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**A SURVEY OF
ECONOMIC MODELS
OF THE DAIRY INDUSTRY**

by
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Abstract

The purpose of this report is to catalog, describe, and provide information concerning existing models of the dairy sector. Many types of dairy models are listed in this report. The models vary by geographic aggregation (e.g., farm, state, regional, national, and international levels), time dimension (e.g., comparative static, annual, quarterly, monthly, weekly, daily specifications), principal application (e.g., Federal Milk Marketing Order, dairy price support program, operations analysis, etc.), computer requirements (mainframe vs. micro-computer, DOS vs. Apple), ease of use, i.e., "user friendliness," and other dimensions. The report should be useful for individuals interested in the dairy industry, public policy, or quantitative methods.

A Survey of Economic Models of the Dairy Industry

Harry M. Kaiser and Don P. Blayney

Introduction

The NC-198 regional research project, entitled "Analyses of Selected Economic Factors Affecting the Long Run Viability of the Northern Dairy Industry," began on September 30, 1989 and is scheduled to conclude on September 30, 1994. Universities from the North Central and Northeastern regions of the United States are included in this project, as are agencies of the United States Department of Agriculture (USDA).

The three objectives of this regional project are:

1. To quantify the underlying factors affecting the location and structure of milk production, processing, and distribution,
2. To evaluate key factors influencing consumer attitudes towards dairy product consumption, and
3. To determine the effects of selected changes in Federal Milk Marketing Orders and dairy price support program policies.

All three objectives involve the use of economic models of the dairy sector. A specific element of this regional project was to hold a workshop on economic modeling of dairy issues. This workshop was held in Washington, D.C. on October 31, 1991. Following the workshop presentations, NC-198 committee members and invited workshop participants held a round-table discussion on economic models and dairy issues. During that discussion, general support was voiced for sponsoring a survey of dairy models to determine the extent of dairy modeling efforts around the country.¹

¹ This survey furthers previous efforts in dairy modeling. Previous work in this area includes: Dairy Models and Modeling for Policy Analysis: Concepts and Issues (from a workshop sponsored by NC-176, NE-153, and S-166 held in 1985 at Ohio State University); Proceedings of a Workshop on Systems Analysis in the Dairy Industry (from a workshop sponsored by USDA-ERS in 1973 in Herndon, Virginia); and Demand and Supply Analysis Tools in Dairy Price and Income Policy (from a workshop sponsored by NCR-70 held in 1969).

Survey Design and Response

In order to maximize the total response rate, a simple questionnaire was designed as the instrument for gathering information about dairy models. The length of the questionnaire was five and one-half pages and required about five to ten minutes to complete. The intent was to obtain as much information about models as possible without placing too much burden on respondents. The catalog of models resulting from the survey was viewed as a general information source rather than a highly detailed or technical source of information. The questionnaire is presented in the Appendix for the interested reader. The questionnaire was informally pre-tested by having several dairy modelers complete it and offer suggestions for revisions. Several subsequent revisions were made.

The revised questionnaire was sent to department chairs in all agricultural economics departments in the U.S., as well as some agribusiness departments on February 3, 1992. Department chairs were asked to deliver the questionnaire to faculty in the department who do or have done research on the dairy sector. In addition, the questionnaire was also mailed to individuals that were identified as having conducted research in the dairy industry. There was only one mailing of the survey with no follow-up, or post card reminder. Survey participants were formally given two-and-one-half weeks to return the questionnaire, but late questionnaires were accepted, with the latest one arriving approximately two months late.

Thirty-one questionnaires were ultimately returned and are cataloged in this report. Of the 31 completed questionnaires, 19 agricultural economics, or agribusiness departments (including the USDA as one department) are represented. In some cases, there is more than one department involved in model ownership due to collaborative work. Departments responding with the most dairy models were: Cornell University (five models), Texas A&M University (five models), the University of Minnesota (four models), and the University of Delaware (three models).

Dairy Model Classification

The dairy models are presented in two ways. First, a general description of each model is presented, including information which: 1) provides the name and address of the model builder(s); 2) briefly describes the model; 3) lists model applications; 4) describes computer requirements; 5) lists user data needs; 6) explains the output of the model; and 7) provides references for the model where available. Second, the models are presented in a tabular form that compares each model by various characteristics.

In terms of individual model information, the models are grouped by category of principal application. For models where there are multiple applications, we used our own judgment in putting them into the category that we felt was the most appropriate. In many cases, there are more than five possible applications for the model. For example, many of the farm-level models could be used to measure farm-level impacts of all types of policy issues. This is why we have put all farm-level models into one general category. The five categories of general applications are: Federal Milk Marketing Order issues, dairy price support program issues, general farm operations analysis, general dairy marketing issues, and international trade issues.

Models Applicable for Federal Milk Marketing Order Issues

OPTIREG

Dairy Market Policy Simulator (DAMPS)

Spatial Equilibrium for Dairy Industry

Wisconsin Spatial Equilibrium Model

Model:OPTIREG

Model Builder(s):

Rodolfo V. Tanjuakio, University of Delaware, Newark, Delaware 19717

Model Applications:

Federal Milk Marketing Order issues (price differentials). Price support issues (changing support price levels).

Description:

The model applies optimal control to a regional econometric model of the U.S. dairy industry to determine the optimal levels of support price and Class I differentials.

Computer Information:

OPTIREG is written in GAMS/Minos, requires SAS for file input and operates in the batch mode on a mainframe.

Model:

Dairy Market Policy Simulator (DAMPS)

Model Builder(s):

Emerson Babb, Department of Food and Resource Economics, University of Florida, and Andrew Novakovic, Department of Agricultural Economics, Cornell University, Ithaca, NY 14853

Description:

DAMPS is a transshipment model of the U.S. dairy sector. The dairy sector is split geographically into federally regulated areas, state regulated areas, unregulated Grade A milk regions, and Grade B or manufacturing milk regions. DAMPS is a quarterly model, capable of simulating from one to five years of dairy sector activity. Dynamic elements of the dairy sector are represented in DAMPS by the carryover of dairy stocks between quarters and by a lagged response of production and consumption to prices.

Model Applications:

Federal Milk Marketing Order issues (price differentials, multiple base pricing, reconstituted milk, shipping provisions, federal order mergers). Price support issues (two-tier pricing, Class IV plans, target price-deficiency payment programs, voluntary supply control, mandatory supply control, changing support price levels. Other issues (milk assembly, milk distribution systems, forecasting/outlook).

Computer Information:

DAMPS is written in FORTRAN. It is being modified using C language and should be ready in June 1992. It runs on a mainframe or on a 386 or 486 microcomputer on an DOS system. It runs in batch and interactive modes on the PC. No additional software is required. Disk storage requirement is 25 mg.

User Data Requirements:

Prices. Extensive base data file is used. This can be modified by user, e.g., transportation costs.

Model Output:

Projected prices, quantities, uses of milk, all components of cost to retail prices, milk and product shipments, CCC purchases.

References:

Staff Paper 91-30, University of Florida, Input Forms for DAMPS; Staff Paper 91-29, University of Florida, 1988 Base Data for DAMPS.

Proprietary Information:

Outside technical support time is estimated at one day. The contact person is Andrew Novakovic, 314 Warren Hall, Cornell University, Ithaca, N.Y. 14853; phone, 607-255-7602; fax, 607-255-9984.

Model:

Spatial Equilibrium for Dairy Industry

Model Builder(s):

M.C. Hallberg, Department of Agricultural Economics and Rural Sociology, Weaver Building, Penn State University, University Park, PA 16802

Description:

Spatial equilibrium for U.S. dairy industry using quadratic programming.

Model Applications:

Federal Milk Marketing Order issues (price differentials, multiple base pricing, deregulation). Price support issues (generic dairy advertising, deregulation). Other issues (consumer behavior).

Computer Information:

Spatial Equilibrium for Dairy Industry is written in FORTRAN and Basic. It runs on a microcomputer on an DOS system and operates in a combination of interactive and batch modes.

User Data Requirements:

Base year regional fluid and manufacturing prices, supplies, blend prices, population, aggregate fluid and manufacturing consumption, and regional supply and demand elasticities. Transportation cost functions for fluid and manufactured.

Model Output:

Equilibrium regional fluid and manufacturing milk prices, producer blend prices, demand quantities, supply, and interregional shipments.

References:

Hallberg, M.C., et al. "Impact of Alternative Federal Milk Marketing Order Pricing Policies on the United States Dairy Industry," The Pennsylvania State University Agr. Exp. Sta. Bul. 818, May 1978.

Hallberg, M.C. "Spatial Equilibrium Model for the U.S. Dairy Industry," Department of Agricultural Economics and Rural Sociology, The Pennsylvania State University, February 3, 1992.

Proprietary Information:

Spatial Equilibrium for Dairy Industry is available without cost. There is no technical support and it is estimated that four hours of outside technical support time would be necessary to learn how to use the model. The contact person is M. C. Hallberg, Dept. of Ag. Econ. & Rural Soc., Weaver Building, Penn State University, University Park, Pennsylvania 16802; phone, 814-865-0467; fax, 814-865-3746.

Model:Wisconsin Spatial Equilibrium Model

Model Builder(s):

J.P. Chavas and T. Cox, Department of Agricultural Economics, University of Wisconsin, Madison, WI 53706

Description:

J.P. Chavas and T. Cox are developing a spatial equilibrium model that will include eight commodities and 15 regions. The model is not yet finished, but promising results have been obtained for a base (competitive) solution. Federal order provisions and constraints have not yet been incorporated. The model will be most suitable for analyzing broad questions of interregional competition.

Model Applications:

Federal Milk Marketing Order issues (multiple component pricing, price differentials, federal order mergers, deregulation). Price support issues (voluntary supply control, mandatory supply control, changing support price levels, deregulation).

Computer Information:

The Wisconsin Spatial Equilibrium Model is written in GAUSS and runs on a micro-computer in an DOS operating system in an interactive mode. GAMS-Minos software is needed and the disk storage requirement is 100 mg.

User Data Requirements:

The model requires demand and supply elasticities for the different regions. These are used to position the demand and supply functions required by the model. Also needed are transportation costs among regions for refrigerated and non-refrigerated dairy products.

Model Output:

Equilibrium prices and quantities of commodity by region, shipments of commodities among regions.

References:

None listed.

Proprietary Information:

The model is not currently available to the public.

**Models Applicable for
Federal Dairy Price Support Program Issues**

National Economic Milk Policy Impact Simulator (NEMPIS)

SWITCHREG

DAIRYSIM

Agricultural Sector Model (ASM)

Political Economic Model of the U.S. Support Price
for Manufactured Dairy Products

Model:

National Economic Milk Policy Impact Simulator (NEMPIS)

Model Builder(s):

Harry M. Kaiser, Department of Agricultural Economics, Cornell University, Ithaca, New York 14853-7801

Description

NEMPIS is an annual model of the national dairy sector that is designed for analyzing policy and technology scenarios. NEMPIS is capable of simulating a wide variety of federal dairy policies and alternatives, as well as new technologies for dairy. The output of the program includes national average production per cow, cow numbers, national milk production, class prices, average milk prices, Class 1 and 2 demand, net government removals, and retail dairy prices.

Model Applications:

Federal Milk Marketing Order issues (price differentials). Federal dairy policy issues (two-tier pricing, Class IV plans, target price-deficiency payment programs, voluntary and mandatory supply control policies, price support program, deregulation). Other issues (forecasting).

Computer Information:

NEMPIS runs on a micro-computer with at least 128K of random access memory (RAM). The program has been compiled so that it will run on any micro-computer using DOS without any other software. NEMPIS is very user friendly and a manual is available from the model builder.

User Data Requirements:

Support price level, assessments technology parameters (e.g., bST yield increases and adoption levels), and other policy parameters (e.g., number of cows disposed in a Dairy Termination Program).

Model Output:

All output is at the national level, including average production per cow, cow numbers, milk production, average farm milk price, net government dairy product purchases, Class 1 and 2 prices, and fluid and manufactured sales and retail prices.

References:

Kaiser, Harry M. "An Overview of NEMPIS: National Economic Milk Policy Impact Simulator." Staff Paper 92-02. Department of Agricultural Economics, Cornell University, February 1992.

Proprietary Information:

Model is free to anyone provided they supply the model builder with an DOS compatible diskette. The contact person is Harry M. Kaiser, 307 Warren Hall, Department of Agricultural Economics, Cornell University, Ithaca, N.Y. 14853-7801; phone, 607-255-1598; fax, 607-255-9984.

Model:**SWITCHREG****Model Builder(s):**

D.J. Liu, H.M. Kaiser, T.D. Mount, and O.D. Forker, Department of Agricultural Economics Cornell University, Ithaca, New York 14853-7801

Description:

Because of the dairy price support program, the dairy industry can be under one of two regimes at any point in time. A competitive regime occurs whenever the market wholesale manufactured price is above the government support price. A government support regime occurs when the market price is below the support price. SWITCHREG is a quarterly econometric-simulation model that corrects for the selectivity bias caused by the dairy industry switching between these two regimes. The model divides the dairy industry into retail, wholesale, and farm markets; and disaggregates products into fluid and manufactured dairy products. Output of the model includes milk production, net government removals, Class I and II supply and demand, retail, wholesale, and farm prices.

Model Applications:

Federal Milk Marketing Order issues (price differentials). Federal dairy policy issues (two-tier pricing, Class IV plans, target price-deficiency payment programs, voluntary and mandatory supply control policies, price support program, deregulation). Other issues (national generic advertising program issues).

Computer Information:

SWITCHREG simulation model is written in TSP-PC (4.1) which requires at least 128K of random access memory (RAM). However, the program runs much quicker on a 386 or 486 computer with the upgraded TSP-PC (4.2).

User Data Requirements:

For in-sample simulation, users can change data for any of the variables (e.g., advertising expenditure levels) to construct and compare scenarios. Users wishing to do out-of-sample simulations are required to enter forecasts for all the exogenous variables in the model.

Model Output:

All output is at the national level and is quarterly. Output includes national milk production, average farm milk price, Class I and II prices, wholesale and retail Class I and II supply and demand, net government removals, and wholesale and retail prices.

References:

Liu, D.J., H.M. Kaiser, O.D. Forker, and T.D. Mount. "Modeling the U.S. Dairy Sector with Government Intervention." Western Journal of Agricultural Economics. 16(1991):360-373.

Liu, D.J., H.M. Kaiser, O.D. Forker, and T.D. Mount. "An Economic Analysis of the U.S. Generic Dairy Advertising Program Using an Industry Model." Northeastern Journal of Agricultural and Resource Economics. 19(1990):37-48.

Proprietary Information:

Model is free to anyone who supplies the model builder with a DOS compatible diskette. However, there is no technical support offered. The contact person is Harry M. Kaiser, 307 Warren Hall, Department of Agricultural Economics, Cornell University, Ithaca, NY 14853-7801; phone, 607-255-1598; fax, 607-255-9984.

Model:DAIRYSIM

Model Builder(s):

L.J. Butler, Department of Agricultural Economics, University of California, Davis, California 95616

Description:

Originally designed to model impact of bST on the U.S. dairy industry. Four equation model (Westcott, 1983) modified for current dairy industry and used in a simulation program with current farm bill policy options.

Model Applications:

Price support issues (two-tier pricing, target price-deficiency payment programs, voluntary supply control, mandatory supply control, changing support price levels). Other issues (forecasting/outlook).

Computer Information:

DAIRYSIM is written in BASIC and runs on a DOS operating system. The disk storage requirement is approximately 100K.

User Data Requirements:

Starting values for each of the outputs listed plus any desired level of simulation.

Model Output:

Total milk cows, milk production per cow, total milk production, total supply of milk, commercial milk use, net government (CCC) removals farm price, effective price, net government expenditures on dairy, plus simulation output on any number of policy options.

References:

None listed.

Proprietary Information:

There is no cost for DAIRYSIM, however a blank diskette is requested. Technical support is offered by Dr. Butler, but little time is necessary to learn how to use the model. The contact person is L.J. Butler, Department of Agricultural Economics, University of California, Davis, Davis, California 95016; phone, 916-752-3681; fax, 916-752-5614; E-Mail, ljbutler@ucdavis.

Model:Agricultural Sector Model (ASM)

Model Builder(s):

Bruce McCarl, Department of Agricultural Economics, Texas A&M University, College Station, Texas 77843

Description:

National agricultural sector optimization model which includes a dairy sector.

Price support issues (changing support price levels). Other issues (international trade).

Computer Information:

ASM is written in GAMS and runs on both mainframes and microcomputers. It runs on DOS, OS2, and Apple operating systems in batch mode. It does not run under Windows, but does run in CICS and Presentation Manager environments. No additional software is needed to run the model, and the disk storage requirement is 15+ megabytes.

User Data Requirements:

None listed.

Model Output:

Equilibrium prices and quantities, net CCC purchases, consumer and producer surplus.

References:

Chang, C.-C., Bobby R. Eddleman, and Bruce A. McCarl. "Potential Benefits of Rice Variety and Water Management Improvements in the Texas Gulf Coast," , Vol. 16, No. 2, December 1991, Western Journal of Agricultural Economics, pp. 185-193.

Proprietary Information:

The model is not currently available to the public.

Model:

Political Economic Model of the U.S. Support Price for Manufactured Dairy Products

Model Builder(s):

Mary A. Marchant, 314 Ag Engineering Building, University of Kentucky, Lexington, KY 40546-0276

Description:

The primary goal of this research was to endogenize government behavior, i.e., to identify variables that influence U.S. policymakers' choice of the support price for manufactured dairy products (MDP). This was accomplished by the development of two models -- a behavioral model and a criterion function model. The behavioral model consisted of two components: (1) a commodity component describing supply, demand, stocks, and government costs and (2) a policy component specifying economic and political variables which may affect policymakers' decisions. Alternatively, the criterion function model was a constrained optimization model, where policymakers maximized total welfare, equaling a weighted welfare sum for processors, consumers and taxpayers, where the weights measure the political influence of each special interest group. Model constraints consisted of a commodity component.

Model Applications:

Price support issues.

Computer Information:

The Political Economic Model of the U.S. Support Price for Manufactured Dairy Products is written with SHAZAM commands and uses DOS and OS/2 environments. It runs in interactive and batch modes and uses SHAZAM, Lotus or Quatro and WordPerfect.

User Data Requirements:

None.

Model Output:

Empirical results of both models indicated that taxpayers' interest in minimizing government costs dominated. In the behavioral model, government cost variables, such as the Federal budget deficit, the share of government expenditures on the dairy program, the difference between the support price and the world price, and the expected additions to government stocks, appeared to influence policymakers' decisions. In the criterion function model, taxpayers' political influence weight dominated relative to that of processors and consumers. Also, political variables, e.g., inertia and farm income, appeared to influence policymakers' decisions in the behavioral model.

References:

Marchant, Mary A. (1989) "Political Economic Analysis of Dairy Policies in the United States." Ph.D. thesis, University of California, Davis.

White, K.J. (1978) "A General Computer Program for Econometric Methods - SHAZAM," *Econometrica*. 46:239-240.

White, K.J. and L.T.M. Bui. (1988) *Basic Econometrics: A Computer Handbook Using SHAZAM*. Montreal: McGraw-Hill.

White, K.J., S.D. Wong, D. Whistler, and S.A. Haun. (1990) *SHAZAM User's Reference Manual Version 6.2*. Montreal: McGraw-Hill.

Proprietary Information:

The model is not currently available to the public.

Models Applicable for Farm-Level Operations Analysis

Nebraska Dairy Enterprise Records (NDER)

DAIRY

Dairy Decisionstm

Modified FLIPSIM V

Adopt

Vermont Dairy LP

Dairy Size Economies

Dairy Expert Management Advisory System (DXMAS)

NC Dairy Farm Model

Dairy Waste Budget, Composting Budget, Dehydration Budget

FLIPSIM

Dairy Cow Purchase Price Analysis (DCPPA)

Model:Nebraska Dairy Enterprise Records (NDER)

Model Builder(s):

H. Douglas Jose, Department of Agricultural Economics, University of Nebraska-Lincoln, Lincoln, Nebraska 68583-0922

Description:

This model is a dairy enterprise records model. NDER calculates the cost of producing milk on a per hundredweight basis. Feed costs are calculated by using the current market price for home-grown feeds. Feed usage is based on the inventory at the end of the accounting period. The program is constructed to calculate costs on a quarterly basis.

Model Applications:

Farm operations analysis.

Computer Information:

NDER runs on a micro-computer (DOS) and requires Lotus version 2.2 software.

User Data Requirements:

All costs that contribute to milk production, quantity produced, and quantities of feed.

Model Output:

Detailed itemization of production costs and physical quantities used on a per hundredweight of milk basis. An executive summary provides a list of the ten most important cost components.

References:

No reference given.

Proprietary Information:

Model will not be available until late 1992. The contact person is H. Douglas Jose, Department of Agricultural Economics, University of Nebraska-Lincoln, Lincoln, NE. 68583-0922; phone, 402-472-1749; fax, 402-472-3460.

Model:

DAIRY

Model Builder(s):

J.W. Wysong, S. Coggin, P. Ganguly,
Department of Agr. & Resource Econ.,
2214 Symons Hall, University of
Maryland, College Park, Maryland 20742

Description:

DAIRY is a dairy farmer organization and operation model designed for sensitivity analyses of changes in farm level milk output (numbers of cows and milk sold annually per cow) and productivity per full-time worker involved. It shows the impact of lower or higher milk prices, costs of feed and labor and other inputs. With proper weightings by size and number of farm firms, DAIRY can be used to aggregate results to state, county, regional and U.S. levels.

Model Applications:

Federal Milk Marketing Order issues (multiple component pricing, price differentials, multiple base pricing, reconstituted milk, seasonal/base pricing plans, federal order mergers, deregulation). Price support issues (two-tier pricing, target price-deficiency payment programs, voluntary supply control, mandatory supply control, generic dairy advertising, changing support price levels, deregulation). Other issues (milk distribution systems, farm operations analysis, forecasting/outlook, international trade).

Computer Information:

DAIRY is written in C. It runs on an DOS operated microcomputer in an interactive mode. The disk storage requirement is <360K.

User Data Requirements:

Technical input and output data appropriate for the future, and financial costs and returns data. These items are built into the simulation model. The operator, user or analyst can quickly change the items which vary from 100, 200 and 400 cow dairy farms.

Model Output:

Has built in input and output parameters that can be changed and varied as appropriate for each dairy farm evaluation. Shows impact of changes in volume of milk and cattle output on the break-even costs and profitability functions with proportionality and size adjustments.

References:

Wysong, J.W., "Economic Analyses and Extension Educational Programs Using Microcomputers to Evaluate Cost and Return Adjustments for a Crop-Dairy Enterprise," University of Maryland Cooperative Extension Service, AREIS 83-21, pp. 22.

Proprietary Information:

DAIRY is available for \$50.00, which includes technical support. It can be learned with very little outside technical support. The contact person is John W. Wysong, 2214 Symons Hall, Department of Agr. & Res. Economics, University of Maryland, College Park, Maryland 20740; phone, 301-405-1288; fax, 301-314-9091.

Model:**Dairy Decisions™**

Model Builder(s):

Kenneth C. Scott, Agribusiness Department, Cal Poly, San Luis Obispo, California 93407

Description:

The model is a spreadsheet application package that simulates a dairy farm operation. It is designed to assist managers as they address issues relating to changing technological and economic environments of the modern dairy farm. The model uses the concept of enterprise budgeting to examine profitability, efficiencies, investment opportunities, and operating adjustments needed to maintain the longevity of the dairy farm.

Model Applications:

Federal Milk Marketing Order issues (multiple component pricing, price differentials, multiple base pricing, seasonal/base pricing plants); Price support issues (two-tier pricing, changing support price levels). Other issues (farm operations analysis).

Computer Information:

Dairy Decisions™ is a spreadsheet applications package designed to run on an DOS operated microcomputer. SuperCalc 5 software is needed. Requirement for C drive is .2 mg and an A drive is needed for data storage.

User Data Requirements:

All input and product coefficients on a per head basis. Input and product prices. Selected financial information for the dairy.

Model Output:

The model simulates the actual financial situation of a dairy farm by reporting on milk string, calf, replacement, heifers, and dry cow enterprises. Information on costs, resources used, efficiencies, profitabilities, marginal adjustments, investment analysis, California quota purchases, mastitis control, culling, etc.

References:**Dairy Decisions Users' Guide****Proprietary Information:**

The cost of Dairy Decisions™ plus initial support is \$489.00 with extended support at \$60/hour. Cost of updates is projected at \$100. Very little technical support time is needed to learn to use the model, but data requirements are substantial. Help is most often requested in getting the proper data set established to run the model. The contact person is Dr. Kenneth C. Scott, President, Dairy Decisions, Inc. 2031 Sierra Way, San Luis Obispo, California 93401; phone 805-544-2240.

Model:Modified FLIPSIM V

Model Builder(s):

C.M. Gempesaw II, Department of Food and Resource Economics, 212 Townsend Hall, University of Delaware, Newark, Delaware 19717

Description:

A modified version of the dynamic stochastic farm simulation model, FLIPSIM V, was used to analyze the impacts of alternative policies on representative dairy farms in Germany and the U.S. The marginal value of under or over quota production was estimated using regression analysis based on the simulation results.

Model Applications:

Price support issues (voluntary supply control, mandatory supply control, changing support price levels). Other issues (farm operations analysis, financial performance of farms).

Computer Information:

Modified FLIPSIM V is written in FORTRAN and runs on a mainframe in batch mode.

User Data Requirements:

Representative farm data (financials).

Model Output:

Cash receipts/expenses, cash farm income, net present value, internal rate of return, probability of survival.

References:

An Economic Analysis of Dairy Policy in the U.S. and Germany, Agricultural Experiment Station Bulletin #495, November 1991, University of Delaware, Newark, Delaware 19717

Proprietary Information:

It takes about one week to learn Modified FLIPSIM V and technical support is available from the University of Delaware. The contact person is C.M. Gempesaw II, Department of Food and Resource Economics, Townsend Hall, University of Delaware, Newark, Delaware 19717; phone, 302-831-1315; fax, 302-831-3651.

Model:

Adopt

Model Builder(s):

Tom McGuckin, New Mexico State University, University Park, New Mexico 88003

Description:

An econometric model of adoption of new technologies. Uses inefficiency and risk attitudes as explanatory variables within a profit maximization framework.

Model Applications:

Price support issues (voluntary supply control, mandatory supply control, deregulation). Other issue (farm operations analysis).

Computer Information:

Adopt is written in GAUSS and will run on a microcomputer in an DOS system. It operates in batch mode.

User Data Requirements:

Uses Farm Costs and Returns Survey (1985) and market prices (1988).

Model Output:

Adoption, inefficiency estimate, production coefficients.

References:

A journal article is planned.

Proprietary Information:

There is no cost for obtaining the model, but no technical support is available. A lot of outside technical support time would be necessary to learn how to use the model. The contact person is Tom McGuckin, Box 3CQ, University Park, New Mexico 88003; phone, 505-646-6302; E-Mail, TMcGucki@NMSU.

Model:Vermont Dairy LP

Model Builder(s):

Andrew Condon and Jonathan Ashley,
Department of Ag. and Res. Econ.,
University of Vermont, 601 Main Street,
Burlington, VT 05401-1700

Description:

Currently an LP which addresses the economics of intensive pasture rotation on representative dairy farms. Future model modifications will include making it a quadratic programming model.

Model Applications:

Federal Milk Marketing Order issues (seasonal/base pricing plans, deregulation). Price support issues (voluntary supply control, mandatory supply control). Other issues (farm operations analysis).

Computer Information:

Data for Vermont Dairy LP is in ASCII form. It currently runs on a mainframe, however it is not required. The operating system is VMS and LINDO (or any linear programming package) software and is run in batch mode.

User Data Requirements:

Costs of production for enterprise (budget data), monthly average blend prices and differentials.

Model Output:

Optimal input mixes and net revenues given various assumptions about prices and availability of land, labor and capital.

References:

None listed.

Proprietary Information:

The model is not currently available to the public.

Model:Dairy Size Economies

Model Builder(s):

Robert Thompson, former graduate research assistant at Colorado State University and presently Professor, Department of Agricultural Economics, Cal Poly, San Luis Obispo, California

Description:

An economies of size analysis is based on a stratified random sample of 40 dairy farms in the state. An econometric analysis estimated size economies for the sample farms and data was pooled into four size groups to make cost structure and size comparisons.

Model Applications:

Farm operations analysis.

Computer Information:

Dairy Size Economies runs with any statistical package on a microcomputer.

User Data Requirements:

Not applicable.

Model Output:

An equation depicting size economies among input groups.

References:

Thompson, Robert C. Jr. 1990. Cost and Returns and Economies of Size on Colorado Dairy Farms. Ph.D. dissertation, Department of Agricultural and Resource Economics, Colorado State University, Fort Collins. 181 p.

Proprietary Information:

The model is not currently available to the public.

Model:Dairy Expert Management Advisory System (DXMAS)

Model Builder(s):

Ed Schmisser, Department of Agr. & Res.
Econ., Oregon State University, Corvallis,
Oregon 97330-3601

Model Output:

One-page management report narrative identifying management problems and their economic cost. Reorganization options are indicated as well.

Description:

Model uses annual dairy performance data as input and 1) identifies major management problems significantly impacting dairy farm profitability, 2) calculates associated economic losses attributed to management problems to provoke management action, and 3) issues specific management recommendations designed to eliminate management problems and/or improve dairy farm profitability.

References:

Schmisser, Ed, J. Pankrety and M. Gamroth, "Tillamook Dairy Farm Reorganization Study," final report of the MEAD Project, December 1991

Model Applications:

Farm operations analysis.

Proprietary Information:

Use of DXMAS requires familiarity with M.1 requirements and Quatro or 1-2-3. There is no cost and technical support is informal. The contact person is Ed Schmisser, Department of Agr. & Res. Econ. Oregon State University, Corvallis, Oregon 97331-3601; phone, 503-737-2942; fax, 503-737-2563.

Computer Information:

DXMAS is written in a prolog-like language in M.1 by Cimflex Teknowledge. It runs in an interactive mode on a microcomputer in an DOS system and requires 512K RAM. Either Lotus 1-2-3 or Quatro is required.

User Data Requirements:

Farm and enterprise production and cost data available from Dairy Herd Improvement Association and accounting records

Model:NC Dairy Farm Model

Model Builder(s):

Kevin Jack, Department of Agricultural Economics, Cornell University, Ithaca, N.Y. 14853

Description:

Linear programming model of Central Piedmont, North Carolina dairy farm. Measures tradeoffs between dairying and competing enterprises using prices and costs typical of the mid-1980s.

Model Applications:

Federal Milk Marketing Order (farm level inputs of: multiple component pricing, price differentials, multiple base pricing, reconstituted milk, seasonal-base plans, deregulation). Price support issues (farm level impacts of two-tier pricing, Class IV plans, deficiency payment program, mandatory and voluntary supply control, deregulation). Other issues (farm operations analysis).

Computer Information:

The NC Dairy Farm Model runs on a mainframe or on a microcomputer on an DOS system using a batch mode. The LP88 software is necessary to run the model on a microcomputer.

User Data Requirements:

Prices, costs, tech. coefficients, and list of potential enterprises all readily modified.

Model Output:

Optimizes enterprise considerations for representative farm.

References:

Competitive Position of Milk Production in the North Carolina Piedmont. Agr. and Resource Econ. Res. Report No. 54, North Carolina State University, Raleigh, North Carolina 27695-8109

Proprietary Information:

Quite a bit of technical support is necessary since the model is region specific. Production activities would need to be modified, but the model structure and logic would be useful to anyone constructing a farm level LP model. The model is available free of charge. The contact person is Kevin Jack, Department of Agricultural Economics, Cornell University, Ithaca, NY 14853-7801; phone, 607 255-8400; fax, 607-255-9984.

Model:

Dairy Waste Budget,
Composting Budget,
Dehydration Budget

Model Builder(s):

Ron Lacewell and Robert Schwart,
Department of Agricultural Economics,
Texas A&M University, College Station,
TX 77843

Model Output:

Budget screens.

References:

There will be a user's manual in the near future.

Description:

Lotus 1-2-3 based dairy waste system budgeting template, a composting waste, and a dehydrating waste system budget. Each template allows user to input size parameters, climate conditions, and materials costs. Budgets calculate total annual costs of constructing and maintaining waste system.

Proprietary Information:

These models are available for \$25.00 through Texas Cooperative Extension. Knowing Lotus is a requirement for using the programs. Support will be through the user reading the manual. The contact person is Robert Schwart, Department of Agricultural Economics, Texas A&M University, College Station, Texas 77843-2124; phone, 409-845-5284; fax 409-845-4261.

Model Applications:

Farm management.

Computer Information:

These programs are written in Lotus and run on a microcomputer on an DOS system. Disk storage requirement is 360K. The programs will run on Apples in *unbaled* Excel only.

User Data Requirements:

Size parameters, climate conditions and materials costs.

Model:FLIPSIM

Model Builder(s):

James Richardson and Clair Nixon,
Department of Agricultural Economics,
Texas A&M University, College Station,
TX 77840

Description:

FLIPSIM -- Farm Level Income and Policy Simulator. Provides a concise method of quantifying the economic impacts of changes in farm programs, feed costs, management strategies and macro variables on a representative dairy farm.

Model Applications:

Federal Milk Marketing Order issues (multiple component pricing, price differentials, multiple base pricing, reconstituted milk, shipping provisions, seasonal/base pricing plans, federal order mergers, deregulation). Price support issues (two-tier pricing, Class IV plans, target price-deficiency payment programs, voluntary supply control, mandatory supply control, generic dairy advertising, changing support price levels, deregulation). Other issues (farm operations analysis).

Computer Information:

FLIPSIM is written in FORTRAN and runs on a 386 or larger microcomputer on an DOS operating system in batch mode. The disk storage requirement is 30 mg.

User Data Requirements:

Projected annual values for milk price, feed prices, interest rates, inflation rates, milk per cow and farm program values. Also, needed are approximately 500 values to describe the farm from both a financial and production point of view.

Model Output:

Financial summary of a dairy farm over a finite planning horizon: income statement, cash flow, balance sheet, and financial ratios. Probability distributions for each of 100 output variables are developed.

References:

Richardson, J.W. and C.J. Nixon.
Description of FLIPSIM V: A
General Farm Level Policy
Simulation Model, Texas Agricultural
Experiment Station, Bulletin B-1528,
1986.

Proprietary Information:

The model is not currently available to the public.

Model:Dairy Cow Purchase Price Analysis (DCPPA)

Model Builder(s):

Lawrence Falconer, James McGraun and Robert B. Schwart, Department of Agricultural Economics, Texas A&M University, College Station, TX 77843

Description:

The dairy cow purchase price analysis model helps a milk producer determine a feasible bid price for dairy cows. The calculated bid price is based on the expected net returns over the productive life of the cow in the herd.

Model Applications:

Farm operations analysis.

Computer Information:

DCPPA is written in Lotus 1-2-3, and runs on a microcomputer on an DOS system in interactive mode. Lotus software is needed, and the disk storage requirement is 360 K.

User Data Requirements:

Number of lactations, percent death loss, pounds of milk produced per lactation, sale price of cull animal, sale weight of cull animal, milk price, calf sale receipts, milk price, discount rate, marginal tax rate, and producer equity in original purchase of cow.

Model Output:

The DCPPA model presents calculated bid price, sensitivity analysis based on changes in input and output levels from a baseline scenario, along with the capability to examine alternative cow financing arrangements.

References:

Dairy Cow Purchase Price Analysis Manual.

Proprietary Information:

DCPPA is available for \$25.00 to Texas residents and \$35.00 to others. Technical support is available, but it is estimated that minimal support would be needed. Contact the Texas Agricultural Extension Service, Extension Computer Technology Group, College Station, Texas 77843-2468; phone, 409-845-3929.

Models Applicable for General Dairy Marketing Issues

Northeast Dairy Sector Simulator (NEDSS)

U.S. Dairy Sector Simulator (USDSS)

Dairy Marketing Margin Models

Milk Processing Cost Estimator

Dairy Coop Cost (DCC)

Milk Sales Projector

TEXMILK

VAR Dairy Policy Forecaster

Dairy Cooperative Operations Simulator

Coop-Elasticities

MILK.WK1

Model:

Northeast Dairy Sector Simulator (NEDSS)

Model Builder(s):

James Pratt and Andrew Novakovic,
Department of Agricultural Economics,
Cornell University, Ithaca, New York
14853-7801

Description:

NEDSS is a single-time-period, multi-commodity transshipment model that combines network flow and facilities location methods for the Northeast. NEDSS models three functional market levels: supply, processing, and consumption. Given spatially specific levels of milk supply and milk product consumption, raw milk assembly costs, finished product distribution costs, intermediate product transportation costs, and product processing costs, NEDSS finds optimal flows of milk and milk products as well as intermediate products between assembly points, processing points, and consumption points.

Model Applications:

Federal Milk Marketing Order issues (multiple component pricing, price differentials, multiple base pricing, reconstituted milk, shipping provisions, seasonal/base pricing plans, federal order mergers, deregulation). Other issues (plant location, milk assembly, milk distribution systems, operations analysis, international trade).

Computer Information:

NEDSS is written in FORTRAN and runs on either the IBM mainframe or the Cornell super computer. NEDSS uses the CMS and AIX operating system and requires OSL software to run. NEDSS is usually run in the batch mode. The amount of time required to learn NEDSS is extremely long-about six month.

User Data Requirements:

Spatially specific supply, consumption, and processing locations. Milk supply at individual supply points, product consumption at individual consumption points, processing capacities (if any) at processing locations. Transportation costs for raw milk, final products, and intermediate products. Processing costs (possibly location specific) for each product type.

Optimal flows of milk, final dairy products, and intermediate products such as 40% cream, skim, ice cream mix, etc. between spatially separate supply, processing, and final demand points, as well as optimal processing locations and quantities.

References:

Pratt, J., A. Novakovic, G. Elterich, D. Hahn, B. Smith, and G. Criner. "An Analysis of Spatial Organization of the Northeast Dairy Industry." Search: Agriculture No. 32, New York Agricultural Experiment Station, Cornell University, 1986.

Proprietary Information:

The model is not currently available to the public.

Model:

U.S. Dairy Sector Simulator (USDSS)

Model Builder(s):

James Pratt and Andrew Novakovic,
Department of Agricultural Economics,
Cornell University, Ithaca, New York
14853-7801

Description:

USDSS is a single-time period, multi-commodity transshipment model that combines net work flow and facilities location methods for the U.S. USDSS models three functional market levels: supply, processing, and consumption. Given spatially specific levels of milk supply and milk product consumption, raw milk assembly costs, finished product distribution costs, intermediate product transportation costs, and product processing costs, USDSS finds optimal flows of milk and milk products as well as intermediate products between assembly points, processing points, and consumption points.

Model Applications:

Federal Milk Marketing Order issues (multiple component pricing, price differentials, multiple base pricing, reconstituted milk, shipping provisions, seasonal/base pricing plans, federal order mergers, deregulation). Other issues (plant location, milk assembly, milk distribution systems, operations analysis, international trade).

Computer Information:

USDSS is written in FORTRAN and runs on either an IBM mainframe or the Cornell super computer. USDSS uses the CMS and AIX operating system and requires OSL software to run. USDSS is usually run in the batch mode. The amount of time required to learn USDSS is extremely long—about six months.

User Data Requirements:

Spatially specific supply, consumption, and processing locations. Milk supply at individual supply points, product consumption at individual consumption points, processing capacities (if any) at processing locations. Transportation costs for raw milk, final products, and intermediate products. Processing costs (possibly location specific) for each product type.

Model Output:

Optimal flows of milk, final dairy products, and intermediate products such as 40% cream, skim, ice cream mix, etc. between spatially separate supply, processing, and final demand points, as well as optimal processing locations and quantities.

References:

Pratt, J., M. Keniston, and A. Novakovic. "Geographic Price Relationships in the U.S. Fluid Milk Industry: A Mathematical Programming Analysis." Staff Paper 89-16, Department of Agricultural Economics, Cornell University, 1989.

Francis, W. Economic Behavior of a Local Dairy Market Under Federal Milk Market Order Regulation. M.S. Thesis, Department of Agricultural Economics, Cornell University, 1990.

Proprietary Information:

The model is not currently available to the public.

Model:Dairy Marketing Margin Models

Model Builder(s):

Charles Lyon, 1257 Fifield Place,
University of Minnesota, St. Paul, MN
55108 and Gary Thompson, Department of
Agricultural Economics, Building 23,
University of Arizona, Tucson, AZ 85721

Description:

The model(s) are alternative specifications of dairy industry marketing margins. The product considered is fluid whole milk. The problem we address is how aggregation of data (spatial and temporal) affects the choice of specification for fluid whole milk marketing margins.

Model Applications:

Federal Milk Marketing Order issues (price differentials at different levels of the marketing systems, across urban, regional and national geographic areas; marketing margins in regional areas or on a national basis). Other issues (milk distribution systems, margin analysis focuses on price differences between different levels of the distribution system).

Computer Information:

The models are written in a GAUSS statistical package and run on a microcomputer in an DOS system. LIMDEP and/or SHAZAM software is needed to run the model which operates in batch and interactive mode.

User Data Requirements:

Prices at retail level, prices at farm or coop level, quantities, input costs in marketing system.

The output answers the question of: Given a specific level of temporal and spatial aggregation, which econometric specification is preferable? There are four alternative models of marketing margin behavior to choose from. Actual output is hypothesis test statistics.

References:

None listed.

Proprietary Information:

The model is not currently available to the public.

Model:Milk Processing Cost Estimator

Model Builder(s):

Steven Jacobs, Assistant Scientist, 206 Winslow Hall, Department of Agricultural and Resource Economics, University of Maine, Orono, Maine 04469

Description:

The model estimates milk processing costs for a 400,000 gallon per week plant. Costs are based on actual values obtained for Maine. Design and construction cost data for the buildings and equipment are from a professional food processing engineer. The model takes inputs on various costs categories, such as equipment, labor and supplies, and calculates per unit processing costs for several different package sizes and types. This model was developed for the Maine Milk Commission in order to estimate theoretically lowest achievable processing costs.

Model Applications:

Federal Milk Marketing Order issues (price differentials). Other issues (operations analysis, forecasting/outlook).

Computer Information:

The Milk Processing Cost Estimator is written in Microsoft Excel and runs on a microcomputer in an DOS system under Windows. With some modification it may work on a MAC in Excel. The disk storage requirement is less than one megabyte, and the model operates in interactive mode.

User Data Requirements:

Costs of fixed and variable expenses are representative of a plant constructed and operated in Maine. Any of these costs can be modified. Several hundred input variables are required.

Model Output:

Generates per unit processing costs for milk products packaged in a variety of container sizes and types.

References:

Jacobs, S.L. and G.K. Criner. 1990. Milk Processing and Distribution Costs: The Maine Model. Maine Agricultural Experiment Station. Technical Bulletin 140, University of Maine, Orono, Maine.

Proprietary Information:

Cost of the Milk Processing Cost Estimator is \$50 for software and related documentation. Technical support is provided at \$50 per hour. Assuming a working knowledge of Microsoft Excel, technical support should be under five hours. The contact person is Steven Jacobs, University of Maine, 206 Winslow Hall, Orono, Maine 04469; phone, 207-581-3166; fax, 207 581-3207; E-Mail, RAR346@Maine.Maine.Edu.

Model:TEXMILK

Model Builder(s):

Oral Capps, Jr., Department of Agricultural Economics, Texas A&M University, College Station, Texas 77843

Description:

An econometric model of demand for whole, 1%, 2%, and skim milk in the Texas Milk Marketing Order. The model was developed to evaluate the effectiveness of generic advertising on the demand for fluid milk in Texas.

Model Applications:

Generic dairy advertising and consumer behavior.

Computer Information:

TEXMILK runs on microcomputers on an DOS operating system in both interactive and batch modes. Additional software needed are SAS and SHAZAM.

User Data Requirements:

Real price of fluid milk products, real income, real price index of nonalcoholic beverages, real television and radio advertising expenditures.

Model Output:

Consumption of fluid milk in the Texas Market Order.

References:

Capps, Oral Jr. and John D. Schmitz. "Effect of Generic Advertising on the Demand for Fluid Milk: The Case of the Texas Market Order," Southern Journal of Agricultural Economics, December 1991, pp. 131-140.

Proprietary Information:

TEXMILK is available at no charge. The contract person is Oral Capps, Jr., Department of Agricultural Economics, Texas A&M University, College Station, Texas 77843; phone, 409-845-8491; fax, 409-845-6378.

Model:VAR Dairy Policy Forecaster

Model Builder(s):

Anthony Crooks, USD/ACS, P.O. Box 96676, Washington, DC 20090

Model Output:

Regional equilibrium prices and quantities.

Description:

Regional vector auto regressive model to generate monthly forecasts of producer deliveries, M-W prices, Federal Milk Marketing Order Class I prices, Federal Milk Marketing Order cooperative prices, and Federal Milk Marketing Order blend prices under alternative Federal Milk Marketing Order policy scenarios.

References:

RATS manual -- source code is documented.

Model Applications:

Federal Milk Marketing Order issues (price differentials, multiple base pricing, reconstituted milk, shipping provisions, seasonal/base pricing plans, federal order mergers, deregulation). Price support issues (two-tier pricing, changing support price levels, deregulation). Other issues (forecasting/outlook).

Proprietary Information:

VAR Dairy Policy Forecaster is available for \$50.00. Technical support is available at \$50.00 per hour. Assuming an understanding of RATS, it is estimated that one-half day of outside technical support time would be needed to learn how to use the model. The contact person is Jerry Hammond, 1994 Buford Avenue, St. Paul, Minnesota 55108; phone, 612-625-4719; fax, 612-625-6245.

Computer Information:

VAR Dairy Policy Forecaster is written in RATS and runs on a microcomputer on an DOS system in batch mode. Disk storage requirement is minimal.

User Data Requirements:

Monthly data is inputted for Federal Milk Marketing Order deliveries of milk to handlers, MW - prices, Federal Milk Marketing Order Class I prices, announced Class I prices paid by coops in Federal Milk Marketing Order, announced Federal Milk Marketing Order blend prices and transportation costs.

Model:Dairy Cooperative Operations Simulator

Model Builder(s):

Anthony Crooks, USD/ACS, P.O. Box
96676, Washington, DC 20090

Description:

Incorporates elasticities generated from Coop-Elasticities model and price/quantity forecasts from VAR Dairy Policy Forecaster to simulate dairy cooperative operational/financial performance under alternative policy scenarios.

Model Applications:

Federal Milk Marketing Order issues (multiple component pricing, price differentials, multiple base pricing, reconstituted milk, shipping provisions, seasonal/base pricing plans, federal order mergers, deregulation). Price support issues (two-tier pricing, voluntary supply control, mandatory supply control). Other issues (operations analysis, commercial stock/inventory behavior, forecasting/outlook).

Computer Information:

Dairy Cooperative Operations Simulator is written in GAUSS and runs on a microcomputer in an DOS system in batch mode. Disk storage requirements are at nominal levels.

User Data Requirements:

Output supply and factor demand elasticities, factor prices, product prices, producer deliveries.

Model Output:

Dairy cooperative production (output) and financial performance statistics.

References:

GAUSS manual. Model is documented in source code.

Proprietary Information:

Dairy Cooperative Operations Simulator is available for \$50.00. Technical support is available upon request at \$50.00 per hour. Given an understanding of GAUSS and simulation dynamics, it is estimated that one-half day of technical support time would be necessary to learn how to use the model. The contact person is Jerry Hammond, 1994 Buford Avenue, St. Paul, Minnesota 55108; phone, 601-625-4719; fax, 612-625-6245.

Model:Coop-Elasticities

Model Builder(s):

Anthony Crooks, USD/ACS, P.O. Box
96676, Washington, DC 20090

Description:

Application of duality theory and flexible functional forms in a multiproduct/multifactor framework to estimate elasticities of output supply and factor demands for dairy cooperatives in the United States.

Model Applications:

Price support issues (target price-deficiency payment programs, changing support price levels). Other issues (operations analysis, commercial stock/inventory behavior).

Computer Information:

Coop-Elasticities is written in GAUSS and runs on a microcomputer on an DOS system in batch mode. Disk storage requirements are nominal.

User Data Requirements:

None listed.

Model Output:

Output supply elasticities and factor demand elasticities for the following dairy cooperative products -- milk, cheese, butter and nonfat dry milk powder by factors -- raw milk, wages, capital.

References:

GAUSS manual. Documentation is provided in the program code.

Proprietary Information:

Coop-Elasticities is available for \$50.00. Upon purchase technical support is available at \$50.00 per hour. A one-half day learning time is estimated. The contact person is Jerry Hammond, 1994 Buford Avenue, St. Paul, Minnesota 55108; phone, 601-625-4719; fax, 612-625-6245.

Model:MILK.WK1

Model Builder(s):

Duane Griffita and Richard McConnen,
Montana State University

User Data Requirements:

Class I prices, margins.

Description:

The model estimates the impact on various sectors of the milk industry, and consumers, of proposed price changes by Montana's Milk Control Board.

Model Output:

Changes in gross revenues on various sectors of the milk production and distribution system and impact on consumers.

Model Applications:

Montana Milk Control Board policy analysis.

References:

None. Developed solely for the use of Montana Milk Control Board members.

Computer Information:

The model is written in Lotus 1-2-3 v 2.x and runs on a microcomputer on an DOS operating system in an interactive mode. The disk storage requirement is 150K.

Proprietary Information:

The model is not currently available to the public.

Models Applicable for International Dairy Trade Issues

GERDAIRY

FAPRI's International Dairy and Livestock Model

U.S. Dairy Import Quota Simulator

Model:GERDAIRY

Model Builder(s):

Jorge Fernandez-Cornejo, ERS, USDA,
1301 New York Ave, Rm 424,
Washington, DC 20005

Description:

The model, using a dynamic dual cost minimization framework, estimates various measures describing the production structure of German dairy farms. These measures include input price elasticities, adjustment rates of quasi-fixed factors and economics of scope.

Model Applications:

International trade, production structure analysis of dairy farms, farm operations analysis.

Computer Information:

GERDAIRY is written in SAS/ETS and SAS/IML and runs on a mainframe in batch mode.

User Data Requirements:

Production/cost data at farm level;
input/output levels and prices.

Model Output:

Short run, long run input price elasticities;
adjustment rates of quasi-fixed factors;
shadow prices of quasi-fixed factors;
dynamic economies of scope and scale.

References:

Dynamic Production Structure of Multi-Product Firms, with an Empirical Application to German Agriculture -- Ph.D. dissertation (1990), University of Delaware.

Proprietary Information:

GERDAIRY requires about one week to learn how to use . Technical support is available from the University of Delaware. The contact person is G.J. Elterich, Department of Food and Resource Economics, Townsend Hall, University of Delaware, Newark, Delaware 19717; phone, 302-831-1316; fax, 302-831-3651.

Model:FAPRI's International Dairy and Livestock Model

Model Builder(s):

Staff of Food and Agricultural Policy Research Institute (FAPRI) at Iowa State University, Ames, Iowa. Primary responsibility: Patrick Westhoff, and K. Eswaramoorthy (Gandhi)

Description:

The FAPRI's International Dairy and Livestock Model is designed to analyze policy options and make projections for production, consumption, stocks, net trade, domestic prices and world prices for milk, butter, cheese and nonfat dry milk. The model uses annual country-level aggregate data. Trade is analyzed at world level. The model is run on Lotus 1-2-3 spreadsheet software.

Model Applications:

Price support issues (two-tier pricing, Class IV plans, target price-deficiency payment programs, voluntary supply control, mandatory supply control, generic dairy advertising, changing support price levels). Other issues (commercial stock/inventory behavior, forecasting/outlook, international trade).

Computer Information:

FAPRI's International Dairy and Livestock Model is run on a microcomputer on an DOS system using Lotus 1-2-3 in an interactive mode. The model can be stored on a diskette with a 1.4 megabyte capacity.

User Data Requirements:

All policy prices in each country -- milk quotas and tariffs information.

Model Output:

Determines production, consumption, stocks and net trade in butter, cheese, and nonfat dry milk for selected countries. World prices and some domestic prices for these products are also determined in the model.

References:

Under preparation.

Proprietary Information:

The model is not currently available to the public.

Model:U.S. Dairy Import Quota Simulator

Model Builder(s):

Steve Neff, ERS/CED, Room 840B, 1301 New York Avenue, N.W., Washington, D.C. 20005-4788

Model Output:

Equilibrium prices and quantities at some market level, net CCC purchases, consumer and producer surplus.

Description:

Purpose: evaluate effects of removing U.S. import quotas on dairy products and sugar. Description: comparative static, synthetic, long-run, multi-commodity, 1982-87 average is base.

References:

None listed.

Model Applications:

Price support issues (target price-deficiency payment programs, deregulation). Other issues (international trade).

Proprietary Information:

The model is available at no cost; however a 3.5" diskette is requested. The contact person is Steve Neff, ERS/CED, Room 840B, 1301 New York Avenue, N.W., Washington, D.C. 20005-4788; phone, 202-219-0710; fax, 202-219-0356.

Computer Information:

This model runs on a microcomputer on an DOS system using JAVELIN and Lotus 1-2-3 .

User Data Requirements:

Support prices.

Comparison of Dairy Models by Selected Characteristics

The following tables show selected characteristics for the dairy models previously listed. The intent is to facilitate comparing and contrasting the models by a number of characteristics. The dairy models listed in Table 1 are available to the public, while those shown in Table 2 are currently not available.

Table 1-A. Comparison of Characteristics Among the Dairy Models Available to the Public.¹

Model	Model Type	Principal Application(s)	User Friendly Scale (1-5) ²	Market Aggregation Level	Time Dimension	Milk Product Measurement	Milk Product Aggregation
DAIRY	Simulation	Federal order, price support program, farm operations analysis, supply control	1	Farm	Annual	Raw milk volume plus butterfat and nonfat levels	NA
Dairy Decisions	Simulation	Federal order, price support program, farm operations analysis	3	Farm	Annual	Raw milk	NA
DAIRYSIM	Econometric and simulation	Price support program, supply control, other policies, forecasting	1	National	Quarterly	Milkfat equivalent	NA
National Economic Milk Policy Impact Simulator (NEMPIS)	Econometric and simulation	Federal order, price support, deregulation, other federal policies and alternatives	1	National	Annual	Milkfat equivalent	Class I, II and III
SWITCHREG	Econometric and simulation	Federal order, price support, deregulation, other federal policies and alternatives	4	National	Quarterly	Milkfat equivalent	Class I, II, and III

¹The entry "NA" means that it is not applicable, or that the information was not provided by the model builder.

² Scale interpretation: 1 = can learn how to use the model in less than one hour, 3 = can learn how to use model in less than one day, and 5 = more than two days to learn how to use model.

Table 1-A. (Continued)

Model	Model Type	Principal Application(s)	User Friendly Scale (1-5)	Market Aggregation Level	Time Dimension	Milk Product Measurement	Milk Product Aggregation
GERDAIRY	Econometric	International trade, production analysis	5	Farm	Annual	Raw milk	NA
OPTIREG	Econometric and simulation	Federal order, price support program,	5	Regional	Annual	Milkfat equivalent	Fluid and manufactured milk
Modified FLIPSIM V	Econometric and simulation	Price support program, supply control, operations analysis, farm financial performance	5	Farm	Annual	Milkfat equivalent	NA
Milk Processing Cost Estimator	Simulation	Federal order, operations analysis, forecasting	5	Plant	Annual	Product basis	Product basis
Adopt	Econometric	Supply control, deregulation	NA	Farm	Annual	Raw milk	NA
Dairy Expert Management Advisory System (DXMAS)	Expert system	Operations analysis	1	Farm	Annual	Raw milk	NA
Spatial Equilibrium for Dairy Industry	Optimization	Federal order, demand enhancement, deregulation, consumer behavior	3	Farm and regional	Annual	NA	Class I, II and III

Table 1-A. (Continued)

Model	Model Type	Principal Application(s)	User Friendly Scale (1-5)	Market Aggregation Level	Time Dimension	Milk Product Measurement	Milk Product Aggregation
NC Dairy Farm LP	Optimization	Federal order, price support program, farm operations analysis	5	Farm	Annual	NA	Class I, II and III
Milk Sales Projector	Simulation	Seasonal/base pricing plans, forecasting	1	Farm	Monthly and annual	Raw milk	NA
US Dairy Import Quota Simulator	Simulation	Deregulation, international trade	5	National	Static model	Product basis	Product basis
Dairy Waste Budget	Spreadsheet	Farm-level operations analysis	1	Farm	Annual	NA	NA
TEXMILK	Econometric	Generic dairy promotion program evaluation	3	Regional	Monthly	Product basis	Whole, 2%, 1%, and skim milk
Dairy Cow Purchase Price Analysis (DCPPA)	Simulation	Bid price for dairy cows	1	Farm	Annual	NA	NA
VAR Dairy Policy Forecaster	Econometric	Federal order, price support programs, two-tiered pricing, forecasting	3	Regional	Monthly	Milkfat equivalent	Class I, II and III

Table 1-A. (Continued)

Model	Model Type	Principal Application(s)	User Friendly Scale (1-5)	Market Aggregation Level	Time Dimension	Milk Product Measurement	Milk Product Aggregation
Dairy Cooperative Operations Simulator	Simulation	Federal order, price support programs, voluntary and mandatory supply control, operations analysis, forecasting	3	Plant and regional	Annual, monthly, weekly	Nonfat milk equivalent	Product basis
Coop-Elasticities	Econometrics	Target-price-deficiency payment program, price support program, operations analysis, commercial inventory behavior	3	Plant	Annual	Nonfat milk equivalent	Product basis

Table 1-B. Comparison of Characteristics Among the Dairy Models Available to the Public

Model	Mainframe or Micro-Computer	Additional Software Requirements	Is Model Available to Public?	Cost of Obtaining Model	Is Technical Support for Model Available?	Most Recent Update to Model	Is Model Compiled?	Is Source Code Available?
DAIRY	Micro-computer	None	Yes	\$50	Yes	1992	Yes	Yes
Dairy Decisions	Micro-computer	SuperCalc 5	Yes	\$489	Yes	1992	No	No
DAIRYSIM	Micro-computer	Basic	Yes	Free, if one provides diskette	Limited	NA	Yes	Yes
National Economic Milk Policy Impact Simulator (NEMPIS)	Micro-computer	None	Yes	Free, if one provides diskette	Limited	1992	Yes	Yes
SWITCHREG	Micro-computer	TSP-PC, or TSP386	Yes	Free, if one provides diskette	None	1988	No	NA
GERDAIRY	Mainframe	SAS/ETS and SAS/IML	Yes	NA	Yes	1990	NA	NA
OPTIREG	Mainframe	GAMS-MINOS	Yes	NA	Yes	NA	NA	NA

Table 1-B. (Continued)

Model	Mainframe or Micro-Computer	Additional Software Requirements	Is Model Available to Public?	Cost of Obtaining Model	Is Technical Support for Model Available?	Most Recent Update to Model	Is Model Compiled?	Is Source Code Available?
Modified FLIPSIM V	Mainframe	None	Yes	None	Yes	NA	Yes	Yes
Milk Processing Cost Estimator	Micro-computer	Microsoft Excel	Yes	\$50	Yes (\$50/hr.)	1990	No	No
Adopt	Micro-computer	GAUSS	Yes	None	No	NA	No	No
Dairy Expert Management Advisory System (DXMAS)	Micro-computer	M.1 by Cimflex Tecknowledge	Yes	None	Limited	1991	No	No
Dairy Market Policy Simulator (DAMPS)	Micro-computer	None	Yes	None	No	NA	Yes	Yes
Spatial Equilibrium for Dairy Industry	Micro-computer	None	Yes	None	No	NA	Yes	Yes
NC Dairy Farm LP	Both	LP88 or other LP software	Yes	Free	No	1989	No	No
Milk Sales Projector	Micro-computer	Lotus 1-2-3	Yes	\$10	Yes	1988	No	No

Table 1-B. (Continued)

Model	Mainframe or Micro-Computer	Additional Software Requirements	Is Model Available to Public?	Cost of Obtaining Model	Is Technical Support for Model Available?	Most Recent Update to Model	Is Model Compiled?	Is Source Code Available?
US Dairy Import Quota Simulator	Micro-computer	Javelin, Lotus 1-2-3	Yes	Free, if one provides diskette	No	NA	No	No
Dairy Waste Budget	Micro-computer	Unbaled Excel	Yes	\$25	No	NA	No	No
TEXMILK	Micro-computer	SAS, SHAZAM	Yes	NA	NA	1991	No	No
Dairy Cow Purchase Price Analysis (DCPPA)	Micro-computer	Lotus 1-2-3	Yes	\$25 (Texas residents); \$35 (others)	Yes	NA	No	No
VAR Dairy Policy Forecaster	Micro-computer	RATS	Yes	\$50	Yes (\$50/hr.)	1990	No	No
Dairy Cooperative Operations Simulator	Micro-computer	GAUSS	Yes	\$50	Yes (\$50/hr.)	1990	NA	NA
Coop-Elasticities	Micro-computer	GAUSS (C)	Yes	\$50	Yes (\$50/hr.)	1990	No	No

Table 2-A. Comparison of Characteristics Among the Dairy Models Not Available to the Public.¹

Model	Model Type	Principal Application(s)	User Friendly Scale (1-5) ²	Market Aggregation Level	Time Dimension	Milk Product Measurement	Milk Product Aggregation
Northeast Dairy Sector Simulator (NEDSS)	Optimization	Federal order, milk distribution systems, international trade	5	Plants located across Northeast	Single period static	Can measure products to match each analysis	Dissaggregate products to match each analysis
U.S. Dairy Sector Simulator (USDSS)	Optimization	Federal order, milk distribution systems, international trade	5	Plants located across U.S.	Single period static	Can measure products to match each analysis	Dissaggregate products to match each analysis
Nebraska Dairy Enterprise Records	Spreadsheet	Farm operations analysis	2	Farm	Annual or quarterly	Raw milk	NA
Dairy Marketing Margin Model	Econometric	Federal order, margin analysis	3	Regional and national	Quarterly and monthly	Fluid whole milk	Fluid milk
Vermont Dairy LP	Optimization	Federal order, supply control	5	Farm	Annual and monthly	Raw milk	NA
FAPRI's International Dairy and Livestock Model	Econometric and simulation	Price support program, supply control, demand enhancement, international trade, forecasting	5	National and international	Annual	Product basis	Fluid, butter, cheese, nonfat dry milk

¹The entry "NA" either means that it is not applicable, or that the information was not provided.

²Scale interpretation: 1 = can learn how to use the model in less than one hour, 3 = can learn how to use model in less than one day, and 5 = it takes more than two days to learn how to use model.

Table 2-A. (Continued)

Model	Model Type	Principal Application(s)	User Friendly Scale (1-5)	Market Aggregation Level	Time Dimension	Milk Product Measurement	Milk Product Aggregation
Spatial Equilibrium for Dairy Industry	Optimization	Federal order, deregulation, consumer behavior	3	Farm and regional	Annual	NA	Fluid and manufactured
Agricultural Sector Model (ASM)	Optimization	Price support program, international trade	5	Regional and national	Annual equilibrium	NA	Product basis
FLIPSIM	Simulation	Federal order, deregulation, price support program, policy alternatives, generic promotion	5	Farm	Annual	NA	NA
MILK.WK1	Simulation	Montana Milk Control Board inputs	5	State (Montana)	Multiple	NA	Class I, II, and III
Wisconsin Spatial Equilibrium Model	Optimization	Federal order, price support program, deregulation, voluntary and mandatory supply control	5	Regional	Annual	Fats and solids - non-fat	Product basis
Dairy Size Economies	Econometric	Farm operations analysis	NA	Farm	Annual	Total solids milk equivalent	NA
Political Economic Model of U.S. Dairy Support Price	Econometric	Price support program	3	National	Annual	Milkfat equivalent	Manufactured dairy product basis

Table 2-B. Comparison of Characteristics Among the Dairy Models Not Available to the Public.

Model	Mainframe or Micro-Computer	Additional Software Requirements	Is Model Available to Public?	Cost of Obtaining Model	Is Technical Support for Model Available?	Most Recent Update to Model	Is Model Compiled?	Is Source Code Available?
Northeast Dairy Sector Simulator (NEDSS)	Mainframe	OSL	No	Cannot obtain model	No	1985	NA	NA
U.S. Dairy Sector Simulator (USDSS)	Mainframe	OSL	No	Cannot obtain model	No	1990	NA	NA
Nebraska Dairy Enterprise Records	Micro-computer	Lotus version 2.2	NA	NA	NA	1992	NA	NA
Dairy Marketing Margin Model	Micro-computer	GAUSS statistical package	Not currently	NA	NA	NA	NA	NA
Vermont Dairy LP	Mainframe	LINDO	Not currently	NA	NA	NA	NA	NA
FAPRI's International Dairy and Livestock Model	Micro-computer	Lotus	No	NA	NA	NA	NA	NA

Table 2-B. (Continued)

Model	Mainframe or Micro-Computer	Additional Software Requirements	Is Model Available to Public?	Cost of Obtaining Model	Is Technical Support for Model Available?	Most Recent Update to Model	Is Model Compiled?	Is Source Code Available?
Dairy Coop Cost (DCC)	Mainframe	None	NA	NA	NA	NA	NA	NA
Spatial Equilibrium for Dairy Industry	Micro-computer	None	NA	NA	No	NA	Yes	Yes
Agricultural Sector Model (ASM)	Both	GAMS	NA	NA	NA	1991	NA	NA
FLIPSIM	Micro-computer	None	No	NA	NA	NA	Yes	No
MILK.WK1	Micro-computer	Lotus 1-2-3	No	NA	NA	NA	NA	NA
Wisconsin Spatial Equilibrium Model	Micro-computer	GAMS-MINOS	NA	NA	NA	NA	NA	NA
Dairy Size Economies	Micro-computer	Any Statistical Software	NA	NA	NA	NA	NA	NA
Political Economic Model of U.S. Dairy Support Price	Micro-computer	SHAZAM and Lotus 1-2-3 or Quatro	Not at this time	NA	NA	NA	NA	NA

4. Describe the output of the model (e.g., equilibrium prices and quantities at some market level, net CCC purchases, consumer and producer surplus, optimal plant location, minimum transportation costs of shipping milk in some region, etc.).

5. Which of the following best describes the level of aggregation in your model?
 - a. farm level
 - b. plant level
 - c. regional
 - d. national
 - e. international
 - f. other (please specify)

6. What is the time dimension of your output and data (if more than one applies, please list and explain)?
 - a. annual
 - b. quarterly
 - c. monthly
 - d. weekly
 - e. daily
 - f. other (please specify)

7. If your model is beyond the farm gate, how are milk products aggregated?
 - a. milkfat equivalent
 - b. nonfat milk equivalent
 - c. total solids milk equivalent
 - d. other (please specify)

8. How are products disaggregated in your model?
 - a. Class 1, 2, and 3
 - b. fluid, butter, ice cream, cheese, nonfat dry milk, etc.
 - c. other (please specify)

9. Please check any of the following applications for which the model could be used without having to modify it from its current form.

Federal Milk Marketing Order Issues:

- Multiple component pricing
- Price differentials
- Multiple base pricing
- Reconstituted milk
- Shipping provisions
- Seasonal/base pricing plans
- Federal order mergers
- Deregulation
- Other (please specify)

Price Support Issues:

- Two-tier pricing
- Class IV plans (two tier with second tier equal to world price)
- Target price-deficiency payment programs
- Voluntary supply control
- Mandatory supply control
- Demand enhancement (e.g., generic advertising)
- Changing support price levels
- Deregulation
- Other (please specify)

Other Issues:

- Plant location
- Milk assembly
- Milk distribution systems
- Operations analysis
- Commercial stock/inventory behavior
- Forecasting/outlook
- Consumer behavior
- International trade
- Other (please specify)

User Data Requirements

10. What type of data, if any, must the user provide as input to run the model (e.g., support prices, Class I prices, advertising expenditures, transportation costs, etc.)?

11. Is it possible for model input to be imported from other software such as spreadsheets, data bases, ASCII files, or other electronic sources?

If yes, list the type of electronic sources for which this is possible.

12. Does the model have the capability to easily export output into spreadsheets, word processing software, SAS, etc. for reporting?

If yes, list the type of electronic sources for which this is possible.

13. Please list, step by step, how to run the model.

Computer Requirements

14. What computer language, if any, is the model written in?
15. Does the model run on a mainframe or micro computer?
16. What type of operating system is required (e.g., IBM-DOS, IBM-OS/2, Apple, Apple MacIntosh)?
17. What type of environment is needed (e.g., Windows, CICS, Presentation Manager, X Windows)?
18. What are the disk storage requirements of the model?
19. What additional software is needed to run the model (e.g., Lotus, Excel, GAMS-Minos, SAS, SPSSX, other [please specify])?
20. Does the model operate in interactive or batch mode?

Proprietary Information

21. What is the name of the model (if there is no name, please give it one)?
22. What is the beginning and ending estimation set of data included in the model?
23. Reference any model documentation:

24. List the name and affiliation of the model builder(s):

25. May a potential user obtain the model?

If yes, complete 25a through 25f.

If no, you have finished the questionnaire

25a. Who is the primary person to contact to obtain the model?

Name:

Address:

Telephone:

FAX:

E-mail:

25b. What is the cost of obtaining the model (include technical support and update costs, if any)?

25c. Is technical support available?

25d. How much outside technical support time would be necessary to learn how to use the model?

25e. Is the model occasionally (i.e., not on a regular basis, but model isn't dormant) updated?

If yes,

Are the updates available?

What year will be the next update for the model?

25f. Is the model compiled?

If yes,

Is the source code available?

If yes,

What is required to re-compile the model (e.g., what programming language,

what libraries are needed, what version of compiler is needed)?

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