | -18.29 | -9.14 | 0.00 | 6.10 | 11.29 |
| 2018-19 | -24.39 | -12.19 | 0.00 | 8.13 | 15.05 |
| 2019-20 | -30.48 | -15.24 | 0.00 | 10.16 | 18.81 |
| 2020-21 | -36.58 | -18.29 | 0.00 | 12.19 | 22.57 |
| 2021-22 | -17.77 | 3.56 | 24.90 | 39.12 | 51.23 |

* Assumes continued sale of skim solids into animal feed market. Negative value indicates the reduction in the 53.4 million kilograms sold into the animal feed market.