

## ADSA Foundation PhD Symposium: Meeting the present and future demand for employees with a PhD

**202 Current and anticipated supply of people with PhDs.** J. R. Knapp\*, *Fox Hollow Consulting LLC, Columbus, OH.*

There is a growing concern among employers in academia and industry regarding the adequacy of PhD training programs for animal scientists in the US in terms of the number of graduates as well as their preparedness. Data from the National Center for Education Statistics and USDA Food and Agricultural Education Information System show that the number of PhDs awarded from animal, dairy, and poultry science departments has declined by nearly 40% in the past 2 decades. Currently, ~150 PhDs are awarded per year in animal science, 80 to 90 of whom are US citizens. While some non-citizens may seek employment and stay in the US, the majority return home. The decline in graduate students is associated with decreased funding for animal agricultural research, the declining numbers of animal science faculty at land grant universities, increased undergraduate enrollment, and the expansion of departmental programming to meet changing societal demands. Although a recent National Research Council publication noted that agricultural research funding to the land-grant universities has been flat in real dollars, the reality is that less funding is available to principal investigators (PIs) to support their research programs and graduate training now than in the past due to increased indirect cost rates charged by universities as well as expansion in administrations. Also, whereas graduate assistantships from formula funds and tuition waivers were the normal way of funding graduate training in the 1980s, today PIs often must cover tuition, stipend, and benefits from their research funds at costs of \$50,000 to \$70,000 per graduate student per year. The likelihood of increased federal funding for agricultural research and graduate training in the future is low, and new approaches to funding and operating graduate training are needed. Industry will need to take a larger role in these approaches. Also, significant redundancy exists among the land-grant agricultural experiment stations; regionalization would lead to more efficient use of limited research funding. Consistent availability and effective use of funding for graduate training will be needed to increase the number of animal science PhDs to a sustainable level for our field.

**Key Words:** graduate training, research funding, future of agriculture

**203 What can industry and academia do to help maintain viability of dairy/animal science departments at land-grant institutions?** Kenneth G. Odde\*, *Kansas State University, Manhattan, KS.*

Animal and dairy science departments at land-grant universities have long served their livestock industries through teaching, research and extension. The number of livestock producers has declined dramatically, and the number of students with farm and ranch backgrounds majoring in animal or dairy science has declined simultaneously. Additionally, Colleges of Agriculture and Departments of Animal Science and Dairy Science have become smaller and less influential components of land-grant universities. As the livestock producer constituency has declined in size, the power of livestock organizations to influence state funding levels and priorities for that state funding has also diminished. Other forces affecting departments include increased emphasis on federally funded research, rising standards for scholarship productivity for faculty members to achieve tenure and promotion, loss of livestock units in proximity to campus, loss of faculty positions, particularly tenure-track positions, greater investment of scarce resources in compliance, and greater emphasis on universities protecting intellectual property and capturing full research costs. The potential exists for stronger relationships between industry and university departments that will ultimately strengthen departments. The strong relationship requires that departmental leadership fully understands the needs and constraints of industry. Likewise, industrial organizations must also understand the nature of universities, and the variables that affect departmental and faculty behavior.

**Key Words:** animal science, dairy science, animal industry

**204 Graduate student perspective: Concerns with pursuing a PhD.** Curtis W. Park\*, *North Carolina State University, Raleigh, NC.*

College students are in a time of life that requires a lot of decisions that will affect their future careers. Attending graduate school and whether to pursue a PhD is a critical decision students have to make. In order for more students to pursue a PhD in a dairy science related field, more

must be done to inform them of the job opportunities available. Some students are intimidated by getting a PhD simply because they do not know what is required for the degree. A survey was conducted with both the ADSA Student Affiliate Division (undergraduates) and the ADSA Graduate Student Division to assess what students consider when making this important decision. The results from this survey will be discussed, as well as insights on how to better engage students early in their educational career, to help those who are thinking of pursuing a PhD in a dairy science-related field.

**Key Words:** PhD, graduate student

**205 Industry–university partnerships in research and graduate student training.** Michael L. Day\*, *Department of Animal Sciences, The Ohio State University, Columbus, OH.*

Industry partnerships for graduate education provide opportunities that benefit students' future careers, a means to meet industry needs for employees with advanced research and technical expertise, and a method to train adequate numbers of scientists for academia and industry, especially given escalating costs of graduate education. The OSU Office of Sponsored Programs (OSP; with M. L. Day as PI) and Select Sires Inc. (SSI) have had a cooperative training partnership program to train graduate students in bovine reproduction, with an emphasis in male reproduction, since 2010. The partnership was the result of recognition by the PI and SSI that the number of students trained in male reproduction was limiting and that needs for scientists with this expertise in industry and academia were unlikely to be fulfilled. This partnership provides a platform to leverage resources of OSU and SSI to study male reproduction. Inherent to all partnerships, especially given that the training affects the student's career, having a thoughtful agreement is crucial to protect interests of all parties. Hence, the resources of OSP were instrumental to develop this program. Key aspects of the agreement give guidance as to intellectual property, inventions, patents, publication of results, and so on. Costs of the graduate stipend and tuition are equally shared by SSI and the Animal Sciences department. Consensus between the PI and SSI scientists is necessary for admission into the program. One member of the student's advisory committee must be from SSI and the specific research hypotheses are determined by consensus to ensure needs of the student, PI, and SSI are met, and to affirm the research is comprehensive and high quality. Supply and travel costs for research are paid by SSI and matched "in-kind" by OSU. An important aspect of the agreement, for the student's protection, is that they are not obligated to be employed by SSI upon graduation. Two graduate degrees, with a third in progress, have resulted from this program. This model of university–industry collaboration has been very effective in producing young scientists to meet emerging needs in the area of male reproduction.

**Key Words:** graduate education, industry, partners

**206 Opportunities for PhD student training support at the National Science Foundation.** Steven Ellis\*, *National Science Foundation, Arlington, VA.*

In 1950, the National Science Foundation (NSF) was created to "... promote the progress of science; to advance the national health, prosperity, and welfare; and to secure the national defense." The NSF has been a strong supporter of graduate education throughout its history. For example, some of the NSF's first awards were to support graduate training, and extensive support for PhD training is still offered through the NSF Research Traineeship program (NRT) and the Graduate Research

Fellowship Program (GRFP). In 2015, the NRT expects to award almost \$37.9M and the GRFP is expected to award roughly \$333M in new and continuing awards (pending availability of funds). Additional support for the costs associated with graduate and postdoctoral training is available through fellowships and awards funded by core programs, special solicitations, and related activities in the research directorates. Understanding the NSF structure, priorities and merit review process are critical to securing support through these programs because each funding agency has a distinct set of goals and objectives. Researchers associated with the ADSA (or other member societies associated through FASS) can find very relevant funding opportunities in all of the NSF research directorates. However, those submitting proposals should recognize and emphasize the basic, fundamental aspects of their research proposals and activities. Merit review at the NSF centers around the intellectual merits of a proposal, and the broader impacts of the proposed work. So, although NSF does not have an explicit emphasis on food production or agricultural efficiency, animal production systems are potentially excellent experimental systems to reveal basic biologic processes, advance complex technical or engineering principles, and even elucidate economic factors. Putting any proposed effort in context with an over-arching and broadly relevant scientific scope can result in a compelling and fully competitive research proposal that includes support for student training. Such activities also represent excellent student training opportunities that will supply the future demand for PhDs with interdisciplinary skill sets.

**Key Words:** research funding, National Science Foundation (NSF)

**207 Research funding opportunities available through Foundation For Food and Agricultural Research.** Christopher Mallett\*<sup>1,2</sup>, <sup>1</sup>*Cargill, Wayzata, MN,* <sup>2</sup>*Foundation for Food and Agricultural Research, Washington, DC.*

The objective of this presentation will be to give an overview of the Foundation for Food and Agricultural Research (FFAR) and research funding opportunities available through the foundation. Authorized by Congress as part of the 2014 Farm Bill, the foundation operates as a non-profit corporation seeking and accepting private donations to fund research activities that focus on problems of national and international significance. The US Congress provided \$200 million for the Foundation, which must be matched by non-federal funds as the Foundation identifies and approves projects. The foundation will leverage public and private resources to increase scientific and technological research. Research funded by the FFAR is addressing issues including plant and animal health; food safety, nutrition and health; renewable energy, natural resources, and environment; agricultural and food security; and agriculture systems and technology.

**Key Words:** USDA, Foundation for Food and Agricultural Research (FFAR), research funding

**208 Dairy Management Inc.'s role in funding PhD research.** David R. McCoy\*, *Dairy Management Inc., Rosemont, IL.*

Dairy Management Inc. (DMI) is funded by America's nearly 49,000 dairy farmers, as well as dairy importers. DMI and its related organizations work to increase demand for dairy through research, education and innovation. US dairy farmers provide 15 cents per hundred pounds of milk, and importers provide 7.5 cents per hundred weight equivalent to the National Dairy Promotion and Research Program. Part of those funds go to DMI for use in funding dairy promotions as well as research. The research funds are used to provide for graduate student salaries

and supplies at several universities. The legislation that established DMI limits us to studies on the utilization of milk and dairy products and the creation of new products, so that the utilization of milk and dairy products may be encouraged, expanded, improved or made more acceptable. DMI also has developed consortia of industry, academia, and government agencies to leverage more funding into dairy research. Through the combination of dairy farmer/ importer contributed funds and consortia project funding, DMI and the associated state and regional check-off programs contract for a significant portion of the dairy foods research in the US

**Key Words:** funding, Dairy Management Inc.

**209 Funding opportunities for PhD programs in animal, dairy and poultry science at the USDA National Institute of Food and Agriculture.** Mark A. Miranda\*, Adele M. Turzillo, and Ray Ali, *USDA National Institute of Food and Agriculture, Washington, DC.*

A variety of opportunities exists to support PhD programs through funding provided by the USDA National Institute of Food and Agriculture (NIFA). NIFA competitive grant programs generally have broad eligibility and, thus, are readily available to support PhD programs across a wide range of institutions and programs, although eligibility is restricted to entities within the US. A major funding opportunity for PhD students is the Predoctoral Fellowship Program of the Agriculture and Food Research Initiative (AFRI) Food, Agriculture, Natural Resources and Human Sciences Education and Literacy Initiative. This

program provides support for up to 2 yr and \$79,000 in total costs/ grant for stipends, tuition, fees, fringe benefits, supplies, and travel. Individual students apply for the fellowships, thereby gaining valuable experience in preparing and submitting a grant proposal. Funding for PhD programs, including allowances for international training, is also available through NIFA's Food and Agricultural Sciences National Needs Graduate and Postgraduate Fellowship Grants Program. In that program, mentors apply for funding to support one or more fellowships totaling \$79,500/fellow over 3 yr, with grant awards limited to 3 yr and \$262,500 in total costs. Support for PhD students can also be included in applications to most other NIFA competitive grant programs. Those with greatest relevance to animal agriculture include, but are not limited to, the AFRI Foundational Program, AFRI Food Security Challenge Area, Organic Research and Extension Initiative, Organic Transitions Program, Biotechnology Risk Assessment Grants Program, and Beginning Farmers and Ranchers Development Program. Information about these and other NIFA funding opportunities is available at <http://www.nifa.usda.gov/fo/funding.cfm>. Funding support for PhD students may also be available through capacity-funded research and extension programs provided by NIFA to institutions (e.g., Hatch, Evans-Allen, Smith-Lever); however, these funds are subject to legislative and institutional restrictions, and thus, may not be readily available to support PhD programs at all institutions.

**Key Words:** federal funding, competitive grants, PhD program