

PROJECT NARRATIVE

1) Introduction:

The overall goal of the proposed project is that Extension, working with partner organizations, effectively informs and influences livestock and poultry producers and consumers of animal products in all regions of the U.S. to move animal production toward practices that are environmentally sound, climatically compatible, and economically viable. A primary desired outcome is that stakeholder decisions result in reduced greenhouse gas emissions without sacrificing America's capacity to produce meat, milk, eggs and other animal products.

Project objectives are to:

- 1) Equip extension personnel and stakeholder representatives to assess stakeholder needs relative to climate change mitigation and adaptation and to deliver educational programs that target those needs;
- 2) Provide on-demand web access to science-based information, educational resources, and decision-support tools to stakeholder groups and the public on climate change related to animal agriculture; and
- 3) Coordinate efforts so information and resources are utilized optimally at the state, regional and national levels.

Background:

In the span of a few years, greenhouse gases, global warming, climate change, and carbon footprints have moved from the realms of academic discussion and research to the front-line attention of legislative debate, market speculation, consumer interest, and state and federal regulation. Given the cross-cutting social-environmental-economic implications of climate change issues, one can see why there is some urgency to generate new knowledge on this topic and also to disseminate knowledge in ways that can induce beneficial changes in practice. This is especially true for animal agriculture, which, although it is identified as a relatively minor source (1-3%) of total U.S. greenhouse gas (GHG) emissions (US EPA, 2010), has been the target of much negative press, calls for consumer avoidance, and regulatory attention to lessen America's contribution to global warming.

When USDA NIFA made climate change a priority area for its competitive grants program it also emphasized its commitment to extending the impacts of new knowledge to current and future practitioners through extension and education. Regarding climate change, extension has great potential to affect the adoption of mitigation and adaptation practices in a positive manner, although an infusion of human capacity may be needed for this to be realized in the short timeframe desired by many Americans. Since its inception in the latter half of the 19th century, Extension has had as its mission helping people use research-based knowledge to improve their lives and livelihoods. Extension has been very instrumental over the years in getting new knowledge out to the masses, demonstrating where practical applications may have the most benefit, and hastening the adoption of appropriate practices and technologies. In this Land-Grant approach, Extension has greatly multiplied the impact of knowledge produced through laboratory and field research. And, nowhere has this been more evident than in production agriculture.

But Extension finds itself at a crossroads of sorts, in that state and federal hard-dollar funding has been noticeably waning at the same time that demands for programming in priority areas remain as high as ever. Less baseline funding has led to attrition in personnel and the associated loss in skills and expertise embodied by reduced staff. Emphasis on bolstering funding support has resulted in many extension specialists – and field staff – committing more of their time and efforts toward obtaining extramural funding and conducting research. All of this has resulted in Extension today being very lean and more efficient than ever. But, it also means that the extension response to new and substantial educational needs – like climate change – may not occur in the desired timely and effective manner without investment of additional resources.

eXtension and the LPELC:

One recent development in technology – eXtension – is helping extension faculty and staff leverage their efforts and benefit more from the expertise of colleagues. This national, web-based environment facilitates networking and extends the availability and utility of extension resources. Extension personnel across the U.S. are now collaborating on ‘communities of practice’ (aka ‘CoP’) and/or utilizing the resources developed by CoPs and placed on eXtension for public access. A visit to eXtension’s website <www.eXtension.org> shows the web presence of numerous CoPs serving both rural and urban audiences.

Going well beyond the several farm commodity-specific CoPs that have formed, one CoP – the Livestock and Poultry Environmental Learning Center (LPELC) – has focused on the environmental concerns of animal agriculture. The LPELC is committed to a customer-driven approach and utilizes audience feedback to improve ongoing efforts in research and outreach. The LPELC maintains up-to-date information and extension resources in a variety of media within the ‘Animal Manure Management’ content area of eXtension. Resources have been developed and are currently available (Koelsch et al., 2007) on the following topics:

Air Quality	Pathogens
Environmental Planning	Regulations
Feed Management	Small Farms
Manure Nutrient Management	Manure Storage, Handling & Mortality
Manure Treatment Technologies	Value and Economics of Manure

LPELC website. The LPELC has engaged more than 100 experts to develop a comprehensive web presence for animal manure issues. The website, launched in March 2008, exceeds 200,000 page views annually and is on track to exceed 250,000 page views in 2010. Website design with eXtension assistance has made the Learning Center competitive among web search engines, accounting for 70+% of site visits. A comprehensive tracking system is in place to analyze website use. This feedback is crucial to determining if individual pieces of content are performing as expected.

Audience engagement. The LPELC has attracted a large and diverse audience interested in animal environmental issues. There is currently a subscriber list of nearly 1,500 people for its monthly newsletter. The newsletter is forwarded to several other relevant listservs, nearly doubling its reach. In addition to this one-way interaction, the LPELC is devoting much effort to cultivating social media connections that allow for two-way interaction and opportunities for the audience to connect and learn from each other. There is a large and growing agricultural presence in Twitter. LPELC has over 400 Twitter followers, most of whom have agricultural

connections and are not subscribers to the newsletter. A recent analysis in “Tweetreach” showed that in a given month, messages by the LPELC reach up to 10,000 people. This is possible because many messages by LPELC are re-tweeted/forwarded to other user’s followers. The number of Twitter followers is growing exponentially – more than 100 new followers were added in May of 2010 alone. A professional networking site (<http://animalag.ning.com>) currently has 74 members. Through this site, the audience promotes their events or publications, starts or participates in discussion forums, adds news items to the blog, and offers feedback.

Webcast series. The monthly webcasts, started in September of 2006, are viewed live at more than 100 sites (by more than 130 individuals) and the archived webcast expands the viewing population at least five-fold. Webcast presenters have included Extension faculty as well as researchers (Land Grant Universities, USDA Ag Research Service and US Geological Survey), and private sector experts. The audience for the webcast series represents a national cross-section of advisors for animal agriculture (Figure 1). Webcast viewers indicate that they influence, on average, the environmental management decisions of 136 livestock and poultry producers annually. Webcast viewers can receive continuing education credit. The LPELC works with Certified Crop Advisers (CCA) and American Registry of Professional Animal Scientists (ARPAS). The LPELC also provides attendance lists for submittal to state programs. Demand has been especially strong from Professional Engineers (PE) and USDA NRCS Technical Service Providers (TSPs).

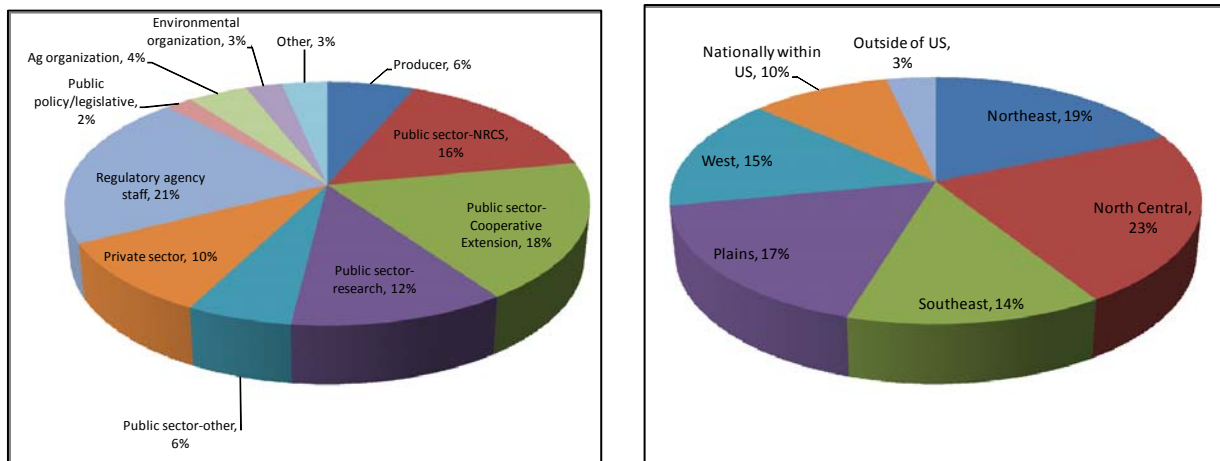


Figure 1. Categorical assessment of participation in LPELC webinars.

Needs assessment and impact evaluation. The LPELC conducts frequent assessments to determine target audience needs and impact evaluations to assess how and how well information is being put to use. The LPELC continues to document its impact. That information is shared with cooperating projects to enhance and target their efforts.

Key personnel and current activity:

Three of the co-PDs for the proposed project (Harrison, Mukhtar, and Risse) played major roles in forming the LPELC and continue to provide leadership in developing the Animal Manure Management web content area. The project director (Stowell) leads an integrated extension-education project – Air Quality Education for Animal Agriculture (AQEAA) – and directs the development of air quality resources within the Animal Manure Management web content area.

AQEAA and the LPELC began developing more climate change-related resources a couple of years ago. The AQEAA team facilitates bimonthly webinars with the LPELC, and four of the webinars broadcast over the past year and a half were focused on greenhouse gas emissions and/or estimation of agriculture's carbon footprint. Two additional LPELC webinars covered carbon credit markets and anaerobic digesters. Recently, the LPELC and the AQEAA project jointly invested resources into developing some basic resources on greenhouse gas emissions, carbon footprints, and other climate change-related information pertaining to animal agriculture. The objective is to seed a new web topic area within the Animal Manure Management web content area dedicated to climate change issues (by the end of 2010). Unfortunately, this initial effort will exhaust the limited available resources of both teams toward such activity.

All of the PDs on this project have fairly extensive experience in extension and have demonstrated leadership in conducting extension programs in one or more of the content areas addressed by the LPELC. PDs Gooch and Mukhtar possess some of the most relevant expertise in conducting extension programs related to climate change via their work in evaluating anaerobic digestion of manure (i.e. methane recovery). PDs Jacobson, Gooch and Mukhtar were involved as investigators in the National Air Emissions Monitoring Study (NAEMS) and direct research studies that monitor greenhouse gas emissions from livestock facilities. Collectively, the PDs' expertise and programs address all of the major food animal species and show established collaborations with many stakeholder organizations.

Synopsis of need:

Even given the success of the LPELC, its eXtension presence, and the programs of individual PDs, the project directors for this proposal recognize a significant shortfall in regard to extension programming in climate change. Simply put, there is a substantial gap in the human capacity needed and that available to implement extension programs nationally as well as produce the extension resources needed to initiate and sustain those programs. With the thinning ranks of extension specialists and educators, the limited number of people in extension who have bonified expertise in climate change matters, and the fairly broad array of demands on those having this expertise, there is a need for additional extension professionals who can dedicate their energies and intellects toward achieving our goal. Thus, we present a proposal that largely puts people in position to develop the capacity at the state and regional levels to conduct extension programs on climate change as it relates to animal agriculture, while forming connections that we expect will foster and sustain national / inter-regional exchange of information and resources into the future.

2) Rationale and Significance:

a) Rationale: With the new AFRI priorities, climate change has become a significant focal point for funding of federal research, extension, and education programs. Research and other grant-funded work in the climate change priority area will generate knowledge, information, tools and

resources that, at least initially, will address targeted regional needs and audiences. Unfortunately, existing lack of extension capacity – both in terms of limited content expertise and personnel time available to coordinate the development and delivery of programs in this new area – will hamper the translation of new climate change knowledge and tools to end-users within most regions of the U.S.

There will also be a great need to extend the utilization of new and existing climate change resources nationally and to other pertinent audiences. The Livestock and Poultry Environmental Learning Center (LPELC) coordinates eXtension programming in several environmental topic areas that influences stakeholder audiences in animal agriculture. What appears to be needed now is to empower a core group of extension professionals to coordinate national eXtension programming on climate change issues for animal agriculture and to collaboratively develop extension resources and programs to meet the needs of a variety of stakeholder audiences.

We believe it is wise use of resources and opportunity to partner key regional extension professionals with the LPELC to tackle these two fundamental challenges for climate change extension – regional capacity building and national eXtension programming – in a coordinated manner. Not only will capacity to develop and deliver extension programs on climate change be developed at several levels, but a solid foundation for extension collaborations with integrated climate change projects will also be put in place. The significance of this proposed project is that the delivery of research knowledge and unbiased information concerning climate change to producers and other decision makers will be greatly enhanced.

b) Program priority area: The proposed project specifically addresses *climate education and extension*. This project proposes to increase the number of extension professionals in the workforce with the skills and knowledge to address climate change issues in animal agriculture. A primary intended outcome is that livestock and poultry producers and consumers of animal products will improve their understanding of climate change, its impacts, and options for environmental stewardship. Resulting extension programs will largely focus on technologies and practices for mitigating greenhouse gas emissions from food animal production. However, our team will also collaborate (e.g. with animal and plant commodity-focused teams) to develop resources and deliver programs on adapting production systems to changing climate.

c) Potential for improvement and sustainability: The proposed project directly supports extension programming that will deliver science-based knowledge to producers and consumers, enabling them to make informed practical decisions relative to greenhouse gas emissions, climate change, and the options afforded to them. Climate change issues will continue to drive assessments of farm efficiency, profitability, and sustainability on multiple levels. Because mitigation of greenhouse gas emissions on animal feeding operations largely involves controlling methane, we also envision continued interest in use of digesters on farms, energy production from biogas recovery, and related entrepreneurial opportunities that may develop in nearby rural communities. Our project seeks to produce extension materials and deliver programs that play a pivotal role in informing and influencing affected stakeholders' decisions.

Our team believes that the proposed project is novel in its concept of closely coordinating on-the-ground extension efforts at state and regional scales with those at the national level via eXtension. Also, we believe that the foundation in climate change extension that we will build across regions will provide unmatched opportunities to establish productive collaborations with CAPs and integrated projects related to climate change and animal agriculture.

3) Approach

Project objectives will be achieved through the coordinated efforts of extension professionals from several regions of the U.S. working in concert with the LPELC as a Climate Change Team. The Climate Change Team will initially consist of an extension specialist and project-dedicated extension professional from each of five regions, in addition to the project director, a project team manager, and a web content manager, all three representing the LPELC (Refer to Figure 2).

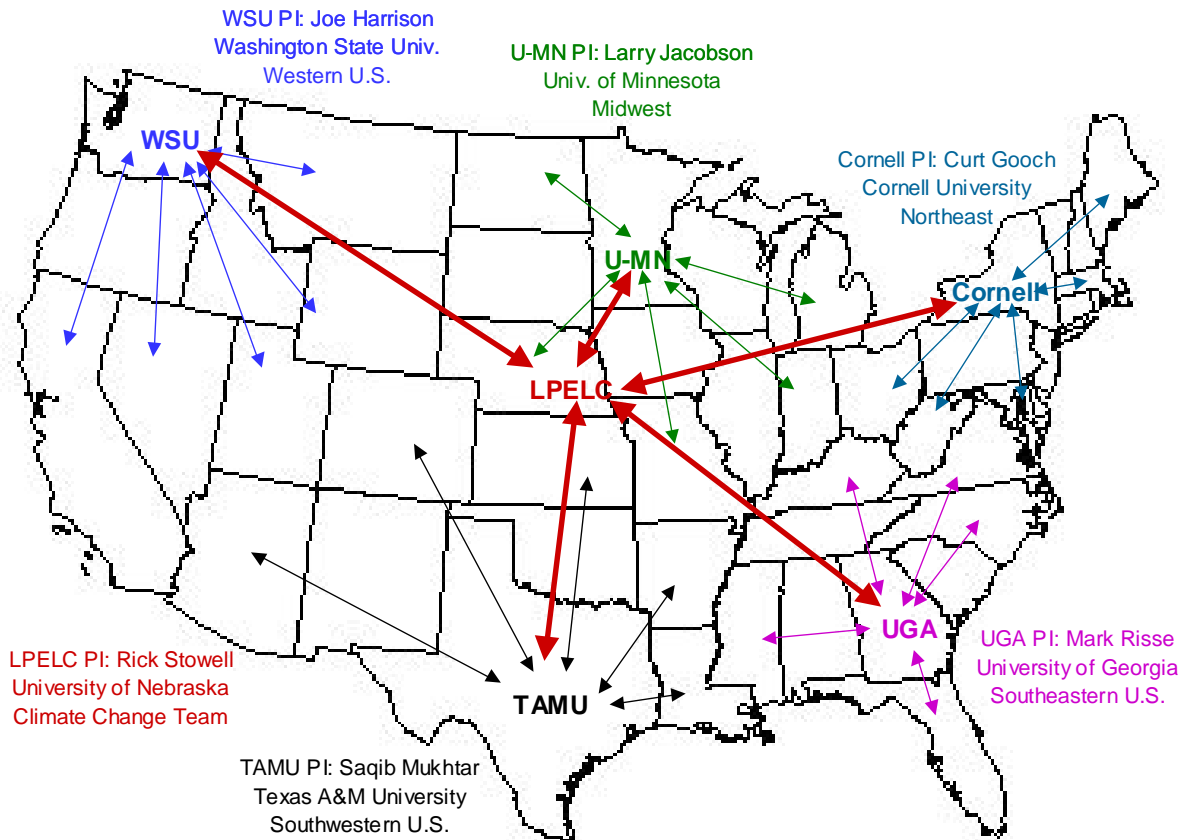


Figure 2. Illustration of Climate Change Team participant locations and geographic regions.

The regional co-PDs will have primary responsibility within their respective regions for developing extension capacity relative to climate change and will oversee associated capacity-building activities. The project director will be responsible for directing collaborative efforts of the Climate Change Team to develop extension resources and deliver broadly applicable programs, as well as oversee climate change-related eXtension activity and associated activities of the LPELC staff.

The dovetailing organizational frameworks for the regional capacity-building aspects and the national information-dissemination aspects of this project are conveyed in the logic models (Figures 3 and 4) that were developed for the project. We believe that shared desired outcomes can be effectively achieved in this project. Project activities are described in more detail in the following section.

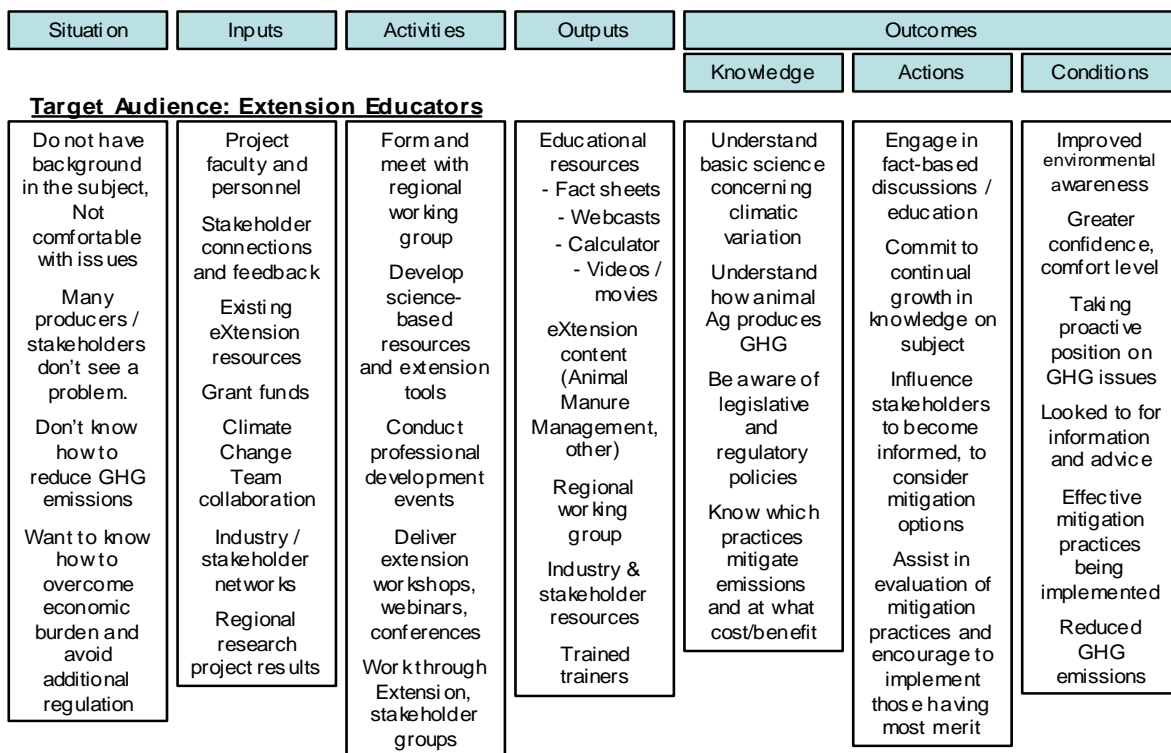


Figure 3. Logic model for developing regional extension capacity to address climate change issues for animal agriculture.

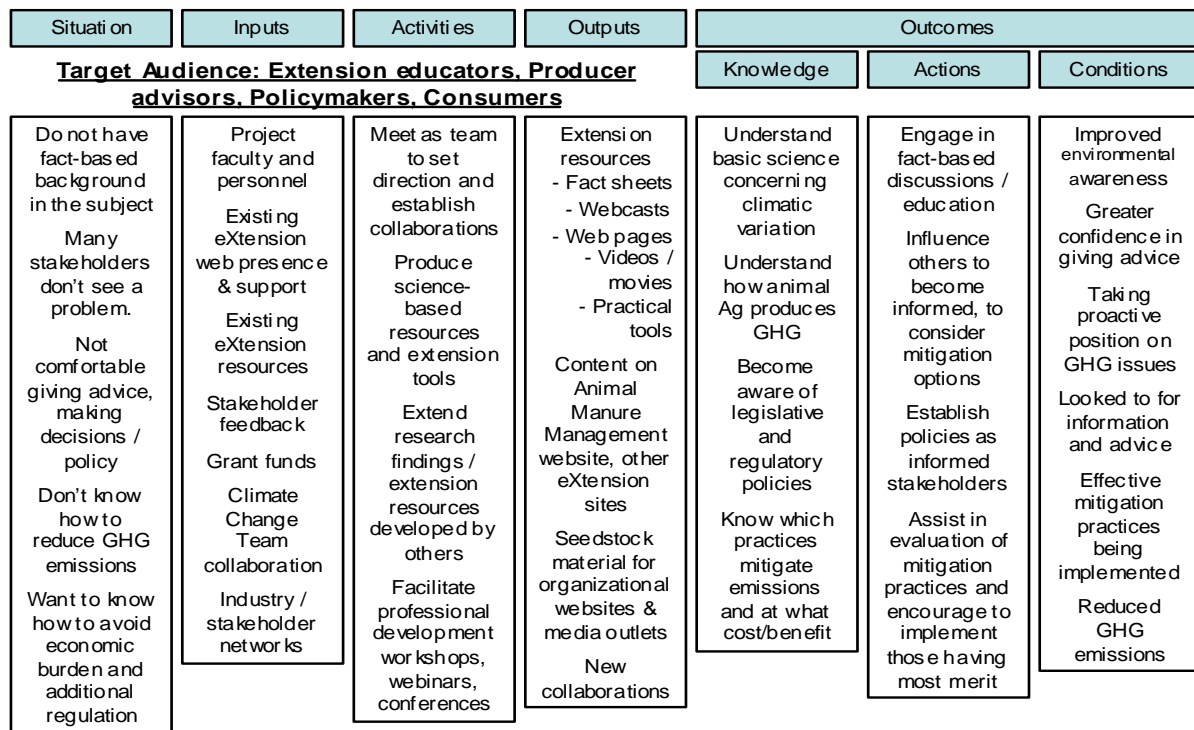


Figure 4. Logic model guiding Climate Change Team activity and development of associated eXtension web content.

a) Activities proposed:

The key functional roles that regional project participants will fulfill are to:

- 1) Develop extension capacity within the region to assess needs, and to develop, deliver, and evaluate extension programs regarding climate change and animal agriculture;
- 2) Facilitate national dissemination of climate change information via eXtension as a core member of the LPELC Climate Change Team;
- 3) Collaborate with integrated projects and with educational efforts within the region that address climate change and agriculture; and
- 4) Foster climate change-related extension programs of counterparts in other regions.

Within the first two months of the project, each regional co-PD will employ a qualified candidate to carry out the day-to-day responsibilities of the listed functional extension roles. The extension professional will be supported full-time by the project for the first two years to ensure that the individual hired can focus on climate change-related activities and be fully committed to developing collaborations within the region and achieving project objectives. Salary support declines during Years 3-5 in recognition that collaborations developed during Years 1 and 2 are expected to provide increasing opportunity for financial support with time. Oversight and targeted expertise and assistance will be provided by the regional co-PD.

Develop capacity within the region. The extension professional will work with extension contacts and stakeholder representatives within their state and neighboring states to form a working group that will coordinate climate change-related extension efforts within the region. [Alternatively, collaboration with an existing team may be selected if this is deemed to be more effective / efficient for a given region.] This working group will then engage stakeholders, helping to direct and facilitate targeted activities in the region. Coordinating professional development opportunities for the working group and other interested extension personnel will be a project priority; in essence, building up capabilities at the state and local levels to conduct extension programs and disseminate research-based information within the regions. In addition to coordinating this working group and related professional development opportunities, the extension professional will lead the way in accessing and developing extension materials that meet targeted extension needs in the region. He/she will also serve as a presenter/instructor at events where this is strategically beneficial to accomplishing project objectives.

A timeline of deliverables expected from performing this role include:

- A working group will be in place and fully functioning within the first three to six months of the project to more effectively address regional needs relative to climate change and animal agriculture;
- Professional development events will be facilitated for the working group members at least once a year; and
- Educational materials and resources will be produced to fill prioritized extension information voids in the region.
- [Regions may have specific events or deliverables for their respective regions.]

Facilitate national dissemination of information. The regional co-PD and extension professional will be core members of the LPELC Climate Change Team, together providing focused and relatively unique climate change expertise to the team. A summary of preliminary expertise/priority areas and targeted audiences for each region are shown in Table 1.

Table 1. Summary of preliminary areas of emphasis for the regional extension efforts.

Region of U.S.	Expertise/priority area or targeted audiences
Midwest	Swine, poultry (layer & turkey), and dairy production systems Grain (corn and soybean especially) production State and local regulators, Public and private mitigation technology enterprises, and Equipment designers and suppliers
Northeast	Dairy housing and waste management systems Manure-based renewable energy systems and effects on farm carbon footprint Innovation Center for U.S. Dairy (goal of 25% reduction in greenhouse gas production in the dairy industry by 2020) Outreach to milk product consumers (with American Dairy Association)
Southeast	Dry litter poultry production systems Grazing dairies and dairies in the humid Southeast Poultry professionals and consultants throughout the Southeast Southern waste certification and education programs
Southwest	Dairy and poultry production systems; Beef production Mainstream media reporters and science writers; High school youth, including FFA and 4H members
West	Beef, dairy, swine and poultry in both wet and arid climates State and regional air regulatory agencies Scientists who have focused on models to inter-relate climate change and livestock and poultry production

The regional co-PD will support team-planning activities and provide targeted information stemming from his expertise. The project-dedicated extension professional will contribute to ongoing eXtension activities of the Climate Change Team in more tangible ways, by:

- Providing regionally prominent information and content to the team;
- Producing climate change-related extension materials for placement on the LPELC eXtension website; [This will entail adjusting materials for a broad-based regional / national audience and obtaining an appropriate peer review of these materials.]
- Servicing eXtension needs by developing FAQs and facilitating response to ‘Ask the expert’ questions; and
- Helping to organize and conduct special events (e.g. a national conference).

Collaborate with projects within the region. Having a project-dedicated extension professional focused on climate change-related programming will greatly enhance regional capabilities to collaborate with integrated projects and with other relevant educational efforts within the regions. The proposed deliverable is that at least one collaboration will be pursued each year with three collaborations being put in place during the duration of the project. Priority will be given to climate change-related CAP and integrated AFRI projects to the extent that is feasible. As swine and poultry production systems are designated as research areas for 2010-11 AFRI Climate Change funding in animal agriculture, prospective collaborations will naturally lead to project team efforts initially emphasizing swine and poultry production.

Foster programs of extension counterparts. A growing major challenge for extension that is faced in all regions is that there is very limited capacity to address needs in emerging or non-prioritized topics. Via interactions with other members of the LPELC Climate Change Team, regional strengths and deficiencies in expertise will become evident. To help address this need relative to climate change and animal agriculture, project personnel will:

- Collaborate with counterparts in other regions to help develop climate change-related resources that meet specific regional program needs;
- Be available as presenters/instructors for extension programs that are organized by counterparts in other regions; and
- Recognize and utilize expertise of counterparts in other regions in developing resources and delivering programs within each region.

The primary functional roles of LPELC project participants are to:

- 1) Coordinate activities and efforts of the Climate Change Team in assessing national extension needs, and developing, delivering, and evaluating broad-based extension programs regarding climate change and animal agriculture;
- 2) Develop climate change extension content where gaps exist or significant needs arise that are not being addressed regionally;
- 3) Facilitate national dissemination of climate change information via eXtension (the Animal Manure Management web content area), conferences, and collaboration with other projects; and
- 4) Coordinate evaluation of national extension materials and program impacts.

Coordination of the Climate Change Team. The project director and Climate Change Team Manager will share responsibilities for coordinating activities and efforts of the team in assessing national extension needs, and developing, delivering, and evaluating extension programs. Annual face-to-face meetings will be employed to set primary direction for the team and establish critical responsibilities for participants. Stakeholder input will be obtained by having stakeholder representatives participate in these meetings, emphasizing the importance of stakeholder input during planning, implementation, and evaluation phases of the project. Regular team communication will be maintained through monthly conference calls, web conferencing where appropriate, and electronic communications.

Development of climate change extension content. A major roadblock in many national projects like this one is that programming gets bogged down because project participants lack time or interest to develop content that meets an identified need, but is not a high priority for specific regions or individual participants. A major responsibility of the Climate Change Team Manager will be to identify and develop just such content. The LPELC will also facilitate technical production of national extension content in various electronic media by covering reasonable costs for layout, videotaping, graphics development, final editing of material, etc.

Facilitating national dissemination of information. The Animal Manure Management web content area within eXtension will be used as the primary platform for making information readily available to stakeholders and the general public. The web content manager will provide regular training to team members on organizing and uploading material to the web in the various platforms utilized by the LPELC. The web content manager will assist in uploading material as needed and process material directly that involves out-of-the-ordinary steps or decisions.

Since posting material on the web is an inherently passive means of communication, the monthly electronic newsletter (nearly 1,500 recipients) will be utilized to highlight content that has been recently added to the website or has special relevance to address a current stakeholder concern.

The PDs recognize the value of disseminating information via other venues as well. With guidance from stakeholders, the project team will utilize links and share material with other eXtension content areas (e.g. dairy and beef CoP sites), commodity organization outlets, and the popular press to maximize the reach and impact of new science-based information.

The project will organize and sponsor workshops and at least one national conference on climate change, tentatively looking at Years 3 and 5 for conducting such primary events. The specific focus of these events will be formulated as federal policies and research evolve, although LPELC surveys have shown pretty clearly that stakeholders want to know why an issue should be of interest/concern to them and what can be done to benefit from situations / respond to concerns.

The project team anticipates collaborating with a regional CAP project and other integrated climate change projects. The LPELC has proven to be flexible and productive in collaborating with other projects, serving in a cosponsor, co-organizer, and/or information-delivery capacity for events such as:

Mitigating Air Emissions from Animal Feeding Operations (May 2007)

National Water Quality Conference (February 2010)

19th Discover[®] Conference, Key Issues in Sustainability of the Dairy Industry (May 2010)

International Symposium for Air Quality and Manure Management in Agriculture (September 2010)

The team is open to collaborating in similar efforts and will pursue other novel and more-sustained joint programming opportunities.

Evaluation of materials and impacts. The LPELC will evaluate materials developed by the Climate Change Team for use in national program events and climate change content placed in the Animal Manure Management web content area. The LPELC has gained a fair amount of experience in evaluating national extension [especially eXtension] materials and program impacts. Basic information will be gleaned about utilization of materials and the effective reach of program activities by monitoring participation at events and web content usage. We plan to utilize the growing number of qualitative indicators available (e.g. social media) to determine if event attendees or website visitors recommend material to others.

The LPELC will also provide guidance and offer structure for regional co-PDs to evaluate materials developed within the region and the impacts of professional development activities. The regional co-PDs will work with stakeholder groups and the regional working groups to collect regular feedback on outcomes and impacts.

b) Methods used:

The regional co-PDs will employ a variety of extension methods for conducting needs assessments and delivering extension programs to build extension capacity within the regions, depending on the specific learning needs and environment of their given regions. A major element of the project will be engaging the stakeholders in the working group to assess preferred techniques for assessing needs (e.g. survey stakeholders / target audience, listening sessions), delivering material (e.g. website, newsletters), and conducting programs (e.g. workshops,

webinars, conferences). Because there are differences in stakeholder groups and associated needs across regions, we anticipate that several different combinations of methods will be used, and the project will rely on co-PD experience and expertise to select and implement appropriate methods. There will be regular sharing of ideas and experiences, however, via the Climate Change Team to help each co-PD implement optimally effective methods.

National material development and programming methods are better defined at this stage. Annual team meetings will include small-group discussions and listening sessions with co-PDs and stakeholder representatives to clarify learning objectives and needs for extension materials and programs. The LPELC has, as a regular practice, surveyed those on the newsletter recipient list to obtain current feedback on needs for information and extension materials. This practice will be maintained on at least an annual basis.

The LPELC is adept at disseminating information and material via the Animal Manure Management eXtension website, and the expectation is that this will continue during this project. The LPELC regularly produces webinars, informational web pages, fact sheets, research summaries, monthly electronic newsletters, videos, frequently asked questions, and ask the expert responses. Methods being adopted include virtual tours, placing video clips on U-Tube, and using other social media to expand our audience and better reach/engage target audiences.

The educational process involves more than just providing quality information in a timely manner, though, so the project will utilize opportunities to engage stakeholders / a target audience via face-to-face, in-depth learning experiences and planned series of learning activities. Prospective learning experiences include regional tours, seminars and workshops, and one or more national conferences. Team members will remain engaged in stakeholder activities as well, which will open up many other teachable moments and opportunities to present information in different venues and to a larger and more diverse audience. The project team plans to develop one or more on-line courses and pursue social media forums that facilitate ongoing learning.

c) Expected outcomes:

A primary outcome expected from this project is that there will be significant growth in the number of personnel who are equipped to engage stakeholders in climate change-related extension programming. Important consequential outcomes of this will be that more and higher quality extension programs and materials will be made available to stakeholders and that more stakeholders indicate that they obtain useful/valuable climate change information from Extension and its Land-Grant partners.

The other main outcome expected is that project activities have shortened the time interval between when new science-based knowledge concerning climate change and animal agriculture is generated and when it reaches the intended target audience in sufficiently understandable and useful form to be readily applied. Subsequent outcomes of this shorter lag period should be quicker adoption of new practices and strategies, and faster realization of the associated benefits of implementing them (e.g. reduced GHG emissions, financial gain from capturing methane or sequestering carbon).

Finally, the PDs expect that the LPELC will be looked to as the eXtension resource for addressing greenhouse gases and climate change as related to animal agriculture, and that Extension will be looked to – across the country – as the main contributor of credible, science-based information on climate change and agriculture.

d) Assessment of results:

The LPELC will utilize its experience in evaluating its eXtension content and sponsored extension events to evaluate the results and impacts of web-based programming and events that stem from the proposed project. Basic information will be gleaned about utilization of materials and the effective reach of program activities by monitoring participation at events and web content usage. Efforts of the current LPELC project coordinator to obtain more detailed and impact-oriented information from web use tracking tools and participant surveys will be maintained and expanded where appropriate. We also plan to utilize the growing number of qualitative indicators available (e.g. social media) to determine if event attendees or website visitors recommend material to others. The LPELC is currently working with an evaluation specialist to conduct a thorough assessment of impact from past programming / existing web content. We will build off of these findings to increase our project's impact potential and to refine the evaluation of project impact.

Ultimately, this project is committed to changing behavior and measuring change in behavior as the primary measure of project impact. Therefore, we are interested in determining whether, within the various regions, state and local extension educators feel better equipped to deliver programs in climate change and are actually using project materials and conducting programs. Although the specific methods of evaluation will vary by region, co-PDs will be expected to utilize ongoing interactions with their working groups to devise and implement feedback mechanisms for determining behavioral status over time. By taking advantage of the longer (5-year) horizons allowed in the current AFRI, the project team will be able to obtain a fuller picture of behaviors and assess outcomes and impacts better over time. We also want to know how the project activities have impacted the behavior of producers, consumers of animal products, and other project stakeholders. Assessment of impact here will be primarily coordinated in conjunction with the relevant stakeholder group or representative.

e) Use of results and products:

Regional PDs will be expected to publish and present the results of assessments and impact evaluations so others can learn about the results and know what activities were most effective in building extension capacity. We envision that increased extension capacity within the regions will generate additional results and impacts after the project is completed.

Similarly, the LPELC will publish and present results of assessments and impact evaluations performed on its eXtension web content and national events, so other CoPs and extension efforts can benefit from the experiences of this project. We envision, of course, that the resources that are produced by the Climate Change Team and made available through this project will be widely used by stakeholders to implement practices and strategies that mitigate GHG emissions and enable producers to adapt production practices to climatic conditions.

f) Potential pitfalls

One potential pitfall is that one or more of the project participants may become unavailable to work on the project, which is especially a concern for people-intensive projects like the one proposed. This project is designed to have some reserve capacity at all levels – each region has a co-PD working with an extension professional; the Climate Change Team manager and project director will work together in planning and coordinating team activities; and the LPELC already employs two people having working knowledge of the eXtension web framework. This beneficial redundancy in capabilities within the project team should facilitate associated project

activities continuing to move forward while the vacant position is filled or other options are followed-up on to perform the affected project responsibilities.

Another potential pitfall is that opportunities for collaboration may unexpectedly diminish. There is certainly the possibility that no animal-related climate change CAPs are funded or that AFRI funding is directed away from the climate change priority area in future years. On the one hand, this is all the more a good reason to support the proposed project to ensure that a base level of extension programming is in place. On the other hand, the project team will need to be more diligent, aggressive and flexible in pursuing collaborations with regional integrated projects, feed crop-focused projects, and commodity-funded projects.

Lastly, there is certainly potential for the project to be in competition for delivering information to stakeholders with other eXtension teams, commodity associations, and commercial enterprises. On the one hand, the project team needs to be up to the challenge of not only being a viable source of information, but of being the leading and most respected source of credible information. On the other hand, the primary objective is to empower stakeholders to make good decisions regarding climate change and animal agriculture, so our work must be performed in as collaborative, non-redundant a manner as is practically feasible without compromising in our goal to have Extension be recognized as a primary if not the main extension provider. For example, the project team may need to pursue or accommodate co-locating resources that address content that is of significant interest to another group or organization.

g) Limitations to proposed procedures:

It is very difficult to anticipate the environmental and economic pressures that stakeholders will face even a few years into the future, which limits our ability to gauge target audience needs and interest levels. This also makes it difficult to assess the suitability of extension delivery methods in advance. The project will, therefore, need to follow continual assessment and improvement plans to avoid our efforts being limited in effectiveness by changing demands and stakeholder interests.

h) Hazardous materials:

Not applicable for this project

i) Project timeline:

Project activities will proceed on multiple fronts and via multiple institutions in this project, with coordination occurring through the Climate Change Team. The timeline for national program efforts and accomplishments is shown in Figure 4 and the timeline for regional capacity-building efforts is shown in Figure 5.

References:

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Climate Change Team / LPELC efforts																				
	Project year 1				Project year 2				Project year 3				Project year 4				Project year 5			
Activity / Milestone	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Hire LPELC project personnel and form team	X																			
Meet to assess needs and plan program materials, delivery & evaluation	X				X					X				X					X	
Communicate via monthly conference calls	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Prepare extension materials	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Interact with stakeholder groups, pursue collaborations, present updates	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Conduct climate change webinar																				
Facilitate national workshop / conference for stakeholders											X									X
Add material to eXtension website and web update content	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Survey newsletter recipients to update stakeholder needs and priorities		X				X				X				X				X		
Conduct evaluation of web content / impact			X				X				X				X				X	
Attend annual PD meeting		X				X				X				X				X		
Facilitate formal evaluation of program activity and impact								X						X						X
Develop CRIS report, publish paper				X				X				X				X				X

Figure 4. Timeline for completing national activities of Climate Change Team and the LPELC.

Regional capacity building																				
	Project year 1				Project year 2				Project year 3				Project year 4				Project year 5			
Activity / Milestone	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Hire extension professional and form working group	X																			
Meet to assess stakeholder needs & plan program materials, delivery and evaluation	X				X					X				X					X	
Communicate with working group and Climate Change Team	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Prepare extension resources and professional development materials	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Provide planned professional development opportunity (minimum expectation)			X				X				X				X				X	
Interact with regional stakeholder groups, pursue collaborations, present updates	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Engage in new collaborative projects																				
Conduct formal evaluation of programs and program impact							X							X						X
Publish engagement results						X					X				X					X

Figure 5. Timeline for co-PDs completing regional extension capacity-building activities.