

AN ECONOMIC EVALUATION OF THE PORK CHECKOFF PROGRAM

EXECUTIVE SUMMARY

George C. Davis
Oral Capps, Jr.
David A. Bessler
James H. Leigh
John P. Nichols

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Department of Agricultural Economics
Texas A&M University
College Station, TX 77843-2124

For more information, please contact Dr. John P. Nichols at the above address or
Phone: (979) 845-8491 Fax: (979)860-3019 Email: jpn@tamu.edu

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Introduction

The **mission of the National Pork Board (NPB)** is to “strengthen the position of the pork industry in the marketplace and maintain, develop, and expand markets for pork and pork products”. It carries out this mission through the operation of the Pork Checkoff Program authorized under the “Pork Promotion, Research, and Consumer Information Act” contained in the 1985 Farm Bill. Funds were collected beginning in 1986 and program activities began in 1987.

The **pork industry is undergoing a significant transition** in organization and structure driven by competitive forces in the market for meat products and rapidly changing technology. Pork production has increased during the study period, but U. S. per capita consumption has remained about level (See Figure ES.1). Exports have increased, especially in recent years. The price of pork relative to other meats has remained stable over this time but all meat prices have shown an upward trend so the value of U.S. pork consumption reached a record high of \$35.4 billion in 1998. Industry consolidation has been rapid with fewer producers and larger operations, a trend that is common throughout agriculture.

National Pork Board Checkoff Program assessments are currently 0.45% of the value of hogs marketed in the U.S. and an equivalent rate on pork imports. The NPB contracts with other organizations, principally the National Pork Producers Council (NPPC), to carry out various program activities described as promotion, research, and consumer information. It is these activities, funded by the NPB, that are the focus of this study. Expenditures on program activities have ranged from approximately \$25 million in 1989 to \$60 million in 1997 (in current dollars), with pork demand expenditures being the primary component. Annual expenditures (deflated) on specific program categories are illustrated in Figure ES.2.

The **purpose of this study** is to provide an economic assessment of the Pork Checkoff Program since its inception in 1987. Three objectives requested by the National Pork Board were addressed:

- X To measure the economic benefit to producers of pork checkoff-funded programs for the period 1987-1998 in terms of net return on investment;
- X To measure the effectiveness of checkoff-funded programs in terms of changing factors which are intermediate- to long-term financial benefits; and
- X To design a system to compute marginal rates of return on investment for alternative existing pork checkoff-funded activities.

Key Results

- **The overall rate-of-return on the Pork Checkoff Program is positive and significant.** Using two separate methods of estimation of returns to producers, the net benefit cost ratio (NBCR) over the period 1987 through 1998 was estimated to be between 4.79 and 26.19 (Table ES.1). This result is interpreted to mean that the **estimated net return to the producer is at least \$4.79 per checkoff dollar invested.** This range is comparable to that found in studies of other generic promotion programs. Examination of different types of program expenditures found that:
 - **The highest returns was from post-farm research and technology transfer activities** directed at increasing the demand for hogs at the processing and wholesale level.
 - **High positive returns also were realized from pork demand enhancing expenditures;** those aimed at increasing consumer demand for pork and pork products.
 - **Foreign market development expenditures also have a positive return** to checkoff expenditures.
 - **Expenditures on farm research and education activities gave mixed results.** No statistically significant benefits were found using the traditional method while negative effects were found in the time series approach. A negative NBCR is not surprising given the inelastic nature of the farm-level demand for hogs. To the extent that these expenditures shifted supply outward through efficiency improvements, the Checkoff Program may have been successful in keeping costs competitive. This result then may be viewed as a “cost of doing business” required to be competitive with other meats. It is important to note, however, that the positive overall NBCR includes these effects. Thus, the other program activities more than offset the effect of shifting supply outward. The mixed results also reflect the difficulty of measuring the effects of research over short time periods.
- **The Pork Checkoff Program resulted in price increases of generally less than 5%.** The substantial NBCR from the program reflects the relatively modest Checkoff Program expenditure levels relative to the total value of industry sales (generally less than 0.1% of pork value and less than 0.4% of hog value). There are many other important factors which influence pork prices to a greater extent than the activities of the Checkoff Program, but this is one area producers can influence directly.

- The price gain for producers, using the more conservative approach, indicate that the **net returns to producers from the Checkoff Program were about \$1.17 per hog (250 lbs.)** (Table ES.2). This result is based on an estimated increase of \$0.62 per cwt. in hog prices that resulted from the Checkoff Program. This is the price effect of the checkoff which would be gained by any producer even if they had not grown with the industry or adopted cost-reducing technology.
- The findings suggest that the **returns to the program were greatest in the most recent years** (Figure ES-3). These results indicate that the industry crisis in 1998 would have been worse had the Checkoff Program, and its program activities, not been in existence during that time.
- **The positive results of Pork Checkoff expenditures also were found in the analysis of micro-level (individual household) data on pork and other meat intake.** Branded pork advertising and NPB/NPPC pork demand expenditures (PDE), as well as beef advertising, play a prominent role affecting the probability of consuming pork and the absolute and relative amounts of pork intake.
- In the analysis of individual household intake, **key health factors associated with the probability of eating pork were identified.** Those individuals who have never smoked, are on a low-fat diet, who always trim the visual fat from meat, and who place greater importance of choosing a diet low in cholesterol, have a lower probability of eating pork. The greater the importance of nutrition, however, the greater the likelihood of eating pork. Region, urbanization, race, age, income, and seasonality also are significant factors affecting pork demand.
- **Pork-related attitudes and awareness of Pork Checkoff-sponsored advertising messages are strongly correlated.** Analysis of tracking study data show that both positive attitudes toward pork and advertising awareness have improved over the available study period January 1992 through May 1998.
- The use of **larger print advertising and spread layouts**, in color with a pulsed presentation, **has positive impacts** on awareness and attitudes.
- **Marginal rates-of-return for different categories of Checkoff-funded activities are implied by the results of the returns on investment part of the study.** The results suggest, but do not guarantee, that more investment may be warranted in the area of post-farm research activities. The data available do not provide the basis to make any stronger statement or to estimate the optimum expenditure levels by program category.

Other Implications of Results

- The results of this study clearly indicate that the **Pork Checkoff Program has, on average, made producers better off** than they would have been without the program. The commitment made by producers to any checkoff program has a strategic dimension. As with any business, producers need to consider what investments are needed to remain competitive and whether they, as an individual producer, wish to remain in the industry. The Pork Checkoff is simply an agreement among producers to do those things that are required for the sector to compete in the marketplace for their products.
- The presence of industry-wide benefits, however, **does not mean that all producers have benefited to the same degree since different producers have different abilities to capture these benefits.** Though the benefits measured here are available to all, some producers may be limited by various constraints (fixed investments, resource base, aversion to change, etc.) from fully capturing them. Others may be readily able to capture a portion of the “platform” of benefits created by the Checkoff Program. Detailed examination of the effects of the Checkoff Program on different types or sizes of producers was beyond the scope of this study.
- **Clearly, however, the \$1.17 return per hog is not enough to offset observed cost differences among producers.** USDA’s Farm Costs and Returns Survey indicates that the average cost of production from that survey was \$46.57, but for high cost producers it was over \$60.06. Average cost of feed on high-cost operations is more than double that of low-cost operations (\$41.37 vs. 19.56 per cwt. gain).
- **As pork demand expenditures of the Checkoff Program increased, branded expenditures decreased.** This finding suggests the need for further evaluation of the relationship among these factors affecting pork demand with the possibility of improved marketing coordination.
- **The successful analysis of micro-level (household) data on pork intake provides a rich basis for additional useful research.** Many significant relationships were found which should provide useful guidance to market segmentation and promotion strategies. Similar analysis with more complete, current, and continuing data sets should be explored.

Study Design

The study uses **several economic and marketing research techniques and methods** to examine the effects in question. The complexities of the hog and pork markets, their relationship to other meats, growing international linkages, the effects of competitors, and many other economic and marketing variables were all taken into account in order to sort out and estimate, where possible, the effects of the Checkoff Program activities.

Data were obtained through many sources. Program expenditures for each of the different program activities were provided by the NPB and NPPC prior to the specification of the models used in the analysis. Quarterly data were available from 1987 through 1998 for a total of 48 quarters. All other data on prices, quantities, and other key economic variables in domestic and international markets were obtained directly from many different public sources.

Given the limited time period available for statistical analysis, it was necessary to group these the activities into four categories: pork demand expenditures (PDE), post-farm research expenditures (PFRE), farm research and education expenditures (FREE) and foreign market development expenditures (FMD).

PDE represents all those activities which are designed to expand the U. S. demand for pork and pork products, especially at the consumer level. In economic terms, PDE are thought to shift the U. S. pork demand curve outward. Post-farm research expenditures (PFRE) are those activities that are targeted at new product and processes and are aimed at the marketing chain. This category includes research, and related technology transfer to processors and others beyond the farm. These expenditures are thought to increase the demand for hogs.

Farm research and education expenditures (FREE), are aimed at improving production technology and educating producers on how to adopt these improvements. These activities, if effective, are thought to impact the U. S. hog supply curve by lowering production costs. Foreign market development expenditures (FMD) are those funds spent by the NPB/NPPC on the development and expansion of export markets for U.S. pork and pork products.

Data for pork intake by individuals were obtained for Objective 2 from the USDA Continuing Survey of Food Intakes by Individuals (CSFII). Survey data from independently conducted periodic tracking studies were provided by Bozell Worldwide, Inc., the NPB/NPPC contractor for advertising and promotion. These tracking surveys, from 1992 through 1998, provided the basis for examining the relationship between advertising and consumer awareness of messages and their attitudes toward pork.

Return on Investment (Objective 1): The return on investment effects of the Pork Checkoff activities were measured using two separate econometric techniques: a *structural* approach; and a *time series* approach. This methodology allows for the strengths of each approach to be drawn upon in the study. The results from these two methods are presented as net benefit cost ratios (NBCR) and, as reported above and in the study, generally track each other well in terms of relative magnitudes. These results should be interpreted as a range which bracket the effects of the program activities.

Micro-level Analysis (Objective 2): Two approaches also were used to address this objective. One analysis focused on the CSFII data on individual food (pork and related meats) intake in relation to various demographic characteristics and indicators of dietary and health knowledge from the USDA Diet and Health Knowledge Survey (DHKS). After accounting for these effects, the impact of Checkoff pork demand expenditures (PDE) on pork intake also was examined. The second approach was a bivariate statistical analysis of the tracking surveys of consumer awareness and attitudes, done in waves, since 1992. These data were examined to determine if a relationship exists between Checkoff-funded advertising and the awareness and attitudinal variables. Data limitations precluded a further more intensive analysis of multivariate techniques.

Marginal Rates of Return (Objective 3): This objective was pursued in relation to the methods and findings from Objective 1. The approach was mainly exploratory to determine if such results could be directly applied to the decisions made by NPB and NPPC managers regarding allocations among alternative program activities. Existing literature on optimization problems of this type is reviewed and a suggested general approach described. Limitations and constraints of this method, in relation to the current study, are documented and discussed. Suggestions regarding data requirements and ways for managers to approach this issue are provided.

Figure ES.1. U.S. Per Capita Consumption of Beef, Pork, and Poultry, 1987-1998

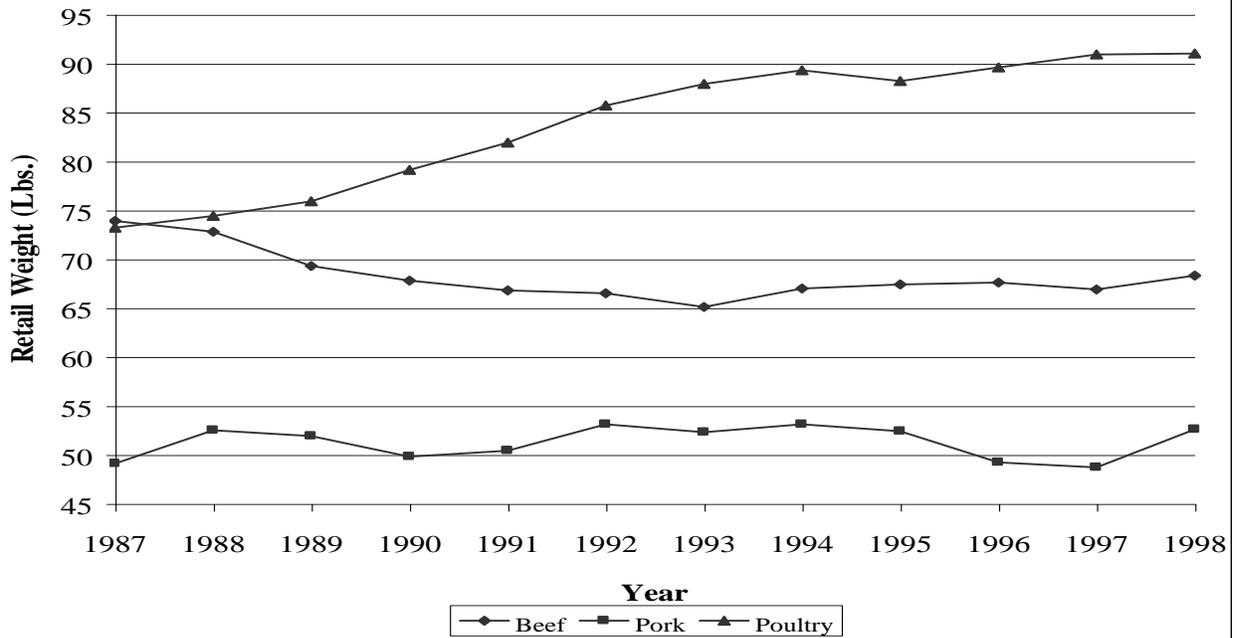


Figure ES.2. NPB/NPPC Annual Expenditures for Major Program Categories, 1987-1998

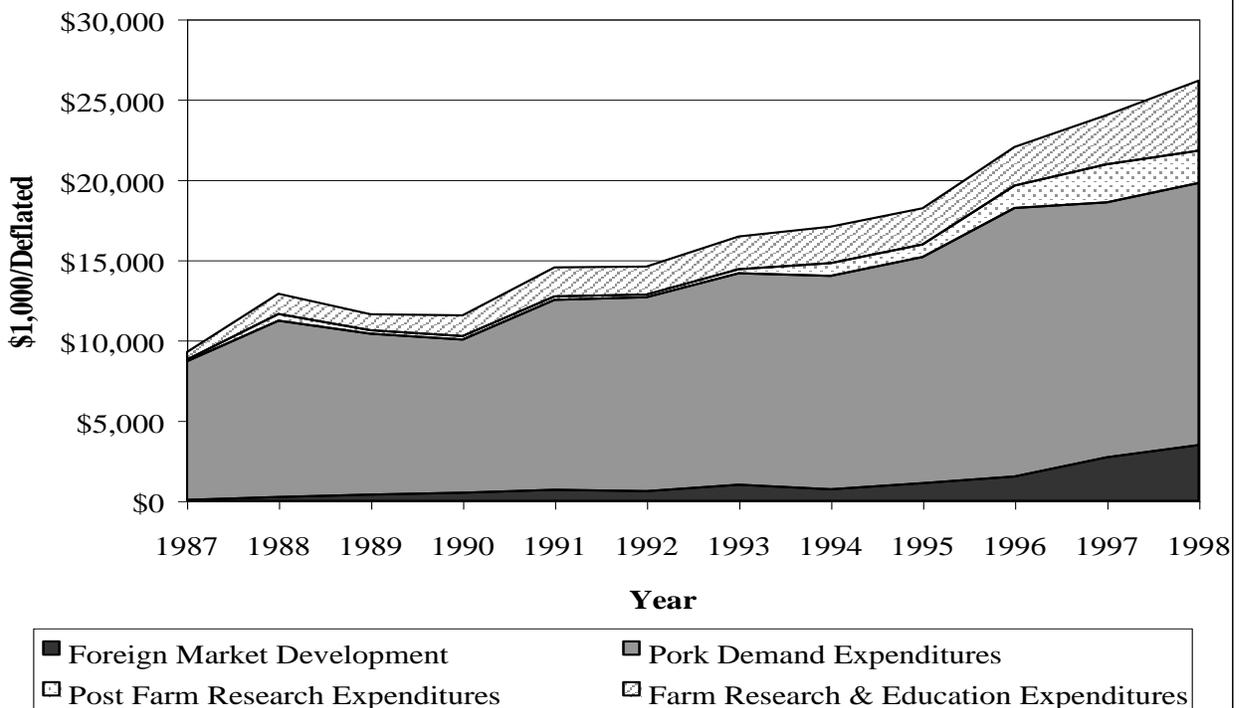


Figure ES.3. Illustration of Cumulative Net Benefit-Cost Ratio, for Two Models, 1987-1998

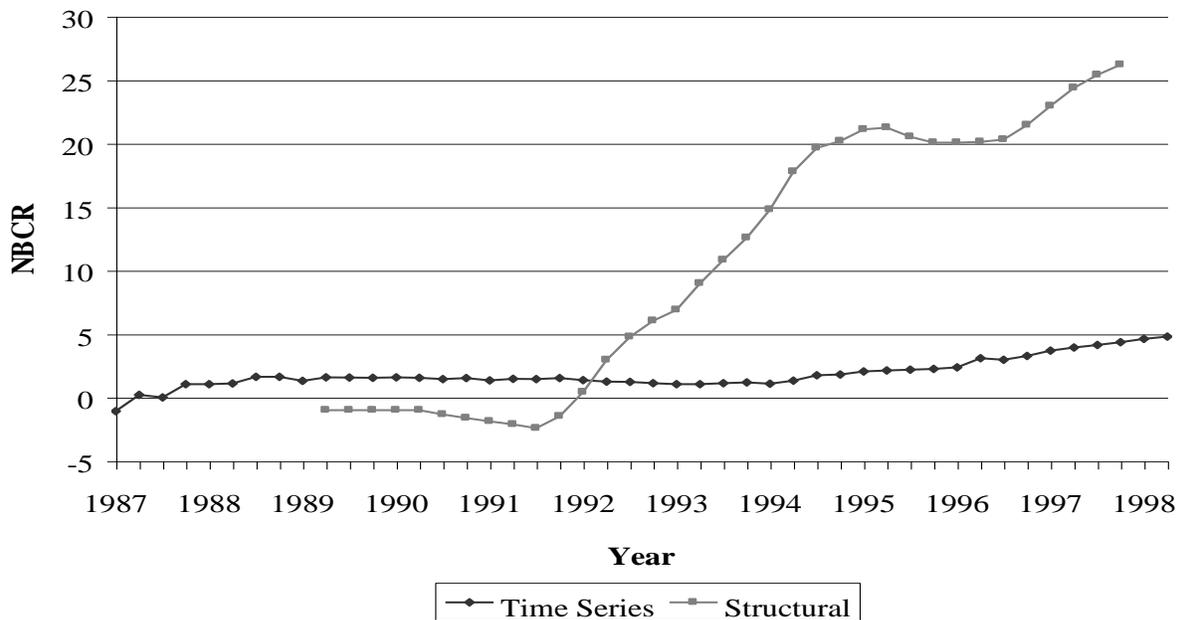


Table ES.1. Summary of Net Benefit-Cost Ratios (NBCR) estimated from the Time Series and Structural Models

NPB/NPPC Program Expenditure Categories	NBCR	
	Time Series	Structural
Pork Demand Expenditures	15.26	22.49
Foreign Market Development Expenditures	*	12.52
Post-Farm Research Expenditures	116.30	197.49
Farm Research and Education Expenditures	-9.24	-1
All Expenditures	4.79	26.19

* Not estimated.

Table ES.2. Illustration of the Average Effect of Price Change (Time Series Results) for the Individual Producer

Variable	With NPB/NPPC Expenditures	Without NPB/NPPC Expenditures	Difference
Hog Price (\$/cwt.)	\$45.42	\$44.80	\$.62
Price of 250 lb. hog	\$113.55	\$112.00	\$1.55
Hog Price – Checkoff (\$/cwt.)	\$45.27	\$44.80	\$.47
Price of 250 lb. Hog – Checkoff	\$113.17	\$112.00	\$1.17