Partnership for abating ammonia emissions from dairy farms: Using a logic model to build consensus and joint work

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Abstract

Partnerships are key to understanding and solving complex issues facing agriculture. Yet, policy makers, agricultural research and extension, agribusiness and producers often have different interests and mandates and therefore different approaches to the development and implementation of technologies that enhance the profitability and environmental performance of animal agriculture. All stakeholders need a common understanding of the real and perceived risks of alternative policies and technologies, and their compatibility with existing production practices. To create this common understanding and a joint action plan for abating ammonia emissions from dairy farms, a multi-stakeholder group of research, extension and policy makers used a logic model framework. The logic model provided an organizational framework that focused discussion and understanding in order to identify the inputs, activities and outputs of each partner to create an action plan and a process for achieving agreed upon desired outcomes.

Introduction

Logic models are being used widely in all sectors to improve planning, implementation, evaluation and communications. Perhaps, one of their most valuable uses is in facilitating conversation among diverse groups and bringing consensus around a plan of action. A logic model is a graphic or pictorial representation that shows the intended flow of action from investments (inputs) to activities and outputs to short, medium and long-term outcomes (Wholey, 1979 and 1987; United Way of America, 1996; McLaughlin and Jordan, 1999). Logic models have been around in one form or another since the late 1960's, but the Government Performance and Results Act of 1993 and the accountability demands of the early 1990's pushed logic models to the forefront. Managers were asked to describe and measure outcomes, not just inputs and processes, and to justify strategies for achieving desired results. The logic model provides a way to depict the expected sequence of steps of linking investments to results, as well as their measures. Today, logic models are used around the world by national, state and local governments, international agencies, public sector institutions, educational bodies, nonprofits and public service organizations, foundations and local community groups.

Variations abound in terminology and structure, but by in large, a logic model displays the logical connections for achieving positive results. The logic model framework used in this project was developed at the University of Wisconsin-Extension (Taylor-Powell et al., 2002) and includes six major components:

1) Inputs: the resources and contributions that are invested: time, people, materials, research base, technologies

2) Outputs: the activities, products, methods and/or services that reach people. Outputs in this model include **activities** and **participation**
3) Outcomes: changes in individuals, families, groups, businesses, communities, organizations, systems. Outcomes occur along a path from shorter term (more immediate) to longer-term achievements that culminate in human, economic, civic or environmental impact. Outcomes may be positive, negative or neutral; intended or unintended.
4) Situation: the conditions, problem, that gives rise to the response (program/initiative)
5) Assumptions: beliefs we have about the response and the people involved; the way we think the program will work; principles that guide the program
6) External factors: the environment in which the program exists that affects the process and outcomes achieved including cultural milieu, climate, economic and political environment. These factors not only influence but are also influenced by the program/ initiative.

Use of Logic Model to Establish the Partnership and the Research Agenda

The national trend towards fewer and larger livestock farms has heightened public concern about water and air pollution. Over the past several years, environmental policy related to animal agriculture has focused on land application of manure, especially how to stop or reverse soil phosphorus (P) build up, runoff, and the subsequent pollution of lakes, streams and other surface water bodies. Policy is now aimed at reducing air emissions from animal agriculture (NRC, 2003). For Wisconsin, "America's Dairyland", air emissions relate directly to ammonia. Most of the nitrogen contained in the urine

excreted by dairy cows can be transformed rapidly and emitted as ammonia gas. Two impacts of emitted ammonia are of principal concern:

(1) Emitted ammonia combines with compounds in the upper atmosphere to form particulates. These particulates have been related to haze in urban areas, and also have been attributed to a variety of adverse health effects, including premature mortality, chronic bronchitis, asthma, and hospital admissions.

(2) When deposited in natural ecosystems, ammonia contributes to ecosystem fertilization, acidification, and subsequent "ageing". This nitrogen (N) input from ammonia can cause dramatic shifts in the vegetation, enhancing grass growth and fire hazards in some areas.

Under the federal Consolidated Emissions Reporting Rule, each state will be required by 2004 to report air emissions to the US Environmental Protection Agency (EPA). These estimates will be used in air quality regulations to control the air-borne particulates and haze that affect many regions of the US.

To respond to this need, the "Partnership in Understanding and Abating Ammonia Emissions from Wisconsin Dairy Farms" was created in March 2004. A number of factors came together at this particular time to cause the creation of this partnership:

1) Funding became available to do ammonia emission research;
2) Wisconsin was required to report an ammonia emissions inventory to USEPA;
3) A world-known British expert in ammonia research and ammonia inventory development of the UK was spending an eight month sabbatical leave in Wisconsin; and

4) Producer concern was rising about the impending ammonia emission regulations and effect on their business.

The partnership included four principal stakeholder groups with diverse interests:

1) Research: USDA-Agricultural Research Service, Dairy Forage Research Center and University of Wisconsin, College of Agricultural and Life Sciences;
2) Extension: Wisconsin Agricultural Stewardship Initiative (WASI)
3) Policy: Wisconsin Department of Natural Resources
4) Producers: Professional Dairy Producers of Wisconsin (PDPW)

The initial purpose, bringing the partners together, was to plan an "Ammonia Emissions Workshop". During the initial planning meetings, it became clear that future workshops focusing on research, technology transfer and policy would be warranted and continued collaboration would be advantageous. Rather than an ad hoc approach, the partners decided to think more long-term and plan for ongoing collaboration. The research and extension members of the workshop planning committee had experience in using the logic model in other planning and evaluation efforts. It was felt that the logic model could provide a way for the partners to clarify their work together, articulate their joint desired outcomes and future research activities.

The research and extension members crafted the first model. It was brought to the group for discussion and modifications were incorporated. The current partnership model is illustrated in Figure 1. It depicts outcomes for the partnership process that are necessary in order for the activities the partnership undertakes to be achieved. It shows the role of the individual stakeholders and how they interrelate and contribute to the achievement of the ultimate goal, reduction in ammonia emissions. This overall logic

model has helped facilitate discussion, understanding and direction among the partners. It is considered a roadmap that highlights and communicates the end destination and route for getting there.

A component research logic model (Figure 2) was developed as a research planning exercise. It depicts, in more detail, the activities and outcomes for the research component that feeds into the overall effort (overall logic model). This component logic model was shared with the other partners and minor modifications were made as a result.

In summary, the logic model framework helped the partnership create a synopsis of initial activities and initiate a process of planning future work. It helped us understand the nature of our partnership and the value of working collaboratively. It helped us focus on and articulate an ultimate end goal and identify the contributions of each partner in achieving that desired end result. It has given us a one-page picture that communicates how we will work together. We will continue to revisit the logic models to:

- Further refine the individual contributions to the whole and the performance necessary from each partner;
- Analyze alternative strategies for achieving our desired end state;
- Refine the series of connections and plausible chains of outcomes;
- Create more specific work plans for accomplishing our goals;
- Identify ways to measure our individual contributions and the success of the whole partnership.

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Figure 1. Logic Model: Partnership in Understanding and Abating Ammonia Emissions from Wisconsin Dairy Farms

SITUATION: Ammonia is a potential human health and environmental concern. No organized, unified effort exists to understand ammonia emissions processes and use this information to develop policy and adoptable practices that enhance ammonia capture on dairy farms.

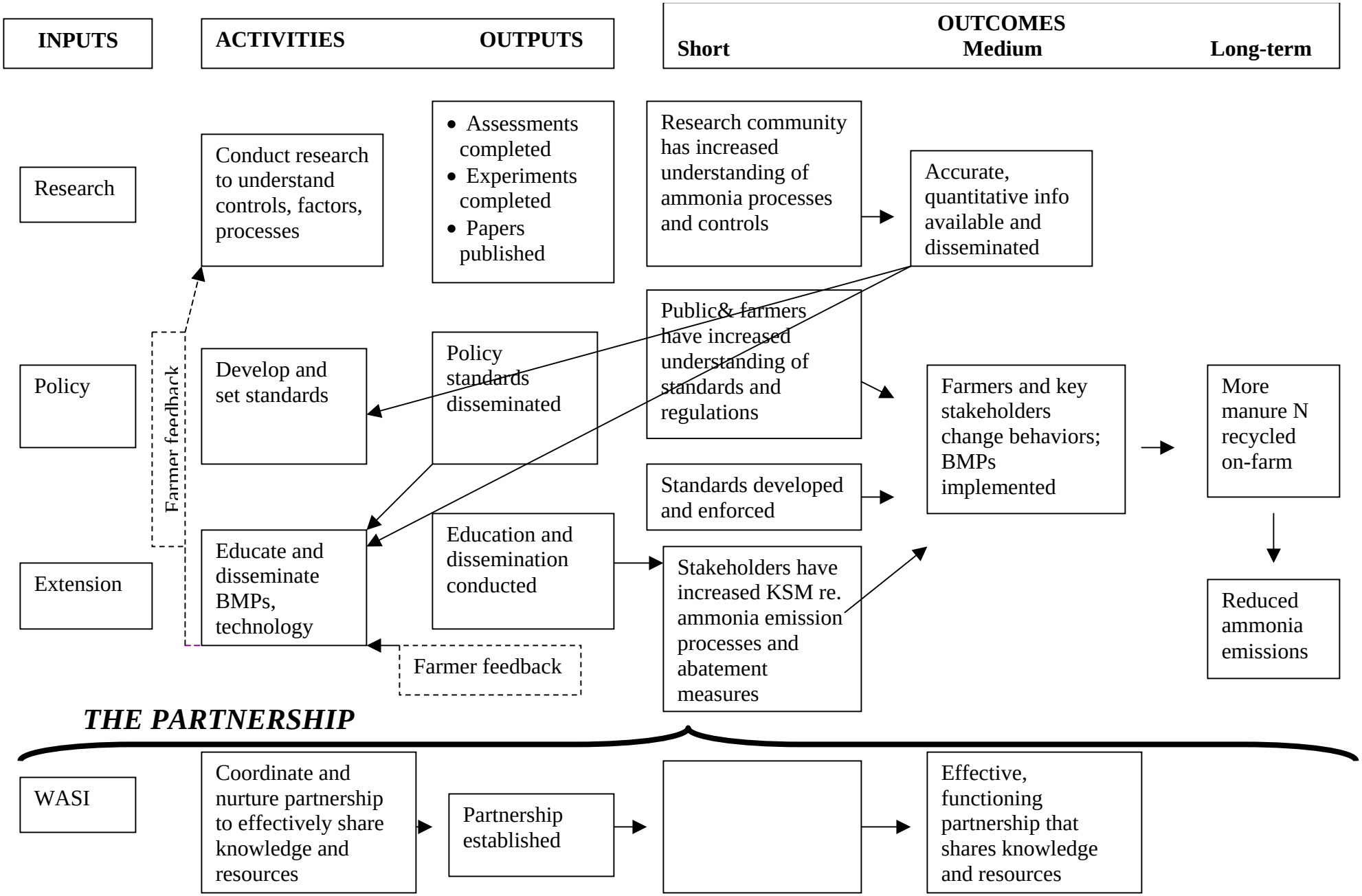

Figure 2. Research Logic Model: Partnership in Understanding and Abating Ammonia Emissions from Wisconsin Dairy Farms

SITUATION: Current research knowledge related to ammonia emissions from dairy farms is inadequate.