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ADDITIONAL SCENARIOS FOR CANADIAN INTERNATIONAL TRADE TRIBUNAL BUTTEROIL BLEND ANALYSIS

Prepared for the Canadian International Trade Tribunal (CITT) by

Economic and Policy Analysis Directorate
Policy Branch
Agriculture and Agri-Food Canada

INTRODUCTION

Agriculture and Agri-Food Canada provided the CITT with some analysis of selected scenarios related to the inquiry into butteroil/sugar blend imports (report dated March 1998). In a memo dated March 26, the CITT requested that AAFC run 4 additional scenarios as follows:

B1) Sensitivity on scenario 2b, with butterfat valued at $4.60/kg.
B2) Create Scenario 2c, where there are two prices for butterfat used in producing ice cream in Canada:

   a) 40% of butterfat for ice cream requirements is valued at $3.93, rest at class 2
   b) 60% of butterfat for ice cream requirements is valued at $3.93, rest at class 2
   c) 80% of butterfat for ice cream requirements is valued at $3.93, rest at class 2

The additional scenarios investigate further how dairy farmers could price domestic butterfat to successfully compete with the blend imports. They do not require much change to the model, and the basic assumptions (aside from the value of butterfat in the imported blend) remain the same as described in the March 1998 paper.

RESULTS

Additional Sensitivity on Scenario 2b:

It is difficult to know the highest price that Canadian dairy farmers can charge ice cream processors for butterfat and still be able to compete successfully with imports.

The original scenario 2b assumed that farmers would have to price butterfat as low as $2.90/kg in order to successfully compete with the blend. This resulted in a loss in producer

333 Laurier Avenue West
Ottawa, Ontario K1A 0G7
(613) 990-2452 Fax (613) 990-2439

333, avenue Laurier ouest
Ottawa (Ontario) K1A 0G7
(613) 990-2452 Téléc. (613) 990-2439

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net income of about $50 million and a consumer gain of about $40 million as compared to the base where imports of the blend rose to 40% of ice cream requirements.

In a sensitivity test to this assumption (section C4 of the original paper, pp23-24), it was assumed that producers could price butterfat at $3.40/kg and successfully compete with imports. Producer losses and consumer gains were reduced (about $35 million and $30 million respectively).

The first additional scenario, B1, is an extension of the sensitivity analysis already presented; it assumes that producers can price butterfat at $4.60 and still successfully compete with imports of the blend.

Table B1 summarizes the results for the three cases. As expected, the higher the price producers can charge and still keep out imports, the lower is their loss in doing so. Consumers gain in these scenarios because they are getting 100% of their ice cream butterfat at the lower price as opposed to 40% in the base scenario. Thus consumer gains are lower the higher the class 5i butterfat price. (Note also that consumer gains are lower if the base scenario contains a higher level of imports).

<u>Table B1: Sensitivity of Results to Value of Butterfat in the Blend</u>
Effects are expressed as change from base scenarios where imports rise to 40% of ice cream butterfat requirements and value of butterfat is as shown.

		1998	1999	2000	2001	2002
Import & Domestic Butterfat @ $2.75						
Class 5i butterfat price	$/kg	2.75	2.63	2.48	2.43	2.49
Change in milk production	mil hl	2.2	2.6	2.8	2.2	1.7
Change in producer revenue	mil $	19.1	30.8	33.5	19.6	9.5
Change in ice cream production	000 tonnes	9.6	8.8	9.2	8.8	8.4
Change in ice cream processor margin	mil $	17.8	16.9	18.0	17.6	17.3
Change in skim milk powder production	000 tonnes	18.0	21.5	23.2	19.0	14.6
Change in butter/powder margin	mil $	17.0	20.6	22.7	18.9	14.9
Change in ice cream consumption	000 tonnes	9.6	8.8	9.2	8.8	8.4
Change in consumer expenditure	mil $	-15.5	-14.6	-15.5	-15.1	-14.8
Consumer surplus	mil $	44.43	41.75	44.44	43.17	42.28
Producer surplus	mil $	-50.38	-51.06	-54.71	-52.00	-45.17
Net change	mil $	-5.95	-9.31	-10.27	-8.83	-2.88
Import & Domestic Butterfat @ $3.60						
Class 5i butterfat price	$/kg	3.59	3.45	3.25	3.19	3.26
Change in milk production	mil hl	2.1	2.5	2.7	2.2	1.6
Change in producer revenue	mil $	35.0	46.7	48.0	33.9	24.1
Change in ice cream production	000 tonnes	6.4	6.1	6.6	6.4	6.1
Change in ice cream processor margin	mil $	11.9	11.7	13.0	12.9	12.5
Change in skim milk powder production	000 tonnes	17.6	21.1	22.6	18.5	14.2
Change in butter/powder margin	mil $	16.6	20.3	22.2	18.4	14.4
Change in ice cream consumption	000 tonnes	6.4	6.1	6.6	6.4	6.1
Change in consumer expenditure	mil $	-10.6	-10.2	-11.3	-11.2	-10.9
Consumer surplus	mil $	29.93	29.00	32.18	31.81	30.77
Producer surplus	mil $	-31.64	-32.78	-37.29	-34.91	-27.81
Net change	mil $	-1.71	-3.78	-5.12	-3.10	2.95
Import & Domestic Butterfat @ $4.60						
Class 5i butterfat price	$/kg	4.60	4.41	4.15	4.07	4.17
Change in milk production	mil hl	2.0	2.4	2.6	2.1	1.5
Change in producer revenue	mil $	53.5	64.6	64.3	50.3	40.9
Change in ice cream production	000 tonnes	2.9	3.1	3.8	3.8	3.5
Change in ice cream processor margin	mil $	5.4	6.0	7.5	7.7	7.2
Change in skim milk powder production	000 tonnes	17.1	20.7	22.1	17.9	13.6
Change in butter/powder margin	mil $	16.1	19.9	21.6	17.8	13.8
Change in ice cream consumption	000 tonnes	2.9	3.1	3.8	3.8	3.5
Change in consumer expenditure	mil $	-4.9	-5.3	-6.7	-6.8	-6.3
Consumer surplus	mil $	13.73	14.93	18.70	19.18	17.79
Producer surplus	mil $	-10.08	-12.21	-17.76	-15.53	-7.90
Net change	mil $	3.65	2.72	0.93	3.65	9.88

Additional Scenario 2c:

This scenario investigates the implications if farmers are able to split the market for milk between processors who will use the blend and those who won't (for quality or other reasons). There would be one price (Class 5i) for ice cream processors who use the blend, and another price (Class 2) for those who don't. This situation could result in higher levels of use of the blend than if imports continued because some of the barriers to use of the imported blend are rules by cooperatives and/or marketing boards which might be harder to defend if they were used to restrict the use of a lower priced domestic product.

In the base for previous analysis, 40% of butterfat requirements were supplied by imports. Scenario 2c is run assuming that farmers can replace this amount of butterfat at the lower class 5i price (i.e. they do not have to lower the price for all ice cream production, just that portion which would have been made using the imported blend). For consistency with the March 1998 paper, Scenario 2c is first run using the full set of base assumptions, including valuing butterfat in the blend at world prices (2.75 in 1998).

Then, three sensitivity runs are performed with blend butterfat valued at 3.93 in 1998 and maximum blend imports being 40%, 60% and 80%. These three scenarios correspond to the scenarios requested in the CITT memo of March 26, 1998.

Scenario 2c, butterfat priced at 2.75, base imports at 40% of ice cream req.

Table B2 summarizes the effects on producers, processors and consumers.

Table B2: Summary of Production, Revenue and Welfare Effects
Effects are expressed as change from base scenario

		1998	1999	2000	2001	2002
Import & Class 5i Butterfat @ $2.75, 40% imports						
Class 5i butterfat price	$/kg	2.75	2.63	2.48	2.43	2.49
Change in milk production	mil hl	1.9	2.3	2.5	2.0	1.5
Change in producer revenue	mil $	50.9	61.1	63.9	51.1	40.4
Change in ice cream production	000 tonnes	0	0	0	0	0
Change in ice cream processor margin	mil $	0	0	0	0	0
Change in skim milk powder production	000 tonnes	16.7	20.3	22.0	17.8	13.5
Change in butter/powder margin	mil $	15.8	19.5	21.5	17.7	13.7
Change in ice cream consumption	000 tonnes	0	0	0	0	0
Change in consumer expenditure	mil $	0	0	0	0	0
consumer surplus	mil $	0	0	0	0	0
producer surplus	mil $	-10	-13	-16	-13	-7
Net change	mil $	-10	-13	-17	-13	-7

<u>Milk producers</u>

As in the other scenarios, milk production increases to meet the imports with the effect after the crossover being smaller. Producer revenues increase by about 50-60 million as compared to the base. As expected, this is a smaller gain than if the imports were blocked by regulation and producers could charge class 2 butterfat prices for all ice cream (Scenario 1a), but higher than if all butterfat to ice cream is priced at the class 5i price.

<u>Ice Cream Processors and Consumers</u>

Ice cream processors are not affected by this scenario since it is assumed that they purchase the same amount of butterfat at the same price from domestic producers as they were from importers in the base.

<u>Butter/Powder Processors</u>

As with many of the scenarios examined, surplus skim milk powder production expands considerably as domestic butterfat replaces the imports.

Scenario 2c with butterfat valued at 3.93/kg

The CITT requested that this scenario be run at three alternative import penetration levels (40%, 60% and 80% of ice cream requirements). Table B3 presents the results.

Of note in these scenarios:
- consumers and ice cream processors are not affected
- the higher the base level of imports the sooner the crossover (see figure B1)
- as in other scenarios, after the crossover it is more worthwhile for producers to compete with imports because they do not have to dispose of as much excess skim milk powder at low world prices

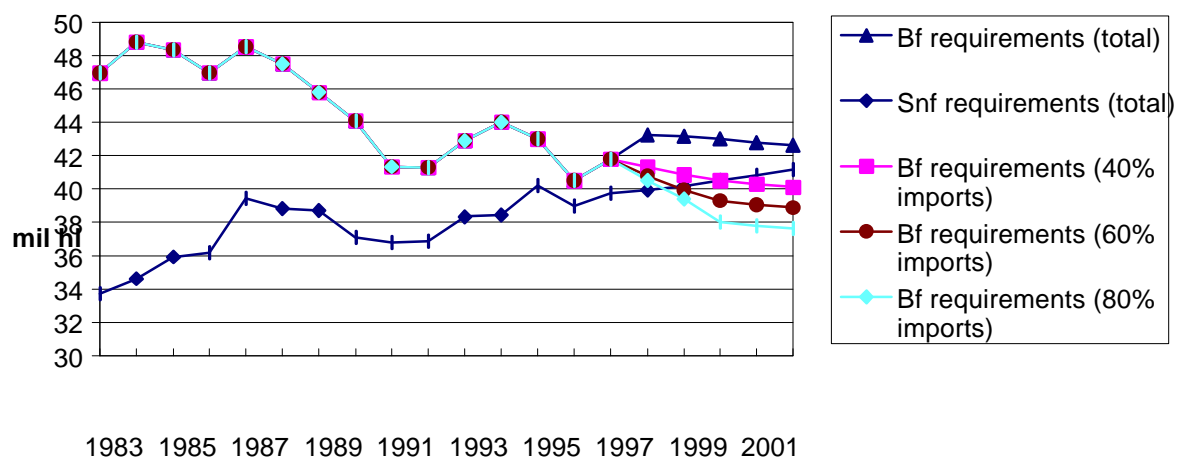## Figure B1: Butterfat requirements change with import levels

Table B3: Summary of Production, Revenue and Welfare Effects

Effects are expressed as change from base scenario

		1998	1999	2000	2001	2002
Import & Class 5i Butterfat @ $3.93, 40% imports						
Class 5i butterfat price	$/kg	3.93	3.77	3.55	3.48	3.56
Change in milk production	mil hl	1.9	2.3	2.5	2.0	1.4
Change in producer revenue	mil $	58.9	70.3	72.5	59.5	49.1
Change in ice cream production	000 tonnes	0	0	0	0	0
Change in ice cream processor margin	mil $	0	0	0	0	0
Change in skim milk powder production	000 tonnes	16.7	20.3	21.7	17.5	13.3
Change in butter/powder margin	mil $	15.8	19.5	21.3	17.5	13.5
Change in ice cream consumption	000 tonnes	0	0	0	0	0
Change in consumer expenditure	mil $	0	0	0	0	0
Consumer surplus	mil $	0	0	0	0	0
Producer surplus	mil $	-2	-4	-7	-3	3
Net change	mil $	-2	-4	-7	-3	3
Import & Class 5i Butterfat @ $3.93, 60% imports						
Class 5i butterfat price	$/kg	3.93	3.77	3.55	3.48	3.56
Change in milk production	mil hl	2.5	3.0	2.5	2.0	1.5
Change in producer revenue	mil $	75.6	93.1	83.0	70.0	59.7
Change in ice cream production	000 tonnes	0	0	0	0	0
Change in ice cream processor margin	mil $	0	0	0	0	0
Change in skim milk powder production	000 tonnes	21.5	26.4	22.7	18.5	14.2
Change in butter/powder margin	mil $	20.3	25.3	22.2	18.4	14.4
Change in ice cream consumption	000 tonnes	0	0	0	0	0
Change in consumer expenditure	mil $	0	0	0	0	0
Consumer surplus	mil $	0	0	0	0	0
Producer surplus	mil $	-3	-3	3	6	13
Net change	mil $	-2	-3	3	6	13
Import & Class 5i @ $3.93, 80% imports						
Class 5i butterfat price	$/kg	3.93	3.77	3.55	3.48	3.56
Change in milk production	mil hl	2.7	3.0	2.5	2.0	1.5
Change in producer revenue	mil $	84.0	97.9	93.8	80.7	70.6
Change in ice cream production	000 tonnes	0	0	0	0	0
Change in ice cream processor margin	mil $	0	0	0	0	0
Change in skim milk powder production	000 tonnes	23.8	26.7	23.6	19.5	15.2
Change in butter/powder margin	mil $	22.5	25.7	23.2	19.4	15.4
Change in ice cream consumption	000 tonnes	0	0	0	0	0
Change in consumer expenditure	mil $	0	0	0	0	0
Consumer surplus	mil $	0	0	-1	0	0
Producer surplus	mil $	-3	2	13	16	23
Net change	mil $	-3	2	12	16	23

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Glossary for report: The Impact of Imports of Butteroil/Sugar Blends on the Canadian Dairy Industry - An Economic Analysis using the FARM Model, March 1998

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1) **Consumer Expenditure** ($ mil): Retail price ($/kg) times domestic disappearance ('000 tonnes). Where domestic disappearance is calculated as production plus opening stocks (if any) plus imports minus exports minus closing stocks. Depending on the responsiveness of consumption to changes in price (the own-price demand elasticity) the change in consumer expenditure due to a price increase can be positive or negative.   Because ice cream demand is considered to be relatively inelastic (demand elasticity of less than one), expenditure increases with a price increase.

2) **Consumer surplus/welfare:** economic term meaning the total benefit to consumers of a certain level of consumption. It compares the price which the consumer would be willing to pay for each unit of consumption with the price actually paid. Geometrically, it is the area below the demand curve and above the price paid. This study looks at changes in consumer surplus due to a price change and a movement along the demand curve. For a linear demand curve, the change in consumer surplus is $(P2-P1)*Q1+1/2*(P1-P2)*(Q1-Q2)$. Where P1,Q1 is the initial price, quantity pair on the demand curve and P2,Q2 is the new consumption point. In the case of ice cream, where demand is inelastic, the welfare impact of price changes is greater than the expenditure impact.

3) **Consumption effect:** change in total consumption due to a change in retail price. Following law of demand, if price goes up, consumers will demand less and less is purchased. Vice versa for a price decline.

4) **Crossover effect:** Industrial milk production (i.e. milk used to make butter, cheese, ice cream etc.) in Canada is controlled using a production quota (called "Market Sharing Quota" or MSQ) which is allotted to each dairy farmer. MSQ is set based on a calculation of domestic requirements for milk. Milk and the milk component of dairy products can be split into two main components: butterfat and solids non-fat. Historically, domestic requirements for the butterfat component of milk have been greater than those for the solids non-fat component. MSQ was set based on butterfat requirements, and the excess solids non-fat was exported as skim milk powder. However, butterfat requirements have been falling while solids non-fat requirements have grown. The crossover point is defined as the point when solids non-fat requirements exceed butterfat requirements. Policy changes since the early 1990's (freezing of the butter support price, price rebates and special (lower priced) classes for some further

processors) have delayed the crossover by stimulating demand for butterfat. In the base, the crossover is projected to occur around the year 2000. At this point, the blend imports begin to result, not in lower MSQ levels, but in increased butter exports. For more discussion refer to Ewing 1994.

5) Direct Payment: the direct payment in this study refers to the federal industrial milk payment. For many years this payment was 6.03/hl at 3.6% butterfat. In 199_, the federal government began reducing the subsidy and it is due to be phased out by 2000.

6) Disposal cost: In this study, the term disposal cost refers to the fact that milk prices in Canada are higher than in international markets and that any surplus production must be sold at a lower price than domestic prices.

7) Incremental/Marginal cost: both meant to refer to the cost of production of an extra unit of milk.

8) Market Penetration: Refers to the level of blend imports as a share of total ice cream butterfat requirements.

9) Market Sharing Quota: the fixed level of production of industrial milk (i.e. milk used to produce processed dairy products such as butter, cheese, ice cream, yogurt, etc) in Canada. Set by a federal/provincial body each year and distributed among provinces. Provincial milk boards then distribute it among milk producers. Farmers must purchase quota in order to sell milk in the domestic market. See Ewing 1994 for more.

10) Medium Term Policy Baseline: Every year or so, AAFC generates a 'baseline' for major agricultural variables of interest to Canada. The baseline projects major variables out about 7-10 years under a status quo policy environment. It is used as a basis for comparing various policy or economic scenarios of interest to AAFC policy makers (e.g. effect of exchange rate changes, effects of Asian financial crisis, changes in Canadian agricultural policies, etc.)

11) Over Quota Milk Price: The class 5e price. The price paid to farmers for milk production above the level of their MSQ and fluid milk quota holdings.

12) Per Capita Consumption (kg/person): Domestic disappearance ('000 tonnes) divided by population (million people). Where domestic disappearance is calculated as production plus opening stocks (if any) plus imports minus exports minus closing stocks.

13) Processor Unit Margin: In FARM, this is defined as the wholesale ice cream price minus the cost of the milk required to make ice cream. The margin is assumed to be constant across the production changes examined in the analysis. Note that because it is hard to obtain industry data on margins for particular dairy commodities (e.g. ice cream), the FARM calculations for unit margin have not been verified against industry data.

14) Processor Total Margin: In FARM, this is defined as the unit margin multiplied by the level of production. The analysis looks at changes in the total margin due to different scenarios. Since the unit margin is assumed constant, changes in the total margin are entirely related to production changes. Note that because it is hard to obtain industry data on margins for particular dairy commodities (e.g. ice cream), the FARM calculations for total margin have not been verified against industry data.

15) Producer Surplus/Welfare: economic term meaning the total benefit to producers of a certain level of production. Similar to consumer surplus, it refers to the difference between the amount the producer receives for the product and the minimum amount he would be willing to accept to supply the same amount. Geometrically, it is the area above the supply curve and below the price received for the product. This study looks at changes in producer surplus due to changes in prices and production quota.

16) Sensitivity Analysis: The economic model is used to develop results under certain assumptions for key parameters (level of butteroil blend imports, price of butteroil in blend, etc.). The sensitivity analysis looks at how results change as these key assumptions are varied.

17) Skim-off requirement: In investigating the issues for this study, we heard that the Ontario milk marketing agency (Dairy Farmers of Ontario) has a regulation that has the effect of ensuring that a certain amount of ice cream be made from skim-off cream from the fluid sector. This fact needs to be verified.

18) Target Price: A long-standing policy instrument where the price for industrial milk is set using a cost of production formula. See Ewing 1994 for more.

19) Tariff-Rate Quota: a border measure where for some level of imports one tariff is charged (usually low) and above that level a higher tariff is charged.