

# UNIVERSITY FACULTY SENATE FORMS

## Academic Program Approval Requesting Permanent Status of the Animal and Food Sciences Major

This form is a routing document for the approval of new and revised academic programs. Proposing department should complete this form. For more information, call the Faculty Senate Office at 831-2921.

**Submitted by:** Kali Kniel                      **phone number:** 302-831-6513

**Department:** Animal and Food Sciences    **email address:** kniel@udel.edu

**Action:** Permanent Status Program Review

(Example: add major/minor/concentration, delete major/minor/concentration, revise major/minor/concentration, academic unit name change, request for permanent status, policy change, etc.)

**Effective term** 14F

**Current degree** BS

**Proposed change leads to the degree of:** BS

**Proposed name:** Animal and Food Sciences (Please note no change)

**List new courses required for the new or revised curriculum. How do they support the overall program objectives of the major/minor/concentrations)?**

(Be aware that approval of the curriculum is dependent upon these courses successfully passing through the Course Challenge list. If there are no new courses enter "None")

No new courses are being proposed at this time.

**Explain, when appropriate, how this new/revised curriculum supports the 10 goals of undergraduate education:** <http://www.ugs.udel.edu/gened/>

The curriculum is not being revised at this time.

**Identify other units affected by the proposed changes:**

(Attach permission from the affected units. If no other unit is affected, enter "None")

None

**Describe the rationale for the proposed program change(s):**

(Explain your reasons for creating, revising, or deleting the curriculum or program.)

Permanent Status requested for this program.

**Program Requirements:**

(Show the new or revised curriculum as it should appear in the Course Catalog. If this is a revision, be sure to indicate the changes being made to the current curriculum and **include a side-by-side comparison** of the credit distribution before and after the proposed change.)

No new changes proposed, please see the senior checkout sheet and information contained within the next several pages.

**ROUTING AND AUTHORIZATION:** (Please do not remove supporting documentation.)

Department Chairperson \_\_\_\_\_ Date \_\_\_\_\_

Dean of College \_\_\_\_\_ Date \_\_\_\_\_

Chairperson, College Curriculum Committee \_\_\_\_\_ Date \_\_\_\_\_

Chairperson, Senate Com. on UG or GR Studies \_\_\_\_\_ Date \_\_\_\_\_

Chairperson, Senate Coordinating Com. \_\_\_\_\_ Date \_\_\_\_\_

Secretary, Faculty Senate \_\_\_\_\_ Date \_\_\_\_\_

Date of Senate Resolution \_\_\_\_\_ Date to be Effective \_\_\_\_\_

Registrar \_\_\_\_\_ Program Code \_\_\_\_\_ Date \_\_\_\_\_

Vice Provost for Academic Affairs & International Programs \_\_\_\_\_ Date \_\_\_\_\_

Provost \_\_\_\_\_ Date \_\_\_\_\_

Board of Trustee Notification \_\_\_\_\_ Date \_\_\_\_\_

Revised 10/23/2007 /khs

## **Permanent Status Program Review (PSPR) Self Study**

### **1. General Information about the program:**

The Animal and Food Sciences Major is one of the three majors in the Department of Animal and Food Sciences. The Department of Animal and Food Science is committed to provide education, service and leadership for regional, national and international stakeholders through development, integration and dissemination of knowledge of animals used for food, fiber, companion, and recreational purposes; and for safe, responsible, ecologically sustainable, and competitive food production. Students within this major will participate in an academically challenging career by participating in courses which support the ten general education goals of the University of Delaware in various ways. Within the department the learning goals of the Department for all three majors are:

- Students will demonstrate oral communication skills important for communicating scientific ideas. (Communications Goal)
- Students will demonstrate written communication skills important for communicating scientific ideas. (Communications Goal)
- Students will use critical thinking and reasoning, skeptical inquiry and scientific approach to solve problems. (Critical Thinking Goal)
- Students will demonstrate knowledge of the major core concepts in the animal and food sciences. (Content Goal)

Within the ANFS Department, students each receive faculty advisors and advisement is a critical element. Students are encouraged to meet with their advisors at a minimum of each semester. Advisors work closely with students to ensure students are on the correct academic pathway and are participating in internships and other elements of career enhancement during their academic undergraduate career.

The Animal and Food Sciences major applies the principles of biology, chemistry and biochemistry to animal agriculture and food systems. The program encompasses a wide range of instruction, including animal nutrition; animal health and molecular biology; food science and its interactions with animal agriculture, physiology, genetics, and reproduction; and dairy, livestock and poultry management. Depending on a student's interest, he or she may choose electives that direct their studies toward production systems; food safety; molecular biology and genetics; and equine and companion animals

Animal and Food Sciences majors have the opportunity to work closely with the department's faculty, which includes leading scholars in animal nutrition and physiology, immunology, virology, molecular biology, animal production, management, food science, and food safety. All major courses and laboratories are taught by faculty, ensuring that students have easy access to these specialists. Beginning with the first semester, students work hands-on with animals, at the University's on-site 350-acre teaching and research complex. Many students also participate in internships, study abroad, and research experiences. They also participate in the Animal Science Club or the Food Science Club for their social, educational, and professional development

activities. Faculty work with students to better understand animal production and animal production problems through a greater understanding of the basic cell and molecular processes in animal growth, production performance which impact food quality and consumption.

The global employment outlook remains promising for Animal and Food Sciences majors. Learning the importance of sustainability in agriculture is key to the global future and the US role in it. A degree in this major prepares students for entry-level technical, research, sales, and marketing positions in the animal and food industries as well as the chemical, and health industries. Government agencies, zoos, aquariums, and veterinary practices may also offer employment opportunities for students. Approximately 35 percent of our graduates pursue advanced degrees in areas related to animal agriculture, food science, and basic animal and biological sciences

**Curriculum Specifics:** Students who successfully complete a major in Animal and Food Sciences earn a BS degree. The curriculum is based in the core sciences and allows flexibility for a student to choose an area of specialization. Students often focus in an area of study, which may include microbiology, biotechnology, disease, processing, or equine health, among others.

The curriculum includes a choice from many rigorous science-based classes at the ANFS 300 level or above, many of these include hands-on laboratory sections. Some of these are taught using problem-based learning techniques and others use unique and creative means to engage students. Students have a choice of Capstone courses that involve a culmination of learning from the students during their 4-year undergraduate career. These courses involve the study of the production and biology of specific animals, including equine, dairy cattle, pigs, sheep, and beef cattle. These are unique amazing learning opportunities for students.

The curriculum satisfies the University, College and departmental requirements. The senior check-out sheet for current students majoring in Animal and Food Sciences is found on the following two pages.

# Animal & Food Sciences *Graduation Check Sheet*

124 credits required

Fall 2013

Name:	UDID:	Phone:
Catalog Date:	Minor(s):	Email:

## UNIVERSITY REQUIREMENTS

All requirements must be fulfilled as indicated in the University Catalog. Exceptions are granted only in extenuating circumstances and only by the Office of Academic Programs.

(7 credits)

COURSE	TITLE	CR	GRADE
ENGL 110	Critical Reading and Writing (minimum C-)	3	
ANFS 165 or UNIV 101	First Year Experience/FYE	1	
§	Discovery Learning Experience (DLE)	*	
	Multicultural Course	3	

University Breadth Requirements $\diamond$  (9 credits)  
(A minimum grade of C- is required for all University Breadths)

Creative Arts and Humanities			
		3	
History and Cultural Change			
		3	
Social and Behavioral Sciences			
		3	
Mathematics, Natural Sciences, and Technology			
	(CHEM 101/103 already fulfills this requirement)	*	

## COLLEGE BREADTH REQUIREMENTS

Agriculture and Natural Resources $\diamond$   
(3 approved areas, 9 credits)

COURSE	TITLE	CR	GRADE

Physical Sciences

	(CHEM 101/103)	*	
	(CHEM 102/104)	*	

\*Credits for these courses should not be counted in the total number of credit hours as they have already been included elsewhere on this checksheet.

Animal & Food Sciences

## MAJOR REQUIREMENTS

A minimum grade of C- is required for all courses with the ANFS rubric/subject are code.

(53 credits)

COURSE	TITLE	CR	GRADE
MATH 221	Calculus I	3	
BISC 207	Intro Biology I	4	
BISC 208	Intro Biology II	4	
CHEM 101/103	General Chemistry I	4	
CHEM 102/104	General Chemistry II	4	
CHEM 213/215	Elementary Organic Chemistry	4	
CHEM 214/216	Elementary Biochemistry w/lab	4	
ANFS 101	Animals, Science and Society	3	
ANFS 102	Food for Thought	3	
ANFS 111	Animal and Food Science Laboratory	1	
ANFS 140	Functional Anatomy	4	
ANFS 230 or ANFS 332	Foodborne Diseases or Animal Diseases	3	
ANFS 251 or NTD 200/ BHAN 130	Animal Nutrition or Nutrition Concepts/ Health Topics	4 or 3/1	
ANFS 265	Career Development	1	
ANFS 300	Principles of Animal and Plant Genetics	3	
ANFS 305	Food Science	3	

§ One of the following 4-credit capstone/DLE courses:

(4 credits)

ANFS 404	Dairy Production	4	
ANFS 411	Food Science Capstone	4	
ANFS 417	Beef Cattle and Sheep Production	4	
ANFS 418	Swine Production	4	
ANFS 421/422	Poultry Production w/ Lab	4	
ANFS 426	Equine Management	4	



## 2. Student Information:

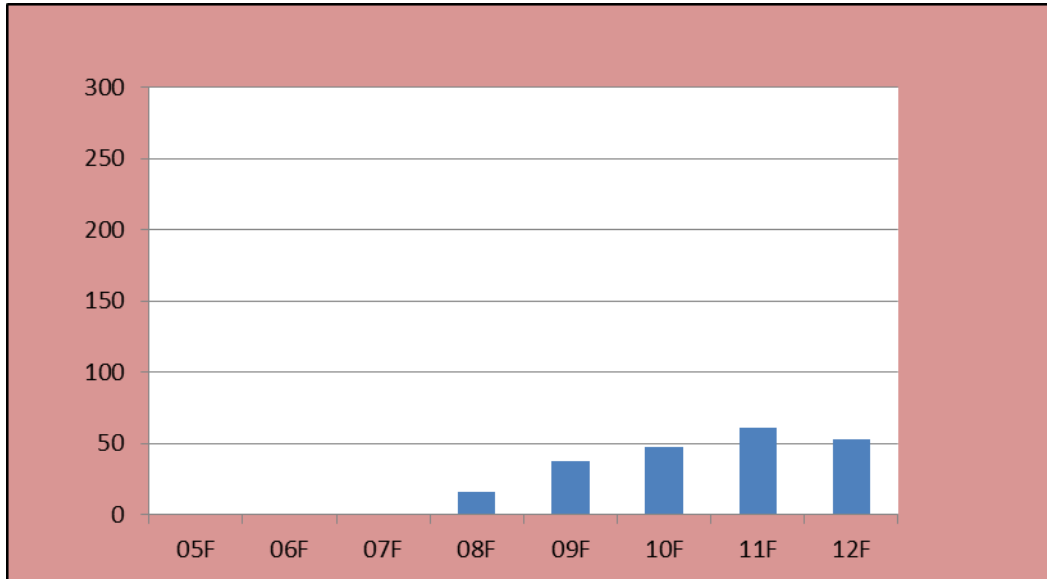
The Animal and Food Sciences curriculum was first offered 2008. The major's overall objective is to address the principles of animal and food production by combining critical components of both fields. The new major is intended for professionals working in production agriculture and food industries where knowledge of both animal and food science is critical for the production of safe and wholesome food. Key areas of concentration include emphasizing, production systems, food safety via the importance of the farm to fork concept, equine and companion animal biology, and molecular biology and genetics. Dairy science related fields have been of great interest to students over the years and many students have sought out faculty in these disciplines for coursework and research, and internship opportunities. Student interest in poultry science has grown in recent years. A "Poultry Science Exploration Days" recruiting event has been held annually since 2011 (<http://www.udel.edu/udaily/2013/oct/canr-exploration-day-102212.html>). With support from a US Poultry and Egg Association Foundation, the Department has enhanced recruitment as well as expands awareness of current students ([http://www.poultryfoundation.org/directory/prog\\_edu.cfm](http://www.poultryfoundation.org/directory/prog_edu.cfm)).

In fall 2012, the department hosted four evening seminars, "UD/CANR Poultry Careers Seminar Series" for current students. A total of 81 students attended these four evening seminars! Speakers from Delmarva Poultry Industry, Inc., USDA, poultry production and vaccine companies, and UD faculty and staff shared information on career opportunities. In addition, students, accompanied by a faculty member, for many years have attended the World Poultry Expo in Atlanta. In 2012, 11 students interviews at the Expo and all received job offers.

Students within the Animal and Food Sciences major continue to be of high caliber (as noted in the Table below).

Fall Semester	No. Students ANFS/FS/Pre-Vet	ANFS			FS			Pre-Vet		
		SAT	HS GPA	HS %ile	SAT	HS GPA	HS %ile	SAT	HS GPA	HS %ile
08F	12/1/68	1732	3.64	78.1	2020	3.99	90	1844	3.58	82.5
09F	11/9/77	1705	3.52	82.3	1816	3.82	83	1809	3.64	85.2
10F	9/8/51	1759	3.60	91	1684	3.88	80.3	1818	3.75	89
11F	8/10/64	1759	3.54	84.8	1825	3.69	87.6	1774	3.65	86.1
12F	5/12/84	1610	3.49	74.3	1908	3.81	82.3	1814	3.71	86.4
Mean	7/8/69	1713	3.56	82.1	1851	3.84	84.6	1812	3.67	85.8

The enrollments in the Animal & Food Sciences undergraduate major are shown in the graph below (2008-12). As a reminder this was a new major in 2008. An important and practical necessity of this major is to offer an alternative major to students who initially enroll in the Pre-Veterinary Medicine and Animal Biosciences major, but later decide that they are no longer interested in applying to veterinary or graduate school, or wish to have greater flexibility or concentration in course selection. Of the 80-90 students who initially enter the Pre-Veterinary Medicine and Animal Biosciences major, 20 may apply to veterinary school as seniors, and the remaining stay in the major or transition to the Animal and Food Sciences major.



Additional information on enrollment, as requested is present in the Table below. This information was supplied from the registrars office, generated by Krista Urbaniak and Al Fanjoy. Please note that there are no freshmen applicants in 2008 as applicants were admitted to the previous major of Animal Science and then were admitted to Animal and Food Sciences or Pre-Veterinary Medicine and Animal Biosciences.

AFS - Animal and Food Science

Year	Applicants		Offer/Admit		Join Major as				Leave Major as		
	FR	TR	FR	TR	FR	TR	Change Major	Return to UD	Change Major	Leave UD	Complete Degree
2008-09	0	1	12	2	12	2	9		4	1	2
2009-10	90	10	53	6	11	4	10	1	10	3	2
2010-11	86	10	39	6	9	3	20	2	16	1	8
2011-12	57	6	34	4	8	3	20		8	3	16
2012-13	58	9	35	4	5	3	18	2	8	3	14
2013 Fall	55	7	42	3	5	3	16		?	?	?

Not final as of 1/9/2014

**Appendices:**

Academic Program Review report from the recent review conducted in October 2013.

Letters of Support from Dr. Gelb (Department Chair) and Dr. Rieger (Dean of the College of Agriculture and Natural Resources).



**External Program Review Report**

**Department of Animal and Food Science  
University of Delaware**

**September 30 – October 2, 2013**

## **REVIEW TEAM MEMBERS**

Shawn S. Donkin, PhD  
Associate Director of Agricultural Research and Director of Graduate Education, College of Agriculture  
Professor of Animal Sciences  
Purdue University  
West Lafayette, IN

Dennis Heldman, PhD  
Professor, Food Agricultural and Biological Engineering  
The Ohio State University  
Columbus, OH

Fred Hoerr, DVM, PhD  
Professor, Department of Pathobiology  
Auburn University  
Auburn, AL

Margo Holland, DVM, PhD  
National Program Leader, Animal Health and Well Being  
USDA National Institute of Food and Agriculture  
Washington, DC

James Lindsay, PhD  
National Program Leader, Nutrition, Food Safety/Quality  
USDA Agricultural Research Service  
Beltsville, MD

Avron Abraham, PhD  
Director, Center for Academic Success  
University of Delaware  
Newark, DE.

## ACADEMIC PROGRAM REVIEW SCHEDULE

### Monday, September 30, 2013

- 5:00 p.m. Arrive Newark, Delaware (Embassy Suites, 654 South College Avenue)
- 6:00-8:30 p.m. Dinner meeting with Dean, Acting Deputy Dean and Deputy Provost
- Dinner will be held at Embassy Suites. Please check with the front desk as this is currently scheduled in Fort Christina Room but this could change per the hotel.

### Tuesday, October 1, 2013

- 7:30 – 8:30 a.m. Breakfast with Department Chair (233 Townsend Hall)
- 8:45 – 10:45 a.m. Tour of facilities (Townsend and Worrilow Halls, O. A. Newton Building, Allen Laboratory, Newark and Webb Farms).
- 11:00 – 12:00 a.m. Meet with department faculty to discuss undergraduate programs. (Allen Laboratory)
- 12:00 – 1:00 p.m. Lunch with undergraduate students (Allen Laboratory)
- 1:00-2:00 p.m. Meet with department faculty to discuss graduate programs (Allen Laboratory)
- 2:00-3:00 p.m. Meet with graduate students (Allen Laboratory)
- 3:00-3:30 p.m. Break
- 3:30-4:30 p.m. Meet with department faculty to discuss outreach and research. Separate meetings will be held with faculty in the areas of Animal Genomics and Physiology, Large Animal Biosciences, Food Science, and Poultry Health and Management
- Food Science – Dallas Hoover (049 Townsend Hall)
  - Large Animal Biosciences – Limin Kung (233 Townsend Hall)
  - Poultry Health and Management – Jack Gelb (Allen Laboratory)
  - Animal Genomics and Physiology – Carl Schmidt (156 Townsend Hall)
- 4:30-5:30 p.m. Meetings with individual faculty/other stakeholders, as requested (049 Townsend Hall)
- 5:30 p.m. Back to hotel

6:30 – 8:00 p.m. Review team dinner with stakeholders at Embassy Suites. Please check with the front desk as this is currently scheduled in Christina River Room but this could change per the hotel.

Names of Stakeholders

Donald Ritter	Director of Health Services	Mountaire Farms, Inc.
Heather Hirst	State Veterinarian	Delaware Dept. of Agriculture
Lorenzo Nicasro	Senior Vice President	Atkins Nutritionals, Inc.
Chris Wacek-Driver	Forage Products Manager	VitaPlus
John Glisson	Director for Research	US Poultry and Egg Association
Stan Vonasek	President	Delaware Equine Council
Mark Tolbert	Program Manager	Campbell Soup Company
Bob Whitaker	Chief Scientific Officer	Produce Marketing Association
Kenny Bounds	Senior Vice President /Regional Manager	Mid Atlantic Farm Credit
John McCarty	Senior Veterinarian	Merial, Inc.
Andrea Jackson	Food Safety Programs	Delaware Dept. of Agriculture

**Wednesday, October 2, 2013**

7:15 – 8:15 a.m. Breakfast (Hotel)

8:30 – 9:30 a.m. Meet with department professionals and staff (Allen Laboratory)

9:30 – 11:00 a.m. Committee members on their own to prepare preliminary report (Allen Laboratory)

11:00 to 12:00 noon Exit interview with department (Allen Laboratory)

12:00-1:30 p.m. Lunch with Provost, Deputy Provost, and Dean and Acting Deputy Dean

1:30-2:30 p.m. Committee members on their own to discuss written report to be submitted one month after site visit

2:30 p.m. Leave for airport/home

## **INTRODUCTION**

The Dean of the College of Agriculture and Natural Resources commissioned a review of the academic programs in the Department of Animal and Food Sciences (ANFS) at the University of Delaware. A comprehensive self-study document was provided to review team members in advance of the site visit. This document served to inform the review team of past accomplishments and strategic directions for the future for the department. Additional resources were provided as links to 2011 ANFS Strategic Plan and ANFS Master Plan. The review team considered the most important goal of our work to provide an outsider view of the department and help identify areas of strength and areas for improvement that would help to inform the decision making process for the future direction of the department.

The review team consisted of five individuals with current or past faculty experience in departments and colleges similar to the University of Delaware Department of Food and Animal Sciences and College of Agriculture and Natural Resources (CANR) in land-grant institutions. Two of the team members were USDA employees, one in ARS and a second in NIFA. One review team member was from within the University of Delaware. Disciplines and areas of expertise corresponding to programs in the Department of Animal Sciences as well as administrative experience were represented among review team members. While on campus, the review team met with the Dean of the College of Agriculture and Natural Resources; the Department Head; faculty representing all programmatic areas of the department; administrative professional, clerical, and service staff; undergraduate and graduate students; and stakeholders.

The review team members genuinely appreciated the efforts of the department faculty and staff in development of the self-study. The central themes of the self-study were helpful in providing perspective on the current state of the department and some indications of future goals of the department. The current review is timely given an emerging strategic plan for the CANR and the near future need to identify a new department head for ANFS. The department is positioned for change. The review team sought to identify strengths, weaknesses and to provide recommendations that would provide opportunities for national and international recognition given opportunities for new leadership. The team also specifically evaluated the dynamics of the current linkage of the disciplines of Animal Sciences with Food Science with regard to academic, research, and outreach programs.

## **EXECUTIVE SUMMARY**

The review team concluded that ANFS was well-organized and administered. The Department Head was viewed as effective and well-regarded by ANFS faculty and staff. A concern related to resources returned to ANFS for the efforts invested/expended was readily apparent due to the impact of the responsibility based budgeting (RBB) and uncertainties surrounding this newly implemented budget structure.

Past departmental decision making has been viewed as fair and transparent with overall satisfaction regarding departmental administration. There appeared to be an understanding within the department, at this point in time, that a unique opportunity exists and that the choice of its future leader will be key to its future success. The department has a history of promoting

prominent researchers from within the department to administrative posts. While this leadership approach has served the department well, it likely has impacted the research productivity and hence current visibility of the department. Providing new leadership that would not compromise current research (or teaching) strengths of the department will benefit ANFS.

Several indicators of a healthy and positive culture existed in the department. Faculty, staff and students were proud of being part of ANFS and have a strong sense of ownership and commitment to the unit. The review team was impressed that 75% to 80% of the faculty were present at most of the general sessions during the on-campus visit. Faculty have shown great willingness to invest efforts to move the interests of the department forward as evidenced by extensive engagement in the development of the self-study documents, the ANFS strategic plan, and operational management in the department. Undergraduate and graduate students and the staff were equally engaged in the information /discussion sessions.–Clearly all groups within ANFS demonstrate an interest in the success of the department and appear willing to put forth the effort necessary to move the department forward. These traits will be crucial to strengthen the department’s future and must continue to be cultivated.

While the culture of the department was generally healthy, some apprehension concerning the future existed among the faculty. Shifts in certain paradigms required some redirection of faculty focus and effort:

- Uncertainty regarding the resources returned to the department for effort and the lag in updating resource allocations back to the department in the current RBB model
- Limited physical capacity and personnel to meet expanding needs for hands-on learning
- Cost of hands-on learning in laboratories and at ‘the farm’ relative to available funds to cover these costs
- Disproportionate number of entering students with career goal expectations of veterinary medicine and ultimate career paths in animal and food sciences
- Continual shifts in the availability of extramural funding and evolving expectations for increased participation in the federal competitive arena
- Shifting emphasis for funding and programmatic priorities towards interdisciplinary work yet concerns that RBB model does not foster interdisciplinary efforts.
- A need to identify unique strengths and opportunities for prominence as a research entity within the land grant system and as part of the USDA-NIFA research portfolio
- Defining an academic program within the agricultural and food systems space that best matches the immediate needs of students and emerging societal needs
- Accommodating an increasing student enrollment with a lack of growth in departmental infrastructure for teaching and learning

ANFS Faculty have been internally focused and preoccupied on issues related to: 1) the uncertainty of teaching resources, 2) implementation of RBB and 3) diversifying the curriculum to attract a broader audience of students. Other challenges include the increasing costs of instruction for core courses in ANFS and inability to increase enrollments due to space needs. The cost per credit hour for ANFS courses is more than twice that of the national average and is not likely not sustainable in the RBB model. New innovative courses have been developed to meet some of the challenges faced by ANFS . The exceptional value and level of satisfaction that students placed on the quality of instruction for courses in ANFS was readily apparent. The

review team recommends identifying mechanisms to reduce the costs of instruction for ANFS intensive courses while expanding the audience for general interest courses.

Undergraduate students unanimously indicated that the presence and proximity of the ANFS Newark farm was a major factor influencing their decision to enroll at the University of Delaware. ANFS and UD administration appeared to explore the appropriate mix of space utilization that retained enough livestock for teaching and research at a cost that the department and college can manage. The review team recommends the following 1) retention of the facilities, 2) continuation of experiential learning with livestock production practices, 3) Explore potential growth area for use of the facility including research that addresses issues around the urban and rural interface of food animal production. The latter may involve several programs in CANR and across campus. 4) consider renaming the facility to indicate the varied facets which could cause others to see it as a resource.

There appeared to be a lack of connection between the overall research and education goals of ANFS and CANR. For example, the CANR plan of work has broad goals in areas including Global Food Security and Hunger, Biotechnology and Biotechnology-Based Agribusiness, Food Safety, Climate Changes and others yet there was a lack of corresponding links to department research themes. Faculty research programs do not seem to identify with these broader goals. Similarly, there is a lack of deliberate connection to the undergraduate curriculum. Consequently, instructional and research strength areas are not uniquely evident for the department. Research efforts appeared to be siloed in individual PI programs. The cross cultural and synergistic potential of the unique combination of faculty and students that represent the continuum of food system is not being fully availed. The review team recommends that the department identify research ‘challenge’ areas or ‘themes’ that will enhance faculty connections with the common purpose of solving identifiable problems in food and agriculture .

The department has some demographic characteristics that favor continued evolution in culture and expectations. Of the 21 tenure-track faculty in the department at the time of this review, 6 are assistant professors, 7 are associate professors and 8 are full professors. Two assistant professors will be leaving the department. Given the growth in enrollment, it is important for the College of Agriculture and Natural Resources to support faculty hiring in ANFS as vacancies occur. The review team recommends ANFS prepare a plan for faculty hiring based on critical teaching needs that intersect ANFS research portfolio and an evolving undergraduate curriculum. A further recommendation is to enhance ANFS research portfolio with faculty hires that will bridge the disciplines of avian biology and food sciences and help to unify the research program in the food systems area.

A deficit of the review process was a lack of discussions with collaborating departments within the college or university. While this may have been an oversight, it could be a symptom of an inwardly focused department. Though faculty revealed partnerships in the areas of genomics and potentially bioinformatics, other associations were not evident. The review team recommends: 1) ANFS faculty exploring opportunities to become engaged and assume greater leadership in University-wide initiatives focused on the biological sciences. 2) The CANR administration should offer opportunities to engage faculty across campus in a way that complements the mission of ANFS but broadens opportunities for research support. Animal scientists, food scientists, and disciplinary specialists in the department have much to offer and

the stature and credibility of ANFS will be enhanced as the visibility of the faculty increases within UD.

Extension activities were not highlighted separately in the review however several faculty members indicated during breakout sessions that they contribute to Extension and provide important services to stakeholder groups. Activities ranged from responding to individual stakeholder needs to research on production practices with immediate application to the industry (i.e. evaluation of house lighting, litter, composting of litter and farm mortality, litter substrates such as switch grass, cow lameness detection models and silage preservation technologies). Likewise services that bridge research, teaching, and extension were evident in the department. The latter includes the diagnostic laboratories, the histopathology service, vaccine certification services. While these activities are on the leading edge for identifying problems for the industry they can also spin off data and new pathogen isolates for research. Overall, the integration of extension with research programs appears to be a strength area of the department

In order for the department to grow capacity for basic research in support of an already strong applied research enterprise, attention must be given to the aging and inadequate laboratory space in the Worrilow Hall and the Newton Building. Aspirations for expanding the department's reach in basic sciences and increasing the prominence of the graduate student enrollment will be limited by the availability of high quality space. The review team recommends UD support the plans for renovation of Worrilow Hall, and develop an adequate food sciences sensory lab and pilot plant space; otherwise strengthening the stature of ANFS among peer institutions will be hampered.

### **Recommendations**

- The overall focus of ANFS should transition from the internal issues that have occupied much of its attention for the past several years to implementation of its plans towards greater engagement and leadership in college- and University-wide initiatives.
- ANFS must assess the balance of its research funding profile and continue to diversify external funding sources. Some opportunities may exist in growth of genomics and bioinformatics funding opportunities.
- Define the department. The mission of the program is not clear, and consequently detracts from program in both Animal Sciences and Food Science. The department appears to function as two disciplines that share the same administrative resources. Joining of the discipline areas is a strength that should be exploited but will take effort and compromise to define. A departmental name that does not include 'and' may be a move in the right direction.
- Consider increasing emphasis on expertise of future faculty areas that bridge traditional animal science disciplines and food sciences research areas.
- To be competitive in justifying new faculty positions and filling positions vacated by retirement, ANFS should have a strategic plan for faculty composition that will fulfill essential teaching needs and present creative and nimble research foci.
- Focus on ways that ANFS can enhance the diversity of its faculty.
- Develop a plan for ANFS and CAFR research and teaching space that allows for flexibility and anticipates growth



## RESEARCH PROGRAMS

One charge to the review team was to consider was *“How well are research programs supported and what strength of training do they lend to graduate programs”* The available databases that make comparisons among Animal Science Departments or Food Science Departments in different institutions much less in departments where the disciplines were in demand were limited. The review team will offer some comments on faculty and graduate student numbers, publications, and grant funding.

Data from the U.S. Education Department indicates that The University of Delaware has selected 12 peer institutions for program planning and comparisons (<http://chronicle.com/article/Who-Does-Your-College-Think/134222/>) . These institutions were: Boston College, Brown University, College of William and Mary, Carnegie Mellon University, Georgia Institute of Technology, Lehigh University, Penn State University, University Park, University of Maryland, College Park, University of North Carolina, Chapel Hill, University of Notre Dame, University of Pittsburgh main campus and University of Virginia. Only Penn State and University of Maryland have Animal and Food Science programs. During the review team visit Cornell University and Virginia Tech were also included as peers due to geographic proximity and potential competition for students.

Data provided to the review team on publications and grant funding originated from compilation by Academic Analytics ([www.academicanalytics.com](http://www.academicanalytics.com)), a tool now being employed by some institutions to evaluate research outcomes in a context of peer comparison. Publication and grant data represented a compilation of 2007-2013. The team was not able to access the database for comparisons but data provided indicated that the Department scored above average for citations, grants and publications and at average for conference proceedings but below average for awards. The NRC doctoral program data (<http://www.nap.edu/rdp/index.html?#download> ) indicated that for Animal Sciences, UD did not match the publication output of peers with Animal Science programs. Although this represented 2000-2006 data, a lack of significant upward trend in numbers of publications from the department since 2006 suggested a similar situation currently exists. The NRC data indicated that UD Animal Science ranked highly for average citations per publication. This may be a sign that faculty might benefit from increased publications or assistance with the writing process.

Discussion around the area of grants development, budgets and grants submission indicated a heavy burden on the administrative assistant to the department head. Support for the grants budgeting process or a process to facilitate collaboration on grant application within ANFS or with other departments in CANR was not apparent. The review team recommends research administrative support to enable increased research collaborations and external grant submissions.

The faculty has organized themselves into Food Science, Large Animal Biosciences, Poultry Health and Management, Animal Genomics, and Physiology for the review. It was not apparent whether these were cohesive working groups or categories that were used only for the review. The review teams recommended development of problem-based research groups rather than the existing discipline areas. There is an advantage to be gained by the complementation of

faculty expertise even within ANFS. Some members within research groups appear to function insularly, while successful in these niche areas, there would appear to be opportunities to synergize with others to explore untraditional research opportunities. Junior faculty members should be encouraged to explore alternative ways to use their expertise in new (collaborative) ventures. The CANR and ANFS should consider mechanisms that facilitate research team building. The department should explore opportunities to apply on-going research of Food Science faculty to animal (poultry) products (i.e. application of expertise in high-pressure processing). Sabbatical leaves should be encouraged if needed for faculty to retool or develop new skillsets that would enhance development of high functioning research teams.

### **Observations, Concerns, and Recommendations**

- Research organized into disciplines rather than problem areas
- Lack of consistent of quality of research space across the department (ABC vs. other research facilities, lab space quality).
- Lack of identity of core research strength(s) and organization of research effort.
- Lack of evidence of core research support within the department (i.e. capability for RNA-seq is not well developed at core UD facilities)
- Lack of organized effort and support to build research teams
- Lack if cross and within disciplinary research synergy (i.e. Food and Animal)
- Future additions to the Food Science faculty should consider a research direction more closely aligned with poultry products processing or one that bridges the production and food areas

### **UNDERGRADUATE PROGRAM**

The department has the largest enrollment of undergraduate students in the College of Agriculture and Natural Resources (approximately 384 students in fall 2013) and enrollment has been increasing steadily for the past 5 years. The undergraduate program exemplifies one of the department's greatest strengths. Faculty and AP staff who are engaged in undergraduate teaching clearly have great dedication to this mission and discuss it with insight and thoughtfulness. Animal Sciences students at UD are beneficiaries of a strong culture of commitment to undergraduate education by the faculty. The impact of the commitment to teaching is evident in conversation with undergraduate students and data from exit surveys.

As indicated above there are several concerns about the impact of RBB on the ability of ANFS to continue to provide meaningful 'hands on' experiential learning in laboratory spaces and at the Newark Farm. There is increasing pressure to justify the expense of Newark Farm. Students and faculty stressed the values of this facility as a hub for research and extension as well an outdoor laboratory. Many students come to ANFS at UD because of this space and there appears to integrate greater use of the facility in discovery learning and other activities that may cut across many disciplines at the university. There are very few institutions of higher learning in urban areas that have such a space available so close to campus. This provides a unique opportunity for CANR and ANFS to set their programs apart.

The department recognizes that the equine sector is growing segment of agriculture in DE and has invested in on-campus facility to enable instruction and extension in equine sciences. This complements the overwhelming interest of undergraduates towards veterinary careers of which equine represents a keen interest. With this said the departure of the sole equine sciences faculty member provides an opportunity to redirect the program particularly the equine sciences minor. The minor program, although generously funded, does appear to be tangential to the main focus areas of the department of animal sciences and food science. An equine science minor would also appear to splinter a segment of animal sciences to a separate program and further contribute to the lack of unified identify for the department.

### **Observations, Concerns, and Recommendations**

- Faculty exercise liberty to change lecture times to unconventional times and causing conflicts with regularly scheduled classes.
- The coherence of the undergraduate curriculum with, for example seniors taking sophomore level physics, and taking it as a co-req not a pre-req. There was the impression that there may be a problem in taking comparative physiology their senior year.
- Students that have taken part in the undergraduate research program indicated the powerful impact the experience had on their learning and suggested the department provide more opportunities for students to engage in research early in their academic program.
- Adequacy of food science pilot plant and kitchen. The team recommends upgrading the Food Science lab and teaching facilities
- The number of food science classes within the curriculum meets the standards set by IFT but offering more courses would be difficult given the number of faculty in the program.
- Future ability to support teaching at the Newark farm may be limited due to cost however this is a genuine strength of the program. The committee recommends exploring opportunities to maintain and broaden access to the facility.
- Potential for greater emphasis on internships and coop programs in the Food Science to ensure that students gain “hands-on” skills are not being fully exploited. These should complement the capabilities normally associated with laboratory and pilot facilities in larger programs but would add value and differentiate the UD program from other Food Science programs.
- The historical departmental strength in poultry health and production does not appear to be integrated into the food science curriculum. The review team recommends future hires that span both areas as a way to bring these areas closer.
- Food Science does not appear to be fully engaged with food industries in the region. Undergraduate programs should look to expand opportunities to respond to the unique expectations of the food industries in the region
- Exposure to research opportunities is important for undergraduate success. Increase opportunities for students to engage in discovery learning early in their academic program. Seek ways to use ‘the farm’ to engage more students in discovery learning at an earlier phase in their program.

- The department seems isolated from other activities on campus. Continue to explore ways in which the department could expose the larger university student body to ANFS through the development of unique and exciting courses that meet university breadth requirements, the creation of minors focused specifically on those students that may have a strong science background and an interest in animal and/or food science. Consider ways in which the strength of the departmental capstone experience can be leveraged through interdepartmental collaborations across campus. Continue to provide resources and support such as the “AGcelerate” program with an emphasis on diversifying the student body.
- Full potential of ‘the farms’ are not being met. Explore increased utilization of the farm as a teaching/learning opportunity for not only CANR students but the broader campus, considering collaborations across campus with related areas. Examples could include but not be limited to environmental sustainability, nutrition, human services, etc.

## **GRADUATE PROGRAM**

The Animal Sciences graduate program is strong and vibrant. The faculty members are well qualified to train both PhD and MS students for positions in industry or academia. Full professors are well established in their respective research areas and provide a firm foundation for graduate education. Additionally, the faculty contains 6 assistant professors and 7 associate professors. These new faculty are well qualified to provide state of the art research training to graduate students and to obtain competitive grant funding to support graduate students and research. The department has equal number of MS students in Food Science and in Animal Science (15 and 17 respectively) but disproportionately fewer faculty member that identify with Food Science in listing their area of expertise (self-study document section 5.5). There are 8 PhD students in Animal and Food Science and in interviews with students some of these appear to be part of interdisciplinary programs.

Graduate students appear to be content with the curriculum and research opportunities. Students valued the open door policy of faculty and the willingness to share expertise. Likewise the flexibility in graduate programs is a desirable feature for students. Students communicated that the requirements for the degree, as stated on the web site and other sources, are confusing and needs work. There does not seem to be a mechanism to provide students with information on progress towards degree and a lack of clear sense for expectations for MS and PhD programs and how these are met in the program.

### **Observations, Concerns, and Recommendations**

- Overall impression of the graduate program was quite positive
- Learning outcomes (i.e. problem solving, creative and critical thinking, project management, core discipline knowledge) for graduate programs are not outlined consequently students appear uncertain about the reasons for engaging in specific courses or activities.
- Responsible conduct in research education is not being observed as a requirement for graduate education. This is a requirement by many funding agencies that cannot be overlooked and an ability to conduct research in a responsible and ethical manner should be a learning outcome for all graduate programs.

- The department utilizes several TAs and a group of students are funded as departmental teaching assistantships. Several graduate students expressed that they did not have an opportunity to experience teaching and that felt they would be discouraged from spending time pursuing experience in teaching. The department is encouraged to explore this further and provide opportunities, release time from research if necessary, credit and rewards for engaging in professional development around teaching and learning.
- In exit surveys and in personal interviews with the review committee, graduate students indicated a high level of satisfaction with courses and advising. Although communication between graduate students and their individual advisors appears to be effective, the interaction and communication between graduate students across subject appears to be minimal.
- Graduate enrollment could increase while seeking alternative ways in which to offer graduate programs. This could include non-thesis, 4 plus1 programs, on-line or hybrid courses, developing certificate programs etc.
- More teaching opportunities for graduate students
- Clarity in the requirements and a web site that provides consistent information
- Opportunities for graduate students to take courses in areas where they make lack the requisite background.
- Consider ways to increase the diversity of graduate student population

## **STAKEHOLDERS**

The review team met with several stakeholders for key programs in Animal Sciences teaching, research, and extension. These key programs encompass multi-species program areas given the diverse nature of animal agriculture in the state including regulatory agencies, producer groups, food processing and marketing organizations, livestock industries, and agricultural service. There was enthusiastic support for the future of the ANFS department. Participants recognized that there were challenges in bringing together the disciplines of food and animal sciences but expressed the unique aspect of the combination. When asked directly there was strong support by the stakeholders that the combined disciplines represents an opportunity for ‘strength in synergy’ rather than a dilution of impact through ‘competing priorities’.

### **Recommendations:**

- Encourage formation of a Department External Advisory Board to identify areas where effort should be concentrated and to identify needs to achieve excellence.
- Connect more frequently with stakeholders
- Explore stakeholder commitment to enhance research and education in the department.
- Engage stakeholder in identifying resources needed to enhance facilities, programs and research capacity for the department
- Explore the specific needs of the stakeholders with respect to potential employees, internship opportunities, research, education and services which ANFS could provide.
- Explore ways to balance the differences in the stakeholder expectations for teaching, research and service for the Animal Science and Food Science areas with a need to create an identity in the department.

## OVERALL PROGRAM RECOMMENDATIONS

- Consider the name of the department and whether it is appropriate as the department moves forward implementing its strategic plan. Possibly consider a generic name that encompasses a wider range of biology related to agriculture and food.
- Build on the opportunity provided by the farm, which may include the consideration of its current strengths and challenges and how this outstanding urban based resource could be leveraged to better serve the college, university, local community and nation.
- Take full advantage of the expected change in departmental leadership to better define the departmental priorities regarding academic programs, research and faculty hires.
- Explore ways to enhance the food science program by upgrading the facilities, and considering curriculum, revisions which better reflect the departmental strengths, without compromising national certification.
- Engage initiatives that build teams within research programs in the department using the traditional disciplines of food and animal science to uniquely position the department for solving problems and greater and more varied extramural research support.
- Build on the goodwill of the stakeholders and local community to specifically enhance opportunities for discovery learning for students and research support for faculty.
- Explore curriculum innovations that provide opportunities for both ANFS students and the broader university through the development of exciting and innovative undergraduate courses, minors and certificate programs that build on the unique aspects provided by the farm and faculty expertise.
- Vigorously pursue a new department head from external candidates. Consider and recruit individuals with a very broad range of ideas and experience both nationally and internationally. The department will likely benefit from a leader with strong management skills. An individual with experience with RBB budgeting models would be an asset. The department/college has the potential to be exceptional, but it needs strong and different leadership to excel in the current academic environment. While there are several talented faculty leaders in the department the previous practice of promoting from within is discouraged.

January 8, 2014

To Whom it May Concern:

I am writing to request permanent status be given to the undergraduate major, *Animal and Food Sciences*, offered by the Department of Animal and Food Sciences.

This major has been highly successful in preparing students for careers in the fields of food animal production and food safety. The curriculum requires students completed work in anatomy, physiology, genetics and genomics, nutrition, animal health and disease as well as food safety to provide training in “farm to fork” concepts. Graduates are employed in government and the private sector relating to the production and/or regulation food and food animals, pharmaceuticals, and veterinary biologicals (vaccines). Graduates have also taken positions in public and private zoos and aquariums using their training in nutrition, physiology, animal management and well-being, and behavior.

In addition to serving students entering as freshman, the major also serves students who internally transfer from the Pre-veterinary Medicine and Animal Bioscience major after discovering that they do not wish to pursue an advanced degree in veterinary medicine or attend graduate school. While enrollments are viable for the success of the program, we plan on increasing enrollment in the major thru active recruitment efforts and perhaps renaming the major to more clearly identify it to prospective majors.

The major, a key program in our Department’s and College’s Master Plan, will be an integral offering in our “One Health” initiative.

Thank you for your consideration.



Jack Gelb, Jr.  
Professor and Department Chair



College of Agriculture  
& Natural Resources

OFFICE OF THE DEAN

113 Townsend Hall  
531 South College Avenue  
Newark, DE 19716-2103  
Phone: 302-831-2501  
Fax: 302-831-6758

January 10, 2014

To whom it may concern:

I support the permanent approval of the following majors in the College:

Pre-veterinary Medicine  
Food Science  
Animal and Food Sciences

Enrollment has either reached desired levels or is increasing on the anticipated trajectory in all cases. The Animal and Food Sciences major will undergo minor curricular revision during the 2014 calendar year as will several majors in the college as we implement our new strategic plan.

Thanks for your consideration.

Sincerely,

A handwritten signature in black ink, appearing to read 'Mark Rieger'.

Mark Rieger  
Dean and Professor  
College of Agriculture and Natural Resources, University of Delaware

cc: Dr. David Frey  
Dr. Kalmia Kniel  
Dr. Jack Gelb