

Definitions and Examples of Outputs, Impacts & Publications for AD-416 and AD-421 reporting



Outputs

Outputs include a progress report of what you have been doing. Outputs are **activities, events, services, and products** that reach people.

Activities include conducting and analyzing experiments or surveys, assessments, facilitating, teaching, or mentoring.

Events include conferences, demonstration sites, field days, symposia, workshops, and trainings.

Services include consulting, counseling, and tutoring.

Products include: models; networks and/or collaborations fostered by the project or activity; physical collections or resources, new animal germplasm, or genetic maps; technology, methods, or techniques; information, skills, and technology for individuals, communities, and programs; or students graduated in agricultural sciences.

Publications, presentations, etc., are also considered “outputs,” but they are to be included elsewhere in Digital Measures under the “*Publications/Intellectual Contributions*” section.

Examples of Well-Written Outputs

Activities: The principal investigator (i) taught statistical methods related to this project through formal courses, conference presentations, and graduate student mentoring; (ii) submitted papers for publication dealing with statistical methods related to this project; and (iii) submitted two funding proposals as co-investigator (one to a USU seed program, one to a NIH/USDA program) related to this project.

Events: The principal investigator taught 13 students in a Spring 2015 Statistical Bioinformatics course at USU. The principal investigator and a supported graduate student presented a poster involving statistical methods for gene expression analysis at the April 2015 Conference on Applied Statistics in Agriculture; approximately 50 attendees visited the display. The principal investigator gave an invited talk on statistical methods for microarray data at the June 2015 International Chinese Statistical Association's Applied Statistics Symposium to an audience of approximately 30.

Services: Statistical consulting was provided by the principal investigator to two separate USU labs (Davies and Isom) employing genomic technologies for animal reproductive studies. One of these projects (Isom) led to an external funding proposal.

Products: Software was formalized by the principal investigator and a supported graduate student for a probe-level model (affyNFM) of gene expression data. This is companion software to the paper published in May 2015 and is freely available online as supplemental material.

Impacts

An impact statement is a non-technical statement that describes the difference your research makes. Such statements answer the question, “So what, who cares?”

A brief **Impact statement** should be based on the following four points:

1. What is the problem, hypothesis, objective, question, or situation and why is it important?
2. What was done (methodology and approach) to solve the problem?
3. What were the answers, results, findings, impacts?
4. What are the impact, interpretation, conclusion, and/or the significance of your answer? In other words, "So What?"

NIFA defines **impacts** as *a change in knowledge, actions, or conditions*.

A **change in knowledge** occurs when the participant (scientist, trainee, or citizen) learns. Examples of a change in knowledge include: new fundamental or applied knowledge; methods and techniques; policy knowledge; improved skills; or increased knowledge of decision-making, life skills, and positive life choices among youth and adults.

A **change in actions** occurs when the participants act upon what they have learned. Examples of a change in actions include: application and actual use of fundamental or applied knowledge; adoption of new or improved skills; direct application of information from publications; adoption and use of new methods or improved technologies; use of skills by youth and adults in making informed choices; or adoption of practical policy and use of decision-making knowledge.

A **change in conditions** occurs when a societal condition is changed due to a participant's action. Examples of a change in conditions include: development of the principal discipline(s) of the project or other disciplines; development of human resources; physical, institutional, and information resources that improve infrastructure; technology transfer; quantified changes in descriptive statistics (trade balance, export sales, etc.); better and less expensive animal health; changes in conditions (e.g., wages, health care benefits, etc.) of the agricultural workforce; higher productivity in food provision; safer food supply; reduced obesity rates and improved nutrition and health; or higher water quality (e.g., increased water clarity) and a cleaner environment (e.g., measurably reduced pollution).

Examples of Well-Written Impacts

During the past five years, Colorado wheat farmers have planted an average of 20% of their fields to newly released and improved wheat varieties. This is a faster adoption rate of improved wheat varieties than for growers from comparable states. The **Colorado State University (CSU) Extension** Wheat Improvement Work Team provides 18% of the total investment in developing and promoting CSU wheat varieties. Plantings of improved wheat varieties increased Colorado farmers' farm gate income by \$12,840,000 in 2008. Extension's share (18%) of this impact for the Colorado wheat industry is \$2,311,000, or about \$13.70 returned for each \$1.00 invested.

Currently proven technologies and management practices have the potential to reduce statewide irrigation water pumped by 2 inches (or 460 billion gallons per year) or more and energy use by 42 million gallons of diesel fuel equivalent per year or more in Nebraska. In addition, for every acre-inch of water not pumped, we benefit from 55 pounds of reduced CO2 emissions creating a current potential for a 490,000 tons of reduction in CO2 emissions. Participants in a NIFA funded **University of Nebraska** program estimated that the skills gained during the educational experiences would allow them to reduce water use between 1.4 and 2.6 inches of water per acre.

Western Sustainable Agriculture Research and Education (SARE) is NIFA funded to educate and help the agriculture industry become more profitable, protect natural resources/the environment, and improve the quality of life for producers and consumers. The number of separate SARE-impacted farms and ranches which increased profits and/or reduced costs was documented as at least 1,452, with adjacent farms and ranches totaled over 3000, impacting 4,178,000 acres. Of these farms and ranches, 82% reported sustained usage of the research-based idea or practices tested. Finally, across the 5-year life-span of this Cooperative Agreement, and across the entire Western Region, there was a positive economic impact of over \$500 million.

Analyses conducted by NIFA funded scientists in **Connecticut** revealed illegal residues of the insecticide pirimiphos methyl in imported cereals. Results were reported to the Connecticut Department of Consumer Protection and the US Food and Drug Administration. There were 4,553 cases of cereal products recalled nationally. These results had impact because stakeholders learned that a food security monitoring system was detecting contaminated products. The prompt recall of contaminated products prevented human illness.

Animal scientists at the **University of Missouri**, in cooperation with scientists from **Nebraska** and **Maryland** have developed a device called the SNP chip to identify DNA markers for economically important traits in livestock, including disease susceptibility, milk production, reproduction and growth. This genomic tool significantly reduces genetic selection time for cattle from years to just a few months. Overall, it allows scientists to be more efficient and economical in their examinations of an animal's entire genome to detect variations that cause trait variation.

NIFA funded scientists at **Oklahoma State University** have developed genetic testing models to determine the economic value of genetic information as it relates to the genome-wide effects of improving beef tenderness via genetic marker-based selection of bulls and replacement heifers. Analyses have determined that an industry-wide strategy to select bulls in the upper 50% of genetic merit of meat tenderness would result in increased profitability (not counting genetic testing costs) of \$4.34/head for feeder cattle and \$1.54/head for fed cattle in 20 years. The present value of this 20 year selection strategy is projected to produce economic benefits of \$3.519 billion. So far, the models developed to determine the value of genetic information to optimally sort cattle have been used by a number of the largest feedlots in the U.S.

Examples of JOURNAL ARTICLE Citations:

Kolodinsky, J., Murphy, M., Baehr, A., and Lesser, S. (2006). Time Price Differentials in the Rent-to-Own Industry: Implications for Empowering Vulnerable Consumers, *International Journal of Consumer Studies*, 29(2): 119-124.

Alam, M., Li, J., and Guo, M.R. 2007. Production of potassium acetate from cheese whey by fermentation. *J. Dairy Science* (in press).

Examples of ABSTRACT Citations:

DAmico, D.J., Druart, M., and Donnelly, C.W. 2006. The 60 day aging requirement does not ensure safety of bloomy rind cheeses manufactured from raw or pasteurized milk when *L. monocytogenes* are introduced as post-processing contaminants. IAFP Program and Abstract Book Annual Meeting, Calgary, Alberta, Canada(P2-13).

Farley, J. (2005) *Ecological Economics* 101. Electronic conference proceedings (abstract), US Society for Ecological Economics, Tacoma, Washington. July, 2005

Examples of NEWSLETTER Citations:

Burczy, S., Lamb, D., Steen, D., Ashman, M. 2006. Words to the Wise. Quarterly. Promotes healthy living among low-income, elderly Vermonters.

Grubinger, V. 2006. Vermont Vegetable and Berry News. Semi-weekly. Provides technical information and observations from network of commercial growers. Via e-mail and in: Agriview, newsletter of the Vermont Agency of Agriculture.

Examples of PROCEEDING Citations:

Barlow, J.W., Zadoks, R.N., and Schukken, Y.H. 2006. Direct and Indirect effects of treating subclinical mastitis. Page 116 to 121 in Proc. 45th NMC Annual Meeting. Verona WI.

Pareek, R., Bond, J., Watson, A., Dowd, S., McFadden, T., and Kerr, D. 2006. Affymetrix GeneChip-based analysis of the genomic response to acute LPS-induced bovine mastitis. Proc. 2006 ISAFG Conference, E. Lansing, MI.

Example of BOOK CHAPTER Citation:

Nyachuba, D. and Donnelly, C. 2005. Sublethal injury, pathogen virulence and adaptation, Chapter 7 In M. Griffiths (ed.), Understanding Pathogen Behaviour. Woodhead Publishing Ltd. Cambridge, England, p. 152-198.

Example of BOOK Citation:

Sherman, C. 2001. The invisible Web: uncovering information sources search engines can't see. Medford, N.J.: CyberAge Books, Information Today; 439 p.