



Agricultural Marketing Service
U.S. DEPARTMENT OF AGRICULTURE

**U.S. Department of Agriculture
Report to Congress**

on the

**Dairy Promotion and
Research Program**

and the

**Fluid Milk
Processor Promotion Program**

2022 Activities

September 2024

Contact Information

Promotion, Research, and Planning Division
USDA, Agricultural Marketing Service, Dairy Program
Stop, 0233, Room 2542-South
1400 Independence Avenue, SW
Washington, DC 20250-0233
<http://www.ams.usda.gov/dairy>

Oral Capps, Jr., PhD
Executive Professor, Regents Professor and Co-Director of Agribusiness, Food and Consumer Economics Research Center
Texas A&M University
Department of Agricultural Economics
2124 TAMU
College Station, TX 77843
(979) 845-5911
Email: AFCERC@tamu.edu
<http://AFCERC.tamu.edu>

National Dairy Promotion and Research Board
Dairy Management Inc.
10255 West Higgins Road, Suite 900
Rosemont, IL 60018
(847) 803-2000
<http://www.usdairy.com>

National Fluid Milk Processor Promotion Board
1250 H Street NW, Suite 950
Washington, DC 20005
(202) 737-0153
<http://www.gonnaneedmilk.com>

In accordance with Federal civil rights law and U.S. Department of Agriculture (USDA) civil rights regulations and policies, the USDA, its Agencies, offices, and employees, and institutions participating in or administering the USDA programs are prohibited from discriminating based on race, color, national origin, region, sex, gender identity (including gender expression), sexual orientation, disability, age, marital status, family/paternal status, income derived from public assistance program, political beliefs, or reprisal or retaliation for prior civil rights activity, in any program or activity conducted or funded by USDA (not all bases apply to all programs). Remedies and complaint filing deadlines vary by program or incident.

Persons with disabilities who require alternative means of communication for program information (e.g., Braille, large print, audiotope, American Sign Language, etc.) should contact the responsible Agency or USDA's TARGET Center at (202) 720-2600 (voice and TTY) or contact USDA through the Federal Relay Service at (800) 877-8339. Additionally, program information may be made available in languages other than English.

To file a program discrimination complaint, complete the USDA Program Discrimination Complaint Form, AD-3027, found online at http://www.ascr.usda.gov/complaint_filing_cust.html and at any USDA office or write a letter addressed to USDA and provide in the letter all of the information requested in the form. To request a copy of the complaint form, call (866) 632-9992. Submit your completed form or letter to USDA by: (1) mail: U.S. Department of Agriculture Office of the Assistant Secretary for Civil Rights, 1400 Independence Avenue, SW, Washington, D.C. 20250-9410; (2) fax: (202) 690-7442; or (3) email: program.intake@usda.gov.

USDA is an equal opportunity provider, employer, and lender.

Mention of a trade name or brand name does not constitute endorsement or recommendation by USDA over other similar products not named.

Contents

Introduction.....	14
Background on the Promotion Programs.....	14
Objectives of the Evaluation Study.....	15
Summary of the Findings.....	15
DMI, MilkPEP, and QP Promotion Program Expenditures	17
Trends in Dairy Use	26
Findings Concerning Impacts of Promotion Expenditures on the Dairy Industry.....	31
Simulation Analysis of the Market Effects of Dairy Promotion.....	34
Concluding Remarks.....	41
Principal Investigator, Institution, Project Title, and Status.....	55
Approved Product Competitive Research Projects, 2022	58
Principal Investigator, Institution, Project Title, and Status.....	58
Alirez Abbaspourrad, PhD (Cornell University): <i>Conversion of lactose to surfactants [ongoing 2022]; Improvement of lactoferrin thermal stability and functionality by complex coacervation and microencapsulation methods [ongoing 2022]; Isolation and encapsulation of tryptophan to improve stability and reduce bitterness [ongoing 2022]; Modifying butter spreadability using microbubbles generation and controlling fat crystallization [ongoing 2022]; Mitigating the astringency of whey protein through complexation and encapsulation techniques [commenced 2022].</i>	58
Jayendra K. Amamcharla, PhD (Kansas State University): <i>Development, characterization, and evaluation of modified milk protein concentrate with enhanced functional properties [ongoing 2022]; Tailoring protein interactions to influence functional properties of milk protein concentrate powders [ongoing 2022]; Development and validation of a simple and rapid water adsorption kinetics-based approach to measure solubility of dairy powders [ongoing 2022]; Functional enhancement of milk protein concentrates with aggregated whey proteins for controlling viscosity in high protein fermented products[commenced 2022].</i>	58
Haotian Zheng, PhD (North Carolina State University): <i>Predicting heat stability of nonfat dry milk in the application of reconstituted UHT milk using spectroscopic techniques as a rapid method [ongoing 2022]; Soft matter strategy for creating novel food texturizer: replacement of starch by using whey protein aggregates and the aggregates stabilized o/w Pickering emulsion droplets [ongoing 2022]; Scalable and cost-effective liquid shear-driven fabrication of nano fibers of whey protein assemblies [commenced 2022]; Establishing database of interfacial properties for US milk powders: interfacial characteristics as indicator of powder quality and functionality [commenced 2022].</i>	60
Principal Investigator, Institution, Project Title, and Status.....	62

Executive Summary

The enabling legislation of the dairy producer, dairy importer, and fluid milk processor promotion programs requires the U.S. Department of Agriculture (USDA) to submit an annual report to the House Committee on Agriculture and the Senate Committee on Agriculture, Nutrition, and Forestry. The dairy and fluid milk promotion programs are conducted under the Dairy Production Stabilization Act of 1983 (7 U.S.C. 4501 *et seq.*) (Dairy Act); the Dairy Promotion and Research Order (7 CFR § 1150) (Dairy Order); the Fluid Milk Promotion Act of 1990 (7 U.S.C. 6401 *et seq.*) (Fluid Milk Act); and the Fluid Milk Promotion Order (7 CFR § 1160) (Fluid Milk Order), respectively. This report includes summaries of the activities for the dairy and fluid milk programs, including an accounting of funds collected and spent, USDA activities, and an independent analysis of the effectiveness of the programs. Unless otherwise noted, this report addresses program activities for January 1 through December 31, 2022, of the Dairy Promotion and Research Program and the Fluid Milk Processor Promotion Program.

Dairy Promotion and Research Program

Mandatory assessments collected under the Dairy Act totaled \$352.1 million in 2022. The Dairy

Board portion of assessments totaled \$124.3 million, and the Qualified Dairy Product Promotion, Research, or Nutrition Education Programs (QPs) totaled \$227.8 million. Expenditures by the Dairy Board and many of the QPs are integrated through a joint process of planning and program implementation to work together on the national, regional, State, and local level. The Dairy Board continued to develop and implement programs to expand the consumption of dairy products by focusing on partnerships and innovation, product positioning with consumers, and innovations for dairy product consumption.

Details of the Dairy Board's activities are presented in Chapter 1. Details of the QPs' activities may be found in Chapter 4.

Fluid Milk Processor Promotion Program

Mandatory assessments collected under the Fluid Milk Act totaled \$79.7 million in 2022. The Fluid Milk Processor Promotion Board (Fluid Milk Board) continued to administer a generic fluid milk promotion and consumer education program funded by America's fluid milk processors. The program is designed to educate Americans about the benefits of fluid milk, increase milk consumption, and maintain and expand markets and uses for fluid milk products in the contiguous 48 States and the District of Columbia.

The Fluid Milk Order requires the Fluid Milk Board to return 80 percent of the funds received from California fluid milk processors to the California Milk Processor Board. Per the Fluid Milk Order requirement, \$6.7 million was returned to the California Milk Processor Board. The activities of the Fluid Milk Processor Promotion Program are presented in the Fluid Milk Board section in Chapter 1.

USDA Activities

USDA has oversight responsibility for the dairy and fluid milk promotion programs. The oversight objectives ensure the boards and QPs properly account for all program funds and administer the programs in accordance with the respective acts and orders and USDA guidelines and policies. USDA reviewed and approved all board budgets, contracts, and advertising materials. USDA employees attended all board and committee meetings, monitored all board activities, and were responsible for obtaining an independent evaluation of the programs. Additional USDA responsibilities included facilitating the nomination and appointment of board members, amending the orders, conducting referenda, assisting with noncompliance cases, and conducting periodic program management reviews. The boards reimbursed the U.S. Secretary of Agriculture (Secretary), as required by the acts, for all of USDA's costs of program oversight and for the independent analysis discussed in Chapter 3. Chapter 2 details USDA's oversight activities.

Independent Analysis

Chapter 3 describes the results of the independent econometric analysis, conducted by Texas

A&M University, on the effectiveness of the programs implemented by the Dairy Board and the Fluid Milk Board. The analysis indicates that the generic fluid milk marketing activities sponsored by the programs have mitigated the decline of fluid milk consumption.

In addition, Chapter 3 presents the combined effects of 2022 promotion activities on the consumption of fluid milk, cheese, butter, all dairy products, and dairy exports and includes the benefit-cost ratios (BCRs) for dairy producers, importers, and fluid milk processors. For every dollar invested in demand-enhancing activities, the BCRs for producers were as follows: (1) fluid milk - \$2.68; (2) cheese - \$3.87; (3) butter - \$17.73. The BCR for fluid milk processors attributed to fluid milk promotion activities is \$3.24.

Chapter 1

The Dairy and Fluid Milk Promotion Programs

The Dairy Board and the Fluid Milk Board continued to develop and implement programs to expand the human consumption of fluid milk and dairy products. This Chapter details the activities of each board.

1. National Dairy Promotion and Research Board

The mission of the Dairy Board is to coordinate a promotion and research program that maintains and expands domestic and foreign markets for fluid milk and dairy products. The Dairy Board is responsible for administering the Dairy Order, developing plans and programs, approving budgets, and monitoring the program results.

The Secretary appoints 37 members to the Dairy Board, 36 of whom are dairy producers, each representing 1 of 12 geographic regions within the United States, and 1 representing dairy importers. The appointments are made from nominations submitted by individual applicants,

producer organizations, importer organizations, general farm organizations, and QPs. Dairy Board members must be active dairy producers or dairy importers. Members serve staggered 3-year terms, with no member serving more than two consecutive terms.

Total Dairy Board income and expenses are provided in the annual independent audit report. The 2022 audit report can be found at: <https://www.usdairy.com/getattachment/b2ad8298-5e47-405e-b496-14628050fabb/National-Dairy-Board-22-21-FINAL.pdf?lang=en-US&ext=.pdf>. The Dairy Board's administrative budget continued to be within the 5-percent-of-revenue limitation required by the Dairy Order.

The Dairy Board has two standing committees: the Finance Committee and the Executive Committee. The Finance Committee consists of the Dairy Board officers and appointees named by the Dairy Board Chair. The Dairy Board Treasurer chairs the Finance Committee. The full Dairy Board serves as the Executive Committee. The other Dairy Board committees are joint program committees with the United Dairy Industry Association (UDIA).

Dairy Management Inc. (DMI), a management and staffing corporation, is a joint undertaking between the Dairy Board and UDIA. UDIA is a federation of 16 of the 63 QPs under the direction of a board of directors. The mission of DMI is to drive increased sales of and demand for dairy products and ingredients on behalf of dairy producers and dairy importers. DMI works proactively, in partnership with leaders and innovators, to increase and leverage opportunities to expand dairy markets. The DMI Board of Directors comprises all Dairy Board (37) and all UDIA (41) members. Voting is equalized between the Dairy Board and UDIA.

DMI serves the Dairy Board and the UDIA Board and facilitates the integration of promotion funds through a joint process of planning and program implementation so that the programs on the national, regional, State, and local level work together. The Dairy Board and UDIA Board must separately approve the DMI budget and annual plan before these plans can be implemented. During 2022, DMI continued to implement a national staffing structure to plan and execute the national programs.

DMI funds 1- to 3-year research projects supporting marketing efforts. Six Dairy Foods Research Centers and one Nutrition Institute provided much of the research in 2022. The mission of the research centers is to conduct research, educate professionals, transfer knowledge to the industry, and create dairy products and ingredients with improved health, safety, quality, and functionality. Universities and other industry researchers throughout the United States competed for these research contracts. Additional information can be found at <https://www.usdairy.com/research-resources/dairy-foods-research-centers>.

The joint Dairy Board and UDIA Board committee structure provides the framework for DMI program activities. The Dairy Board and UDIA Board Chairs assign their respective board members to the following five joint program committees: Position U.S. Dairy in a Global Food System; Accelerate Incremental Sales Growth; Build Trust in Youth and the Conflicted Health Seeker; Farmer and Community Relations; and Exports. Each committee elects a chair and vice-chair. The DMI Board and joint committees set program priorities, plan activities and projects, and evaluate results. During 2022, the Dairy Board and UDIA Board met jointly six times both

in person and virtually.

For more information on the Dairy Board and UDIA Board activities and initiatives implemented in 2022, see the DMI annual report at <https://www.usdairy.com/getattachment/1d546d00-c2c7-4ba1-b57a-ab17c6e4e155/2022-DMI-Annual-Report-FINAL.pdf?lang=en-US&ext=.pdf>.

II. National Fluid Milk Processor Promotion Board

The Fluid Milk Board, as authorized in the Fluid Milk Act, administers a fluid milk promotion and consumer education program funded by fluid milk processors. The program is designed to educate Americans about the benefits of fluid milk, increase milk consumption, and maintain and expand markets and uses for fluid milk products in the contiguous 48 States and the District of Columbia. The fluid milk marketing programs are research-based and message-focused for the purpose of positively changing the attitudes and purchase behavior of Americans regarding fluid milk.

The Secretary appoints 20 members to the Fluid Milk Board. Fifteen members are fluid milk processors who each represent a separate geographical region, and five are at-large members. Of the five at-large members, at least three must be fluid milk processors and at least one must be from the general public. The members of the Fluid Milk Board serve 3-year terms and are eligible to be appointed to two consecutive terms. The Fluid Milk Order provides that no company shall be represented on the Fluid Milk Board by more than three representatives. Fluid Milk Board members who fill vacancies with a term of 18 months or less may serve two additional 3-year terms. The Milk Processor Education Program (MilkPEP) carries out the activities of the Fluid Milk Board.

The Fluid Milk Board elects four officers: Chair, Vice-Chair, Secretary, and Treasurer. Fluid Milk Board members are assigned by the Chair to the Fluid Milk Board's program committees. The program committees are responsible for setting program priorities, planning activities and projects, and evaluating results. In addition, the Fluid Milk Board has a Finance Committee to review all program authorization requests for funding sufficiency as well as review the Fluid Milk Board's independent financial audit and the work of the board's accounting firm. The Fluid Milk Board met three times in 2022 to conduct board business.

Total Fluid Milk Board income and expenses are displayed in the annual independent financial audit: <https://s3.us-west-2.amazonaws.com/externalassets-p.milkpep-production.g43labs.net/2022+Nat'l+Fluid+Milk+Audit.pdf>. The Fluid Milk Board's administrative budget continued to be within the 5-percent-of-revenue limitation required by the Fluid Milk Order. For more information on the Fluid Milk Board activities and initiatives implemented in 2022, see the MilkPEP annual report at <https://s3.us-west-2.amazonaws.com/externalassets-p.milkpep-production.g43labs.net/MilkPEP+Annual+Report+2022>.

Chapter 2

USDA Activities

The USDA's Agricultural Marketing Service's (AMS) Dairy Program has oversight responsibilities for the Dairy Board and the Fluid Milk Board. AMS Dairy Program's oversight activities include reviewing and approving the Dairy and Fluid Milk Boards' budgets, contracts, investments, and marketing campaigns. Materials are monitored for conformance with provisions of the respective Acts and Orders, the U.S. Dietary Guidelines for Americans, in addition to other legislation. AMS Dairy Program also uses the "Guidelines for AMS Oversight of Commodity Research and Promotion Programs" to govern oversight and facilitate the application of legislative and regulatory provisions of the Acts and the Orders.

The AMS Dairy Program ensures that the collection, accounting, auditing, and expenditures of promotion funds are consistent with the enabling legislation and Orders; certifies Qualified Programs; and provides for the evaluation of the effectiveness of both promotion programs' advertising campaigns. The AMS Dairy Program assists the Boards in their assessment collection, compliance, and enforcement actions.

Other AMS Dairy Program responsibilities include facilitating the nomination and appointment process of board members, amending the Orders, conducting referenda, reviewing communications, and conducting periodic management reviews. AMS Dairy Program representatives attend full board and committee meetings and other meetings related to the programs.

Dairy Promotion and Research Program Oversight

Collections

The Dairy Act specifies that each person making payments to a producer for milk produced in the United States and purchased from the producer should, in the manner prescribed by the Order, collect an assessment based on the number of hundredweights of milk for commercial use handled for the account of the producer and remit the assessment to the Dairy Board. The current rate of assessment for dairy producers is 15 cents per hundredweight of milk for commercial use or the equivalent thereof, as determined by the Secretary. In addition, the rate of assessment for imported dairy products prescribed by the Order is 7.5 cents per hundredweight of milk for commercial use or the equivalent thereof, as determined by the Secretary.

Contracts

The Dairy Act and Dairy Order require contracts expending assessment funds be approved by the Secretary. During 2022, the AMS Dairy Program reviewed and approved 601 Dairy Board and DMI agreements, amendments, and annual plans. During 2022, DMI retained the certified public accounting firm of Ernst & Young to audit the records of the following contractors: Futerra Sustainability Communications Limited, River Global LLC, PIPA LLC, United Dairywomen of Arizona, and the University of Minnesota/ Midwest Dairy Foods Research Center. No material exceptions were found.

USDA Foreign Agricultural Service

The Secretary of Agriculture has delegated oversight responsibility for all foreign market development activities outside the United States to the USDA, Foreign Agricultural Service (FAS) (7 CFR 2.43(a)(24)). FAS reviews the U.S. Dairy Export Council (USDEC) foreign market development plan and related contracts. The AMS Dairy Program also reviews USDEC contracts to ensure conformance with the Dairy Act, Dairy Order, and established USDA policies. In 2022, the AMS Dairy Program reviewed and approved 102 USDEC agreements, amendments, and annual plans.

Organic Exemption

On December 31, 2015, a final rule was published, with an effective date of February 29, 2016, to amend the organic exemption regulations to allow persons that produce, handle, market, process, manufacture, feed, or import “organic” and “100 percent organic” products to be exempt from paying assessments associated with commodity promotion programs administered by AMS,

regardless of whether the person requesting the exemption also produces nonorganic products (80 FR 82005, published December 31, 2015). In States having mandatory assessment laws, organic dairy producers are exempt only from the Federal assessment. Organic producers are still responsible for remittance of State assessments. In 2022, exempted assessments totaled \$1,688,155. The Dairy Order requires organic producers to reapply annually to continue to receive the exemption.

USDA Dairy Promotion and Research Program Expenses

Per the Dairy Board's enabling legislation, the Dairy Board reimburses the AMS Dairy Program for the cost of administrative oversight and compliance audit activities. In 2022, the AMS Dairy Program's oversight expenses totaled \$687,546, and the Federal Milk Market Administrators incurred \$183,707 in expenses for verification audits conducted on behalf of the Dairy Board.

Qualified Programs

Qualified Programs are State, regional, or importer organizations conducting dairy product promotion, research, or nutrition education programs, authorized by Federal or State law, or were active programs prior to the Dairy Act. In 2022, the AMS Dairy Program reviewed applications for continued qualification from 63 Qualified Programs. A list of Qualified Programs is provided in Chapter 4. Consistent with its responsibility for monitoring the Qualified Programs, the AMS Dairy Program obtained and reviewed income and expenditure data from each Qualified Program, and data reported are included in aggregate for 2022 in Chapter 4.

National Fluid Milk Processor Promotion Board Oversight

Program Development

The Fluid Milk Board contracted with Gale Partners, LLC, to develop programs for advertising, promotion, and consumer education in connection with the national fluid milk campaign.

Collections

The Fluid Milk Act specifies that each fluid milk processor shall pay an assessment on each unit of fluid milk product processed and marketed commercially in consumer-type packages. The current rate of assessment is 20 cents per hundredweight of fluid milk products marketed.

Contracts

The Fluid Milk Act and Fluid Milk Order require budgets and contracts expending assessments be approved by the Secretary. During 2022, the AMS Dairy Program approved 129 Fluid Milk Board agreements, amendments, and annual plans. The Fluid Milk Board retained the certified public accounting firm of Snyder Cohn, PC, in 2022 to audit the records of Gale Partners LLC, New York. No material exceptions were found.

Organic Exemption

On December 31, 2015, a final rule was published, with an effective date of February 29, 2016, amending the organic exemption regulations to allow persons that produce, handle, market, process, manufacture, feed, or import “organic” and “100 percent organic” products to be exempt from paying assessments associated with commodity promotion programs administered by AMS, regardless of whether the person requesting the exemption also produces nonorganic products (80 FR 82005, published December 31, 2015). In 2022, the amount of exempted fluid milk assessments was approximately \$2,939,303. The Fluid Order requires organic fluid milk processors to reapply annually to continue to receive the exemption.

USDA Fluid Milk Processor Promotion Program Expenses

Per the Fluid Milk Act, the Fluid Milk Board reimburses the AMS Dairy Program for the cost of administrative oversight and compliance audit activities. In 2022, the AMS Dairy Program’s oversight expenses totaled \$441,446 and the Federal Milk Market Administrators incurred \$121,728 in expenses for verification audits conducted on behalf of the Fluid Milk Board.

Chapter 3

Quantitative Evaluation of the Effectiveness of Promotion Activities by the National Dairy Promotion and Research Program and the National Fluid Milk Processor Promotion Program – 1995 to 2022

Introduction

The Dairy Act and the Fluid Milk Act require an annual independent analysis of the advertising and promotion programs that operate to increase consumer awareness and sales of fluid milk and dairy products. Dr. Oral Capps, Jr., Executive Professor and Regents Professor, Co-Director of the Agribusiness, Food, and Consumer Economics Research Center (AFCERC), and Holder of the Southwest Dairy Farmers Marketing Endowed Chair, Department of Economics, Texas A&M University, was awarded a competitive contract to conduct this study. This Chapter is a summary of the 2022 quantitative evaluation of the effectiveness of the dairy and fluid milk promotion programs.

Background on the Promotion Programs

The Dairy Research and Promotion Program, also known as the Dairy Checkoff Program, is a coordinated national research and promotion program intended to maintain and expand domestic and foreign markets for fluid milk and dairy products. To fund the program, U.S. dairy producers pay a 15-cent-per-hundredweight assessment on milk marketings, and importers pay a 7.5-cent-per-hundredweight assessment, or milk-equivalent thereof, on dairy products imported into the United States. Dairy Management Inc. (DMI), a management and staffing corporation, is a joint undertaking between the National Dairy Promotion and Research Board (Dairy Board) and the United Dairy Industry Association (UDIA). The UDIA is a federation of State and regional dairy-producer-funded promotion organizations referred to as Qualified Programs¹ (QPs). The UDIA operates under the direction of a board of directors of their member organizations. DMI's mission is to drive increased sales of, and demand for, dairy products and ingredients on behalf of dairy producers and dairy importers. DMI works proactively in partnership with leaders and innovators to increase and apply knowledge that leverages opportunities to expand dairy markets.

The Fluid Milk Processor Promotion Program, or Milk Processor Education Program (MilkPEP), develops and finances generic advertising programs designed to maintain and expand markets for fluid milk products produced in the United States. Fluid milk processors marketing more than three million pounds of fluid milk per month pay a 20-cent-per-hundredweight assessment on fluid milk processed and marketed in consumer-type packages in the contiguous 48 States and the District of Columbia.

¹ Qualified Dairy Product Promotion, Research or Nutrition Educational Programs (Qualified Programs or QPs) are State, regional, local, or importer promotion programs certified annually by the Secretary of Agriculture to receive a portion of the funds generated under the Dairy Research and Promotion Program.

The Dairy Research and Promotion Program, funded by dairy producers and dairy importers, and the Fluid Milk Processor Promotion program, funded by fluid milk processors, are hereinafter referred to jointly as the National Programs.

Objectives of the Evaluation Study

The National Programs are evaluated with two key questions in mind: (1) Have the demand-enhancing activities conducted by dairy producers, importers, and fluid milk processors increased the demand for fluid milk and manufactured dairy products? (2) Did those who have paid for the promotions conducted benefit from them?

Historically, these questions have been answered through econometric studies of the relationships between the consumption of dairy products and promotion program demand-enhancing expenditures. These demand relationships are estimated econometrically, accounting for a plethora of impacts of key market forces. Economic returns to dairy producers, importers, and fluid milk processors that result from marketing and promotion activities and the associated changes in consumption are calculated using the parameters obtained from the estimated demand models. The summary indicator of economic return on investment is termed the benefit-cost-ratio (BCR).

The level of the BCR often is taken as an indication of the impact of any program. Due to diminishing marginal returns, the ratio between the incremental revenue generated and the level of funding (i.e., the BCR) declines as funding increases for promotion programs. Consequently, metrics other than the BCR, such as the level of impact on consumption, prices, and exports are also useful indicators of the impact and effectiveness of any checkoff program.

The objectives of this report are to:

1. Statistically measure the combined effects of the promotion activities of the National Programs on the consumption of fluid milk, cheese, butter, all dairy products, and dairy exports.
2. Provide a quantitative analysis of dairy product imports and import assessments.
3. Update the benefit-cost analysis associated with the National Programs for dairy producers, fluid milk processors, and importers.

This project covers the period of 1995 to 2022 and captures the joint efforts of DMI, MilkPEP, and QPs. On average, the shares of each promotion entity in the total demand-enhancing expenditures over this period are as follows: (1) DMI – 26.1 percent; (2) MilkPEP – 22.7 percent; and (3) QPs – 51.2 percent.

Summary of the Findings

The overall finding of this evaluation is that dairy promotion under the National Programs has effectively increased U.S. demand (domestic and exports) for dairy products. Per capita consumption of fluid milk, cheese, butter, and nonfat dry milk were higher by 8.6 percent, 3.8 percent, 3.2 percent, and 1.0 percent respectively. In particular, the downward trend of per capita

fluid milk consumption from 1995 and 2022 was mitigated to some extent by the promotional efforts of the National Programs. Exports of butter were lower by 17.7 percent, while exports of cheese were up by 4.3 percent over the same period because of the promotional programs. Exports of nonfat dry milk decreased by 3.4 percent over the period 1995 to 2022.

The returns from the programmatic activities of producers and to fluid milk processors are summarized with benefit-cost ratios (BCRs). The BCRs are based on the demand-enhancing expenditures only; therefore, they do not account for certain operating expenses such as administrative expenses, overhead, technical support, and industry relations. This procedure has been standard practice in all checkoff evaluations, not just those indigenous to dairy. Demand-enhancing expenditures accounted for roughly 93 percent of total DMI expenditures, 98 percent of total MilkPEP expenditures, and 85 percent of total QP expenditures. Therefore, most of the expenditures associated with the various programmatic activities are accounted for in this analysis.

Over the period from 1995 to 2022, the BCRs (expressed in terms of producer profit or net returns at the farm level) were calculated to be \$2.68 for every dollar invested in demand-enhancing activities for fluid milk; \$3.87 for every dollar invested in demand-enhancing activities for cheese; and \$17.73 for every dollar invested in demand-enhancing activities for butter. For other nonspecific or nondelineated promotion activities, the BCR was calculated to be \$8.38 for every dollar invested. Over the same period, the BCR of export promotion was \$8.63 per dollar invested. On a fat and skim solids basis, a significant positive relationship was evident between the demand for all dairy products and the advertising and promotion expenditures associated with the National Programs. The aggregate all-dairy BCR was 5.23, meaning that, on average, producer profit increased by \$5.23 for each dollar invested in demand-enhancing activities. These BCRs are net of the costs associated with the National Programs. Relative to the past three evaluations, wherein the BCRs were estimated to range from 4.30 to 5.07, the BCR for all dairy products currently exceeds these measures.

The returns-on-investment as measured by the BCR for all dairy products and cheese are larger than what was previously reported in the past three evaluations (i.e., the 2019, 2020, and 2021 Reports to Congress). The BCRs associated with fluid milk had declined steadily from 3.26 to 1.91 to 1.63. Now, the BCR associated with fluid milk is estimated to be 2.68. The BCRs associated with butter have declined monotonically from 24.40 to 17.73 over time. The BCRs associated with exports and other nonspecific dairy products declined slightly relative to the BCRs reported in the previous evaluation but are higher than those reported in 2019 and in 2020.

Importers of dairy products have paid assessments to the Dairy Research and Promotion Program since August 1, 2011. Import assessment funds totaled between \$3.44 million and \$4.76 million per year from 2012 to 2022, averaging \$4.05 million per year. The cumulative import assessment funds totaled \$45.60 million from August 2011 to December 2022. On a monthly basis, funds from the dairy import assessment ranged from \$210,086 to \$493,975, averaging \$335,318 over the period of August 2011 to December 2022. The import assessment averaged just under 1 percent of the total demand-enhancing expenditures made by DMI, MilkPEP, and the QPs between 2012 and 2022.

Imported cheese levels were higher by 1.65 million pounds over the period 2012–2022 due to promotion funds collected from importers. Unit values of cheese imports amounted to roughly \$3.30 per pound on average over the period between 2012 and 2022. Hence, incremental revenue to importers solely from cheese attributable to the import assessment (on cheese) totaled roughly \$5.46 million. These results are in alignment with those in the previous Report to Congress. The BCR associated with DMI spending was estimated to be 6.51, higher than the 5.23 return on investment for all dairy product promotion investments. The BCR for MilkPEP was estimated to be 2.58, very similar to the 2.68 return previously mentioned for all fluid milk promotional spending. In the three previous evaluations of National Programs, the BCR associated with DMI spending was calculated to be 6.43 based on data from 1995 to 2021, 5.43 based on data from 1995 to 2020, and 5.59 based on data from 1995 to 2019, while the BCR associated with MilkPEP spending was calculated to be 1.55 based on data from 1995 to 2021, 1.89 based on data from 1995 to 2020, and 3.28 based on data from 1995 to 2019.

The BCR of fluid milk at the processor level was estimated to be 3.24 over the period 1995 to 2022. In the previous evaluations of the effectiveness of the dairy checkoff, this BCR was estimated to be 2.84 based on data from 1995 to 2020 and 2.44 based on data from 1995 to 2021. The cost of milk was used as a proxy for the cost of production since data concerning the costs of production for fluid milk processors were not available. Initially, we calculated the added total value at the retail level of the marketing channel attributed to MilkPEP promotion. Then we calculated the added total value accruing at the farm level attributed to MilkPEP promotion. The difference is the added total value captured by market participants beyond the farm gate to the retail level. Over the period 1995 to 2022, this cumulative added value amounted to \$9.97 billion. Over the same period, the cumulative amount of MilkPEP promotion expenditures totaled \$2.35 billion. Hence, the BCR of fluid milk at the processor level was estimated to be 3.24 over this period.

Caution must be exercised in making comparisons from various Reports to Congress across years. The economic phrase/condition *ceteris paribus*, meaning all other factors invariant, does not hold. The underlying endogenous and exogenous variables provided by various government sources have been revised and updated, and four additional quarters of data are now available not only for these variables, but also for the data associated with the programmatic expenditures of the National Programs.

DMI, MilkPEP, and QP Promotion Program Expenditures

The expenditure data for this analysis were acquired from DMI, QPs, and MilkPEP. The demand-enhancing expenditures from all three entities were aggregated in the quantitative appraisal. The National Programs use advertising as well as other means to influence consumers. Advertising dollars are directed to media outlets including television, radio, outdoor, print, and internet ads. Marketing activities other than advertising are directed at the retail level of the marketing channel or at intermediaries. The nonadvertising marketing expenditures include health and nutrition education programs, public relations, food service and manufacturing programs, sales promotion programs, school milk programs, school marketing activities, retail programs, child nutrition and fitness initiatives, and single-serve milk promotion.

Certain promotion expenditures are not directed at the retail level of the marketing channel. These types of expenditures include crisis management, trade service communications, and

strategic research activities. Because their intent is to directly increase or support sales of dairy products, these expenditures are classified as demand-enhancing expenditures. As stated above in our introduction of the BCRs, overhead, technical support, industry relations, and administrative expenses are excluded from this analysis also because they are not primarily related to demand-enhancing efforts.

Over the years, the DMI Board of Directors changed their marketing strategies to focus more on partnerships within the dairy industry to increase demand for fluid milk, manufactured dairy products, and dairy ingredients. Currently, DMI's strategies include the following: (1) working with and through specific partners to achieve sustainable, category-level sales impacts; (2) attracting partner co-investments to fund demand-enhancing efforts; and (3) maximizing resources and impacts in increasingly competitive markets. These efforts include co-developing marketing information, research, business models, and best practices that can be used by the industry to increase sales of fluid milk and dairy products.

Annual promotion program expenditures made by DMI, MilkPEP, and QPs over the period 1995 to 2022 are depicted in Table 3-1 and in Figure 3-1. On average, roughly \$374 million was spent annually by the respective entities over this period, with spending since 2011 totaling between nearly \$390 million and \$434 million each year. Over the period 1995 to 2022, the shares of each promotion entity concerning total demand-enhancing expenditures on average were as follows: (1) DMI – 26.1 percent; (2) MilkPEP – 22.7 percent; and (3) QPs – 51.2 percent.

The data associated with the demand-enhancing activities initiated by DMI and MilkPEP are available on a quarterly basis. The QP expenditure data, however, are only available on an annual basis. To impute quarterly QPs programmatic expenditures, we mirror the seasonal nature of the DMI and MilkPEP programmatic expenditures. That is, we assume the QP programmatic expenditures to follow the same seasonal patterns as the DMI and MilkPEP programmatic expenditures data. Consequently, the seasonal factors associated with DMI and MilkPEP data are obtained and applied to the annual QP data to arrive at quarterly expenditures. The estimation of these data on a quarterly basis is important in allowing for sufficient observations to conduct the econometric analysis of demand for dairy products.

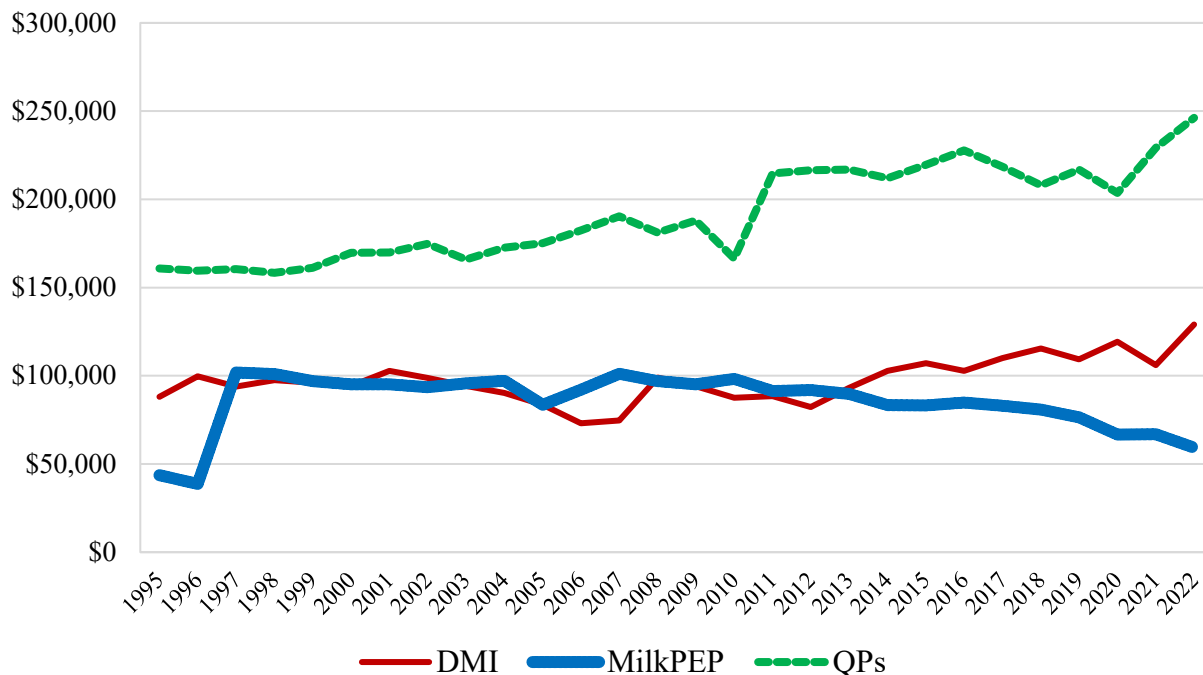
Table 3-1. Annual Dairy Management, Inc. (DMI), Milk Processor Education Program (MilkPEP), and Qualified Program (QP) Promotion Program Expenditures, 1995 to 2022¹

Year	DMI	MilkPEP	QPs	Total
1995	\$88,105	\$43,654	\$160,832	\$292,592
1996	\$99,674	\$38,690	\$159,600	\$297,964
1997	\$93,859	\$101,850	\$160,379	\$356,088
1998	\$97,570	\$100,901	\$158,348	\$356,819
1999	\$96,010	\$97,023	\$161,161	\$354,194
2000	\$94,260	\$95,158	\$169,654	\$359,072
2001	\$102,835	\$95,112	\$169,967	\$367,914
2002	\$98,752	\$93,511	\$174,857	\$367,120
2003	\$94,256	\$95,688	\$165,973	\$355,917
2004	\$90,171	\$97,167	\$172,667	\$360,005
2005	\$83,484	\$83,527	\$175,081	\$342,092
2006	\$73,067	\$92,029	\$182,443	\$347,539
2007	\$74,623	\$101,125	\$190,289	\$366,037
2008	\$99,051	\$97,003	\$181,092	\$377,146
2009	\$94,071	\$95,109	\$187,992	\$377,172
2010	\$87,512	\$98,316	\$166,459	\$352,287
2011	\$88,456	\$91,289	\$214,763	\$394,508
2012	\$82,360	\$91,893	\$216,484	\$390,736
2013	\$93,184	\$89,633	\$216,844	\$399,662
2014	\$102,728	\$83,426	\$211,919	\$398,074
2015	\$107,133	\$83,098	\$219,660	\$409,891
2016	\$102,712	\$84,858	\$227,834	\$415,404
2017	\$110,005	\$82,910	\$218,548	\$411,462
2018	\$115,442	\$80,817	\$207,903	\$404,163
2019	\$109,287	\$76,429	\$216,867	\$402,583
2020	\$119,340	\$66,712	\$203,544	\$389,595
2021	\$106,086	\$66,920	\$229,182	\$402,188
2022	\$129,059	\$59,228	\$246,198	\$434,485
Mean	\$97,611	\$85,110	\$191,662	\$374,382
Median	\$96,790	\$91,591	\$185,218	\$372,530
Std Dev	\$12,370	\$16,197	\$25,918	\$32,340
Min	\$73,067	\$38,690	\$158,348	\$292,592
Max	\$129,059	\$101,850	\$246,198	\$434,485

¹Thousands of dollars.

Source: Data from DMI, MilkPEP, and the U.S. Department of Agriculture.

Figure 3-1. Annual Dairy Management, Inc. (DMI), Milk Processor Education Program (MilkPEP), and Qualified Program (QP) Promotion Expenditures, 1995 to 2022



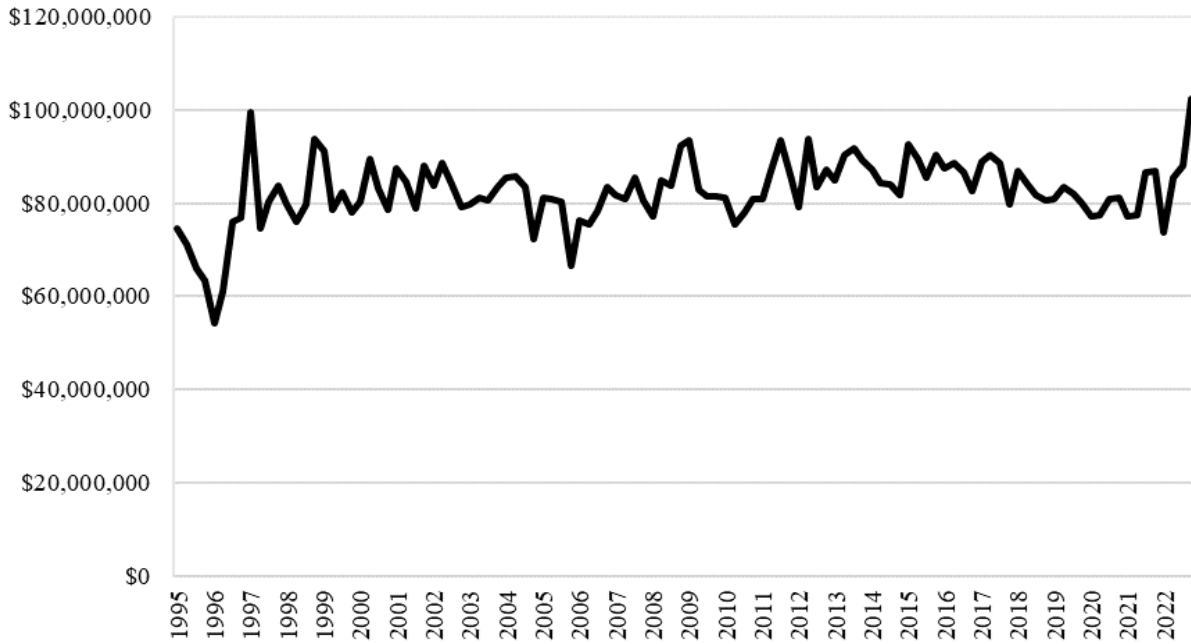
Source: DMI, MilkPEP, and the U.S. Department of Agriculture.

Nominal, seasonally adjusted demand-enhancing expenditures by DMI, MilkPEP, and QPs for all dairy products (fluid and manufacturing) combined on a quarterly basis from 1995 to 2022 are exhibited in Figure 3-2. These demand-enhancing expenditures varied from \$54.2 million to \$102.2 million per quarter, averaging \$82.4 million over the period of analysis.

Nominal, seasonally adjusted demand-enhancing expenditures for fluid milk from DMI, MilkPEP, and QPs on a quarterly basis from 1995 to 2022 are exhibited in Figure 3-3. Over that period, nominal, seasonally adjusted quarterly promotion program expenditures for fluid milk ranged from roughly \$13.4 million to \$63.3 million per quarter. On average over the same period, nominal, seasonally adjusted demand-enhancing expenditures for fluid milk were \$32.4 million per quarter.

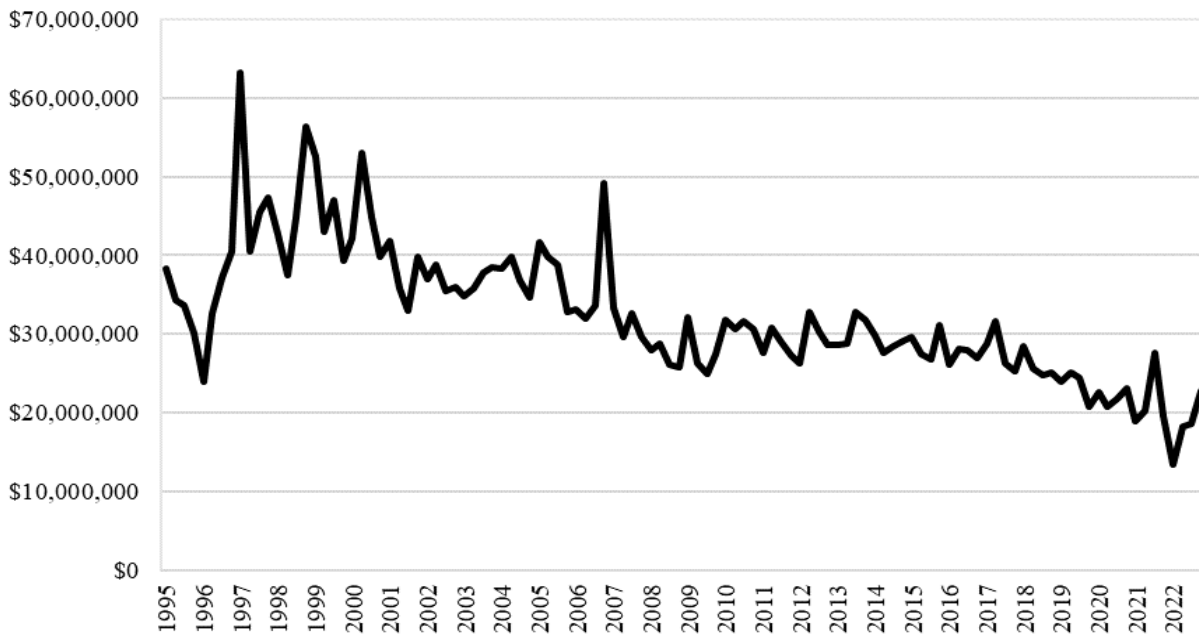
As exhibited in Figure 3-4, over the period 1995 to 2022, nominal, seasonally adjusted demand-enhancing expenditures for cheese averaged \$15.2 million per quarter, ranging from \$8.0 million to \$27.7 million. Nominal, seasonally adjusted demand-enhancing expenditures for cheese ranged from \$12.8 million to \$27.7 million between 1995 and 2004, averaging \$21.8 million per quarter. From 2005 to the third quarter of 2008, promotion expenditures associated with cheese were much smaller compared to the period of 1995 to 2004. On average, expenditures on cheese marketing and promotion were \$12.0 million during this period. From the fourth quarter of 2008 through the end of 2022, nominal quarterly expenditures on cheese marketing and promotion activities ranged from \$8.0 million to \$17.1 million, averaging \$11.4 million per quarter.

Figure 3-1. Quarterly All Dairy Product Promotion Expenditures (Nominal, Seasonally Adjusted) by (Dairy Management, Inc. (DMI), Milk Processor Education Program (MilkPEP), and Qualified Programs (QP), 1995 to 2022*



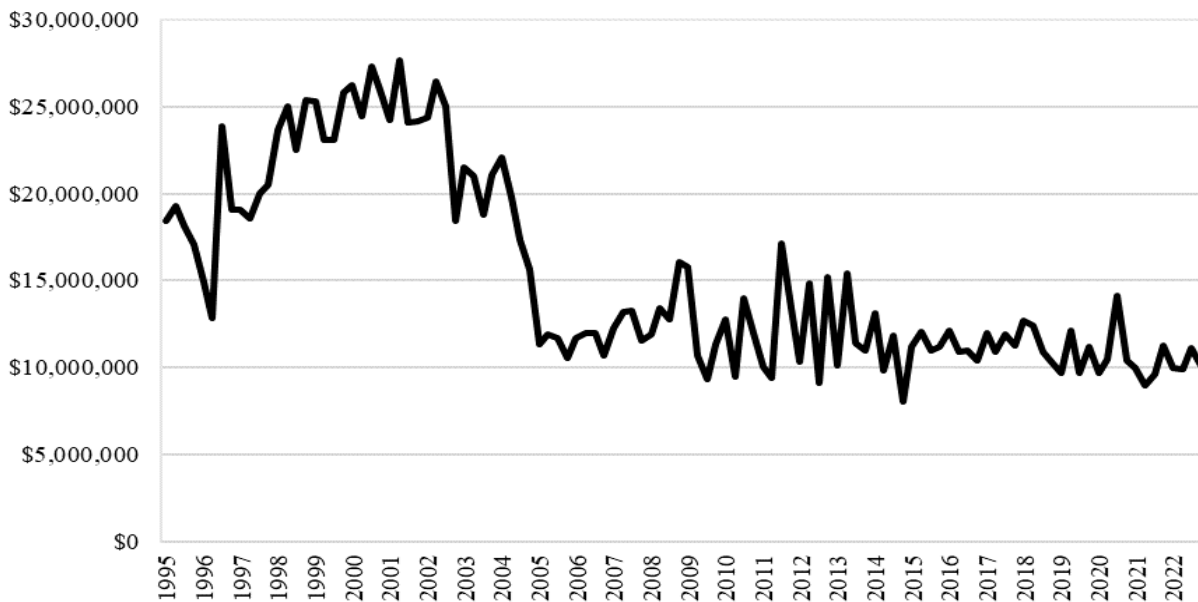
*Includes expenditures for advertising, promotion, dairy foods and nutrition research, nutrition education, and market and economic research. Source: DMI, MilkPEP, QPs, and calculations by the authors.

Figure 3-3. Quarterly Fluid Milk Promotion Expenditures (Nominal, Seasonally Adjusted) by Dairy Management, Inc. (DMI), Milk Processor Education Program (MilkPEP), and Qualified Programs (QP), 1995 to 2022



Source: DMI, MilkPEP, QPs, and calculations by the authors.

Figure 3-2. Quarterly Cheese Promotion Expenditures (Nominal, Seasonally Adjusted) by Dairy Management, Inc. (DMI) and Qualified Programs (QP), 1995 to 2022



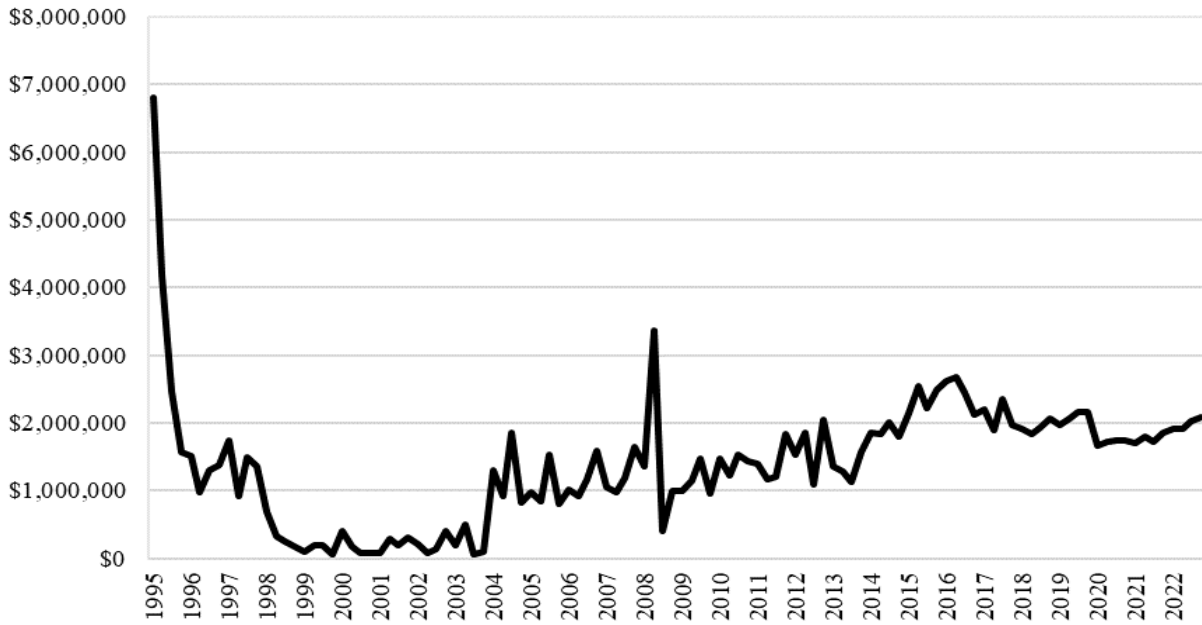
Source: DMI, QPs, and calculations by the authors.

As shown in Figure 3-5, nominal, seasonally adjusted demand-enhancing quarterly expenditures on marketing and promotion of butter ranged from close to \$60,000 to \$6.8 million, averaging slightly less than \$1.4 million per quarter over the period 1995 to 2022. Marketing and promotion expenditures for butter are a fraction of the expenditures for fluid milk and cheese.

Beginning in 2006, DMI transitioned from featuring milk, cheese, and butter in product-specific promotions to broader campaigns that relate to several dairy products. As a result of an increasing number of campaigns affecting multiple products, assessing demand enhancements for the aggregate of dairy products as well as within specific product classes is important. Programmatic expenditures include a pro-rata share of the expenditures for nonspecific promotion efforts.

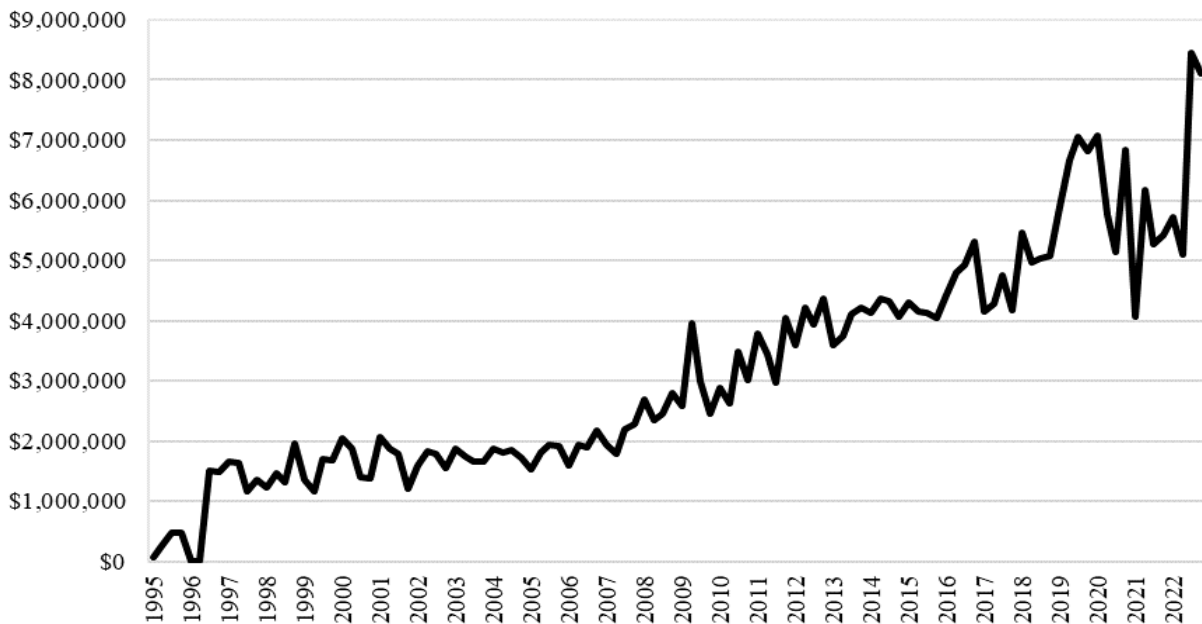
DMI also invests in dairy export promotion through the U.S. Dairy Export Council (USDEC). Nominal, seasonally adjusted DMI expenditures directed to dairy export promotion on a quarterly basis ranged from just under \$800 to approximately \$8.4 million (Figure 3-6a). DMI expenditures directed to dairy export promotion trended upward from 1995 to 2022, averaging nearly \$3.1 million per quarter over this period. Funding is also awarded through USDA’s Foreign Agricultural Service to promote dairy exports through the Foreign Market Development (FMD) Program and the Market Access Program (MAP). Under these programs, quarterly contributions to dairy export promotion (nominal, seasonally adjusted) by USDEC varied from just under \$310,000 to about \$2.5 million, averaging nearly \$1.2 million per quarter over the period of 1997 to 2022 (Figure 3-6b). The aggregate of DMI and FMD/MAP expenditures (nominal, seasonally adjusted) ranged from \$881 to \$10.3 million per quarter, averaging \$4.3 million on a quarterly basis over the period from 1995 to 2022 (Figure 3-6c).

Figure 3-3. Quarterly Butter Promotion Expenditures (Nominal, Seasonally Adjusted) by DMI (Dairy Management, Inc.) and Qualified Programs (QPs), 1995 to 2022



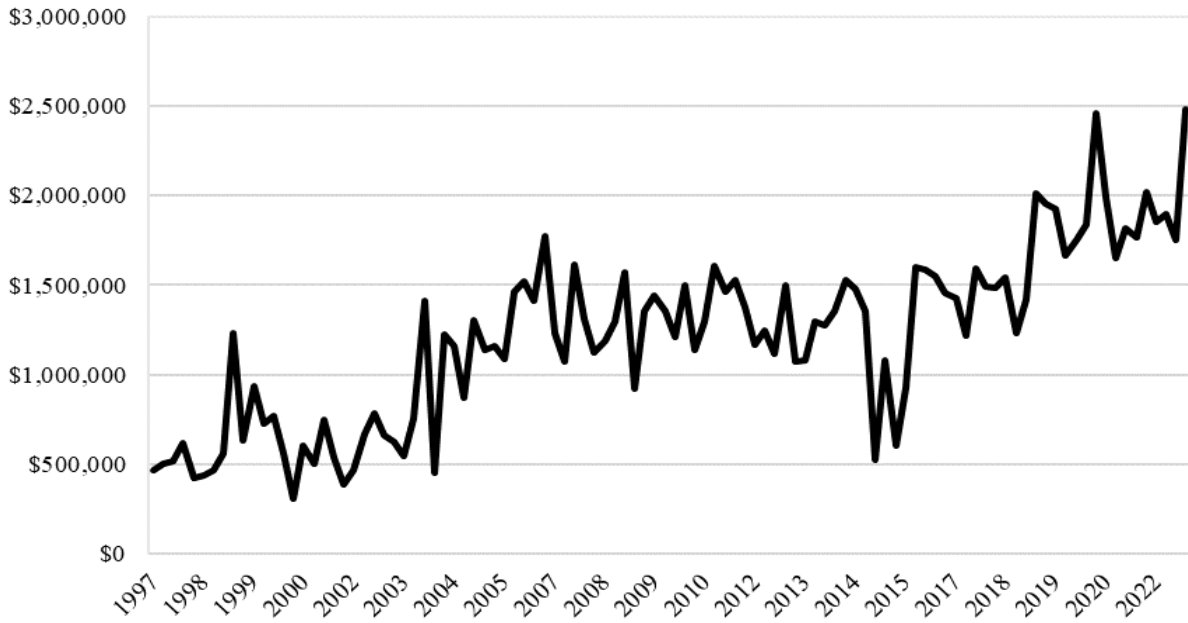
Source: DMI, QPs, and calculations by the authors.

Figure 3-4a. Quarterly Dairy Product Export Promotion Expenditures (Nominal, Seasonally Adjusted) by Dairy Management, Inc. (DMI), 1995 to 2022



Source: DMI, and calculations by the authors.

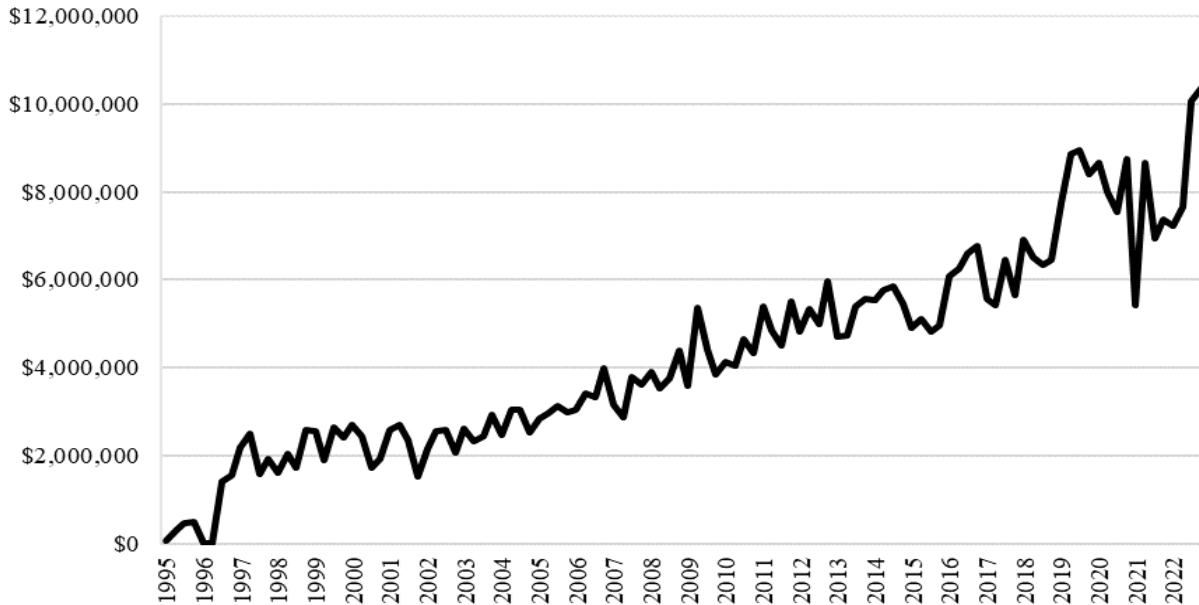
Figure 3-6b. Quarterly Dairy Product Export Promotion Expenditures (Nominal, Seasonally Adjusted) through the Foreign Market Development/ Market Access Programs, 1997 to 2022*



*Data were not available prior to 1997. Also, only annual data were available for 1997 and 1998. Quarterly interpolations were made for these years.

Source: U.S. Department of Agriculture, Foreign Agricultural Service, and calculations by the authors.

Figure 3-6c. Quarterly Aggregate Dairy Product Export Promotion Expenditures (Nominal, Seasonally Adjusted) by Dairy Management, Inc. (DMI) and the Foreign Market Development/Market Access Programs, 1995 to 2022



Source: Calculations by authors.

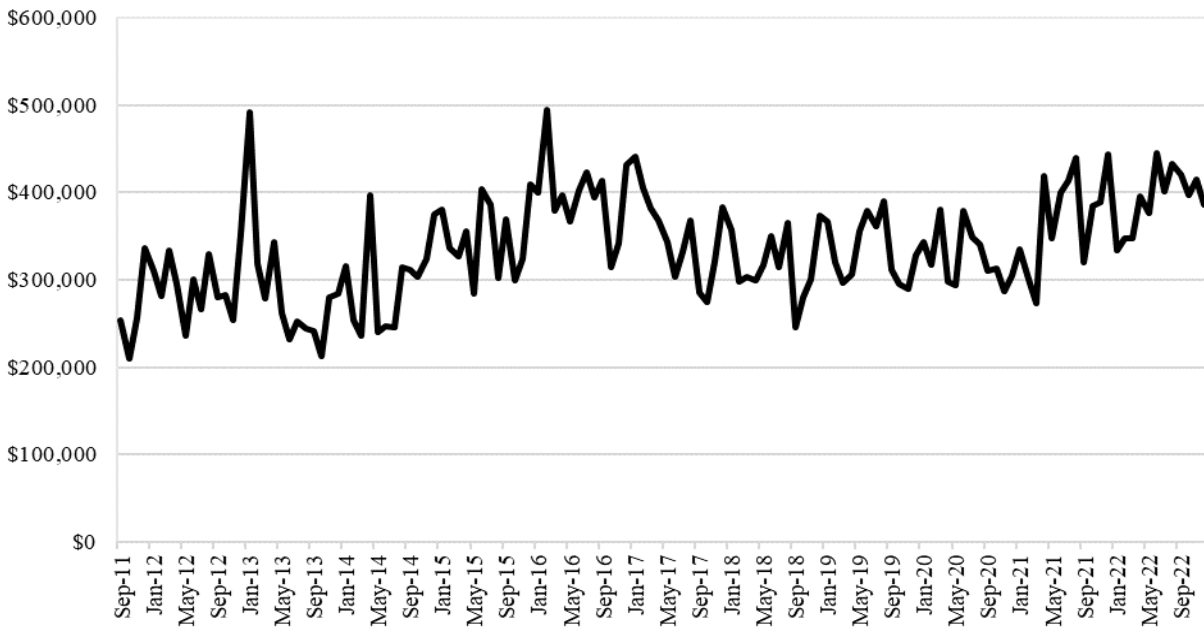
The assessment that importers of dairy products have paid to the National Dairy Promotion and Research Program effective August 1, 2011, is based on milk content as follows:

“This rule requires importers to calculate assessments due based upon documentation concerning the cow’s milk solids content of the imported products. Products shall be assessed at the rate of \$0.01327 per kilogram of cow’s milk solids.”

(Agricultural Marketing Service, 2011, “Rules and Regulations,” *Federal Register*, Volume 76, No. 53, page 14479).

Two-thirds of the import assessment collections are allocated to the National Dairy Board. The remaining amount can be designated to be used by one of three QPs to support dairy promotion: (1) The Cheese Importers Association of America (CIAA); (2) The Global Dairy Platform (GDP); and (3) The Wisconsin Milk Marketing Board, Inc. (dba Dairy Farmers of Wisconsin). Import assessment funds totaled between \$3.44 million and \$4.76 million per year from 2012 to 2022, averaging \$4.05 million. The cumulative import assessment funds totaled \$45.60 million from September 2011 to December 2022. On a monthly basis, funds from the dairy import assessment ranged from \$210,086 to \$493,975, averaging \$335,318 over the period of September 2011 to December 2022 (Figure 3-7). The import assessment averaged just under 1 percent of the total demand-enhancing expenditures made by DMI, MilkPEP, and the QPs between 2012 and 2022.

Figure 3-5. Monthly Dairy Import Assessment Funds, September 2011 to December 2022



Source: U.S. Department of Agriculture

Trends in Dairy Use

The U.S. dairy market size is on the order of \$107.08 billion in 2024 and is projected to reach \$126.80 billion by 2029. This market is expected to grow at a compound annual rate of 3.44 percent from 2024 to 2029 (Mordor Intelligence, 2024).² The International Dairy Foods Association estimated the annual U.S. economic impact of the dairy industry at \$793.75 billion (International Dairy Foods Association, 2023 Economic Impact Study, June 2023).³

According to this economic impact study, the U.S. dairy industry currently supports:

- 3.2 million total jobs.
- \$49 billion in direct wages for workers in the dairy industry.
- \$72 billion in Federal, State, and local taxes (not including sales taxes paid by consumers).
- 3 percent of U.S. GDP.

Additionally, dairy products play a key role in the American diet, containing vital nutrients for the health and maintenance of the human body, notably calcium, vitamin D, protein, and potassium (Bailey *et al.*, 2010).

On a per capita consumption basis, the major dairy products in the United States include fluid milk, cheese, butter, yogurt, and ice cream. In this report, the center of attention is on fluid milk, cheese, and butter, as well as on the aggregate of all dairy products on a fat basis and on a skim solids basis. Yogurt, (Greek and non-Greek), ice cream (regular and low-fat), and other products are accounted for through the aggregate category of all dairy products.

Per capita fluid milk consumption trended downward over the period 1995 and 2022 (Figure 3-8). In 2022, quarterly per capita consumption of fluid milk ranged from 31.49 pounds per person to 33.33 pounds per person, down from 50.44 pounds per person to 53.20 pounds per person in 1995. Seasonality is evident in per capita U.S. consumption of fluid milk. The downward trend likely reflects changes in the frequency of fluid milk intake without changes in portions (Stewart, Dong, and Carlson, 2013), as well as changes in portions of fluid milk intake (Stewart *et al.*, 2021). Most Americans born in the 1990s tend to consume fluid milk less often than those born in the 1970s, who in turn consume fluid milk less often than those born in the 1950s. U.S. annual per capita milk consumption has declined roughly 35 percent since 1995 due to changing consumption habits and increased competition from other beverages.

Notably, the consumption of plant-based milk alternatives had been steadily building over the past decade until recently. Increasing sales of plant-based milk alternatives contributed to the accelerated rate at which U.S. per capita fluid milk consumption decreased during the 2010s

² Mordor Intelligence, “Statistics for the 2023 & 2024 United States Dairy Market Size,” created by Mordor Intelligence™ Industry Reports, Available online at: <https://www.mordorintelligence.com/industry-reports/united-states-dairy-market/market-size>, May 24, 2024.

³ International Dairy Foods Association, 2023 Economic Impact Study, Available online at: <https://www.feedstuffs.com/agribusiness-news/economic-impact-of-u-s-dairy-industry-is-nearly-794-billion, June 2023>.

(Stewart *et al.*, 2020).

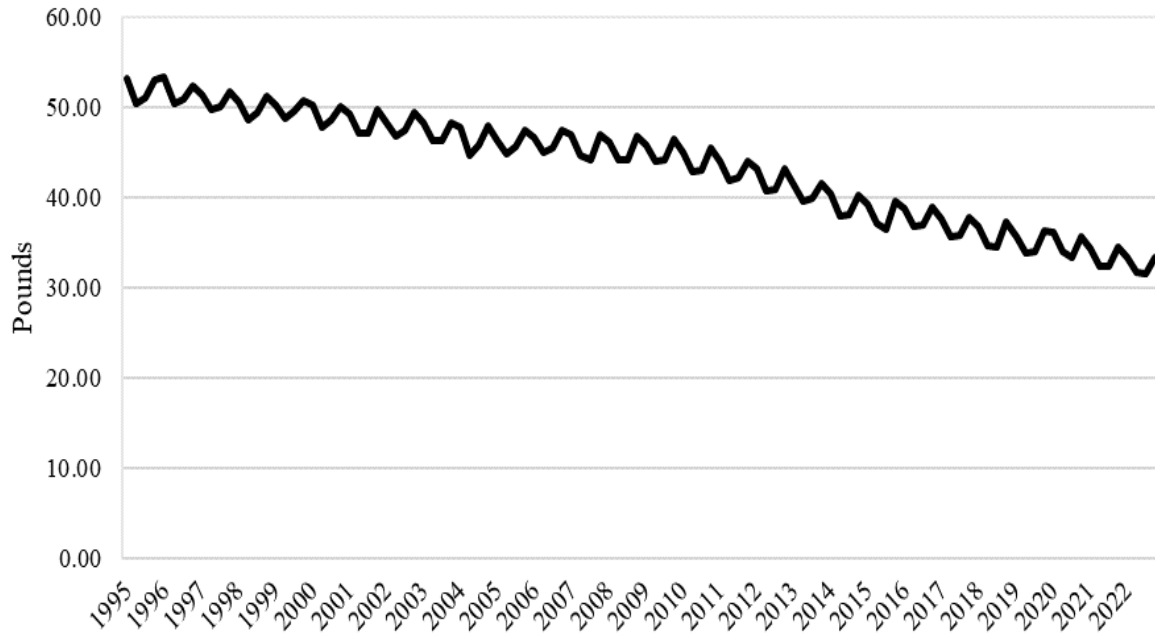
Cheese consumption per capita has grown over time and exhibits seasonal patterns (Figure 3-9). From 1995 to 2022, the commercial per capita disappearance of cheese ranged from 6.42 pounds per quarter to 10.21 pounds per quarter, averaging 8.24 pounds. Over the same period, per capita butter consumption grew modestly and exhibited seasonal patterns as well (Figure 3-10). The commercial disappearance of butter on a per capita basis ranged from 0.89 pounds per quarter to 1.86 pounds per quarter, averaging 1.27 pounds.

On average over 1995 to 2022, the per capita commercial disappearance of all dairy products on a fat basis averaged 153.25 pounds per quarter, ranging from 136.69 pounds to 173.38 pounds per quarter (Figure 3-11). On a skim-solids basis, the per capita commercial disappearance of all dairy products over that same period averaged 138.27 pounds per quarter, ranging from 130.10 pounds to 148.34 pounds per quarter (Figure 3-12).

Over the period 1995 to 2022, quarterly dairy exports averaged nearly 1,538 pounds on a fat basis and 6,416 pounds on a skim-solids basis (Figure 3-13). Over this period, dairy exports on a skim-solids basis experienced notable growth compared to dairy exports on a fat basis.

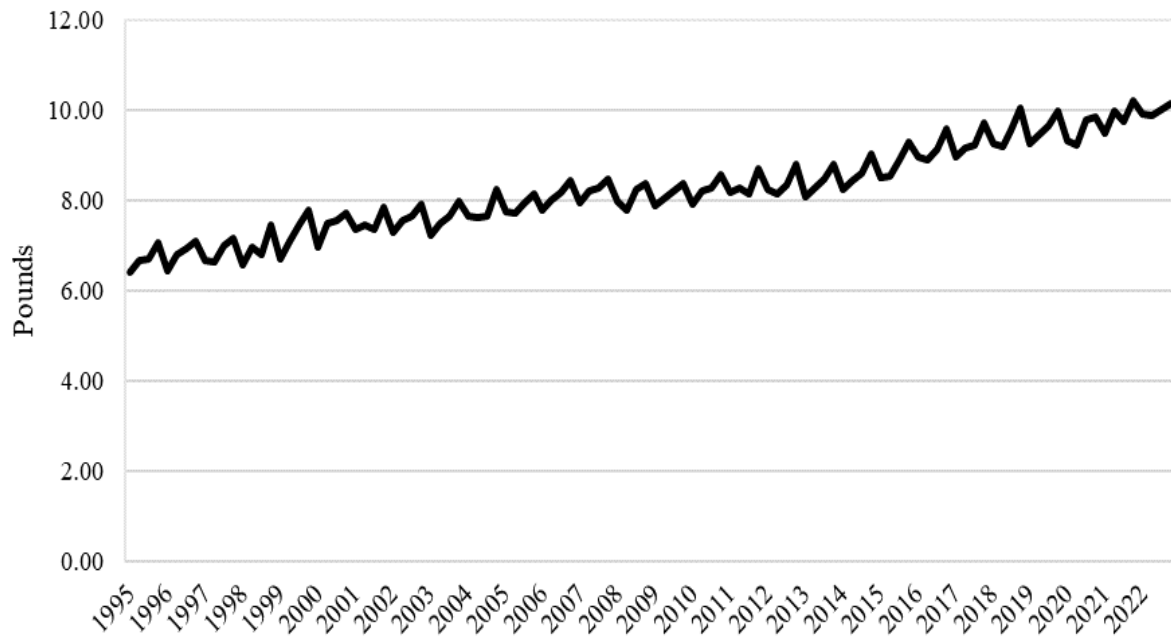
The United States imported between \$2.846 billion and \$5.304 billion in dairy products from 2012 to 2022 (Table 3-2). The import assessment per \$1,000 value of all dairy imports ranged from \$0.89 to \$1.48 over the period 2012 to 2022. Cheese products accounted for 29.6 percent to 43.1 percent (by value) of all dairy imports (Figure 3-14). Cheese imports as a percentage of total dairy imports averaged 36.7 percent over the period 2012 to 2022.

Figure 3-6. Quarterly Per Capita U.S. Consumption of Fluid Milk, 1995 to 2022



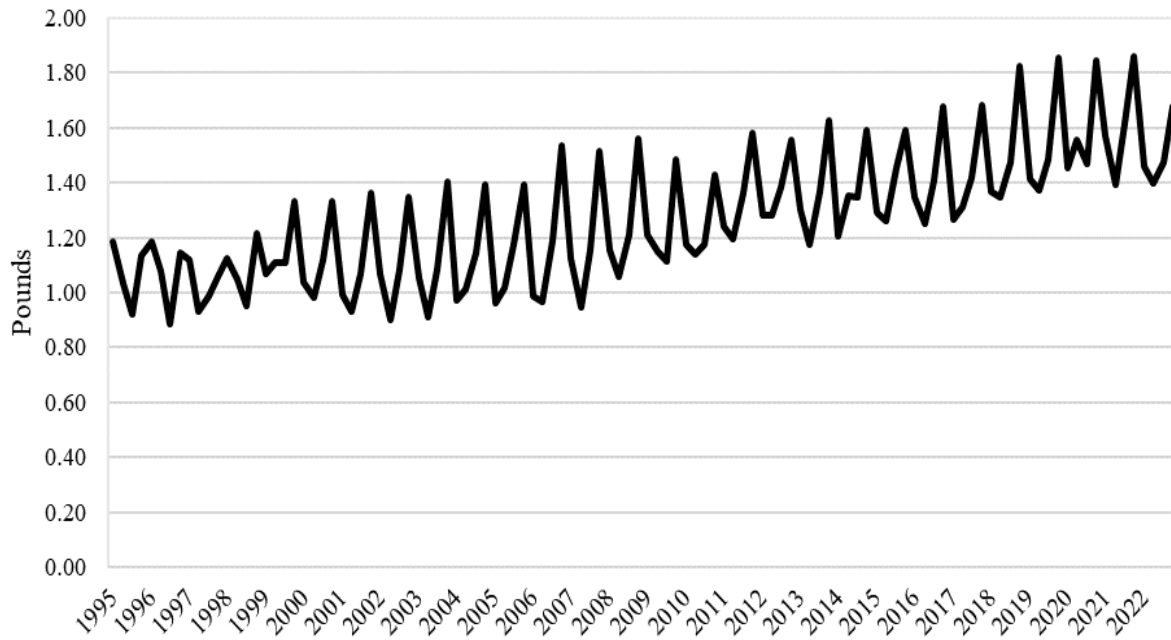
Source: U.S. Department of Agriculture and calculations by the authors.

Figure 3-7. Quarterly Per Capita U.S. Consumption of Cheese, 1995 to 2022



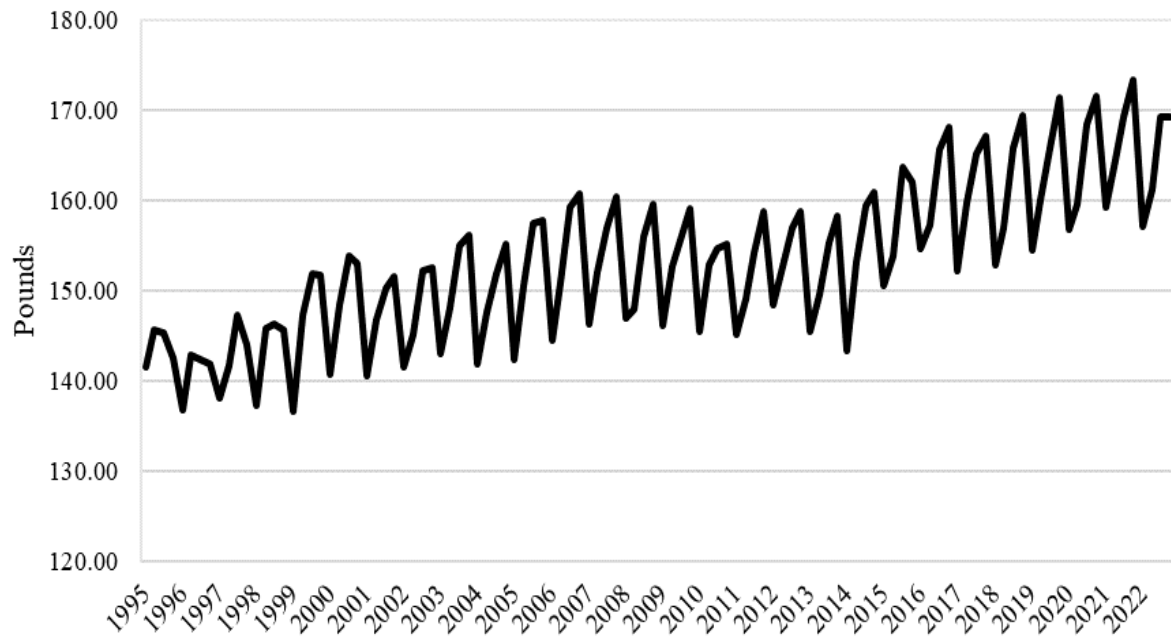
Source: U.S. Department of Agriculture and calculations by the authors.

Figure 3-8. Quarterly Per Capita U.S. Consumption of Butter, 1995 to 2022



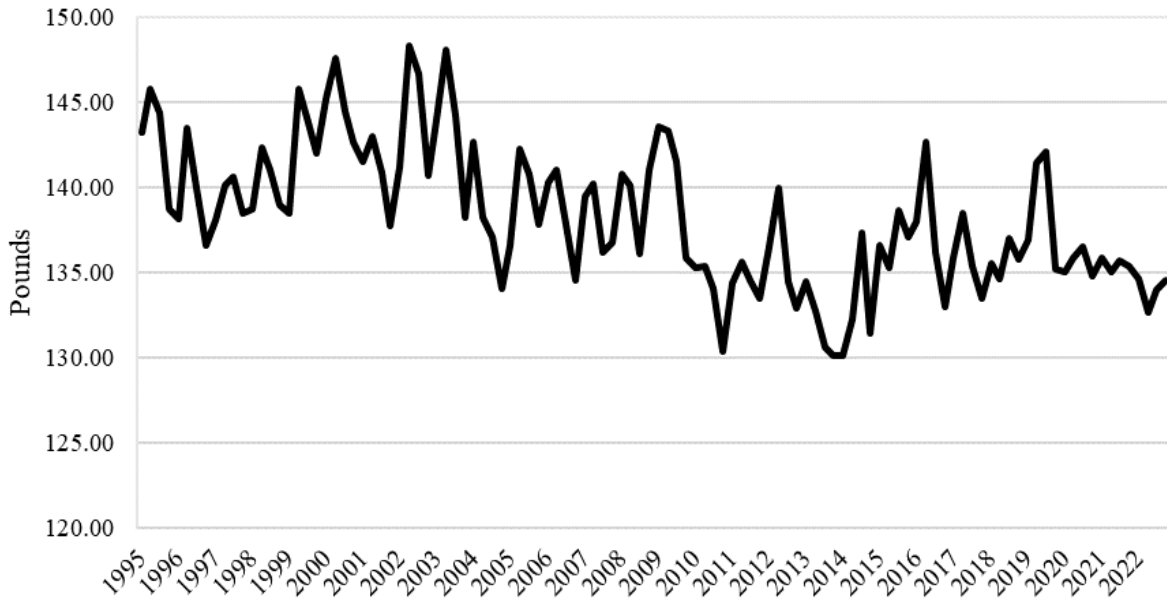
Source: U.S. Department of Agriculture and calculations by the authors.

Figure 3-9. Quarterly Per Capita U.S. Consumption of All Dairy Products on a Milk-Equivalent Fat Basis, 1995 to 2022



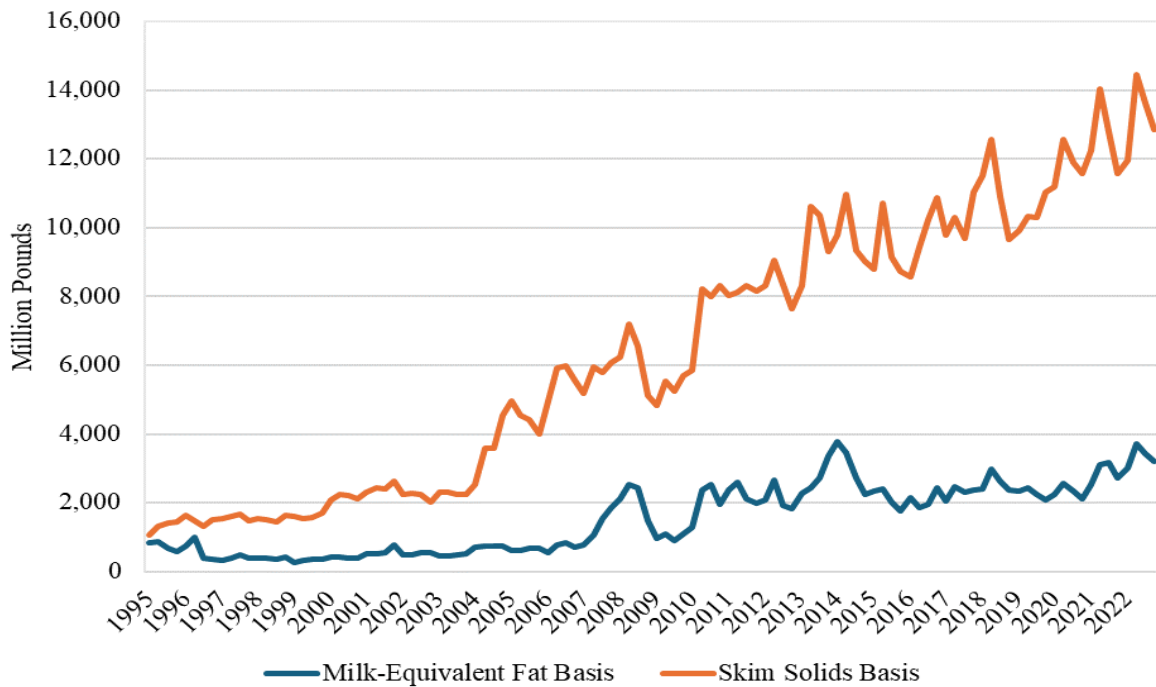
Source: U.S. Department of Agriculture and calculations by the authors.

Figure 3-10. Quarterly Per Capita U.S. Consumption of All Dairy Products on a Skim-Solids Basis, 1995 to 2022



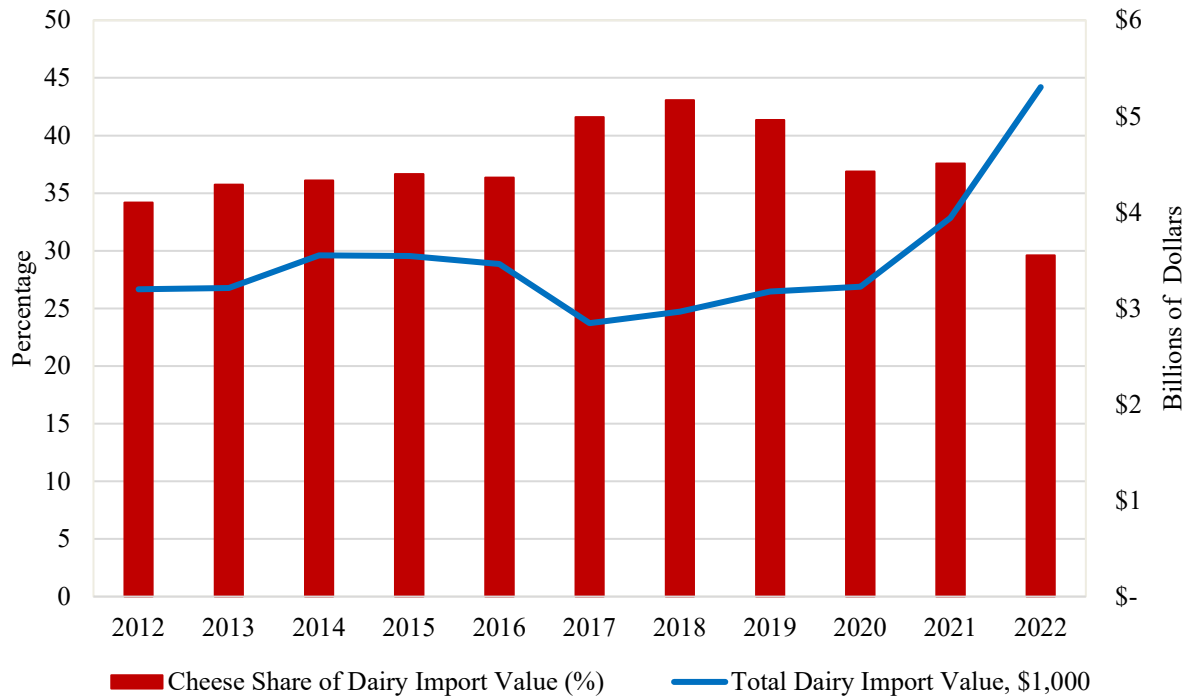
Source: U.S. Department of Agriculture and calculations by the authors.

Figure 3-11. Quarterly U.S. Dairy Commercial Exports on a Milk-Equivalent Fat Basis and Skim-Solids Basis, 1995 to 2022



Source: U.S. Department of Agriculture and calculations by the authors.

Figure 3-12. Value of Total U.S. Dairy Imports and Cheese Share of Dairy Import Value, 2012 to 2022



Source: U.S. Department of Agriculture, Foreign Agricultural Service.

The analysis in the next section addresses the response of consumers to dairy promotion expenditures. Structural econometric models were developed to isolate the effects of those expenditures on consumer demand for dairy products from those of other fundamental economic forces such as price and income.

Findings Concerning Impacts of Promotion Expenditures on the Dairy Industry

The primary objective of the analysis is to answer two key questions regarding the National Programs over time:

- (1) What have been the effects of dairy promotion programs on domestic consumption of fluid milk, dairy products, and exports?
- (2) What have been the returns to dairy promotion programs?

In answering the first question, the focus is on the effects of the dairy promotion program on U.S. demand and exports of fluid milk and dairy products. Once those market effects have been determined, the benefit-cost analysis of the dairy program at the producer level and at the fluid milk processor level is conducted to answer the question about returns.

Estimation of Dairy Consumption and Export Changes Due to Promotion Program Expenditures

This study finds a definitive positive association between dairy promotion program expenditures and the demand for dairy products. This association holds for all dairy products in the aggregate as well as for fluid milk, cheese, and butter individually. In addition, this association holds for dairy exports on a skim-solids basis and on a milkfat basis.

Table 3-1. U.S. Dairy Product Imports and Import Assessment Funds, 2012 to 2022¹

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Value of All Dairy Imports (\$1,000)	\$3,200,708	\$3,211,124	\$3,551,991	\$3,544,941	\$3,462,671	\$2,846,496	\$2,967,727	\$3,174,852	\$3,226,486	\$3,943,298	\$5,303,770
Value of Cheese Imports (\$1,000)	\$1,094,013	\$1,147,824	\$1,282,189	\$1,299,464	\$1,258,932	\$1,183,858	\$1,278,095	\$1,312,349	\$1,189,781	\$1,481,977	\$1,569,914
Quantity of Cheese Imports, (metric tons)	154,008	147,635	165,416	199,578	204,512	183,270	175,829	180,618	165,265	187,979	188,921
Unit Value of Cheese Imports (\$/MT)	\$7,104	\$7,775	\$7,751	\$6,511	\$6,156	\$6,460	\$7,269	\$7,266	\$7,199	\$7,884	\$8,310
Import Assessment Funds (\$)	\$3,521,054	\$3,441,461	\$3,564,781	\$4,175,783	\$4,757,469	\$4,205,885	\$3,803,099	\$4,000,574	\$3,917,344	\$4,462,577	\$4,696,243
Import Assessment per \$1,000 value of all dairy imports	\$1.10	\$1.07	\$1.00	\$1.18	\$1.37	\$1.48	\$1.28	\$1.26	\$1.21	\$1.13	\$0.89

¹ The import assessment went into effect August 1, 2011. Funds have been collected in each month from September 2011 to present. The table shows funds collected from January 2012 to December 2021.

Sources: Import Assessment data from Agricultural Marketing Service, USDA. Trade data from USDA, Foreign Agricultural Service, <https://apps.fas.usda.gov/gats/ExpressQuery1.aspx>.

The key indicator of the impact of marketing and promotion expenditures is a measure of the relative sensitivity to demand-enhancing expenditures. This measure, known as the promotion expenditure elasticity, is defined as the percentage change in consumption (or exports) given a 1-percent change in demand-enhancing expenditures, with all other variables held constant.

The estimated dairy demand sensitivity to promotion, price, and income over the period 1995 to 2022 is summarized in Table 3-3. The promotion elasticities for butter, cheese, and fluid milk over the period 1995 to 2022 were, on average, 0.030, 0.015, and 0.059, respectively. The promotion elasticities for all dairy products on a skim-solids basis and on a fat basis were, on average, 0.069 and 0.047, respectively. The demand responsiveness to promotion for individual dairy products and for dairy products in the aggregate was allowed to vary over time. Further, the cumulative impact of promotion was also identified. Demand-enhancing expenditures affect the market for cheese for up to two quarters. The effect on fluid milk persisted for up to three quarters and up to eight quarters for butter. For the aggregate of all dairy products, the effect persisted for six quarters on both a fat and skim-solids basis.

These estimates for butter, cheese, fluid milk, all dairy, and dairy exports align well with those given in the previous Report to Congress based on data from 1995 to 2021. The estimated promotion elasticities based on data from 1995 to 2022 are slightly lower for the respective products compared to those promotion elasticities based on data from 1995 to 2021. That said, the estimated promotion elasticity for fluid milk, calculated to be 0.059 over the period 1995 to 2022, is higher compared to the estimated promotion elasticity of 0.048 calculated over the period 1995 to 2021.

To measure the effects of DMI export promotion enhancement expenditures on U.S. dairy commercial exports, two U.S. dairy export demand models were specified and estimated using two different data series for dairy exports supplied by USDA: (1) dairy exports on milk-equivalent skim-solids basis (SSB), and (2) dairy exports on a milk-equivalent fat basis (FB). The results indicated that when U.S. dairy prices were low (high) relative to Oceania dairy export prices, the United States exported more (less) dairy products.⁴ The lag length for SSB export promotion expenditures was estimated to be nine quarters. The SSB export promotion expenditure elasticity was estimated to be 0.060 (Table 3-3). The lag length for the FB export promotion expenditures was estimated to be six quarters. The FB export promotion expenditure elasticity was estimated to be 0.098 (Table 3-3).

⁴ Key drivers of dairy demand were found to include the ratio of the Oceania export butter price to the U.S. butter price on a fat basis; the ratio of the Oceania export price for skim milk powder (SMP) to the U.S. nonfat dry milk (NDM) price on a skim-solids basis; a measure of real-world income; seasonality; and inertia or stickiness of dairy exports in world markets.

Table 3-3. Estimated Dairy Demand Sensitivity to Promotion, Prices, and Income, 1995 to 2022

	Promotion Elasticities		Own-Price Elasticity	Income Elasticity
	1995 to 2022	2022 only		
Butter	0.030	0.033	-0.054	0.391
Cheese	0.015	0.010	-0.139	0.497
Fluid milk	0.059	0.037	-0.028	-0.043
All dairy				
Skim-solids basis	0.069	0.060	-0.068	0.105
Fat basis	0.047	0.041	-0.065	0.344
Exports				
Skim-solids basis	0.060	0.060	-0.228	0.702
Fat basis	0.098	0.098	-0.309	0.536

Note: The promotion elasticities estimated for 2020 and 2021 include supply disruptions and behavior attributed to the COVID-19 pandemic. In this analysis, we account for the pandemic as well as the accompanying supply disruptions. All elasticities are significantly different from zero except for the income elasticity associated with fluid milk.

Source: Calculations by the authors.

Simulation Analysis of the Market Effects of Dairy Promotion

Although the analysis covered the period of 1995 to 2022, for comparison purposes we partitioned the results into four distinct time periods: (1) 1995–2001, (2) 2002–2008, (3) 2009–2015, and (4) 2016–2022. This partitioning was done to ascertain the existence of different effects over the respective time periods. The analysis was accomplished by first aligning the annual model of the U.S. dairy industry maintained at the University of Missouri, the Agricultural Markets and Policy Group Dairy Model (AMAP Dairy Model) as modified to account for dairy promotion, with the observed data over the 1995 to 2022 period. The impacts attributed to the promotion activities associated with the National Programs were obtained by removing demand-enhancing expenditures from the model. The model was initially simulated over history to generate a “with promotion” scenario representing the effects of the dairy programs over actual history. A second “no promotion” scenario (the counterfactual scenario) was then generated by setting promotion expenditures to zero. The “no promotion” scenario results represent the per capita consumption of fluid milk, cheese, butter, and nonfat dry milk, and exports of cheese, butter, and nonfat dry milk that would have existed if the National Programs had not been created and, thus, dairy promotion had not occurred. Hence, the AMAP simulation model quantifies the effects of dairy promotion on U.S. dairy markets, prices, and exports.

The results for selected key variables in the model for the “with promotion” and “no promotion” scenarios are presented in Table 3-4 and Table 3-5. These tables provide a comparison of the “with promotion” levels of each variable (actual historical data) to the “no promotion” levels (simulated levels without promotion) to show the effects across time from dairy promotion spending. Note that the “with promotion” scenario is actual history. Thus, the columns associated

with “promotion” in these respective tables constitute the average observed level of the respective variable during that period. The columns associated with “no promotion” for each variable in each period is the average level of that variable that would have been observed if there had been no dairy promotion expenditures during those periods. The rows marked as “change” are the “promotion” levels minus the “no promotion” levels and represent the amount of change in each variable in each period that can be attributed to the dairy promotion checkoff program. The columns marked “percent change” denote the percentage change from the “no promotion” levels to the “promotion” levels with the “no promotion” level as the base.

Various factors are at play, including the level of promotion expenditures in each year and the supply dynamics built into the AMAP structural dairy model. To provide insight into these model dynamics, four subperiods of results are shown along with the entire period for the selected endogenous variables. The analysis starts in 1995 and, thus, does not include the effects of any dairy promotion that may have occurred prior to that year.

Because no other exogenous variable in the model (e.g., levels of inflation, exchange rates, income levels, government policies, etc.) other than dairy promotion expenditures is allowed to change in either scenario, this analytical process effectively isolates the effects of the National Programs on U.S. dairy markets and exports. That is, the simulated differences between the values of the endogenous variables from the “with promotion” scenario and those from the “no promotion” scenario provide direct measures of the historical effects of dairy promotion expenditures (and only those expenditures) on U.S. dairy markets and exports.

As shown in Table 3-4, per capita consumption of fluid milk, cheese, butter, and nonfat dry milk was higher by 8.6 percent, 3.8 percent, 3.2 percent, and 1.0 percent, respectively, over the period of 1995 to 2022 due to promotion efforts associated with the National Programs, all other exogenous factors held constant. These results indicate that the overall downward trend of per capita fluid milk consumption between 1995 and 2022 was mitigated to some extent by the promotional efforts of the National Programs. Without the promotion programs, fluid milk consumption would have averaged 173.23 pounds per capita instead of 188.17 pounds per capita over the 1995 to 2022 period as actually occurred with promotion. Hence, promotion expenditures associated with the National Programs spending on fluid milk reduced the rate of decline in per capita consumption, controlling for all other factors.

The results also indicate that per capita consumption of cheese would have averaged 31.79 pounds without promotion versus the 32.99 pounds as actually occurred with promotion over 1995 to 2022. For butter, per capita consumption would have averaged 4.93 pounds without promotion versus the 5.09 pounds that occurred with promotion over the same period. Per capita consumption of nonfat dry milk (NFDm) would have been on average 3.05 pounds without promotion versus 3.08 pounds per capita as actually occurred with promotion over the 1995 to 2022 period.

Table 3-4. Average Annual Effects of Dairy Promotion on U.S. Dairy Markets Based on Simulation of Supply Response – Per Capita Consumption of Dairy Products, 1995 to 2022

		Fluid Milk Per Capita Consumption (pounds)	Cheese Per Capita Consumption (pounds)	Butter Per Capita Consumption (pounds)	Nonfat Dry Milk Per Capita Consumption (pounds)	
Period	2016 – 2022	With Promotion (lbs)	159.53	38.35	6.05	2.68
		No Promotion (lbs)	148.25	36.92	5.79	2.63
		Change (lbs)	11.28	1.43	0.26	0.05
		Percent Change	7.6%	3.9%	4.5%	1.9%
	2009 – 2015	With Promotion (lbs)	186.03	33.70	5.34	3.35
		No Promotion (lbs)	171.43	32.38	5.15	3.29
		Change (lbs)	14.60	1.32	0.19	0.06
		Percent Change	8.5%	4.1%	3.7%	1.8%
	2002 – 2008	With Promotion (lbs)	198.90	31.60	4.62	3.15
		No Promotion (lbs)	182.41	30.42	4.51	3.12
		Change (lbs)	16.49	1.18	0.11	0.03
		Percent Change	9.0%	3.9%	2.4%	1.0%
	1995 – 2001	With Promotion (lbs)	208.22	28.31	4.35	3.14
		No Promotion (lbs)	190.82	27.44	4.27	3.15
		Change (lbs)	17.40	0.87	0.08	-0.01
		Percent Change	9.1%	3.2%	1.9%	-0.3%
	1995 – 2022	With Promotion (lbs)	188.17	32.99	5.09	3.08
		No Promotion (lbs)	173.23	31.79	4.93	3.05
		Change (lbs)	14.94	1.20	0.16	0.03
		Percent Change	8.6%	3.8%	3.2%	1.0%

Source: Calculation by the authors.

Exports of butter were lower by 17.7 percent, while exports of cheese were up by 4.3 percent over the same period because of the promotion programs. Exports of nonfat dry milk decreased by 3.4 percent over the period 1995 to 2022. In the previous evaluation based on quarterly data from 1995 to 2021, per capita consumption of fluid milk, cheese, and butter was higher by 8.1 percent, 4.6 percent, and 5.3 percent, respectively. In addition, per capita consumption of nonfat dry milk was higher by 2.2 percent over this period. Exports of butter were smaller by 18.4 percent, but exports of cheese were higher by 5.2 percent. Exports of nonfat dry milk were higher by 0.5 percent due to dairy promotion.

Table 3-5. Average Annual Effects of Dairy Promotion on U.S. Dairy Markets Based on Simulation of Supply Response – Cheese, Butter, and Nonfat Dry Milk, 1995 to 2022

		Cheese Exports (million lb)	Butter Exports (million lb)	Nonfat Dry Milk Exports (million lb)	
Period	2016 – 2022	With Promotion	799.57	66.83	1,617.32
		No Promotion	767.71	71.83	1,560.24
		Change	31.86	-5.00	57.08
		Percent Change	4.2%	-7.0%	3.7%
	2009 – 2015	With Promotion	556.84	96.57	986.21
		No Promotion	535.02	107.97	994.34
		Change	21.82	-11.40	-8.13
		Percent Change	4.1%	-10.6%	-0.8%
	2002 – 2008	With Promotion	164.78	41.78	402.49
		No Promotion	152.95	55.60	455.38
		Change	11.83	-13.82	-52.89
		Percent Change	7.7%	-24.9%	-11.6%
	1995 – 2001	With Promotion	78.34	10.49	17.27
		No Promotion	78.36	26.73	119.94
		Change	-0.02	-16.24	-102.67
		Percent Change	-0.0%	-60.8%	-85.6%
	1995 – 2022	With Promotion	399.88	53.92	755.82
		No Promotion	383.51	65.53	782.48
		Change	16.37	-11.61	-26.66
		Percent Change	4.3%	-17.7%	-3.4%

Source: Calculation by the authors.

Over the period 1995 to 2001, per capita consumption changes for cheese, butter, and fluid milk were positive. However, the change in per capita consumption of nonfat dry milk was negative. Moreover, exports of butter and nonfat dry milk were lower by 60.8 percent and 85.6 percent, while cheese exports were virtually unchanged during this period. From 2002 to 2008, per capita consumption changes were positive for all dairy products: 9.0 percent for fluid milk, 3.9 percent for cheese, 2.4 percent for butter, and 1.0 percent for nonfat dry milk. Cheese exports were higher by 7.7 percent during this period, opposite the results for butter and nonfat dry milk, with declines of 24.9 percent and 11.6 percent, respectively. Over the period 2009 to 2015, per capita consumption changes were again positive for all dairy products: 8.5 percent for fluid milk, 4.1 percent for cheese, 3.7 percent for butter, and 1.8 percent for nonfat dry milk due to dairy promotion activities. Cheese exports rose by 4.1 percent over the 2009 to 2015 period, but butter exports and nonfat dry milk exports fell by 10.6 percent and 0.8 percent, respectively. From 2016 to 2022, per capita consumption of fluid milk, cheese, butter, and nonfat dry milk was higher by 7.6 percent, 3.9 percent, 4.5 percent, and 1.9 percent, respectively, due to promotion. Exports of butter were 7.0 percent less than would have occurred without promotion, while exports of nonfat dry milk and cheese were 3.7 percent and 4.2 percent higher, respectively, due to

promotion.

Since August 2011, per capita cheese consumption was higher by 0.017 pounds with the promotion funds collected from importers, a percentage change of close to 0.05 percent. Percentage changes in per capita consumption of butter, nonfat dry milk, and fluid milk were negligible. Finally, other cheese consumption rose 5.443 million pounds, or 0.08 percent, because of the import assessment. Imports of products largely intended for industrial use, including casein, lactose, and whole milk powder, are not explicitly accounted for in this analysis.

What then is the impact of the assessment on imports of dairy products? Given that cheese occupies a notable share of imported dairy products, attention is focused on the incremental amount of imports of cheese attributed to the importer assessment. Over the period 2012 to 2022, cheese consumption in the United States amounted to 142.3 billion pounds. Because of the assessment from importers, total domestic cheese consumption was higher by roughly 66 million pounds. To arrive at this Figure, we multiply 142.3 billion pounds by the percentage change in cheese consumption because of the importer assessment (0.0465 percent as noted previously). Further, because cheese imports are roughly 2.5 percent of domestic consumption based on information provided by USDA, then due to promotion funds collected from importers, imported cheese levels were higher by 1.65 million pounds. Further, unit values of cheese imports amounted to roughly \$3.30 per pound on average annually between 2011 to 2022. Hence, incremental revenue to importers solely from cheese attributed to the import assessment totaled \$5.46 million. In the previous evaluation based on data from 1995 to 2021, incremental revenue to importers solely from cheese attributed to the import assessment totaled about \$4.99 million.

Dairy Promotion Program Benefit-Cost Analysis

This section provides a benefit-cost analysis of the National Programs based on the results of the scenario analyses discussed in the previous section. As calculated, the producer profit BCR is the additional industry profits (additional cash receipts net of additional production costs and promotion assessments) earned by producers because of the promotion expenditures (as measured through the scenario analyses) divided by the cumulative promotion expenditures made to generate those additional profits. The fluid milk processor BCR is calculated similarly to the producer BCR in which the cost of milk is used as a proxy for the cost of production since data pertaining to the cost of production for fluid milk processors are not available.

The level of the BCR often is mistakenly taken as the sole indicator of the level of the market impact of a promotion program. The BCR from a \$1 investment that returns \$4 is the same (4 to 1) as the BCR for a \$1 billion investment that returns \$4 billion. Although the BCRs from these two investments are the same, the levels of their market impacts obviously are not. The more that is spent, the larger the market impact of the commodity program. As spending increases, however, each additional dollar spent has a declining effect, so that the total additional revenue achieved increases but at a declining rate. This phenomenon is consistent with the law of diminishing marginal returns in economics. Thus, the ratio between the additional revenue generated by promotion and the additional funds spent on promotion (the BCR) declines as funding increases. Further, a lower (higher) BCR during a particular period relative to another period or for one commodity relative to another does not mean the program is less (more)

effective. Other metrics, such as impacts on per capita consumption, prices and exports, typically are more revealing and insightful than the BCR as indicators of market impact.

As exhibited in Table 3-6, over the period from 1995 to 2022, the Benefit-Cost Ratios (BCRs) expressed in terms of producer profit or net returns at the farm level were calculated to be \$2.68 for every dollar invested in demand-enhancing activities for fluid milk; \$3.87 for every dollar invested in demand-enhancing activities for cheese; and \$17.73 for every dollar invested in demand-enhancing activities for butter. For other nonspecific or nondelineated promotion activities, the BCR was calculated to be \$8.38 for every dollar invested. Over the same period, the BCR of export promotion was \$8.63 per dollar invested.

The aggregate all-dairy BCR was 5.23, meaning that, on average, producer profit increased by \$5.23 for each dollar invested in demand-enhancing activities. These BCRs are net of the costs associated with the National Programs. Relative to the past three evaluations, wherein the BCRs were estimated to range from 4.30 to 5.07, the BCR for all dairy products currently exceeds these measures.

Table 3-6. Calculated Benefit-Cost Ratio (BCRs) at the Producer Level Attributed to the National Programs, 1995 to 2022

Producers	
Product	BCR
All Dairy	5.23; (5.07, 4.30, 4.76)
Fluid Milk	2.68; (1.63, 1.91, 3.26)
Cheese	3.87; (3.23, 3.27, 3.62)
Butter	17.73; (23.10, 24.11, 24.40)
Exports	8.63; (8.85, 7.43, 6.94)
Other Nonspecific Dairy Products	8.38; (9.05, 6.93, 6.79)

Note: The first number in parentheses corresponds to the BCRs reported using data from 1995 to 2021, the second number in parentheses corresponds to the BCRs reported using data from 1995 to 2020, and the third number in parentheses corresponds to the BCRs reported using data from 1995 to 2019.

Source: Calculations by the authors.

The returns-on-investment as measured by the BCR for all dairy products and cheese are larger than what was reported in the past three evaluations. The BCRs associated with fluid milk had declined steadily from 3.26 to 1.91 to 1.63. Now, the BCR associated with fluid milk is estimated to be 2.68. The BCRs associated with butter have declined monotonically from 24.40 to 17.73 over time. The BCRs associated with exports and other nonspecific dairy products declined slightly relative to the BCRs reported in the previous evaluation but are higher than those reported in 2019 and in 2020.

To address the effectiveness of the investments made by DMI and MilkPEP separately, we simulated “with promotion” and “without promotion” scenarios for each of the two entities following the same methodology as for the aggregate analysis. DMI promotion expenditures

have largely focused on promotion programs for fluid milk, cheese, butter, nondelineated products, and exports. In contrast, MilkPEP promotion expenditures have targeted fluid milk exclusively.

The BCR associated with DMI spending was calculated to be 6.51, higher than the 5.23 return on investment for all dairy product promotion investments. The BCR for MilkPEP was calculated at 2.58, very similar to the 2.68 return calculated for all fluid milk promotional spending. In the three previous evaluations of National Programs, the BCR associated with DMI spending was calculated to be 6.43 based on data from 1995 to 2021, 5.43 based on data from 1995 to 2020, 5.59 based on data from 1995 to 2019, while the BCR associated with MilkPEP spending was calculated to be 1.55 based on data from 1995 to 2021, 1.89 based on data from 1995 to 2020 and 3.28 based on data from 1995 to 2019.

In addition, we calculate the BCR associated with the promotion of fluid milk at the processor level. The cost of milk was used as a proxy for the cost of production since data concerning the costs of production for fluid milk processors were not available. First, we calculated the added total value at the retail level of the marketing channel attributed to MilkPEP promotion. Then we calculated the added total value accruing at the farm level attributed to MilkPEP promotion. The difference is the added total value captured by market participants beyond the farm gate. Over the period 1995 to 2022, this cumulative added value amounted to \$9.97 billion. Over the same period, the cumulative amount of MilkPEP promotion expenditures totaled \$2.35 billion. Hence, the BCR of fluid milk at the processor level was estimated to be 3.24 over this period. In the previous evaluation of the effectiveness of National Programs, this BCR was calculated to be 2.44.

Importantly, this measure captures the gross return on investment for fluid milk market participants beyond the farm level. Any additional costs incurred by these market participants from handling the larger volume of fluid milk that occurs due to MilkPEP promotion were excluded because we simply do not know the magnitude of these additional costs. Further, others in the marketing channel besides fluid milk processors capture a portion of this incremental total value; however, we have no knowledge of the portion captured by processors versus other milk market participants beyond the farm gate. Due to these caveats, we exercise caution in providing this estimate of the BCR attributed to the promotion of fluid milk at the processor level over the 1995 to 2022 period.

Also, caution must be exercised in making comparisons from various evaluations of the dairy checkoff program across years. The economic phrase *ceteris paribus*, meaning all other factors invariant, does not hold. The underlying endogenous and exogenous variables provided by various government sources have been revised and updated, and four additional quarters of data are now available not only for these variables, but also for the data associated with the programmatic expenditures of the National Programs.

Concluding Remarks⁵

This report provides a continued annual independent evaluation of the effectiveness of the National Programs covering the period 1995 to 2022. The key findings regarding markets for fluid milk and manufactured dairy products over this period include the following:

- The National Programs have effectively increased the demand for promoted dairy products, especially cheese and butter, while moderating the decline in per capita fluid milk consumption.
- The gains in profit at the producer and fluid milk processor level from promotion were larger than the costs of the National Programs. The aggregate BCR (using change in profit net of costs) of the dairy producer promotion program was calculated to be 5.23. That is, for every dollar spent on demand-enhancing activities, dairy producers received an additional \$5.23.
- The BCR for fluid milk promotion was calculated to be \$2.68 for every dollar invested in demand-enhancing activities. The BCR was calculated to be \$3.87 per dollar invested in cheese promotion and \$17.73 for every dollar invested in butter promotion. The BCR for dairy export promotion was calculated to be \$8.63 per dollar invested.
- The National Programs promotion spending over 1995 through 2022 increased annual per capita consumption of dairy products and cheese exports:

Fluid milk consumption per capita	+8.6 percent
Cheese consumption per capita	+3.8 percent
Butter consumption per capita	+3.2 percent
Nonfat dry milk consumption	+1.0 percent
Butter exports	-17.7 percent
Cheese exports	+4.3 percent
Nonfat dry milk exports	-3.4 percent
- Promotion funds collected from importers boosted the annual average level of cheese imports by 1.65 million pounds. Annual unit values of cheese imports amounted to about \$3.30 per pound over the period from 2012 to 2022. Hence, the incremental revenue to importers solely from cheese attributable to the expenditure of the import assessments for cheese promotion totaled \$5.46 million.
- The BCR associated with fluid milk at the processor level was estimated to be 3.24. For every dollar contributed, U.S. milk processors received \$3.24 in additional receipts, net of incremental costs.

Regarding methodology, the analysis was accomplished by first statistically estimating the relationships between dairy product demands and export demand for dairy products and their respective demand drivers, including prices, income, seasonality, and promotion expenditures.

⁵ A reference list is available upon request.

The impact of the COVID-19 pandemic was also accounted for in these demand models. The structural econometric models used for this analysis are statistically valid and consistent with prior studies evaluating generic commodity promotion.

The annual model of the U.S. dairy industry maintained at the University of Missouri, the Agricultural Markets and Policy Group Dairy Model, was modified to include the results of the dairy demand statistical analysis and then aligned with the observed data over the 1995 to 2022 period. The model was simulated over history to generate a “with promotion” scenario representing the effects of the dairy programs over actual history. A second “no promotion” scenario (the counterfactual scenario) was then generated with the model over history in which promotion expenditures in the dairy product demand equations were set to zero. The results of the second scenario represent the levels of prices and quantities that would have existed if the National Programs had not been created and, thus, dairy promotion had not occurred.

Chapter 4

Qualified State, Regional, or Importer Dairy Product Promotion, Research, or Nutrition Education Programs

The Secretary annually certifies Qualified Programs as part of the Dairy Act and Order. To receive certification, the Qualified Program must meet the following (7 CFR §1150.153):

1. Conduct activities intended to increase human consumption of milk and dairy products generally;
2. Be active and ongoing before passage of the Dairy Act, except for programs operated under the laws of the United States or any State; and except for importer programs;
3. Be primarily financed by producers, either individually or through cooperative associations or dairy importers;
4. Not use a private brand or trade name in its advertising and promotion of dairy products (unless approved by the Dairy Board and USDA);
5. Certify that requests from producers or importers for refunds under the program will be honored by forwarding to either the Dairy Board or a Qualified Program designated by the producer or importer that portion of such refunds equal to the amount that would otherwise be applicable to that program; and
6. Not use program funds for the purpose of influencing governmental policy or action.

The aggregate revenue from the assessment directed to the Qualified Programs in 2022 was \$227.8 million (approximately 10 cents of the 15-cent producer assessment and 2.5 cents of the 7.5-cent import assessment). This Chapter provides the aggregate income and expenditure data of the Qualified Programs as well as a list of certified programs in 2022.

**2022 Qualified State, Regional or Importer
Dairy Product Promotion, Research or Nutrition Education Programs
Aggregate Income and Expenditure Data Reported to USDA
(Thousands)**

Aggregate Income	FY 2022
Carryover from Previous Year ¹	\$114,582
Producer Remittances	227,811
Transfers from Other Qualified Programs	87,742
Transfers to Other Qualified Programs	(80,304)
Other Income	15,596
Total Adjusted Annual Income	<u>\$365,427</u>
Aggregate Expenditures	FY 2022
General and Administrative	\$12,270
Milk Advertising and Promotion	11,351
Cheese Advertising and Promotion	32,490
Butter Advertising and Promotion	7,310
Frozen Dairy Products Advertising and Promotion	4,085
Other Advertising and Promotion ²	6,939
Unified Marketing Plan ³	106,945
Dairy Foods and Nutrition Research	9,899
Public and Industry Communications	24,981
Nutrition Education	12,214
Market and Economic Research	4,956
Other	5,758
Total Annual Expenditures	<u>\$246,198</u>
Total Available for Future Year Programs	\$117,478

¹ Differences can occur because of audit adjustments and varying accounting periods. The COVID-19 pandemic caused remittance and program implementation delays.

² Other includes “Real Seal,” holiday, multi-product, calcium, foodservice, product donations at State fairs, and other promotional activities.

³ Unified Marketing Plan: Reported local spending by participants in the Unified Marketing Plan to fund national implementation programs.

Source: Data Reported by Qualified Dairy Product Promotion, Research, and Nutrition Education Programs.

2022 Qualified State, Regional or Importer Dairy Product Promotion, Research or Nutrition Education Programs

Alabama:

- American Dairy Association of Alabama Inc.

Arizona:

- Dairy Council of Arizona

California:

- California Milk Advisory Board
- Dairy Council of California

Connecticut:

- Connecticut Milk Promotion Board

Florida:

- Florida Dairy Farmers, Inc.

Georgia:

- Georgia Agricultural Commodity Commission for Milk
- Southeast United Dairy Industry Association (d/b/a The Dairy Alliance)
- American Dairy Association of Georgia

Idaho:

- Idaho Dairy Products Commission
- Dairy West

Illinois:

- Illinois Milk Promotion Board

Indiana:

- American Dairy Association of Indiana
- Indiana Dairy Industry Development Board

Kansas:

- Kansas Dairy Commission

Kentucky:

- American Dairy Association of Kentucky

Louisiana:

- Louisiana Dairy Industry Promotion Board

Maine:

- Maine Dairy and Nutrition Council
- Maine Dairy Promotion Board

Massachusetts:

- Massachusetts Dairy Promotion Board
- New England Dairy and Food Council, Inc.
- New England Dairy Promotion Board

Michigan:

- American Dairy Association of Michigan
- Dairy Council of Michigan
- Michigan Dairy Market Program

Minnesota:

- Midwest Dairy Association
- Midwest Dairy Council
- Minnesota Dairy Research and Promotion Council

Mississippi:

- American Dairy Association of Mississippi, Inc.

Missouri:

- Dairy Promotion, Inc.
- Promotion Services, Inc.
- St. Louis District Dairy Council

Nebraska:

- Nebraska Dairy Industry Development Board

Nevada:

- Dairy Council of Nevada

New Hampshire:

- Granite State Dairy Promotion

New Jersey:

- New Jersey Dairy Industry Advisory Council

New York:

- American Dairy Association & Dairy Council
- Milk for Health on the Niagara Frontier, Inc.
- New York State Department of Agriculture, Division of Milk Control and Dairy Services
- Rochester Health Foundation, Inc.

North Carolina:

- American Dairy Association of North Carolina

North Dakota:

- North Dakota Dairy Promotion Commission

Ohio:

- American Dairy Association Mideast

Oregon:

- Oregon Dairy Products Commission

Pennsylvania:

- Allied Milk Producers' Cooperative, Inc.
- Mid-Atlantic Dairy Association
- Pennsylvania Dairy Promotion Program

Puerto Rico, Commonwealth of:

- Milk Industry Development Fund of Puerto Rico (Fondo Fomento Industria Lechera)

South Carolina:

- American Dairy Association of South Carolina

South Dakota:

- American Dairy Association of South Dakota

Tennessee:

- American Dairy Association of Tennessee
- Tennessee Dairy Promotion Committee

Texas:

- Dairy MAX, Inc.
- Western Dairy Association
- Southwest Dairy Museum, Inc.

Utah:

- Utah Dairy Commission

Vermont:

- Vermont Dairy Promotion Council

Virginia:

- American Dairy Association of Virginia

Washington:

- Washington State Dairy Council
- Washington Dairy Products

Wisconsin:

- Wisconsin Milk Marketing Board, Inc. (d/b/a Dairy Farmers of Wisconsin)

Qualified Importer Programs:

Cheese Importers Association of America

Wisconsin Milk Marketing Board (d/b/a Dairy Farmers of Wisconsin)

Global Dairy Platform

**Dairy Management Inc., Dairy Research Institute,
and U.S. Dairy Export Council Contracts Approved by USDA, 2022**

Administration & Operations:

Aramark
AVI Systems, Inc.
Bold Orange Egg, LLC
Canon USA, Inc.
CFE Solutions, Inc.
Culture Amp Pty, Ltd
DataBank Holdings, Ltd.
Empist, LLC
Ernst & Young Global Limited
Eventbrite, Inc.
Getty Images (US), Inc.
Igloo, Inc.

Information Resources, Inc.
Iron Mountain, Inc.
Messina Group, Inc.
Microsoft Corporation
Midwest Mechanical
Newport, LLC
Nutrichicos, LLC
Privacy Vaults Online, Inc., d/b/a PRIVO
The Cambridge Group, LLC
USI Insurance Services
Verizon Communications, Inc.
Watkinson Miller, PLL

Communications & Unified Marketing Plan:

American Butter Institute
American Dairy Association Indiana, Inc.
American Dairy Association Northeast
Antenna Group, Inc.
C&R Research, Inc.
CRA, Inc.
Dairy West
Edelman Public Relations Worldwide
Fair Oaks Farms, LLC
Flock Associates USA, Inc.
Florida Dairy Farmers, Inc.
Flowers Communication Group, Inc.
Global Dairy Platform, Inc.
GoNoodle, Inc.
Hudson Grey Sky Productions, LLC
Imperial Marketing Concepts, Inc.
Ipsos Insights, LLC
Kantar, LLC d/b/a Kantar TNS
Maine Dairy Promotion Board
Meltwater News US, Inc.
Midwest Dairy Association

Mischief@NoFixedAddress, Inc.
Music Powered Games, LLC d/b/a
AdArcade
New England Dairy & Food Council, Inc.
On the Go Marketing, Corp.
Parenti Partners d/b/a Culinary Garage
Rise Interactive Media & Analytics, LLC
Ruby Do, Inc.
Southeast United Dairy Industry Association
d/b/a The Dairy Alliance
sparks & honey, LLC
Strategy Muse
The DuPuis Group
United Dairymen of Arizona
Villacorta, Manual
Vision Media
Viral Nation, Inc.
Washington Dairy Products Commission
Weber Shandwick
Williams, Alexandra
Ypulse, Inc.

Exports, Trade & Ingredients:

Alamar Foods Company
Agribusiness-Connect Asia
Arab Marketing Finance, Inc.
Costco Wholesale Corporation

Culinary Sales Support, Inc.
Dairy & Food Market Analyst, Inc.
DairyBusiness, LLC
Dairy Farmers of Washington

Darigold, Inc.
DeCandio, Jaclyn
Domino's Pizza Enterprises – Japan
Dorantes International Trade and
Regulatory Law Advisors
Eastern Trade Media Pte Ltd., publisher
of Asia Pacific Food Industry
Emerging Ag, Inc.
Esser, John
Euromonitor International
Gaalswyk, Dennis
Gardner, Emily
Girag & Associates, SARL
Global Child Nutrition Foundation, Inc.
GlobalData Plc (Canadean Consumer)
Gravity Marketing, LLC
Hatrack 3C, LLC
Herdbook Ag Media, LLC
HotSpex Media, Inc.
Hruska, Cindy
Illumenra
Ingredient, Inc.
Inter-American Institute for
Cooperation in Agriculture
JHG Global Economics, LLC
Jiangnan University
Johnson, Rachel
John Roach Productions, Inc.
Keller & Heckman, LLP

Knowledge, Innovation and Partnerships:

84.51, LLC
American Eagle.com
Andexler, Rebecca
Associated Milk Producers, Inc.
Black Swan Data, Ltd.
Brainyak Inc. d/b/a GutCheck
Cady, Roger
California Dairy Foods Research Center
California Milk Advisory Board
CB Information Services, Inc.
Center for Generational Kinetics
Cheese Market News
Cheese Reporter
Context Network, LLC

Lane, Tonya
Lightspeed Research, Ltd.
Lindsey, Briaunna
Market Makers, Inc.
MEXCAM Mercadotecnia SA DE CV
Novak Birch
Pizza Hut, LLC
Pizzavest Co., Ltd
PR Consultants Limited
Promar International Limited
PublicPolicyAsia Advisors Pte., Ltd.
Rasmussen, Larry
Ravindran Associates, LLP
Ready Ink Communications
Results Direct
River Global, LLC
Rogers, Paul
Rust Films, LLC
Sohn's Market Makers
Sopexa
Spire Research & Consulting Pte. Ltd.
Strategic Growth & Ventures, LLC
TradeMoves, LLC
Tutwiler, Ann
White, Richard
Wilken, Edith
William Westman & Associates, LLC
Zenith International, Ltd.

Cornell University for the
Northeast Dairy Foods Research Center
Dairy Farmers of America
Dairy Insights, LLC
Daniel J Edelman
DARI, LLC
Domino's Pizza, LLC
Emplifi, Inc.
EpidStrategies, A Division of
ToxStrategies, LLC
Esser, John
FoodMinds, A Division of
Padilla Speer Beardsley, Inc.
Foodsense, LLC
Fuelcomm Inc., d/b/a. Stackline

Gaalswyk, Dennis
General Mills, Inc.
Godfrey & Kahn S.C.
Harper, Caleb
HJG Communications, LLC
Hubert Company/ LLC
Inmar Analytics, Inc.
Innova Market Insights
International Dairy Foods Association
Kantar Retail d/b/a Kantar Worldpanel
Keenan, Judy
Lumanity Clinical and Regulatory, Inc.
Lux Research, Inc.
Mandell, Laura
McClelland, Alyssa
McDonald's USA, LLC
Meridian Institute
Midwest Dairy Foods Research Center
National Fluid Milk Processor
Promotion Board
National Football League, Inc.
National Football League Properties
National Milk Producers Federation
North Carolina State University for the
Southeast Dairy Foods Research Center
PIPA, LLC
Prime Consulting of Florida
Quaife, Tom

Nutrition and Wellness:

American Farm Bureau
Foundation for Agriculture
American Society for Nutrition
BCS Food Consulting, LLC
Bruno, Richard
Commercial Quality and
Food Safety Solutions, Inc.
Complete Power Foods, LLC
Direct Dairy Nutrition Service, LLC
Food Allergy Research and Education
FoodTriton Science dba
FoodTriton Solutions, LLC
GenYouth Foundation, Inc.
Good Sport Nutrition, LLC
Joslin Diabetes Center, Inc.
KJ Marketing Consulting

Raising Cane's Restaurants, LLC
Research Resources
Shamrock Foods Company
Shelford, Timothy
Sidley Austin, LLP
Sikand, Vadna
Spherix Consulting Group
SR Strategy LLC
Taco Bell Corporation
Taylor, Tammy
Technomic, Inc.
Texas A&M AgriLife Research
The Center for Generational Kinetics
The Economist Intelligence Unit, NA, Inc.
The Fresh Approach, Inc.
The Kroger Company
United States Farmers and
Ranchers Alliance
University of Wisconsin-Madison for the
Wisconsin Center for Dairy Research
USDA Agriculture Research Service,
Western Human Nutrition Research
Center
Vivayic, Inc.
Wallace, James
Watson Green, LLC
Western Dairy Research Center
Wilson, Norrie

Mayo Clinic
MB Clinical Research and Consulting, LLC
MMS Education, Inc.
National Football League Players, Inc.
National Medical Association
Nutrition Impact, LLC
Nutrition Insights, LLC
Nutrition On Demand, LLC
RTI International
Team Services, LLC
The Foundation for National
Institutes of Health
The Hartman Group, LLC
The NPD Group, Inc.
Traverse Science, Inc.
TSM Nutrition Consultants, LLC

VerdanaBold
Volp, Lori

Whey Protein Research Consortium
ZS Associates, Inc.

Sustainability:

Alliance Dairies, LLP
American Society of Agronomy, Inc.
Baxter Communications, Inc.
Biofiltro USA, Inc.
BR Bock Consulting
Briggs, Kaitlyn
CadmiumCD, LLC
Ceres Dairy Risk Management, LLC
C-Lock, Inc.
ConferenceDirect, LLC
Cultivating the Future, LLC
CustomED
Dairy Strong Sustainability Alliance
EarthShift Global, LLC
Esty & Associates, LLC
Farm Journal Foundation
Farmers for Sustainable Food
Foundation for Food and
Agriculture Research
Futerra Sustainability
Communications Limited
Harbor Environmental, LLC
Harper, Lowry
Houston Engineering Inc.
IdeaMilk, LLC

Illustra, Inc.
Industrial Economics, Incorporated
Inspire11, LLC
Institute for the Future
ISOS Group, LLC
J Wallace Consulting
KCoe Isom, LLP
Leading Authorities, Inc.
LEIF, LLC
Manifest, LLC
National Fish and Wildlife Foundation
Paradox Nutrition, LLC
Paulsen Marketing Inc.
Production Plus Technologies
Provoyant Corporation
Soil Health Institute
Strategic Conservation Solutions, LLC
Sustainable Conservation
Sustainable Environmental Consultants
The Context Network, LLC
The McCully Group
The Nature Conservancy
Tomlinson Consulting, LLC
Williams, Robert

National Fluid Milk Processor Promotion Board Contracts Approved by USDA, 2022

Administration & Operations:

Association of National Advertisers, Inc.
Bridge
California Milk Advisory Board
Capital Bank, N.A.
Ebiquity, Inc.
Food For Thought Consulting, Inc.
Hartford Financial Services Group, Inc.
Information Resources, Inc.
InTech Integrated Marketing Services

International Dairy Foods Association
Phalanx AI, Inc.
Pondera Advisors, LLC
Rubin, Ronald
Snyder Cohn, PC
Spectrum Group Productions, Inc.
The Colony Group, LLC
Watkinson Miller, PLLC

Advertising and Communications:

A Worthey Media, LLP
AdAdapted, Inc.
Adams, Aubrey
Adams, Spice
Adriana-Frias, Ruby
All for the Memories, LLC
Allie Henrie Nutrition, Inc.
Amato, Olivia
Atwood, Marisa
Barna, Katherine
Battishill, Amber
Beal, Lyndsay
Berg, Wesley
Bradley, Trinity
Bryant, Tomika
Bufkin, Haley
California Milk Processor Board
Calpito, Isaac
Charm City Table, LLC
Chavez, Amber
Cheers Harrisburg, LLC
Cherish 365, LLC
Chrisman, Rebekah
Coastal Brand Management, LLC
Cofield, Kara
Cognition Interactive, Inc.
Cook, Lois
Courtney Covers Cleveland, LLC
Crème de la Crumb, LLC
Crystal Creamery, Inc.

Dairy Management, Inc.
Dawn-Burns, Andrea
Dixson-Griggs, Alexa
Dr. Tanya Altmann Consulting
Dunston, Rachel
eatbigfish, LLC
Emmerling, Amanda
ExtraEmily LLC
Forever Three 17, LLC
Fowler, Paige
Fuentes, Lenzie
Gale Partners, LLC
General Mills, Inc.
GENYOUTH, Inc.
George, Darian Allan
Girls on the Run International
Graviet, Mada
Gridiron Queendom, LLC
HAWI Management
Hernandez, Amanda
Houston, Caitlin
HPR Partners, LLC
Hungry Grl Big City, LLC
InMarket Media, LLC
Jeans, Ashley
JUS10, LLC
Kantar, LLC
Keating, Lydia
Kelly, Bridget
Khatib, Rahaf

King Henry, LLC
Kjos, Jade
Klauser, Tinus
Kopecky, Elyse
KRG Marketing Consultants, LLC
Kyla Marie Charles, LLC
LeCouppte, Kristen
Linkner, Rita
Long Haul Management
Mack Lawrence Studio
Mars Advertising, Inc.
Mason Woodward & Nicole Bybee
Miller, Christina
Milne, Brooke
MLA Integrated Marketing Consulting, LLC
MMI Agency, LLC
Moore, Adele
Murphy, Megan
Murray, Emily
Neptune Retail Solutions
Noe, Renee Maudlena
Nutrition by Kylie, LLC
Nutrition for Littles, LLC
Ojeda, Jessica
Outside Interactive, Inc.
Overstreet, Joann
PepsiCo, Inc.
Ponderosa Advisors, LLC
Premier Sport Psychology, PLLC
Prime Consulting of Florida, Inc.
Pritchard, Norah
Radius Global Market Research
Red Spark Consulting, LLC

Rodriguez, Samantha
Rutland, Lindsay
Samuela, Selena
Sarfo, Kojo
Schinella, Megan
Sierra Prescott, Inc.
Sleymann, Ayat
Spear, Hayley
St. Louis Baking and Pastry, LLC
Stevenson, Amanda
Street Smart Nutrition, LLC
Su, Carolyn
Tales and Turbans, LLC
Team Juju, LLC
Team Services, LLC
Tervalon, Jinghuan Liu
The Advantage Group International, Inc.
The Baby Dietitian, LLC
Tillack, Kristin
Tompkins, Magaly
Trojan Goddess, LLC
Twitch Interactive, Inc.
United States Olympic Committee
Velazquez, Tracy
Village Marketing Agency, LLC
Walton, Irene
Ward, Jennifer
Watters, Harper
Whitehead-Caple, Macee
Wiser Partners, LLC
Xiao, Jona
Xu, Ashley
Youngren, Kennedy

Approved Nutrition Competitive Research Activities, 2022

Principal Investigator, Institution, Project Title, and Status

Lacy Alexander, PhD (Pennsylvania State University): *Cheese consumption and human microvascular biomarkers of inflammation* [ongoing 2022].

Mary Cloud Ammons, PhD (Idaho Veterans Research and Education Foundation) & Margaret Doucette, DO (Boise Veterans Affairs Medical Center): *Data collection cooperative research and development* [ongoing 2022].

Daniela Barile, PhD (University of California-Davis): *Whey Phospholipid concentrate as a source of bioactive compounds that improve human health* [ongoing 2022].

Nick Bellisimo, PhD (Ryerson University): *Effect of dairy form on mood and cognitive performance in school-aged children* [commenced 2022].

Sherman Bigornia, PhD (University of New Hampshire): *Prospective associations of dairy intake with cardiometabolic and brain-related health in the Hispanic community health Study/Study of Latinos* [commenced 2022].

Christopher Blesso, PhD (University of Connecticut): *Evaluation of milk polar lipids on lipoprotein metabolism, inflammation, and gut microbiota in dyslipidemic adults with abdominal obesity* [commenced 2022].

Bradley Bolling, PhD (University of Wisconsin-Madison): *Anti-Inflammatory activity of yogurt mediated by the intestinal barrier* [ongoing 2022].

Richard Bruno, PhD (Ohio State University): *Alleviation of metabolic endotoxemia in adults with metabolic syndrome with milk fat globule membrane* [concluded 2022].

Nicholas Burd, PhD (University of Illinois at Urbana - Champaign): *Dairy food consumption and its effects on inflammation and the postprandial regulation of muscle protein synthesis* [ongoing 2022].

Wayne Campbell, PhD (Purdue University) & Whey Protein Research Consortium: *Whey protein effects on Type 2 Diabetes Mellitus risk factors: A systematic review of clinical trials* [ongoing 2022].

In-Young Choi, PhD (University of Kansas): *Dairy intake and cerebral antioxidant defense in aging: A dietary intervention study* [ongoing 2022].

Sharon Donovan, PhD, RD (University of Illinois at Urbana - Champaign): *STRONG Kids 2: A cells-to-society approach to nutrition in early childhood* [ongoing 2022].

Foundation for the National Institutes of Health: *The performance of Novel Cardiac Biomarkers in the general U.S. population* [ongoing 2022].

Darcy Freedman, PhD (Case Western Reserve University): *Nourishing Neighborhoods, Empowering Communities Study* [commenced 2022].

Osama Hamdy, MD, PhD (Joslin Diabetes Center): *Dairy and Type 2 Diabetes: Research, outreach, and education* [ongoing 2022].

Thom Huppertz, PhD (Wageningen University): *Quantifying differences in bioavailability of different dietary proteins in older adults* [ongoing 2022].

Ruchi S. Gupta, PhD (Food Allergy Research and Education): *The childhood activities nutrition and development oversight study* [commenced 2022].

Naiman A. Khan, PhD, RD (University of Illinois at Urbana - Champaign): *Cross-sectional and longitudinal predictors of cognitive control and early academic abilities among preschool children* [ongoing 2022].

Kevin C. Maki, PhD (Midwest Biomedical Research, a division of MB Clinical Research & Consulting): *Scientific literature review on the naturally occurring hormone contents of foods* [ongoing 2022].

Kelsey M. Mangano, PhD, RD, (University of Massachusetts Lowell): *Longitudinal associations between dairy foods and biomarkers with cardiometabolic outcomes in the Boston Puerto Rican Health Study* [ongoing 2022].

Maria Marco, PhD (University of California-Davis): *Fermented dairy effects on markers of intestinal health: A literature review* [ongoing 2022].

Nicola McKeown, PhD (Tufts University): *Building a database and evidence map on dairy, health, and environmental factors* [ongoing 2022].

Daniel Moore, MD, PhD (University of Toronto): *Anabolic potential of dairy and dairy products for active children and adolescents* [ongoing 2022].

Lynn L. Moore, DSc, MPH (Boston University School of Medicine): *Yogurt and total dairy intake among women: effects on weight change and fracture risk during critical life stages* [ongoing 2022].

Stuart Phillips, PhD (McMaster University): *The mechanistic underpinning of protein quality and quantity in aging skeletal muscle: A high sensitivity Proteome profiling approach* [ongoing 2022].

Jeffery Schwimmer, MD (University of California, San Diego): *Whole dairy foods consumption for children with NAFLD* [ongoing 2022].

Marie-Pierre St-Onge, PhD (Columbia University): *The role of dairy products on sleep health: A narrative review* [ongoing 2022].

Connie Weaver, PhD (San Diego State University): *Racial/Ethnic Differences in Calcium Metabolism in Response to Dietary Sodium* [commenced 2022].

Elena Volpi, MD, PhD (University of Texas Medical Branch at Galveston): *A Phase I randomized clinical trial of in-hospital and post-hospital Whey Protein vs. Isonitrogenous Collagen Protein vs. Isocaloric Placebo Maltodextrin Supplementation to improve recovery from hospitalization for an acute medical illness in previously independent community dwelling older adults* [ongoing 2022].

Trudy Voortman, PhD (Erasmus University Medical Center Rotterdam): *The role of dairy foods in inflammation and inflammatory diseases in the general population: Resolving inconsistencies in current evidence* [ongoing 2022].

Approved Product Competitive Research Projects, 2022

Principal Investigator, Institution, Project Title, and Status

Alirez Abbaspourrad, PhD (Cornell University): *Conversion of lactose to surfactants* [ongoing 2022]; *Improvement of lactoferrin thermal stability and functionality by complex coacervation and microencapsulation methods* [ongoing 2022]; *Isolation and encapsulation of tryptophan to improve stability and reduce bitterness* [ongoing 2022]; *Modifying butter spreadability using microbubbles generation and controlling fat crystallization* [ongoing 2022]; *Mitigating the astringency of whey protein through complexation and encapsulation techniques* [commenced 2022].

Jennifer Acuff, PhD (University of Arkansas): *Determination of thermal inactivation kinetics of salmonella and a surrogate in dairy powders* [ongoing 2022].

Samuel Alcaine, PhD (Cornell University): *Create nationwide food safety resources and provide support for artisan/farmstead dairy producers* [ongoing 2022].

Jayendra K. Amamcharla, PhD (Kansas State University): *Development, characterization, and evaluation of modified milk protein concentrate with enhanced functional properties* [ongoing 2022]; *Tailoring protein interactions to influence functional properties of milk protein concentrate powders* [ongoing 2022]; *Development and validation of a simple and rapid water adsorption kinetics-based approach to measure solubility of dairy powders* [ongoing 2022]; *Functional enhancement of milk protein concentrates with aggregated whey proteins for controlling viscosity in high protein fermented products*[commenced 2022].

Dennis D'Amico, PhD (University of Connecticut): *Optimizing the application of hydrogen peroxide to control listeria monocytogenes contamination on the surface of high-moisture cheese* [ongoing 2022].

MaryAnne Drake, PhD (North Carolina State University): *Identification of consumer-centric messaging for these products* [concluded 2022]; *Southeast Dairy Center Application Laboratory Program* [ongoing 2022]; *Sugar reduction in school lunch chocolate milk* [ongoing 2022]; *Protein beverage innovation platform* [commenced 2022]; *The role of pH and mineral salts on heat stability and acid gelation of commercial liquid and dried MPC* [commenced 2022]; *Understanding the sources of variability in butter hardness: stage of lactation* [commenced 2022].

Kathleen Glass, PhD (University of Wisconsin-Madison): *Mapping the development of D- and Z-values for L. monocytogenes and escherichia coli O157:H7 in cheese milk to reduce pathogen risks in cheese manufacture* [concluded 2022].

Selvarani Govindasamy-Lucey, PhD (University of Wisconsin-Madison): *Shelf-stable snacks made by extrusion of natural cheeses* [concluded 2022]; *Improving the functionality of frozen and superchilled shredded cheese during extended storage* [ongoing 2022]; *Strategies to control browning/blistering in low-moisture part-skim mozzarella cheese* [commenced 2022].

Federico Harte, PhD (Pennsylvania State University): *Effects of calcium chelation and alteration of serum composition on low temperature gelation of concentrated milk protein solutions* [ongoing 2022]; *Transforming High Pressure Jet (HPJ) processing into a commercially viable technology for the dairy industry* [ongoing 2022]; *Harte-Milk Textiles: Electrospinning of neat casein nanofibers* [commenced 2022].

Richard Hartel, PhD (University of Wisconsin-Madison): *Application of select dairy ingredients to enhance shelf life, physical properties and sensory attributes of high protein frozen dairy desserts* [ongoing 2022]; *Characterizing the functional and practical performance of hydrolyzed lactose syrup in selected foods* [commenced 2022].

Tu-Anh Hyunh, PhD (University of Wisconsin-Madison): *Inhibition of listeria monocytogenes on wooden cheese board microbiota* [concluded 2022].

Mark Johnson, PhD (University of Wisconsin-Madison): *Innovative approaches to increase the shelf life of string cheese and fresh cheese curds* [ongoing 2022]; *Manufacture of low-moisture part-skim mozzarella cheese using milks high in casein and novel cheesemaking approach* [commenced 2022]; *Developing a dairy-based antifungal ingredient for use in the cheese industry* [commenced 2022].

Helen Joyner, PhD (University of Idaho): *Creating cleaner label process cheese foods by replacing emulsifying salts with dairy proteins* [ongoing 2022].

John A. Lucey, PhD (University of Wisconsin-Madison): *Wisconsin Center for Dairy Research Applications Laboratory* [ongoing 2022]; *Novel ceramic nanofiltration to improve coproduct quality and increase utilization* [concluded 2022]; *Dairy beverage innovation* [ongoing 2022]; *Controlling sedimentation during storage of high protein UHT beverages* [ongoing 2022].

Curtis Lockett, PhD (University of Tennessee): *Preference mapping of the Chinese cheese market* [ongoing 2022].

Maria Marco, PhD (California Dairy Research Foundation): *The yogurt matrix during digestion: benefits of milk composition and structure* [commenced 2022].

Sergio Martinez-Monteagudo, PhD (South Dakota State University): *Effective phospholipids extraction from dairy byproducts using switchable solvents* [ongoing 2022].

Susan Mayer (RTI Innovation Advisors): *International wellness benefits for dairy* [ongoing 2022]; *Permeates – market opportunity scouting* [concluded 2022]; *Digital dairy technology landscape* [commenced 2022].

Owen M. McDougal, PhD (Boise State University): *Cost effective dairy protein certification method* [ongoing 2022].

Carmen I. Moraru, PhD (Cornell University): *Cheese snack products: consumer trends and a novel manufacturing approach using vacuum microwave drying technology* [ongoing 2022].

Daniel Noguera, PhD (University of Wisconsin-Madison): *Microbial production of value-added constituents from lactose-rich dairy coproducts* [ongoing 2022]; *Improved recovery of succinic acid and lactic acid as microbially-produced value-added chemicals from lactose-rich coproducts* [commenced 2022].

NIZO Food Research B.V. (Netherlands): *Reduction of spore count in milk powder production - Phase II of development of an improved enumeration method for highly heat resistant spores* [ongoing 2022].

Reza Ovissipour, PhD (Virginia Polytechnic Institute and State University): *Reducing surface bacterial contamination with nanobubbles to enhance sanitation in dairy processing facilities* [ongoing 2022].

Scott A. Rankin, PhD (University of Wisconsin-Madison): *Production of lactose-free dairy products by the catalytic hydrolysis of lactose in dairy streams with solid acid catalysts* [ongoing 2022].

Prafulla Salunke, PhD (South Dakota State University): *Midwest Dairy Foods Applications Laboratories Program* [ongoing 2022]; *Manufacture of ingredients for use in clean label process cheese and recombined cheese in export markets* [ongoing 2022]; *Effect of shred dimensions on functionality and consumer acceptance of low moisture mozzarella cheese* [commenced 2022].

Tonya Schoenfuss, PhD (University of Minnesota): *Improvement of processing and functional properties of milk protein concentrate and micellar casein by pulsed electric field pre-treatment* [concluded 2022].

Abigail Snyder, PhD (Cornell University): *Management of yeasts and molds through strain-level PCR-based typing schemes* [ongoing 2022].

Caixia Wan, PhD (University of Missouri): *Process development for bioplastics production from lactose permeate* [ongoing 2022].

Yi-Cheng Wang, PhD (University of Illinois - Urbana-Champaign): *Nanomaterials-based time-temperature indicators for monitoring the quality of aseptic milk products* [commenced 2022].

Ruihong Zhang, PhD (University of California-Davis): *A novel integrated system for polyhydroxyalkanoates (PHA) production from cheese production byproducts* [ongoing 2022].

Qixin Zhong, PhD (University of Tennessee): *Improving functionalities of spray-dried skim milk powder by supplementing soluble caseins* [ongoing 2022].

Haotian Zheng, PhD (North Carolina State University): *Predicting heat stability of nonfat dry milk in the application of reconstituted UHT milk using spectroscopic techniques as a rapid method* [ongoing 2022]; *Soft matter strategy for creating novel food texturizer: replacement of starch by using whey protein aggregates and the aggregates stabilized o/w Pickering emulsion droplets* [ongoing 2022]; *Scalable and cost-effective liquid shear-driven fabrication of nano fibers of whey protein assemblies* [commenced 2022]; *Establishing database of interfacial*

properties for US milk powders: interfacial characteristics as indicator of powder quality and functionality [commenced 2022].

Approved Sustainability Competitive Research Activities, 2022

Principal Investigator, Institution, Project Title, and Status

Brent Auvermann, PhD (Texas A&M AgriLife Research): *U.S. Dairy Net Zero Initiative: Improving dairy on-farm sustainability through improved soil health and manure management* [ongoing 2022].

Joshua Boltz, PhD (Arizona State University): *Maximizing value from dairy-cow wastewater by intensifying anaerobic digestion* [ongoing 2022].

Barry Bradford, PhD (Michigan State University): *Assessment of greenhouse gas footprints on small and mid-sized U.S. dairy farms* [commenced 2022].

Michael Cope, PhD (University of Wisconsin, Platteville): *U.S. Dairy Net Zero Initiative: Improving dairy on-farm sustainability through improved soil health and manure management* [ongoing 2022].

Geoffrey Dahl, PhD (University of Florida): *Potential for manipulating methane intensity in dairy production* [commenced 2022].

Foundation for Food and Agriculture Research: *The Greener Cattle Initiative (GCI) program* [ongoing 2022].

Randy Jackson, PhD (University of Wisconsin-Madison): *U.S. Dairy Net Zero Initiative: Improving dairy on-farm sustainability through improved soil health and manure management* [ongoing 2022].

Quirine Ketterings, PhD (Cornell University): *U.S. Dairy Net Zero Initiative: Improving dairy on-farm sustainability through improved soil health and manure management* [ongoing 2022].

Ermias Kребreab, PhD (University of California - Davis): *Quantitative assessment for feed additives enteric methane mitigation protocol* [ongoing 2022]. *Statistical analysis of dairy cow diet re-formulation to mitigate enteric methane* [ongoing 2022].

Kim Stackhouse-Lawson, PhD (Colorado State University): *U.S. dairy industry inventory of sustainable practices* [ongoing 2022]; *U.S. dairy industry inventory of sustainable practices* [commenced 2022].

April Leytem, PhD, (USDA, ARS, Northwest Irrigation and Soils Research): *U.S. Dairy Net Zero Initiative: Improving dairy on-farm sustainability through improved soil health and manure management* [ongoing 2022].

Deanne Meyer, PhD (University of California, Davis): *U.S. Dairy Net Zero Initiative: Improving dairy on-farm sustainability through improved soil health and manure management* [ongoing 2022].

Cristine Morgan, PhD (Soil Health Institute): *U.S. Dairy Net Zero Initiative: Improving dairy on-farm sustainability through improved soil health and manure management* [ongoing 2022].

Keith Paustian, PhD (Colorado State University): *Modeling environmental impacts of synthetic and dairy-manure based fertilizers in U.S. dairy farms* [ongoing 2022].

Kristan Reed, PhD (Cornell University): *The ruminant farm system model - dairy cow ration formulation and feed allocation modules* [ongoing 2022]; *Expanding FARM ES capability through integration with the Ruminant Farm Systems (RuFaS) model* [commenced 2022].

Bruce E. Rittmann, PhD (Arizona State University): *NEWT Non-CORE Project: Maximizing value from dairy-cow wastewater by intensifying anaerobic digestion* [commenced 2022].

Daniel Sumner, PhD (University of California - Davis): *Economic, environmental and resource impacts of using by-products as ingredients in feed rations on U.S. dairy farms* [ongoing 2022].

Greg Thoma, PhD (University of Arkansas): *Environmental stewardship – reporting platform* [ongoing 2022].

Mike Van Amburgh, PhD (Cornell University): *Quantifying nitrogen volatilization in dairy excretion: A case for reducing protein feeding through improved dietary formulation* [commenced 2022].

Francisco Leal Yepes, PhD (Washington State University): *Smart sensing solutions for dairy farming* [commenced 2022].