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Introduction

## **The Effects of Canadian Special Milk Classes in the U.S. and Canadian Dairy Trade**

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In recent years, international trade in agricultural products has gathered both theoretical and empirical interests. In spite of all the trade liberalization efforts, many countries still use a series of protective policies. In the post-GATT policy environment where the uses of protective policy tools are restricted, the impacts of additional trade liberalizations are of interest. Being one of the most heavily protected industries, dairy is characterized by several uses of trade and domestic policies. This paper looks into the U.S. and Canadian dairy sectors and trade to evaluate the impacts of the much-debated-Canadian special milk classes.

The dairy sector is a significant part of the agricultural and agri-food economy for both the U.S. and Canada. When compared through the OECD calculated PSE/CSE measures, the level of protections for the dairy industry in these countries are above world average. The protective nature of the industry in these countries is well shown in the application of trade agreements. Although the North American Free Trade Agreement (NAFTA) committed both countries to reduce all tariffs to zero over a 10-year period, the agreement is not even applied to their dairy trade. Instead, the U.S. and Canada agreed early in the debate over dairy trade issue that the Uruguay Round trade commitments (referred to as the WTO) with greater import protection would apply when considering bilateral dairy trade.

In this highly protective environment, the adjustments to meet WTO commitments on trade policies have been the subject of considerable interest. Since the special milk classes were introduced by the Canadian dairy industry in 1995, their purpose and the possible effects on dairy trade have been the focus of longstanding

disputes. Canada claims the special milk classes were established to allow domestic processors of dairy products to access the ingredients they require (i.e. milk components) at prices equivalent to those in the U.S. while complying with the new WTO trade rules under which support of exports using over-quota levies was no longer permitted. The United States and New Zealand, however, claim the special milk classes are another form of export subsidy that is inconsistent with the WTO commitments. In 1998, the U.S. and New Zealand requested that a WTO compliance panel investigate Canada's dairy export practices. In December 2002, after five years, six panel discussions, and four appeals, the WTO has continues to rule against Canada.

This paper models the use of special milk classes and CEM explicitly in the Canadian dairy industry and investigates their economic impacts on U.S. and Canadian dairy trade. How they affect the trade pattern and in what extent are explored. The extent they affect the U.S. and Canadian dairy trade is of special interest since it can provide scope on how much the U.S. can raise compensatory tariffs against Canadian imports based on the WTO rulings. The paper examines how the dairy industries in both countries respond in terms of production, consumption, prices, and resulting welfare under different policy environments, such as current dairy policies, no CEMs, no SMCs, and trade liberalization.

### WTO Dispute Background

In 1995, Canada replaced its subsidy payments on all dairy exports, which were financed by a levy on dairy producers, with a new system to comply with the WTO

obligations to limit export subsidies for dairy products. Under the new system, Canadian processors buy lower-priced milk for dairy export products through Special Milk Classes.

In February 1998, the U.S. filed its complaint with the WTO dispute settlement panel to challenge Canada's dairy trade practices as inconsistent with its WTO obligations on export subsidies. New Zealand joined the U.S. challenge.

In 1999, a WTO panel and the Appellate Body found that Canada's special milk class system, which provides discounted milk for export products, acts as an export subsidy and that Canada was violating its WTO commitments by shipping more subsidized dairy exports than it had agreed to.

In response to the panel and Appellate Body reports, Canada eliminated Class 5e (surplus removals) and its Optional Export Program (OEP) as of Aug. 1, 2000. It also limited the Class 5d uses to the WTO export subsidy quantity restrictions. Now over-quota milk is sold to Class 4m for marginal domestic markets such as animal feeds. Canada also introduced a "Commercial Export Milk (CEM)" system, an adjusted version of OEP, under which private sector farmers and processors set pre-contracts for commercial export milk on the terms of trade without government intervention.<sup>1</sup>

In January 2001, the U.S. and New Zealand charged that Canada's new system still did not bring Canada's export subsidy system into conformity with its WTO obligations since it is indirectly subsidizing exports above its commitments through the CEM. A new WTO dispute settlement panel agreed in July 2001 that Canada's new system continued to provide an export subsidy in the form of discounted milk to Canadian dairy processors.

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<sup>1</sup> This is the current Canadian dairy system. The model in the paper is based on this structure.

In December 2001, the Appellate Body said it could not reach a decision because it did not have enough information. Another WTO panel reviewed the additional information requested by the Appellate Body. In July 2002, the panel concluded that Canada was continuing to provide export subsidies over the commitment level to Canadian dairy processors with the discounted milk under the CEM program. In December 2002, the Appellate Body report upheld that panel's findings.

### Conceptual Model<sup>2</sup>

We use the theoretical framework of Chavas, Cox, and Jesse (1998) which expanded the spatial equilibrium model of Samuelson, and Takayama and Judge (STJ) by considering vertical markets. In this paper, we extend the model for trade policies such as tariff-rate quota and export subsidy and apply it to the U.S. and Canadian dairy trade.

Consider the case of a two-stage production system that consists of the first stage for the production of a primary product and the second stage for the production of processed commodities.

### Basic Notation

$i, j$  Index for the regions;  $i, j = 1, \dots, J_1, J_1+1, \dots, J_1+J_2$ .  $J_1+J_2 = J$ .

$k$  Index for the processed commodities;  $k = 1, \dots, K$ .

$w_i$  Quantity of primary product produced in region  $i$ .

$x_i$  Quantity of primary product used as an input in the production of processed commodities in region  $i$ .

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<sup>2</sup> The basic framework of the conceptual model is identical to Chavas, Cox, and Jesse (1998). We explain the necessary elements of the model here. Those who are familiar with the model can skip the section and go into implementation section. For complete details including derivation and implications of K-T conditions, refer to Chavas, Cox, and Jesse (1998).

$y_{ik}$  Quantity of k-th processed commodity produced in region i.

$z_{ik}$  Quantity of k-th processed commodity consumed in region i.

$T_{ij}$  Exports of the primary product from region i to region j;  $T_{ij} \geq 0$ .

$T_{ii} \geq 0$  is the quantity of primary product both produced and utilized in region i.

$t_{ijk}$  Exports of the k-th processed commodity from region i to region j;  $t_{ijk} \geq 0$ .

$t_{iik} \geq 0$  is the quantity of k-th processed commodity both produced and consumed in region i.

$C_{ij}$  Unit transportation cost for primary product from region i to region j;  $C_{ij} \geq 0$ .

Transportation cost for intra-regional trade is assumed to be zero, i.e.  $C_{ii} = 0$ .

$c_{ijk}$  Unit transportation cost for k-th processed commodity from region i to region j;

$c_{ijk} \geq 0$ . Transportation cost is assumed to be zero for intra-regional trade, i.e.

$c_{iik} = 0$ .

Production of processed commodities,  $y$ , involves two categories of inputs: the primary product,  $x$ , and other inputs denoted by the vector  $\varpi$ . The transformation of the primary input  $x$  into the processed outputs  $y$  in region i is given by the non-empty, closed, and convex production possibility set  $F_i$ :

$$(\varpi_i, x_i, y_i) \in F_i \quad (1)$$

where  $y_i = \{y_{ik} : k = 1, 2, \dots, K\}$  is the 2-dimensional vector of processed outputs, and  $\varpi_i$  is the vector of other inputs besides  $x_i$  used in the production of  $y_i$ . Let  $h_i$  denote the vector of market prices for the other inputs  $\varpi_i$ . Assuming competition in the other input markets, efficient uses of these inputs require that they should be chosen in a cost minimizing way as follows:

$$G_i(x_i, y_i) = \min_{\varpi_i} \{h'_i \varpi_i : (\varpi_i, x_i, y_i) \in F_i\} \quad (2)$$

where  $G_i(x_i, y_i)$  is a restricted cost function measuring the cost of optimal use of other inputs,  $\varpi_i$ , conditional on primary input use,  $x_i$ , and on the output level,  $y_i$ .  $G_i(x_i, y_i)$  is assumed to be a decreasing function of  $x_i$  and an increasing function of  $y_i$ . When primary input use,  $x_i$ , increases, less of other inputs are needed to produce the same output level,  $y_i$ . On the other hand, other inputs use has to be increased to produce more output,  $y_i$ , while holding primary input use,  $x_i$ , fixed. These primary and other inputs work as substitutes to some extent.  $G_i(x_i, y_i)$  measures the costs of transformation of primary goods into final products in a region. The primary inputs,  $x_i$ , and other inputs,  $\varpi_i$ , are also assumed to be weakly separable.

For either region, exports plus domestic use cannot be larger than domestic production, and domestic consumption cannot exceed domestic production plus imports for both primary product (equation (3a) & (3b)) and processed commodities (equation (3c) & (3d)). Then the trade flow constraints across regions take the form:

$$w_i \geq \sum_{j=1}^2 T_{ij}, \text{ for all } i \quad (3a)$$

$$\sum_{j=1}^2 T_{ji} \geq x_i, \text{ for all } i \quad (3b)$$

$$y_{ik} \geq \sum_{j=1}^2 t_{ijk}, \text{ for all } i \text{ and } k \quad (3c)$$

$$\sum_{j=1}^2 t_{jik} \geq z_{ik}, \text{ for all } i \text{ and } k \quad (3d)$$



The quasi-welfare function in this two-stage model can be written as:

$$W(w, x, y, z) = \sum_{i=1}^2 \{D_i(z_i) - S_i(w_i) - G_i(x_i, y_i)\} . \quad (4)$$

The first term  $D$  is interpreted as a measure of the total benefits to consumers and the second term  $S$  is the cost of producing the primary product  $w$ .  $(S+G)$  is the total costs of production of the processed goods,  $z$ , in the absence of trade. Then the quasi-welfare function  $W$  in (4) is a measure of net social benefits (i.e. consumer benefits minus producer costs in the absence of trade.) Assume  $W(w, x, y, z)$  is differentiable and concave in  $(w, x, y, z)$  and satisfies:

$$\frac{\partial S_i(w_i)}{\partial w_i} = p_i^s \geq 0 \quad (A1)$$

$$\frac{\partial D_i(z_{ik})}{\partial z_{ik}} = p_{ik}^d \geq 0, \text{ for } k = 1, 2, \dots, K. \quad (A2)$$

Being a food product, the crucial linkage between primary input (raw milk) and processed outputs (dairy products) is the nutritional components (milk fat, cheese protein, carbohydrate, and other solids-non-fat) the implicit characteristics of these products. In the  $i$ -th region, let  $a_{is} \geq 0$  denote the quantity of the  $s$ -th nutrient per unit of primary product  $x_i$ , and let  $b_{iks} \geq 0$  denote the quantity of the  $s$ -th nutrient per unit of the  $k$ -th processed commodity  $y_{ik}$ . I assume the compositions of hedonic characterization for each commodity are known and constant, i.e.  $a_{is} \geq 0$  and  $b_{iks} \geq 0$  are constant. Under the assumption, the production technology  $F_i$  takes the specific form:

$$y_{ik} = \min\{x_{ik} a_{i1} / b_{ik1}, x_{ik} a_{i2} / b_{ik2}, \dots, x_{ik} a_{iS} / b_{ikS}, f_{ik}(\varpi_{ik}, x_{ik})\}, \text{ for all } i \text{ and } k \quad (5)$$

where  $x_{ik}$  is the quantity of the primary input used in the production of the k-th processed

output in region i.  $x_{ik}$  satisfies the identity:  $x_i = \sum_{k=1}^2 x_{ik} = x_{i1} + x_{i2}$ ,  $i = 1, 2, \dots, J$ . The

production function  $f_{ik}(\varpi_{ik}, x_{ik})$  shows maximum level of output,  $y_{ik}$ , that can be

produced with the specified amount of other inputs,  $\varpi_{ik}$ , given primary input level,  $x_{ik}$ .

Under the technology (5), the cost function becomes:

$$g_i(x_i, y_i) = \min \{h_i' \varpi_i : y_{ik} \leq f_{ik}(\varpi_{ik}, x_{ik})\}, \text{ for all } k = 1, 2, \dots, K \quad (6a)$$

subject to:

$$\sum_{k=1}^2 y_{ik} b_{iks} \leq x_i a_{is}, \text{ for all } s = 1, \dots, S \text{ and } i = 1, 2, \dots, J. \quad (6b)$$

The relationship in (6b) ensures a balanced allocation of the s-th nutrient component in the i-th region. It corresponds to a linear Lancaster model where each commodity exhibits fixed component proportions, but where the components are perfect substitutes in their allocation among commodities.

Under the previous concavity and (A1)-(A2) assumptions, a competitive equilibrium is characterized using standard concave programming subject to linear constraints as follows:

$$\max_{w, x, y, z, T, t} \left\{ \sum_i [D_i(z_i) - S_i(w_i) - g_i(x_i, y_i)] - \sum_{i,j} T_{ij} C_{ij} - \sum_{i,j,k} t_{ijk} c_{ijk} : \right. \\ \left. \text{Eqs.(3a - 3d), Eq.(6b), } w \geq 0, x \geq 0, y \geq 0, z \geq 0, T \geq 0, t \geq 0 \right\}. \quad (7)$$

From the transportation arbitrage conditions;

$$(p_j^s - p_i^s - C_{ij}) T_{ij} = 0, \text{ for all } i, j, k \quad (8a)$$

$$(p_{jk}^d - p_{ik}^d - c_{ijk}) t_{ijk} = 0, \text{ for all } i, j, k, \quad (8b)$$

the spatial price difference between regions must be exactly equal to the unit transportation cost whenever trade takes place.

### Implementation

The model is applied to the U.S. and Canadian dairy industry. The single primary product is farm milk. Farm milk is transformed into 9 ( $K=9$ ) categories of dairy products: fluid milk, soft dairy products, frozen dairy products, American cheese, Italian cheese, other cheese, butter, nonfat dry milk, and all other manufactured products. The following milk components ( $K=3$ ) are allocated among these products: fat, protein, and carbohydrate. The composition of all dairy products was estimated in a way consistent with their average composition in 2000. For the analysis, we focus on total of 19( $=J$ ) regions. Among them, 12( $=J_1$ ) regions are the U.S. regions and 7( $=J_2$ ) regions are Canadian.<sup>3</sup>

The regional milk supply and dairy product demand elasticities are taken from Chavas, Cox, and Jesse (1998). We assume linear milk supply and dairy products demand functions. The intercept and slope values are set consistent with prices and quantities in 2000. To adjust for the Canadian milk production quotas<sup>4</sup> the marginal cost price of farm milk is obtained by subtracting the quota value from the weighted average

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<sup>3</sup> The U.S. regions are 11 Federal Milk Marketing Order regions (Northeast, Appalachian, Florida, Southeast, Mideast, Upper Midwest, Central, Southwest, Western, Pacific Northwest, and Arizona) and California.

Canadian regions are British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, Quebec, and the Eastern Provinces including Nova Scotia, New Brunswick, and Prince Edward Island. Newfoundland joined the Canadian national dairy system as of Aug. 1, 2001. Since this paper focuses on year 2000 and the dairy industry in Newfoundland is minimal, it is excluded from the analysis.

<sup>4</sup> Since the Canadian milk industry imposes a production quota, part of farm milk price comes from quota rent. Implementation of the Canadian production quota will be discussed below.

of all milk class returns. Farm-gate dairy products prices are calculated based on their class component prices and compositions.

The transportation costs are estimated from actual transportation costs in 1998 (Chavas, Cox, and Jesse, 1998) for fluid products (farm milk and fluid milk), refrigerated products (soft dairy products, cheese, butter, frozen products, and manufactured products), and non-refrigerated product (nonfat dry milk).

Intermediate usages, whey losses, and on-farm milk uses have been appropriately adjusted in the component balance constraints (6b). A technical constraint for whey as a by-product in cheese production has been added to the model. It sets the minimum production of total manufacture products (including whey) production to be proportional to total cheese production in each country. With the exception of this added constraint, the nutrient components are assumed to be perfect substitutes in their allocations among the different processed commodities. When some nutrient components are left unused in the production process of one commodity, they are used by the process that pays the highest return for their use. The resulting components utilization across all dairy products balances with the components from farm milk supply in each country.

#### Government Milk Price Supports

To maintain the dairy products prices above the minimum level, both countries use government milk price support programs, implemented through government purchases of dairy commodities. The U.S. government purchases American cheese, butter, and nonfat dry milk. Canadian government purchases butter and nonfat dry milk.

These are modeled as “additional region” for endogenous government demand. As a price floor, the demand is set horizontally line at the intervention prices.

### Classified Pricing

Both countries employ classified pricing where farm milk return is determined based on its end use. As a price discrimination scheme, classified pricing enhances revenues by charging higher prices in price inelastic markets. The U.S. classified pricing imposes a minimum class differential for each 4 classes (5 classes in California). In the model, the class differential in each region is treated as a price wedge that is equivalent to an increase in the cost of producing fluid milk. The price wedge term is added to the objective function as additional cost. The regional revenue generated by this price wedge is redistributed to regional dairy farmers as a higher farm milk price. As a result, dairy farmers receive blend prices based on the regional utilization of the each class of milk. The each class wedge is solved for endogenously.

The basic framework of the Canadian classified pricing with 5 groups of classes is similar to the U.S. classified pricing. But unlike the U.S. system, Canadian class returns are regulated to ensure a target return level. The most striking difference is the existence of Special Milk Classes. SMC returns are much lower than regular Class 1-4 groups. Class 5a & 5b returns are set at the U.S. Class III & IV returns to maintain Canadian dairy producers competitiveness with imported products. The implementation of Canadian classified pricing through class wedges is done in similar way as the U.S.

The processed commodity produced using SMC is set as a separate variable for each special class, commodity, and region. Class 5a-5c uses for intermediate usage are

modeled as exogenous. Class 5d, used for planned export is modeled endogenously and is limited by the WTO export subsidy quantity restrictions.

#### Canadian National Special Milk Pooling vs. Regional All Milk Pooling

The real difference between the US and Canadian classified pricing systems comes in the revenue pooling. To share the burden (for farmers) of lower returns for SMC, these returns are pooled nationally among all nine provinces (P9)<sup>5</sup>. The regional adjustment made from P9 is added back to 2 regional pools where returns from all classes of in-quota milk are pooled together for the regions in each pool (P3 & P6)<sup>6</sup>. Dairy farmers receive the pooled return for the in-quota milk they produce. This 2-tier pooling is implemented in the model.

This national pooling of SMC returns actually incurs an income transfer from regions with lower utilization of SMC to regions with higher utilization of SMC. Since it is pooled nationally, the revenue loss of the individual milk farmer who provides for SMC is much smaller than actual milk price differential.

#### Canadian Milk Production Quota

To enforce high return for class milk without resulting in too much milk surplus, milk production is restricted via a quota system. Canadian fluid milk production quota is administered through provincial governments and Market Sharing Quota for industrial

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<sup>5</sup> P9 refers to the all nine provinces in the national dairy system. Again, Newfoundland was excluded from P9 in 2000. Newfoundland joined the national dairy system as of Aug. 1, 2001.

<sup>6</sup> P3 refers to the Western 3 provinces: British Columbia, Alberta, and Saskatchewan. P6 refers to the rest of Eastern 6 provinces. In 2000, Manitoba was part of both regional pools where its regional adjustment for SMC is made in P4 with Western 3 provinces and the adjustment is added back for all milk pooling in the P6 with the Eastern provinces. This detailed process is implemented in the empirical model.

milk (MSQ) is administrated nationally. Milk produced over quota is used for animal feeds in marginal domestic markets with very low returns (around CDN \$20/hl compared to CDN \$60+/hl fluid milk use in 2000/01). Over-quota milk is not pooled with in-quota milk. Instead the farmer gets the exact (low) return for what he produced over quota and the burden of this low return falls on his shoulders. The over-quota milk return is implemented without pooling. The over-quota milk production is modeled as a separate variable which is filled only if in-quota milk is filled to the quota limit.

### Commercial Export Milk

This is the category that has been the focus of last WTO ruling. The CEM is strictly for export purposes. CEM price and volume are negotiated directly between the processor and the producer. The contract is a pre-commitment and is filled with the first milk out of tank. Therefore, it is possible to have positive CEM production even when the quota has not been filled.

CEM runs outside the classified pricing system and is not pooled. Weighted average returns for CEM was CDN \$29/hl in 2000/2001. The weighted CEM returns of 785 sampled contracts range from CDN \$24.15 to CDN \$33.61.<sup>7</sup> In the model, the average CEM price in 2000, CDN \$29/HL, is used. CEM milk production is modeled as separate variables as are the commodities produced utilizing CEM milk, and the commodities produced from CEM must be exported.

In the model, to ensure no component from CEM goes back into the domestic market, a CEM component balance equation is added. In-quota milk and over-quota milk

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<sup>7</sup> WTO Report of the Panel, July 2002

are balanced likewise with one exception that the excess solids-non-fat from in-quota milk can be added to the marginal market.

### Trade policies

As in the actual U.S. and Canadian dairy trade, tariff-rate quota is incorporated in the model. Up to a certain level (“tariff-rate quota”) of each commodity imports, relatively low in-quota tariffs are imposed and once imports exceed the level, a high (and often prohibitive) over-quota tariffs are imposed for the imports over the level.

Export subsidy is incorporated through the use of class 5d and CEM. Any dairy commodity that is processed using class 5d milk and CEM, and exported is considered subsidized.<sup>8</sup> For the U.S., the DEIP subsidized exports are already exogenously set in the model. The WTO export subsidy quantity restrictions are applied for class 5d milk only in the model to examine the effects of uncontrolled CEM in the U.S. and Canadian dairy trade.

### Data

Since the U.S. and Canada use different units of measurement, Canadian data are converted into the U.S. measure. In the model, million pounds are used for quantity measure and US\$/cwt is used for prices. Conversion from Canadian metric system is done using the conversion factor of 1MT = 22.0456 cwt. The exchange rate of CDN \$1 = US \$0.673309 is used to convert the CDN\$ to US\$.

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<sup>8</sup> Both class 5d and CEM require the their processed products to be exported.



Canadian data source:

Canadian Dairy information Centre (<http://www.dairyinfo.agr.ca/>)

Statistics Canada

U.S. data source:

USDA, NASS, Milk Production, Disposition and Income, 2000 Summary

USDA/ERS, Dairy Yearbook 1998

FATUS

FAPRI

U.S. Dairy Export Council

### Policy Scenarios

(1) Base Scenario:

The current U.S. and Canadian dairy trade model is solved for.

(2) No CEM Scenario:

As WTO announced its final ruling last December, Canada is required to discontinue the use of indirect export subsidy through CEM. In this scenario, the only channel for subsidized exports is through Special Class 5d milk, whose quantity is limited to the WTO commitment level.

(3) No Special Milk Classes & No CEM Scenario:

Canada eliminates the whole Special Milk Classes and CEM. There's no export subsidy.

(4) Trade Liberalization Scenario:

Tariff-rate quota and export subsidy are eliminated. Therefore CEM and Class 5d are eliminated.

Results

The key variables from the (1), (2), and (3) scenarios are presented.

(The trade liberalization scenario and the discussions are still progressing.)

Conclusions

Although not shown in the tables, the Canadian exports to the U.S. have dropped as CEM & SMC goes as easily expected. But surprisingly the elimination of CEM and/or SMC does not have a big impact on the U.S. economy in general.

(Still progression)

**Table 1. FARM LEVEL All Milk PRICES (\$/cwt).**

<b>Policy Scenario</b>	<b>(1) BASE</b>	<b>(2) No CEM</b>	<b>(3) No SMC/CEM</b>
<b>U.S.</b>			
<b>Northeast</b>	<b>13.48</b>	<b>13.48</b>	<b>13.49</b>
<b>Appalachia</b>	<b>14.31</b>	<b>14.32</b>	<b>14.31</b>
<b>Florida</b>	<b>15.60</b>	<b>15.60</b>	<b>15.61</b>
<b>Southeast</b>	<b>12.94</b>	<b>12.94</b>	<b>12.95</b>
<b>Mideast</b>	<b>12.80</b>	<b>12.80</b>	<b>12.81</b>
<b>Upper Midwest</b>	<b>11.78</b>	<b>11.79</b>	<b>11.79</b>
<b>Central</b>	<b>12.11</b>	<b>12.11</b>	<b>12.12</b>
<b>Southwest</b>	<b>12.92</b>	<b>12.92</b>	<b>12.93</b>
<b>Western</b>	<b>10.79</b>	<b>10.80</b>	<b>10.80</b>
<b>Northwest</b>	<b>12.80</b>	<b>12.80</b>	<b>12.81</b>
<b>California</b>	<b>11.02</b>	<b>11.03</b>	<b>11.03</b>
<b>Arizona</b>	<b>11.90</b>	<b>11.91</b>	<b>11.91</b>
<b>AGG US</b>	<b>12.30</b>	<b>12.31</b>	<b>12.31</b>
<b>FMMO All Milk</b>	<b>12.61</b>	<b>12.61</b>	<b>12.61</b>
<b>CANADA</b>			
<b>Eastern</b>	<b>17.09</b>	<b>17.09</b>	<b>17.09</b>
<b>Quebec</b>	<b>16.14</b>	<b>16.01</b>	<b>16.01</b>
<b>Ontario</b>	<b>16.90</b>	<b>16.90</b>	<b>16.90</b>
<b>Manitoba</b>	<b>16.90</b>	<b>16.90</b>	<b>16.90</b>
<b>Saskatchewan</b>	<b>15.99</b>	<b>15.99</b>	<b>15.99</b>
<b>Alberta</b>	<b>17.34</b>	<b>17.34</b>	<b>17.34</b>
<b>British Columbia</b>	<b>18.10</b>	<b>18.10</b>	<b>18.10</b>
<b>AGG CAN</b>	<b>16.74</b>	<b>16.70</b>	<b>16.70</b>

**Table 2. FARM LEVEL PRODUCTION (million pounds).**

<b>Policy Scenario</b>	<b>(1) BASE</b>	<b>(2) No CEM</b>	<b>(3) No SMC/CEM</b>
<b>U.S.</b>			
<b>Northeast</b>	<b>29,217</b>	<b>29,220</b>	<b>29,221</b>
<b>Appalachia</b>	<b>6,306</b>	<b>6,307</b>	<b>6,307</b>
<b>Florida</b>	<b>2,867</b>	<b>2,867</b>	<b>2,868</b>
<b>Southeast</b>	<b>5,337</b>	<b>5,338</b>	<b>5,338</b>
<b>Mideast</b>	<b>12,591</b>	<b>12,592</b>	<b>12,593</b>
<b>Upper Midwest</b>	<b>33,067</b>	<b>33,071</b>	<b>33,074</b>
<b>Central</b>	<b>13,794</b>	<b>13,796</b>	<b>13,798</b>
<b>Southwest</b>	<b>10,909</b>	<b>10,910</b>	<b>10,911</b>
<b>Western</b>	<b>9,696</b>	<b>9,699</b>	<b>9,700</b>
<b>Northwest</b>	<b>7,225</b>	<b>7,226</b>	<b>7,227</b>
<b>California</b>	<b>32,057</b>	<b>32,063</b>	<b>32,067</b>
<b>Arizona</b>	<b>2,973</b>	<b>2,973</b>	<b>2,974</b>
<b>AGG US</b>	<b>166,039</b>	<b>166,062</b>	<b>166,078</b>
<b>CANADA</b>			
<b>Eastern</b>	<b>853</b>	<b>853</b>	<b>853</b>
<b>Quebec</b>	<b>6,048</b>	<b>5,940</b>	<b>5,940</b>
<b>Ontario</b>	<b>5,590</b>	<b>5,590</b>	<b>5,590</b>
<b>Manitoba</b>	<b>654</b>	<b>654</b>	<b>654</b>
<b>Saskatchewan</b>	<b>470</b>	<b>470</b>	<b>470</b>
<b>Alberta</b>	<b>1,386</b>	<b>1,386</b>	<b>1,386</b>
<b>British Columbia</b>	<b>1,364</b>	<b>1,364</b>	<b>1,364</b>
<b>AGG CAN</b>	<b>16,365</b>	<b>16,257</b>	<b>16,257</b>

**Table 3. WHOLESALE PRICES (\$/cwt)**

<b>Policy Scenario</b>	<b>(1) BASE</b>	<b>(2) No CEM</b>	<b>(3) No SMC/CEM</b>
<b>U.S.</b>			
<b>Fluid</b>	<b>13.84</b>	<b>13.84</b>	<b>13.83</b>
<b>Soft Products</b>	<b>26.79</b>	<b>26.81</b>	<b>26.82</b>
<b>American Cheese</b>	<b>115.41</b>	<b>115.44</b>	<b>115.45</b>
<b>Mozzarella Cheese</b>	<b>88.17</b>	<b>88.19</b>	<b>88.20</b>
<b>Other Cheese</b>	<b>98.37</b>	<b>98.39</b>	<b>98.40</b>
<b>Butter</b>	<b>95.84</b>	<b>95.95</b>	<b>96.01</b>
<b>Frozen Products</b>	<b>20.50</b>	<b>20.51</b>	<b>20.51</b>
<b>Other Manufactured</b>	<b>33.87</b>	<b>33.89</b>	<b>33.91</b>
<b>Nonfat Dry Milk</b>	<b>103.66</b>	<b>103.66</b>	<b>104.27</b>
<b>CAN</b>			
<b>Fluid</b>	<b>16.31</b>	<b>16.39</b>	<b>16.32</b>
<b>Soft Products</b>	<b>33.28</b>	<b>33.75</b>	<b>33.58</b>
<b>American Cheese</b>	<b>133.89</b>	<b>135.27</b>	<b>134.90</b>
<b>Mozzarella Cheese</b>	<b>106.78</b>	<b>107.78</b>	<b>107.39</b>
<b>Other Cheese</b>	<b>123.19</b>	<b>124.26</b>	<b>123.87</b>
<b>Butter</b>	<b>141.70</b>	<b>145.22</b>	<b>144.07</b>
<b>Frozen Products</b>	<b>27.34</b>	<b>27.70</b>	<b>27.54</b>
<b>Other Manufactured</b>	<b>34.43</b>	<b>34.39</b>	<b>33.95</b>
<b>Nonfat Dry Milk</b>	<b>111.24</b>	<b>111.21</b>	<b>111.03</b>

**Table 4. WHOLESALE PRODUCTION (million pounds)**

<b>Policy Scenario</b>	<b>(1) BASE</b>	<b>(2) No CEM</b>	<b>(3) No SMC/CEM</b>
<b>U.S.</b>			
<b>Fluid</b>	<b>54,818</b>	<b>54,816</b>	<b>54,820</b>
<b>Soft Products</b>	<b>7,788</b>	<b>7,787</b>	<b>7,785</b>
<b>American Cheese</b>	<b>3,598</b>	<b>3,603</b>	<b>3,603</b>
<b>Mozzarella Cheese</b>	<b>2,576</b>	<b>2,576</b>	<b>2,576</b>
<b>Other Cheese</b>	<b>1,297</b>	<b>1,297</b>	<b>1,297</b>
<b>Butter</b>	<b>1,316</b>	<b>1,316</b>	<b>1,317</b>
<b>Frozen Products</b>	<b>12,050</b>	<b>12,048</b>	<b>12,047</b>
<b>Other Manufactured</b>	<b>4,115</b>	<b>4,117</b>	<b>4,117</b>
<b>Nonfat Dry Milk</b>	<b>1,468</b>	<b>1,467</b>	<b>1,468</b>
<b>CAN</b>			
<b>Fluid</b>	<b>6,112</b>	<b>6,108</b>	<b>6,112</b>
<b>Soft Products</b>	<b>963</b>	<b>957</b>	<b>959</b>
<b>American Cheese</b>	<b>297</b>	<b>291</b>	<b>291</b>
<b>Mozzarella Cheese</b>	<b>252</b>	<b>251</b>	<b>251</b>
<b>Other Cheese</b>	<b>103</b>	<b>102</b>	<b>103</b>
<b>Butter</b>	<b>177</b>	<b>176</b>	<b>175</b>
<b>Frozen Products</b>	<b>1,118</b>	<b>1,113</b>	<b>1,115</b>
<b>Other Manufactured</b>	<b>306</b>	<b>302</b>	<b>303</b>
<b>Nonfat Dry Milk</b>	<b>164</b>	<b>161</b>	<b>160</b>

**Table 5. WHOLESALE CONSUMPTION (million pounds)**

<b>Policy Scenario</b>	<b>(1) BASE</b>	<b>(2) No CEM</b>	<b>(3) No SMC/CEM</b>
<b>U.S.</b>			
<b>Fluid</b>	<b>54,265</b>	<b>54,263</b>	<b>54,267</b>
<b>Soft Products</b>	<b>7,715</b>	<b>7,713</b>	<b>7,712</b>
<b>American Cheese</b>	<b>3,534</b>	<b>3,533</b>	<b>3,533</b>
<b>Mozzarella Cheese</b>	<b>2,576</b>	<b>2,576</b>	<b>2,576</b>
<b>Other Cheese</b>	<b>1,485</b>	<b>1,485</b>	<b>1,485</b>
<b>Butter</b>	<b>1,272</b>	<b>1,271</b>	<b>1,271</b>
<b>Frozen Products</b>	<b>11,915</b>	<b>11,912</b>	<b>11,911</b>
<b>Other Manufactured</b>	<b>4,104</b>	<b>4,103</b>	<b>4,102</b>
<b>Nonfat Dry Milk</b>	<b>714</b>	<b>714</b>	<b>712</b>
<b>CAN</b>			
<b>Fluid</b>	<b>6,155</b>	<b>6,151</b>	<b>6,155</b>
<b>Soft Products</b>	<b>963</b>	<b>957</b>	<b>959</b>
<b>American Cheese</b>	<b>267</b>	<b>267</b>	<b>267</b>
<b>Mozzarella Cheese</b>	<b>279</b>	<b>278</b>	<b>278</b>
<b>Other Cheese</b>	<b>136</b>	<b>135</b>	<b>135</b>
<b>Butter</b>	<b>206</b>	<b>205</b>	<b>206</b>
<b>Frozen Products</b>	<b>1,125</b>	<b>1,120</b>	<b>1,122</b>
<b>Other Manufactured</b>	<b>395</b>	<b>395</b>	<b>396</b>
<b>Nonfat Dry Milk</b>	<b>77</b>	<b>77</b>	<b>77</b>

**Table 6. FARM LEVEL PRODUCER SURPLUS (\$ million).**

<b>Policy Scenario</b>	<b>(1) BASE</b>	<b>(2) No CEM</b>	<b>(3) No SMC/CEM</b>
<b>U.S.</b>			
<b>Northeast</b>	<b>3,432</b>	<b>3,434</b>	<b>3,435</b>
<b>Appalachia</b>	<b>614</b>	<b>614</b>	<b>614</b>
<b>Florida</b>	<b>356</b>	<b>356</b>	<b>356</b>
<b>Southeast</b>	<b>554</b>	<b>554</b>	<b>554</b>
<b>Mideast</b>	<b>1,354</b>	<b>1,354</b>	<b>1,355</b>
<b>Upper Midwest</b>	<b>3,288</b>	<b>3,289</b>	<b>3,290</b>
<b>Central</b>	<b>1,322</b>	<b>1,323</b>	<b>1,323</b>
<b>Southwest</b>	<b>1,136</b>	<b>1,136</b>	<b>1,137</b>
<b>Western</b>	<b>822</b>	<b>822</b>	<b>823</b>
<b>Northwest</b>	<b>726</b>	<b>726</b>	<b>727</b>
<b>California</b>	<b>2,755</b>	<b>2,756</b>	<b>2,757</b>
<b>Arizona</b>	<b>285</b>	<b>285</b>	<b>285</b>
<b>AGG US</b>	<b>16,644</b>	<b>16,649</b>	<b>16,656</b>
<b>CANADA</b>			
<b>Eastern</b>	<b>54</b>	<b>54</b>	<b>54</b>
<b>Quebec</b>	<b>385</b>	<b>368</b>	<b>368</b>
<b>Ontario</b>	<b>344</b>	<b>344</b>	<b>344</b>
<b>Manitoba</b>	<b>54</b>	<b>54</b>	<b>54</b>
<b>Saskatchewan</b>	<b>39</b>	<b>39</b>	<b>39</b>
<b>Alberta</b>	<b>105</b>	<b>105</b>	<b>105</b>
<b>British Columbia</b>	<b>91</b>	<b>91</b>	<b>91</b>
<b>AGG CAN</b>	<b>1,072</b>	<b>1,055</b>	<b>1,055</b>



**Table 7. CONSUMER SURPLUS (\$ million)**

<b>Policy Scenario</b>	<b>(1) BASE</b>	<b>(2) No CEM</b>	<b>(3) No SMC/CEM</b>
<b>U.S.</b>			
Northeast	10,946	10,944	10,944
Appalachia	5,678	5,677	5,676
Florida	3,288	3,288	3,287
Southeast	5,714	5,713	5,712
Mideast	6,460	6,459	6,458
Upper Midwest	3,945	3,944	3,944
Central	4,539	4,538	4,538
Southwest	4,691	4,690	4,690
Western	1,314	1,314	1,314
Northwest	1,910	1,910	1,909
California	6,347	6,346	6,346
Arizona	970	970	970
<b>AGG US</b>	<b>55,802</b>	<b>55,793</b>	<b>55,788</b>
CCC Costs	582	580	562
<b>US Welfare</b>	<b>71,864</b>	<b>71,862</b>	<b>71,882</b>
<b>CANADA</b>			
Eastern	431	429	430
Quebec	1,891	1,883	1,886
Ontario	2,841	2,830	2,835
Manitoba	277	276	277
Saskatchewan	206	205	205
Alberta	717	715	716
British Columbia	1,026	1,023	1,027
<b>AGG CAN</b>	<b>7,389</b>	<b>7,361</b>	<b>7,376</b>
CDC Costs	20	17	39
<b>CAN Welfare</b>	<b>8,441</b>	<b>8,399</b>	<b>8,392</b>

## **References**

**Chavas, Jean-Paul, Tom L. Cox, and Edward V. Jesse, 1998**, Spatial Allocation of the Shadow Pricing of Product Characteristics, *Agricultural Economics* 18

**Lippert, Owen, 2001**, The Perfect Food in a Perfect Mess: The Cost of Milk in Canada, *The Fraser Institute Public Policy Sources*, No. 52

**OECD, 1998**, *The Agricultural Outlook 1998-2003*

**Takayama, Y. and G.G. Judge, 1971**, Spatial and Temporal Price and Allocation Models. North-Holland, Amsterdam

**WTO, 2002**, Canada-Measures Affecting the Importation of Milk and the Exportation of Dairy Products, Second Recourse to Article 21.5 of the DSU by New Zealand and the U.S., Report of the Panel (July 26, 2002)