

National Research Support Project Proposal

Project Title: National Animal Nutrition Program

Requested Duration: 5 years

Administrative Advisor: Nancy Cox, Southern Region (Lead)
Dave Benfield, North Central Region

NIFA Representative: National Program Leader, Animal Nutrition

STATEMENT OF ISSUES AND JUSTIFICATION

Prerequisite Criteria

1. How is the NRSP consistent with the mission (8000 characters)?

A MISSION-DRIVEN EFFORT

The proposed National Animal Nutrition Program, a research-support activity that has been requested by stakeholders, is focused on addressing a serious national problem for researchers and educators in animal agriculture and filling a current void in science-based resources for the research and academic community and the animal agriculture industry. The mission of the proposed effort is focused on a systematic approach for keeping current the process for collecting, assembling, synthesizing, and disseminating science-based information, educational tools, and enabling technologies on nutrient needs of agricultural animals that will facilitate high-priority research across all domestic agricultural species. Currently, there are no up-to-date, science-based syntheses of data, standard teaching tools, or prediction technologies on nutrient needs of major species of agricultural animals. Similarly, there are no comprehensive up-to-date databases on feed ingredients and their characteristics. Thus, outdated information is being used by educators, researchers, extension professionals, regulators, and the feed and animal industries as the basis for teaching the next generation of animal scientists; for all published animal research; in the development of animal diets, feeds and foods; as the applied driver of efficiency in food and fiber production; as the basis for dealing with environmental impacts; to address animal well being and meet requirements in the Animal Welfare Act; and in regulatory actions involving animal nutrition, feeding, and welfare.

The objectives of the National Animal Nutrition Program are to:

- Support agricultural animal-related research by developing a current, comprehensive, science-based nutrition foundation in the form of easily accessible and publicly available synthesis publications on nutrient requirements across species for animal nutrition education, research, and application.

- Expand and enhance shared feed databases and partner to provide other common resources such as models that facilitate agricultural animal research, education, and extension.
- Increase the national linkage of nutrition information to other scientific endeavors by disseminating tools through “real time” global communication efforts and improve the animal nutrition infrastructure for researchers, educators, extension professionals, as well as the regulatory and industry communities that rely on conclusive animal nutrition information.

Providing a Foundation

The proposed program will provide a critical underpinning for research in scientific disciplines important to animal agriculture including genomics, immunology, endocrinology, reproductive and molecular biology, among others in order to make continued substantial progress in efficiencies and competitiveness of production of all agriculturally important domestic animals. The output from the proposed program will benefit the animal nutrition-related programs and the animal producers in every state. In addition, the establishment of a National Animal Nutrition Program will provide a foundation that is currently lacking in order to advance discovery and application in multiple areas of animal-related research including current knowledge and future needs of (1) estimating and controlling emissions from animal feeding operations, (2) enhancing animal welfare, (3) improving utilization of and evaluation of alternative feeds and co-products of the biofuels industry, and (4) ensuring abundant and safe food-animal products.

Partnering for Resources

Bringing researchers, modelers, technologies, and resources together to spawn a synergistic approach accomplishes what could not otherwise be accomplished with single uncoordinated efforts. These partnerships and collaborations result in delivery of a variety of tools that are used widely by the science community and animal industries. Some of those significant tools, which are necessarily derived from sharing of resources, include databases of nutrient composition of feeds and models to predict nutrient requirements under various conditions for different animal species.

Increasing Linkages and Improve Infrastructure

Linking the nutrition foundation with other areas of science has resulted in great strides in our knowledge and ability to improve production efficiencies in animal agriculture. For example, there is a tremendous amount of new genetic information that is now available and the goals of linking nutrition and genomics are to obtain better feeds and genetic tools to enhance animal health and productivity. Using “nutrigenomics” it is possible to delineate the relationship between diet, genetics and disease; develop feeds that can be matched to genotypes of animals to benefit health and enhance normal physiological processes; and use genetic code of an animal to measure the effects of certain nutrients (e.g., nutritional supplements) and how they alter the gene's instruction of the body. Another example is linking nutrition with immunology. Goals are to manipulate the immune system through diet to decrease dependence on antibiotic use, to

use diet with other environmental factors to change immune responses under production conditions, to control onset of immunologic and production-related changes by dietary modifications, and to develop methods to use immune response as a biologically meaningful index to determine specific dietary requirements. These types of linkages are crucial for many areas of animal science that are dependent on a nutrition foundation. Aside from linkages, a sound infrastructure of nutrition information and resources is required to ensure that the research, education, regulatory and industrial communities have information and tools needed to properly carry out their respective work.

2. How does this NRSP pertain as a national issue?

A PROJECT THAT ADDRESSES NATIONAL ISSUES

Throughout history, animal nutrition resources and tools have underpinned solutions to critical national issues. For example, during Herbert Hoover's presidency, the challenges facing the nation were exhibited prominently by the popular promise of "a chicken in every pot." Indeed, farmers were expected to produce abundant food to feed the U.S. population; however, farmers were experiencing extreme hardships because of low income for their products. Given the demands and financial crisis facing agriculture, especially the food-animal industry, animal nutrition resources and tools were clearly needed to define nutrient needs and feed nutrient values, which allowed farmers to improve the cost-effectiveness of feeding regimes.

In an era of high unemployment, financial crises, and evolving technologies, animal nutrition resources were called upon in the 1930s to ensure that the food supply, the farmers, and food-producing industries remained viable. Research discoveries of essential vitamins, like riboflavin, vitamin K, and pantothenic acid were new to farmers during this time; however, through research support activities these new concepts were synthesized and put into practice allowing farmers to raise increasingly important food items such as poultry in a resource-scarce nation.

During World War II, the Secretary of Agriculture called for a 10 percent increase in national pork production to address the nation's shortage of meat and to provide greatly needed food supplies during wartime. Pork producers were faced with serious handicaps presented by the war emergency to meet this demand. Animal diets would have to be significantly revised to ensure an adequate supply of protein and vitamins. These major adjustments were a result of the decreased supply of fish oils, the diversion of large amounts of skim milk to human needs, and the shortage of protein such as tankage and meat scraps that had been traditionally fed to pigs. Alternative sources of protein and vitamins would need to be identified. The solution was based on support activities that included collecting research findings, developing resources, and distributing information on the use of oilseed meals, which remain important economic nutrient sources in animal diets today.

After World War II the United States was rich in private resources but poor in public ones. The focus was on increasing production in the private sector; there were surpluses of some agricultural commodities and vertical integration was progressing rapidly, particularly in the poultry industry. Animal nutrition tools were one of the few critical resources that continued to support advances in the public sector and were used in the public education system, while they

continued to be used by the federal government in setting standards. The private feed and food-animal industries also had come to rely heavily on these tools, which guided their success.

The national issues of today are eerily similar to those of the early 1900s. We are facing an economic crisis. We are in the midst of a war. Unemployment is high. Farmers, especially animal producers, are facing severe challenges. And, the agricultural landscape is changing dramatically. Unlike the early 1900s when the National Academies National Research Council (NRC) provided the research support activities for animal nutrition, there is no organized coordinating national group of animal nutritionists to coordinate and assemble information and develop enabling technologies for use by researchers, regulators, and industry; the NRC terminated the activities of its Committee on Animal Nutrition six years ago in 2003. All research support information and enabling technologies for major agricultural animal species (swine, beef, dairy, poultry) produced by the NRC are now 8-15 years old and are of limited value in today's scenarios.

NRC terminated the activities of its standing Committee on Animal Nutrition in 2003 after it was determined by the leadership of the Academies, based on information from a commissioned outside review, that the activity was not financially viable to maintain as a standing committee of the NRC and it was no longer supported as such by the user community. The outside review also reaffirmed user needs and desires for the series on nutrient requirements of different species, but elucidated the disparity between user desires for the series and their ability or willingness to provide operating support. The review panel concluded that although there was interest in supporting this important work, it was unlikely that adequate operating support for continued work at the National Academies at an acceptable level could be achieved. Discussions were then undertaken between the Academies and the Federation of Animal Science Societies, the American Society of Nutrition, and others regarding the potential for these professional organizations to take on the responsibility for the nutrient requirement series.

The NRC does not and has never maintained a feed composition database for use by its researchers on its committees. Each committee initiates new work and reinvents feed tables each time an ad hoc group is formed.

The NRC does not and has never maintained in-house or external consistent modeling expertise or technical support for the models it develops. All modeling expertise or support has been provided by the university community and in some cases industry on an ad hoc volunteer or remunerated basis.

Despite the very concerted and heroic best efforts of the Academies to reorganize its business structure to allow for proceeds of sales of reports to support the program and to secure funding to keep the series updated, the recommendations of the review panel convened by the Academies have proven true. Adequate operating support at the level required by the National Academies has not been achieved to maintain timely and continual updates of species reports.

The strength of the solid scientific perpetual network of expertise represented by participants in an NRSP activity would provide a foundation to enable NRC work to continue in a more contemporized fashion, building on the support provided by NRSP through scientific, modeling,

and technical committees. It would also allow financial supporters and users of the nutrient requirement series to pool scarce resources to fund an ongoing cohesive infrastructure through the NRSP and fund NRC's complementary, but independent role in developing timely recommendations.

The NRC recognizes the value that the NRSP serves as a research support mechanism and has suggested ways in which it could work with the proposed NRSP. Several ways in which the NRSP could support the research activities of the NRC and in which the NRC could contribute to the NRSP include:

1. The NRC has begun to update the Swine report. The report on Beef will likely be started in the next few years. Members of the NRSP Coordinating Animal Nutritionists and the Species Technical Committees could serve as a pool of potential expert committee members and reviewers for each report.

2. The NRSP proposed comprehensive database on feed composition could be used to construct the feed ingredient tables in future NRC reports. For each species under study by the NRC, the NRSP Feed Composition committee will tabulate a list of relevant feedstuffs, including nutrient composition and bioavailability, for inclusion in the NRC report (with acknowledgement to NRSP and the Feed Composition committee). The NRC also would create a link to the online NRSP database from its Animal Nutrition Series website.

3. Nutrient requirements models associated with NRC reports would be examined and validated by the NRSP Modeling committee. Modified or new models developed by the Modeling committee would be reviewed by an NRC expert committee for possible inclusion or association with an NRC species update, with attribution to the Modeling committee.

4. To assist the NRC in preparing for an update of the 2001 Dairy Cattle report and the 1994 Poultry report, the appropriate NRSP Species Technical committees will consider what aspects of those reports need updating, and prepare technical papers with proposed updates to those relevant sections. The technical papers will be reviewed by expert committees appointed by the NRC, which may incorporate the findings. Any information used from the NRSP technical papers in the revised NRC publication will be properly attributed to the authors of the paper.

Never has the need been greater for research support, enabling technologies, and resource-sharing in animal nutrition. Like meeting increased demands for food during wartimes and economic crises of the past, farmers are now being asked to meet increased demands for biofuels. The rapid expansion and likely continued development of the biofuels industry significantly impacts the availability, quality, and range of feeds for animal diets. Researchers are being asked to solve issues of processing and derive value added co-products of the biofuels industry for animal agriculture.

The recent move to identify alternatives to fish meal and fish oil in agricultural animal diets today due to growing pressure on wild fisheries mimics the need to identify alternatives to fish oils as a result of decreased supply during World War II. Fish meal and fish oil are important components in the feeds for many farm-raised species, from pigs and poultry to farmed fish. One

of the top issues facing the global animal agriculture industries—especially the aquaculture industry—is the need to reduce the amount of fish meal and oil used in diets, fueling research on suitable alternative feed ingredients. Research support activities in animal nutrition, enabling technologies in predicting animal nutrient needs, and up-to-date assembled information are all critical missing elements needed to solve this issue.

Trends and limited resources in the public education system today are similar to the constraints faced by educators in the early 1900s. Shifts from whole-animal to molecular sciences are being observed and concern exists about where future generations of animal scientists will come from. Assembling fundamental knowledge, educational and research tools, and modern enabling technologies will be essential to future generations, but is currently taking a back seat to other disciplines and scientific endeavors in animal science departments throughout the nation.

Collecting, sharing, and synthesizing information and developing prediction technologies through a national research support project will enable the same kind of previously derived solutions to issues that will allow the nation's agriculture to meet contemporary challenges and provide the resources to researchers, educators, and farmers to remain relevant. The proposed project will draw from the best minds from State Agricultural Experiment Stations in addition to other experts to develop, share, and disseminate these resources, which is consistent with the Hatch mission and reinforces the Multi-State Research goals and objectives.

Like many other National Research Support Projects (NRSP), the proposed National Animal Nutrition Program will provide information, data, and educational tools that are applicable to researchers and educators in every region of the United States. Although there are approximately a dozen multi-state committees working on various aspects of animal nutrition in different animal species, there is no one effort to coordinate, synthesize, and disseminate the research and technology that is developed on nutrient requirements through the collaborative efforts of these committees or through numerous other research endeavors. Relative to the realm of other NRSPs, the proposed project is inclusive of all major agricultural animals and will enhance the research support activities provided for those important national animal-product commodities that account for the majority (51 percent) of the value of U.S. agricultural products, exceeding \$100 billion per year (Economic Research Service, 2008). It is anticipated that strong relationships will be built with the National Animal Genome Research Program (NRSP-8) in areas where information and ideas would be useful to exchange.

Similar to the original NRSP-8, this proposal focuses on the major economically important agricultural animals for which it is critical to fill the current void of information that exists. Current information on poultry is 15 years old, beef is 13 years old, swine is 11 years old, and dairy is 8 years old. Two years ago, the NRC updated its 22-year-old and 26-year-old reports on goats and sheep and its 18-year-old report on horses. The NRC has initiated a study to revise its 16-year-old report on fish and that information is expected to be available in a year. Although not proposed here, information on all of these minor species also will likely need to be updated much earlier than the schedule on which the NRC has traditionally operated (~10-20 years between updates).

Currently, options to involve the National Academies National Research Council in the proposed new program have been and continue to be explored and initial interactions have been positive in developing plans for a mutually beneficial collaboration. Updates will be provided on the potential role, extent, and level of involvement of the National Research Council.

Rationale

1. Priority established by ESCOP/ESS

NATIONAL SCIENCE PRIORITIES

The National Animal Nutrition Program directly addresses key national priorities, as identified by ESCOP in its updated Science Roadmap for Agriculture (2006).

Challenge 1: We can ensure food safety and health through agricultural and food systems.

The body of research on animal feeding to reduce potential for food-borne illnesses is significant. Similarly, strategies are continually being developed to feed animals to improve the nutritional value of food (e.g., improve balance of nutrients) and create health-promoting foods (e.g., increase healthful omega-3 and 6 fatty acids). Policies and guidelines to address food safety and agrosecurity often center on the animal feed system as evidenced by a recent final BSE feed rule, concerns about mycotoxin and other toxic levels in feed ingredients from the biofuels industry, and pet food recalls as a result of melamine contamination. Critical to meeting the challenge of food safety in any of these areas is fundamental information on animal nutrient needs, diet formulation, and feed composition.

Challenge 2. We can provide the information and knowledge needed to further improve environmental stewardship.

Animal wastes generated on farms can be tailored through animal diets to be beneficial for alternative uses. Livestock production systems are increasingly moving toward more sustainable management strategies, including feeding strategies that promote environmental stewardship. Models that are currently being developed, used, and will be used in the future to address environmental, ecologic, and economic concerns rely on sound animal nutrient requirement and management components.

Challenge 3. We can improve the economic return to agricultural producers.

Farm expenditures for feed rose 22% between 2006 and 2007 and feed currently represents the largest farm production expenditure at almost 15% of total expenditures (NASS 2008). Clearly, updated information on animal nutrition, nutrient requirements, feeding strategies, and feed ingredients is critical and is probably the single-most effective strategy to improve economic return to producers.

Challenge 4. We can strengthen our communities and families.

Entrepreneurship and business development in rural communities can be founded on animal production for local and emerging markets like the growing organic dairy farms in the West, cooperatives in rural Wisconsin, and alliances in the Northeast. These communities and families

depend on results of animal nutrition research that can be applied to their businesses to take advantage of development opportunities.

Challenge 5. We can develop new and more competitive crop production practices and products and new uses for diverse crops and novel plant species.

New markets for plant products are being developed as a result of alternative feed ingredients being used in animal diets that incorporate co-products from the biofuels industry and others. Technologies to improve processing are rapidly being developed to make co-products higher quality and more valuable in the animal industries that utilize them. These markets and technologies are based on knowledge of animal nutrient needs.

Challenge 6. We can lessen the risks of local and global climatic change on food, fiber, and fuel production.

Animal agriculture contributes to and is affected by climate change. The goals of creating models to assess impacts, risks, and opportunities associated with global climate change, to optimize domestic food, fiber, and fuel production in response to global climatic changes, and to minimize the effects of long-term global climatic changes on production of livestock requires science-based knowledge and synthesis of information on animal nutrient requirements as well as information on diet impacts on excretion of methane, carbon dioxide, and nitrous oxide.

Challenge 7. We can develop new and more competitive animal production practices and products and new uses for animals.

Technologies for reducing the impact of animal agriculture on the environment are being developed (see Challenges 2 and 6 above) as a result of nutrient management plans and other means. Enhanced value of food and other animal products is an objective for both producers and consumers as mentioned above (Challenge 1). Improved conventional technologies and new technologies are being developed in the area of animal nutrition to improve the efficiency of animal production. Finally, new and enhanced technologies are required to improve efficiency and welfare of animals that are processed for food. Improving animal production practices and new uses for animals will be based on improved nutrient utilization, improved bioavailability of nutrients, reduced nutrient waste, and feeding animals to improve their well being.

2. Stakeholders

DIVERSE STAKEHOLDERS

Stakeholders are any persons who use or conduct research, extension, or education activities. These stakeholders comprise various constituencies who have a stake in priority-setting and other activities. The National Animal Nutrition Program will interact with constituencies, which include:

- Research scientists, teachers, and extension specialists in universities, colleges, veterinary medical centers, and other research and education institutions that conduct and disseminate animal-related research;
- Producers and agribusiness professionals who apply animal nutrition research results and who can help identify research needs (specialized producers, technical staff, extension

agents, social workers, public health practitioners, and other allied agricultural and animal health practitioners);

- Organized voluntary groups and individuals active in advocating for animal nutrition and welfare;
- Organizations and individuals who represent groups with special challenges or problems (members of particular ethnic groups, low-income populations, niche markets, etc.);
- Congress, which provides authorities and funding to carry out research, which oversees effectiveness, and with which we must maintain good communication about research priorities;
- White House policy officials and program managers in an era of transition;
- Federal agencies (research, education, extension, regulatory);
- State and local government officials;
- International governments; and
- Media who communicate activities in research, education, and extension and who thus play an important role in helping the public understand our roles.

Primary stakeholders are those affected, either positively or negatively, by the project activities. From the list above primary stakeholders are identified as professionals in universities, governments, and industry.

Secondary stakeholders are the ‘intermediaries’ who are indirectly affected by the projects activities. From the list above secondary stakeholders are identified as policy makers, representatives of the media, and those in interest organizations.

Roles of Stakeholders

Interaction and input from the constituent groups will be sought through some or all of these various mechanisms. Input is one of many sources of information that the project will use to shape its programs and activities to serve these constituencies and decision-makers.

In addition the role that stakeholders have in shaping programs and providing input, it is anticipated that active participants in the proposed project (i.e., developing, reviewing, and distributing) will be drawn from primary stakeholder groups, particularly research scientists, teachers, extension professionals, producers and industry experts, relevant organizations, as well as federal, state and local governments.

Stakeholder Needs and Use of Outputs

The proposed project evolved from stakeholders’ expressed needs, stakeholder discussions, and stakeholder ideas. Specifically, researchers, regulators, and industry groups have uniformly identified an urgent need for updated nutrient requirements and models in the areas of swine nutrition, beef cattle nutrition, and dairy nutrition.

Stakeholder use of project outputs (i.e., publications, models, databases) may be determined by the number of publications requested by stakeholders, the extent of distribution and incorporation of the information and tools into other science and policy activities, the number

and extent of visits to and downloads from relevant websites, and the by the number of citations of the publications.

BENEFICIARIES

Beneficiaries include scientists, educators, policy makers, research and regulatory agencies, industry, and organizations associated with the production and welfare of agricultural animals. The ultimate beneficiaries of the proposal project are agricultural producers and the American people, whose well-being is improved by innovation and science.

IMPLEMENTATION

1. Objectives and Projected Outcomes

In its broadest context, this project includes the development of support resources and enabling technologies that will result in a series of reports and electronic prediction technologies (or models) on nutrient requirements for all species of agricultural animals as well as a feed database that can be accessed and used by the research community.

Initial implementation objectives will be to:

- * Meet the urgent need for updated synthesized information and technologies on animal nutrition and produce a continual stream of updates on a routine basis
- * Establish and maintain an effective coordinating group of animal nutritionists
- * Establish and maintain at least two working species-specific technical committees at all times

Initial projected outcomes will be to:

- * Synthesize credible, reliable data
- * Publish one or more reports each year that assemble and synthesize current knowledge for particular animal species
- * Create updated modeling tools for swine, beef, and dairy cattle that utilize and integrate existing research results and applications
- * Assemble a publicly available database on feed composition that integrates information from existing reliable scientific sources
- * Conduct dissemination activities for project outcomes

2. Management, Budget, and Business Plan

MANAGEMENT

The proposed National Animal Nutrition Program will be organized to link and facilitate animal nutrition research and education among universities, SAES, NIFA and ARS. It will also serve to connect FDA, EPA, NRCS, and the animal production and feed industries with the animal

science community. The project will leverage funding from USDA, FDA, and the feed industry to enhance the sharing of animal nutrition resources: tools, data, animal populations, and bioinformatics. The resulting products support the research community, the commodity groups, industry and government regulatory agencies by providing conclusive information and tools on nutrient requirements, feed composition, relationship of diet and health, nutritional efficiency, and modeling nutrient needs under various production conditions.

Coordinating Animal Nutritionists represent the group of animal nutritionists that will coordinate, oversee, and integrate the activities of the various species-specific technical committees. Members of the Coordinating Animal Nutritionists would be appointed through a competitive process open to all scientists and educators from SAES and other cooperating organizations. The selection process will be administered by the Program Leader and Lead Administrative Advisor.

Species Technical Committees represent the groups of animal nutritionists that will develop information and enabling technologies by collecting, assembling, storing and distributing materials, resources, and information on swine nutrition, beef cattle nutrition, dairy cattle nutrition, and poultry nutrition. Four species technical committees are anticipated to be established: one each for swine, beef, dairy, and poultry. Two enabling technology committees will be established: one for feed composition and one for modeling. Whenever possible, these technical committees will take advantage and coordinate with existing multi-state committees that have elements of nutrition associated with their work. It is anticipated that efficiencies will be gained from close collaboration with the work of related multi-state committees and NRSP programs. Members of the species technical committees will be selected through a competitive process administered by the Coordinating Animal Nutritionists and overseen by the Program Leader and Administrative Advisors.

Administrative Advisors. The Regional Associations of Directors in the North Central, Northeastern, Southern, and Western Regions will designate their Regional Representatives to the National Animal Nutrition Program. These Administrative Advisors will provide policy guidance to the Coordinating Animal Nutritionists and work closely with the NIFA Representative (Program Leader) on administrative, programmatic, and budgetary matters. The current Administrative Advisors are:

Southern: Nancy Cox

North Central: David Benfield

NIFA Representative. The National Animal Nutrition Program Leader will serve as the NIFA representative to project. The Program Leader is responsible for overall leadership of the program and works closely with the Species Coordinators, and Administrative Advisors. Other responsibilities of the Program Leader include providing liaison with the Agriculture and Food Research Initiative (AFRI) Competitive Grants Program, serving as USDA link to international animal nutrition activities, providing linkage to other programs, and being an advocate for animal nutrition research activities within the USDA.

Industry Representatives. Each Species Technical Committee will select one or more industry representatives, in consultation with appropriate national industry organizations.

Reporting. The Coordinating Animal Nutritionists will prepare an annual progress report that reviews project accomplishments and outlines future plans. Publication of information and technologies will be through various media to provide greatest public access to the benefits of the outcomes fostered by this project.

Budget and Business Plan

The total estimated budget for a National Animal Nutrition Program is \$1,001,000 per year of which we are requesting MRF support at a level of \$350,000 total per year for a total of 5 years (Table 1). Shared and in-kind costs from the Coordinators' institutions will constitute \$651,000 (Tables 2-4). Commitments and/or willingness to provide financial or in-kind support have been made by the chair of the American Feed Industry Association (January 2008), staff of the Food and Drug Administration's Center for Veterinary Medicine (March 2008) and USDA agencies. The proposed role of all federal agencies, including ARS, is to provide support to the NRSP program at a level that is feasible under constrained budget scenarios and that results in regular measurable outcomes to justify those public investments.

In summary, requested MRF funding constitutes approximately 1/3 of the total project funding with the other 2/3 of the support anticipated to come from industry and federal agencies in the form of grants or agreements and from public institutions and industry as in-kind support.

This funding request reflects what is projected to be required to fill the current void in nutrition research support information and technology. At the end of the 5-year period it is anticipated that the gaps will have been filled and a foundation set for others to assume greater responsibility for funding and/or carrying out these activities.

The initial distribution of the requested annual funding will be as follows:

\$40,000	Coordinating Animal Nutritionists (chair)
\$40,000	Swine Coordinator
\$40,000	Beef Cattle Coordinator
\$40,000	Dairy Cattle Coordinator
\$40,000	Poultry Coordinator
\$40,000 ^a	Feed Database Coordinator
\$40,000 ^b	Predictive Technologies Coordinator
<u>\$70,000</u>	<u>National Research Council</u>
\$350,000	Total MRF Requested
\$511,000	In-kind Support Anticipated
\$70,000	Other (Federal Agency) Support Anticipated
\$70,000	Other (Industry) Support Anticipated
<u>\$1,001,000</u>	<u>Total Estimated Cost</u>

^aFor maintenance and upgrade of a feed composition database.

^bFor maintenance of modeling systems.

Budget Justification. The requested MRF funding is to support the facilitation activities of the four Species Coordinators and their committees and will not be used to directly fund research programs. Coordinator funding is used for the support of all the outlined coordination activities, including working meetings, travel, synthesis of information, editing, integrating and providing technical and other resources, and maintaining communication among species committees and with outside collaborators.

Funding for the two enabling technology coordinators will be for salaries, requisite computer hardware and software, and computer maintenance to update and improve models and databases, data entry and screening activities.

Budget Authorization. Coordinators will submit budget requests and reports annually. Allocations will be reviewed annually and the distribution will be revised, if necessary, by the Program Leader and the four Regional Administrative Advisors.

Types of Expenditures: Salaries are for professional and technical support staff for developing and distributing materials and for data input and operation of the database and models. Salaries of Species Coordinators and collaborators are contributed by the participating institutions. Supplies include materials to be shared with Species Committee members, computer supplies and software for maintaining databases and computer information servers, shipping costs, publication costs, postage, and communications activities. Equipment is primarily computer equipment for the database and storage/handling of materials. Funds are requested to support travel of the Species Committee members to regular meetings of the Species Committees for development of the research support materials and models.

Table 1. National Animal Nutrition Program MRF Budget Request for Fiscal Years 2011-2015.

Coordination / Technical Group	FY2011	FY2012	FY2013	FY2014	FY2015
Coordinating Animal Nutritionists	\$40,000	\$40,000	\$40,000	\$40,000	\$40,000
Swine	\$40,000	\$40,000	\$40,000	\$40,000	\$40,000
Beef Cattle	\$40,000	\$40,000	\$40,000	\$40,000	\$40,000
Dairy Cattle	\$40,000	\$40,000	\$40,000	\$40,000	\$40,000
Poultry	\$40,000	\$40,000	\$40,000	\$40,000	\$40,000
Feed Database	\$40,000	\$40,000	\$40,000	\$40,000	\$40,000
Prediction Models	\$40,000	\$40,000	\$40,000	\$40,000	\$40,000
National Research Council	\$70,000	\$70,000	\$70,000	\$70,000	\$70,000
Total	\$350,000	\$350,000	\$350,000	\$350,000	\$350,000

Table 2. National Animal Nutrition Program Other (In-Kind^a) Anticipated Support.

Coordination / Technical Group	FY2011	FY2012	FY2013	FY2014	FY2015
Coordinating Animal Nutritionists	\$73,000	\$73,000	\$73,000	\$73,000	\$73,000
Swine	\$73,000	\$73,000	\$73,000	\$73,000	\$73,000
Beef Cattle	\$73,000	\$73,000	\$73,000	\$73,000	\$73,000
Dairy Cattle	\$73,000	\$73,000	\$73,000	\$73,000	\$73,000
Poultry	\$73,000	\$73,000	\$73,000	\$73,000	\$73,000
Feed Database	\$73,000	\$73,000	\$73,000	\$73,000	\$73,000
Prediction Models	\$73,000	\$73,000	\$73,000	\$73,000	\$73,000
Total	\$511,000	\$511,000	\$511,000	\$511,000	\$511,000

^aIn kind support includes support from public institutions and private industry, and includes but is not limited to:

Products, supplies, and equipment: furniture, computers, office equipment;

Use of services/facilities: financial and administrative support services, meeting space, mailing services, computer services, printing and duplicating; and

Professional and employee expertise: graphic arts/design, writing/advertising/promotion/marketing, legal assistance, business and financial advice, strategic planning.

Table 3. National Animal Nutrition Program Other (Federal Agency^a) Anticipated Support.

Coordination / Technical Group	FY2011	FY2012	FY2013	FY2014	FY2015
Coordinating Animal Nutritionists	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000
Swine	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000
Beef Cattle	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000
Dairy Cattle	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000
Poultry	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000
Feed Database	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000
Prediction Models	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000
Total	\$70,000	\$70,000	\$70,000	\$70,000	\$70,000

^aExamples of federal agencies to be solicited include FDA, USDA, and EPA.

Table 4. National Animal Nutrition Program Other (Industry^a) Anticipated Support.

Coordination / Technical Group	FY2011	FY2012	FY2013	FY2014	FY2015
Coordinating Animal Nutritionists	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000
Swine	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000
Beef Cattle	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000
Dairy Cattle	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000
Poultry	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000
Feed Database	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000
Prediction Models	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000
Total	\$70,000	\$70,000	\$70,000	\$70,000	\$70,000

^aExamples of industry organizations to be solicited include American Feed Industry Association, National Pork Board, National Milk Producers Federation, National Cattlemen's Foundation, National Chicken Council, others.

The budget is split equally among the different activity areas because each species committee will conduct roughly the same activities, which will require similar levels of resources. The rationale for a coordinating committee, and hence the need to coordinate, is based on the already existing models for plant and animal genomics. Developing nutrient requirements is inherently more efficient and productive when researchers collaborate and share scientific and technical (e.g., modeling) resources and databases, and because most animal nutritionists operate on comparatively limited budgets. First and foremost the Coordinating Animal Nutritionists are to be facilitators for identification, assimilation, review, and dissemination of information produced by the species committees and to coordinate with national and international animal nutrition leaders. The activities of the species-specific coordinators include coordinating meetings, review materials, coordinating database and model development, providing shared materials and resources, and assisting individual members of their species technical committees. Coordinators do not develop research priorities or use funds for their research programs. Similarly, modeling and feed composition database groups will require sharing and coordination of resources.

A basic estimated budget for each coordinator and technical group is anticipated to be broken down as follows:

Table 5. Example of an estimated budget for each coordinator and technical group

Description	Amount Requested from NRSP (FY)	Amount Through Cost/Sharing or Matching Includes anticipated support from other Federal agencies (\$10,000) and industries (\$10,000), but does not include in-kind support (\$73,000)
Salaries	\$13,100	\$13,100
Fringe Benefits	\$3,900	3,900
Wages		
Travel (7 people x 3 trips)	\$21,000	
Supplies	\$2,000	\$3,000
Maintenance		
Equipment/Capital Improvement		
Total	\$40,000	\$20,000

Integration and Documentation of Research Support

Efforts of the proposed project are projected to be integral components of education systems and extension activities. Fundamental information and definitions of energy terms, the roles of dietary nutrients, and the effects of environment and metabolic modifiers on animal nutrient needs are only a few examples of the integrative animal nutrition work that has provided the basis for teaching nutrition concepts to students throughout the world. With the incorporation of enabling technologies such as databases and electronic prediction models that provide an understanding of the biology for predicting requirements, these standard teaching tools have evolved in many animal science classrooms throughout the nation. These mechanisms allow for

consideration of genetic variation, individual production and environmental conditions, and the use of various production parameters to give students a well rounded concept and real-world exposure to animal agriculture. Extension educators—or those on the front line—are dependent on the type of information that is proposed to be developed by this effort. On a daily basis extension personnel use these types of nutrition information, databases, and electronic prediction technologies to assist a broad range of clientele.

Outcomes of the proposed project are also anticipated to be used as the foundation for important policy-making activities by federal regulatory agencies as they address animal nutrition, feed adequacy and safety, and animal welfare. Similarly, the research community is anticipated to use this information to ensure research is conducted and published in accordance with the best and most up-to-date information on animal nutrient requirements.

Outreach, Communications and Assessment

One of the most important elements of the project is outreach, both to solicit input and to convey information on project outputs. Based on an extensive review of outreach methods used by others, the proposed project incorporates well-defined options for outreach (to obtain input and to transfer information), communications, and assessment. Mechanisms and examples being considered are listed below and will be undertaken based on a determination of stakeholder preferences, suitability for different groups, and available resources.

Public Meetings Meetings can take place in person, via web conferencing, video conferencing, webcasting and generally include periodic or routine general meetings, focused topical workgroup meetings, or electronic meetings (see below). The intent of the meeting can be to obtain experiential and anecdotal information from each participant on, for example, challenges faced, how the challenges are met, approaches that are productive or successful, and those which were not. The attendees may or may not change from session to session. The specific agenda subjects will likely change and may be set in advance or be free form. No consensus advice or recommendations resulting from group deliberation or interaction is expected or will be solicited. The intent of most meetings will be to obtain information or viewpoints from individual attendees as opposed to advice, opinions or recommendations from the group acting in a collective mode.

Workshops are brief intensive courses, a seminars or a series of meetings emphasizing interaction and exchange of information among a usually small number of participants. Workshops are envisioned to be held in conjunction with development of tools.

Web Conferencing Web conferences are an excellent means to disseminate new information and project outputs. In a web conference, each participant sits at his or her own computer and is connected to other participants via the internet. This can be either a downloaded application on each of the attendees computers or a web-based application where the attendees will simply enter a URL (website address) to enter the conference.

Webinars are a specific type of web conference. It is typically one-way, from the speaker to the audience with limited audience interaction, such as in a webcast. A webinar can be collaborative

and include polling and question and answer sessions to allow full participation between the audience and the presenter. In some cases, the presenter may speak over a standard telephone line, pointing out information being presented on screen and the audience can respond over their own telephones, preferably a speaker phone. Webinars can provide hidden or anonymous participant functionality, enabling participants to be unaware of other participants in the same meeting.

On-line Dialogues EPA has conducted some of these. An example was EPA's online stakeholder dialogue as an effort to improve its Toxic Release Program. The dialogue was announced through a Federal Register notice and took place on a designated web for a specified period of time (60 days). Issue papers were posted to focus the dialogue, which was conducted in two phases: (1) EPA sought comments on improving management of data and (2) EPA sought comments on future directions. A valuable aspect of this approach is its archiving capability.

Email Conferences and Workshops USDA has conducted some of these. An example was USDA's Microbial Genomics Stakeholder Workshop for Animal Health and Food Safety Pathogens in 2001. It was intended to solicit comments and feedback on a draft list of pathogens proposed for sequencing. Monitored discussion zones allowed two groups of people (panelists and stakeholders) to provide comments and suggestions. A valuable aspect of this approach is its archiving capability.

Web Site Input and Feedback The National Academies have a website that incorporates an element for obtaining public input on its committees and activities. The feedback element allows people to comment on committee makeup during a specific period of time (20 days) and then allows people to submit general comments throughout the duration of a study. Feedback elements are linked to specific projects and program areas. In addition, the website contains an element that provides a list of meetings (dates, times, locations) that are open to the public for input, and an element that allows the public to request additional information.

Needs Assessment A systematic exploration of the way things are and the way they should be. The first step is to check the actual performance of our systems and our people against existing standards, or to set new standards. Define the current situation and then define the desired situation. The gaps between the two represent "needs."

Surveys A survey is the "collection of information" broadly. As defined by OMB it covers any identical questions posed to 10 or more members of the public -- whether voluntary or mandatory, whether written, electronic, or oral. Many "Conversations with America" do not require PRA clearance -- employee conferences, complaint systems, suggestion systems, and town halls, listening sessions, and other meetings with customers (driven by an agenda rather than "questions"). PRA does not apply to open ended web-based invitations for comments.

Focus Groups Focus groups are intended to get feedback on services (or idea/products) They are essentially interviews, but with 6-10 people at the same time in the same group. A great deal of information can be gained during a focus group session if questions are structured appropriately and the meeting is well facilitated. Focus groups should never be the only method of gathering input since they will likely be narrow in focus.

Advisory Bodies Federal agencies and public institutions use advisory bodies extensively for stakeholder input. For example, the National Agricultural Research, Extension, Education, and Economics Advisory Board has a membership representing cross sections of stakeholder communities. The advisory board meeting regularly and produces reports to advise the Under Secretary for REE. Notices of federal government open meetings are posted in the Federal Register in accordance with the Federal Advisory Committee Act (FACA).

Listening Sessions The public is invited to identify, discuss, and define their community's current and future needs at forums to be held in various locations throughout a certain time period. These can be part of a "Needs Assessment" and can be conducted at professional society meetings.

Interviews This approach entails one-on-one discussions with selected stakeholders representing broad interests generally. It requires a significant investment of time and effort on the part of individuals conducting and participating in the interviews. Interviews can be conducted in person, via telephone, or other mechanisms.

Projected Participation

Station/Institution and Department	Participant	Objective No.	Research						Extension		
			KA	SOI	FOS	SY	PY	TY	FTE	Program	
											•
											•
											•
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APPENDIX – Answers to questions that were raised:

- **Why did NRC stop providing this service? Did they determine it was not needed or used by the industry, or did it become a low priority activity for NRC, or some other reason?**

NRC terminated the activities of its standing Committee on Animal Nutrition in 2003 after it was determined by the leadership of the Academies, based on information from a commissioned outside review, that the activity was not financially viable to maintain as a standing committee of the NRC and it was no longer supported as such by the user community. The outside review also reaffirmed user needs and desires for the series on nutrient requirements of different species, but elucidated the disparity between user desires for the series and their ability or willingness to provide operating support. The review panel concluded that although there was interest in supporting this important work, it was unlikely that adequate operating support for continued work at the National Academies at an acceptable level could be achieved. Discussions were then undertaken between the Academies and the Federation of Animal Science Societies, the American Society of Nutrition, and others regarding the potential for these professional organizations to take on the responsibility for the nutrient requirement series.

The NRC does not and has never maintained a feed composition database for use by its researchers on its committees. Each committee initiates new work and reinvents feed tables each time an ad hoc group is formed.

The NRC does not and has never maintained in-house or external consistent modeling expertise or technical support for the models it develops. All modeling expertise or support has been provided by the university community and in some cases industry on an ad hoc volunteer or remunerated basis.

Despite the very concerted and heroic best efforts of the Academies to reorganize its business structure to allow for proceeds of sales of reports to support the program and to secure funding to keep the series updated, the recommendations of the review panel convened by the Academies have proven true. Adequate operating support at the level required by the National Academies has not been achieved to maintain timely and continual updates of species reports.

The strength of the solid scientific perpetual network of expertise represented by participants in an NRSP activity would provide a foundation to enable NRC work to continue in a more contemporized fashion, building on the support provided by NRSP through scientific, modeling, and technical committees. It would also allow financial supporters and users of the nutrient requirement series to pool scarce resources to fund an ongoing cohesive infrastructure through the NRSP and fund NRC's complementary, but independent role in developing timely recommendations.

- **What role does ARS have in the proposed activity?**

The proposed role of all federal agencies, including ARS, is to provide support to the NRSP program at a level that is feasible under constrained budget scenarios and that results in regular measurable outcomes to justify those public investments.

- **Why is the budget split equally between the different activity areas? What is the justification for this? What is the basic budget for each coordinator and technical group for the first year, ie. salaries/wages, travel, supplies, equipment, etc?**

The budget is split equally among the different activity areas because each species committee will conduct roughly the same activities, which will require similar levels of resources. The rationale for a coordinating committee, and hence the need to coordinate, is based on the already existing models for plant and animal genomics. Developing nutrient requirements is inherently more efficient and productive when researchers collaborate and share scientific and technical (e.g., modeling) resources and databases, and because most animal nutritionists operate on comparatively limited budgets. First and foremost the Coordinating Animal Nutritionists are to be facilitators for identification, assimilation, review, and dissemination of information produced by the species committees and to coordinate with national and international animal nutrition leaders. The activities of the species-specific coordinators include coordinating meetings, review materials, coordinating database and model development, providing shared materials and resources, and assisting individual members of their species technical committees. Coordinators do not develop research priorities or use funds for their research programs. Similarly, modeling and feed composition database groups will require sharing and coordination of resources.

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Equipment/Capital Improvement		
Total	\$40,000	\$20,000

- **Why is aquaculture and other minor species (small ruminants, horses, etc.) not included?**

The proposal focuses on the major economically important agricultural animals for which it is critical to fill the current void of information that exists. Current information on poultry is 15 years old, beef is 13 years old, swine is 11 years old, and dairy is 8 years old. Two years ago, the NRC updated its 22-year-old and 26-year-old reports on goats and sheep and its 18-year-old report on horses. The NRC has initiated a study to revise its 16-year-old report on fish and that information is expected to be available in a year. Although not proposed here, information on all of these minor species also will likely need to be updated much earlier than the schedule on which the NRC has traditionally operated (~10-20 years between updates).

- **Note this addition:**

The NRC recognizes the value that the NRSP serves as a research support mechanism and has suggested ways in which it could work with the proposed NRSP. Several ways in which the NRSP could support the research activities of the NRC and in which the NRC could contribute to the NRSP include:

1. The NRC is has begun to undertake an update of the Swine report. The report on Beef will likely be started in the next few years. Members of the NRSP Coordinating Animal Nutritionists and the Species Technical Committees could serve as a pool of potential expert committee members and reviewers for each report.
2. The NRSP proposed comprehensive database on feed composition could be used to construct the feed ingredient tables in future NRC reports. For each species under study by the NRC, the NRSP Feed Composition committee will tabulate a list of relevant feedstuffs, including nutrient composition and bioavailability, for inclusion in the NRC report (with acknowledgement to NRSP and the Feed Composition committee). The NRC also would create a link to the online NRSP database from its Animal Nutrition Series website.
3. Nutrient requirements models associated with NRC reports would be examined and validated by the NRSP Modeling committee. Modified or new models developed by the Modeling committee would be reviewed by an NRC expert committee for possible inclusion or association with an NRC species update, with attribution to the Modeling committee.
4. To assist the NRC in preparing for an update of the 2001 Dairy Cattle report and the 1994 Poultry report, the appropriate NRSP Species Technical committees will consider what aspects of those reports need updating, and prepare technical papers with proposed updates to those relevant sections. The technical papers will be reviewed by expert committees appointed by the NRC, which may incorporate the findings. Any information used from the NRSP technical papers in the revised NRC publication will be properly attributed to the authors of the paper.

Additional response to concerns that were raised:

Concern: However, it is still unclear what the demand is among university animal scientists and veterinarians for this type of information and how it is critical for supporting research in animal nutrition.

While the value of this project to industry and educators is clearly stated, questions were raised by reviewers of the initial submission of this proposal about whether the proposed project is needed and supported by the research community. In response to those questions, the need for the project was actually identified by researchers, specifically several species-specific multi-state research committees. In addition, this proposal was reviewed by several research animal nutritionists who were members of multi-state committees and they were extremely supportive of the approach developed in this proposal.

The research community is strongly supportive of the proposed project and is committed to ensuring that the proposed work enhances research and education activities as well as any activities that the National Research Council takes on in the future.