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AGRIBUSINESS AND APPLIED ECONOMICS



EVALUATION OF THE NORTH DAKOTA
**AGRICULTURAL PRODUCTS
UTILIZATION COMMISSION
GRANT PROGRAMS**

AGRIBUSINESS & APPLIED ECONOMICS REPORT 753

JULY 2016





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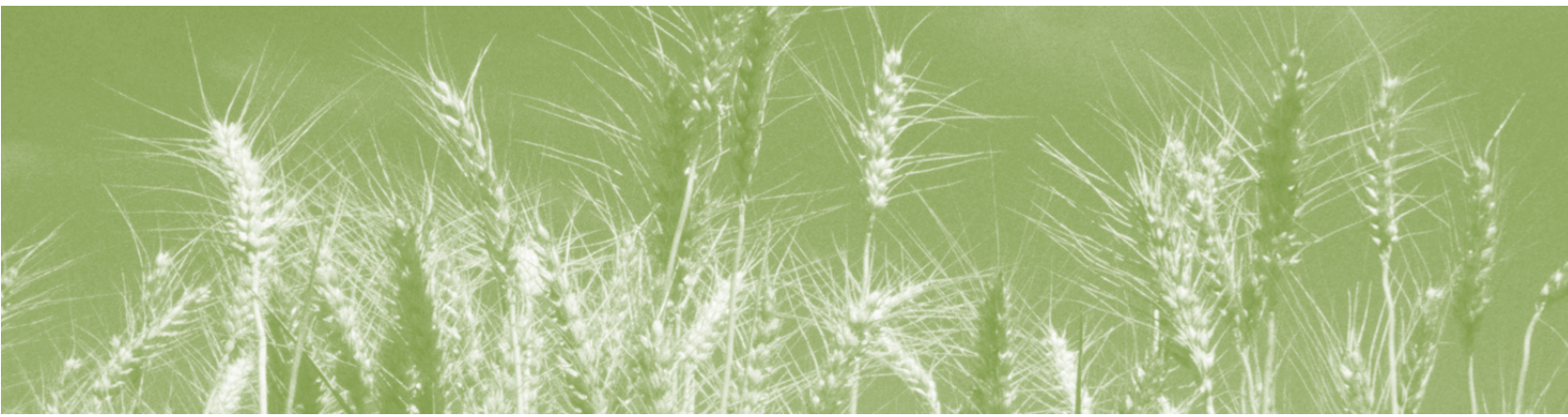
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EVALUATION OF THE NORTH DAKOTA AGRICULTURAL PRODUCTS UTILIZATION COMMISSION GRANT PROGRAMS

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and Dean A Bangsund, Research Scientist*

The North Dakota Agricultural Products Utilization Commission (APUC) was established in 1979 by the North Dakota Legislature (NDCC Section 4-14. 1-03) to administer tax revenue collected from the newly created alcohol motor vehicle tax fund (State Historical Society 2016). APUC's mission was to work with private industry to establish an open an agriculturally derived alcohol plant that would manufacture and market alcohol and methanol produced from biomass residue (APUC 2004). In 1989, the Legislature expanded the use of the APUC funds to include the agricultural processing industry. APUC funds were to be used to provide necessary assistance in the construction, operation, and maintenance of any state agricultural processing plant where derived fuel, chemicals, or other agricultural products would be manufactured and marketed. Also, the Legislature required that 75 percent of the funds be available for basic and applied research for processing agricultural products and by-products.

Subsequent legislative sessions provided for additional uses for APUC funds. In 1991, APUC was tasked with trying to improve the agricultural economy by developing new uses for and a more efficient system for processing and marketing of agricultural products and by-products. APUC also added cooperative marketing and farm diversification in its grant programs. In 1997, the Legislature made APUC a division of the Department of Economic Development and Finance and allowed them to fund agricultural prototype development grants. In 2001, the Department of Commerce was formed at which time APUC, along with Economic Development and Finance agency, moved to become a division of this department. Changes made in the 2005 Legislature allowed APUC to award grants for agricultural technologies, nature-based tourism and technical assistance.

There are currently six APUC grant programs:

- | | |
|---------------------------------|---|
| (1) basic and applied research; | (4) technical assistance and sponsorships; |
| (2) marketing and utilization; | (5) nature-based tourism; and, |
| (3) farm diversification; | (6) agricultural prototype development
and technology. |



APUC criteria for determining grant awards include: probability of jobs and wealth creation; scientific and technical merit of the award; probability of rapid commercialization; shared commitment for funding; Commission's judgement for the potential success of a proposal; and geographic considerations.

APUC programs have been previously evaluated (Hodur et al. 2006a) for the 1995-2004 period and this study will examine APUC programs from 2005-2014 period. This study will use similar methods as the previous study. This assessment will also incorporate the new program areas of nature-based tourism and sponsorships and technical assistance. Study objectives are to review program activities and evaluate the Commission's success in attaining its goals.

APPROACH

A program evaluation attempts to answer questions about the success of a program in achieving its goals or expectations, whether the program's activities were implemented as planned, and the social and economic effects of the program (Kosecoff and Fink 1982). While the goal of APUC is to create new wealth and jobs through the development of new and expanded uses for North Dakota agricultural products, the six grant programs advance this goal in somewhat different ways, which imply somewhat different evaluation criteria.

Basic and applied research grants and prototype development grants are more long-term in nature. Basic and applied research grants are typically aimed at developing new or improved production systems for crops or livestock. A successful outcome for this grant type would be the adoption of a new system by agriculture producers or processors. Prototype development grants support development of technologies that have the potential to enhance agricultural production and processing. A successful prototype development project would result in product or process commercialization. Outcomes would likely occur over a substantial period of time.

Marketing and utilization and farm diversification grants support activities that would take place typically over one or two years. Marketing and utilization grants support feasibility studies, marketing studies, and/or business planning for producer groups or firms seeking to launch new ventures or expand existing ones. These efforts may lead to new or expanded enterprises that result in substantial job creation and economic contributions, both directly and indirectly. These efforts may also conclude further commercialization efforts would be ill-advised. Farm diversification grants provide support for individual producers seeking to diversify their farm or ranch with innovative non-traditional enterprises. If the new enterprise proves profitable and sustainable for the individual, the grant would be considered successful.

Nature-based tourism grants support activities that would take place within two to three years. These grants help develop activities such as you-pick berry farms, vineyard tours, trail rides and paths, and seasonal hunting lodge accommodations. Some of these activities may not be ready for business in the first year or two, but could be in a longer period of time. The economic benefits may not be as large as some other categories but could provide seasonal revenues and promote good will and understanding of agriculture on farms and ranches in North Dakota. These impacts may be long lasting and benefit the future of agriculture in the state.

The technical assistance and sponsorships category is divided into two types of grants with two different time frames.

Technical assistance grants are geared toward updating infrastructure and facilities to meet the demands of a modern facility. These grants are for a longer term and have larger grant amounts than sponsorships. The effects of technical assistance grants are realized and can continue to accrue over a longer period than one-year. Modernization activities may be accomplished in a shorter time period but the realization of the value of the technical upgrade may occur over a much longer term.

Sponsorships typically are small grants to promote youth agricultural activities such as 4-H and Future Farmers of America (FFA), or grants for agricultural related conferences, events and trade show meetings. Sponsorships may be small in monetary terms, but help to support activities where people with agricultural interests may be exposed to new ideas, technologies or processes that may benefit the agricultural industry in various ways.

Measuring the success of each program requires a different rationale, and some programs more readily lend themselves to quantification than others. This project was aimed at examining the outcomes of a sample of grant recipients from each program type to evaluate the overall effectiveness of the program in meeting its stated objectives. Program impacts were quantified where possible. When quantification was not possible, a modified case study approach was used to evaluate program outcomes.

METHODS

The time frame for the evaluation was 2005-2014 period. Grants were reported on a biennium basis and the analysis done on the same basis. Grants for the biennium that cover 2005-2007 fiscal years will be referred to as the 2005-2006 biennium. APUC staff provided a list of projects funded in each program area during the study period. Summary statistics were compiled to describe the number and amount of grants awarded during the study period. The previous study also included a summary of grants funded by USDA Rural Business and Enterprise Grants (RBEG). APUC applies for RBEG funds and awards them based on the terms and conditions of the grant. However, no RBEG grants were applied for or awarded during the current study period.

If contact information was not available or incomplete, the project team attempted to obtain contact information for grant recipients. Contact information for grants awarded early in the study period, especially the 2005-2006 biennium, was limited and proved difficult to locate. Many of these entities have changed personnel, location, name, ownership, and some no longer exist. Contact information was available for all grant recipients in the prototype development, basic and applied research, nature-based tourism, and technical assistance and sponsorship categories. Except for the 2005-2006 biennium grant recipients, contact information for most farm diversification and marketing and utilization categories was obtained. Completing the grant recipient information enabled the research team to contact most grant recipients to enlist their participation in the APUC program evaluation.

An information collection template was designed for each grant, taking into consideration the goals of each program. The template was used to guide development of an online survey instrument. Questionnaires had both multiple choice and open-ended questions that were applicable to each of the specific grant application types. Questionnaires were not developed for the sponsorships and technical assistance category; however, a summary of these grants were included in this assessment. The varied nature of the grants for sponsorships and technical assistance make quantifying outcomes difficult.

Before the questionnaire was distributed, an email from APUC was sent to all grant recipients (where email contact information was available) to alert them that a study was being conducted. The email informed them that the NDSU research team would be contacting them and encouraged them to participate. Later the same day, an email was sent to grant recipients with a link to the online questionnaire.

The first email had a very poor response rate. A second email was delivered approximately one week later; however, the response was again disappointing. With so few responses it was not possible to generalize outcomes to the larger population of grant recipients. Given the limited number of responses, the outcomes described based on the questionnaires must be viewed as anecdotal examples and not representative of overall program outcomes. In the future, retaining better contact information would improve efforts to track outcomes associated with APUC grants. However, the data base of contact information was more complete during the latter part of the research period.

A summary of the response to the online survey is detailed below.

- The farm diversification category awarded 19 grants during the 2005-2014 period study. Contact information was available for nine recipients and four grant recipients completed the questionnaires.
- Fifteen prototype development grants were awarded during the study period with several recipients receiving more than one grant. Thirteen questionnaires were administered and three were completed.
- Fifty-two basic and applied research grants were awarded during the study period. Contact information was available for almost all of the grant recipients; however, many recipients received multiple awards. Thirty-five grant recipients received questionnaires and 24 were completed. This was the best response rate of all the grant categories, 68 percent.
- One hundred and thirty-one marketing and utilization grants were awarded. Contact information was available for 85 grant recipients and 20 completed and returned the questionnaire.
- Nature-based tourism had the fewest number of grants awarded during the study period. Twelve grants were awarded, contact information was available for 11 grant recipients, and only two recipients completed the questionnaire.

In addition to the online survey instrument, two projects from each grant category were selected for qualitative case studies. This case study approach illustrates the type of projects funded, potential outcomes, and economic effects associated with APUC grants. The case studies are not intended to be representative of all potential outcomes but to illustrate the type and range of projects and outcomes. Ten grant recipients representing each of the five grant types (basic and applied research, prototype development, farm diversification, marketing and utilization, and nature-based tourism) were identified based on input from study sponsors. Telephone interviews were used to obtain detailed information about how the grant money was used, challenges or difficulties with project implementation, time frame for the project or commercialization effort, whether the project was a new enterprise or expansion of an existing one, and the level of success and outcomes achieved. Grant recipients were also asked if additional jobs were created as a result of the project or if the project resulted in any capital expansion or increase in revenues.

The analysis also includes an economic impact assessment of selected projects that have received APUC awards. The economic impact assessment does not imply that the impacts are solely the result of the APUC grants, but illustrate the outcomes associated with projects that received grants. This analysis does not attempt to estimate the economic contribution of all APUC awards. Data limitations prevent an assessment of the economic effects of all APUC grant recipients. An economic impact assessment of all APUC grants would require annual in-state expenditures resulting from grant activities from nearly all the grant recipients. It was beyond the scope of this study to obtain that level of detailed data from each of the grant recipients. Further, some enterprises have failed and no longer exist, some have been sold and the level of

detail required to assess the effects of an expansion effort would require a significant effort from grant recipients.

To illustrate the economic effects of in-state expenditures of enterprises that received an APUC grant during the study period, six grant recipients were selected. Expenditure data was obtained from one grant recipient each in the basic and applied research, prototype development, farm diversification, and nature-based tourism categories, and two from the marketing and utilization category. Two were selected from the marketing and utilization category because over half of the grants and dollars awarded were for marketing and utilization grants. Grant amounts in this category ranged from \$10,000 to over \$100,000. The impact analysis is not representative of all APUC grants, only the enterprises associated with the six awards selected to illustrate economic impacts of enterprises that have received APUC grants.

Expenditure data from select businesses in each grant category were aggregated to estimate direct and secondary economic impacts of programs, projects and enterprises that have received an APUC grant. Local operational expenditures were estimated using both primary data collected as part of the effort and other secondary data sources. For example, other operating expenses (repairs, supplies, etc.) were assumed to be in the same proportion to payroll as for other recently developed agricultural processing facilities (Coon and Leistritz 2003; Coon and Leistritz 2001; Coon and Leistritz 1997). One-time construction impacts from four large projects that received an APUC grant during the study period were also estimated. The North Dakota Input-Output Model was used to estimate the secondary economic impacts based on this data. For a complete description of the input-output model, see Coon and Leistritz (1989). The procedures used in the analysis are parallel to those used in estimating the impact of other facilities and activities (Leistritz 1995; Bangsund et al. 1995; Bangsund and Leistritz 2004, Hodur et al. 2006b).

RESULTS

An overall program summary and summary for each APUC grant program are detailed in the following sections.



PROGRAM SUMMARY

During the study period, a total of \$8.8 million was awarded to 249 projects (Table 1). All grant amounts are reported in terms of current year, or nominal dollar values. No RBEG federal funds were awarded during the 2005-2014 study period. Grant distributions per biennium varied from a high of \$2.3 million in the 2005-2006 biennium to a low of \$1.2 million in the 2009-2010 biennium. Marketing and utilization grants were awarded most frequently. Fifty-three percent of APUC awards were in the marketing and utilization category. Basic and applied research grants made up nearly 21 percent of the awards. Grants in the other categories were

awarded less frequently. Sponsorship and technical development grants were 8.1 percent of total awards followed by farm diversification grants (7.6 percent), prototype development (6.0 percent) and nature-based tourism (4.8 percent). While just over half of the awards were for marketing and utilization category grants, they accounted for 64 percent of the awarded funds. The percentage of total grants and the percentage of total funding for basic and applied research grants was nearly equal, 21 percent and 26 percent, respectively. For farm diversification, nature-based tourism and prototype development grants, the percent of total funding was less than the percent of total grants awarded. Average size of grants and biennium allocations per grant program will be discussed separately.

Table 1. Grant Expenditures by Program Area, Agricultural Product Utilization Commission, 2005-2014

Item	Farm Diversification	Prototype Development	Basic and Applied	Marketing and Utilization ¹	Nature-Based Tourism	Sponsorships & Technical Assistance	Total
Biennium	-----nominal dollars-----						
2013 - 2014	136,408	51,000	523,871	1,189,713	73,500	81,199	2,055,691
2011 - 2012	36,500	105,500	511,344	1,128,360	31,500	42,529	1,855,733
2009 - 2010	5,250	122,400	193,312	788,478	16,725	31,250	1,157,415
2007 - 2008	26,250	60,500	380,785	967,823	10,500	--	1,445,858
2005 - 2006	26,250	--	666,904	1,507,940	12,180	46,055	2,259,329
Total	230,658	339,400	2,276,216	5,582,314	144,405	201,033	8,774,026
(N)	(19)	(15)	(52)	(131)	(12)	(20)	(249)
	-----percent-----						
Percent of grants	7.6	6.0	20.9	52.6	4.8	8.1	100.0
Percent of total funding	2.6	3.9	25.9	63.6	1.7	2.3	100.0

¹The Marketing and Utilization category includes grants to Ag Open in 2006, 2007, 2008, 2009, and 2010, and Marketplace in 2009.

FARM DIVERSIFICATION GRANTS

Farm diversification grants are intended to support efforts to diversify operation of North Dakota farms and ranches. The program is directed at non-traditional crop or livestock production or on-farm value-added processing of agricultural commodities. Traditional crops are those crops that the North Dakota Agricultural Statistics Service reports and maintains statistics. Applicants must be an agricultural producer with 51 percent of total income from farm operations. The proposed project must have the potential to create additional income for the farm unit and be a sustainable new venture. Awards are on a one-time basis, but projects that have advanced can apply for a second grant. Prior to the 2011-2012 biennium, grants were capped at \$5,000 with a fiscal agent fee of up to 5 percent of the grant request for professional services. In the 2011-2012 biennium, the maximum grant award was increased to \$25,000, with a 5 percent fiscal agent fee not to exceed \$3,000. For every three dollars of APUC support requested, one of those dollars must be provided by the recipient in the form of matching funds (i.e., one-third of the project cost). APUC grant funds are paid in two installments. Grant recipients are required to submit a final written report prior to final payment of the grant funds. This information is stored electronically for a reasonable time period and is available to the public through North Dakota's open records laws. A written request to the APUC office is required to obtain the report, and confidential data is redacted.

APUC awarded 19 farm diversification grants totaling \$230,658 during the study period (Table 2). The number of grants awarded for this study period was much less than the 90 grants awarded during the previous study period. While fewer grants were awarded during the 2005-2014 study period, the average amount of the awards was larger. Grant awards averaged \$12,140 for the 2005-2014 study, much larger than the average \$5,495 for the 2008 study. The reason for the discrepancy was the change in amount of the maximum award. For the 2011-2012 biennium, the maximum grant award was increased from \$5,000 to \$25,000. Eight of the 19 (42 percent) grants were awarded in the last two biennia, accounting for 75 percent of the total dollar value awarded.

The total dollar value of the grants awarded for the 2005-2006 and 2007-2008 biennium was \$26,250. Only one award was made in 2009-2010. All applicants in each of the first three biennia of the study period received the maximum allowable amount of \$5,250. In 2011-2012 and 2013-2014, grant sizes increased, reflecting the change in the maximum award. Grants averaged \$22,735 in the 2013-2014 biennium. All but one applicant applied for the maximum amount allowed. Over two-thirds of the funds distributed went to awards of \$25,000 or more, again reflective of the change in the cap amount. Grants were evenly distributed across the 10-year time period with the fewest grants made in 2009-2010 (1) and 2011-2012 (2), and the most in 2013-2014 with six. The smaller number of grants awarded during the 2009-2010 and 2011-2012 biennia may be reflective of more prosperous times for agriculture with higher grain and livestock prices.

Grants were awarded to support a wide range of projects related to non-traditional crops like fresh produce, berries, herbs, grapes, greenhouse operations and non-traditional livestock enterprises, such as goats or deer. To help describe the farm diversification projects funded, a four-category classification system was created. Grants were classified by the research team as 'crops/commodities,' 'livestock production,' 'value-added/processing,' or 'non-traditional activities.' 'Crops/commodities' included ventures that grew and marketed non-traditional crops such as berries, grapes, pumpkins, rhubarb, or other fresh produce. The 'livestock' category included traditional livestock enterprises such as dairy and beef, as well as non-traditional animal production such as bison, goats, or deer. The 'value-added/processing' category included ventures that either further processes an existing commodity such as meat processing, or a winery, or produced a new product from an agricultural input. Finally, the 'non-traditional farm activity' category included enterprises that offered activities such as a non-traditional building, a machine shop, horseback riding, a hunting lodge and/or hunting activities. This classification system is not used by APUC and was created for illustrative purposes for this evaluation. By briefly examining the project descriptions, it was possible to reasonably determine the nature of the enterprise receiving the grant and classify the enterprise into one of the four descriptive categories.

Five awards were for ventures related to non-traditional crops and five were for value-added processing. Six grants for projects related to crops and commodities were awarded. Awards related to livestock activities received the fewest number of grants (three). The non-traditional farm activities were related to hunting and expanding or adding an auxiliary enterprise to the farm operation. Grants for crops/commodities were for non-traditional crops and included pumpkins, rhubarb, and vineyards. Livestock grant awards were mostly for non-traditional enterprises including goats and poultry. The value-added category awarded grants for a locker plant, a renewable energy initiative, and a certified kitchen. Two of the non-traditional activities awards were for hunting lodge enterprises. These operations may have an activity component (e.g., trophy hunts), but also may have game production for trophy hunting, or for other uses. Accordingly, these operations were included in the non-traditional activities category.

The amount of grant awards for non-traditional activities and value-added processing were much larger than the other two categories. Three of the five grants for non-traditional activities were awarded during the 2013-2014 biennium when the maximum award was increased from \$5,000 to \$25,000. Each grant was funded at the maximum grant amount.

Two grant recipients with awards related to non-traditional activities responded to the questionnaire with awards related to value-added processing and crops/commodities. Sixteen of 19 farm diversification grants were for projects related to those three activity categories.

Farm diversification grants were used to purchase commercial equipment and expand a you-pick berry operation. One recipient used their award to promote agriculture by using a weekly distribution of bags with an agriculture theme that contained goodies and information for interested persons to take home to learn about agriculture. Another recipient used the grant to fund a feasibility study to determine if they should expand their enterprise and examine

potential locations. This recipient also conducted a second study to determine if a small operation affiliated with post-secondary education could be a successful part of the enterprise. As a result, a small operation is now being constructed at Dakota College in Bottineau, and an Associate of Applied Science program in aquaponics is slated to begin the spring semester of 2016. Three respondents implemented their APUC grant as planned, while one implemented their grant with some modifications.

Three of the respondents used their APUC grants to expand their enterprises. Annual gross revenue from the enterprises funded by the grant averaged \$10,999. Although none of the enterprises added full-time employees, all respondents added part-time or seasonal workers. Average seasonal or part-time employees per enterprise was 2.3 workers. Three respondents indicated they expect to expand their enterprise in the future, with two saying they “may” expand, and the other indicating they “will likely” expand.

Table 2. Summary Statistics, Farm Diversification Grants, Agricultural Products Utilization Commission, 2005-2014

Item	Sum of Awards ---dollars---	Number of Awards ---number---	Share of Dollars Awarded ---percentage---
Award summary			
APUC Awards	230,658	--	--
Total awards	230,658	--	--
Total number of grant awards	--	19	--
Average grant amount	12,140	--	
Grant awards by year			
2005 – 2006	26,250	5	11.4
2007 – 2008	26,250	5	11.4
2009 – 2010	5,250	1	2.3
2011 – 2012	36,500	2	15.8
2013 – 2014	136,408	6	59.1
Awards by grant size			
Less than \$5,300	57,750	11	25.0
\$5,300 - \$25,000	15,908	2	6.9
More than \$25,000 (N)	157,000	6 (19)	68.1
Awards by grant type			
Non-traditional activities	68,000	5	29.5
Crops/commodities	36,908	6	16.0
Livestock	36,500	3	15.8
Value-added processing (N)	89,250	5 (19)	38.7

APUC grants were important to the recipients. Respondents indicated the grants were either “very helpful” or “critical, could not have done it otherwise.” Respondents indicated that the grants were “critical for business development” and they helped them acquire “start-up products necessary for expanding their enterprise.” One respondent stated that “without the funding there would not be an expanded operation and an educational program.”

Two of the respondents to the questionnaire received their grants in the 2013-2014 biennium, one in the 2011-2012 biennium, and one in the 2007-2008 biennium. The average grant award for the four respondents was \$15,727, larger than the \$12,140 average for all grants (Table 2).



PROTOTYPE DEVELOPMENT

Prototype development grants support the development of technologies that have the potential to enhance agricultural production and processing. APUC provides grants for two areas of agricultural innovation: prototype development and technology. The processes for prototype development which are eligible for funding include: product design, prototype assembly, prototype testing, patenting, prototype evaluation or redesign, and market assessment to refine the prototype. APUC also considers funding for conceptual and unproven technologies or prototypes. While technologies related to agriculture can cover a broad scope, the program limits funding to those technologies related to food processing equipment and agricultural equipment. APUC’s definition of technology includes hardware, software, devices, or processes.

Grants are limited to a one-time award of \$25,000, plus a fiscal agent fee up to 5 percent, not to exceed \$3,000 per project. Grant recipients can apply for additional awards if substantial modifications are required or if the product is moving toward commercialization within five years and the market potential appears to be good. Prototype development grants require one-to-one matching funds. APUC prototype development grants normally have a one-year time frame.

Fifteen prototype development grants were awarded during the study period. The total dollar amount awarded was \$339,400 with an average grant award of \$22,627 (Table 3). Grants ranged in size from \$8,400 to \$28,500. Grants were fairly evenly distributed over the study period except for the 2005-2006 biennium when no grants were awarded. Three grants were awarded in the 2007-2008 biennium, six in 2009-2010, four in 2011-2012, and two in the most recent biennium. Four of the grants were for less than \$25,000, 10 were for \$25,000 to \$26,250, and only one exceeded \$26,250.

Contact information was available for 13 of the 15 prototype grant awards; however only three completed questionnaires were returned. Respondents received their grants in the 2007-2008 biennium and the 2009-2010 biennium. The average award for the respondents to the online questionnaire was \$25,700, which is slightly higher than the average of \$22,627 for the 10-year period (Table 3). All respondents indicated they had completed their project as planned and the APUC funding had led to follow-up research and development activities. Current status of the projects varied, with two of the three respondents reporting research and development activities are on-going with a goal of future commercial production and operations. The other respondent indicated the project was currently "on hold." None of the respondents had sold any units at the time of the survey, and therefore, reported no gross revenues from sales.

All of the respondents provided positive feedback. Two respondents indicated the grants were "critical, could not have done it otherwise" and one respondent said the grants were "very helpful." One respondent indicated that the project was being funded personally, and without the APUC grant it was likely that market entry would be delayed for years. The respondent also stated that "the APUC grant was a key component in our decision to launch this project." Another respondent said the APUC program is very important to the "state of North Dakota, and many of us would not have gotten where we are today without it."

On-going efforts for the prototype development category included refining the product, developing injection molds, redesigning components for mass production, and drafting patents. Developers were continuing efforts to promote their product through marketing/sales communications with major distribution chains. Also, prototype models were tested and demonstrated to companies that could manufacture and market the product.

Table 3. Summary Statistics, Prototype Development Grants, Agricultural Products Utilization Commission, 2005-2014

Item	Sum of Awards ---dollars---	Number of Awards ---number---	Share of Dollars Awarded ---percentage---
Award summary			
APUC Awards	339,400	--	--
Total awards	339,400	--	--
Total number of grant awards	--	15	--
Average grant amount	22,627	--	
Grant awards by year			
2005 - 2006	--	--	0.0
2007 - 2008	60,500	3	17.8
2009 - 2010	122,400	6	36.1
2011 - 2012	105,500	4	31.1
2013 - 2014	51,000	2	15.0
(N)		(15)	
Awards by grant size			
Less than \$25,000	53,800	4	15.9
\$25,000 - \$26,250	257,100	10	75.7
More than \$26,250	28,500	1	8.4
(N)		(15)	



BASIC AND APPLIED RESEARCH GRANTS

Basic and applied research grants represent front-end efforts to develop and commercialize new products, crops, production practices, or value-added opportunities. Guidelines are quite broad and left to the discretion of the Commission. As the name implies, basic and applied research grants support some of the first steps in the development of a new product or enterprise, such as cultivation of a new crop or implementation of a new

production practice. Basic and applied research grants are not limited to a specific amount and may include an additional 5 percent fiscal agent fee not to exceed \$3,000. Grants typically are for a one-year time frame and projects that have advanced can apply for a second grant. In many cases, outcomes are difficult to ascertain. Basic research often takes years to complete and, even after the basic research has been completed, additional research may be required or other issues may prevent further commercialization activities. In other instances, the initial research may indicate the project is not feasible, and research efforts are discontinued.

Fifty-two basic and applied research grants were awarded during the study period totaling \$2,276,216 (Table 4). Five projects received multiple grants. The number of grants awarded per biennium varied considerably. Eighteen were awarded in 2005-2006, 12 in 2011-2012, nine in 2007-2008 and 2013-2014, and four in 2009-2010. Grants averaged \$43,773 and ranged in size from \$7,500 to \$100,000.

Nearly 27 percent of the awards were for \$20,000 to \$29,999. Less than 10 percent of the awards were for \$19,999 or less, 15 percent were for \$30,000 to \$39,999, and 8 percent were for \$40,000 to \$49,999. While only 13 percent of the grants awarded were \$50,000 or more, they accounted for 62.6 percent of the total dollars awarded.

Contact information was available for most of the 52 grant awards. Thirty-five questionnaires were distributed and 24 were completed and returned. The grants for basic and applied research were used for projects on a wide array of topics including biofuels and materials, field peas for ethanol, grapes, drought stress corn, flax fiber for industrial application, radio frequency identification for sugar beets, and development of a national agricultural genotyping center, in addition to others. Many of the grants were awarded for research projects at North Dakota State University and the University of North Dakota, but awards were also made to private entities. The broad spectrum of research titles illustrates the diversification and innovation that characterizes the state's agricultural industry.

Twenty-two of the respondents (92 percent) indicated their research project was completed as planned. Seventeen of the respondents indicated their basic and applied research grants led to follow-up research and development projects. Continued research was funded by grants from APUC, United States Department of Energy (USDOE), United States Department of Transportation (USDOT), North Dakota Corn Utilization Council (NDCUC), North Dakota Centers of Excellence, Federal Aviation Administration (FAA), United States Department of Agriculture National Institute of Food and Agriculture (USDA NIFA), and private industry funding. The current status of the research projects was evenly distributed with six of the respondents indicating the research has been completed; six saying the basic research is on-going; six saying commercial activities have begun; and the remaining six indicated "other." The "other" category consisted of projects the respondent considered to currently be on "hold" or discontinued. Reasons given for discontinuing research or commercialization efforts included: it was a one-time assessment; request to refund the grant was denied; no market could be found for a product; and benefits of the new process were small. Research where results determined that a process/product/activity was not feasible, were also important outcomes of the research activity.

The questionnaire also asked the grant recipients how important the APUC grant was in helping to launch the enterprise. Twenty grant recipients responded that the grants were "very helpful" or "critical, could not have done it otherwise," and four said the grants were "somewhat helpful," or "neutral." Respondents were provided an opportunity to make open-ended

comments regarding their APUC grants. Most respondents expressed their appreciation for the grants. APUC support was termed “critical” or “essential” by many respondents. Comments from respondents included, “I think this is one of the best funding mechanisms in the state;” “APUC plays a critical role in supporting commercialization of agricultural projects;” “The APUC grant provided essential support for a study that resulted in valuable information to a number of potential commercial projects;” “The grant allowed us to see that the technology and the premise were worthwhile, the market and sale of the product would take a dedicated business all to itself;” “APUC was critical in funding the basic research grant;” and “The information we gained will be extremely helpful to the flaxseed industry.” A couple of suggestions were that the duration of the research grants be longer than one year because some projects were very difficult to finish in that time frame. One respondent indicated that the APUC grants were most effective when combined with other grants. Inventions and patents were often listed as positive results of the APUC grants.

Six respondents indicated that producers or agribusinesses had shown interest in their research. Five of six respondents indicated they were aware of producers or commercial entities that had incorporated their research findings into their enterprises. Four respondents said they believed there have been substantial economic impacts associated with their research findings.

Respondents were asked to describe their commercialization activities. A very large commercial development project to build a world-scale fertilizer plant is ongoing. Other commercialization efforts included the development of two commercial corn hybrids, improved crop genetics, and improving seed storage environments.

Eight respondents to the survey indicated they received their APUC grant in the 2005-2006 biennium, seven in the 2011-2012 biennium, four in the 2013-2014 biennium, and three in the 2007-2008 biennium. This distribution closely follows the distribution for all grants (Table 4). The average grant award for the survey respondents was \$42,192, very similar to the average for all grants (\$43,773) awarded during the 10-year period. Not every grant resulted in a commercialized entity; however, each research project added to the body of knowledge, and findings are publically available through North Dakota’s open records laws. This information is also available to the public by written request to APUC.

Table 4. Summary Statistics, Basic and Applied Research Grants, Agricultural Products Utilization Commission, 2005-2014

Item	Sum of Awards ---dollars---	Number of Awards ---number---	Share of Dollars Awarded --percentage---
Award Summary			
APUC Awards	2,276,216	--	--
Total awards	2,276,216	--	--
Total number of grant awards	--	52	--
Average grant amount	43,773	--	
Grant awards by year			
2005 - 2006	666,904	18	29.3
2007 - 2008	380,785	9	16.7
2009 - 2010	193,312	4	8.5
2011 - 2012	511,344	12	22.5
2013 - 2014	523,871	9	23.0
(N)		(52)	
Awards by grant size			
Less than \$10,000	26,171	3	1.2
\$10,000 - \$19,999	34,307	2	1.5
\$20,000 - \$29,999	343,586	14	15.1
\$30,000 - \$39,999	275,977	8	12.1
\$40,000 - \$49,999	171,170	4	7.5
\$50,000 or more	1,425,005	7	62.6
(N)		(52)	

MARKETING AND UTILIZATION GRANTS

APUC marketing and utilization grants were designed to support marketing efforts for North Dakota agricultural products or by-products. Grants can be used for the purpose of marketing a product or to formulate or implement a marketing plan. Grants can be for either new or existing enterprises. Projects must be completed in one year. Projects that have advanced substantially can apply for a second grant. Marketing and utilization grants are not limited to a specific dollar amount and may include an additional fiscal agent fee up to 5 percent but not to exceed \$3,000. Over the course of the study period, APUC awarded 131 marketing and utilization grants totaling \$5,582,314 (Table 5). The average grant size was \$42,613, with 14 projects receiving multiple awards.

Table 5. Summary Statistics, Marketing and Utilization Grants, Agricultural Products Utilization Commission, 2005-2014

Item	Sum of Awards ---dollars---	Number of Awards ---number---	Share of Dollars Awarded --percentage---
Award summary			
APUC Awards	5,582,314	--	--
Total awards	5,582,314	--	--
Total number of grant awards	--	131	--
Average grant amount	42,613	--	
Grant awards by year			
2005 - 2006	1,507,940	40	27.0
2007 - 2008	967,823	33	17.4
2009 - 2010	788,478	21	14.1
2011 - 2012	1,128,360	18	20.2
2013 - 2014	1,189,713	19	21.3
(N)		(131)	
Awards by grant size			
Less than \$15,000	266,993	29	4.8
\$15,000 - \$29,999	592,894	28	10.6
\$30,000 - \$44,999	722,855	21	12.9
\$45,000 - \$59,999	990,554	19	17.8
\$60,000 - \$74,999	595,058	9	10.7
\$75,000 or more	2,413,960	25	43.2
(N)		(131)	

Grant awards were fairly evenly distributed over the study period. Forty grants totaling \$1,507,940 were awarded in the 2005-2006 biennium. Thirty-three grants totaling \$967,823 were awarded in the 2007-2008 period. During the 2009-2010 biennium, 21 grants were awarded but funding only totaled \$788,478, the least amount awarded for marketing and utilization grants for the study period. The fewest grants were awarded in the 2011-2012 and 2013-2014 biennia with 18 and 19 awards, respectively. Funding amounts for these two periods were very similar with \$1,128,360 awarded in the 2011-2012 biennium and \$1,189,713 awarded in the 2013-2014 biennium.

Forty-four percent of the grants were for less than \$30,000 and 22 percent of the total number of grants were for less than \$15,000 (Table 5) and accounted for only 5 percent of total dispersed funds. Alternately, 19 percent of the awards were for \$75,000 or more, accounting for 43 percent of total amount awarded. Two and a half times more grants and grant dollars were awarded for marketing and utilization grants than for the next largest category.

Contact information was available for 85 of the 131 grant recipients. Twenty grant recipients completed and returned the online questionnaire. Three of the respondents used the grant money to fund a feasibility study for a new enterprise or expansion of an existing enterprise; six respondents used it for marketing, business plans, or other activities associated with the launch of a new business or enterprise; seven used it for marketing, business plans, or associated activities related to an existing business or enterprise; and four replied that the grant was used for "other." The "other" category included research and development, a referral program, and for services and marketing.

Grant recipients were asked to briefly describe their project. While responses varied, activities related to feasibility studies and marketing activities were frequently cited. Comments included "The APUC grant was used for a feasibility study concerning a new enterprise for an existing crop" and "This grant enabled us to see if our project would be viable in North Dakota." Respondents also reported using APUC grants for product promotion such as newsletters, websites, logos, social media, etc. Others used funds for promotions; "The grant was used for promotions including marketing, letters, website development and travel," and "We created a video and revamped our website."

Several respondents used their APUC grant to further their "brand." Some of the comments regarding "branding" included, "We are currently using our APUC grant for expansion purposes of our brand into new markets and to expand our reach within the United States and beyond;" "We used our grant to further brand our product and create packaging material for both local and regional markets;" and "We used our grant for rebranding of our company's ads, logo, ad strategy and new websites."

Several respondents used their APUC grants for marketing studies and to develop marketing plans. One respondent commented, "The funds from APUC helped us travel to food shows and visit with customers directly across North America, promoting our new line of products." One of the respondents described their project as "one of the best marketing tools we have ever developed."

Respondents were asked if the APUC grant was used to launch a new enterprise or expand an existing enterprise. Fourteen respondents used the grant to expand an existing enterprise and six used it to launch a new enterprise. One of the goals of the APUC marketing and utilization grant is to facilitate commercialization efforts. Three respondents indicated they were able to commercialize their project, two responded no and two indicated commercialization efforts were ongoing. APUC grant recipients were asked about start-up costs, payroll, full-time employment, and part-time employment. Because too few respondents answered these questions, no values will be reported to avoid potential disclosure of financial information.

APUC marketing and utilization grant recipients were asked to rate the level of importance of the grant to their project. The positive responses suggested the program is very popular. Ninety percent said the APUC grant was either "very important" or "critical, could not have done it otherwise;" while only 5 percent said it was "somewhat helpful;" and 5 percent said it was "neither." Comments included, "Great program--please keep it going;" "APUC has benefitted many companies in North Dakota;" "I am proud of the organization and I have appreciated the opportunity to work with APUC;" "It is a great program;" "With the need to continue diversification from the oil industry, we need to keep the continued focus on agriculture in North Dakota;" "We have actually been funded two times by APUC, one in 2009, and once in 2011. Both grants were instrumental in the growth that we have experienced since;" "APUC has been a huge benefit to small town jobs, value-added agriculture, and international business from North Dakota;" "A big thank you to APUC;" and "Great program for ag-related businesses."

The questionnaire asked APUC recipients the impact the grant had on their existing enterprise. Twelve respondents said that the business or enterprise is expanding, one said will remain the same, and one said the business no longer exists.



NATURE-BASED TOURISM GRANTS

Nature-based tourism as defined by APUC purposes is an enterprise that seeks to attract visitors to a working farm or any agricultural, horticultural, or agribusiness operation to enjoy, be educated or be involved in activities. Nature-based tourism activities can bring people to rural areas to participate in sport, recreational, educational, or labor-assisted sales experiences. APUC guidelines require that nature-based tourism activities be fee based and may be either primary or secondary source of income. APUC grant awards for nature-based tourism are not to

exceed \$25,000 per application, plus an additional fiscal agent fee up to 5 percent of the grant but not more than \$3,000. For every three dollars of grant money requested, the applicant must provide one dollar of matching funds. Individual companies are eligible for only one grant, and the grant duration is for one year.

Twelve nature-based tourism grants totaling \$144,405 were awarded during the 10-year study period (Table 6). The number of grants were fairly evenly distributed over the five biennia. The average nature-based tourism grant was \$12,038, similar in size to farm diversification grants. Four grants were for less than \$10,000, five ranged from \$10,000 and \$14,999, and three were over \$15,000. The grants supported various nature-based tourism activities such as berry picking, vineyards, and trail rides.

Respondents to the questionnaire received their grants in the 2007-2008 and 2009-2010 biennia. The average APUC grant amount for the two respondents was \$7,613, much less than the \$12,038 average for the 12 grants awarded from 2005-2014 (Table 6).

Twelve nature-based tourism grants were awarded and contact information was available for all but one recipient. However, only two grant recipients responded to the survey. Both respondents described the outcome of their grant as positive with the enterprise being implemented as designed. The planned activities included marketing their tourism enterprise through multiple media including newspapers, brochures, television and radio. Physical improvements included adding additional restrooms for customer convenience. Both respondents indicated that since their APUC grant has ended, their nature-based tourism enterprise has expanded.

Table 6. Summary Statistics, Nature-Based Tourism, Agricultural Products Utilization Commission, 2005-2014

Item	Sum of Awards ---dollars---	Number of Awards ---number---	Share of Dollars Awarded ---percentage---
Award summary			
APUC Awards	144,405	--	--
Total awards	144,405	--	--
Total number of grant awards	--	12	--
Average grant amount	12,038	--	--
Grant awards by year			
2005 - 2006	12,180	2	8.4
2007 - 2008	10,500	1	7.3
2009 - 2010	16,725	3	11.6
2011 - 2012	31,500	3	21.8
2013 - 2014	73,500	3	50.9
(N)		(12)	
Awards by grant size			
Less than \$10,000	266,992	4	12.4
\$10,000 - \$14,999	592,894	5	36.7
\$15,000 or more	722,855	3	50.9
(N)		(12)	

Grant recipients were asked about start-up costs, payroll, full-time employment, and part-time employment. However, too few responses were collected from nature based tourism grant recipients to report financial information. No values will be reported to avoid potential disclosure of financial information.

Both respondents indicated that the APUC grants were important, with one responding that the grant was “very helpful” and the other indicated the grant was “critical, could not have done it otherwise.” Additional comments included, “Enjoyed working with the APUC group and the grant was fairly easy to fill out,” and “Thank you APUC. We would not be where we are today or an agri-tourism business if it wasn’t for these grants.” Both businesses indicated that they may expand their enterprise in the future. Nature-based tourism involved a smaller number of grants awarded than the other categories, and the grant amounts also tended to be smaller. However, those who received the grants indicated the grants were very helpful in establishing or expanding their business.

SPONSORSHIPS AND TECHNICAL ASSISTANCE GRANTS

Technical assistance grants are designed to maintain and expand North Dakota’s existing value-added businesses helping grant the applicants to become more competitive, productive, and profitable. An eligible candidate for this grant is an existing company located, operated, and registered in North Dakota that adds value to agricultural products. Companies applying for APUC grants should have an North American Industry Classification System (NAICS) industrial code of 311 (food processors) or 312 (beverage manufacturers). APUC technical assistance grants have a maximum award of \$25,000 with an additional fiscal agent fee of 5 percent not to exceed \$3,000. Companies requesting APUC grants must provide one dollar of matching funds for every two dollars of APUC funding. In-kind supports can be substituted for financial cash match but should be no more than 50 percent of the total match. Grants are not to exceed one year and are for North Dakota projects only.



Twenty technical assistance grants, totaling just over \$200,000 were awarded during the study period (Table 7). Grant awards averaged \$10,052. Five grants were awarded in the first three biennia and 15 in the last two. Almost 62 percent of the grant dollars were awarded in the 2011-2012 and 2013-2014 biennia. Eleven of the 20 grants were for less than \$5,000 and five grants were for greater than \$25,000, which accounted for 68 percent of the total awards for technical assistance grants.

Ten grants for sponsorships for \$1,000 each were awarded during the study period. Sponsorship grants went to a variety of agricultural organizations such as the FFA Foundation, 4-H, and various agricultural trade shows. Sponsorships and technical assistant grant recipients were not surveyed in this study.

Table 7. Summary Statistics, Sponsorships and Technical Assistance Grants, Agricultural Products Utilization Commission, 2005-2014

Item	Sum of Awards ---dollar---	Number of Awards ---number---	Share of Dollars Awarded ---percentage---
Award summary			
APUC Awards	201,033	--	--
Total awards	201,033	--	--
Total number of grant awards	--	20	--
Average grant amount	10,052	--	
Grant awards by year			
2005 - 2006	46,055	2	22.9
2007 - 2008	--	--	--
2009 - 2010	31,250	3	15.5
2011 - 2012	42,529	8	21.2
2013 - 2014	81,199	7	40.4
Awards by grant size			
Less than \$5,000	10,000	11	5.0
\$5,000 - \$25,000	54,195	4	26.9
More than \$25,000	136,838	5	68.1
(N)		(20)	
Awards by grant type			
Sponsorship	10,000	10	5.0
Technical Assistance	191,033	10	95.0
(N)		(20)	

APUC CASE STUDIES

Case studies for each of APUC grant award program are detailed in the following sections.

BASIC AND APPLIED RESEARCH

Case Study #1

APUC awarded three basic and applied research grants for the development of the vineyard/winery industry in North Dakota. The most recent award was for a grape germplasm enhancement program, which used APUC funds to evaluate grape varieties, and for salaries and supplies related to this research.

The grape breeding program began in 2013. Winter hardy grapes from the east and west coast were bred with hardy North Dakota varieties called river grapes to produce varieties suitable for vineyards in North Dakota. One challenge associated with breeding winter hardy grapes is balancing hardiness with appropriate qualities for wine making. Research associated with the breeding program has been completed, but it typically takes 15 years to commercialize a new variety and another 2-3 years after the grapes are planted before they produce fruit. However, once a vineyard is established, even in North Dakota, it should produce grapes for 50 to 75 years.

APUC grants for grape germplasm development have not resulted in any additional full-time jobs, but one part-time worker has been hired to help with the research project. The APUC grants were not leveraged to secure other grant funds, but researchers hope APUC will continue to fund their efforts. Research on grape varieties is on-going and work continues in all aspects of grape production. Grant recipients indicated continued support from APUC is critical to growth of the grape/vineyard industry in North Dakota. APUC has been the leading source of funding for grape industry research. Grant money from APUC has helped advance the growth of the grape and wine industry in North Dakota. This research may lead to an expanded winery industry; a value-added enterprise for grape growers.

Vineyard and wineries have the potential to provide opportunities for specialty crop operations without significant capital investments. Land requirements are small. A one-acre plot would be adequate for a beginner and a vineyard that has expanded to five acres is considered large and may employ mechanical harvesting methods. Small acreages could produce sizeable profits, resulting in agricultural diversity, profitable small farms, and opportunities for new or part-time farmers. Neighboring Minnesota has seen vineyard numbers increase, providing opportunities for rural economic development.

Researchers reported that APUC grants were critical to developing new grape varieties for North Dakota, since no other funding resources were available. The success of this APUC grant for basic and applied research has resulted in the development of new grape cultivars for the state which have the potential to spur growth in vineyards and wineries. Outcomes and the

value of the research will be realized over the long term as new varieties are commercialized and the vineyard/wine industry expands in North Dakota. Grant recipients expressed concerns that changes to the rules for basic and applied research grants requiring matching funds may make them ineligible for future grants. Grant recipients also expressed concerns that matching funds for specialty crops in North Dakota are not available, potentially impacting ongoing research.

Case Study #2

Another APUC basic and applied research grant supported efforts to develop a system for handling seed potatoes. A seed potato grower had difficulty segregating small lots of seed potato varieties to the point it was too labor intensive to be profitable. The seed grower applied for an APUC grant to work with engineers to develop a system to handle small seed lots. The seed producer worked with North Dakota State University agricultural engineers and private engineers to develop a system that would be efficient for handling and storing multiple small lots of seed potatoes. A complete handling system was developed as a result of one APUC grant and a second grant was used to create a storage system. This project involved development, fabrication, and ultimately, operations. The system worked so well that no changes or modifications were required.

Although the system has been successfully operationalized, it technically was not commercialized because of the limited market for the enterprise (i.e., limited number of seed potato operations at this level in North Dakota). However, implementation of the seed potato system has resulted in the addition of three full-time employees and additional storage facilities were added in 2015. The new system has resulted in North Dakota potato growers having greater access to new potato varieties. Potato growers and the industry have benefitted from the research supported by the APUC grant.

The grant recipient was very grateful to APUC for awarding the grant funds needed to move their idea forward. They reported, "APUC was very good to them, they were encouraging, always seemed to be interested, and were easy to work with." The grant recipient does not expect to apply for additional APUC grants at this time, and suggests that only minor changes be made to the application process. The entire handling system was developed solely with grants from APUC, and those grants were not leveraged to obtain additional funding.

PROTOTYPE DEVELOPMENT

Case Study #1

A company in Fargo was in the process of developing an electric lift 2-wheel truck for the agricultural and manufacturing industries. The company applied for and received an APUC grant and then leveraged the APUC grant to secure another technical grant which ultimately led to successfully manufacturing the prototype. The product provided a safe and easy way to move small cargo that might be difficult for an individual but too small for a forklift. Two North Dakota businesses, Cavandish Farms and Goodrich Cargo, were the original customers. An international corporation based in Portland, Maine purchased the company in 2013 and moved the manufacturing there. The purchasing corporation left the original firm in Fargo to continue all of the sales, marketing, and technical research and development from the North Dakota State University Research & Technology Park. In 2012, the product was awarded the Edison Gold Award honoring excellence in new product and service development, marketing, human-centered design, and innovation. The developers of the product are extremely proud of this award. In 2015, sales exceeded \$200 million.

While the product is no longer manufactured in North Dakota, non-manufacturing operations remain in Fargo with seven full-time and two part-time workers. Derivations of the original prototype have been customized for more specific tasks, and it is used by major corporations throughout the United States. For example, Sherwin-Williams paint stores use a variation of the prototype to transport and load five-gallon paint pails for customers. The product is attractive from an employee safety perspective and can help to accommodate an aging workforce. The company expects to continue to grow and expand in the future. More products are being added to the line through research and development efforts in Fargo, and sales are expected to continue growing with the expansion of the manufacturing plant in Maine. The international corporation built a new manufacturing facility in Maine in 2009 costing \$7.0 million, and has added a \$1.0 million addition since purchasing the local company.

The grant recipient said his company would not have survived without the \$10,000 APUC grant. He said although he has not taken time to personally thank APUC for the help, he has never forgotten how the grant helped him hold the company together until they got their first big break.

Case Study #2

In 2013, APUC awarded a prototype development grant for the purpose of developing a new agricultural rubber. The goal of the project was to replace the petroleum component in the rubber formula with soybean oil to create a product that was of equal or better quality, more environmentally friendly, and that would provide a new use and market outlet for soybeans. The \$25,000 APUC grant was leveraged to obtain an additional \$100,000 grant. In addition, the grant recipient invested about \$375,000 in development and testing of the new product. The prototype development project was completed as planned over the course of three years.

New product applications were tested in 2015. Applications included rubber belting for conveyors, some limited uses for combine pick-up belts, and belts for hay balers. Additional applications will be tested in 2016 and research efforts are ongoing. While funding from APUC and U.S. Soybean Board helped bring the prototype to commercialization, the product is still being tested and research is ongoing and supported by the grant recipient. The new rubber compound could also be adapted for recently developed combine draper heads. Industrial uses for the belting would likely be for product conveyor belts for companies like UPS and FedEx. The process has not been adapted for use in tires yet, which could hold the potential for large expansion in the future. Further, because the process is environmentally friendly and soybean oil-based rubber is compliant with European regulations, there may be a potentially large new market for the product overseas.

No additional employees have been hired as the result of the new rubber formulation because the manufacturing process has not been altered. Some construction has resulted from the development of the new product. Racking systems to store additional product were necessary because both rubber compounds (petroleum base and soybean oil base) are still being used. The company expects to fully transition to the new rubber compound in three to five years. Most of the development activities (about two-thirds of the cost of developing the product) occurred in North Dakota, with some testing done out of state. The product is manufactured in Texas.

The research effort has resulted in the development of a new, better product that benefits North Dakota soybean growers. The new rubber formulation has enhanced durability, is more resistant to abrasion, is easier to work with during the manufacturing process, and is slightly less expensive to produce than the oil-based rubber.

The grant recipient indicated the application process went well and that the process for prototype development grants was easier than for some other APUC grant programs. The grant recipient also indicated he was surprised at the positive reaction received from APUC. The grant recipient indicated the APUC prototype development grant was what really got the project started, and provided the "jump start" needed to move forward. The grant was used to successfully develop a new technology, and they were the first company in the world to successfully produce a soybean oil-based rubber product. Grant recipients think APUC grants for prototype development are a great stimulus to all inventors in North Dakota. The company

has applied for a marketing and utilization grant from APUC, but currently does not meet the guidelines. Outcomes so far have been very positive with the potential for the development of additional products and enterprise expansion in the future.

FARM DIVERSIFICATION

An APUC farm diversification grant supported efforts for converting a traditional hay pasture to a forage cover crop plot mixture that can be grazed year around. Grant funds were used to purchase the cover crop and to pay part of the salary of a permanent worker that planted the cover crop. The cover crop farming practice was a new enterprise for an existing business (ranch).

The original cover crop consisted of 10 varieties but has since been expanded to include six additional varieties. Cover crop varieties included corn, turnips, millet, radishes and soybeans. The APUC grant facilitated and expedited the transition from traditional haying to a multi-variety cover crop. Savings were from reduced expenses for growing and harvesting hay. By winter grazing the cover crop, feed and overhead costs were reduced by 30 percent. The APUC grant was implemented as planned and the cover crop enterprise has been so successful that the rancher wants to expand this practice. Winter grazing has also allowed a change in calving dates from early spring to May and June when more favorable weather conditions exist. The rancher considers this new practice to be an example of successful farm diversification. By reducing costs, profits have increased and he considers his operation to be an example of "sustainable agriculture."

In addition to the farm diversification grant, the ranch operator has also received an APUC nature-based tourism grant to develop a hunting lodge. The hunting lodge enterprise complements and fits well with the new cover crop practices. The cover crop provides much needed wildlife habitat especially in light of the reduction in Conservation Reserve Program grassland in the area. He termed the cover crop as a "wildlife utopia." The APUC grant allowed the rancher to change his operation to a more sustainable enterprise.

The rancher has added one full-time employee as a result of the cover crop operation. In addition, the rancher stated that without the APUC grant he and his three siblings would not all have been able to remain on the ranch. The grant recipient attributes much of the success of the project to the APUC grant which enabled him to convert to the cover crop system. The rancher commented that APUC makes new ideas visible for the people of North Dakota. This APUC grant facilitated the implementation of a new sustainable system that increased profitability by reducing costs that at the same time provides wildlife habitat that complements his nature-based tourism enterprise.

MARKETING AND UTILIZATION

Case Study #1

APUC awarded a marketing and utilization grant to a food production company in the 2011-2012 biennium for development of a marketing plan and branding effort. The grant recipient used the funds to purchase a truck and trailer to advertise their brand and promote their products. A colorful paint job on the trailer has greatly expanded their brand. The truck and trailer were used for promotions at retail grocery stores, special events, and for product taste-test trials. One event that produced substantial exposure was at the NDSU Bison football tailgating lot. Company officials feel that this has been the best marketing campaign that they have ever undertaken. Sales have increased significantly and target marketing areas have been redefined. Sales have been especially strong in the Bismarck and Red River Valley areas, in part due to sales at Walmart retail stores. Radio ads were used to supplement the "tour" and to provide additional exposure. Prior to the truck and trailer, much of their marketing efforts directed to the Midwest and the Pacific Northwest. However, efforts are now concentrated in North Dakota, South Dakota, Minnesota and Iowa.

The APUC grant was completed as planned and a company representative described the truck and trailer as a very successful marketing effort. As a result of the grant, the company has added one full-time and two part-time employees. No new manufacturing capacity has been added by the company at this time, but if sales continue to grow an expansion project may be considered. Plans are to continue to expand the truck and trailer marketing effort by enhancing the kitchen in the trailer and adding more portable generator capacity to make for a more complete customer experience. Company officials indicated that four things have occurred as a result of the APUC grant they received: (1) jobs were created; (2) a truck and trailer purchased; (3) a comprehensive advertising campaign was developed; and (4) marketing efforts are now concentrated in North Dakota, South Dakota, Minnesota and Iowa.

Case Study #2

An APUC marketing and utilization grant was awarded in the 2007-2008 biennium to a company that is a value-added processor of North Dakota sunflowers and that markets sunflower seeds as a snack food.

The purpose of the grant was to help expand the company's marketing territory and to promote a new line of low sodium sunflower seeds. During the previous study period (1995-2004) the company received an APUC grant which resulted in a \$7.0 million construction project. The second APUC grant helped expand the business enough to warrant a \$1.0 million addition.

A company representative indicated the APUC grant facilitated market territory expansion more quickly than could have occurred in its absence. The company continues to expand by adding new territories and bringing additional snack food items to market. All operational expenditures for the company are spent locally which means most of the economic effect of operations

accrue in North Dakota. Employment has increased by 15 full-time workers since the first grant award while the number of part-time workers remains unchanged at 20 employees. New markets were added in California, Texas and the East Coast.

Case Study #3

A food cooperative in Fargo with plans to open a new retail grocery store and organic food market has been awarded two APUC marketing and utilization grants. A grant in the 2009-2010 biennium was for market analysis and a feasibility study and to identify potential store locations. In the 2013-2014 biennium, a second grant was awarded to conduct a membership drive and capital campaign. The cooperative is slated to open in 2016.

The cooperative currently has one full-time and one part-time contractual employee, but plans to employ 20 full-time employees when it opens. The cooperative currently has over 900 members and has raised \$3.6 million to remodel an existing building, advertise and stock shelves. All suppliers have been secured with much of the product sourced locally.

When the cooperative is fully operational, annual sales are projected to be \$5 million. This market will serve an area in downtown Fargo with limited grocery outlets and a growing younger-aged population that wants to be able to walk to their retail outlets.

NATURE-BASED TOURISM

Case Study #1

An APUC nature-based tourism grant was awarded to a berry farm in the 2013-2014. The purpose of the grant was for the addition of a you-pick berry tourism enterprise to an existing enterprise that grows vegetables to supply stores in North Dakota. Funds from the grant were used to pay for the plowing and tillage of the land in preparation for the berry planting, purchasing berry plants, and planting the berries. In addition to raspberries some honeyberries were also planted. Berries were planted in 2014 and are expected to produce fruit in 2016, with commercial operations to begin in 2017.

To date, no additional workers have been added but the enterprise employs one part-time worker six months of the year. An old building has been purchased and moved near the berry patch to provide a "berry stand" where they can also sell fruit to customers who do not want to pick their own. Grant recipients indicated they would like to further expand the berry operation but the high cost of land makes expansion difficult. In the future, the enterprise hopes to add some longer season berries such as juneberries to extend the tourism season. The enterprise also plans to join with other neighbors to form a commercial kitchen in a nearby town. The

facility would be a shared resource for member producers to sell baked goods and pastries. The group has applied for an APUC grant to help start the kitchen enterprise.

Grant recipients indicated the APUC grant was very helpful and put them on a track to add the berry enterprise in a very short time frame. The grant recipient said it was a pleasure to work with APUC, and once they understood the award procedures and criteria it was easy to apply for the grant. The grant recipient indicated that the APUC grant process was simple and very helpful to the new enterprise. Grant recipients indicated the you-pick berry enterprise likely would not have come to fruition without the APUC grant.

Case Study #2

A nature-based tourism grant was awarded in the 2009-2010 biennium for the development of a hunting lodge/hunting/hunting guide enterprise. Planning for the enterprise began in 2000, but work began after the APUC award. In addition to the APUC grant, the hunting lodge received promotional help from the North Dakota Department of Commerce - Tourism Division. The plan submitted for the APUC grant was completed as planned and the enterprise was commercialized.

The project consisted of adding a new enterprise to an existing North Dakota ranch. The APUC grant was used to remodel original buildings on the ranch into a hunting lodge. It took 2-½ years and extensive remodeling to transform the original buildings into a hunting lodge. All the remodeling was done by family members. The grant recipient has received APUC grants in other categories and currently has an active grant to facilitate the addition of a winery to the hunting lodge. Existing apple and plum orchards will be used to make wine until the vineyards can supply grapes for the winery.

The lodge is busy from September to January with hunting activities. A complete hunting package is available including meals, lodging, hunting dogs, guide services and hunting. In addition to hunting activities, the enterprise has hosted numerous birding events. The lodge is also used for meetings and events, such as weddings, quilting events, professional meetings, and has even hosted international tourist groups. The enterprise hosts about 40 tours a year for various groups such as school class trips and overseas travelers visiting the United States. The addition of a winery will further expand available offerings. The ultimate enterprise goal is to create a year-round destination that can be used by groups with diverse interests.

The hunting lodge is an auxiliary enterprise to ranching operations operated by four siblings. In addition to the four siblings that manage the enterprise, six part-time (hunting season) workers have been hired. Grant recipients indicated they were very satisfied with the process for obtaining an APUC grant, and that the grant was critical in their efforts to launch the nature-based tourism enterprise. One sibling indicated that he moved back to the family ranch from Arizona because of the nature-based tourism enterprise they were able to start with the help of the APUC grant.

ECONOMIC IMPACTS

Economic impacts were estimated for four construction projects that occurred during the study period. Also, economic impacts from operations were estimated for a sample of APUC projects. Operational impacts in 2014 for a large new business, a moderately sized enterprise that was added to an existing business, a medium sized basic and applied research grant, a prototype development company¹ that commercialized their product, a farm diversification enterprise, and an existing business that added a nature-based tourism activity were estimated. This sample of enterprises each used different types of APUC grants and offers a good cross section of the economic effects of projects and enterprises that have received an APUC grant. To avoid disclosing confidential data, the expenditures for the businesses were combined and the impact analysis presented for six enterprises in total. The economic impacts presented in the analysis are not totally attributable to the APUC grants, but rather illustrate the impacts from companies that received APUC grants.

Annual expenditures in the local economy represent direct economic impacts and are reported in Table 8. Expenditures and employment data for the analysis were provided by the selected entities. The six projects directly employ 74 workers, with payments to North Dakota households of \$6.4 million annually. Direct impacts in the transportation sector totaled \$31.0 million and direct impacts in the communications and public utilities totaled \$26.2 million. Total in-state expenditures from operations from the six sample enterprises were estimated to be \$84.5 million in 2014.

¹ The prototype development company included in the assessment has been purchased by an out-of-state international corporation. Although the manufacturing of this product is currently out-of-state, all other corporate operational expenditures (sales, marketing, advertising, and research and development) remain in North Dakota.

Table 8. Direct Economic Impacts Associated with Operations of Six Enterprises that Received APUC Funding During the 2005-2014 Period, 2014 Operational Year

Item	Total ---\$000---
Operation expenditures:	
Construction	2,342
Transportation	30,980
Communications & Public Utilities	26,157
Ag Processing & Misc. Manufacturing	1,395
Retail Trade	1,442
Finance, Insurance & Real Estate	8,433
Business & Personal Services	1,857
Professional & Social Services	5,518
Households	6,423
Total	84,547
Direct employment (FTE)	74
Number of projects	6

The North Dakota Input-Output (I-O) Model was used to estimate the secondary and total economic impacts associated with these direct expenditures. Direct economic impacts of facility operations were applied to the I-O coefficients, to estimate total (direct plus secondary) impacts (Table 9). Total annual impacts of these facilities operations were estimated to be \$257.1 million, including \$25.6 million of additional personal income for North Dakota households and \$46.9 million in added retail sales. These levels of economic activity would be expected to support about 398 indirect and induced jobs in various sectors of the North Dakota economy, in addition to the 74 workers employed directly. Additional retail sales would also result in about \$2.2 million in added sales and use tax collections while the additional personal income would generate approximately \$1.1 million in added personal income tax collections, for a total added state revenue from these two sources of \$3.3 million annually.

Table 9. Total (Direct Plus Secondary) Economic Impacts Associated With Operations of Six Enterprises that Received APUC Funding During the 1995-2004 Period, 2014 Operational Year

Item	Total ---\$000---
Sector:	
Construction	7,579
Transportation	31,873
Communications & Public Utilities	34,367
Retail Trade	46,910
Finance, Insurance & Real Estate	18,832
Services	16,427
Households	75,496
Other ¹	25,635
Total	257,119
Secondary employment (FTE)	398
State Tax Revenue	
Sales & use tax	2,172
Personal income tax	1,132

During the 2005-2014 study period four ethanol plants were constructed and became operational. Another ethanol plant was under construction during the study period, but was not operational until 2015 so it was not included in the estimate of economic impact from construction activities. While there were construction impacts from other projects that received APUC grants they were rather small by comparison. Many of the smaller construction projects were related to the addition of a new enterprise to an existing business. Impacts associated with the construction of ethanol plants illustrate the potential magnitude of construction impacts associated with projects that receive an APUC grant.

Construction phase economic impacts are one-time impacts which may occur over a period of years. Construction of the four ethanol plants took place from 2006 to 2009. The direct impacts and total impacts for the construction of these plants were combined to avoid disclosing confidential data. Construction impacts are one-time impacts that occur over the construction time period, as opposed to the annually recurring operational phase impacts. The direct construction phase impacts were estimated from primary data collection and a number of published sources (Coon et al. 2012; Coon and Leistritz 2003; Coon and Leistritz 2001; Coon and Leistritz 1997; Swenson and Eathington 2006). Total construction related expenditures in the local economy (direct impacts in North Dakota) were \$288 million for the four plants (Table 10). When the local expenditures were applied to the North Dakota Input-Output Model, the total economic impact (direct and secondary) was estimated to be \$779 million. The total impact resulted in increased retail trade activity of \$172 million and increased personal income

of \$223 million. The business activity generated by the construction was estimated to produce \$8 million in sales and use tax revenue and \$3 million in personal income tax revenue.

The number of jobs associated with the construction workforce estimates were not included in the assessment. Because of variability associated with various construction related activities and the fact that the four projects spanned several years, estimating the total construction workforce was beyond the scope of this study. Business activity generated by the construction would be expected to create secondary (indirect and induced) jobs for 1,190 workers.

Caution should be exercised when interpreting the number of secondary jobs created by construction activities. Input-output models assume that all sectors are at full employment and that an increase in business volume in a basic sector (like construction activities for new facilities) translates directly into an increase in business volume in non-basic sectors and households (wages/salaries). Any increase in business volume would translate into an increase in labor requirements to meet additional demand for secondary services that support base sector activities. However, if the increase in business volume does not exceed the capacity of the current labor force no increase in labor (new jobs) would be needed to meet the additional demand. It is likely that the existing labor force in non-basic sectors (secondary services) would have been able to absorb much of the short-term spike in demand for services related to construction activities from projects that received APUC grants. Recent research on secondary workers in North Dakota's oil patch found that secondary jobs did not materialize as economic theory would suggest (Bangsund and Hodur 2012, Coon et al. 2012). Regardless of potential model shortcomings regarding secondary employment, economic impacts related to construction activities during the study period has been substantial.

Table 10. Direct and Total Economic Impacts Associated With the Construction of Four APUC-Sponsored Ethanol Plants, 2006-2009 Construction Period

Item	Direct Impacts	Total Impacts
	-----dollars-----	
Sector		
Construction	147,232	163,509
Transportation		3,093
Communication & Public Utilities		23,364
Retail Trade	35,727	172,295
Finance, insurance & real estate	44,948	73,916
Bus & Personal Services	27,084	38,656
Prof & Soc Services	11,525	26,748
Households	21,609	223,047
Other ¹		54,310
Total	288,125	778,938
Secondary employment		1,190
State tax revenue		
Sales & use tax		7,977
Personal income tax		3,345
Total		11,322

¹ Includes agriculture, mining, manufacturing, energy conversion, and government.

KEY FINDINGS

In the last ten years, APUC has awarded 19 farm diversification grants totaling \$230,000, roughly \$23,000 a year. Fewer farm diversification grants were awarded in the current study period than during the previous study period. Nineteen farm diversification grants were awarded in the current study period compared to 90 awarded during the previous study period. Farm diversification grants were most frequently awarded to support nontraditional auxiliary agricultural enterprises such as wineries, berry patches, pumpkin patches, certified kitchen, nontraditional livestock (goats and deer), and hunting lodges. Other APUC awards supported activities that improved profitability through improved efficiency and reducing costs. Many farm diversification grant recipients added a new enterprise to an existing enterprise. Evaluating APUC's return on investment for farm diversification grants is difficult due to the nature of many of these enterprises and the time necessary to realize returns. Some enterprises realized immediate profit enhancement, while the return on investment for others may occur over longer periods of time. Farm diversification grantees who responded to the online questionnaire generally indicated that their projects had been implemented as planned, and most had plans to continue or expand their enterprises. Most had favorable things to say about the program and generally indicated the APUC grant was a significant factor in launching their enterprise which would suggest they may not have been able to undertake their projects without APUC's assistance. It would seem reasonable to conclude that APUC's return on

investment for farm diversification grants is positive and that the program has successfully aided farm operation's efforts to diversify.

Fifteen prototype development projects were funded during the study period, totaling over \$339,000 in grant awards, roughly \$34,000 per year. Prototype development, by its very nature, is speculative. Not all prototypes are successful and even some good prototypes may never be commercialized. Often commercialization efforts occur over a period of many years. One enterprise that received a prototype development grant has successfully commercialized their product. The company started production in North Dakota but was ultimately purchased by an out-of-state international corporation. Current annual sales are in excess of \$200 million. Another prototype grant was awarded to a company that aimed to replace the petroleum base in rubber with soybean oil. This project was successfully commercialized and the product is used as a component in agricultural equipment and in industrial applications as well. The company holds the patent on this process and future growth potential could be substantial. Not all of the prototype development programs are successful, which is not unexpected. The two projects examined highlight the potential associated with a successful commercialization effort. Even if only a few projects are ultimately successful the APUC's overall return on investment is positive.

Basic and applied research grants represent front-end efforts to develop and commercialize new products, crops, or value-added opportunities. APUC awarded 52 basic and applied research grants totaling roughly \$2.3 million or about \$230,000 annually. Because of the long-term nature of basic research, the likelihood that research efforts will lead to a successful commercial venture or widespread adoption of a new production process is varied at best. Several of the basic and applied research grant recipients contacted reported very concrete outcomes with substantial economic impacts. In other cases, research is on-going and outcomes are uncertain pending additional research activities. In other cases, research efforts have been discontinued which is also a positive outcome, preventing future losses associated with a concept that is not feasible. Like prototype development initiatives, while not all projects may ultimately be successful, a few projects with positive outcomes result in an overall net positive return on investment.

Marketing and utilization grants support a diversity of projects directed at market analysis, feasibility studies, business plan development, and related services to support the launch and/or expansion of value-added enterprises. APUC awarded 131 marketing and utilization grants totaling over \$5.5 million during the study period. The grants supported activities associated with the launch of several large value-added processing plants as well as a number of smaller projects. Some projects supported new enterprises while others supported the expansion of an existing enterprise. Alternately, the results of some market and feasibility analyses have led to the conclusion that the project, as conceived, was not commercially viable. While disappointing to project proponents, these findings may well have saved potential investors from substantial losses.

Successful projects assisted by this program have made very substantial economic contributions. The six projects examined in this study were estimated (when fully operational) to contribute more than \$257 million annually to the state economy and result in \$3.3 million in added state sales and use tax and personal income tax revenues annually. During the 2005-2014 period, four large construction projects also made substantial one-time impacts.

Most grant recipients were generally very positive about APUC and grateful for the grant support, several indicated that they had subsequent difficulties accessing adequate capital. Given that North Dakota has several organizations and programs geared to supporting entrepreneurial efforts, perhaps more effort could be made to make APUC recipients aware of these programs.

RESEARCH LIMITATIONS AND RECOMMENDATIONS

As highlighted in the introduction, because each of the APUC programs advance APUC goals in a different manner, program evaluation requires slightly different approaches for each grant program. While this is the second evaluation of APUC grant programs, some research shortcomings that limit and hamper evaluation efforts remain.

The creation of a working database of all grant awards would allow for better classification and tracking of grant recipients. Indicator variables could help track the key characteristics of the grants and be used in future evaluation efforts. Indicator variables could include some qualification of the size of enterprise, type of enterprise, grant program, use of funding, funding amount, project description, and other relevant information. A classification system that better describes the project would facilitate the evaluation process substantially. A database consisting of the grant recipients contact information (contact names, phone numbers, address, and email address) would greatly help with future evaluations. The evaluation process was limited by lack of contact information for grant recipients, especially for those awards made early in the study period.

Future evaluation efforts should include a regularly scheduled evaluation using a mail, or preferably, an email survey. Collecting data with an email questionnaire at the end of each biennium would offer timely insight into project outcomes. A simple questionnaire could be developed for each program area, and distributed at the conclusion of each biennium. Data collected would be entered into the working database. At the end of the next biennium, new grant recipients, as well as previous recipients, could be polled again. This would allow APUC to track outcomes over time, and a rich data set would be in place the next time APCU undertakes an evaluation of this nature.

This is especially relevant for farm diversification grants, marketing and utilization grants, and nature-based tourism grants. These grant programs are characterized by fairly short project time periods. A brief questionnaire not only would be more effective in tracking outcomes over time, but also would allow for the collection of more detailed information that would likely provide

enough observations to confidently make generalizations about the population of grant recipients for those award types.

Tracking for basic and applied research grants and prototype development often requires a long time frame. Often the research itself takes several years to complete. Continued follow-up until such time as research has been discontinued or the project has been commercialized would provide a much more definitive description of outcomes. Because basic and applied research and prototype development grants can vary substantially, a combination of online and telephone surveys may be required depending on the level of information desired. The same considerations would apply to prototype development grants.

Regardless of the grant type, evaluation and assessment of grant project outcomes would be much easier if done relatively soon after project completion. Tracking APUC award outcomes was especially difficult for those projects that were completed early in the study period, as long as ten years ago. Enterprises may no longer exist or personnel changes in which the person or persons involved with the project are no longer employed or involved with the project can make evaluating outcomes difficult.

The case study evaluations do an excellent job of providing examples of successful outcomes associated with projects and enterprises that received an APUC grant. Grant recipients that participated in the case study portion of the assessment were willing to share their story, experiences and outcomes of their APUC grant project, often in more detail than can be presented in this assessment. They also all reiterated how important the grant was to the success of their project. However, not all grant recipients that were contacted were willing to disclose financial information. The inability to obtain business and enterprise financial data limits the ability to quantify the economic effects of enterprises that have received an APUC grant. While collecting financial data from every grant recipient is not feasible, a representative sample is necessary to generalize findings to the larger population of grant recipients. Accordingly, the case study evaluations serve as an illustration of potential outcomes.

The subjects of the case study were not randomly selected but were chosen with input from the study sponsor. The case study awards were for both large and small enterprises and projects. All of the case studies had successful outcomes, however, success was measured differently for each grant category. For example, a prototype development project was successfully commercialized and is manufacturing a product being sold to leading corporations in the United States. Alternately, a basic and applied research grant resulted in the development of a variety of winter hardy grapes for North Dakota's vineyard industry. While the variety has not been commercialized the potential for widespread adoption and the expansion of the state's vineyard and winery industry is substantial. Both projects were successful with very different outcomes.

The economic impact assessment is not representative of the economic effects of all projects that have received an APUC award. Data limitations make it impossible to estimate the economic effects from all projects. The scope of this research effort would need to be substantially expanded in order to attempt to overcome data limitations. Short of requiring

APUC grant recipients to provide necessary financial data as a condition of the award, collecting the needed financial data would require a substantial primary data collection effort.

Also, the assessment does not suggest that the economic activities generated by projects and entities that received an APUC grant were solely as result of the APUC award. While some project outcomes are directly the result of the APUC award and the project would not have come to fruition without APUC support, that statement cannot be categorically made for all projects. Absent the APUC program, recipients may have used an alternate funding source, or self-funded. Also, the APUC grant may represent a small portion of the overall cost of the research or project. Accordingly, it is not appropriate to attribute 100 percent of any economic effects to the fact the project had an APUC award.

CONCLUSIONS

The Agricultural Products Utilization Commission was established in 1979 to promote the state's agriculture industry. From 1995 to 2004 APUC awarded 396 grants totaling \$9.3 million. From 2005 to 2014 period, 249 grants were awarded with a total value of \$8.8 million. Project size varied considerably and ranged from small farm diversification and nature-based tourism projects to multi-million-dollar, value-added, agricultural processing facilities. APUC grants have also supported basic and applied research efforts and prototype development projects where it may take years for project outcomes to come to fruition.

The review of the six APUC grant programs indicates that each program appears to be successful in meeting its objectives. In its efforts to support the development of new products and to assist groups seeking to launch new ventures, APUC is essentially acting as a venture investor. In the literature dealing with venture investment and new business development, it is virtually axiomatic that most of the net returns result from a minority of investments. A commonly quoted statistic is that 10 percent of investments produce virtually all of the returns (Heard and Sibert 2000). Viewed in this context, in addition to successfully meeting program objectives, APUC appears to not only be achieving a very high overall return on its investment portfolio but also is supporting a relatively large percentage of successful investments. The success achieved as a result of APUC grants has benefited not only the agriculture industry, but the entire state.

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