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Financial Impact of Penn State Extension's Know Your Numbers Dairy Program

Abstract

Dairy-related Extension programming is important in many states, but the economic impact of such programming has received little attention. We examined the impact of Know Your Numbers, an educational program offered by the Penn State Extension Dairy Team. Using follow-up evaluation data and the economic impact tool IMPLAN, we estimated that the program had a total financial impact of $9.5 million and an employment impact of 69 jobs in 2014. The overall financial impacts of the Dairy Team, given its abundance of other programming, likely are significantly higher. Our approach for estimating the economic impact of an Extension program can be used by others to understand and demonstrate the value of their work.

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Introduction

Documenting the impact of Extension programming can be important for helping funders and stakeholders understand the value of Extension as well as for helping state Extension systems evaluate program priorities (Goetz & Davlasheridze, 2016; O'Neill, 1998). Economic impact analysis has been used to study a variety of individual Extension programs, including personal finance programs in New Jersey (O'Neill, 1998), forestry workshops in Oklahoma (Marcouiller, Ray, Schreiner, & Lewis, 1992), and new landowner land management and agricultural enterprise programming in four Texas counties (Shackelford, Murphrey, Dozier, Ripley, & Lockett, 2017). The impacts of activities such as 4-H participant spending on livestock projects in Colorado (Hill & Goodwin, 2015), participant spending on all 4-H projects in a Florida county (Harder & Hodges, 2011), and

spending of Extension staff supporting Supplemental Nutrition Assistance Program educational programming in Arizona (Kerna et al., 2015) also have been examined.

Dairy-related Extension programming is important in states with large dairy industries and thus is important to funders and stakeholders, but the financial impact of such programming has received little attention. Several researchers have considered whether participants in Extension dairy programs adopt or use what they learn. For example, Higginbotham and Kirk (2006) surveyed attendees of a dairy herdsman short course and found that 41% of attendees were applying the information they had learned in the course. Imler, Carr, Hersom, Johnson, and Thrift (2012) similarly evaluated a dairy beef quality assurance Extension program and found that all respondents planned to implement at least one new production practice to improve animal welfare or meat quality. Such studies are useful for evaluating the effectiveness of programming but by themselves do not identify to what extent programs make a financial difference for producers, an outcome that is of interest to funders.

The study we report here examined the financial impact of a major educational program provided by the Penn State Extension Dairy Team (hereafter Dairy Team). The program was conducted by a multidisciplinary team that included animal science members of the Dairy Team and several agricultural economists who provided evaluation support. Our analysis addressed the financial impact on farmers involved in the program in 2013 and associated economic impacts as well as the potential statewide financial impact if more dairy farmers were to have participated in the program. Of course, the Dairy Team's overall financial impact is larger than estimates reported here because the team's work expands beyond just one program. In general, the Dairy Team's work has broad bearing due to the size of the state's dairy industry. According to the U.S. Department of Agriculture (USDA) National Agricultural Statistics Service (NASS) (2016), Pennsylvania ranks fifth nationally in value of dairy sales. Specifically, Pennsylvania had 7,829 dairy farms in 2012, more than every state except Wisconsin (USDA NASS, 2012), and the value of milk production in the state was $1.97 billion in 2015 (USDA NASS, 2016). The approach we used for estimating economic impacts brought about through the work of the Dairy Team can be applied by others seeking to assess such impacts of various types of Extension programming.

The Dairy Team's Know Your Numbers Program

The Dairy Team offers numerous courses, workshops, and conferences that are open to all dairy producers in the state and often are attended by out-of-state and foreign farmers as well. These events focus on five core subjects: dairy business management, dairy cattle nutrition, dairy herd management, human resource and team management, and nutrient and feed management. Drawing on Penn State dairy research, the Dairy Team provides educational programming to dairy producers, their employees, and industry consultants.

For the financial impact research described here, we focused on a Dairy Team program with good pre- and postprogram data that would allow us to acquire a clear understanding of the program's impacts on participant farms. Funded by the Risk Management Agency of the USDA, the Know Your Numbers (KYN) program centers on workshops and seminars covering cash flow planning for various situations. Specifically, the program includes a cash flow planning workshop, an advanced cash flow planning workshop, and advanced cash flow planning brunch meetings. The cash flow planning workshop accommodates producers who have not completed a cash flow plan in the past or are new to the program. Participants discuss cropping and feed costs, income over feed costs, and risk management strategies for mitigating price risks for both feed and milk production. The advanced cash flow planning workshop is for producers who have completed a cash flow plan in the past. Participants evaluate their past year's cash flow and cropping and feeding management practices and evaluate quality of milk,

corn silage, and manure. They use their findings to develop a plan for the coming year. The KYN program was recognized by the National Association of County Agricultural Agents as the National Winner of Search for Excellence Programs in Farm and Ranch Management in 2014.

Method

In 2013, 143 dairy producers participated in KYN. Our research, which addressed financial impacts resulting from implementation of the program that year, involved the use of primary and secondary data sources and included participation by Dairy Team members who provided "before" and "after" data from farms participating in the program. The Dairy Team was able to collect these data from a representative sample of 10 of the KYN participants as part of the program evaluation process.

Participants reported that after attending the KYN programming, they had made alterations to their farm practices that had allowed them to reduce production costs and thus increase their profits. Typical changes included reducing alfalfa silage feeding rate, increasing corn silage acreage and feeding rate, reducing corn grain feeding rate while increasing acreage, and increasing small grain acreage and feeding rate. The herd sizes of the 10 participants who provided data ranged from 52 to 573 and averaged 247 cows. They sold an average of 57,127 hundredweight of milk in 2014 and had an overall increase of $639,818 in farm income as a result of the program, or an average increase of $63,982 per farm.

To estimate the potential impact of the program on participants, we extrapolated the evaluation findings to all 2013 program participants. For example, we multiplied the $63,982 average per-farm income increase indicated by the 10 evaluated participants by 143, the total number of farmers who participated in the program, to estimate an overall income increase of $9,149,426 across all farms. We estimated the local economic multiplier effects in Pennsylvania by entering this estimate into the input–output economic model IMPLAN. IMPLAN is among the most widely used economic impact models and has been used in prior Extension-focused research (see Harder & Hodges, 2011; Hill & Goodwin, 2015; Kerna et al., 2015; Marcouiller et al., 1992). Such economic tools model the interrelationships between sectors in an economy, allowing the analyst to understand how a change in one sector (such as higher household income among dairy farmers) affects other sectors, such as what would occur when dairy farm households spend some of their increased income at local businesses, whose owners then spend some of what they receive, and so on, with the income rippling through the economy in what economists call multiplier effects. IMPLAN and other similar economic models thus can help Extension professionals understand the broader economic impacts of their work.

The major economic change KYN program participants identified was increase in household income resulting from cost reductions on the farm. The KYN program thus affects Pennsylvania's economy largely through increased spending by farm households rather than spending by the farm businesses themselves. From an economic modeling perspective, this means that the impacts are induced effects arising from the households rather than direct or indirect effects from the farm businesses. It should be noted as well that our analysis focused on financial impacts on the farms and did not take into account how other businesses may have been affected by circumstances such as the farmers' using inputs more conservatively.

Results

Impact of the KYN Program

The IMPLAN analysis of the data indicated that the total financial impact on the Pennsylvania economy in 2014 as a result of the Dairy Team's KYN program was $9,527,135 (see Table 1). The analysis also suggested that this spending supported 69 jobs, representing a total of $3.3 million in wages and salaries (see Table 1).

Table 1.

Know Your Numbers Program Impact Summary, 2014

Impact type	Total effect
Employment	69
Labor income	$3,313,855
Output	$9,527,135

Note. Data source is authors' calculations using IMPLAN.

A detailed breakdown of where the effects of the $9,527,135 output occurred in Pennsylvania's economy is shown in Table 2. The largest increase was in the service sector, which accounted for about $6.4 million of the increase.

Table 2.

Financial Impact of Know Your Numbers Program in Pennsylvania by Sector

Sector	Total effect
Total	$9,527,134.75
Service	$6,430,121.52
Trade	$1,243,915.07
Transportation, information, and public utilities	$950,915.83
Manufacturing	$540,597.22
Government	$154,681.60
Construction	$133,424.37
Mining	$38,195.17
Agriculture	$35,283.97

Note. Data source is authors' calculations using IMPLAN.

The employment impact in Pennsylvania of the KYN program was 68.9 jobs, with about 50 of these occurring in the service sector due to increased income to dairy farm households (see Table 3). In addition to the 50 service sector jobs, an additional 13 or so jobs occurred in trade, the second most affected sector (see Table 3).

Table 3.

Know Your Numbers Program Impact on Employment in Pennsylvania by Sector

Sector	Jobs

Total	68.9
Service	50.1
Trade	12.9
Transportation, information, and public utilities	3.0
Manufacturing	0.9
Government	0.8
Construction	0.7
Agriculture	0.3
Mining	0.1

Note. Data source is authors' calculations using IMPLAN.

Potential Impact of Extending the Dairy Extension Programming to All Pennsylvania Dairy Farms

As part of our study, we considered the potential financial impacts of more Pennsylvania dairy producers' adopting the methods and techniques taught in the KYN program. We considered two scenarios: (a) What if half of all Pennsylvania dairy producers were to have participated in the program and implemented the same changes made by existing program participants? (b) What if all Pennsylvania dairy producers were to have participated in the program and implemented the changes?

If half of the dairy producers in Pennsylvania were to have participated in the cash flow plan program and implemented the practices taught, the financial impact would increase to about $219.8 million, supporting 1,590 jobs (see Table 4). If all Pennsylvania dairy producers were to have adopted these changes, the overall fiscal impact would be about $439.6 million (see Table 5), but this result requires fairly strong assumptions, including an absence of general equilibrium effects within the state's economy resulting from the changes.

Table 4.

Potential Impact Were 50% of Dairy Farms in Pennsylvania to Participate in Know Your Numbers Program

Impact type	Total effect
Employment	1,590
Labor income	$76,450,408
Total value added	$128,793,319
Output	$219,790,333

Note. Data source is authors' calculations using IMPLAN.

Table 5.

Potential Impact Were 100% of Dairy Farms in Pennsylvania to Participate in Know Your Numbers Program

Impact type	Total effect
Employment	3,181
Labor income	$152,900,816
Total value added	$257,586,638
Output	$439,580,667

Note. Data source is authors' calculations using IMPLAN.

Conclusion and Summary

Individual Extension programs increasingly are expected to demonstrate their value. In this article, we have shown that IMPLAN can be used to obtain estimates of financial impacts of an Extension dairy program. Doing so required us to have knowledge that the program had changed farmers' bottom lines by allowing them to reduce expenses and raise their net incomes. This result was extended to all dairy farms participating in the program, as well as all such farms statewide, through the use of a few mild assumptions. The latter estimation required somewhat stronger assumptions. We also showed how these impacts reverberated in the different sectors making up the economy, showing that increases in farm household spending would have had the proportionately largest effects on the service sector.

The analysis we conducted suggests that one of the Penn State Extension Dairy Team's program offerings in 2013 generated $9.5 million in financial impact in Pennsylvania. The overall financial impact of the team's activity likely is significantly higher as our estimates do not reflect the impact of the team's other major programming efforts. Additionally, it is important to recognize that the impacts we identified will occur annually, as participating farmers continue to use farming practices learned at the workshops.

The approach we used to estimate the economic impact of the KYN program can be used by other Extension professionals to understand and demonstrate the value of their work. Using IMPLAN itself may be beyond the capabilities of someone who is unfamiliar with economic analysis or lacks the time needed to acquire the required finesse and intuition to use IMPLAN appropriately; however, Extension professionals without the necessary background can partner with an economist to conduct such analysis. The approach requires collecting economic information from Extension program participants about how their use of program-related training and information affected their farming operation and/or household. Such data collection likely can occur as part of existing program evaluation efforts. The researcher then can analyze the information gleaned using the IMPLAN economic modeling tool to understand how economic impacts resulting from the program have rippled through the local economy.

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