Department of Animal Science
College of Agriculture, Health and Natural Resources
University of Connecticut
Strategic Plan 2019-2024

Mission Statement

The Animal Science Department will provide citizens of the State of Connecticut with a modern and comprehensive program that addresses human interaction with agricultural and companion animals. It will accomplish this by meeting the Land Grant missions of teaching, research, and extension as they relate to sustainable approaches for improving human, animal, and environmental health.

Specific Mission Goals:

- To provide a science-based curriculum and relevant experiential opportunities that will broaden students' knowledge and awareness by encouraging critical thinking and self-awareness while preparing them for the diversity of careers in agriculture. This will target students pursuing AAS, BS, MS, and PhD degrees.
- To establish the Department as a national and international leader in Animal Science research by generating new knowledge and disseminating scholarly findings.
- To support Connecticut's agricultural community, state agencies, and general public through educational extension and outreach programs, including 4-H and FFA.

Background

With the global population approaching 9.8 billion by 2050 (United Nations, 2017), there is a critical need to produce high quality food sources (meat and dairy) using fewer resources while improving environmental stewardship and food safety. Livestock protein products provide essential amino acids, as well as a range of essential micronutrients, including minerals and vitamins, making these a critical component of a healthy diet. Likewise, per capita consumption of dairy products fluctuates but has increased nearly 5% between 2007 and 2017 (USDA ERS). Connecticut is home to 19,000 dairy cows on 110 licensed dairies with an average herd size of 173 cows (https://www.progressivedairy.com/site/stats/us-dairy-stats). There are also 28 dairy processors in the state. Dairy is an important component of farming in Connecticut with dairy

receipts accounting for 15% of the state's total farm receipts. At the same time, the nutrient rich nature of animal-based food products provide opportunities for food safety issues, particularly as the distance between areas of production and consumption increases, resulting in longer transport routes and storage times. In addition, antibiotics in the food supply chain may also contribute to food safety issues and antibiotic resistance. The increased demand for animal-based products is coupled with increasing pressure to improve environmental health by reducing water use and improving nutrient management. Further, the contribution of livestock production to greenhouse gas emission must be reduced to mitigate the impact of agriculture on climate change.

The challenges facing animal agriculture are complex and require interdisciplinary research to help solve them. Investments in food safety and microbiology will continue to improve the safety of our food supply and address issues of antibiotic use. Research in growth physiology will continue to improve the efficiency of growth and production in meat- and dairy-producing animals, coupled with reduced green-house gas emission and increased environmental stewardship. New investments in nutrient/waste management and mediation of methane emissions will directly impact environmental health. Further, addressing these issues provides opportunities for graduate student training, resulting in the next generation of scientists to continue the work.

The Department of Animal Science is the only animal science department in New England that maintains all major livestock species on campus with a sufficient number of animals for research, teaching, and extension. Because of this, we are a primary choice for students in New England with aspirations toward veterinary school, graduate school, and industry careers. The Department of Animal Science supports the second largest undergraduate major in the College of Agriculture, Health, and Natural Resources while prioritizing small class sizes within a curriculum designed for experiential learning, and extensive student and faculty interaction. The research productivity of the Department is well-documented in areas of food microbiology, food safety, stem cell and regenerative biology, growth physiology, and muscle biology where faculty have been successful in securing extramural funding, publishing results, training graduate students, and supporting undergraduate research. Extension and outreach programs in the Department serve the state's industry, youth, and hobbyists, and are strongest in the areas of equine and dairy (management and foods). This is particularly important as Connecticut ranks third in New England in terms of agricultural sales, and 32% of these sales are related to animal and animal product production (Zwick Center Report). Further, dairy

processing (milk, cheese, ice cream and frozen desserts) account for approximately 60% of total direct sales, highlighting the importance of the dairy industry in Connecticut (Zwick Center Report). Thus, our faculty composition and resources position us to meet the challenges faced by animal agriculture.

Importantly, with the current faculty and future strategic investments, the Department of Animal Science is well-positioned to address the present and emerging challenges, and will do so by addressing the following goals in undergraduate education, graduate education, research and outreach:

Undergraduate Education

Specific Goals

1. **Achieve a student:faculty ratio of 15:1.** The main challenges to our teaching program are the demands of increasing student numbers impacting our already heavy faculty academic advising responsibilities and increasing pressure on our animal handling and laboratory intensive curriculum. Over the past five years, the Animal Science major had an average student:faculty ratio of 22.8:1, which has been increasing (from 21.5:1 in 2013-2014 to 24.4:1 in 2018-2019). At the same time, the ratio for the University was 15.6:1 and CAHNR, 15:1. In accordance with best pedagogical practices, our teaching program favors small, faculty-led discussions and experiential laboratories that ensure students apply fundamental concepts to actual animals. Student numbers in these lab sections are restricted by physical space, teaching objectives of specific classes, and safety assurance. To meet student demand, both qualitatively and quantitatively, we have increased the number of classes with multiple faculty-led lab and discussion sections, which has placed additional demands on faculty with already heavy teaching responsibilities. The Animal Science program has great potential for continued growth and recruitment of high quality students but we are rapidly depleting our human capital resources to support such continued growth. In addition, we have recently lost two faculty members with primary teaching appointments in Livestock Science and Poultry Science to retirement and we are anticipating the retirement of several additional faculty members with extensive teaching (in dairy management, ruminant nutrition, reproductive physiology, and endocrinology) and advising (responsible for ~40% of departmental undergraduate advising) responsibilities in the next two to five years (2021 to 2024).

Replacement of the teaching responsibilities of these faculty on a 1:1 FTE basis is critical to maintain the current level of teaching and advising in the Department.

2. **Provide diverse opportunities for students to participate in experiential learning activities including undergraduate research (Honors and non-Honors), internships, service learning, and self-directed learning.** Approximately 50% of our undergraduate students participate in some form of experiential learning each academic year, and all undergraduates participate in experiential learning at least once during their undergraduate career with required participation in 'Little I' as part of ANSC 101/SAAS101 (Introduction to Animal Science). Although the Department has a strong historic commitment to this goal, maintaining the facilities, animal population, and faculty culture for a long-term sustainable program is essential. Undergraduates that have participated in research and internships were more successful in matriculating to veterinary and graduate school than those who did not. Opportunities for service-learning have increased over the past eight years. Short- and long-term study abroad opportunities have been and continue to be available for students with varied interests (ep., equine, dairy, sustainable agriculture, One Health). Further, students involved in self-directed learning (such as Honors Scholars or University Scholars, and those enrolled in Independent Study courses) are able to adapt the Animal Science curriculum and tailor it to their specific learning and career goals. To continue meeting the demand and provide additional opportunities, we need to:
    - Increase capacity for undergraduate experiential learning activities such that 75% of students in a graduating cohort will have participated in at least one identified activity per year
    - Increase the breadth of opportunities for experiential learning activities
    - Encourage incorporation of service learning activities into the Animal Science curriculum
    - Consider the addition of a capstone course and(or) activities for seniors

    To accomplish these goals, it is necessary to:
    - Increase the number of research faculty to support undergraduate research and the number of teaching faculty to support the addition of the capstone course.
    - Encourage utilization of institutional programs to fund undergraduate research (e.g. SURF, OUR funding, IDEA grant funding).

- Increase development opportunities through the UConn Foundation to increase funding for these opportunities.
- Increase submission of grant proposals focused on enhancing undergraduate education through experiential learning opportunities to at least one submission within the Department per year.
- Support development of Education Abroad courses specific to agriculture and animal science; including full semester and shorter duration programs, especially to global areas of food shortage.
- Provide training on incorporation of service-learning activities into the Animal Science curriculum.

3. **Ensure the Department's ability to provide a comprehensive undergraduate curriculum consistent with national norms.** The loss of key faculty in livestock production, especially in Livestock Management and Poultry Management and the expected retirement of faculty in Dairy Production and Management, has/will severely reduce teaching capacity in this area. This is a key component of animal science programs across the country and leverages our unique position in New England as the only university currently using all major livestock species for teaching, extension and research, including the addition of robotic milking to the Dairy Unit. Continuing this option is crucial for our continued ability to attract outstanding undergraduate and graduate students regionally and nationally. Replacement of these faculty on a 1:1 teaching FTE basis is required to meet this need.
4. **Establish an interdepartmental food science/food safety program.** With the addition of new faculty, we have strong expertise in food science and food safety, which, with the formation of an interdepartmental undergraduate major, could lead to accreditation by the Institute of Food Technologists (IFT). This accreditation process requires a minimum of four faculty members in the food science area, up-to-date facilities for teaching, and coursework that covers the IFT core competencies. Accreditation in this area could attract additional undergraduate students in an area that has high employment rates annually and at attractive levels. Recruitment of an expert in Meat Science/Food Engineering responsible for teaching (50%) and research (50%) to contribute to collaborations in the area of food science and safety is required to meet this need.

5. **Increased scholarship of teaching and learning (SoTL)**, especially by faculty in primary teaching appointments (i.e., greater than 50% teaching assignment). Curriculum development and teaching approaches serve students best as dynamic processes. As such, the Department values successful efforts to acquire extramural funding to improve student learning outcomes. There have been six publications related to SoTL activities in the last eight years. Four proposals related to experiential learning have been submitted in the past eight years to external funding agencies (none funded). Four others have been submitted to internal funding, with much greater success (three funded).
    - Increase support for SoTL activities, resulting in teaching enhancements and peer-reviewed publications. Value successful internal and external grant submissions to support these activities through merit and the promotion process.

Metrics for Undergraduate Education

- Improved student:faculty ratio on a per faculty basis to 15:1.
- Increase number of undergraduates participating in experiential learning activities such that 75% of students in a graduating cohort will have participated in at least one identified activity per year.
- Increased grant submissions and external funding for undergraduate experiential learning opportunities to one per year from the Department.
- Place value on training and curriculum changes that incorporate experiential learning and/or service learning activities into Animal Science coursework through merit and the promotion process.
- Increased peer-reviewed publications relating to the SoTL to one per year from the Department.

Graduate Education

Specific Goals

1. **Provide a relevant and timely education (both disciplinary and life skills) that prepares students to meet the challenges and opportunities facing animal agriculture.** The Department of Animal Science has a history of supporting the development of independent scientists by providing technical training in areas of expertise, encouraging the development

of communication skills, offering opportunities for teaching experience, and supporting the presentation of research findings (e.g. peer-reviewed publications, presentations at international meetings). These skills allow graduates to be competitive on the job market and contribute to addressing the challenges facing animal science. To continue to meet this goal, we will:

- Continue to develop a self-sustaining (externally funded) graduate program of national and international recognition in animal and food science, linking our commitment to graduate education with well-funded research programs.
- Increase our graduate support funding in all areas. Specifically, increase grant submissions aimed at improving and increasing graduate training opportunities to one per year from the Department.
- Continue to support graduate student presentations at national and international scientific meetings and to set aside departmental funds for that purpose.
- Increase the number of Hatch/Multi-state projects in the Department.
- Continue to assess the graduate curriculum to ensure the coursework offered is meeting the needs of current and future graduate students.

Metrics for Graduate Education

- Increased grant submissions that include graduate student stipends, especially federally funded grants. In addition, increased submissions specific to graduate student training.
- Increase number of funded graduate students and the number of graduate degrees (MS and PhD) awarded. Faculty members with research appointments of 25% or more should have at least one graduate student at all times, faculty members with a 50% or greater research appointments should have at least two graduate students.
- Maintain our average time to graduation (2 years for MS, 5 years for PhD).
- Increase the number of graduate students presenting at national meetings to 75% of current students per year, in part by maintaining travel support from the Department for graduate student travel.

Research and Scholarship

Specific Goals

1. **Increase external research support, especially federally funded competitive grants, for all faculty and graduate programs**. To meet this goal, faculty with 25 to 50% research appointments should be PI on at least one active grant (internal or external); faculty with over 50% research appointments should be PI on at least one active external grant and have at least 1 federal/competitive grant submitted. External research funding is critical to the success of the Department and faculty, through support of graduate students and scholarship. Development of additional research support through industry collaborations and trade organizations will also increase research productivity and provide opportunities to link research programs with graduate education, establishing career opportunities for our graduates.
2. **Expand research in meat/food science and food safety, dairy management and reproduction, livestock management and production, and poultry science that utilizes existing (dairy, livestock, poultry) and future (ABSL2) animal units.** Focusing on these areas will allow us to address challenges to animal agriculture, including the need to increase animal-based products in a safe, ethical, and environmentally-conscious manner. To meet this goal, it is necessary to support the research programs of current faculty (by maintaining, not increasing, their teaching/advising responsibilities) and hire new faculty in strategic research areas (see Hiring Plan).
3. **Develop stronger collaborative and multidisciplinary research partnerships at all levels (Department, College, University, multi-state/multi-institutional, and international).** Interdisciplinary collaborations provide opportunities to complete research beyond the capacity of single researchers and increases the efficiency of resource use. Further, participation in these collaborations supports the training of well-rounded graduate students with greater career options. To meet this goal, the Department will continue to support attendance and active participation at scientific meetings and support networking events on campus.
4. **Increase entrepreneurial activities that enhance ties between our faculty and the industries we serve.** Entrepreneurial activities allow us to impact the industries we serve by directly providing products or services. Increasing these activities will improve the interaction between faculty and their respective industries and allow us to better serve our stakeholders. To meet this goal, the Department will value establishment of entrepreneurial activities through the merit and promotion process.

Metrics for Research

- Recruit top-tier faculty in targeted research focus areas (see hiring plan).
- Increase external research funding by more aggressive grant-writing and leverage support from the College and University to facilitate research. Faculty with greater than 25% research appointments should have one active or submitted grant; faculty with 25 to 50% research appointments should have at least one active grant (internal or external); faculty with over 50% research appointments should have at least one active external grant and at least one federal/competitive grant submitted.
- Maintain a strong peer-refereed journal publication rate / research FTE. Faculty members with less than 25% research appointment should publish one peer-reviewed publication every two years, faculty with 25 to 50% research appointments should publish one peer-reviewed publication per year, and faculty with greater than 50% research appointments should publish at least two peer-reviewed publications per year. Publications should be in journals appropriate for each faculty member's area of expertise and target publication rates should be as first- or corresponding author.
- Increase the number of faculty nominations for research awards (internal and external) to at least one per year.

Extension

Specific Goals

1. **Pursue extramural funding for extension programming, particularly in areas of equine, dairy, and livestock.** Current programming in the Department supports equine and dairy (and dairy foods) outreach. However, since the retirement of key personnel, we have no specific faculty with a focus on outreach in livestock or poultry areas, which are areas of need in New England, primarily for small farms. Our extension programming should leverage our unique position in New England as the only university currently using all major livestock species for teaching, extension and research, including the addition of robotic milking to the Dairy Unit.
2. **Produce scholarship that addresses academic and/or industry audiences.** Publication related to each faculty member's signature programming is required (at least one publication

per year). For faculty with greater than 50% extension appointments, one peer-reviewed publication, as first- or corresponding author, every other year related to the impact of their programming or data related to research questions in that signature program is required to meet this goal.

3. **Increase interdisciplinary support for state extension programs involved in health and well-being.** This is currently accomplished through food safety programs, HACCP training, the appointment of extension educator in food safety as an adjunct faculty member in the Department, and food science support for community nutrition programs that would mirror our commitment to additional graduate training in these areas. Additional areas for expansion would include areas that address nutrient management, environmental health, and sustainable animal production practices.
4. **Improve our collaborations with state, regional, national and international food and agricultural organizations.** Currently we have very close ties with some, such as with New England collaborations in food science, dairy, horse, and sheep, and national horse programs but others have been less well maintained (poultry, dairy technology, and livestock).

Metrics for Extension

1. Increased number of grant submissions to support extension activities, such that all faculty with at least 25% extension appointments have at least one grant submitted to fund extension programming.
2. Increased number of publications resulting from extension activities, such that all faculty with extension appointments have at least one publication (eg., extension bulletin or fact sheet), and faculty with greater than 50% extension appointments have one peer-reviewed publication every other year, as first- or corresponding author, related to their activities per year.
3. Maintain self-sustaining extension programming.
4. Maintain quality engagement to meet the needs of the stakeholders, including participation in State 4-H and FFA youth programs, as evidenced by our formal extension publications, programs, clinical or expert services, and feedback from College and Department advisory groups.

ADDITIONAL DEPARTMENTAL GOALS

1. Human Capacity Development
    - **Establish a mentorship program for new faculty.** This program should provide a mentor in each of that faculty member's appointment areas, and will improve retention and success of junior faculty.
    - **Provide continuing education for staff, including farm managers and workers.** As the premier Animal Science Department in the Northeast, we are committed to maintaining programs that are at the forefront of each livestock industry. As such, we are committed to continuing to improve our facilities and management practices to maintain this standing. In addition, the incorporation of Farm Services into the Department of Animal Science provides additional opportunities to improve production practices.
2. **Work with the UConn Foundation to establish an Endowed Chair in Animal Science.** In addition to attracting highly productive faculty, endowed chairs increase the reputation and standing of the Department nationally and internationally.
3. **Share success stories and program impacts** to engage with our alumni, stakeholders, and the citizens of Connecticut. In addition to increasing awareness of the positive impact of our Department on the state and beyond, this provides an additional opportunity to share relevant research and information with our constituents.
4. **Regularly reassess the teaching/research/extension appointments** to make adjustments as necessary to support the optimal function of the Department.

Faculty Hiring Priorities (approved by faculty vote on January 16, 2019)

Tenure Track:

1. Dairy Production and Management: Installation of robotic milkers at the Kellogg Dairy Center provide a unique opportunity for significant research and extension programming.
2. Reproduction: This is a historically well-funded area of research and has a traditional presence in animal science departments. Our Department needs to re-establish this as a funded research area (and to make sure we have an instructor for ANSC 3122 upon retirement of the current instructor).
3. Waste management: Developing a new area of research in food, manure waste, and/or greenhouse gas emissions will position the Department at the forefront of research on the

impact of animal agriculture on climate change. This is an important, emerging area of research and fits in well with the current CAHNR strategic plan.

4. Food Engineer: Hiring in this position would allow for creation of an interdepartmental food science/food safety program accredited by IFT. This is an area with fundable research opportunities and excellent job placement rates for graduates.

Non-Tenure Track

1. Livestock: We need a permanent instructor for the Livestock Management course and other applied courses (especially selection courses and skills classes). Combining this with an extension appointment (especially some poultry expertise) will restore a presence in the state/region.
2. Behavior/Companion Animal: This is an area of interest for many of our undergraduate students and would allow us to expand our course offerings in these areas. This will help with student recruitment.
3. Food Science: Hiring for this position would support the creation of an interdepartmental food science/food safety program, which would prepare graduates for an area with excellent job placement options.

Priorities (ranked) with appointment splits:

Tenure Track:	**Non-tenure Track**:
Dairy Management (Research/Teach)	Livestock (Teach/Ext)
Repro (Research/Teach)	Behavior/Comp Animal (Teach)
Waste (Research/Teach)	Food Science (Teach)
Food Engineer (Research/Teach)	

FACILITIES

The physical facilities available for the Department of Animal Science to meet its teaching, research, and extension mission are mixed. The George C. White Building is in need of major renovation; the building is old, worn, and out-of-date to meet current high-tech teaching and research needs. The physical environment is variable, some locations within the building have been renovated and are significantly improved, while others remain very uncomfortable

(e.g. poor heat, virtually no environmental control, noisy, and limited privacy). However, the building still requires asbestos abatement in some areas, the wiring is insufficient (especially for modern labs and computer-based equipment), and the floors are substandard. The teaching and research labs need major renovation (e.g. environmental controls, wiring, casework, hoods). First class laboratory space is severely limited, is only available within the adjacent Advanced Technology Lab (ATL) and Agricultural Biotechnology Lab (ABL) buildings, and is not BSL2. Additional lab space needs to be upgraded in the White Building. The primary teaching lab (Room 10) only has space for 20 students and is a major factor contributing to the need for multiple lab sections (thus further exacerbating our teaching staff demands). Teaching space is limited; class and lab demands are exceeding our physical capacity.

The animal facilities are currently undergoing renovations to continue to meet the institution's commitment to maintaining AAALAC accreditation. However, in the renovation process we lost several key facilities to support large animal physiology research, large animal surgery, and poultry teaching and processing capability. New facilities or further renovation are critical to facilitate increased research productivity, support student learning, and attract new hires. To continue to increase our research portfolio and capacity for attracting extramural funding, research facilities must be in line with other peer institutions. In addition, the increased demands to meet continual AAALAC and institutional regulatory standards are severely taxing our current workforce and critical hires are needed to maintain these teaching and research capabilities for the future.

Two additional areas that need attention are the Meat Laboratory in Ratcliffe Hicks arena and Horse Unit 2. The Ratcliffe Hicks arena is no longer available for many of our teaching and service functions because of University scheduling. The loss of this highly flexible facility has been a major problem and is causing program reductions (loss of teaching labs, cancellation of extension and service activities such as short courses, auctions, and shows). Horse Unit 2 requires significant renovation to facilitate the teaching and research needs of the expanding horse program. The structure is deteriorating and, while cosmetic changes have been completed, there is a need for renovation of the exterior structure, addition of insulation, and renovation of the interior to continue supporting the expanding equine breeding program. Further, the expansion of the horse program is putting major pressure on the riding facilities. Covering the outdoor riding area and round-pen is warranted, and will provide state-of-the art facilities to expand our riding and teaching programs.

SUMMARY OF NEEDS TO MEET STRATEGIC PLANNING GOALS

Faculty Hiring Goals

Tenure Track:

Dairy Management (Research/Teach)

Repro (Research/Teach)

Waste (Research/Teach)

Food Engineer (Research/Teach)

Non-tenure Track:

Livestock (Teach/Ext)

Behavior/Comp Animal (Teach)

Food Science (Teach)

Staff Hiring Goals

- Assistant Manager for Livestock Units; to assist Manager in day to day operations
- Administrative support (1/2 clerical, 1/2 financial)
- Technical support (lab, equipment, computers, etc.)
- Maintain Agriculture worker numbers to efficiently operate each of the animal units.

Facilities

1. Renovation of George White Building
    a. Update and expand teaching classroom and labs
    b. Update research labs
    c. Update electrical, environmental, and complete asbestos abatement
2. Ratcliff Hicks Arena Renovation
    a. Meat lab renovations
3. Horse Unit 2
    a. External structure
    b. Insulation and environmental controls
    c. Renovation to improve space use
    d. Fencing
4. Covered out-door riding area and round pen (over current areas)
5. Large Animal Surgery and Research facilities