University of Wisconsin-Madison
Department of Agricultural Economics
Marketing and Policy Briefing Paper Series

Department of Agricultural Economics, College of Agricultural and Life Sciences, University of Wisconsin-Madison Cooperative Extension Service, University of Wisconsin-Extension

Paper No. 52
March 1995

Regional Effects of Selected Dairy Policy Options: Dairy IRCM Simulations

by

Thomas L. Cox and Edward V. Jesse

Paper No. 52
March 1995

REGIONAL EFFECTS OF SELECTED DAIRY POLICY OPTIONS: DAIRY IRCM SIMULATIONS

Tom Cox and Ed Jesse[1]

INTRODUCTION

Since 1988, researchers in the Department of Agricultural Economics at UW-Madison have developed and systematically revised and enlarged a complex interregional competition model of the U.S. dairy industry. Denoted the Dairy IRCM, the model is designed to evaluate the effects of specified changes in factors that affect milk and dairy product supply and demand on regional prices, production, consumption, and trade flows. To date, the Dairy IRCM has been used to evaluate technological changes that would elevate protein content of milk, regulatory changes that would alter fluid milk solids-not-fat standards, and policy changes that would modify or terminate certain federal dairy programs. The model has also been used to estimate the regional impacts of the North American Free Trade Agreement (NAFTA) and is currently being revised to examine how the new General Agreement on Tariffs and Trade (GATT) will affect the dairy industry.

In this paper, we discuss the application of the Dairy IRCM to several dairy policy options that have surfaced in 1995 farm bill discussions. We begin with a brief explanation of how the Dairy IRCM works, stressing the important assumptions underlying the model and its strengths and limitations as an analytical tool. We follow this with a discussion of the base scenario, in which the model is used to replicate actual conditions in 1993. We then outline eight alternative dairy policy scenarios and discuss the results of simulating the effects of these options with the model.

---

[1]Associate Professor and Professor, respectively, Department of Agricultural Economics, University of Wisconsin-Madison. The authors gratefully acknowledge financial support from the Wisconsin Agricultural Experiment Station for development of the Interregional Competition Model used in this analysis.

Our focus is exclusively on the model simulations. We do not discuss the rationale for the policy simulations nor do we editorialize about the implications of the results. Readers are left to draw their own conclusions about the desirability and the political feasibility of the options.

THE DAIRY IRCM[2]

The version of the Dairy IRCM used in this analysis defines 13 regions of the U.S. that represent separate milk and dairy product production/consumption areas. The regions are identified in Figure 1. In each of the regions, there is a milk supply relationship based on estimated supply elasticities; i.e., the responsiveness of milk production to changes in farm-level milk prices. Each region has demand relationships for nine dairy products: fluid milk; "soft" manufactured products (e.g., cream products and yogurt); American cheese; Italian cheese; other cheese; butter; nonfat dry milk; frozen dairy products; and residual manufactured dairy products (mainly whey products and evaporated and condensed milk). These regional demands are based on estimates of wholesale demand relationships at the national level that contain certain demographic variables. This permits tailoring of the national relationships according to specific demographic characteristics of the regions.

The supply and demand elasticities used in the model are intermediate-run. This means that changes in production and consumption are assumed to occur over a three-to-five year period.

The model is forced to meet consumption requirements within the regions for the nine dairy products from a combination of local production and "imports" from other regions. Similarly, the model allocates regional milk supply to dairy products that are either consumed locally (within the region) or "exported" to other regions.

The model simulates farm-level milk prices and milk production, wholesale product prices and production, and interregional trade flows. In technical language, it does this by maximizing the sum of producer and consumer welfare. In simpler terms, the model generates production, prices, and trade flows that result in maximum producer and consumer benefits given regional supply and demand relationships and starting values for production, consumption, and prices.

Prices are linked among the regions through transportation costs. Product prices in any two regions cannot differ by more than the cost of hauling the product between the regions. In generating a solution, price differences greater than transportation costs trigger interregional shipments. This increases supply in the receiving region and decreases supply in the shipping region, ultimately leading to a price equilibrium.

---

[2]This section provides a simplified and intuitive explanation of the Dairy IRCM. Readers interested in a formal mathematical presentation of the model should contact the authors for appropriate references.

A unique aspect of the Dairy IRCM is farm-level component pricing of butterfat, protein, and lactose. Component values are converted to associated raw milk and wholesale dairy product prices in evaluating supply and demand relationships. The model makes a distinction in the value of butterfat depending on whether it is allocated to butter or other dairy products; butterfat in butter is valued lower than other butterfat.

Model solutions are achieved through an iterative process. Given starting values, the model looks to see if it can improve upon the current situation by reallocating milk components to different products or reallocating dairy products among regions. It continues the process of seeking more beneficial solutions until no further improvement is possible. Typically, several thousand iterations are performed in deriving optimal solutions.

The model pursues its goal of maximizing producer and consumer welfare without regard to certain market characteristics. For example, while the model might show the elimination of production of some dairy product in a region, it is unlikely that existing manufacturing facilities would disappear overnight. Similarly, the unconstrained model does not recognize some institutional barriers to the allocation of butterfat from fluid milk processing and cheesemaking. In order to reflect market realities, we add a number of constraints to the Dairy IRCM. These prevent what might be economically optimal but pragmatically unreasonable solutions.

Some key constraints include:

- The butterfat content of fluid milk consumed in the U.S. is just over two percent, while farm-level milk has 3.67 percent butterfat. Consequently, most milk destined for fluid products is skimmed, resulting in large volumes of excess butterfat. The model constrains the allocation of excess fat from fluid products by forcing at least 70 percent into butter.

- Similarly, Italian cheese production yields excess butterfat, since milk is typically standardized to optimal fat-to-dry matter ratios by adding nonfat solids or removing cream. The model forces at least 75 percent of excess butterfat from Italian cheese production to the production of butter.

- Production of American and other cheeses yields butterfat in the form of whey cream. All of this butterfat is forced into butter production.

- In regions where fluid milk use exceeds 60 percent of milk production, we assume that balancing fluid milk markets will be accomplished by diverting reserve milk to butter/powder plants. This assumption is implemented by forcing 25 percent of total fluid milk consumption (the assumed fluid reserve) to be allocated to butter and nonfat dry milk.

- Because of its unique state pricing system. California produces an abnormally large volume of butter relative to what the model would otherwise predict. To force more realistic butter production in California, butterfat allocated to butter production is assumed to be at least 75 percent of the butterfat allocated to butter in 1993.

- In recognition of existing capacity levels, the model constrains protein allocated to nonfat dry milk (NDM) production in California and in the Northwest region to be at least 75 percent of what was allocated in 1993.

- The California state pricing system is explicitly modeled. That is, the model uses the pricing formulas actually used in California to derive product and farm-level prices.

THE BASE SOLUTION

The first step in evaluating policy options with the Dairy IRCM is to generate a BASE solution, which is used as a comparison base for the options. The BASE solution is a simulation of the current situation with respect to prices, production, and interregional trade flows. Since any model is an imperfect reflection of reality, it is more instructive to compare alternatives to the base values than to actual values. This avoids confounding simulated model changes with the model's inability to exactly replicate the real world.

The BASE uses 1993 prices, production, and consumption as starting values.[3] Table 1 summarizes wholesale sector utilization and supply starting values by region. Regional domestic commercial disappearance is computed from 1990 regional population shares (derived from state level Census data) times 1993 U.S. domestic commercial disappearance. Aggregate commercial disappearance and government removals are from published USDA data sources. Net private exports are reported (USDA) exports adjusted for estimated government foreign donations. Private stocks include shipments to U.S. territories as well as change in private stocks.

Regional wholesale production and aggregate imports (Table 1) are from USDA data sources. Note that total wholesale utilization (domestic commercial disappearance + government removals + net private exports + private stocks) balances very closely with total wholesale supply (wholesale production + imports).

Since the BASE scenario attempts to replicate the current milk marketing system, the dairy price support program and federal milk marketing order pricing rules are explicitly included via model constraints. The dairy price support program is incorporated by setting

[3]Detailed information on sources of data and computations necessary to derive regional values is available from the authors.

minimum prices for butter, American cheese, and nonfat dry milk at the existing CCC purchase prices in 1993. These prices are expressed in terms of farm-level values by subtracting make allowances to yield $1.02 per pound for cheese, $.68 per pound for butter, and $.98 per pound for NDM.

Federal milk marketing orders are incorporated by building in single basing point pricing for fluid milk. In regions east of the Rocky Mountains, fluid milk prices are constrained to be greater than or equal to the M-W price plus $1.04 per hundredweight (the Class I differential at the Eau Claire, Wisconsin, basing point) plus 21 cents per hundred-weight per 100 miles distance from Eau Claire. For markets west of the Rocky Mountains, the weighted average Class I differential for federal order markets within the region are used instead of the distance-based formula.

Table 2 compares actual 1993 aggregate and regional farm level production, prices and revenues with the BASE simulation results. This comparison provides a rough measure of the reasonableness of the BASE scenario as a representation of the U.S. dairy sector in 1993. With the exceptions of the Central (+5.0%), East North Central (+6.1%), and North West (-2.6%) regions, the BASE simulation generates regional milk production within 2% of actual 1993 levels. Similarly, BASE simulation of regional shares of aggregate milk production are within a percentage point of observed 1993 levels. These results are quite respectable for this type of simulation model.

Given moderately inelastic, intermediate run (3-5 year adjustment period) supply curves, it is generally more difficult to accurately simulate prices than quantities. The BASE scenario generates farm level all milk prices that are within 4% of actual 1993 levels with the exception of the Northeast (+4.2%), East North Central (+6.2%), Upper Midwest (-7.3%) and Northwest (-4.9%) regions. With respect to the large Upper Midwest region, the BASE scenario generates prices that are 94 cents less than observed in 1993. This is comparable to the observed 80-90 cent competitive premiums on manufacturing milk in the Upper Midwest in 1993. In other words, the BASE scenario indicates that Upper Midwest manufacturers paid considerably more for milk than expected based on 1993 product prices.

Large errors in either production or price will be manifested in regional farm total revenue errors, as evidenced in Table 2. Note, however, that the BASE scenario generates regional shares of total farm revenues that are within 1 percentage point of the actual revenue shares with the exception of the Upper Midwest (2 percentage points). Finally, aggregate farm production, all-milk price and total revenue from the BASE scenario are within 1% of observed 1993 levels.

Table 3 summarizes the aggregate wholesale and endogenous sector simulation results relative to 1993 starting values. Wholesale prices are computed as the sum of constituent farm level component values for wholesale products with the exception of Fluid ($13.23/cwt) and Residual Mfg. ($.336/pound). Farm level component values are computed from the following products and reference prices: Farm-level all milk ($12.85/cwt), Butter

($.60/pound), NDM ($.984/pound), and American Cheese ($105/cwt).[4] Note that since this is a farm level model, these are farm level prices for wholesale products.

The BASE scenario generates aggregate wholesale prices for American, Italian and other cheese, and NDM that are quite close to 1993 levels (+/- 2%). The BASE scenario fluid price is 86 cents (6.4%) higher, while butter is 2 cents (3.8%) higher than 1993 starting values. Soft, Frozen and Residual Mfg. are within 9% of the 1993 starting values. Aggregate wholesale production and consumption from the BASE simulation are generally quite close to observed 1993 levels (+/- 3%) with the exception of Residual Mfg. production (+8.1%). Note that, with the exception of Soft (+3.4%) and Frozen (+2.7), BASE scenario wholesale consumption is quite close to observed levels. The BASE scenario is a bit heavy on American cheese production (+100 million pounds, +3.3%) and a bit light on NDM (-26 million pounds, -2.8%), which partially explain the relatively larger production of Residual Mfg. (i.e., more whey solids from excess American cheese and more nonfat solids from deficient NDM).

These BASE scenario results are also reflected in the endogenous sector removals. While Butter (+3.6%) and NDM (-1.7%) removals are quite close to 1993 levels, American Cheese removals are off 71 million pounds while Residual Mfg. exports are roughly double the 1993 levels. Valuing the BASE scenario endogenous removals of American cheese, Butter, and NDM at 1993 CCC purchase prices yields total Government costs that were $89 million (15.7%) greater than actual 1993 costs.

Given the enormous complexities of pricing and marketing milk in the U.S. dairy sector and the inherent limitations of mathematical modeling, the Dairy IRCM yields a very reasonable representation of 1993 conditions.

POLICY SCENARIOS

Eight dairy policy scenarios were simulated using the Dairy IRCM. Three of the scenarios involved termination of either or both of the primary instruments of federal dairy policy, the dairy price support program and federal milk marketing orders. Four scenarios involve modifications of current federal milk order pricing rules and one elevates the federal solids-not-fat standards for fluid milk products. A brief description of how the model was modified to reflect these alternatives follows.

---

[4]This procedure basically computes the marginal value of farm milk components at CCC support levels (i.e., an additional unit of milk component is valued at CCC prices). Given these all milk, butter and NDM reference prices, $1.05/pound was the highest farm level value for cheese that could be obtained. Using the average 1993 Wisconsin Assembly Point block price of $1.315/pound, this implies a marketing margin for American cheese of 26 cents per pound, considerably more generous that USDA's $1.37 per hundredweight make allowance under the dairy price support program. Note, however, that $1.05/pound is the farm level component value of American cheese and does not include any whey by-product values.

Terminate Price Supports/Retain Marketing Orders: Average 1993 world market prices for butter and NDM and the GATT minimum price for cheddar cheese (Northern European ports) replace CCC purchase prices as price floors. Converted to farm-level, these minimum prices are $.56/pound for butter, $.65/pound for NDM, and $.58/pound for cheese. Federal order and California fluid milk pricing rules are retained.

Terminate Marketing Orders/Retain Price Support: Both federal and California fluid milk pricing constraints are removed, and the model is allowed to determine fluid milk prices without reference to Upper Midwest prices. The CCC price support floors for butter, NDM, and American cheese are retained.

Free Market: Both federal order/California fluid milk pricing floors and CCC commodity price support floors are removed. This scenario depicts the complete deregulation of the U.S. dairy industry, with the exception of import quotas. Fluid milk prices are competitively determined, and price floors for butter, NDM, and cheese are world market or GATT minimum prices.

Universal California Fluid Milk Standards: California has standards of identity for packaged fluid milk products that require solids-not-fat levels higher than normally observed in farm-level milk. This requires that fluid milk be fortified through the addition of nonfat solids, usually in the form of condensed skim milk. In this scenario, California standards are applied nation-wide, raising the protein level from 3.32 percent to 3.56 percent and the lactose level from 4.73 percent to 5.07 percent.

A/B Manufacturing Milk Price Mover: The BASE scenario ties regional fluid milk prices to the M-W price. This scenario uses the model-computed weighted average value of milk used for manufactured products in the Upper Midwest as the base for regional fluid milk price constraints. The resulting A/B manufacturing milk price is about 8 percent higher than the M-W price.

Flat $2.00 Class I Differential: In this scenario, Class I differentials based on distance from the Upper Midwest (or fixed differentials in Western markets) are replaced with a common minimum Class I differential of $2.00 per hundredweight. This results in higher minimum prices in the Upper Midwest and the Northwest and lower minimum prices in other regions. The minimum differentials are added to the M-W price to obtain minimum fluid milk prices. The California pricing system is not altered.

Flat $2.00 Differential Pooled Nationally: This is a national pooling scenario in which a $2.00 per hundredweight common Class I differential applied to all fluid milk sales except California is allocated regionally in proportion to milk production. In effect, fluid milk revenues are shared equally without regard to where the fluid milk was produced.

National Order with Utilization-based Class I differentials and Partial Pooling: A national federal order replaces the current order structure and the California milk pricing

system. The national order has four broad regional pricing zones. Minimum Class I differentials are set according to Class I utilization within the zones. The resulting differentials are $2.38 per hundredweight for the Northeast, Mid-Atlantic, South Atlantic, Central, and East North Central regions; $3.36 per hundredweight for the Southeast and East South Central regions; $1.92 for the West South Central, Upper Midwest, and West Central regions; and $1.99 per hundredweight for the Northwest, Mountain, and California regions. One dollar of the minimum differential is pooled nationally. In other words, each region receives $1.00 per hundredweight times the national average fluid utilization plus additional fluid revenue in accordance with regional fluid sales and the amount by which the regional fluid differential exceeds $1.00.

MODEL RESULTS

The results of simulating the eight policy scenarios are shown in Table 4. Highlights are noted below. In all cases, the "changes" noted are relative to the BASE scenario, not actual 1993 values.

Terminate Price Supports/Retain Marketing Orders

- Farm level milk prices decline by 4 percent on average and production falls by 1.6 percent.

- Milk prices fall in every region. The largest declines occur in primary manufacturing regions (Upper Midwest and California).

- The butter price falls to the world market price ($.56 per pound) in 3 regions (Upper Midwest, Northwest, and California), and the NDM price is at the world price ($.65) in California. This represents only a 6.5 percent decline for butter, but a 32 percent fall in the price of NDM. American cheese prices remain well above the GATT minimum ($.58), although below the CCC purchase price.

- Because of sharply lower prices, NDM production drops by 22 percent. Milk solids are reallocated away from NDM to other products, especially Italian cheese, which has a relatively high protein-to-fat ratio.

- Reduced milk production cuts production of most other manufactured products.

Summary: Actual CCC purchases of NDM in 1993 were not particularly large by historical standards. Nevertheless, the presence of a floor price for NDM was clearly effective in propping milk prices. If the milk solids in the NDM purchased by the CCC had to find a home in other products, there would be a pronounced effect on the

regional price surface for nonfat dry milk, and a spillover effect on the production and prices of other products.

*Terminate Marketing Orders/Retain Price Support*s

- Aggregate farm-level milk prices increase by 0.3 percent, but production is off by 1 percent.

- There are large price declines in all markets east of the Rocky Mountains except the Upper Midwest.

- Milk prices increase strongly in the Upper Midwest, Northwest, and California. There is a modest price gain in the Mountain region.

- Fluid milk prices fall by 12 percent and consumption of fluid milk increases by more than 2 percent.

- Larger fluid milk sales combined with reduced farm-level milk production reduce the supply of milk for manufactured products, especially cheese. This tightens cheese supplies, raising prices sharply. It also reduces the supply of whey products, affecting the price of residual manufactured products.

- Larger supplies of restricted butterfat from larger fluid milk sales increases butter production by 6 percent.

- NDM production increases. This increase comes almost exclusively from a reallocation of milk in the East North Central region. Fluid sales fall by 1.2 billion pounds, as the region's fluid exports are almost completely displaced. The extra milk represented by displaced fluid sales is allocated to NDM.

Summary: This scenario demonstrates that Federal milk marketing orders have a major effect on both fluid and manufacturing milk prices. Removing milk order constraints forces a significant realignment of fluid milk prices, even though most regions show fluid milk prices in the base solution that are higher than the order minimum prices. The realignment occurs primarily because the unconstrained fluid price in the large Mid-Atlantic region falls to a level that would induce shipments of fluid milk if prices in other regions did not correspondingly fall. Large increases in fluid milk consumption in response to lower prices reduces the supply of milk for manufacturing, resulting in considerable benefits to primary manufacturing regions.

Free Market

- In the Upper Midwest, California, and Northwest, the negative effects of removing price supports are more than offset by the positive effects of terminating milk marketing orders.

- Farm-level prices in other markets fall, in most cases, sharply.

- The average U.S. farm milk price falls by almost 3 percent, and production is off by 2.6 percent.

- A strong gain in fluid milk use (+3 percent) combined with sharply lower farm milk production results in significant changes in manufactured product production and prices. Production of all manufactured products is down. Prices are higher except for butter and nonfat dry, which fall to world market prices, and the residual manufactured category.

- Butter prices fall to the world market price in the Upper Midwest, Northwest, and California. The NDM price is at the world price in California.

Summary: The results from this scenario is very similar to the No Marketing Order scenario except that dropping of the CCC price floors results in some adjustments in product mix.

Universal California Fluid Milk Standards

- The U.S. average farm-level price increases slightly, but there is considerable regional variation in price changes. California and the Upper Midwest show relatively large farm price gains; other regions show no change or losses ranging from 0.1 to 1.1 percent.

- A peculiar result in high fluid utilization markets is that both fluid milk and manufactured product prices are generally higher, but farm level milk prices are lower. This comes about because the higher nonfat solids composition of fluid milk leaves less solids for manufacturing. Hence, manufacturing revenue is reduced more than the implied reduction in milk allocated to manufacturing.

- The primary effect of higher fluid standards is a substantial tightening of the supply of nonfat milk solids. This, in turn, causes a major shifting of milk among products. The product most affected is nonfat dry milk, with production down 14 percent. CCC purchases of NDM fall by 125 million pounds, but the NDM price remains at support in some regions.

- Output of other high solids products also falls, especially American cheese and residual manufactured products.

- Higher standards elevate fluid milk prices by 1.6 percent, resulting in reduced production of 0.3 percent.

- Because of scarce milk solids relative to butterfat, butter production is up almost 6 percent. Butter prices fall only slightly, since the support price is binding in major butter producing regions.

Summary: This scenario shows gains to regions that are important in cheese production because of a tightening of the supply of nonfat milk solids. Losers are regions important in fluid sales, where the supply of milk solids for manufacturing is reduced the most. In these regions, product price increases are not large enough to offset reduced production.

A/B Manufacturing Milk Price Mover

- Despite a higher basic formula price for moving fluid milk prices, overall revenue is lower. Aggregate farm-level price declines 0.5 percent. This result comes from a sharply lower manufacturing price in the Upper Midwest (-2.3 percent), which is the fluid milk basing point.

- High fluid milk prices and resulting lower fluid sales causes a reallocation of milk to manufacturing. The average manufacturing milk price is lower in all regions.

- In regions with high fluid milk utilization, the amount of excess milk resulting from reduced fluid milk consumption is considerable. Much of this milk is diverted to production of bulky soft and frozen products, for which transportation costs are relatively high in comparison to product value. Soft and frozen production increases 1.7 percent, dropping prices by 4.5 and 5.8 percent, respectively.

- Since soft and frozen products are high in butterfat, increased production leaves a "solids-rich" residual. This is allocated to Italian cheese and NDM, the products with the largest protein/fat composition ratios. Italian cheese production is up 2.3 percent, dropping price by more than 9 percent. NDM production is up 2 percent. The large drop in Italian cheese price is the primary reason that Upper Midwest milk prices fall sharply in this scenario.

- Lower fluid sales decrease the amount of restricted butterfat, leading to lower butter production.

Summary: Raising the pricing base for fluid milk has the effect of penalizing important manufacturing regions. Lower fluid milk sales combined with higher farm milk production in regions with high fluid milk utilization adds to the supply of milk for manufacturing in those regions.

Flat $2.00 Class I Differential

- With the exception of the Upper Midwest and Northwest regions, which show farm-level milk price increases of 1.7 and 1.3 percent, respectively, changes in regional prices and production are modest.

- Despite a $1.00 per hundredweight higher minimum price, the fluid milk price in the Upper Midwest increases by only 8 cents per hundredweight as over-order premiums are nearly eliminated. The average value of milk for manufacturing in the Upper Midwest increases by 22 cents per hundredweight as milk is shifted from Italian cheese to higher-valued American cheese.

- The Northwest shows a fluid milk price increase of 28 cents per hundredweight. There is the same shifting of milk from Italian to American cheese as is observed in the Upper Midwest.

Summary: This scenario results in only minor impacts, both in the aggregate and among regions. This is because the model generates fluid milk price differentials that are generally well-above the $2.00 minimum. The Upper Midwest and Northwest regions are affected more because they have the lowest fluid differentials.

Flat $2.00 Differential Pooled Nationally

- National pooling of the entire Class I differential creates some peculiar production incentives and leads to some wild swings in regional product mix. There are very large price gains in regions with low fluid utilization, since producers in these regions share fluid revenues in proportion to their share of national milk production. Largest gains are experienced in the Upper Midwest and Northwest, with fluid utilization of 11 and 25 percent, respectively. Prices fall the most in regions with the highest Class I utilization.

- There are very large changes in milk production, with the Upper Midwest and Northwest regions increasing 4 and 9 percent, respectively. Milk production in the Central region falls by 9 percent, in the Southeast by 9 percent, and in the East North Central region by 6.5 percent.

- Large changes in milk production yield major changes in regional processing patterns and interregional trade. The Upper Midwest becomes a major supplier of fluid milk, increasing exports by more than 4 billion pounds. This tightens the supply of milk for manufacturing, benefitting all major manufacturing regions.

- Production of all manufactured products except Italian cheese are down; most are down sharply. Italian cheese production is up because of a 25 percent increase in Upper Midwest production and more than a doubling of Northwest production. These regions move heavily into Italian cheese because of much higher milk production.

Summary: This scenario yields very dramatic changes from the base because of the manner in which fluid revenues are redistributed. It results in the largest producer gains and losses among the policy options considered.

National Order with Utilization-based Class I differentials and Partial Pooling

- Changes in farm-level prices and production are comparatively small, and changes in product prices and production are even smaller. There is very little observed change in regional production patterns from the base.

- The largest effect is an increase in farm-level prices in the Upper Midwest and the Northwest, the regions with the lowest fluid utilization.

- Other regions lose roughly in proportion to Class I utilization. However, some shifts in production between soft and frozen products in the Southeast and Central regions cause exceptions to this general rule.

- There are some minor changes in fluid milk trade. The Upper Midwest increases fluid milk exports by 270 million pounds, with other regions down about the same volume in the aggregate.

Summary: This is a relatively quiet scenario. Class I differentials are not much different from the base, and Class I prices change very little. The redistribution of fluid milk revenues is not nearly as dramatic as in the $2.00 National Pooling option, resulting in much smaller price and production changes.

SUMMARY

The Dairy IRCM demonstrates the kinds of changes in production, prices, and interregional trade that would likely occur if federal programs were terminated or substantially modified. The model emphasizes how prices are interrelated among regions and among products, and how, as a result of these interrelationships, changes that have primary effects in one region or on one product spill over into all other regions and products.

The Dairy IRCM does a reasonably good job of representing the complex U.S. milk marketing and pricing system. But we stress that it is only a model. Its predictions must be interpreted carefully and tempered by market experience and intuition. It is only one tool among many that should be used together in the process of gaining an understanding of the effects of dairy policy changes.

Internet Access:

This paper and others in this series are available electronically via Internet Gopher. Gopher to CALSHP.CALS.WISC.EDU and follow the path:

AGRICULTURAL ECONOMICS PUBLICATIONS
MARKETING AND POLICY BRIEFING PAPERS
MPB50.EXE

If you cannot address a Gopher directly, follow the path:

OTHER GOPHER SERVERS
WORLD WIDE GOPHER SERVERS
NORTH AMERICA
USA
WISCONSIN
UNIV. OF WISCONSIN-MADISON (WISCINFO)
OTHER INFO SOURCES AND GOPHER SERVERS
UW-MADISON GOPHER SERVERS
COLLEGE OF AG. AND LIFE SCIENCES (CALS) SERVER
AGRICULTURAL ECONOMICS PUBLICATIONS
MARKETING AND POLICY BRIEFING PAPERS
MPB50.EXE

Download MPB50.EXE and type the string of characters BEFORE THE .EXE (MPB50) The paper will automatically decompress into MPB50.W51, a WordPerfect 5.1 document. You may then print it. Check in the document for font specifications. Any technical problems with downloading the paper, please contact Jack Solock, Taylor-Hibbard Library, Dept. of Ag. Economics, Univ. of Wisconsin-Madison, (608) 262-9488, jack@agecon.wisc.edu

Table 1. 1993 Wholesale Sector Starting Values: Regional and U.S. Utilization and Supply Summary (million pounds).

REGIONAL WHOLESALE DOMESTIC COMMERCIAL DISAPPEARANCE

	FLUID	SOFT	AMER CH	ITAL CH	OTHER CH	BUTTER	FROZEN	RESID MFG	NDM
North East	2,902	208	156	132	71	54	396	209	31
Mid-Atlantic	8,264	592	445	377	202	155	1,127	594	88
South Atlantic	3,084	221	166	141	75	58	421	222	33
South East	6,490	465	350	296	158	122	885	466	69
Central	1,882	135	101	86	46	35	257	135	20
E. South Central	2,897	208	156	132	71	54	395	208	31
W. South Central	4,757	341	256	217	116	89	649	342	51
E. North Central	8,157	584	439	372	199	153	1,113	586	87
Upper Midwest	2,330	167	125	106	57	44	318	167	25
West Central	2,626	188	141	120	64	49	358	189	28
North West	1,915	137	103	87	47	36	261	138	21
Mountain	2,447	175	132	112	60	46	334	176	26
California	6,540	469	352	298	160	123	892	470	70
TOTAL 14 REGION	54,292	3,890	2,924	2,477	1,326	1,019	7,407	3,901	581
Other	364	26	20	17	9	7	50	26	4
TOTAL	54,657	3,916	2,944	2,493	1,335	1,026	7,456	3,927	585

GOVERNMENT REMOVALS, PRIVATE EXPORTS, PRIVATE STOCKS/SHIPMENTS

	FLUID	SOFT	AMER CH	ITAL CH	OTHER CH	BUTTER	FROZEN	RESID MFG	NDM
GOV'T REMOVALS	0	0	8	0	0	289	0	0	304
NET PRIVATE EXPORTS	163	18	(16)	22	6	14	83	372	47
PRIVATE STKS/SHIP	0	0	41	9	6	(9)	0	0	7
TOTAL UTILIZATION	54,820	3,933	2,977	2,524	1,347	1,320	7,539	4,299	942

REGIONAL WHOLESALE PRODUCTION

	FLUID	SOFT	AMER CH	ITAL CH	OTHER CH	BUTTER	FROZEN	RESID MFG	NDM
North East	2,902	210	35	85	31	34	400	209	23
Mid-Atlantic	8,264	597	101	544	206	99	1,244	679	36
South Atlantic	3,084	223	0	7	0	60	241	120	39
South East	6,490	469	24	0	0	5	814	0	0
Central	1,882	136	68	15	14	78	211	38	11
E. South Central	2,897	209	183	0	2	0	226	4	9
W. South Central	4,757	344	242	0	0	93	505	150	50
E. North Central	6,657	589	0	137	179	67	1,078	402	34
Upper Midwest	3,830	153	1,538	941	323	381	467	1,496	99
West Central	2,626	190	154	267	200	24	656	244	89
North West	1,915	138	237	77	43	137	332	132	130
Mountain	2,447	177	35	27	29	1	324	47	18
California	6,540	473	337	392	51	335	1,025	752	420
TOTAL 14 REGION	54,291	3,908	2,954	2,493	1,077	1,315	7,524	4,273	957
Other	529	15	3	2	(1)	0	15	(0)	1
TOTAL PRODUCTION	54,820	3,923	2,957	2,495	1,076	1,315	7,539	4,273	958
IMPORTS (ROW-US)	0	10	20	30	270	4	1	26	1
TOTAL SUPPLY	54,820	3,933	2,977	2,524	1,347	1,319	7,539	4,299	959

AGGREGATE SUPPLY AND UTILIZATION BALANCE

	FLUID	SOFT	AMER CH	ITAL CH	OTHER CH	BUTTER	FROZEN	RESID MFG	NDM
Difference	0.0	0.0	0.1	-0.1	-0.1	-0.4	0.0	0.0	16.5
% change	0.0%	0.0%	0.0%	-0.0%	-0.0%	-0.0%	0.0%	0.0%	1.7%

Table 2. Comparison of BASE Simulation Results with Actual 1993 Farm Secto

	FARM MILK PRODUCTION (million pounds)					FARM LEVEL ALL MILK PRICE			FARM REVENUES (million $)		
REGION	1993 PROD'N MILL LBS.	BASE PROD'N MILL LBS.	% ERROR: BASE vs. ACTUAL PROD'N	1993 PROD'N SHARE	BASE PROD'N SHARE	1993 PRICE ($/cwt)	BASE PRICE ($/cwt)	% ERROR: BASE vs. ACTUAL PRICE	1993 REVENUE MILL $	BASE REVENUE MILL $	% ERR BASE ACTU REVEN
North East	4,454	4,506	1.2%	3%	3%	13.58	14.15	4.2%	605	637	5.4%
Mid-Atlantic	21,648	21,688	0.2%	14%	14%	13.33	13.37	0.3%	2,886	2,900	0.5%
South Atlantic	3,786	3,791	0.1%	3%	3%	13.69	13.87	1.3%	518	526	1.5%
South East	5,903	6,026	2.1%	4%	4%	14.77	15.24	3.2%	872	919	5.3%
Central	4,052	4,254	5.0%	3%	3%	13.50	13.97	3.5%	547	594	8.6%
E.South Central	2,918	2,964	1.6%	2%	2%	13.93	14.32	2.8%	406	424	4.4%
W.South Central	9,718	9,749	0.3%	7%	6%	13.21	13.27	0.5%	1,284	1,294	0.8%
E.North Central	14,750	15,651	6.1%	10%	10%	12.97	13.77	6.2%	1,913	2,155	12.6
Upper Midwest	35,276	34,800	-1.3%	24%	23%	12.84	11.90	-7.3%	4,530	4,143	-8.5%
West Central	8,887	8,999	1.3%	6%	6%	12.75	12.86	0.9%	1,133	1,157	2.2%
North West	9,793	9,541	-2.6%	7%	6%	12.32	11.71	-4.9%	1,206	1,117	-7.4%
Mountain	5,304	5,223	-1.5%	4%	3%	12.77	12.35	-3.3%	677	645	-4.8%
California	22,893	22,954	0.3%	15%	15%	11.45	11.54	0.8%	2,621	2,649	1.0%
TOTAL U.S.	149,382	150,146	0.5%	100%	100%	12.85	12.76	-0.7%	19,199	19,160	-0.2%

Table 3. Comparison of BASE Simulation Results with Actual 1993 Wholesale Sectors.

COMMERICAL WHOLESALE SECTOR:

	1993 PRICES ($/cwt)	BASE PRICES ($/cwt)	% ERROR: BASE vs. ACTUAL PRICES	1993 PROD'N MILL LBS.	BASE PROD'N MILL LBS.	% ERROR: BASE vs. ACTUAL PROD'N	1993 CONSUMP MILL LBS.
FLUID	13.23	14.08	6.4%	54,820	54,051	-1.4%	54,291
SOFT	26.21	24.04	-8.3%	3,923	4,040	3.0%	3,890
AMERICAN CHEESE	**105.00**	**104.55**	**-0.4%**	**2,957**	**3,054**	**3.3%**	**2,923**
ITALIAN CHEESE	83.74	83.82	0.1%	2,495	2,472	-0.9%	2,476
OTHER CHEESE	80.84	81.12	0.4%	1,076	1,069	-0.6%	1,326
BUTTER	**60.00**	**62.28**	**3.8%**	**1,315**	**1,317**	**0.1%**	**1,018**
FROZEN	20.44	18.70	-8.5%	7,539	7,658	1.6%	7,406
RESIDUAL MFG	34.21	36.12	5.6%	4,273	4,621	8.1%	3,902
NDM	**98.40**	**99.83**	**1.5%**	**958**	**932**	**-2.8%**	**580**

ENDOGENOUS SECTOR (GOVERNMENT REMOVALS + NET EXPORTS):

	1993 PRICE FLOORS/1 ($/cwt)	1993 REMOVALS MILL LBS.	BASE REMOVALS MILL LBS.	1993 COST MILL $	BASE COST MILL $	% ERROR: BASE vs. ACTUAL COST
RESIDUAL MFG	33.60	372	780	125	262	109.7%
AMERICAN CHEESE	112.00	8	87	9	97	987.5%
BUTTER	65.00	303	314	197	204	3.6%
NDM	103.40	351	345	363	357	-1.7%
TOTAL GOVERNMENT COST				**569**	**658**	**15.7%**

/1 These are CCC purchase prices with the exception of RESIDUAL MFG.

Table 4. Summary of Alternative Policy Scenarios: Farm Sector Simulation Results (% change from BASE Scenario).

FARM LEVEL PRICES ($/cwt).

	BASE ($/cwt)	BASE vs NO CCC % CHG	BASE vs NO MMO's % CHG	BASE vs FREE MKT % CHG	BASE vs CALIF FLUID % CHG	BASE vs AB/MMO % CHG	BASE vs FLAT $2.00 % CHG	BASE vs $2/POOLING % CHG	BASE vs 4 ZONE/POOL % CHG
North East	14.15	-2.5%	-4.0%	-8.7%	-1.0%	0.1%	-0.1%	-8.5%	-0.4%
Mid-Atlantic	13.37	-2.6%	-2.7%	-4.6%	-0.4%	0.1%	0.4%	-5.7%	-0.4%
South Atlantic	13.87	-2.5%	-4.8%	-9.4%	-0.8%	-0.1%	0.4%	-9.5%	-0.2%
South East	15.24	-2.4%	-5.4%	-10.6%	-0.9%	-0.5%	0.3%	-13.9%	-0.1%
Central	13.97	-2.7%	-5.7%	-8.1%	-1.1%	0.2%	-0.2%	-8.8%	-0.5%
E.South Central	14.32	-2.2%	-5.7%	-11.2%	-0.9%	-0.7%	0.3%	-10.5%	-0.2%
W.South Central	13.27	-1.1%	-5.1%	-7.3%	-1.0%	-0.1%	-0.0%	-6.9%	-0.4%
E.North Central	13.77	-2.3%	-6.7%	-9.0%	-0.8%	-0.6%	0.1%	-8.5%	-0.5%
Upper Midwest	11.90	-4.2%	7.2%	4.1%	2.1%	-2.3%	1.7%	17.8%	2.1%
West Central	12.86	-3.4%	-2.1%	-4.5%	-0.6%	-0.4%	0.4%	-3.1%	-0.5%
North West	11.71	-3.8%	4.2%	1.9%	0.0%	-1.3%	1.3%	13.9%	1.2%
Mountain	12.35	-1.6%	1.4%	-0.1%	-0.1%	1.2%	-0.5%	-2.6%	-1.2%
California	11.54	-5.6%	6.6%	1.4%	1.8%	1.1%	0.1%	2.8%	2.0%
TOTAL U.S.	12.76	-3.3%	0.3%	-2.9%	0.3%	-0.5%	0.5%	0.9%	0.5%

FARM LEVEL PRODUCTION (million pounds).

	BASE MILLION LBS	BASE vs NO CCC % CHG	BASE vs NO MMO's % CHG	BASE vs FREE MKT % CHG	BASE vs CALIF FLUID % CHG	BASE vs AB/MMO % CHG	BASE vs FLAT $2.00 % CHG	BASE vs $2/POOLING % CHG	BASE vs 4 ZONE/POOL % CHG
North East	4,506	-0.7%	-1.2%	-2.5%	-0.3%	0.0%	-0.0%	-2.4%	-0.1%
Mid-Atlantic	21,688	-1.6%	-1.7%	-2.8%	-0.3%	0.0%	0.2%	-3.5%	-0.3%
South Atlantic	3,791	-0.3%	-0.5%	-1.1%	-0.1%	-0.0%	0.0%	-1.1%	-0.0%
South East	6,026	-1.6%	-3.6%	-7.0%	-0.6%	-0.3%	0.2%	-9.1%	-0.1%
Central	4,254	-3.8%	-8.1%	-11.5%	-1.5%	0.2%	-0.2%	-12.5%	-0.6%
E.South Central	2,964	-1.3%	-3.3%	-6.5%	-0.5%	-0.4%	0.2%	-6.0%	-0.1%
W.South Central	9,749	-0.8%	-3.5%	-5.0%	-0.7%	-0.1%	-0.0%	-4.7%	-0.3%
E.North Central	15,651	-2.2%	-6.6%	-8.9%	-0.8%	-0.6%	0.1%	-8.4%	-0.5%
Upper Midwest	34,800	-0.7%	1.2%	0.7%	0.4%	-0.4%	0.3%	3.1%	0.4%
West Central	8,999	-4.9%	-3.1%	-6.5%	-0.8%	-0.5%	0.5%	-4.5%	-0.8%
North West	9,541	-1.9%	2.1%	1.0%	0.0%	-0.6%	0.7%	7.1%	0.6%
Mountain	5,223	-0.7%	0.6%	-0.1%	-0.1%	0.6%	-0.2%	-1.2%	-0.5%
California	22,954	-1.9%	2.3%	0.5%	0.6%	0.4%	0.0%	1.0%	0.7%
TOTAL U.S.	150,146	-1.6%	-1.0%	-2.6%	-0.1%	-0.2%	0.2%	-1.6%	0.0%

FARM LEVEL TOTAL REVENUES (million $).

	BASE $ MILLION	BASE vs NO CCC % CHG	BASE vs NO MMO's % CHG	BASE vs FREE MKT % CHG	BASE vs CALIF FLUID % CHG	BASE vs AB/MMO % CHG	BASE vs FLAT $2.00 % CHG	BASE vs $2/POOLING % CHG	BASE vs 4 ZONE/POOL % CHG
North East	637	-3.2%	-5.1%	-11.0%	-1.3%	0.1%	-0.2%	-10.7%	-0.5%
Mid-Atlantic	2,900	-4.2%	-4.4%	-7.3%	-0.7%	0.1%	0.7%	-9.0%	-0.7%
South Atlantic	526	-2.7%	-5.3%	-10.4%	-0.8%	-0.1%	0.4%	-10.4%	-0.2%
South East	919	-3.9%	-8.8%	-16.9%	-1.5%	-0.8%	0.5%	-21.8%	-0.1%
Central	594	-6.4%	-13.4%	-18.7%	-2.6%	0.4%	-0.4%	-20.2%	-1.1%
E.South Central	424	-3.4%	-8.8%	-17.0%	-1.3%	-1.1%	0.5%	-15.9%	-0.3%
W.South Central	1,294	-1.9%	-8.4%	-11.9%	-1.8%	-0.2%	-0.1%	-11.2%	-0.7%
E.North Central	2,155	-4.4%	-12.8%	-17.1%	-1.6%	-1.2%	0.1%	-16.2%	-1.0%
Upper Midwest	4,143	-4.9%	8.5%	4.9%	2.5%	-2.6%	2.0%	21.5%	2.5%
West Central	1,157	-8.1%	-5.2%	-10.8%	-1.4%	-0.9%	0.9%	-7.4%	-1.3%
North West	1,117	-5.7%	6.4%	2.9%	0.1%	-1.9%	2.0%	22.0%	1.7%
Mountain	645	-2.2%	2.1%	-0.2%	-0.2%	1.8%	-0.7%	-3.7%	-1.7%
California	2,649	-7.4%	9.1%	1.9%	2.5%	1.5%	0.1%	3.8%	2.7%
TOTAL U.S.	19,160	-4.9%	-0.8%	-5.4%	0.1%	-0.7%	0.7%	-0.7%	0.5%

Table 4. Continued: Wholesale and Endogenous Sector Simulation Results (% change from BASE Scenario).

WHOLESALE LEVEL PRICES ($/cwt).

	BASE $/CWT	BASE vs NO CCC % CHG	BASE vs NO MMO's % CHG	BASE vs FREE MKT % CHG	BASE vs CALIF FLUID % CHG	BASE vs AB/MMO % CHG	BASE vs FLAT $2.00 % CHG	BASE vs $2/POOLING % CHG	BASE vs 4 ZONE/POOL % CHG
FLUID	14.08	-3.4%	-11.8%	-16.4%	1.6%	2.4%	-0.7%	1.4%	-0.7%
SOFT	24.04	4.3%	9.1%	14.9%	2.9%	-4.5%	2.2%	11.0%	0.5%
AMER CHEESE	104.55	-5.4%	8.0%	3.4%	0.9%	0.8%	0.0%	6.0%	-0.0%
ITAL CHEESE	83.82	-7.8%	14.4%	12.7%	6.2%	-9.1%	5.3%	-16.6%	0.1%
OTHER CHEESE	81.12	2.5%	10.8%	13.9%	2.7%	-1.5%	1.5%	3.0%	0.0%
BUTTER	62.28	-6.5%	-2.4%	-7.0%	-0.3%	0.0%	0.0%	0.4%	0.0%
FROZEN	18.70	14.7%	10.0%	25.9%	2.9%	-5.8%	2.6%	13.5%	0.4%
RESIDUAL MFG	36.12	0.0%	1.3%	0.0%	0.3%	0.0%	0.0%	0.2%	0.0%
NDM	99.83	-32.0%	-1.0%	-32.1%	0.7%	-0.2%	0.0%	0.3%	0.0%

WHOLESALE LEVEL PRODUCTION (million pounds).

	BASE $/CWT	BASE vs NO CCC % CHG	BASE vs NO MMO's % CHG	BASE vs FREE MKT % CHG	BASE vs CALIF FLUID % CHG	BASE vs AB/MMO % CHG	BASE vs FLAT $2.00 % CHG	BASE vs $2/POOLING % CHG	BASE vs 4 ZONE/POOL % CHG
FLUID	54,051	0.6%	2.1%	2.9%	-0.3%	-0.4%	0.1%	-0.2%	0.1%
SOFT	4,040	-1.6%	-3.4%	-5.5%	-1.1%	1.7%	-0.8%	-4.2%	-0.2%
AMER CHEESE	3,054	-2.0%	-4.1%	-3.4%	-3.0%	-2.3%	2.7%	-3.8%	-0.1%
ITAL CHEESE	2,472	2.0%	-3.6%	-3.2%	-1.6%	2.3%	-1.3%	4.2%	-0.0%
OTHER CHEESE	1,069	-1.5%	-6.5%	-8.3%	-1.6%	0.9%	-0.9%	-1.8%	-0.0%
BUTTER	1,317	-4.1%	6.1%	-0.8%	5.8%	-1.3%	-0.1%	-0.8%	0.1%
FROZEN	7,658	-4.3%	-2.9%	-7.5%	-0.9%	1.7%	-0.8%	-4.0%	-0.1%
RESIDUAL MFG	4,621	1.6%	-17.2%	-1.2%	-5.1%	-2.1%	0.8%	-4.1%	-0.0%
NDM	932	-22.2%	26.1%	-21.7%	-13.8%	2.1%	-2.2%	-5.9%	-0.4%

WHOLESALE LEVEL CONSUMPTION EXPENDITURES (million $).

	BASE $ MILLION	BASE vs NO CCC % CHG	BASE vs NO MMO's % CHG	BASE vs FREE MKT % CHG	BASE vs CALIF FLUID % CHG	BASE vs AB/MMO % CHG	BASE vs FLAT $2.00 % CHG	BASE vs $2/POOLING % CHG	BASE vs 4 ZONE/POOL % CHG
FLUID	7,561	-2.8%	-9.9%	-13.9%	1.3%	2.0%	-0.6%	1.1%	-0.6%
SOFT	967	2.6%	5.4%	8.5%	1.8%	-2.9%	1.4%	6.4%	0.3%
AMER CHEESE	3,058	-4.6%	6.6%	2.9%	0.8%	0.7%	0.0%	5.0%	-0.0%
ITAL CHEESE	2,075	-6.0%	10.2%	9.1%	4.5%	-7.1%	3.9%	-13.1%	0.1%
OTHER CHEESE	1,074	1.3%	5.1%	6.3%	1.4%	-0.8%	0.8%	1.5%	0.0%
BUTTER	628	-4.9%	-1.8%	-5.3%	-0.2%	0.0%	0.0%	0.3%	0.0%
FROZEN	1,422	9.7%	6.8%	16.3%	2.0%	-4.2%	1.8%	9.0%	0.3%
RESIDUAL MFG	1,387	0.0%	0.9%	0.0%	0.2%	0.0%	0.0%	0.2%	0.0%
NDM	575	-22.0%	-0.5%	-22.1%	0.4%	-0.1%	0.0%	0.2%	0.0%
TOTAL	18,748	-2.4%	-0.7%	-3.0%	1.5%	-0.4%	0.4%	0.9%	-0.2%