Research Roadmap - Department of Animal Sciences, IFAS, University of Florida

1. What areas of research is your department best known for **by others**?

Animals and animal agriculture continue to hold places of great economic, environmental, and societal significance in Florida. In our ever-changing world from predominately rural, farm-based, and community-centered to primarily urban and global in scope, the interaction between animals and people and the interface between their environments evolve in concert. The Department of Animal Sciences exists at UF to discover and share knowledge about animal agriculture serving students, the scientific community, and the citizens and agriculture industry in the state of Florida.

While we provide instruction and extension support across livestock species, our research focuses on the primary forage consuming species (beef and dairy cattle and horses) and their products (meat, milk, recreation and sport). Florida ranks 12th in beef production, 16th in dairy production and arguably in the top 3 with regard to the magnitude and economic impact of the horse industry.

2. What truly are your current areas of excellence, **your research strengths** currently in the discipline including your entire statewide faculty?

Our current research strengths include:

- Reproductive biology of cattle
- Environmental physiology esp. heat stress
- Meat and muscle biology
- Subtropical forage utilization by cattle and horses
- Ruminant and equine nutritional physiology
- Dairy systems analysis
- Genetic analysis of multibreed populations

3. What are **your research weaknesses**, gaps that are not covered now, yet you deem essential for the future directions and scientific impact of your discipline?

Areas that can be strengthened include:

- Genomics and proteomics
- Animal adaptation and behavior
- Management of animal environmental impact
- Management factors that enhance immune status
- Livestock systems analysis

4. Where is your discipline moving to in the future? What are the major trends in your field of science? What do the very best departments in the country look like in this discipline? Think of these as **your research opportunities**.

The premier Departments of Animal Science(s) combine fundamental and translational research across domestic species, including companion animals. While no single

department has research across all domestic species, the premier programs include strength in animal products in addition to production related research. Considering the breadth of impact of animal agriculture, it is clear that sustaining that industry is critical to the health and welfare of all Floridians, now and in the future. But there are challenges to sustaining the Florida livestock industry. Because profitability is the foundation of a sustainable industry, solutions to problems must be economically viable. Yet business decision support tools for the livestock industry are limited currently and require constant revision to remain relevant. New potential revenue streams, such as incentives for maintaining open space, must be evaluated and included in economic models to ensure that societal benefits beyond food production are appropriately compensated.

The tropical/subtropical environment of Florida creates unique advantages and challenges for commercial livestock operations. For example, the climate offers an opportunity for year round forage production, and thus favors forage consuming species such as cattle and horses. However, research is needed to determine optimal forage species for varying climates and specific animal production cycles. Beyond the animal's ability to utilize forages, the capacity for different plant species to recycle nitrogen, phosphorus and other byproducts of animal production is essential knowledge to develop sustainable production systems. Because Florida's environment is not replicated in any other area in the US, we must generate data specific to this setting and evaluate the impact of this environment on animal performance and well-being. In the broader perspective, the data generated in Florida has application on an international scale and brings that global dimension to our activities, an important factor in today's interconnected world.

A final facet of sustainability is applying modern technologies to selection of animals that can best perform under the challenging conditions found in Florida. What type of animal can we breed that is best adapted to the environment here in FL? Can we select animals that are better suited to resist pathogens? Are there behavioral traits that improve an animal's performance in the tropical/subtropical environment? Not only is this type of knowledge critical to Florida producers, but there are collateral benefits for consumers. For example, improved pathogen resistance should allow for reduced used of antibiotics to treat disease. Consumers increasingly embrace animal products that are free from exogenous inputs, and increased knowledge of genetic mechanisms will lead to new opportunities to manage animals in more sustainable, systematic ways.

5. Aside from times of limited resources, what/who are the **major research threats** to fulfilling your vision?

Adoption of basic research findings by producers is dependent on applied studies to test those applications. The maintenance of production facilities where we can perform controlled, applied studies is essential to fulfill our research goals. Even more important is the maintenance of herds to use as research models. Significant time and substantial dollars are invested in the growth and maturation of these animals and short-term resource limitations can wreak long-term havoc to research programs. We must carefully plan for maintaining these herds with state and non-state resources.

Support from the ICBR for genomics and proteomics technologies will be necessary to fully realize the potential of model systems now available and those developed in the future. Any loss of ICBR infrastructure would jeopardize our

advancement.

6. What current areas of research in your department will need to be enhanced to be the leading department in your field? What new areas of research in your department will need to be added to be the leading department in your field? And which areas of your discipline are less likely to be essential in the your department in 10 and 20 years?

Enhancement of our capacity to use tools of functional genomics and proteomics is a key opportunity. These tools need to be combined with unique models of animal performance already available at UF, particularly as they relate to production in a sub-tropical and tropical environment. While it is difficult to pinpoint particular areas of future research that will be important in the department, those tools will likely be used heavily to further develop programs already in place. That does not mean that new areas of research will not be developed, but the development will arise from hiring and retaining excellent young faculty that fit core needs within our mission areas. Non-forage nutrition will continue to recede as those animal industries decline in Florida. One caveat is that of aquaculture, which may be an area of growth in Florida and will require nutrition and management related research to support that industry. Such an effort would likely be in a supportive role to Fisheries faculty in the School of Forest Resources & Conservation.

7. What are the cross cutting research topics that need to be addressed through partnerships with other disciplines in UF, at other universities, or with other agencies? How would your department benefit from partnerships/interaction with other units?

Within IFAS, collaborating departments that are integral to our mission include Agronomy, Food and Resource Economics, Soil and Water Science, Agricultural and Biological Engineering, and Microbiology and Cell Science. We are leaders for interdisciplinary programs such as the Animal Molecular and Cell Biology and Program in Reproductive and Perinatal Biology which allow our faculty to collaborate with faculty in the Health Sciences, CLAS, and Veterinary Medicine. These are examples of faculty-generated programs that typically result from interactions of small groups with a common interest that then develop into broader programs. Rather than identify any particular topic, it would be our goal to be prepared to support those that arise naturally from faculty-faculty interactions.

We already benefit significantly from our partnership with the beef, dairy, and horse industries within the state. Those stakeholders provide cash and in-kind support for many programs, and serve as the source of researchable problems. Other state agencies such as the DACS and DEP also provide grant support and partner with our faculty to develop solutions to issues within the animal industries.

8. Knowing the faculty that you must have in place to accomplish your goals, what critical hires in order of importance in your discipline will be necessary to position your department as the leader in its discipline? Create short job descriptions.

Order of hire is less important than getting the best possible individual for each position. For example, a spousal hire might alter specific order and force reconsideration

of priority area. We have, however, developed a listing of potential positions to be filled that includes (not in rank order):

- 2 Equine physiologists
- 1 Rumen microbiologist
- 2 Livestock specialists (emphasis on Systems Management, Youth)
- 2 Forage utilization nutritionists
- 1 Animal behavior scientist
- 1 Meat scientist
- 1 Nutrient management specialist
- 2 Physiological geneticists (emphasis on Lactation, Immune Function)
- 1 Forage geneticist

9. Would reaching your research goals be helped by key research hires in other IFAS departments? Who? What? (Please contact those departments if you list them here.)

The forage geneticist could be hired by or in collaboration with Agronomy, the youth livestock specialist could be affiliated with Agricultural Education and Communication, and the nutrient management position could be affiliated with Soil and Water Science or Agricultural and Biological Engineering. The livestock systems management position would align well with Food and resource Economics. The rumen microbiologist would align with Microbiology and Cell Science.

10. Are there mechanisms of research administration that you see as needing to change to assist you in attaining your department goals? How can FAES administration change and thereby help your department meet its goals?

- Greater efforts by FAES to increase national funding vehicles, especially the National Research Initiative (now AFRI) and broadening the scope of TSTAR to include animal agriculture.
- Streamline paperwork requests that sap faculty time from actual performance of research.