University of Kentucky
Department of Entomology
Academic Year 2016-2017 Periodic Program Review

Department of Entomology

Periodic Program Review
2010-2016

Submitted by:
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Self-study Report Committee:
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Submitted to Dr. Nancy Cox, Dean
College of Agriculture, Food and Environment

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College of Agriculture, Food and Environment
Educational Unit (including Degree Programs) Self-Study Report Checklist*
This narrative must describe, analyze and synthesize information about the Unit and its departments (as appropriate). The report should include the components detailed below. Some documents may be tabled features within the text. Others may be featured as appendices. An electronic version of the report and supporting documentation is required for archival purposes.
Please note that the structure of the narrative need not follow the structure of the checklist.

Part 1: Academic Department (Educational Unit)

	Academic Department (Educational) Unit Overview	**Included ✓**	**Narrative Page(s)**	**Page Number(s) of appropriate Evidence/ Supporting Documents**
1	Explain how your department's goals are consistent with and demonstrate a strong contribution to UK's mission and strategic plan. There should be a clear connection between the department and the institutional, college, and state goals (where applicable). Focus on each of the following: • Consistency with UK mission and priorities • How the program contributes to CPE--Stronger by Degrees • How the program aligns with the CPE statewide strategic implementation plan (Stronger by Degrees)	**CPE Requirement**	14-16	
2	Consortial Relations: The SACS accreditation process mandates that we "ensure the quality of educational programs/courses offered through consortial relationships or contractual agreements and that the institution evaluates the consortial relationship and/or agreement against the purpose of the institution." Please list any consortium or contractual relationships your department has with other institutions in Kentucky, as well as the mechanism for evaluating the effectiveness of these relationships.	**SACS-COC Requirement**	N/A	
3	Articulate primary departmental/unit strategic initiatives for the past 3 years and the department's progress towards achieving the university and college/school initiatives (be sure to reference Unit Strategic Plan, Annual Progress Report, and most recent Implementation Plan)		14-16	Appendix 3

4	Department benchmarking activities: Provide a summary of benchmarking activities, including institutions benchmarked against and comparison results tracked against: • Promotion and tenure expectations • Annual evaluation expectations • Faculty mentoring expectations • Budget • Number of faculty		55-56	
	Department Faculty and Research Support			
5	Describe primary faculty contributions to the 3-4 strongest research and creative areas in the department.		17-21	Appendix 7
6	Describe primary faculty contribution to teaching and service at the department level that has enhanced college and university strategic initiatives.		13-16, 17, 21-23	
7	Describe the attrition (cumulative number not tenured, resigned, retired, or other) of the program faculty over the past 5 years. Discuss the expected effect on program(s) under review and other issues related to ability to retain qualified faculty (5-year review). Including a table is recommended.		13, 55-56	Appendix 6
8	List current number of unfilled lines and discuss current actions or plans to fill lines. Include general descriptions of start-up packages.		13	
9	Department level GTA and GRA information: List the salary range (hourly rate or semester half-time contract) for GTAs and GRAs and estimate the number on fellowships for the current or most recent fall semester.		12, 29-30	
10	Describe the reasons students reject fellowships or assistantships offered from the university, college, or department**.**		32	
11	Unit Faculty Research (if applicable) • Overview of current research program and plans for each of the last 5 years • Number of research FTE faculty for each of the last 5 years • Summary of research programs by topic for each of the last 5 years • Fellowships for each of the last 5 years • Honors and recognitions for each of the last 5 years • Publications (such as books, book chapters, refereed journal articles, non-refereed articles, reviews) for each of the last 5 years		Throughout	Appendix 5

12	Number of postdoctoral fellows and scholars, graduate research and teaching assistantships for each of the last 5 years	**CPE Requirement**	32	
13	List of grants and contracts for the period of review, including funding amounts from the OSPA Web site for each of the last 5 years	**CPE Requirement**		Appendix 2
	Documentation of Policies and Procedures Implementation: Identify the educational policies and procedures established through faculty governance and responsible parties for implementation (e.g., admission criteria and procedure, academic performance standards, equivalency credits, course transfers, course substitutions)	**Included ✓**	**Narrative Page(s)**	**Page Number(s) of appropriate Evidence/ Supporting Documents**
14	Evidence of adherence to educational policies and procedures established through the faculty governance process, including consistency in applying policies related to grading, probation, admissions, termination	**SACS-COC Requirement**	15-16	
15	Evidence of consistent review and monitoring of course substitution, course equivalency credits, course transfers toward degree completion, and vetting of exceptions, degree requirements, and drop, fail and withdraw (DEW) rates	**SACS-COC Requirement**	22-24	
16	Evidence of adherence to unit procedures on faculty personnel actions (e.g., appointment, promotion and tenure) and budget request preparation		11	
17	Evidence of course scheduling and teaching assignment		27	
18	Evaluation of course grade distribution by level and discussion of strategies to monitor grade deflation/inflation		NA	
19	Dissemination and transparency of all the above		13-14	
Part 2: Degree Program(s) COMPLETE FOR EACH DEGREE PROGRAM (as applicable) i.e., one for Bachelor's, Master's, and Doctoral				
Academic (Degree) Program Description		**Included ✓**	**Narrative Page(s)**	**Page Number(s) of Appropriate Evidence/ Supporting Documents**
	Program Demand/Unnecessary Duplication			
20	Number of students enrolled, number of graduates, and credit hour production for each of the last 5 years, including summer, fall, and spring. Credit	**CPE Requirement**	23-25	

	hour production refers to the number of credit hours produced by program faculty. Include Institution's definition of Instructional FTE: Student credit hour per instructional FTE is defined as credit hours taught by program faculty in a unit, department, or discipline, divided by the number of instructional FTE (as defined by the institution) of those program faculty.			
21	Number of degrees conferred for each of the last 5 years. Number of enrollees and degrees conferred includes totals from summer, fall, and spring semesters.	**CPE Requirement**	33	
22	Explanation of how curriculum is different from existing programs at Kentucky institutions or that access to these programs is limited	**CPE Requirement**	NA	
23	Explanation of pursuit of collaborative opportunities with similar programs at other Kentucky institutions and how collaboration will increase effectiveness and efficiency	**CPE Requirement**	NA	
24	Program history and background/organizational structure: Critical events/background information which will help in understanding the program currently.		11-13	
25	Program uniqueness: Unique components, distinctive innovations; is the program a response to changes in the discipline or other academic necessities? How is this program different from similar programs at other Kentucky institutions? Is access to other institutions limited?	**CPE Requirement**	NA	
26	Describe how the program is administered (e.g., is there a program coordinator and/or program committee? What is their role or function? How do they operate? How are appeals handled? Etc.)		11-13	
27	Describe the recruitment and development plan for the program (include attention to faculty, staff, and students)		22	
28	Program delivery: Review of distance learning course offerings, services and outcomes to ensure compliance with best practices, SACS policies, federal rules, and University Senate and college curriculum committees. Describe flexibility of program delivery: classes available at convenient times, in convenient formats for non-traditional students, etc.	**SACS-COC and CPE Requirements**	NA	
29	Program Contributions to undergraduate general education or UK General Education Core		22-23	

	Program Quality and Student Success: The curriculum should be structured to meet the stated objectives and student learning outcomes of the program.	**Included ✓**	**Narrative Page(s)**	**Page Number(s) of appropriate Evidence/ Supporting Documents**
30	Student Learning Outcomes Assessment • Briefly describe comprehensive assessment results from the past 5 years and explain how these results have been used to make improvements to the program. Provide at least two examples. • Assessment results reports and findings for improvement (include evidence) for each of the last 5 years • State all learning outcomes of the program • Explain how outcomes were evaluated (i.e., assessment plan), citing benchmarks and targets • Briefly summarize the results of each SLO	**CPE Requirement**	26-29	Appendix 4
31	Explain the program's measures of teaching effectiveness and what efforts to improve teaching effectiveness have been pursued based on these measures	**CPE Requirement**	24-25, 56-57	
32	External awards or other recognition of the students, faculty, and/or program for each of the last 5 years	**CPE Requirement**	31, 52-55	
33	Average time and credits to degree for each of the last 5 years	**CPE Requirement**	23	
34	Post-Graduation Student Success: • Employer satisfaction with graduates as measured by surveys and/or alumni satisfaction for each of the last 5 years • Job placement (undergraduate and graduate) for each of the last 5 years • Graduate school admission for each of the last 5 years	**CPE Requirement**	29	
35	Pass rates on licensure/certification (if applicable) for each of the last 5 years	**CPE Requirement**	NA	
36	Identify the number of students in each program that have participated in an internship and/or co-op for each of the last 5 years		NA	
37	Student involvement in research and initiatives for each of the last 5 years, including graduate student and undergraduate student publications and presentations	**CPE Requirement**	34	

38	Describe processes used to ensure currency of curriculum (industry advisory boards, pass rates on licensure, standardized tests, etc.)		22-28	
39	Describe quality of orientation, advising, other student services/developmental programs, effectiveness of advising, innovations in advising and efforts to improve		55	
40	Discuss program qualifications/standards for incoming students, program admission		22, 25-26, 29	
	Program Resources	**Included ✓**	**Narrative Page(s)**	**Page Number(s) of appropriate Evidence/ Supporting Documents**
41	Cost and Funding of Program: The resource requirements and planned resources of funding of the program must be detailed in order to assess the adequacy of the resources to support a quality program. Include budget summary information (including extramural funding) and adequacy	**CPE Requirement**	33	
42	Operational costs: • Facilities summary information and adequacy • Equipment (including IT capacity) summary information and adequacy		32, 33	
43	Personnel summary information and adequacy (including faculty and staff numbers, salaries, demographics)		11, 47-48	
44	Describe financial support from other university units (college, research, administration, Office of Engagement, human resources from Development and Alumni Affairs)		33	
	Input from Affected Constituents (e.g., surveys, focus groups, interviews, etc.) Information to be gathered from accreditation visit/external reviewers and progress updates since last program review (append external review comments for accredited reviews).	**Included ✓**	**Narrative Page(s)**	**Page Number(s) of appropriate Evidence/ Supporting Documents**
45	Evaluation data from faculty for each of the last 5 years			Appendix 1
46	Evaluation data from staff for each of the last 5 years			Appendix 1
47	Evaluation data from students for each of the last 5 years		22-23	
	Evidence of Program Quality and Productivity	**Included**	**Narrative**	**Page**

		✓	Page(s)	Number(s) of appropriate Evidence/ Supporting Documents
48	Operations: Quality of faculty and staff communications and interactions, such as awards/recognitions, opportunities for input, unit meeting schedule, unit retreat schedule, opportunities for faculty and staff to interact		21,22	
49	Instruction: Overview of current instructional program(s) and plans; describe measures of teaching effectiveness and efforts to improve (e.g., faculty development initiatives for instruction, teacher mentor programs) • Class sizes and faculty nucleus for program instruction • Instructional equipment • Faculty credentialing to support core/elective course offerings		31, 32	
50	Program research activities and initiatives		13-16	Appendix 2
51	Overview of research programs and plans for each of the last 5 years; number of research FTE faculty for each of the last 5 years		12, 16-20, 48, 49, 56, 57	
52	Number of postdoctoral fellows and scholars, graduate research and teaching assistantships for each of the last 5 years		32	
53	Summary of research programs by topic for each of the last 5 years		17-21	
54	Fellowships for each of the last 5 years		30	
55	Publications (such as books, book chapters, refereed journal articles, non-refereed articles, reviews) for each of the last 5 years			Appendix 5
	Service, Extension and Non-Extension Programs	**Included ✓**	**Narrative Page(s)**	**Page Number(s) of appropriate Evidence/ Supporting Documents**
56	Summary of quantity and quality of outreach and community service; interrelationship of public service with research and other aspects of the program; nature and quality of service to the university and discipline	**CPE Requirement**	34-41	

57	Summary of Extension and community activities: • Summary of extension programs by topic • Summary of county-level programs • Summary of youth programs • Summary of community-based programs and training • Extension publications and videos • Number of clientele served; programs and training opportunities • Description and evaluation of outreach, service, and engagement activities • Evidence of public service activities such as congressional testimony, service on boards		34-41	
58	Number of FTE extension faculty and extension specialists		34-41	
	Other Areas	**Included ✓**	**Narrative Page(s)**	**Page Number(s) of appropriate Evidence/ Supporting Documents**
61	Quality Enhancement Plan (Multimodal Communications Across the Discipline): Please indicate program contribution to the goals of the QEP. See http://www.uky.edu/SACS/QEP_themes.html		NA (graduate program only)	
60	University Diversity Plan: Please indicate ways in which the program contributes to the university's Diversity Plan. See http://www.uky.edu/DiversityPlan/diversity_plan.html		56	

Please include a copy of your department's most current departmental report as an appendix. See http://administration.ca.uky.edu/content/departmental-statistical-reports for the most recent report.

Part 1: Academic Department

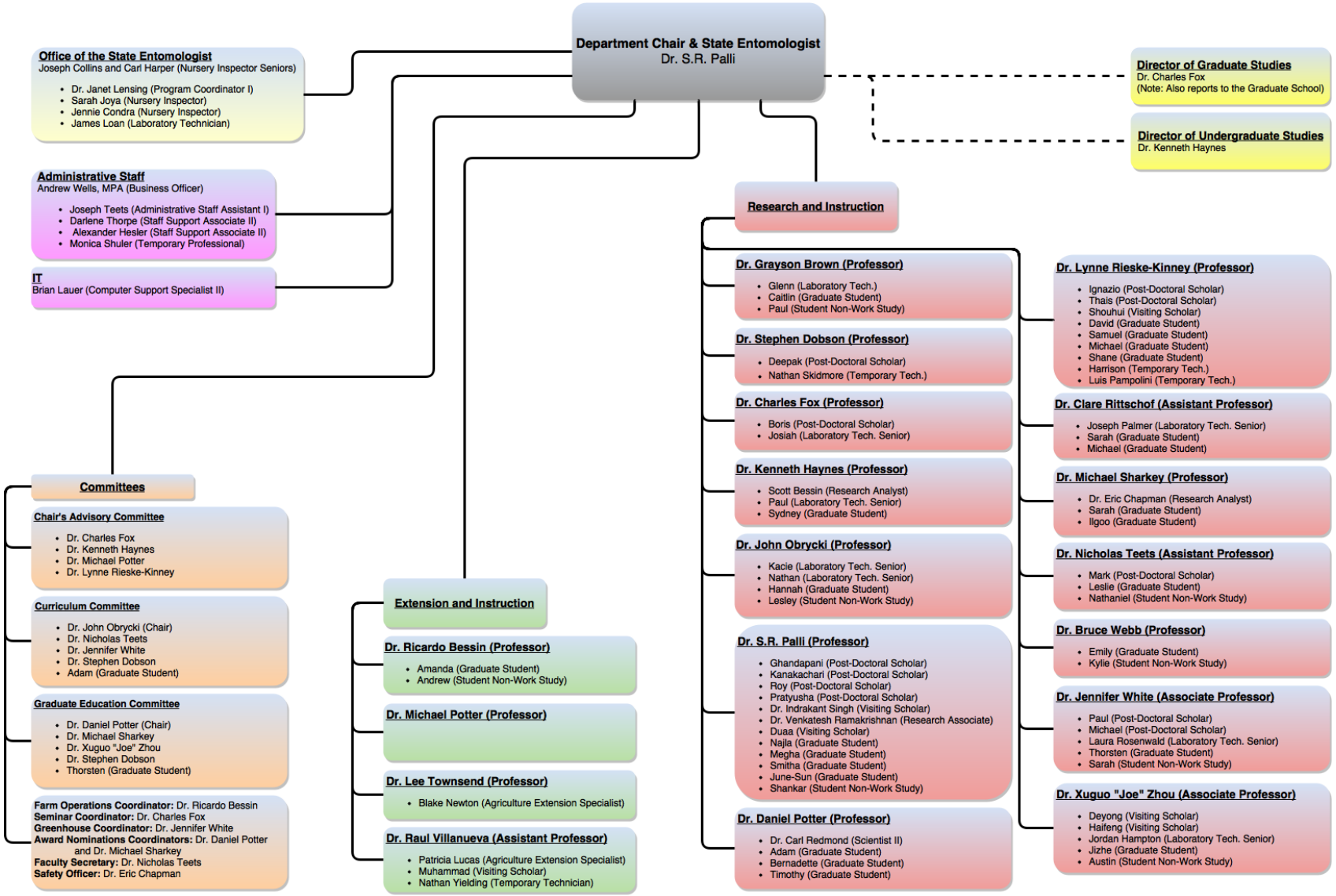
A. Introduction to the Department of Entomology

The University of Kentucky Department of Entomology recently celebrated its 125th continuous year of education, research and service. It is one of the oldest and most productive intact units of its kind in the nation as indicated by its designation as a Top 10 Entomology Program by the *Chronicle of Higher Education* Faculty Scholar Activity Index. Four faculty members have served as president and elected as fellows of the Entomological Society of America, the world's largest organization of entomologists. This level of recognition and productivity stems from a rich legacy of vibrant scholarship, innovative education, and outreach and is coupled with strong and steady leadership.

For additional information see:
http://www2.ca.uky.edu/entomology/dept/images/120years.pdf

Department Organizational Chart

as of 09/01/2016



Current positions of the department:

Job Title	Total
Administrative Services Assistant Senior	1
Administrative Support Associate I	1
Agriculture Extension Specialist	2
Computer Support Specialist II	1
Faculty	18
Graduate Research Assistant	23
Laboratory Technician	2
Laboratory Technician Senior	5
Nursery Inspector	2
Nursery Inspector Senior	2
Post-Doctoral Scholar	10
Program Coordinator I	1
Research Analyst	2
Research Associate	1
Scientist II	1
Staff Support Associate II	2
Student/Non-Work Study	8
Temporary Professional Non-Admin	1
Temporary Technical/Paraprofessional	7
Visiting Scholar	7
Grand Total	**97**

Average Salary by Position

Job Title	Total
Administrative Services Assistant Senior	$ 44,990.00
Administrative Support Associate I	$ 32,175.00
Agriculture Extension Specialist	$ 55,665.50
Computer Support Specialist II	$ 43,895.00
Faculty	$115,211.65
Graduate Research Assistant	$ 18,875.00
Laboratory Technician	$ 30,119.50
Laboratory Technician Senior	$ 26,473.40
Nursery Inspector	$ 35,494.50
Nursey Inspector Senior	$ 53,590.00
Post-Doctoral Scholar	$ 35,574.50
Program Coordinator I	$ 49,438.00
Research Analyst	$ 37,381.50
Research Associate	$ 40,000.00
Scientist II	$ 57,960.00
Staff Support Associate II	$ 28,377.50
Student/Non-Work Study	$ 6,864.00
Temporary Professional Non-Admin	$ 10,049.00
Temporary Technical/Paraprofessional	$ 19,373.00

The members of the Department of Entomology are committed to providing high-quality programs. We continue to look for new opportunities and adjust current programs to enhance our ability to meet the changing needs of society. Our strengths are in graduate education, research, teaching, and extension. The faculty are active in a number of undergraduate degree programs, including Agricultural Biotechnology (ABT), Sustainable Agriculture, and an individualized program in Entomology within the BS program in agriculture. Faculty members teach undergraduate courses that are required for several majors within the College of Agriculture, Food and Environment (e.g., Forestry, Horticulture, and Plant and Soil Sciences) and Arts and Sciences (Biology). Each semester for the past 15 years the department has taught Insect Biology (ENT 110) that fulfills a natural sciences requirement in the current UK Core - General Education Requirements at the University of Kentucky.

Department of Entomology faculty are dedicated instructors who take pride in their graduate and undergraduate teaching responsibilities. Attrition is not a concern in the Department of Entomology. In the past six years, only three full-time regular faculty members have left the department. Two of these departures were due to retirements, one after 42 years of service and the other after 36 years of service. Additionally, the success rate on promotion and tenure has been 100 percent. The department is in the process of replacing one open position and is hopeful to have someone joining by January 2018. For the few faculty members hired in recent years, start-up packages were not a concern. All new hires received generous start-up packages in support of their research programs. For example, a faculty member hired in 2015 received $180,000 for equipment and supplies, $20,000 for a vehicle for field research, funding for a graduate research assistant for five years, and funding for a field technician for five years. This particular faculty member also received laboratory space, a storage unit on the research farm, a mobile lab unit, and a location for field research.

Within the department, we strive for a creative synergy between fundamental and applied entomological research, developing long-term solutions to entomological problems, while providing answers that address immediate short-term problems. We have a strong integration of research and extension efforts that enhances our visibility and effectiveness. We also integrate the graduate education program with our research and extension strengths. Our response to the more recent world-wide outbreak of bed bugs, colony collapse disorder in honey bees, and Zika virus demonstrate how we respond to critical needs within the Commonwealth of Kentucky, the nation, and the world.

In addition, four members of the Department of Entomology hold fellowships in national scientific societies. John Obrycki and Ken Haynes are Fellows of American Association for Advancement of Science. Dan Potter and Reddy Palli are Fellows of the Entomological Society of America.

The Department of Entomology adheres to the Rules of Procedure as established

and approved by the College of Agriculture, Food and Environment on May 27, 2015. The relevant rule may be found at the following link: https://administration.ca.uky.edu/sites/administration.ca.uky.edu/files/2015_cafe_rop_for_web.pdf.

In addition, the department maintains internal Rules of Procedure, which were revised, approved by the faculty, and implemented in 2016: https://dib.uky.edu/universitysenate/sites/www.uky.edu.universitysenate/files/Rules/PriorYears/CAFE%20ENT%20RoP%20approved%20by%20provost%2004%2028%202016.pdf.

See Appendix 3 for more information about the strategic plan reports and implementation plan reports for the department.

B. Mission and Values for the Department of Entomology

Our mission is to improve the quality of human life and protect our environment through a better understanding of insects and related arthropods. We conduct fundamental and applied research on arthropods; deliver information through education and outreach activities; educate graduate and undergraduate students; develop and provide resources to professionals involved in managing insect populations that affect plant, animal and human health; implement integrative and effective systems for pest/vector management; and enhance science education and public appreciation of human-insect interactions.

We strive for continuous improvement in our programs and success of our students. The personal and professional development of our faculty and staff; diversity among our students, faculty and staff; and being a collaborative part of the CAFE and the UK are among our core values.

In 2015, the department participated in a faculty and staff survey conducted by UK's Human Resources for the entire university. This survey dealt with career development, communication, inclusion and diversity, and so on. See Appendix 1 for the results of 17 respondents of the survey for the Department of Entomology. In all categories the department scored higher than the Provosts' areas overall, except on the question "At the present time, are you seriously considering leaving UK?", which differed from the university overall by one point.

Following the release of the survey results, each department in CAFE was asked to choose one survey metric on which to implement an improvement plan. Entomology chose "I have the equipment/resources I need to do my work effectively" and has been reporting on that metric quarterly. Specifically, the department's goals are to:

1. Improve laboratory and office space;
2. Move Entomology Faculty out of Animal Pathology Building where the conditions are no longer suitable for conducting research;

3. Renovate laboratory space in Ag. Science North;
4. Move laboratories that perform molecular biology research to Plant Science building.

As of August 2016, labs N-334 and N-336 in Ag Science Center North were renovated for departmental use. In addition, the department received permission to establish four labs in the Plant Science Building (PSB 113, 437, 431 and 433). The survey initiative will end in the fall of 2017, after which time a final report will be issued UK Human Resources will conduct a follow-up survey.

C. Addressing the goals and values of the University of Kentucky

The Department of Entomology supports the mission and goals outlined in the University of Kentucky 2015-2020 Strategic Plan (http://www.uky.edu/sotu/2015-2020-strategic-plan). Specifically, the Department of Entomology supports the following Strategic Objectives in the 2015-2020 Strategic Plan:

Graduate Education

Strengthen the quality and distinctiveness of our graduate programs to transform our students into accomplished scholars and professionals who contribute to the Commonwealth, the nation, and the world through their research and discovery, creative endeavors, teaching, and service.

Diversity and Inclusivity

Enhance the diversity and inclusive of our University community through recruitment, promotion, and retention of an increasingly diverse population of faculty, administrators, staff, and students, and by implementing initiatives that provide rich diversity-related experiences for all to help ensure their success in an interconnected world.

Research and Scholarship

Expand our scholarship, creative endeavors, and research across the full range of disciplines to focus on the most important challenges of the Commonwealth, our nation, and the world.

Outreach and Community Engagement

Leverage leading-edge technology, scholarship, and research in innovative ways to advance the public good and to foster the development of citizen scholars.

D. The Department of Entomology supports the mission and vision of the University of Kentucky and embraces the core values of the University.

College of Agriculture, Food and Environment Strategic Plan 2015-2020: Building Our Future on the Land Grant Legacy

The Department of Entomology will make significant contributions to the following

CAFE goals.

- Prepare highly motivated and culturally adaptive graduates who are competitive in a global economy and support societal values.
- Build and nurture relationships with the people of the Commonwealth and across the world.
- Recruit, develop, and retain exceptional faculty and staff who are leaders in expanding knowledge to improve the quality of life and sustainability of the human and physical environment.
- Show CAFE commitment to diversity and inclusion to attract and retain students, staff, and faculty, and provide a culturally aware environment for successful engagement in a global society.
- Produce innovative solutions through multidisciplinary collaborations.

E. Vision and Goals for the Department of Entomology

Goals:
We strive to be among the strongest research, extension, and graduate education programs in Entomology in the nation.

Within the Department, we maintain a high-quality program by:

- Establishing a creative environment that fosters productive faculty, staff, and students
- Developing high impact extension and research programs that address the needs of the citizens of Kentucky, the nation, and the world
- Recruiting and training outstanding graduate students who are highly competitive for quality professional positions
- Maintaining a balance between applied and fundamental research programs
- Striving for an extramural funding base of competitive federal grants
- Supporting high publication productivity in respected peer-reviewed journals
- Mentoring quality graduate students and post-doctoral scholars

Members of the Department foster a creative environment for scholarly activities.

- Our scholarly focus is driven by the pursuit of fundamental knowledge and an applied mission to deliver new technologies and knowledge. The Department provides the intellectual environment for new discoveries and the application of knowledge to improve the quality of life. We adapt to new opportunities and challenges as they arise, e.g., novel insect-vertebrate interactions, new invasive species, or the planting of insect-resistant transgenic crops. The influence of our activities extends beyond the University of Kentucky, through our teaching, outreach, and the strengths of our graduate students.
- The Department of Entomology extension programs foster the adoption of Integrated Pest Management and sustainable agricultural practices while promoting the wise stewardship of the commonwealth's natural resources. A significant effort is placed on training private and commercial pesticide

applicators and providing a range of continuing education programs. We ambitiously pursue an extramural funding base that includes competitive federal grants, and we seek funding for the formation of endowed chairs and graduate student fellowships.

F. Department Faculty Research

Entomology faculty respond to the needs of the citizens of Kentucky. These highly visible research programs are a critical aspect of the mission of the Department of Entomology.

Grants for the review period may be found in Appendix 2.

Protection of Natural Resources from invasive pests

Rieske-Kinney's research group integrates field and laboratory approaches to address behavioral and ecological issues in forest ecosystems in the context of herbivore-plant relations, feeding guild interactions, and interactions among plant stressors. With an emphasis on invasive species, this group is evaluating how disturbance forces directly and indirectly impact arthropod abundance, herbivory and herbivore success, forest community dynamics, and employs integrative approaches to develop mitigation strategies. Rieske-Kinney and Palli labs teamed up with USDA collaborator Dr. Duan Jian to develop RNAi-based methods to control insects that attack trees.

Community Entomology (urban, recreational, home and garden)

Dan Potter's research program supports sustainable management of insect pests and conservation of pollinators, natural enemies, and other beneficial insects in urban and suburban landscapes. This group works at the interface of applied ecology and integrated pest management to clarify the interactions between plants, pests, and beneficial invertebrates and their responses to anthropogenic disturbances such as pesticide inputs and habitat modification. For more than 37 years this program has generated a substantial portion of the world's primary literature on Japanese beetles, root-feeding white grubs, scale insects, wood borers, and other key pests of urban landscapes, while providing guidelines and leadership for implementing conservation biological control, host plant resistance, and urban biodiversity conservation.

Haynes laboratory conducts research on bed bug biology, behavior, and control. The reemergence of this blood-feeding insect as a major pest in the urban environment has led to focused attention on a wide range of issues related to their biology and control. This group has determined that resistance to pyrethroids is widespread, and is likely the major factor in the recent resurgence of bed bugs. Our discovery of this insecticide resistance, which has been corroborated by several other groups, has fundamentally changed the way the pest control industry deals with this pest, and undoubtedly resulted in improved pest management procedures. These pest management procedures include the use of combination products which are alternatives to pyrethroids (typically a pyrethroid and a neonicotinoid), inhibitors of oxidative phosphorylation (such as chlorfenapyr), and desiccants (most notably silica gel). Collaborations among Haynes, Palli and Mike Potter pursued research on bed bugs in

diverse and exciting directions, including identification genes responsible for insecticide resistance among bed bug populations collected from across the United States. They have also collaborated with UK Agricultural Economics on Assessing impacts of bed bugs on the hotel and lodging industry.

Medical Entomology-Disease vector management

The invasive mosquito *Aedes albopictus* (the Asian tiger mosquito) is a significant biting pest and competent vector in a large portion of the United States, including Kentucky. A component of the current research in the Dobson lab is dedicated to understanding how *Ae. albopictus* behaves in a non-endemic habitat. Ongoing research is centered on a series of Mark-Release-Recapture (MRR) experiments in which both traditional and novel insect marking technologies are applied to mark non-biting male mosquitoes, which are released into the environment and then recaptured at various time periods thereafter. Results obtained from this research will help estimate dispersal, longevity, and relative population sizes in the field, which will enhance understanding and the ability to control this pest species. The interaction between mosquitoes and their *Wolbachia* infections, which are obligate, intracellular bacteria that can affect insect reproduction, are also being studied. In addition to characterizing the general impacts on mosquito fitness, we are also developing strains and strategies that may be used for manipulating medically important mosquito populations. We are currently collaborating with an abatement district in California to field trial a mosquito-suppression approach.

Brown's laboratory provides teaching, research, and service regarding insect-borne diseases and other arthropod-related human health problems. The lab provides services to the professional and lay community in the area of public health education. They maintain a reference collection of the commonwealth's mosquito fauna, as well as other arthropod vectors. Insomuch as possible, the lab provides mosquito, tick, sand fly, and other vector identifications for state and county public health authorities, and answers questions from the public and media concerning public health entomology issues. The lab carries out cooperative research projects with many, varied organizations, both public and private. These programs include disease surveillance programs, vector ecology research, and public health education. Laboratory staff are available to address questions from the media concerning insects and other arthropods posing a public health threat.

Fundamental / Translational Research

Interfering with regulatory mechanisms involved in critical physiological processes such as molting, metamorphosis, diapause, and apoptosis can result in the death of pest insects. Studying some of these processes of pest insects and disease vectors at the molecular level may help in the identification of targets that can be used for pest and disease vector control. The Palli laboratory uses whole genome sequence data and functional genomics approaches including transcriptomics, metabolomics, RNA interference (RNAi), and genome editing to identify genes that are critical for the survival of insects. The genes identified are being used to develop high throughput screening assays for identification target-specific insecticides, as well as to perform

toxicogenomics and pharmacogenomics that can help to elucidate the effects of candidate pesticides on the pest ecosystem.

Environmental stress is a major determinant of insect population dynamics and species ranges. Teet's lab investigates the physiological and molecular mechanisms by which insects tolerate environmental stress using an integrative approach to understand stress at the molecular, cellular, organismal, and population level, in particular, the focus on stress associated with overwintering. Overwintering conditions vary strongly across latitudinal gradients, and climate changes are leading to warmer and more variable winter conditions. Three specific areas of research in this lab are: 1) investigating the cellular and molecular mechanisms governing rapid responses to low temperature; 2) integrating physiology and genomics to understand arthropod adaptations to Antarctica and other extreme environments; and 3) investigating the genetic basis of freeze tolerance, i.e., the ability of select insects to survive internal freezing. While much of this research is basic, there is also interest in applications of insect stress biology, specifically, an ongoing project funded by the USDA which uses transgenic methods to enhance the stress tolerance of insects used in sterile release programs. Insights from cold tolerance work may inform organ cryopreservation efforts.

Research in the Zhou lab is focused on the understanding of: 1) the genetic underpinnings govern social behaviors in eusocial termites, and 2) the evolution of eusociality in the wood-feeding dictyopterans. This research is particularly interested in genes potentially affecting caste differentiation (worker-solider and worker-reproductive transition, respectively) and termite behaviors (aggression, isolation, undertaking, learning and memory, foraging, and parental care).

Rittschof's laboratory studies the evolutionary consequences and mechanistic underpinnings of behavioral plasticity, particularly in the context of social interactions. Current research focuses on socially-induced variation in aggression in the honey bee. This research combines perspectives from behavioral ecology, behavioral genomics, and neuroscience.

Fox's group works on the evolution of insect life histories and behavior and the scientific peer review process. The primary focus of the research continues to be at the interface of ecology, evolutionary biology, behavior, and genetics of insects. Our major projects over the past couple of years have focused on four themes: Adaptation to new environments (a long-term experimental evolution experiment using the agricultural pest seed beetle, *Callosobruchus maculatus*), the mechanisms underlying adaptive life history plasticity in a seed beetles that exhibits plasticity in egg size (using the non-pest seed beetle, *Stator limbatus*), the ecology and genetics of inbreeding depression, and the evolution of genital spines and mating behavior in response to sexual conflict in seed beetles. The inbreeding depression work focuses on (1) the genetics and environmental sensitivity of inbreeding depression (especially focusing on responses to stress), (2) the influence of inbreeding on the evolution of mating behavior, and (3) how mating behavior mediates inbreeding and inbreeding depression.

Research in Sharkey's lab focuses largely on the taxonomy, phylogenetics and systematics of parasitic wasps in the family Braconidae. Members of this family are parasitoids of other insects and many are important in the natural and biological control of insect pests. Our major goal is to describe, identify, and produce phylogenetic hypotheses (classifications) for genera and higher taxa of selected parasitic wasps and describe and provide identification keys for constituent taxa. In doing so, we have increased in the specimen holdings at the Hymenoptera Institute and other museums for comparative purposes and morphological study. In the past 5 years, we returned thousands of borrowed specimens to many museums that we identified to species. By providing identification services, we benefit by being able to catalog specimen information and the museums benefit by having their specimens identified by a world-recognized expert. We have added digital information on thousands of braconid specimens to an ever-growing, web-accessible Integrated Digitized Biocollections (IDigBio)-supported database (http://symbiota4.acis.ufl.edu/scan/portal/index.php). We have developed and published a better understanding of the relationships among braconid wasps and their host associations. This knowledge could aid in biological control efforts in cases where one or more hosts become pests, as species-specific parasitoids have been among the most successful biological control agents. Our papers have led to a better understanding of the identification and phylogenetic relationships of the parasitoid species contained within, which is essential information when developing biological control programs.

Agricultural Entomology: Sustainable IPM

The long-term goals of Obrycki's research group are to improve human attempts to manipulate and enhance populations of predatory insects based on a fundamental understanding of population-level variation in these natural enemies. Human-assisted movement and release of insect parasitoids and predatory insects for the suppression of arthropod pests represents one of the major practices of biological control. Delineating the population structure of widely distributed species provides a strong basis for understanding population-level differences, which in species manipulated by humans may be critical to understanding the consequences of our activities.

Recent efforts in White's lab have revealed that a facultative symbiont dictates the breadth of host plants attacked by an agricultural pest, the cowpea aphid. Such findings have major implications for understanding sudden shifts in crop attack patterns by pest insects. We have subsequently started collaborating to characterize bacterial symbionts in a different aphid, the sugarcane aphid, which has recently exhibited such a host plant shift, to devastating effect in sorghum crops.

RNAi has become a widely used reverse genetic tool to study gene function in eukaryotic organisms and is being developed as a technology for insect pest control. Four laboratories in this department (Palli, Riskey-Kenny, Webb, and Zhou) are working on RNAi. The Palli and Webb labs are developing methods for using nanoformulation of double-stranded RNA to control insects that attack crops, trees and transmit infectious diseases. The lack of standardized ecological risk assessment procedures is considered by many to be the bottleneck for establishing RNAi as a

viable pest control alternative. Research in Zhou laboratory is focused on: 1) the development of an ecological risk assessment framework to assess the potential risks associated with RNAi transgenic crops, and 2) the integration of RNAi into pest control practices against urban pests, including dsRNA-mediated baiting system for termite control.

Please see Appendix 8 for more information on the current research activity in the department.

Examples of current research projects

Investigator Name	Title
Potter, D	Biology and Management of Insects Attacking Turf and Woody Landscape Plants
White, J	Ecology and Management of European Corn Borer and Other Lepidopteran Pests of Corn
Brown, G	Improving Management of Insects of Public Health Significance in Kentucky
Fox, C	Inbreeding depression in mating biology following population bottlenecks in a storage pest
Obrycki, J	Biology, impact, and management of soybean insect pests in soybean production systems
Rieske-Kinney, L	Biological Improvement of Chestnut through Technologies that Address Management of the Species, its Pathogens and Pests
Obrycki, J	Biological Control of Arthropod Pests and Weeds
Webb, B	Defining and utilizing selected molecular features of insect viruses
Sharkey, M	Systematics, taxonomy, biodiversity, and food-web interactions of Ichneumonidae (Insecta: Hymenoptera)
Haynes, K	Identifying weak links in bed bug biology
Rieske-Kinney, L	A sustainable approach for protecting our forests from emerald ash borer, with applications to other exotic wood-boring invaders
Palli, S	Molecular Analysis of Insecticide Resistance
White, J	Bacterial symbionts and defensive traits in insects
Dobson, S	Biology, Ecology & Management of Emerging Disease Vectors
Zhou, X	Colony Collapse in Termites-RNA Interference-Mediated Genetic Manipulation
Potter, D	Management of Pests and Conservation of Beneficial Insects in Urban Landscapes
Obrycki, J	Comparative ecological and phenological studies of predatory lady beetles (Coleoptera: Coccinellidae)

G. Interdepartmental Activities

The involvement of Entomology faculty as instructors and advisors in the undergraduate Agricultural Biotechnology program is an example of our involvement in

interdepartmental teaching programs. Drs. Fox and White have been actively involved in the annual Center for Ecology, Evolution and Behavior (CEEB) Research Symposium at the University of Kentucky. The role of entomology faculty in teaching courses that contribute to a number of majors is highlighted throughout this report. Faculty also provide leadership for programs in Integrated Pest Management, Pesticide Safety Education, IR-4 programs for Minor Use Crops, NSF I/UCRC Center for Arthropod Management Technologies, the Kentucky Pollinator Protection Plan, and the Urban Forest Initiative.

H. Quality of faculty and staff communications and interactions

The best opportunity for faculty, staff and student interactions is provided by weekly receptions prior to departmental seminars. Other opportunities include holiday lunches, picnics, student-staff-faculty sports competitions etc. At annual departmental luncheon, members of the department are recognized for their service as well those that won awards, honors etc. The new members of the department are introduced at this function. Technical staff members interact with faculty supervisors and other faculty members in their area of expertise on a daily basis. Departmental meetings including staff, students and faculty are organized on a need basis. For example, we had department staff, student and faculty meeting in 2016 to discuss internet security.

I. Recruitment and development plan

The department's recruitment of faculty, staff and students is based on the need to fulfill teaching, research and service missions. Positions vacated by turnover are filled to optimize program growth and development, not necessarily be filled by individuals with expertise similar to the departing member. University and CAFE plans are implemented for the development of faculty, staff and students.

Part 2: Degree Program(s)

A. Undergraduate Education

The College of Agriculture, Food and Environment, including the Department of Entomology, adheres to all University Senate rules pertaining to educational policies and procedures, including consistency in applying policies related to grading, probation, admissions, and termination. The relevant rules, Section IV: Rules Relating to Admission to the University and Section V: Rules Relating to Attending the University, may be found at the following link:
http://www.uky.edu/Faculty/Senate/rules_regulations/index.htm

Course substitutions requested by students are reviewed by faculty members. Once approved by a faculty member, the department chair or director of undergraduate study signs the course substitution form before it is submitted to the associate dean for instruction, where the request is further vetted. Equivalency credit and course transfers are reviewed by the director of undergraduate studies, with the consultation of faculty when the requests are received from the registrar. The decision is forwarded to the registrar.

Degree requirements and vetting of exceptions are reviewed by faculty. When the faculty agrees to change course requirements, a program change proposal is submitted to the college undergraduate curriculum committee for review. After this review and approval by the associate dean for academic administration, the proposal is submitted for university approval.

The Department of Entomology offers a major in Entomology as an individualized program within the Bachelor of Science in Agriculture degree program (http://www.ca.uky.edu/students/welcome/entomology.asp) and an undergraduate minor in Entomology. The requirements for the minor in Entomology are described at: http://www.uky.edu/Registrar/Major-Sheets/minorsCurrent/agr/ent.pdf. The faculty schedules meetings to discuss scheduling and teaching of classes. All courses required for a degree are offered during a scheduled four-year plan.

Insect Biology (ENT 110) currently fulfills a natural sciences requirement for the UK Core at the University of Kentucky. General Entomology (ENT/BIO 300) fulfills a requirement for the Biology major as well as a natural sciences requirement for the UK-Core. In addition, our faculty teach courses that serve students from several undergraduate programs including Plant and Soil Sciences, Forestry, Horticulture, Animal Science, and Natural Resources and Conservation. Several faculty members of the Department of Entomology actively participate as instructors and advisors in the Bachelor of Science in Agricultural Biotechnology (ABT) program (http://www.ca.uky.edu/students/welcome/ag_biotechnology.asp) and Entomology faculty members teach ABT 201, ABT 360, ABT 460 and ABT 495 courses. Faculty also mentor undergraduate students through independent study projects and research experiences.

Student Credit Hours and Course Evaluations for faculty in the Department of Entomology

For the academic years 2010-15, the average number of earned student credit hours for courses taught by Entomology faculty was 936. The student credit hours resulting from ENT 110 (Insect Biology) represents almost one-third of the total student credit hours in Entomology for the academic years 2010 to 2015.

Department of Entomology attempted/earned student credit hours 2010-2015

2014-2015 Attempted/Earned Student Credit Hours

	Total	Fall	Spring	Summer
Attempted SCHs	937	542	395	0
Earned SCHs	845	496	349	0
Unearned SCHs	92	46	46	0
% Earned	90.2%	91.5%	88.4%	NA

2013-2014 Attempted Student Credit Hours

	Total	Fall	Spring	Summer
Attempted SCHs	928	536	390	2
Earned SCHs	848	496	352	0
Unearned SCHs	80	40	38	2
% Earned	91.4%	92.5%	90.3%	0%

2012-2013 Attempted Student Credit Hours

	Total	Fall	Spring	Summer
Attempted SCHs	1,169	603	557	9
Earned SCHs	1,080	581	490	9
Unearned SCHs	89	22	67	0
% Earned	92.4%	96.3%	88.0%	100.0%

2011-2012 Attempted Student Credit Hours

	Total	Fall	Spring	Summer
Attempted SCHs	1,092	547	499	46
Earned SCHs	984	505	439	40
Unearned SCHs	108	42	60	6
% Earned	90.1%	92.3%	88.0%	100.0%

2010-2011 Attempted Student Credit Hours

	Total	Fall	Spring	Summer
Attempted SCHs	1,012	529	483	0
Earned SCHs	923	479	444	0
Unearned SCHs	89	50	39	0
% Earned	91.2%	90.6%	91.9%	0

Faculty in the department take pride in their teaching and are dedicated to this aspect of their profession. This dedication is reflected in the results of student/course evaluations for Entomology (below). With few exceptions, the semester averages for the value of course and quality of teaching in undergraduate and graduate courses in entomology are consistent between 3.0 and 4.0 (good to excellent). Several courses and instructors are consistently evaluated above 3.5.

Teacher and Course Evaluation Results for Department of Entomology; Spring 2010 – Fall 2015

Semester averages for the overall value of a course and the overall quality of teaching (below) are based upon a scale of 1 to 4 (poor to excellent). Source: University of Kentucky Institutional Research.

Year Semester	Value of Course	Department Quality of Teaching Mean (StDev)	College of Ag Quality of Teaching Mean (StDev)	University Quality of Teaching Mean (StDev)
2010 Spring	3.6 (0.5)	3.7 (0.5)	3.4 (0.80)	3.4 (0.8)
Fall	3.5 (0.6)	3.6 (0.6)	3.3 (0.83)	3.4 (0.8)
2011 Spring	3.5 (0.6)	3.6 (0.6)	3.2 (0.89)	3.4 (0.78)
Fall	3.5 (0.6)	3.6 (0.6)	3.2 (0.75)	3.4 (0.81)
2012 Spring	3.5 (0.6)	3.7 (0.6)	3.5 (0.77)	3.4 (0.79)
Fall	3.6 (0.6)	3.7 (0.5)	3.4 (0.79)	3.4 (0.82)
2013 Spring	3.6 (0.7)	3.8 (0.5)	3.5 (0.78)	3.5 (0.78)
Fall	3.4 (0.8)	3.6 (0.7)	3.5 (0.75)	3.4 (0.81)
2014 Spring	3.5 (0.7)	3.6 (0.7)	3.8 (0.41)	3.4 (0.81)
Fall	3.2 (0.6)	3.4 (0.6)	Unavailable	Unavailable
2015 Spring	3.5 (0.7)	3.7 (0.6)	Unavailable	Unavailable
Fall	3.5 (0.5)	3.7 (0.4)	Unavailable	Unavailable

B. Graduate Education

The Department of Entomology offers graduate work leading to the Master of Science (Plan A -- Thesis and Plan B -- Non-thesis) and the Doctor of Philosophy degrees. The graduate student handbook is updated as needed and is available on the Department's website (http://www.ca.uky.edu/entomology/dept/gradprogram.asp). Individual graduate programs are planned by students in consultation with their advisor, and advisory committee, and the Director of Graduate Studies. Study and research are available in various areas of entomology including applied entomology, behavior, biochemistry, biological control, ecology, genetics, plant resistance, insect biology, medical and veterinary entomology, molecular biology, physiology, systematics, and taxonomy. The discipline of entomology, similar to all agricultural and biological sciences, has evolved significantly during the past two decades and continues to undergo rapid changes. To increase flexibility in the core curricula, the Ph.D. and MS core curricula are the responsibility of the graduate faculty in Entomology, which represents a change from prior responsibility at the Graduate School level.

Admission Requirements

Admission to the graduate program in Entomology is based upon the recommendation of the Entomology Graduate Program Committee. Minimum admission requirements include an overall undergraduate grade point average of 3.0 and an overall graduate grade point average of 3.25, a score of at least 300 on the combined verbal and quantitative portions of the Graduate Record Examination (GRE) and a minimum score of 150 on the quantitative part of the GRE. Those whose native language is not English must have a Test of English as a Foreign Language (TOEFL) with a minimum score of 79 on the TOEFL-IBT or a minimum score of 6.5 on the International English Language Testing System (IELTS). Meeting the minimum requirements does not guarantee

admission. These minimal requirements may be waived in exceptional cases if sufficient additional evidence is presented regarding the ability of the student to do graduate work. Admission to the Graduate Program in Entomology does NOT automatically guarantee financial assistance to the student. However, 100% of the graduate students enrolled in our program during past six years received either research assistantship or an internally or externally funded graduate fellowship.

Degree Requirements

During their first year of graduate studies, M.S. (Plan A) and Ph.D. students must prepare a formal written research proposal encompassing a thorough literature review, clear statement of objectives, and materials and methods of the project. A research proposal seminar is presented to the department upon completion of the written research proposal. An exit seminar, usually presented during the last semester of the student's tenure, is required for M.S. (Plans A and B) and Ph.D. students. August graduates present their seminar in the preceding spring. M.S. students using the Plan B option are required to provide a detailed outline of their practicum to their Advisory Committee. The practicum must be a minimum of 3 credit hours (maximum of 6 credit hours) and may consist of library research, special problems, internships, etc., as agreed upon by the student and major professor, and approved by the Advisory Committee. M.S. and Ph.D. students must post a formal notification of scheduled examinations on the notice board in the main departmental office two weeks prior to the examination date.

All M.S. and Ph.D. students must satisfy the following core course requirements:

A. An undergraduate course in general entomology. Students who have not had such a course must take ENT 300.
B. STA 570 Basic Statistical Analysis
C. Each M.S. student must take two semesters of ENT 770, Entomological Seminar, (or approved equivalent seminars) and Ph.D. candidates must take four semesters of approved seminars.
D. Each Ph.D. and M.S. candidates using the Plan A option must take a minimum of one course from two of the following core areas. M.S. candidates using the Plan B option must take a minimum of one course from all three core areas.

Core Area 1: Insect Behavior, Ecology, Evolution and Systematics

ENT 505	Evolution in Agriculture, Medicine and Conservation Biology
ENT 564	Insect Taxonomy
ENT 568	Insect Behavior
ENT 607	Advanced Evolution
ENT 625	Insect-Plant Relationships
ENT 660	Immature Insects
ENT 665	Insect Ecology
ENT 667	Invasive Species Biology
ENT 684	Phylogenetic Systematics

Core Area 2: Insect Molecular Biology, Physiology and Genetics

ENT 635	Insect Physiology
ENT 636	Insect Molecular Biology

Core Area 3: Pest Management and Applied Ecology

ENT 561	Insects Affecting Human and Animal Health
ENT 680	Biological Control

In all cases, an equivalent graduate-level course from another institution is acceptable upon approval of the Advisory Committee. Such approval will not decrease the minimum number of credits required but will permit the student to take other courses.

For a complete list of Entomology courses see:
http://www.ca.uky.edu/entomology/dept/courses.asp

Detailed information on the graduate program in Entomology can be found at:
http://www.research.uky.edu/gs/bulletin/bullinfo.shtml

Graduate students in Entomology pursue research M.S. or Ph.D. degrees in one of three broad areas of emphasis, all of which provide preparation for competitive positions in academics, extension, government agencies, or industry:

- Insect Molecular Biology, Physiology and Genetics
- Insect Behavior, Ecology, and Evolution Insect Pest
- Management and Applied Ecology

Insect Molecular Biology, Physiology and Genetics

This area trains students to use insects as model systems to understand the general principles of molecular biology, physiology, and genetics.
Areas of strength

- Molecular Virology
- Genetic Engineering of Insect Pathogens
- Insect Immunity
- Insect/Bacterial Symbioses
- Physiological Basis of Chemical Communication
- Molecular/Biochemical Insect Parasitology
- Biochemistry of Insect-Plant Interactions
- Mendelian and Quantitative Genetics
- Genomics/Transcroptomics/Proteomics
- Development/Reproduction/Diapause

Faculty: Stephen L. Dobson, Charles W. Fox, Kenneth F. Haynes, S. Reddy Palli, Clare Rittschof, Nick Teets. Bruce A. Webb, Jennifer A. White, Xuguo Zhou

Insect Behavior, Ecology, Evolution, and Systematics

Students use insects to understand general principles of biology.

Areas of Strength

- Chemical and acoustic communication
- Community ecology and food-web studies
- Evolutionary and behavioral genetics
- Mating behavior
- Modeling
- Predator/prey interactions
- Insect/plant interactions
- Insect/vertebrate interactions
- Systematics

Faculty in this area:
Grayson C. Brown, Stephen L. Dobson, Luke Dodd (adjunct), Charles W. Fox, Kenneth F. Haynes, John J. Obrycki, Daniel A. Potter, Lynne K. Rieske-Kinney, John D. Sedlacek (adjunct), Michael J. Sharkey, Bruce Webb, Thomas Webster (adjunct), Jennifer A. White and Steve Yanoviak (adjunct)

Pest Management and Applied Ecology
Students are prepared for careers in agricultural, urban, horticultural, or forest pest management.

Areas of strength

* Integrated pest management
* Host (plant or animal)/insect interactions
* Enhancement of biological control
* Host resistance
* Extension and technology transfer
* Urban entomology
* Forest entomology
* Conserving biodiversity

Faculty in this area:
Ricardo T. Bessin, Grayson C. Brown, Stephen L. Dobson, Luke Dodd (adjunct), Kenneth F. Haynes, John J. Obrycki, S. R. Palli, Daniel A. Potter, Michael F. Potter, Lynne K. Rieske-Kinney, John D. Sedlacek (adjunct), Michael J. Sharkey, Lee H. Townsend, Thomas Webster (adjunct), Jennifer A. White, and Xuguo Zhou

<u>Assessment Methods and Measures</u>

Learning Outcome 1
Assessment: PhD: Written and oral qualifying examination before advancement to candidacy and oral dissertation defense following completion of PhD research. Masters: Oral final examination.

Learning Outcome 2
Assessment: PhD: Completion of required coursework, with performance above the graduate school and departmental minimum GPA, prior to qualifying examination.

Qualifying examination before advancement to candidacy.
Masters: Completion of required coursework. Oral final examination.

Learning Outcome 3
Assessment: PhD: Completion of required math and/or statistics prior to qualifying examination.
Committee evaluation of statistical application to dissertation research.
Defense of dissertation
Masters: Completion of required math and/or statistics courses. Oral examination includes defense of thesis (MS Plan A) or practicum (MS Plan B) and included statistical approaches.

Learning Outcome 4
Assessment: PhD: Completion and successful oral defense of written PhD dissertation.
Written and oral qualifying exam questions.
See Appendix 4 for more information on Student Learning Outcomes.

Publication of dissertation research in regional, national or international journals.
Oral presentation of dissertation research at Entomology department seminar.
Presentation of dissertation research as poster or oral presentation at regional and/or national meeting(s) of appropriate professional societies.

Oral defense of dissertation
Masters: Completion and successful oral defense of written MS thesis.
Presentation of thesis research as poster or oral presentation at regional and/or national meeting(s) of appropriate professional society(ies).
Publication of thesis research in regional, national or international journals.
Defense of thesis (MS Plan A) or defense of Practicum (MS Plan B).

Data Analysis
The Director of Graduate Studies (DGS), Department Chair, and faculty members of the departmental curriculum committee will be involved in the analysis of the data. Based on our learning outcomes assessment we will modify our graduate curriculum to address learning outcomes that need improvement.

Teaching Effectiveness
Teaching effectiveness in graduate courses will be assessed using online TCE forms. Teaching effectiveness will be improved by consultations with members of CELT.

Plans for evaluating students' post-graduate success
The department tracks program graduates to determine their post-graduate success. Placement of graduate students is used as one of the indicators of post-graduate success. All (100%) students that graduated from our program during the past six years are employed.

<u>Department level GTA and GRA information</u>

Entomology GRAs (with Salary Range)
$22,000.00 Max
$18,000.00 Min

Student Name	Lab PI	Position Title
Adam	Potter, D.	Graduate Research Assistant
Amanda	Bessin	Graduate Research Assistant
Bernadette	Potter, D.	Graduate Research Assistant
Caitlin	Obrycki	Graduate Research Assistant
David	Rieske-Kinney	Graduate Research Assistant
Emily	Webb	Graduate Research Assistant
Hannah	Obrycki	Graduate Research Assistant
Ilgoo	Sharkey	Graduate Research Assistant
Jizhe	Zhou	Graduate Research Assistant
June-Sun	Palli	Graduate Research Assistant
Leslie	Teets	Graduate Research Assistant
Megha	Palli	Graduate Research Assistant
Michael	Rittschof	Graduate Research Assistant
Michael	Rieske-Kinney	Graduate Research Assistant
Najla	Palli	Graduate Research Assistant
Samuel	Rieske-Kinney	Graduate Research Assistant
Sarah	Sharkey	Graduate Research Assistant
Sarah	Rittschof	Graduate Research Assistant
Shane	Rieske-Kinney	Graduate Research Assistant
Smitha	Palli	Graduate Research Assistant
Sydney	Haynes	Graduate Research Assistant
Thor	White	Graduate Research Assistant
Timothy	Potter, D.	Graduate Research Assistant

Three students are on University Scholarships during Fall 2016

- Leslie received the Kentucky Opportunity Fellowship
- Hannah received the Graduate School Academic Year Fellowship
- Michael has a Reedy ($3000) fellowship - this is *in addition to* a graduate research assistant appointment (RA), not instead of.

Graduate Program Committee

The Graduate Program Committee will give general guidance to the graduate program, coordinate graduate course needs with the Curriculum Committee, establish graduate program Student Learning Objectives, coordinate evaluation of graduate student performance for graduate program assessments, and establish goals for research

training of post-doctoral scholars. It will also review and make recommendations to the Department Chair regarding applications for admission for students that do not meet the departmental requirements for admission. The Department Chair will appoint the Graduate Program Committee Chair, who will have the rank of Full or Associate Professor; this appointment will be re-evaluated annually. The committee will consist of two additional faculty members and one graduate student. Committee appointment will be for two-year terms, except for the student member who will serve for one academic year.

Examples of External awards or other recognition of the students

- Graduate School Fellowship (2015-2016), University of Kentucky.
- 2nd place Master's Ten Minute Presentation. Fitness effects of differentially toxic prey on members of the coccinellid community. 70th Annual Meeting of the North Central Branch of the Entomological Society of America, Manhattan, KS.(May-June, 2015)
- North Central Branch Student Travel Scholarship (June 2015).
- University of Kentucky 3 Minute Thesis Competition 'Think' like a bed bug: Elucidating behavior to enhance control. First place overall winner, advanced to nationals. (December, 2015)
- North Central Branch Student Travel Award. Annual Meeting of the North Central Branch of the Entomological Society of America, Cleveland, OH. (June, 2016)
- First Place PhD Oral Paper. PhD Student Paper Competition at the Ohio Valley Entomological Association Annual Meeting, Lexington, KY. (2015)
- Travel Scholarship (2015). Funding for travel to the annual Entomological Society of America meeting. University of Kentucky, The Graduate School, Lexington, KY. $400.00.
- MUVE Student Scholarship. 2015. Entomology Society of America Annual Meeting, Minneapolis, MN, $500.
- AAAS/Science Program for Excellence in Science. July 2015. Nominated for participation in program.
- Young Professional of the Month. April 2015. American Mosquito Control Association. Young Professionals Travel Stipend. March 2015. American Mosquito Control Association Annual Meeting, New Orleans, LA, $1,000.
- Second place in ESA student competition for the president's prize (2015).
- 1st place in oral presentations-MS at NCB ESA meeting in June 2015,
- Award for oral presentation at the Southern Forest Insect Work Conference in Fayetteville, AR in July.
- Monsanto research grant awards given by ESA.
- First in ESA student competition for the president's prize.

Average time and credits to degree

Graduate Year	Time to PhD (mean in years)	Time to MS (mean in years)
2004-2005	4.4	2.5
2005-2006	4.8	1.9
2006-2007	5.2	2.2
2007-2008	3.8	-
2008-2009	4.7	2.5
2009-2010	4.4	2.8
2010-2011	4.7	2.4
2011-2012	4.8	1.9
2012-2013	4.4	2.9

The reasons students reject fellowships or assistantships offered from the university, college, or department include

1. Better offers from the competing departments
2. Lower level fellowships or assistantships offered
3. Lack training in some areas of Entomology, e.g. Vector Biology

Processes used to ensure currency of curriculum

The department chair appoints the Curriculum Committee Chair, two additional faculty members and one graduate student to serve on this committee. The Curriculum Committee shall provide recommendations on teaching objectives, curriculum planning, course content, and scheduling. The Curriculum Committee will meet at least once each academic year to review proposals and syllabi for new courses, periodically evaluate course offerings, and may suggest additions, deletions, revisions, or renumbering of courses.

Number of postdoctoral fellows and scholars (2010-2016)

Year	# of Fellows/Scholars
2015-16	6
2014-15	9
2013-14	8
2012-13	7
2011-12	8
2012-13	7

Departmental Facilities

Modern computer, microscope, video, chromatographic and molecular equipment, along with laboratory and greenhouse facilities, are available to support graduate and

undergraduate student research projects. An array of equipment is available to complement studies in molecular biology and physiology, including**:** real-time PCR, a cell culture facility, GC-MS, capillary electrophoresis, SEM, Confocal and Photo-microscopes, scintillation counters, ultracentrifuges, scanners, imagers etc. The University has an advanced genomics technology center. Proteomics and micro-array facilities are available. In addition, faculty and students at the University have access to UK field sites.

Assessment of Graduate Education

The graduate program in the Department of Entomology is dynamic and vibrant, and is among the best in the nation. Our graduate program is productive, averaging over two (students/post-docs) / faculty / year (derived by dividing the number of tenure-track faculty by the number of graduate students and post-docs). The Department of Entomology has awarded an average of 5 Ph.D. and 4 M.S. degrees per year (see below) from 2010 to 2015.

Enrollment / Degrees Awarded 2010-2015

Fall/Spring	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
MS	6 / 4	11 / 14	12 / 9	13 / 13	11 / 12	14 / 14
PhD	17 / 20	25 / 23	23 / 21	19 / 19	21 / 19	18 / 14
Post-doc	7 / 8	11 / 11	9 / 8	8 / 9	11 / 14	6 / 9
Total	30 / 32	47 / 48	43 / 38	40 / 41	43 / 45	38 / 37

Degrees awarded by year

Calendar year	2010	2011	2012	2013	2014	2015
MS	6	2	2	3	7	5
PhD	7	5	4	5	2	5
Total	13	7	6	8	9	10

One quantitative measure used to assess the quality of a graduate program is the GRE scores of students enrolled.

Average GRE scores (verbal + quantitative) for students enrolled in the Graduate Program in Entomology and in CAFE, 2010-2016.

Year (Fall / Spring)	Average GRE (verbal + quantitative)
2010/11	1185
2011/12	1171
2012/13	305[1]
2013/14	306
2014/15	313
2015/16	307
2016*	381

[1] The GRE scoring system changed in 2012. All scores after this data include only averages of admitted applicants with GRE scores under the new system.
* Admissions still in progress; average scores as of 29 February 2016

Another quantitative measure of graduate program quality is professional development opportunities. Our graduate students are productive and take advantage of opportunities to publish and present their research findings.

Summary of Entomology Graduate Student Productivity, 2010-2015, showing the numbers of refereed publications and presentations at regional, national, or international meetings on which at least one Entomology graduate student was an author.

Calendar year	# Publications	# Presentations
2010	16	40
2011	21	27
2012	23	41
2013	18	38
2014	23	33
2015	22	36

Program resources
The department 2016 annual budget was about $8.3M. This budget includes $1.3M from federal formula funds, $2.9M from state funds and $4.1M from external grants and gifts. The department of Entomology also received funding from CAFÉ to help with startup packages for new faculty, UK vice-president for research in the form of research grants to faculty for obtaining preliminary data for grant proposals and Agriculture Experimental Station/Associate dean for research office in the form of activity awards to help faculty travel to meetings and for publication charges.

See Appendix 7 for more information about the Department of Entomology resources.

Part 3: Service, Extension and Non-Extension Programs

There is a critical need to balance extension education with increasing demands for research-based information to address clienteles' questions and stakeholders' needs. The Department of Entomology has four extension faculty and two extension specialists. One extension entomologist and an Integrated Pest Management specialist are assigned to the Research and Education Center (REC) in Princeton, KY, They report academically and administratively to the Department of Entomology on the Lexington campus. The extension entomologists conduct applied research and seek extramural funding, routinely collaborate on educational programs and research projects, and are involved with research faculty and graduate students.

Extension Personnel and Responsibilities:

Dr. Lee Townsend (80% extension 20% teaching), Coordinator Pesticide Safety Education (PSEP), Livestock Insects, Turf and Ornamentals, Invasive Species, Forages, Tobacco, and Biocontrol of Weeds

Dr. Ric Bessin (100% extension), Coordinator Integrated Pest Management (IPM) Program, Minor Use Pesticide Clearance Program (IR-4), Corn, Vegetables and Sustainable Agriculture

Dr. Mike Potter (100% extension), Structural Pest Control, Homeowner Pest Control and Medical Entomology

Dr. Raul Villanueva ((75% extension – 25% research, Princeton) Pest Management Centers (PMC), Small Grains, Soybeans, Grain Sorghum, Stored Grain, Fruits / Nuts

Patty Lucas (MS) (100% extension, Princeton) IPM Specialist

Blake Newton (MS) (100% extension) 4H &Youth Entomology and Pesticide Safety Education

Grain Production
The extension entomologist at the UKRECC in Princeton focuses on arthropods associated with grain production and contributes to a multi-disciplinary team that develops strong research and demonstration programs to support the profitable production of high quality wheat. Emerging problems include: the brown marmorated stink bug, kudzu bug, and sugarcane aphid. Long term programs involve educating growers on the importance of refuges in managing potential Bt-resistance and the effects of insecticide seed treatments for preventive pest control. In addition, this faculty member addresses general entomological questions and agent training for western Kentucky.

Livestock and Equines
Kentucky is the 8th largest beef cow producing state in the US and largest east of the Mississippi River. Extension programming has focused on management of pasture flies (horn flies and face flies) including evaluation of insecticide impregnated ear tags and feed-thru minerals for fly control and education on managing insecticide resistance in the horn fly through effective mode of action rotation practices. The potential role of pasture flies in increased incidence of anaplasmosis and pinkeye are emphasized in producer meetings. Information on insects affecting cattle and horses are disseminated through articles in Mid-American Farmer-Grower, Equine Wellness Magazine, and the Equine Disease Quarterly.

Because of catastrophic losses to the eastern tent caterpillar / Mare Reproductive Loss Syndrome, the eastern tent caterpillar egg hatch is monitored in central Kentucky each spring so that horse farm managers can make timely examinations of pasture and paddock fencerows and take appropriate management steps. The eastern tent caterpillar population has been increasing steadily across the state over the last three

years. The surveillance effort is relatively limited but does supply important and timely information.

Urban Entomology
The mission of the urban entomology program is to protect the health, food, property and quality of life of the public. The program provides information and assistance to citizens, businesses, institutions and agencies in Kentucky and beyond. Annually, the department hosts the UK Pest Control Short Course, recognized as one of the premier educational events in the industry. In recent years, about 500 practitioners attend from several states to hear the latest insights on pest management.

Information on pests of public importance is provided on the department website in "ENTfacts: Insect Advice - Home and Health." Our publications on termite control, bed bugs, brown recluse spiders, etc. are also listed at or near the top of Google™. Consumers and news organizations often cite these articles as being among the most useful on the Web. Publications are also written for the pest management industry, including the most comprehensive, current reference on termite control published in the Mallis Handbook of Pest Control.

Forages
Kentucky has more than 7 million acres in grass and alfalfa hay production. Insect problems that can affect production and animal health include occasional outbreaks of armyworms, alfalfa weevil, and potato leafhopper. Infestations of the bermudagrass stem maggot were identified in southern Ky and the few producers of this warm-season forage were alerted. Interest in bermudagrass as a forage may increase in the state in view of milder winters that are being experienced. In addition, an ongoing educational effort is maintained to alert horse owners and hay producers of potential problems with blister beetles in hay.

Integrated Pest Management (IPM)
IPM is the balanced use of cultural, biological, and chemical measures that are most appropriate in light of economic, social, and environmental factors. County extension agents, ag and horticulture producers, and agribusiness personnel need a working knowledge of IPM concepts and processes. Consumers should understand and value the benefits of IPM to food safety and the environment. Finally, Ag producers/ businesses must understand that the consumer places a value on the environmental effects of production, as well as the product.

Historically, extension IPM programs were supported by Smith/Lever 3(d) formula funds. The funds served as seed support to develop working groups which have sought additional operating funds. These funds became fully competitive in 2009. UK-IPM has been successful in obtaining support at a slightly higher rate than the formula would have provided. From its inception, Integrated Pest Management (IPM) in Kentucky has been taught and demonstrated in the broadest sense in all field crops, vegetable and fruit crops, ornamental crops, and Master Gardner programs. Additionally, there are special efforts in pest diagnosis and identification.

County level programs are conceived, planned, and implemented at that level. While they often involve state level people, the flow of ideas begins with the local community. Examples include: Improving vegetable insect identification for homeowners (Daviess Co.) and Combating organophosphate-resistant codling moth and Oriental fruit moth in commercial apple orchards (Graves, Warren, and Larue Counties).

Selected Impacts of IPM Programs

Commercial production of ornamental plants Growers are realizing an increase in plant quality leading to higher returns due to the adoption of IPM techniques. Growers averaged an increase of approximately $2,300 due to information gained: the ability to identify insects and diseases, spraying for borers at the appropriate time, preserving beneficial insects, and tracking water and substrate pH and fertilizer. Both can predispose a plant to insect and disease problems when at non-optimal levels. This means an economic value of $179,000 for the 79 grower-participants.

Commercial vegetable demonstration, Daviess Co. One grower reduced his sprays 15% - 20%, eliminating 2 sprays over 116 acres, resulting in saving $2,320.

Plant Disease Diagnostic

A client survey indicated that the diagnostic responses and information received favorably impacted the pest management decisions. An estimated 650,000 acres of soybean were not sprayed with a fungicide as a direct result of soybean rust surveillance and disease diagnostic activities associated with this project.

Fertility Success

Improved nitrogen management techniques can increase overall nitrogen use efficiency by approximately 20%, leaving less N for environmental contamination and reducing the number of trips over the field. Improved N management resulted in approximately $30 per acre of additional income for the producer as a result of increased yield.

Insect Trapping

Surveys of Kentucky Certified Crop Advisors found that they use insect pest flight data to make scouting and control decisions. The information also alerted them to problems they would have missed. The information saved consultants on average 2.5 hours for each event. Twenty-four percent indicated that they used the trap data during the season to help them make decisions not to spray 20,875 acres of field crops with insecticides. Also, 15 counties confirmed damages caused by armyworms. About 3,700 acres were checked because of the issued warnings. The warnings saved approximately 64,000 bushels of corn, 150 tons of pasture and 7,275 bushels of wheat or approximately $389,000.

Teaching Growers to Use Refuges with Bt Corn

Insect management in field corn has undergone rapid and dramatic changes. Producers have moved from a threshold-based pest management system using broad-

spectrum insecticides, to a preventive system of Bt corn and seed treatments. Because all of the corn seed is now treated with a single class of insecticide and Bt corn represents the majority of our acreage, resistance management is now a heightened concern. A recent survey of corn producers at regional meetings indicated that as many as 40% of our growers may not be using refuges of adequate size to effectively manage resistance. Resistance management is explained to growers at state, regional, and county-based educational programs.

County-based vegetable programs
Scouting-based vegetable insect and disease management programs have been used the past two seasons in Lincoln and Casey Counties to aid vegetable producers to increase produce quality and yield while minimizing pesticide applications, saving growers at least $50 per acre.

IPM Web Pages
The IPM program web page: http://www.uky.edu/Agriculture/IPM/ipm.htm provides a gateway to expertise for interested individuals. The increase in "hits" over the years is one way to gauge the effects of these pages. In years past we have received ca. 250,000 hits per year. Recently our ability to measure use has changed, and we can no longer evaluate the number of individual "hits" However, we do know that more than 450 unique individuals (read addresses) are accessing this site. Starting on July 27, 2009 Google Analytics was added to the IPM website to allow for more current tracking and site usage information. As a result, we identified the visits from July to November 2009 originating from 34 different states and 36 countries.

Pesticide Safety Education
Extension entomology specialists and staff provide leadership for this program, training manuals and meetings, and maintain a website that provides on-line manuals and schedules of approved training and testing opportunities.

Agriculture and Natural Resource and Horticulture agents train and certify farmers as private pesticide applicators so that they may apply Restricted Use Pesticides safely and correctly. There are approximately 13,000 private applicators in the state that must be re-certified every 3 years, approximately 4,300 per year. In 2015 there were just over 260 training meetings with about 2.5 hours of content in the meeting. The trainings are done by agents at all CES offices across the state with materials prepared by extension specialists. A selection of presentations is provided that Ag Natural Resources & Horticulture agents may use in this task. Most of the topics are covered by narrated Powerpoint presentations. Some are YouTube videos or recorded presentations from workshops or county meetings. Most are 4 to 10 minutes long. Agents can tailor training meetings to the interests of the group so that the subjects are as relevant as possible and participants can leave with information that they can use.

Topics are developed from articles that have appeared in the Kentucky Pest News with occasional stories from the Mid-America Farmer Grower, or publications from other states. Each article is modified into a script and recorded. Powerpoint slides are

prepared to illustrate the topic and the finished presentation is completed in Windows Movie Maker. The goal is to add at least 2 topics to each category every fall. Preparation time for a program is about 3 hours.

Numbers of available topics by category

General – 18	Sprayers and application – 8
Grain, hay, pastures – 9	Alfalfa – 2
Corn – 11	Soybean – 8
Tobacco - 4	Wheat – 6
Vegetables – 9	Fruit – 10
Pesticide safety in Spanish - 4	

There are approximately 10,300 certified and licensed commercial and non-commercial pesticide applicators in Kentucky engaged over 25 categories of pest management (turf maintenance, structural pest control, rights-of-way, etc.) The pesticide safety education program provides more than 500 certification manuals each year to new hires for those businesses. Assuming an average starting salary of $20,000, this contributes $12.5 million dollars annually to the economy of the state. An on-line training site has been developed to allow people to develop the knowledge base required to pass the certification and licensing exam and to improve test taking skills. The site has had over 11,500 visits since its establishment this year.

Certified commercial and non-commercial applicators must accumulate 12 hours of training every 3 years to maintain their certification and license. Much of this training is provided by UK Cooperative Extension personnel.
A Pesticide Safety Education website has been established at
http://pest.ca.uky.edu/PSEP/welcome.html

The current goal is to update training materials and present them as web-based study modules for commercial and non-commercial applicators that are available at http://pest.ca.uky.edu/PSEP/welcome.html. The objectives of this work are to: 1. Reduce or eliminate the need for mailing printed manuals to people wishing to become certified and 2. Increase 1st attempt pass rate – align study materials with test questions. The tables below show the use of these pages.

Topic (Start date) Visits through 5/18/16

General

PPE	626	Hazards	598	Labels	1,029	Transport	1,030
Environ	740	Formulations	1,046	Drift	448	Planning	425
Spills	314						

Ag

Laws	2,152	Pests	744	Equip	270	Resistance	113
Demo	135						

Landscape

Laws	480	Pests	251	Equip	276

Public health - developed 5/16 to certify health department personnel for mosquito control, expanded to general pest control

Terms	294	Mosquitoes	251	Cockroaches	285
Lice, etc.	369	Fleas & ticks	381	Rodents	390
Wasps & hornets	274	General	133	Wood	156

Rights of way 285

Commercial and non-applicators (~10,000) need annual continuing education opportunities. Large companies located in or near metropolitan areas have regular access to training meetings and workshops. However, these opportunities are very limited or non-existent for individuals and small companies that operate in rural parts of the state. Some agents are utilizing educational meetings in their counties to provide meetings that provide continuing education credit in local communities by 1) assisting with the CEU approval process (~25 per year), and 2) helping to develop meeting agendas for counties.

Training manuals are being reviewed and updated to ensure that they contain information that is asked in certification tests. Important points in the manuals need to be emphasized.

A recent example of the impact of the pesticide safety education program comes from the city of Owensboro. The Department of Entomology provided a local program in the area that was attended by approximately 100 individuals. The city of Owensboro had 13 employees participate in the free training program. Compared to training costs through some of the other providers and programs, at a cost of $90 per person, this program provided at least $1,170 of training to the employees of the city of Owensboro.

4H/Youth Education Programs

The department creates displays and gives presentations at youth events across the state. Blake Newton, an extension specialist in the department, coordinates this active youth education program. Since 2003 there have been more than 14,000 contacts at museums, schools, science festivals, and other venues. Annual events include the Raven Run Night Insect Walk and Bugs-All-Day at the Lexington Explorium, each of which attracts about 200 attendees each year.

Community-based science projects - Starting in 2005, the Department began working closely with the Tracy Farmer Institute for Sustainability and the Environment on a series of year-long community-based science (CBS) projects. So far, these grant-funded (USDA and NSF) projects have engaged over 500 K-12 students from six Kentucky counties in long-term studies of a variety of entomological topics, including Mare Reproductive Loss Syndrome and Invasive Species.

Training opportunities - Several training opportunities have been provided for Kentucky 4H agents and K-12 teachers by the department, the availability of these opportunities is increasing. 4-H Entomology in-service training sessions were offered to agents. K-12 teachers enrolled in the CBS projects (above) attend a week-long workshop each summer. We created Braille and low-vision insect-study guides for K-12 teachers, and workshops were conducted in support of these materials.

Insect Identification Services
Identification of arthropods (approx. 700/year) submitted by county extension agents, specialists, private individuals and businesses is an important part of the extension entomology program. The lab participates in the Southern Plant Diagnostic Network, a web-based approach to problem diagnosis that contributes data to national bioterrorism and national security efforts. The insect identification lab also cooperates closely with the Plant Disease and Diagnostic Lab, Livestock Disease Diagnostic Center, UK Medical Center, and county health departments.

Resident Instruction
Individuals working with IPM concepts cooperate in a number of formal classes. The instructors of the class listed below have long been associated with IPM programs in Kentucky. Additionally, they rely on experts from various departments to fulfill a portion of their class schedule, thus continuing the team approach.

ENT 695 is a 3 credit hour course that is delivered to county extension agents by distance learning. It includes on-line narrated Powerpoint lectures along with a weekly Lync session. The Fall 2016 semester will be the 5th time the course has been offered. Approximately 40 agents have taken the course, either for credit or as professional development.

PLS-490 Topics in plant and soil science. Dr. Erin Haramoto (Agronomy, Production Res/Inst) A capstone course for majors in Plant and Soil Science to be taken near the conclusion of the student's academic career.

PLS 531 Plant Pest Management is being taught by Dr. Erin Haramoto, a weed scientist in the Department of Plant and Soil Science. This offering focuses directly on the "field experience" segment of IPM.

SAG 101 - Introduction to Sustainable Agriculture. Dr. Krista Jacobsen. Will incorporate IPM principles.

PLS /SAG 386, Plant Production Systems. Drs. Krista Jacobsen & Mark Williams, will incorporate IPM principles.

Departmental Web Resources
The Department of Entomology maintains several distinct web resources on multiple servers, including Extension Entomology Programs, Integrated Pest Management Programs, and the Kentucky Critter Files. Our web resources serve as our primary

interface within and outside the department and significantly enhance our extension, research, and graduate education activities within the Department. These resources are all linked through our main departmental website, located at https://entomology.ca.uky.edu/.

Main Departmental Website

From January 2010 to December 2015, our departmental website was hosted by College of Agriculture, Food and Environment servers at http://www2.ca.uky.edu/entomology. The college maintained detailed website usage statistics until March 2011, and during each of the 15 months of January 2010 to March 2011, multiple pages from our site were among the top 20 most-visited sites hosted by CAFE. For instance, in January 2010, 6 pages from our site were among the 20 most-visited of all college pages. During that period, ef636.asp ("Bed Bugs") was the second-most visited site (second only to the main college homepage), with 16,549 hits. In March 2011, 8 of our pages were among the top 20 and 2 pages ("Bed Bugs" and "Termite Control") were the second and third most-visited.

Google Analytics, a software package that tracks visits to our site, has allowed us to gather detailed usage statistics over the years. For instance, from January 2010 - December 2014, our site received 13,032,845 page views from over 100 countries and all 50 United States. The most-visited page during that period was ef636.asp ("Bed Bugs"), with 1,264,041 views. Visits to our site have gradually increased over time. In 2014 our site received 2,675,376 total visits, compared to 2,370,434 visits in 2010, an increase of about 12%. Visits by Kentuckians have grown even more. In 2014 our site received 112,886 views by Kentucky users, compared to 84,291 visits in 2010, an increase of about 33%.

The main departmental website contains basic departmental information such as personnel, contact information, and application materials for prospective students. However, our metrics indicate that our collection of over 230 *ENTfacts* are by far the most-visited content. *ENTfacts* are online factsheets (available in both HTML and PDF formats) that provide topic-specific information and recommendations for Kentucky agricultural professionals, gardeners, homeowners, consumers, and others who are impacted by insects and arthropods. During the period of January 2010 to December 2014, 47 of the 50 most-visited pages within our site were *ENTfacts*. The other 3 most-visited pages were our main homepage and menu pages that are associated with *ENTfacts*. During that same period, total visits to HTML and PDF versions of our *ENTfacts* accounted for over 12,000,000 of the 13,032,845 total page views to our website.

In 2015, the main website was moved to a Drupal CMS (content management system), including all of the *ENTfacts*. This new system will allow us to post and edit content much more quickly than the old platform.

Kentucky Critter Files

The Kentucky Critter Files (located at http://www.uky.edu/Ag/CritterFiles/casefile/casefile.htm) is an on-line guide to common insects, spiders, and other arthropods that are encountered by Kentucky Youth and 4-Hers. From January 2010 to December 2014, this site received 2,571,730 page views. Kentucky users contributed 261,575 of those page views.

Part 4 Other Areas

A. The Office of the State Entomologist

The Office of the State Entomologist is responsible for the licensing of businesses and individuals that buy, sell, ship, or distribute nursery stock for commercial or monetary gain in Kentucky. This includes, but is not limited to, nurseries, garden centers and landscapers. We conduct annual inspections of nurseries and assist nursery owner/managers with their pest problems. 823 nursery dealers were licensed in 2015; 409 nurseries were licensed in the fiscal year 2014-2015.

Members of the State Entomologist Office also handle Phytosanitary Certificate Applications for individuals who ship any plant or plant products out of Kentucky. This includes international movement of plants and plant products and domestic shipments within the United States.

The vast majority of state entomologists in the United States are associated with state governmental departments of agriculture. However, Kentucky statutes state that the chair of the Department of Entomology of the Agricultural Experiment Station at the University of Kentucky shall be the State Entomologist.

Personnel in the Office of the State Entomologist

- Dr. S.R. Palli, State Entomologist
- Mr. Joe Collins, Senior Nursery Inspector
- Mr. Carl Harper, Senior Nursery Inspector
- Dr. Janet Lensing, Cooperative Agricultural Pest Survey (CAPS) Coordinator
- Mr. J.D. Loan, Insect Survey Coordinator (Eastern Kentucky)
- Ms. Katie Joya, Nursery Inspector (Western half Kentucky)
- Ms. Jennie Condra, Nursery Inspector (Eastern half Kentucky)

Selected Examples of Pest Surveys conducted in Kentucky

The Office of the State Entomologist received federal funding for invasive pest surveys each year. Some surveys are funded through the federal-state partnership CAPS (Cooperative Agricultural Pest Surveys) program, others are funded as special line items through the USDA, and some are funded through the USDA Farm Bill Program. The CAPS Coordinator applies for funding and manages the surveys along with the other OSE personnel. As an example, funded projects from 2015 are listed below:

2015 CAPS Surveys focused primarily on invasive moth pests: Soybean Commodity Survey, Corn Commodity Survey, Small Grains Commodity Survey, Forest Pests in State Parks Survey (invasive moths, Asian longhorned beetle,

hemlock woolly adelgid)

2015 Other Line Item Surveys: Gypsy Moth Survey, Imported Fire Ant Survey, Pine Shoot Beetle Survey

2015 Farm Bill Funded Projects: Asian Longhorned Beetle Outreach in Kentucky, *Phytophthora ramorum* Nursery Survey, Walnut Twig Beetle/Thousand Cankers Disease Survey, Apple Commodity Survey, Grape Commodity Survey

See www.ky-caps.org for a complete list of pest surveys conducted in Kentucky, both past and present. Below are some excerpts of survey results that can be found on the ky-caps.org website:

Gypsy Moth: Gypsy moth, which was initially introduced to the United States in Massachusetts in 1869, is now a serious forest pest endemic to the northeastern states. Kentucky is nearly surrounded by regulated, infested areas in Virginia, West Virginia, Ohio, Indiana and eastern Tennessee. We have been surveying for this pest since 1983 using triangular delta traps that are baited with a synthetic female sex pheromone to attract and capture male gypsy moths. Detection traps are set throughout the state in order to detect moths. Delimiting traps are extra traps set in an area which previously had several moth captures. Slow the Spread is a program that gives funding to states to intensively trap along the leading edge of the zone which is generally infested with gypsy moth to detect populations and allow for quick eradication.
Numbers of moths captured in each county are shown in parentheses after the county name.

2012
- Number of Traps Set: 2938
- Number of Moths Captured: 8
- Number of Positive Counties: 4
- Positive Counties: Boone (1), Campbell (4), Carter (2), Fayette (1)

2013
- Number of Traps Set: 2634
- Number of Moths Captured: 9
- Number of Positive Counties: 8
- Positive Counties: Campbell (1), Floyd (1), Johnson (1), Kenton (1), Lawrence (1), Lewis (1), Magoffin (1), Mason (2)

2014
- Number of Traps Set: 7065 Detection, 12 Delimiting, 546 Slow the Spread
- Number of Moths Captured: 3
- Number of Positive Counties: 3
- Positive Counties: Boyd (1, STS), Fayette (1, Detection), Pendleton (1, Detection)

2015

- Number of Traps Set: 7328 Detection, 41 Delimiting, 505 Slow the Spread Detection, 9 Slow the Spread Delimiting
- Number of Moths Captured: 84 in Detection Survey, 86 in Slow the Spread, 1 in the US Forest Service trap
- Number of Positive Counties: 27 in Detection Survey, 5 in Slow the Spread Survey, 1 in US Forest Service survey
- Positive Counties (Detection): Boone (2), Breathitt (13), Clark (1), Elliott (2), Fayette (2), Fleming (1), Floyd (7), Gallatin (2), Grant (2), Greenup (1), Henry (2), Johnson (1), Knott (7), Lee (6), Leslie (1), Letcher (1), Madison (1), Magoffin (10), Menifee (4), Montgomery (3), Morgan (3), Nicholas (1), Owen (3), Perry (1), Powell (2), Scott (2), Wolfe (3)
- Positive Counties (Slow the Spread): Boyd (1), Floyd (7), Letcher (5), Martin (1), Pike (72)
- Positive Counties (US Forest Service): Clay (1)

Pine shoot beetle survey: Since the introduction and subsequent establishment of *Tomicus piniperda*, the pine shoot beetle, in states immediately north of Kentucky there are concerns about the possibility that the pine shoot beetle has spread into Kentucky. Lindgren funnel traps baited with alpha-pinene (A-pinene) lure have been used in these surveys.

Traps are set in tree farms, roadside areas, forested areas, and commercial nurseries along the Ohio River and are checked once every two weeks. Pine shoot beetle was found for the first time in Kentucky in March 2015.

2012

- Number of Traps Set: 37
- Number of Beetles Captured: 0
- Number of Counties Included in the Survey: 11
- Counties Surveyed: Boone, Boyd, Bracken, Campbell, Carter, Greenup, Kenton, Lewis, Mason, Pendleton, and Rowan

2013

- Number of Traps Set: 40
- Number of Beetles Captured: 0
- Number of Counties Included in the Survey: 11
- Counties Surveyed: Boone, Boyd, Bracken, Campbell, Carter, Greenup, Kenton, Lewis, Mason, Pendleton, and Rowan

2014

- Number of Traps Set: 39
- Number of Beetles Captured: 0
- Number of Counties Included in the Survey: 11
- Counties Surveyed: Boone, Boyd, Bracken, Campbell, Carter, Greenup,

Kenton, Lewis, Mason, Pendleton, and Rowan

2015

- Number of Traps Set: 29
- Number of Beetles Captured: 2
- Number of Counties Included in the Survey: 8
- Counties Surveyed: Boone, Boyd, Bracken, Campbell, Greenup, Kenton, Lewis, Mason

Outreach

In 2009 emerald ash borer (EAB) was detected in Kentucky for the first time. Since that time EAB has rapidly spread throughout the eastern half of Kentucky and can now be found more than 40 counties. EAB is responsible for the death of a large number of ash trees within the Commonwealth, and the public has taken notice of all the dead and dying trees. To capitalize on this, the State Entomologist's Office participates in many outreach events to teach both industry and the public about invasive pests. This includes not only EAB but also Asian Longhorned Beetle (ALB) which was discovered in Ohio approximately 10 miles from the KY border in 2011. A known pathway for both ALB and EAB movement is firewood and the message that is delivered is to not take firewood on camping trips but rather to purchase locally sourced firewood.

B. Center for Arthropod Management Technologies (CAMTech)

The University of Kentucky and Iowa State University, in partnership with NSF and industry, established a National Science Foundation Industry/University Cooperative Research Center (I/UCRC), the Center for Arthropod Management Technologies in 2013. The I/UCRC) program was launched by the National Science Foundation more than thirty years ago as an initiative to stimulate non-federal support of research and development, speed the delivery of technologies, and improve the industrial competitiveness of the United States. There are approximately 60 active I/UCRCs with more than 1,000 industrial firms and government labs as members. The vision for CAMTech is to streamline the efforts of industry, government, and academia toward the development of technologies for the effective management of arthropod pests. The CAMTech research will acquire fundamental knowledge to facilitate the development of arthropod management technologies within the industrial sector. CAMTech will augment the basic research foundation necessary for the applied goals of industry. Research within the center will lead to significant commercial benefits in areas such as:

- Management of Arthropod resistance to current control strategies
- Deployment of pest-tolerant transgenic plants
- Application of RNA interference for pes management
- Identification of novel targets for new pest control measures
- Development of new and optimized methods associated with arthropod pest management

While the I/UCRC is largely supported by membership fees, the benefits to industry membership far outweigh the annual fee of $50,000. Benefits to Deaprtment and University hosting I/UCRC include; vehicle to attract and to retain students to STEM

fields, stimulating creativity and invigorate the research labs, diversifying the source of funding, trusted relationship with industry, provide possible access to otherwise inaccessible data and to additional funds through applied research projects byproduct of the shared value and ready partners for translation

Currently, CAMTEch is supported by nine members paying $450,000 in the annual membership fee. Six projects including three at University of Kentucky, Department of Entomology are supported by CAMTech in 2015-2016.

1. Enveloped porous nanoparticles for RNA delivery to insects – Knutson and Webb
2. Integrating IPM into IRM theory for improved resistance management and pest suppression – Fox and Obrycki
3. Mechanisms of RNA interference 2 – Palli

C. Entomology office – Organization and customer service philosophy

The University of Kentucky Department of Entomology Administrative Office is comprised of four staff members, one of which is retiring in January 2017. The staff are currently designated specific areas of expertise and responsibility.

Alexander Hesler serves as the administrative assistant to the department chair/state entomologist. In this role, he provides assistance in any manner needed by the department chair. Similarly, Alexander serves as the assistant to the co-director of CAMTech. He coordinate's the CAMTech program with a counterpart located at Iowa State University. In addition to these two roles, Alexander serves as faculty support for the research and instruction faculty in the Department of Entomology.

Darlene Thorpe currently serves as faculty support to the Department of Entomology's extension faculty. She also serves as the assistant to the director of graduate studies in the department. Darlene works as one of the coordinators for the Kentucky Pest Control Short Course, held annually in Lexington, Kentucky. In addition to this course, Darlene also administers the commonwealth's pest control applicator training exam.

Joe Teets, our newest team member, is the department's primary purchaser. He currently controls the online purchasing system for all of the department's orders. He also oversees the editing process of all University Procard purchases. He works alongside the department business officer to provide any type of fiscal assistance to the department chair and faculty.

Andrew Wells serves in the capacity of business officer. His primary mission is to oversee all department financial and human resource activity, provide counsel to the department chair, and to manage the day-to-day administrative operations of the department. Andrew provides each account holder in the department required accounting documents on a monthly basis. He also provides financial and budgetary aid in the form of budgetary guidance and reporting tools to the department's primary investigators.

The administrative team in the Department of Entomology is currently undergoing a philosophical transition. An attitude of service with a focus on effectiveness and efficiency is currently being written in the protocols developed by this team for the department as a whole. The creation of standard operating procedures for common tasks performed throughout the department is a major priority for the administrative team so as to add an administrative structure to the department with the hopes that department members will feel secure in their actions and the reduction of administrative errors and mistakes. A focus on the mission of the department will become a priority for the administrative team in the coming months so as to develop an emphasis on the service to the department's faculty and students.

Part 5: Productivity of Entomology Department

A. Extension Productivity

The department has published over 230 entomology fact sheets and lesson plans over the past 5 years. These valuable sources of information are disseminated at meetings and workshops throughout Kentucky and are available electronically on the department's website. Extension and research faculty also publish many articles in leading industry trade journals with international circulation. They are routinely interviewed by news organizations throughout Kentucky, and such national news outlets as *The New York Times, Washington Post, U.S. News & World Report, National Public Radio, Mid-America Farmer Grower.*

Newsletter

Kentucky Pest News newsletter is a joint venture among plant pathologists, entomologists, and weed scientists in the college with occasional contributions from some other specialists. Extension entomologists and staff regularly provide articles for the newsletter.

Extension Clientele Served

Each year the extension group provides hundreds of consultations with householders, growers, businesses, institutions and state agencies about pest problems, pesticide issues, bites, stings, product contamination and pest-related litigation.

Householders (advice to thousands per year) Kentucky Pest Control Industry
KY Housing Authorities
KY Food Processing & Pharmaceutical Industries
KY Health Departments and Health Care Industry
KY Public Schools
KY Parks & Recreation
KY Wood Products Industry KY Correctional Facilities
KY Department of Agriculture
KY Office of the Attorney General

Some specific KY clientele served in the past 5 years, most in the form of on-site pest management inspections and advice included:

Ashland Oil, GTE, General Electric, LexMark, Hitachi USA, Armour, Algood & Kroger Foods, Great Harvest Bread Company, KY History Center, KY Transportation Cabinet, Fayette County Attorney's Building, Shakertown, Ronald McDonald House, UK Healthcare, Humana Hospitals, Maker's Mark, Amazon.com.

Invasive species Webpages are maintained for invasive arthropod species in Kentucky. They include maps of the known distribution in the state, relevant local information, and links to regional or national pages. Pages currently available are: Asian chestnut gall wasp, brown marmorated stink bug, emerald ash borer, hemlock woolly adelgid, kudzu bug, spotted wing *Drosophila*, sugarcane aphid, and Zika virus.

A biological control program for spotted knapweed has been initiated in a joint project with the UK Weed Science program and the Ky Department of Highways. Knapweed root weevils were released at two sites in Hardin County in 2015. Five additional sites have been identified for releases of this insect knapweed flower weevils in 2016. Spotted knapweed (*Centaurea stoebe* spp. *micranthos*) is an invasive biennieal or short-lived perennial plant that is phytotoxic to other plants. It spreads rapidly along artificial corridors, such as road rights-of way and is a threat to pastures.

Highlights of Extension Programs and Activities

Kentucky Pest Control Short Course
The conference, organized and hosted by our extension group, is recognized as one of the finest training events of its kind in the country. In fall 2015, 650 individuals from Kentucky and more than a dozen surrounding states attended the meeting in Lexington, which also received national trade industry coverage by *Pest Control* and *Pest Control Technology* magazines.

Major Extension Programs of the Department
Kentucky Pest Management Center
Gypsy Moth Program
USDA Crop Profiles and Pest Management Strategic Plans PSEP (Pesticide Safety Education Program)
IPM (Integrated Pest Management)
CAPS Program (Cooperative Agricultural Pest Survey) School Visits; classroom presentations.

B. Research Productivity (Data from Agricultural Experiment Station Summaries)

Between 2010 and 2014, members of the Department of Entomology maintained an excellent record of productivity, which is among the highest departmental productivity rates for the CAFE.

Publications by members of the Department of Entomology: 2010-2014.

Year	Book and Chapters	Journal Articles	Other Research Pubs	Avg. Number of Publications/ tenure-track faculty	Avg. Number of Publications / Research FTE
2010	4	51	10	3.6 (N=18)	5.5 (N=11.4)
2011	2	49	5	3.3 (N=17)	5.1 (N=11)
2012	9	47	5	3.6 (N=17)	5.6 (N=10.8)
2013	5	66	7	3.9 (N=17)	6.1 (N=10.8)
2014	3	55	8	3.9 (N=17)	6.2 (N=10.5)

From 2010 to 2015, entomology faculty, students, post-docs and staff published in a wide range of high impact journals, e.g., *PlosGenetics, Journal of Biological Chemistry, Nature Communications, Scientific Reports, American Naturalist, Animal Behaviour, Archives of Insect Biochemistry and Physiology, Journal of Molecular Entomology, Molecular Ecology, Biological Control, Ecology, Environmental Entomology, Evolution, Gene, Genetics, Insect Biochemistry and Molecular Biology, Journal of Economic Entomology, Oecologia, Oikos, and Virology*. In addition, three entomology faculty members were recognized as experts in the sub-disciplines by receiving an invitation to write a review article for the *Annual Review of Entomology*, which has the highest impact factor of all Entomological journals.

See Appendix 5 for more information on publications.

Between 2010-2015, entomology faculty have generated over $8M in grant funding, averaging $100,000 per Research FTE per year. Federal competitive grant sources included NSF, USDA/NRI and NIH.

FY	Total Grant Funding ($)	Ave per all FTE	Ave per Research FTE	% FEDERAL COMP. GRANT DOLLARS
2010-2011	$2,529,559	$140,531 (18)	$215,465 (11.74)	53%
2011-2012	$269,695	$15,864 (17)	$24,341 (11)	32%
2012-2013	$1,712,250	$100,721 (17)	$158,689 (10.8)	53%
2013-2014	$2,565,993	$150,937 (17)	$237,586 (10.8)	36%
2014-2015	$1,226,814	$72,166 (17)	$116,728 (10.5)	10%

From FY 2010-2015 the percentage of awards to the department from federal competitive sources ranged from 10 to 53%.

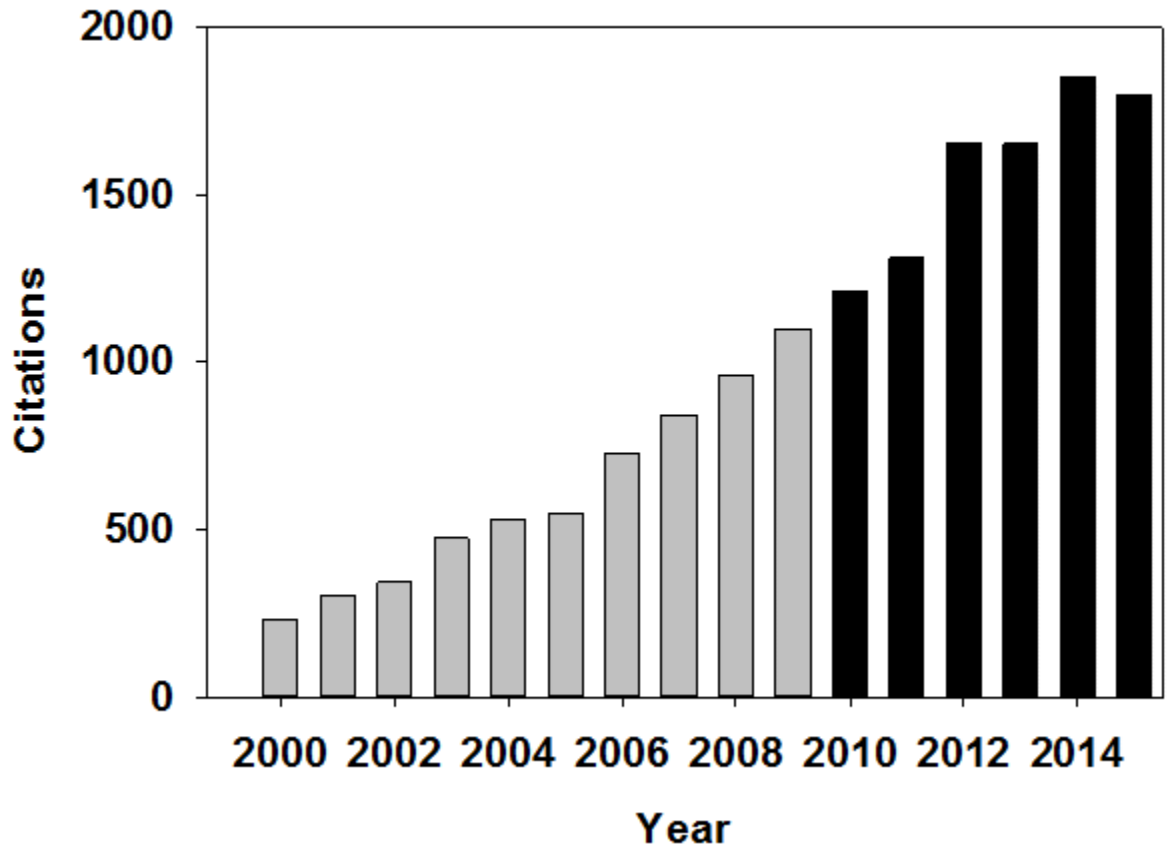


Figure 1. Citations of works published by **current and recently retired faculty members**. Black shading is for the current review period (2010 – 2015). Web of Science, 1 June 2016. Numbers include only publications with zip code 40546 in the address field. Authors include Bessin R, Brown G, Dobson S, Fox C, Harwood J, Haynes K, Johnson D, Obrycki J, Palli S, Potter D, Potter M, Rieske L, Rieske-Kinney L, Rittschof C, Sharkey M, Teets N, Townsend L, Villaneuva R, Webb B, White J, Yeargan K or Zhou X. Publications that originated by current faculty before employment at UK are not included. Publications by UK faculty that retired before 2015 are not included.

Another indicator of the productivity of the entomology faculty and their influence and contributions to science is based on the number of citations of their publications as summarized by the Web of Science. There has been a general increase in the annual number of citations for the faculty in Entomology. This increase is expected for the senior faculty. Additionally, even though our extension faculty does not have formal research responsibilities, they continue to publish in referred journals and their

scientific contributions add to the departmental citations. Faculty in Entomology department also maintained a study rate of 50-60/year during the review period.

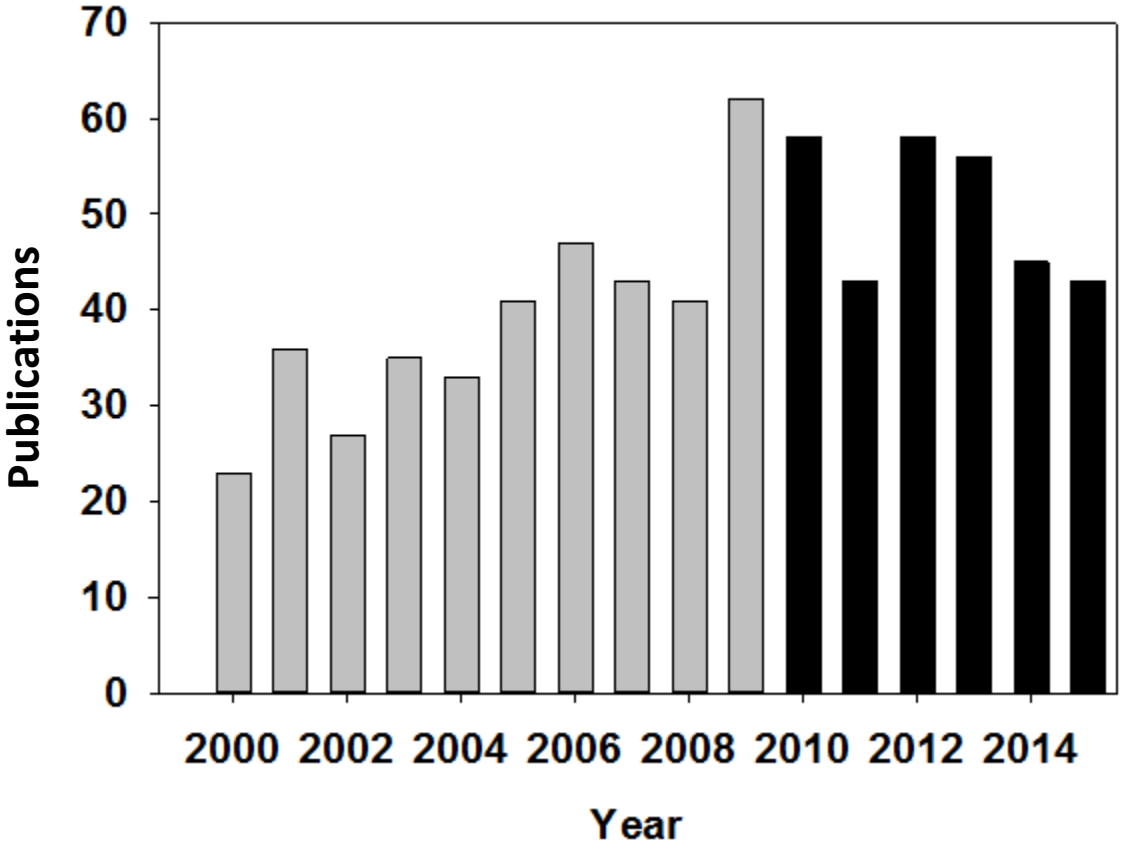


Figure 2. Publication by **current and recently retired faculty members**. Black shading is for the current review period (2010 – 2015). Web of Science, 1 June 2016. Numbers include only publications with zip code 40546 in the address field. Authors include Bessin R, Brown G, Dobson S, Fox C, Harwood J, Haynes K, Johnson D, Obrycki J, Palli S, Potter D, Potter M, Rieske L, Rieske-Kinney L, Rittschof C, Sharkey M, Teets N, Townsend L, Villaneuva R, Webb B, White J, Yeargan K or Zhou X. Publications that originated by current faculty before employment at UK are not included. Publications by UK faculty that retired before 2015 are not included.

Faculty Honors and Awards

Bessin:

2014 ASHS Southern Region Extension Publication Award ID-36. An IPM Scouting Guide for Common Problems of Cole Crops in Kentucky. T. Coolong, K. Seebold, R. Bessin.

2013 IR-4 Southern Region Meritorious Service Award.

2011-2013 Entomological Society of America Treasurer (Governing Board & Executive Committee).

Fox:

2015 David Parkin Visiting Professorship, University of Bath.
2012 University of Kentucky, College of Agriculture, Prestigious Paper Award.
2011 Royal Entomological Society, Best Paper Award for 2009 paper published in *Physiological Entomology*.

Potter, D.

2014 College of Agriculture, Food, and Environment High Impact Research/Extension Program Award.
2010 United States Golf Association Green Selection Award.
2008-2011 B.C. Pass Endowed Professorship

Potter, M

2016 ESA Distinguished Achievement Award in Urban Entomology.
2013 University of Kentucky "Provost's Distinguished Service Professor" (six recipients university-wide, recognizing high achievement and service to university and society).
2013 Featured in the 80th anniversary issue of Pest Management Professional, as one of 80 'Difference Makers' in the history of pest control.
2012 Inducted into Professional Pest Control Hall of Fame.
2011 National Pest Management Association Pinnacle Award, the industry's highest honor for career contributions to pest management.
2011 UK College of Agriculture High Impact Research & Extension Award (with K.F. Haynes and S.R. Palli).
2011 Honorary Member of the Ohio Pest Management Association (only10 recipients have been named in the association's 65-year history).

Haynes

2012 C. V. Riley Award, North Central Branch, Entomological Society of America for "outstanding contributions to the science of entomology".
2011 High Impact Research/Extension Program Award (with M Potter and R. Palli).
2011 Fellow, American Association for the Advancement of Science.

Obrycki

2016-2020 Selected as Bobby C. Pass Research Professor
2013 Fellow, American Association for the Advancement of Science

Palli

2014 Fulbright-Nehru Academic and Professional Excellence Award
2014 Selected as a Fellow of the Entomological Society of America
2013 Prestigious Research Paper Award, University of Kentucky
2013 ESA Recognition Award in Insect Physiology, Biochemistry, and Toxicology
2013 President, Bluegrass Indo-American Cultural Society

2012 President, Physiology, Biochemistry, and Toxicology Section of Entomological Society of America.
2011 High Impact Research/Extension Award, University of Kentucky.

Villanueva:

2016 Friends of IPM Award – Southern Region School IPM Working Group.
2016 Texas A&M AgriLife Extension Service Superior Service Award.
2015 Recipient of award for the control of the sugarcane aphid by the Cotton and Grain Producers of the Lower Rio Grande Valley of Texas.
2014-2015 Chair of the Texas Sugarcane Aphid Task Force –Texas A&M University and Texas A&M AgriLife.
2014-2016 Section Director of Outreach in the Subtropical Agriculture and Environments Society.
2014 Recognition award for the contribution on the identification and control of the sugarcane aphid SAGARPA, INIFAP, Mexico.
2013 President of Acarological Society of America.
2013 Recipient of the Administrator's award for the participation in the multi-agency team that developed and implemented the area-wide management program to control Asian citrus psyllid and the spread of huanglongbing disease in Texas – USDA-APHIS.
2013-2015 Committee member of the Recognition Award - Entomological Society of America.
2011 Recipient of an award for contributing to the agronomic knowledge on the Sustainable Agriculture Approach -Texas Plant Soil Lab Certificate.

Rieske-Kinney

2014-2015 AD Hopkins Award for outstanding contributions in forest entomology. The highest recognition from the Southern Forest Insect Work Conference.

Rittschof:

2015-2017 Entomological Society of America Science Policy Fellow.
2015 Premier Presentation selection for 2015 Entomological Society of America conference.
2014 National Academies of Sciences Christine Mirzayan Science Policy Fellowship Finalist.
2013 Best Talk Winner at the 3rd Annual Postdoctoral Research Symposium (the Beckman Institute.
2011 Sigma Xi Award for Graduate Student Research, University of Florida.
2011 Walter Clyde Allee Competition for Best Student Paper Finalist Animal Behavior Society Meeting.

Teets:

2015 Runner-up, University of Florida Postdoc Research Symposium oral Presentations.
2015 Selected to participate in New Generation of Polar Researchers Leadership Symposium.

2013 Entomological Society of America John Henry Comstock Award for Excellence in Graduate Research.
2013 First Place, Ohio Agricultural Research and Development Center Student Poster Competition.
2013 Ohio Agricultural Research and Development Center William E. Krausse Director's Award for Excellence in Graduate Research.
2012 Skip Nault Research Award, Department of Entomology, Ohio State University given annually to the top student-authored paper in the department.
2012 Entomological Society of America International Congress of Entomology Travel Award for travel to International Congress of Entomology in Daegu, South Korea.
2012 National Science Foundation Antarctic Service Medal – awarded to individuals with at least six weeks of field research experience at a US Antarctic base.
2011 First Place, Physiology, Biochemistry, and Toxicology Section of the Entomological Society of America Student Paper Competition.
2011 Ohio State University Ray Travel Award for travel to the Entomological Society of America Annual Meeting in Reno, NV.
2011 NSF Travel Award for travel to the Society for Experimental Biology meeting in Glasgow, UK.

Webb
2011-2016 University of Kentucky Provost's Distinguished Professor.

White:
2012 Marsico Scholar, Denver University.
2010-2011 University of Kentucky, Wethington Award.

See Appendix 6 for additional faculty information.

Benchmark Comparisons

There are Departments of Entomology at 13 of the benchmark institutions used by the University of Kentucky. Each of these 13 universities is a land-grant institution. Only tenured or tenure-track faculty listed on the departments' websites are included in the below table (data collected in June 2016). Nine of the 13 Departments of Entomology at our benchmark institutions are larger than ours at the University of Kentucky (11 departments if faculty joint appointments are included in the total for the University of Arizona and if affiliates are included for the University of Illinois). Despite our relatively small size, the Department of Entomology at the University of Kentucky has been ranked as a top 10 (upper 25 %) graduate program in Entomology (among all Entomology programs) during the past three years in the Academic Analytics ratings of graduate programs in the United States. Relative to the Departments of Entomology at our 13 peer institutions, the Department of Entomology at the University of Kentucky ranked ahead of 8 programs and below 5 programs in the most recent Academic

Analytics summary for 2008.

Institution	Number of faculty in Department of Entomology
Michigan State University	34
North Carolina State University	23
Ohio State University	18
Pennsylvania State University	27
Purdue University	34
Texas A&M University	39 (on and off main campus faculty)
University of Arizona	22
University of Florida Entomology and Nematology	63 (Gainesville faculty, which includes Nematologists)
University of Georgia	34 (three locations)
University of Kentucky	**17**
University of Illinois	14 plus 18 affiliates
University of Maryland - College Park	22
University of Minnesota - Twin Cities	19
University of Wisconsin - Madison	14

C. Diversity of faculty, staff, and students

The members of the Department of Entomology are committed to building on the strengths of a diverse group of faculty, staff and students. Of the 26 students currently enrolled in our graduate program, 14 are female (54%) and 7 (26%) are international students. The staff in the Department is balanced between males and females. Out of 23 staff members, 10 are female (43%). The diversity of the faculty in the department has increased due to our recent hires; we currently have three women and three international faculty in the department.

D. Fostering a professional and creative environment

All members of the Department work towards creating a professional and creative environment. Examples of the types of activities within the department include:

- Support student attendance at professional meetings,
- Proposal and Exit Seminars by graduate students,
- Encouragement and recognition to publish results while a graduate student, and
- Encouragement to present results at the professional meeting.

E. Efforts to maximize program effectiveness

During the past years, several new initiatives have been established to enhance the effectiveness of departmental programs. Examples include a graduate student publication scholarship program designed to encourage students to publish their

studies promptly. The Clarke-Knapp Endowment Fund was established to support graduate student travel to scientific meetings to present research results. A Student Choice Seminar Speaker is hosted by our students on an annual basis. Students annually recognize a member of the Department who has engaged in outreach activity (Shelby Stamper Memorial Outreach and Extension Award). A Distinguished Alumni Lecture Series has been developed to invite successful alumni of the Department of Entomology to present a seminar and meet with current graduate students. This program not only highlights our successful graduates from the Department but it also highlights the faculty mentors within the Department. The Bobby Pass Research Professorship was established in the Department in 2008. This endowed professorship is currently held by Ken Haynes, Full Professor in the Department of Entomology. An Urban Entomology Graduate Fellowship was established to attract an outstanding Ph.D. student to our graduate program.

F. Quality enhancement plans

We focus on enhancing scholarship including Critical Thinking, Effective Communication, & Academic Integrity among the members of the department. Through the offering of various courses including topical seminars, we teach many of the skills necessary for students to be ethical, informed decision-makers and communicators.

Part 6: Goals and Plans for the Department of Entomology

The plan for the Department of Entomology is to continue to foster a dynamic, synergistic, creative environment for research, teaching, and extension. The Department has a healthy collegial environment for graduate student training, research and extension. We embrace new technologies and discover new knowledge to follow our intellectual pursuits and address societal issues. Our new discoveries will continue to be applied in mission-oriented programs through technology transfer. Our new knowledge and information will be transferred to students and the public through our integrated programs in research, teaching, and extension.

Entomology as a profession is changing rapidly. New insect transmitted diseases are emerging with impacts at local, national and global levels. Urban pests such as bed bugs are on the rise. Because of an increase in international travel and trade, the number of invasive insect species that are reaching major pest status is on the rise as well. Insects that perform pollination services are declining at an alarming rate. To address these and other emerging issues, it is essential that we support, enhance and strengthen the department in relevant areas. The impending retirement of several senior faculty provides opportunities to strengthen faculty groups that can compete nationally and internationally in emerging areas such as vector management, invasive species mitigation, and pollinator biology. Training future professionals that can tackle these emerging problems is a challenge that the Department of Entomology stands ready to address. Going forward, we will strive to strengthen our ability as an Entomology department that conducts cutting-edge research, instruction, and outreach

aimed at protecting plants, animals, humans and environment from insects to support one health initiatives at the state and national levels. To achieve this, we plan to recruit faculty that specialize in vector relations, and the biology and management of native and non-native pests for the protection of agricultural, urban, and natural resources. To that end, we have initiated discussions on developing a BS/MA program in the biology and management of vectors and the diseases they transmit

It has been a long-term goal of the Department of Entomology to house our programs in one building. Progress has been made to consolidate the department, and most faculty, staff, and students are now located on the second and third floors of the Agricultural Science Center North and in a section of the seed house in the greenhouse complex. However, there are four research programs in the Dimock Building and two research programs in the Plant Sciences Building. Despite the splintering effects of three locations for departmental personnel, we have maintained a strong esprit de corps and highly productive programs. The current situation is not ideal, and we continue to work towards the long-term goal for the Department of Entomology to be housed in a single modern facility.

The following are some of the long-range plans for the Department of Entomology

Research

- The department should develop a few integrated research foci with faculty with complementary expertise which will become nationally prominent research areas for the Department.
- New areas of emphasis discussed among faculty include disease vectors, invasive species and pollinator biology. These research concentrations will be accomplished through new hires with complementary strengths.
- The department will target future faculty hires to address areas of research where an expansion of extramural support is likely to occur, and where there are long-term needs identified at the state, national or international levels.
- Research, extension, and teaching needs should also guide hiring new faculty.
- The department will encourage the creation of and/or participation in interdepartmental and inter-college research programs.
- We should identify means to improve departmental research facilities and equipment.
- We will develop strategies to attract multi-million dollar individual and collaborative grants.

Instruction

<u>Undergraduate education</u>

- We should consider increasing our offerings of undergraduate service courses, such as ENT 110.
- We should consider developing undergraduate courses, a minor or a major in

disease vectors, invasive species and pollinator biology. Undergraduate courses may provide income for teaching assistantships for graduate students as well as opportunities for gaining experience in teaching.
- We should maintain our commitment to Ag Biotech program.
- We should explore offering selected courses through distance learning.

Graduate education

- We should develop a culture of department-wide student participation in reading groups and seminars that are outside our normal coursework framework.
- The department should provide credit for student participation in such seminars, such as a catchall ENT course number, to encourage and reward students for participation.
- We should develop a mechanism to provide/encourage/reward training in teaching.
- We should expand graduate offerings targeted to extension agents or other industry professionals.
- We should expand our MS-plan B for these specific groups. We should continue to revise our core curriculum to include an integrated core curriculum and professional development courses.
- We should increase our graduate student stipends to reach levels offered by peer institutions.

Extension

- We must maintain the current critical number of extension faculty and specialists to sustain existing educational programs.
- Because faculty are actively involved in applied research and graduate training. Consequently, they must have dedicated technical help.
- We should maintain latitude and support to respond to new issues.
- As federal programs (IPM, IR-4, PSEP) mature it may not be necessary to maintain coordination of these programs by entomology faculty. These programs may be coordinated by staff-level personnel or transferred to other units.
- Federal funds for the pesticide applicator training program have been cut by about 80%, but have increased reporting requirements, and Kentucky Department of Agriculture funding to maintain the private applicator database is uncertain. Charging for the private applicator and commercial training or training materials and moving to online training would improve the sustainability of the program.

Wishlist

1. Promptly replace retiring faculty and staff. Explore new opportunities to hire faculty members specializing in vector ecology, nematology, landscape ecology, invasive species, urban entomology and public health entomology.
2. Modernize the graduate program and develop graduate/undergraduate courses and programs in disease vectors/invasive species/pollinator biology.

3. Relocate all Entomology faculty/staff/students into one new building.
4. Facilitate efficiency in the delivery of our three core missions by improving infrastructure, facilities and equipment.

2015 Department of Entomology UK @ Work Survey

Category	Item Text	Provost Overall (n=2,795)	CAFE Overall (n=694)	CAFE Faculty Overall (n=103)	CAFE Staff Overall (n=591)	Entomology (n=17)
Career Dev.	At UK, there are sufficient opportunities for me to receive training to improve my skills in my current faculty/staff position.	72	76	66	77	88
Career Dev.	I believe I have the opportunity for personal development and growth at the University.	74	73	77	73	82
Career Dev.	I have a reasonably good idea of my possible career paths at UK.	67	70	N/A	70	54
Career Dev.	I think the University is doing a good job of retaining its most talented faculty and staff.	41	46	35	48	76
Career Dev.	In my opinion, the most competent people get promoted.	41	44	55	42	59
	Career Development Averages:	59	62	58	62	72
Communication	UK does an excellent job of keeping faculty/staff informed about matters affecting us.	68	74	55	77	76
Communication	Sufficient effort is made to get the opinions and thinking of faculty/staff.	55	64	47	66	71
	Communication Averages:	62	69	51	72	74
Diversity & Inclusion	UK leadership recognizes and respects the value of human differences.	73	79	73	80	76
Diversity & Inclusion	I feel a sense of community at UK.	70	74	67	76	88
Diversity & Inclusion	I feel that UK leadership supports equal opportunity for all faculty/staff.	63	71	66	71	82

Diversity & Inclusion	UK effectively addresses campus incidents of intolerance and bigotry.	62	62	57	63	41
	Diversity & Inclusion Averages:	67	72	66	73	72

Empowerment	I have a very clear idea of the responsibilities for my faculty/staff position/job.	89	92	90	92	94
Empowerment	The information I need to do my work is readily available.	77	81	70	83	82
Empowerment	I am satisfied with my involvement in decisions that affect my work.	68	76	66	77	94
Empowerment	Colleagues in my department are encouraged to come up with innovative solutions to work-related problems.	71	71	67	72	100
Empowerment	UK has established a climate where people can challenge our traditional ways of doing things.	49	60	37	64	65
Empowerment	I am satisfied with the procedures available for resolving faculty/staff complaints.	45	51	47	52	53
	Empowerment Averages:	67	72	63	73	81

Engagement	I am proud to be associated with UK.	92	94	88	95	100
Engagement	I work beyond what is required to help the University succeed.	94	94	93	94	94
Engagement	My work gives me a sense of personal accomplishment.	88	91	93	90	100
Engagement	I believe strongly in the goals and mission of the University.	87	88	86	88	76
Engagement	I am able to sustain the level of energy I need throughout the work day.	79	84	75	86	88
Engagement	I have the equipment/resources I need to do my work effectively.	74	83	64	86	76
Engagement	My colleagues usually get along well together.	83	80	76	81	100
Engagement	My department is able to meet our work challenges	73	79	67	81	94

	effectively.					
Engagement	There are no substantial obstacles at the University to doing my work well.	65	74	56	77	82
	Engagement Averages:	82	85	78	86	90
Leadership	UK leadership decisions are consistent with the values.	70	77	66	79	59
Leadership	Faculty/Staff are treated with respect here regardless of their position.	62	70	64	71	82
Leadership	I have confidence in the decisions made by UK leadership.	58	67	52	70	76
Leadership	There is sufficient contact between leadership and faculty/staff at UK.	53	60	46	63	65
Leadership	I think action will be taken based on the problems identified in the survey.	39	43	31	45	29
	Leadership Averages:	56	63	52	66	62
Operating Effectively	My department operates effectively.	75	79	76	79	94
Operating Effectively	Decisions at UK are made at the appropriate level.	53	59	44	61	53
Operating Effectively	In my opinion, decisions at UK are made in a timely manner.	43	51	34	53	53
	Operating Effectively Averages:	57	63	51	64	67
Pay & Benefits	From what I hear, our benefits are as good as or better than the benefits in similar institutions.	82	84	69	87	71
Pay & Benefits	From what I hear, our pay is as good as or better than the pay in similar institutions.	33	32	21	34	12
	Pay and Benefits Averages:	58	58	45	61	42
Perf. Evaluation	At UK, I understand how my work performance is evaluated.	80	85	80	86	88
Perf. Evaluation	At UK, I think my work performance is evaluated	71	77	69	79	88

	fairly.					
Perf. Evaluation	Where I work, my colleagues are accountable for following through on what they have promised.	69	69	66	70	82
	Performance Evaluation Averages:	**73**	**77**	**72**	**78**	**86**

Retention	At the present time, are you seriously considering leaving UK?	66	70	58	72	65
	Retention Averages:	**66**	**70**	**58**	**72**	**65**

Stress, Balance, Workload	My work schedule allows sufficient flexibility to meet my personal/family needs.	88	90	88	90	88
Stress, Balance, Workload	There is usually sufficient staffing in my department to handle the workload.	55	72	46	77	82
Stress, Balance, Workload	Overall, the physical working conditions at my location are satisfactory (e.g., ventilation, temperature, space to work).	60	69	39	75	53
Stress, Balance, Workload	I find it very difficult to balance my work and my personal responsibilities. (N)	66	67	52	69	88
Stress, Balance, Workload	Work is usually appropriately distributed among faculty/staff in my department.	61	66	51	68	65
Stress, Balance, Workload	The amount of stress I experience at work significantly reduces my effectiveness. (N)	56	60	52	61	76
	Stress, Balance, Workload Averages:	**64**	**71**	**55**	**73**	**75**

Supervision	My Department Chair/Director/Dean/Supervisor: Treats me with respect.	88	91	90	92	100
Supervision	My Department Chair/Director/Dean/Supervisor effectively works with people who are different from him- or herself.	79	82	80	83	100
Supervision	My Department Chair/Director/Dean/Supervisor: Communicates	77	80	80	81	100

	effectively.					
Supervision	My Department Chair/Director/Dean/Supervisor: Gives me regular feedback on my performance.	**75**	**80**	**77**	**81**	**100**
Supervision	My supervisor does a good job of building teamwork.	**71**	**72**	N/A	**72**	**100**
	Supervision Averages:	**78**	**81**	**80**	**82**	**100**

Univ. Culture	We have an institutional culture that promotes collaboration.	**66**	**72**	**64**	**73**	**76**
Univ. Culture	UK is highly regarded by its faculty/staff.	**60**	**70**	**54**	**73**	**65**
Univ. Culture	I think I could report instances of dishonest or unethical practices to the appropriate level of authority without fear of reprisal.	**66**	**67**	**64**	**67**	**88**
	University Culture Averages:	**64**	**70**	**61**	**71**	**76**

Work Relationship	People in my department treat each other with respect.	**81**	**81**	**81**	**81**	**94**
Work Relationship	My colleagues/The people I work with are willing to help each other, even if it means doing something outside their usual activities.	**77**	**77**	**66**	**79**	**88**
Work Relationship	There is a great sense of collaboration and collegiality at UK.	**65**	**69**	**63**	**70**	**88**
Work Relationship	In my department, our meetings/briefings are generally informative and useful.	**69**	**69**	**70**	**68**	**88**
Work Relationship	There is a strong feeling of trust between members of my department.	**64**	**66**	**66**	**66**	**71**
Work Relationship	Differing opinions are openly discussed in reaching decisions in my department.	**59**	**57**	**63**	**56**	**88**
	Work Relationship Averages:	**69**	**70**	**69**	**70**	**86**

Appendix 2

Department of Entomology Grants and Contracts, FY 2011-2016

Fiscal Year 2016

Bessin, Ricardo/Dunwell, Winston/Gauthier, Nicole/Knott, Carrie/Lucas, Patricia/Saha, Shubin – Kentucky IPM Extension and Implementation Program:2014 - 2017, (3048112016), National Institute of Food and Agriculture, $65,000.00

Brown, Grayson – FY 15-16 UK Mosquito Surveillance, (3048111312), KY Department for Public Health, $10,000.00

Brown, Grayson – FY 15-16 UK Mosquito Surveillance, (3048111312), KY Department for Public Health, $20,400.00

Dobson, Stephen – SBIR Phase 2 - Biological vector control reducing arboviruses, including Dengue and Chikungunya, (3048112188), MosquitoMate Incorporated, $31,827.00

Dobson, Stephen – Biopesticide Project, (3200000170), University of Florida, $25,500.00

Dobson, Stephen – Biopesticide Project, (3200000438), University of Florida, $12,750.00

Fox, Charles – Integrating IPM into IRM theory for improved resistance management and pest suppression: 2016, (3048112894), Iowa State University, $60,000.00

Harper, Carl – Monitor Gypsy Moth Populations for Slow the Spread Program, (3200000604), Slow the Spread Foundation, $44,000.00

Lensing, Janet – Invasive Pest Outreach in Kentucky, (3048112487), Animal and Plant Health Inspection Service, $44,077.00

Lensing, Janet – Pine Shoot Beetle Survey, (3048112578), Animal and Plant Health Inspection Service, $11,290.00

Lensing, Janet – CAPS 2016 – Infrastructure, (3200000370), Animal and Plant Health Inspection Service, $28,161.00

Lensing, Janet – CAPS 2016 – Infrastructure, (3200000370), Animal and Plant Health Inspection Service, $10,319.00

Lensing, Janet – CAPS 2016 - Nursery Survey, (3200000371), Animal and Plant Health Inspection Service, $4,456.00

Lensing, Janet – CAPS 2016 - Nursery Survey, (3200000371), Animal and Plant Health Inspection Service, $5,956.00

Lensing, Janet – CAPS 2016 - Forest Pests Survey, (3200000372), Animal and Plant Health Inspection Service, $18,906.00

Lensing, Janet – CAPS 2016 - Forest Pests Survey, (3200000372), Animal and Plant Health Inspection Service, $5,212.00

Lensing, Janet – Imported Fire Ant Survey, (3200000428), Animal and Plant Health Inspection Service, $3,783.00

Lensing, Janet – Grape Commodity Survey, (3200000472), Animal and Plant Health Inspection Service, $19,983.00

Lensing, Janet – Firewood Scout in Kentucky, (3200000479), Animal and Plant Health Inspection Service, $8,231.00

Lensing, Janet – Phytophthora ramorum Survey, (3200000480), Animal and Plant Health Inspection Service, $25,578.00

Lensing, Janet – Apple Commodity Survey, (3200000499), Animal and Plant Health Inspection Service, $15,731.00

Lensing, Janet – Walnut Twig Beetle/Thousand Cankers Disease Survey, (3200000517), Animal and Plant Health Inspection Service, $19,698.00

Lensing, Janet – CAPS 2016 – Soybean, (3200000522), Animal and Plant Health Inspection Service, $8,813.00

Lensing, Janet – CAPS 2016 – Corn, (3200000523), Animal and Plant Health Inspection Service, $19,637.00

Lensing, Janet – Gypsy Moth Survey, (3200000582), Animal and Plant Health Inspection Service, $252,600.00

Lucas, Patricia – Kentucky Contact for the Southern Region Regulatory Information Network, (3048112690) North Carolina State University, $7,000.00

Palli, Subba – Mechanisms of RNA interference, (3048111227), Iowa State University, $130,000.00

Palli, Subba – Epigenetic and posttranslational modifier regulation of Juvenile hormone action, (3200000388), National Institute of General Medical Sciences, $280,000.00

Potter, Daniel – Scale efficacy in container:15-006, (3200000279), University of Florida, $10,000.00

Rieske-Kinney, Lynne – Do blossom end rot fungus and Asian chestnut gall wasp interact on chestnut, (3048112911), Northern Nut Growers Association, $6,700.00

Rieske-Kinney, Lynne – Integrating biological and chemical control to save our ash, (3200000154), KY Division of Forestry, $149,500.00

Rieske-Kinney, Lynne – Development of RNAi in Woody Plants for Broad Scale Management of Tree Pests, (3200000169), Forest Service, $50,000.00

Rieske-Kinney, Lynne – Urban Forestry Initiative with KY Communities, (3200000577), KY Division of Forestry, $1,480.00

Teets, Nicholas M – Improving the Efficacy of Sterile Insect Technique by Enhancing Male Performance with Targeted Overexpression of Antioxidant Defense Systems, (3200000629), National Institute of Food and Agriculture, $85,481.00
Townsend, Lee H – 2015-2016 Private Pesticide Applicator, (3048112555), KY Department of Agriculture, $27,500.00

Fiscal Year 2015

Bessin, Ricardo/Dunwell, Winston/Gauthier, Nicole/Knott, Carrie/Lucas, Patricia/Saha, Shubin – Kentucky IPM Extension and Implementation Program: 2014 - 2017, (3048112016), National Institute of Food and Agriculture, $65,000.00

Brown, Grayson – FY 15-16 UK Mosquito Surveillance, (3048111312), KY Department for Public Health, $10,000.00

Collins, Joseph/Lensing, Janet – Regional Firewood Outreach and Education Program, (3048112102), KY Division of Forestry, $75,000.00

Dobson, Stephen – SBIR Phase 2 - Biological vector control reducing arboviruses, including Dengue and Chikungunya, (3048112188), MosquitoMate Incorporated, $13,767.00

Dobson, Stephen – Development of Artificial Blood for Mosquitoes, (3048112539), Bill and Melinda Gates Foundation, $100,000.00

Dobson, Stephen – Mosquito Mass Production and Tool Development, (3048112303), MosquitoMate Incorporated, $13,000.00

Harper, Carl – Monitor Gypsy Moth Populations for Slow the Spread Program,

(3048112612), Slow the Spread Foundation, $44,000.00

Harwood, James – Biodiversity and the development of natural pest control, (3048111009), Washington State University, $50,000.00

Knutson, Barbara/Rankin, Stephen/Webb, Bruce – * Enveloped Porous Nanoparticles for RNA Delivery to Insects, (3048112354), Iowa State University, $65,000.00

Lensing, Janet – Imported Fire Ant Survey, (3048112518), Animal and Plant Health Inspection Service, $3,758.00

Lensing, Janet – Apple Commodity Survey, (3048112477), Animal and Plant Health Inspection Service, $15,510.00

Lensing, Janet – Grape Commodity Survey, (3048112478), Animal and Plant Health Inspection Service, $19,520.00

Lensing, Janet – Biological Control of the Hemlock Woolly Adelgid, (3048111715), Animal and Plant Health Inspection Service, $15,000.00

Lensing, Janet – Kentucky Cooperative Agricultural Pest Surveys (CAPS), (3048112346), Animal and Plant Health Inspection Service, $101,460.00

Lensing, Janet/Collins, Joseph – Phythophthora ramorum Nursery Survey, (3048111686), Animal and Plant Health Inspection Service, $25,106.00

Lensing, Janet/Harper, Carl – Thousand Cankers Disease Survey, (3048111440), Animal and Plant Health Inspection Service, $17,972.00

Lensing, Janet/Harper, Carl – Asian Longhorned Beetle (ALB) Outreach in Kentucky, (3048111513), Animal and Plant Health Inspection Service, $37,500.00

Lensing, Janet/Harper, Carl – Gypsy Moth Survey, (3048112519), Animal and Plant Health Inspection Service, $252,600.00

Palli, Subba – Development of Novel Insecticide Synergistic for Resistance Management, (3048112020), Agricultural Research Service, $130,000.00

Potter, Daniel – Invasive Asian Earthworms: Mounting Threat to North American Golf Courses, (3048112133), O J Noer Research Foundation Inc, $9,700.00

Potter, Daniel – Assessing Bee Attractiveness of Woody Landscape Plants and

Mitigating Potential Bee Hazard from Neonicotinoid Insecticides, (3048112412), Horticultural Research Institute, $26,000.00

Potter, Daniel – Efficacy of Management Tools for Armored Scale in Containers, (3048112108), University of Florida, $10,000.00

Rieske-Kinney, Lynne – Biological Assessments of the Eastern Kentucky Training Site and H.R. Disney Training Site in Kentucky, (3048112177), Eastern KY University, $11,689.00

Rieske-Kinney, Lynne – A long-term evaluation of the interacting effects of fire and White-Nose Syndrome on endangered bats, (3048112058), Eastern KY University, $57,943.00

Sharkey, Michael – TCN: Collaborative Research: Plants, Heribivores, and Parasitoids: A Model System for the Study of Tri-Trophic Associations, (3048108809), University of Delaware, $12,510.00

Sharkey, Michael/Chapman, Eric – KSEF R&D: Applying next generation sequencing technology to estimate biodiversity: A new tool to accurately, rapidly and efficiently solve an old problem, (3048111599), KY Science and Technology Co Inc, $29,982.00

Townsend, Lee – Pesticide Safety Education, (3048111195), National Association of State Departments of Agriculture Research Foundation, $8,100.00

Townsend, Lee – 2015-2016 Private Pesticide Applicator, (3048111432), KY Department of Agriculture, $27,500.00

Webb, Bruce – SBIR Phase 1:A novel biological method to suppress insecticide resistance in transgenic plants, (3048111518), ParaTechs Corp, $44,197.00

Williams, Mark/Bessin, Ricardo
* Shielding cucurbit crops for resilient agroecosystems, (3048110022), Iowa State University, $11,317.00

Fiscal Year 2014

Andrews, Rodney/Bonner, Simon/Brill, J/Cao, Gang/Cheng, Yang-Tse/Delong, L/Grulke, Eric/Guiton, Beth/Hastings, Jeffrey/Hinds, Bruce/Jaromczyk, Jerzy/Kaul, Ribhu/Ng, Kwokwai/Patwardhan, Abhijit/Schardl, Christopher/Schofield, Matthew/Seo, Sung Seok/Shin, H – * NSF/EPSCoR: Transforming Kentucky's New

Economy with EPSCoR, (3048108525), National Science Foundation, $1,265,500.00

Bessin, Ricardo – 2010 University Protocol for Evaluating Field Efficacy of Herculex I, YieldGard Corn Borer, and Bt11xMIR162 Deployed Against Corn Earworm, Fall Armyworm, and Other Southern U.S. Ledidoptera Larvae, (3048107133), Pioneer Hi Bred International Inc, $30,580.00

Bessin, Ricardo/Dunwell, Winston/Gauthier, Nicole/Knott, Carrie/Lee, Chad/Lucas, Patricia/Seebold, Kenneth – Advancing IPM in Kentucky through Extension: 2013-2016, (3048110899), National Institute of Food and Agriculture, $86,500.00

Brown, Grayson – FY 13-14 UK Mosquito Surveillance, (3048110763), KY Department for Public Health, $6,804.00

Brown, Grayson – FY 13-14 UK Mosquito Surveillance, (3048111232), KY Department for Public Health, $10,000.00

Dobson, Stephen – Trial of IV Formulae, (3048110636), Intellectual Ventures Management LLC, $139,000.00
Harper, Carl – Monitor Gypsy Moth Populations for Slow the Spread Program, (3048111554), Slow the Spread Foundation, $44,000.00

Harper, Carl – Monitor Gypsy Moth Populations for Slow the Spread Program, (3048110668), Slow the Spread Foundation, $41,000.00

Harwood, James – Biodiversity and the development of natural pest control, (3048111009), Washington State University, $45,000.00

Harwood, James – Who's eating the Dubas Bug? Characterization of Biological Control Through Molecular Gut Analysis, (3048111192), Research Council of Oman, $452,818.00

Harwood, James/Schmidt, Jason/Williams, Mark – Specialty Crop: Assessing the interactive effects of on-farm management in cucurbit production systems, (3048111324), KY Department of Agriculture, $49,502.00

Lensing, Janet – Phytophthora ramorum Farm Bill National Nursery Survey, (3048110463), Animal and Plant Health Inspection Service, $25,000.00

Lensing, Janet – Asian Longhorned Beetle (ALB) Outreach, (3048110410), Animal and Plant Health Inspection Service, $27,481.00

Lensing, Janet – Thousand Cankers Disease (TCD) Survey, (3048110756), Animal

and Plant Health Inspection Service, $14,740.00

Lensing, Janet/Collins, Joseph – Imported Fire Ant Survey, (3048111365), Animal and Plant Health Inspection Service, $3,758.00

Lensing, Janet/Harper, Carl – Grape Commodity Survey, (3048111411), Animal and Plant Health Inspection Service, $7,500.00

Lensing, Janet/Harper, Carl – Orchard Commodity Survey, (3048111412), Animal and Plant Health Inspection Service, $8,000.00

Lensing, Janet/Harper, Carl – Pine Shoot Beetle Survey, (3048111346), Animal and Plant Health Inspection Service, $11,290.00

Lensing, Janet/Harper, Carl – Gypsy Moth Survey, (3048111395), Animal and Plant Health Inspection Service, $252,600.00

Lensing, Janet/Harper, Carl – Biological Control of the Hemlock Woolly Adelgid, (3048110831), Animal and Plant Health Inspection Service, $15,000.00

Lensing, Janet/Harper, Carl – Cooperative Agricultural Pest Surveys, (3048111149), Animal and Plant Health Inspection Service, $101,460.00

Palli, Subba – Mechanisms of RNA interference, (3048111227), Iowa State University, $120,000.00

Palli, Subba – Center for Arthropod Management Technologies, (3048110661), National Science Foundation, $308,000.00

Palli, Subba – P450 inhibition assays, (3048110217), Agricultural Research Service, $100,000.00

Palli, Subba – Molecular Analysis of Juvenile Hormone Action, (3048106860), National Institute of General Medical Sciences, $13,417.00

Palli, Subba/Xu, Jingjing – Ecdysteroid signaling in Filarial parasites, (3048111060), University of South Florida, $16,263.00

Potter, Daniel – Efficacy of Management Tools for Rose Slug Sawfly, (3048110916), University of Florida, $7,500.00

Rieske-Kinney, Lynne – Semiochemicals offer hope for managing the granulate ambrosiabeetle, an invasive pest of chestnut, (3048111392), Northern Nut Growers

Association, $6,924.00

Rieske-Kinney, Lynne/Townsend, Lee – Integrating biological control and chemical suppression to save our ash resources, (3048109720), Forest Service, $45,000.00

Townsend, Lee – Pesticide Safety Education, (3048111195), National Association of State Departments of Agriculture Research Foundation, $10,000.00

Webb, Bruce – SBIR: Biological methods for enhancing wound healing properties., (3048111122), ParaTechs Corp, $52,239.00

White, Jennifer – Understanding the Mechanisms for Aphid-derived Toxicity Toward Ladybeetles, (3048110650), KY Science and Technology Co Inc, $29,984.00

White, Jennifer – Toxic aphids: how bacterial symbionts influence coccinellid defense and biological control of Aphis craccivora, (3048110826), National Institute of Food and Agriculture, $454,573.00
Zhou, Xuguo/Haynes, Kenneth – Talk to the dead: Chemical communications in corpse management in termites, (3048110649), KY Science and Technology Co Inc, $30,000.00

Fiscal Year 2013

Andrews, Rodney/Bonner, Simon/Brill, J/Cao, Gang/Cheng, Yang-Tse/Delong, L/Grulke, Eric/Guiton, Beth/Hastings, Jeffrey/Hinds, Bruce/Jaromczyk, Jerzy/Kaul, Ribhu/Ng, Kwokwai/Patwardhan, Abhijit/Schardl, Christopher/Schofield, Matthew/Seo, Sung Seok/Shin, H – * NSF/EPSCoR: Transforming Kentucky's New Economy with EPSCoR, (3048108525), National Science Foundation, $2,531,000.00

Andrews, Rodney/Bonner, Simon/Brill, J/Cao, Gang/Cheng, Yang-Tse/Delong, L/Guiton, Beth/Hastings, Jeffrey/Hinds, Bruce/Jaromczyk, Jerzy/Kaul, Ribhu/Ng, Kwokwai/Patwardhan, Abhijit/Schardl, Christopher/Schofield, Matthew/Seo, Sung Seok/Shin, Hainsworth/Str – * KY EPSCoR: Transforming Kentucky's New Economy with EPSCoR, (3048108526), KY Council on Postsecondary Education, $933,797.00

Bessin, Ricardo – 2010 University Protocol for Evaluating Field Efficacy of Herculex I, YieldGard Corn Borer, and Bt11xMIR162 Deployed Against Corn Earworm, Fall Armyworm, and Other Southern U.S. Ledidoptera Larvae, (3048107133), Pioneer Hi Bred International Inc, $30,580.00

Bessin, Ricardo/Coolong, Timothy
Whole Farm Organic Management of BMSB and other Pentatomids through Habitat

Manipulation, (3048110026), Rutgers University, $84,309.00

Bessin, Ricardo/Coolong, Timothy/Durham, Richard/Johnson, Douglas/Lee, Chad/Lucas, Patricia/Murdock, Lloyd – IPM in Kentucky: Integrated Development and Delivery, (3048107580), National Institute of Food and Agriculture, $93,645.00

Collins, Joseph – Pine Shoot Beetle (Tomicus piniperda) Survey, (3048109232), Animal and Plant Health Inspection Service, $8,468.00

Collins, Joseph – Biological Control of the Hemlock Woolly Adelgid, (3048109641), Animal and Plant Health Inspection Service, $15,000.00

Collins, Joseph – EAB Public Awareness, (3048109816), KY Energy and Environment Cabinet, $5,000.00

Collins, Joseph – Regional Firewood Outreach and Educational Campaign, (3048109815), KY Energy and Environment Cabinet, $55,000.00

Collins, Joseph/Lensing, Janet – Forest Pest Outreach, (3048109728), Animal and Plant Health Inspection Service, $37,500.00

Coolong, Timothy/Bessin, Ricardo/Williams, Mark – * Shielding cucurbit crops for resilient agroecosystems, (3048110022), Iowa State University, $164,519.00

Dobson, Stephen – Supplemental Vector Intervention Required to Eliminate Lymphatic Filariasis in the South Pacific, (3048104232), Bill and Melinda Gates Foundation, ($16,178.00)

Dobson, Stephen – Trial of IV Formulae using Aedes mosquito species, (3048109799), Intellectual Ventures Management LLC, $2,797.00

Dobson, Stephen – SBIR Phase I: Self-delivering, biological control of Aedes albopictus mosquitoes, (3048110009), MosquitoMate Incorporated, $7,073.00

Dobson, Stephen – Mass production of Aedes albopictus males for Experimental Use, (3048110199), MosquitoMate Incorporated, $11,458.00

Harper, Carl – Pine Shoot Beetle Survey, (3048110461), Animal and Plant Health Inspection Service, $11,290.00

Harwood, James – Biological Control of Cereal Aphids in Wheat: Implications of Alternative Foods and Intraguild Predation, (3048107617), Binational Agricultural Research & Development Fun, $62,000.00

Harwood, James – Importance of Natural Enemies for Stink Bug Control, (3048109598), University of Georgia, $12,000.00

Harwood, James/Johnson, Douglas/Kowles, Katelyn – Tracking the source of aphid-vectored virus in winter wheat, (3048109880), Kentucky Small Grain Growers Association, $8,262.00

Haynes, Kenneth/Potter, Michael – Valent Bioscience VBC3 for bed bug control, (3048109608), Valent BioSciences Corporation, $10,467.00

Kajita, Yukie – A bio-economic study of an introduced biological control agent: ecological, evolutionary, and economic factors in sustainable agricultural systems, (3048109502), National Science Foundation, $424,542.00

Krupa, James/Crowley, P/Harwood, James – * KSEF RDE: Conservation and Ecology of an Insect Feeding Guild Containing a Kentucky State-endangered Carnivorous Plant., (3048109941), KY Science and Technology Co Inc, $50,000.00

Lacki, Michael/Rieske-Kinney, Lynne – * Fire Management and Habitat Quality for Endangered Bats in Mammoth Cave National Park, JFSP, (3048107619), Forest Service, $20,000.00

Lensing, Janet – Phytophthora ramorum Survey, (3048109639), Animal and Plant Health Inspection Service, $25,000.00

Lensing, Janet – Thousand Cankers Disease Survey, (3048109640), Animal and Plant Health Inspection Service, $17,157.00

Lensing, Janet – Cooperative Agricultural Pest Surveys - Infrastructure, (3048110121), Animal and Plant Health Inspection Service, $101,460.00

Lensing, Janet/Collins, Joseph/Harper, Carl – Emerald Ash Borer Survey in Kentucky, (3048110278), Animal and Plant Health Inspection Service, $94,320.00

Lensing, Janet/Harper, Carl – Grape Survey, (3048110459), Animal and Plant Health Inspection Service, $12,613.00

Lensing, Janet/Harper, Carl – Orchard Survey, (3048110409), Animal and Plant Health Inspection Service, $15,035.00

Lensing, Janet/Harper, Carl – Gypsy Moth Survey, (3048110440), Animal and Plant Health Inspection Service, $76,745.00

Palli, Subba – P450 inhibition assays, (3048110217), Agricultural Research Service, $25,918.00

Palli, Subba – Planning Grant: I/UCRC for Arthropod Management Technologies, (3048109717), National Science Foundation, $11,499.00

Palli, Subba – Molecular Analysis of Juvenile Hormone Action, (3048106860), National Institute of General Medical Sciences, $185,774.00

Potter, Daniel/Dobbs, Emily – Benefits of golf course naturalized areas for biological control and pollinator conservation, (3048110344), United States Golf Association, $40,000.00

Rieske-Kinney, Lynne – Recruitment of Natural Enemies MIitigates Impacts of the Asian Chestnut Gall Wasp, (3048109981), Northern Nut Growers Association, $5,555.00

Rieske-Kinney, Lynne – 3rd Kentucky Invasive Species Conference, (3048109746), Forest Service, $2,500.00

Rieske-Kinney, Lynne – Post-Invasion Forests: Composition and Structure Following Invasive Species Establishment, (3048107055), Forest Service, $30,000.00

Rieske-Kinney, Lynne/Townsend, Lee – Integrating biological control and chemical suppression to save our ash resources, (3048109720), Forest Service, $85,000.00

Sharkey, Michael – TCN: Collaborative Research: Plants, Heribivores, and Parasitoids: A Model System for the Study of Tri-Trophic Associations, (3048108809), University of Delaware, $55,461.00

Townsend, Lee – 2013-14 UK Private Pesticide Applicator, (3048109414), KY Department of Agriculture, $55,000.00

Townsend, Lee – Pesticide Safety Education, (3048109883), National Institute of Food and Agriculture, $10,000.00

Fiscal Year 2012

Andrews, Rodney/Bonner, Simon/Brill, J/Cao, Gang/Cheng, Yang-Tse/Delong, L/Guiton, Beth/Hastings, Jeffrey/Hinds, Bruce/Jaromczyk, Jerzy/Kaul, Ribhu/Ng, Kwokwai/Patwardhan, Abhijit/Schardl, Christopher/Schofield, Matthew/Seo, Sung

Seok/Shin, Hainsworth/Str – * NSF/EPSCoR: Transforming Kentucky's New Economy with EPSCoR, (3048108525), National Science Foundation, $2,521,000.00

Andrews, Rodney/Bonner, Simon/Brill, J/Cao, Gang/Cheng, Yang-Tse/Delong, L/Guiton, Beth/Hastings, Jeffrey/Hinds, Bruce/Jaromczyk, Jerzy/Kaul, Ribhu/Ng, Kwokwai/Patwardhan, Abhijit/Schardl, Christopher/Schofield, Matthew/Seo, Sung Seok/Shin, Hainsworth/Str – * KY EPSCoR: Transforming Kentucky's New Economy with EPSCoR, (3048108526), KY Council on Postsecondary Education, $1,000,000.00

Bessin, Ricardo – State Liaison for the Minor Use Pesticide Program and Eggplant Flea Beetle Insecticide Efficacy, (3048108506), University of Florida, $7,000.00

Bessin, Ricardo – 2010 University Protocol for Evaluating Field Efficacy of Herculex I, YieldGard Corn Borer, and Bt11xMIR162 Deployed Against Corn Earworm, Fall Armyworm, and Other Southern U.S. Ledidoptera Larvae, (3048107133), Pioneer Hi Bred International Inc, $15,290.00

Bessin, Ricardo – Evaluation of Novel Insecticide Seed Treatments for Wireworm and White Grub Control in Corn, (3048108347), Syngenta Crop Protection, $30,000.00

Collins, Joseph – Pine Shoot Beetle (Tomicus piniperda) Survey, (3048109232), Animal and Plant Health Inspection Service, $2,822.00

Coolong, Timothy/Bessin, Ricardo/Seebold, Kenneth/Wilhoit, John/Woods, Timothy/Wright, Shawn/Yeargan, Ricky – * Specialty Crop: The Vegetable Academy: A Short Course to Advance Vegetable Production in Kentucky, (3048109145), KY Department of Agriculture, $24,469.00

Dobson, Stephen – Supplemental Vector Intervention Required to Eliminate Lymphatic Filariasis in the South Pacific, (3048104232), Bill and Melinda Gates Foundation, ($1,590,913.00)

Harper, Carl – Monitor Gypsy Moth Populations for Slow the Spread Program, (3048109402), Slow the Spread Foundation, $41,000.00

Harwood, James – Biological Control of Cereal Aphids in Wheat: Implications of Alternative Foods and Intraguild Predation, (3048107617), Binational Agricultural Research & Development Fun, $31,000.00

Harwood, James – Importance of Natural Enemies for Stink Bug Control, (3048108656), University of Georgia, $10,000.00

Harwood, James – Who's Eating Spider Mites? Molecular Tracking of Mite Predation

(WSPC), (3048108261), Washington State Potato Commission, $30,000.00

Harwood, James/Johnson, Douglas – Impact of Predator Bioversity on Pest-Suppression in Kentucky Wheat: A Denaturing Gradient Gel Electrophoresis Approach, (3048108306), KY Science and Technology Co Inc, ($40,915.00)

Harwood, James/Johnson, Douglas – Impact of Predator Bioversity on Pest-Suppression in Kentucky Wheat: A Denaturing Gradient Gel Electrophoresis Approach, (3048108367), KY Science and Technology Co Inc, $40,915.00

Harwood, James/Johnson, Douglas/Kowles, Katelyn – Tracking the source of aphid-vectored virus in winter wheat, (3048108695), KY Small Grain Growers Association, $8,521.00

Johnson, Douglas/Bessin, Ricardo/Coolong, Timothy/Durham, Richard/Lee, Chad/Lucas, Patricia/Murdock, Lloyd – IPM in Kentucky: Integrated Development and Delivery, (3048107580), National Institute of Food and Agriculture, $93,645.00

Johnson, Douglas/Bessin, Ricardo/Hershman, Donald – Addressing Multiple Soybean Pest Management Issues through Integrated studies., (3048109253), KY Soybean Promotion Board, $25,787.00

Lensing, Janet – Phytopthera ramorum Survey, (3048108588), Animal and Plant Health Inspection Service, $25,000.00

Lensing, Janet – Thousand Cankers Disease Survey in Kentucky, (3048108430), Animal and Plant Health Inspection Service, $20,000.00

Lensing, Janet/Collins, Joseph – Citizen Volunteer Pest Survey, (3048108586), Animal and Plant Health Inspection Service, $10,000.00

Lensing, Janet/Collins, Joseph – Forest Pest Outreach and Survey Project, (3048108587), Animal and Plant Health Inspection Service, $37,500.00

Lensing, Janet/Collins, Joseph – Gypsy Moth Survey, (3048109218), Animal and Plant Health Inspection Service, $90,288.00

Lensing, Janet/Collins, Joseph – Cooperative Agricultural Pest Surveys-Infrastructure, (3048108887), Animal and Plant Health Inspection Service, $110,043.00

Lensing, Janet/Collins, Joseph – Emerald Ash Borer Survey and Outreach in Kentucky, (3048109209), Animal and Plant Health Inspection Service, $278,125.00

Obrycki, John/Lensing, Janet – Emerald Ash Borer Survey and Outreach in Kentucky, (3048108084), Animal and Plant Health Inspection Service, $190,914.00

Obrycki, John/Lensing, Janet – Cooperative Agricultural Pest Survey-Gypsy Moth, (3048107908), Animal and Plant Health Inspection Service, $55,983.00

Palli, Subba – Molecular Analysis of Juvenile Hormone Action, (3048106860), National Institute of General Medical Sciences, $225,180.00

Sharkey, Michael – TCN: Collaborative Research: Plants, Heribivores, and Parasitoids: A Model System for the Study of Tri-Trophic Associations, (3048108809), University of Delaware, $12,510.00

Townsend, Lee – Pesticide Safety Education, (3048108665), National Institute of Food and Agriculture, $10,000.00

Williams, Mark/Bessin, Ricardo/Coolong, Timothy – * Incorporating Row Covers into Muskmelon IPM with a Farming Systems Approach, (3048108857), Iowa State University, $76,000.00

Zhou, Xuguo – Developing a framework for assessing the risks of in planta RNAi on non-target arthropods, (3048108827), National Institute of Food and Agriculture, $500,000.00

Fiscal Year 2011

Archbold, Douglas/Bessin, Ricardo/Strang, John/Williams, Mark – * Specialty Crop Optimizing Orchard Strategies for Yield, Plant Health, and Fruit Quality in Organic Apple Production., (3048108126), KY Department of Agriculture, $73,590.00

Bessin, Ricardo – State Liaison to the Minor Use Pesticide Program 2010, (3048107770), University of Florida, $2,000.00

Bessin, Ricardo – State Liaison to the Minor Use Pesticide Program 2010, (3048107653), University of Florida, $2,250.00

Bessin, Ricardo – 2010 University Protocol for Evaluating Field Efficacy of Herculex I, YieldGard Corn Borer, and Bt11xMIR162 Deployed Against Corn Earworm, Fall Armyworm, and Other Southern U.S. Ledidoptera Larvae, (3048107133), Pioneer Hi Bred International Inc, $12,000.00

Connolly, John/Brill, J/Cao, Gang/Delong, L/Guiton, Beth/Hinds,

Bruce/Jaromczyk, Jerzy/Kaul, Ribhu/McNear, David/Ng, Kwokwai/Patwardhan, Abhijit/Puleo, David/Saunders, Marnie/Schardl, Christopher/SCHOFIELD, MATTHEW/Seo, Sung Seok/Shin, Hainsworth/Strachan – * State EPSCoR: Transforming Kentucky's New Economy, (3048104850), KY Council on Postsecondary Education, $1,000,000.00

Connolly, John/Brill, J/Cao, Gang/Delong, L/Hinds, Bruce/Jaromczyk, Jerzy/Ng, Kwokwai/Parkin, Sean/Patwardhan, Abhijit/Puleo, David/Saunders, Marnie/Schardl, Christopher/Stromberg, Arnold/Voss, Stephen/Webb, Bruce – * NSF/EPSCoR: Transforming Kentucky's New Economy with EPSCoR, (3048105113), National Science Foundation, $2,495,000.00

Coolong, Timothy/Bessin, Ricardo/Seebold, Kenneth/Williams, Mark – * Developing a Training Program in Sustainable Vegetable Production for Agriculture Professionals in Kentucky and Tennessee, (3048107511), University of Georgia, $59,532.00

Dobson, Stephen – Genetic Modification of Mosquito Populations to Make Them Incapable of Transmitting Dengue Virus, (3046961000), University of Queensland, ($50.00)

Dobson, Stephen – Eradication of a Primary Filariasis Vector Population at an Endemic Field Site, (3048035600), National Institute of Allergy and Infectious Diseases, $239,298.00

Dobson, Stephen – Supplemental Vector Intervention Required to Eliminate Lymphatic Filariasis in the South Pacific, (3048104232), Bill and Melinda Gates Foundation, $350.00

Harper, Carl – Monitor Gypsy Moth Populations for Slow the Spread Program, (3048108264), Slow the Spread Foundation, $50,000.00

Harwood, James – Biological Control of Cereal Aphids in Wheat: Implications of Alternative Foods and Intraguild Predation, (3048107617), Binational Agricultural Research & Development Fun, $3,000.00

Harwood, James/Johnson, Douglas – Impact of Predator Bioversity on Pest-Suppression in Kentucky Wheat: A Denaturing Gradient Gel Electrophoresis Approach, (3048107367), KY Science and Technology Co Inc, $39,085.00

Harwood, James/Johnson, Douglas – Impact of Predator Bioversity on Pest-Suppression in Kentucky Wheat: A Denaturing Gradient Gel Electrophoresis Approach, (3048108306), KY Science and Technology Co Inc, $40,915.00

Johnson, Douglas – 2010 University Protocol for Evaluating Field Efficacy of Herculex I, YieldGard Corn Borer, and Bt11xMIR162 Deployed Against Corn Earworm, Fall Armyworm, and Other Southern U.S. Ledidoptera Larvae, (3048107132), Pioneer Hi Bred International Inc, $12,000.00

Johnson, Douglas/Coolong, Timothy/Durham, Richard/Fulcher, Amy/Lee, Chad/Lucas, Patricia/Murdock, Lloyd – IPM in Kentucky: Integrated Development and Delivery, (3048107580), National Institute of Food and Agriculture, $93,645.00

Lacki, Michael/Rieske-Kinney, Lynne – * Fire Management and Habitat Quality for Endangered Bats in Mammoth Cave National Park, JFSP, (3048107619), Forest Service, $262,759.00

Obrycki, John – Ecological Genetics of the Predatory Lady Beetle Hippodamia convergens: Effects of Augmentative Releases, (3048108113), National Institute of Food and Agriculture, $57,823.00

Obrycki, John/Lensing, Janet – Cooperative Agricultural Pest Survey-Gypsy Moth, (3048107908), Animal and Plant Health Inspection Service, $167,950.00

Obrycki, John/Lensing, Janet – Emerald Ash Borer Survey and Outreach in Kentucky, (3048108084), Animal and Plant Health Inspection Service, $572,742.00

Palli, Subba – Molecular Analysis of Xenobiotic Response in the Colorado Potato Beetle, (3048107969), National Institute of Food and Agriculture, $456,364.00

Palli, Subba – Feeding RNAi for Pest Management, (3048107323), KY Science and Technology Co Inc, $49,940.00

Palli, Subba – Molecular Analysis of Juvenile Hormone Action, (3048106860), National Institute of General Medical Sciences, $187,650.00

Palli, Subba – 20 Hydroxyecdysone Suppression of Juvenile Hormone Response, (3046820900), National Science Foundation, $224,999.00

Rieske-Kinney, Lynne – Post-Invasion Forests: Composition and Structure Following Invasive Species Establishment, (3048107055), Forest Service, $30,000.00

Townsend, Lee – Private Pesticide Applicator - FY 2011-2012, (3048108078), KY Department of Agriculture, $55,000.00

Webb, Bruce – Novel Methods for Improving Virion Production in Baculovirus,

(3048107826), ParaTechs Corp, $33,000.00

White, Jennifer – KSEF R&D Excellence: Molecular Characterization of the Microbial Community of Invasive Arthropods, (3048107228), KY Science and Technology Co Inc, $49,658.00

White, Jennifer – The Effect of an Aphid Bacterial Symbiont on Interactions Among Soybean Aphid, (3048107978), National Institute of Food and Agriculture, $149,940.00

Appendix 3

Department of Entomology
Annual Strategic Plan and Implementation Plan Reports 2009-2015

Entomology Program Review Implementation Plan 2015 Annual Report

(Implementation Plan originally submitted March, 2011)

Recommendation 1: Develop a plan to address faculty hiring based on the needs of the department and the clientele served by the department.

Assessment method: The actual development of a faculty hiring and staffing plan.

Results: Following faculty discussions, the faculty ranked the following three positions as high priorities for the Department: Integrative Insect Biology, Public Health Entomologist, and Entomological Interactions within Sustainable Agroecosystems.

Analysis of results and reflection: While three essential faculty positions have been identified and ranked, the Department should continue to develop a faculty hiring plan to fill the three identified positions.

Ongoing improvement actions: The Department recently hired two assistant professors in the area of Integrative Insect Biology.

Recommendation 2: Clarify policies for admission into PhD program in Entomology.

Assessment method: The formulation of simplified policies for admission into the PhD program in Entomology will be measured by the number of PhD candidates who apply for admission.

Results: The policies for direct admission into the PhD program in Entomology when a student does not have a MS degree were clarified (March 2011). Since that time applications for our PhD program from students with only BS degrees has remained the same.

Analysis of results and reflection: The clarification of our policy has made our application process clearer for the relatively few students with only BS degrees who apply directly to our PhD program.

Ongoing improvement actions: The department will continue to ensure that all admissions policies or other policies affecting students are clear and concise.

Recommendation 3: The department should review and revise the core curriculum for graduate students.

Assessment method: The review and revision of the core curriculum for graduate students will be assessed by the number of students who achieve a Master's or PhD in Entomology.

Results: No significant revisions have been made to date.

Analysis of results and reflection: The revision of the graduate curriculum in Entomology is an on-going discussion at faculty meetings. Some progress has been made.

Ongoing improvement actions: The department faculty approved offering Integrated Physiology and Integrated Organismal Biology courses on a trial basis. Drs. Dan Potter and Jen White initiated discussions on offering a curriculum development course.

Recommendation 4: Review the safety of all laboratory fume hoods and repair or replace those that are not functioning at safe levels.

Assessment method: The proper functioning of fume hoods will be assessed by a reduction in the reporting of malfunctioning hood units to PPD.

Results: Major lab renovations have been completed on the second and third floors of the Ag Science Center North. One poorly functioning hood has been removed.

Analysis of results and reflection: The quality of and safety within these labs have been greatly improved. The number of reports of malfunctioning fume hoods to PPD has diminished by 100%. There have been no recent reports of malfunctioning fume hoods.

Ongoing improvement actions: The department will continue to monitor lab fume hoods in order to provide safe environments within all labs.

Recommendation 5: Internet connectivity concerns voiced by faculty and graduate students housed in the Animal Pathology Building should be investigated and addressed immediately.

Assessment method: Reduction in the number of complaints about internet service from faculty and graduate students housed in the Animal Pathology Building.

Results: The UK IT office was contacted to resolve these problems. Wireless connectivity has been established in the Animal Pathology Building and complaints have been reduced to zero.

Analysis of results and reflection: The Internet connectivity issues in the Animal Pathology Building have been successfully resolved.

Ongoing improvement actions: The department chair will continue to monitor Internet connectivity in the Animal Pathology Building.

Recommendation 6: College and Departmental administrators should meet with PPD to resolve differences over HVAC maintenance issues (e.g. ductwork cleanliness and ambient temperature control in laboratories) which compromise the ability of Entomology faculty, staff, and students to fulfill research grant and contractual obligations.

Assessment method: The resolution of HVAC maintenance issues in Ag North and the renewed ability of Entomology faculty, staff, and student to fulfill research grant and contractual obligations.

Results: Ductwork was cleaned in 2014, which improved air flow.

Analysis of results and reflection: Adequate heating and cooling remains a problem within the Ag Science Center, which continues to compromise the ability of Entomology faculty, staff, and students to fulfill research grant and contractual obligations.

Ongoing improvement actions: Several labs are being renovated in Ag Science North to address issues involving heating and cooling of the second and third floor labs and offices. The Chair will continue to work with college administration and PPD to reach a successful solution to the heating and cooling issues within Ag North.

Recommendation 7: College and Department administrations should review the policy of locking exterior, office, and laboratory doors to ensure the security of employees and students working after hours (evenings and weekends) and to reduce the incidences of theft at all times, as well as to investigate other means of limiting access to these areas (i.e., control keypad, card readers, etc.).

Assessment method: The reduction in thefts and an increase in safety measures

Results: A keypad lock has been installed for the computer lab on the second floor of the Ag Science Center. The lock on one of the main office doors has been replaced. Reported incidences of theft have decreased.

Analysis of results and reflection: While the reports of thefts have decreased, the safety of employees and students working after hours continues to be of concern. Additional keypad locks will continue to be a priority.

Ongoing improvement actions: Providing a safe and secure environment for members of the Entomology Department continues to be a priority.

Entomology Program Review Implementation Plan 2014 Annual Report

Recommendation 1: Develop a plan to address faculty hiring based on the needs of the department and the clientele served by the department.

Assessment method: The actual development of a faculty hiring and staffing plan.

Results: Following faculty discussions, the faculty ranked the following three positions as high priorities for the Department: Integrative Insect Biology, Public Health Entomologist, and Entomological Interactions within Sustainable Agroecosystems.

Analysis of results and reflection: While three essential faculty positions have been identified and ranked, the Department should continue to develop a faculty hiring plan to fill the three identified positions.

Ongoing improvement actions: The Department will work with the Dean of the College to fill the three identified faculty positions. The Department will also continue to evaluate approaching retirements, the ability of the program to meet the needs of students and constituents, and the evolution of the department to the ever changing research needs of future clientele in the quest to identify future faculty staffing and hiring needs.

Recommendation 2: Clarify policies for admission into PhD program in Entomology.

Assessment method: The formulation of simplified policies for admission into the PhD program in Entomology will be measured by the number of PhD candidates who apply for admission.

Results: The policies for direct admission into the PhD program in Entomology when a student does not have a MS degree were clarified (March 2011). Since that time applications for our PhD program from students with only BS degrees has remained the same.

Analysis of results and reflection: The clarification of our policy has made our application process clearer for the relatively few students with only BS degrees who apply directly to our PhD program.

Ongoing improvement actions: The department will continue to ensure that all admissions policies or other policies affecting students are clear and concise.

Recommendation 3: The department should review and revise the core curriculum for graduate students.

Assessment method: The review and revision of the core curriculum for graduate students will be assessed by the number of students who achieve a Master's or PhD in Entomology.

Results: No significant revisions have been made to date.

Analysis of results and reflection: The revision of the graduate curriculum in Entomology is an on-going discussion at faculty meetings. Some progress has been made, but a major revision of the curriculum is needed and will be the focus of the Entomology faculty during 2015.

Ongoing improvement actions: The department will formulate specific revisions of the curriculum for graduate students and implement those revisions.

Recommendation 4: Review the safety of all laboratory fume hoods and repair or replace those that are not functioning at safe levels.

Assessment method: The proper functioning of fume hoods will be assessed by a reduction in the reporting of malfunctioning hood units to PPD.

Results: Major lab renovations have been completed on the second and third floors of the Ag Science Center. One poorly functioning hood has been removed.

Analysis of results and reflection: The quality of and safety within these labs have been greatly improved. The number of reports of malfunctioning fume hoods to PPD has diminished by 100%. There have been no recent reports of malfunctioning fume hoods.

Ongoing improvement actions: The department will continue to monitor lab fume hoods in order to provide safe environments within all labs.

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Analysis of results and reflection: The Internet connectivity issues in the Animal Pathology Building have been successfully resolved.

Ongoing improvement actions: The department chair will continue to monitor Internet connectivity in the Animal Pathology Building.

Recommendation 6: College and Departmental administrators should meet with PPD to resolve differences over HVAC maintenance issues (e.g. ductwork cleanliness and ambient temperature control in laboratories) which compromise the ability of Entomology faculty, staff, and students to fulfill research grant and contractual obligations.

Assessment method: The resolution of HVAC maintenance issues in Ag North and the renewed ability of Entomology faculty, staff, and student to fulfill research grant and contractual obligations.

Results: Ductwork was cleaned in 2014 – which improved air flow.

Analysis of results and reflection: Adequate heating and cooling remains a problem within the Ag Science Center, which continues to compromise the ability of Entomology faculty, staff, and students to fulfill research grant and contractual obligations.

Ongoing improvement actions: Several labs are being renovated in Ag Science North to address issues involving heating and cooling of the second and third floor labs and offices. The Chair will continue to work with college administration and PPD to reach a successful solution to the heating and cooling issues within Ag North.

Recommendation 7: College and Department administrations should review the policy of locking exterior, office, and laboratory doors to ensure the security of employees and students working after hours (evenings and weekends) and to reduce the incidences of theft at all times, as well as to investigate other means of limiting access to these areas (i.e., control keypad, card readers, etc.).

Assessment method: The reduction in thefts and an increase in safety measures

Results: A keypad lock has been installed for the computer lab on the second floor of the Ag Science Center. The lock on one of the main office doors has been replaced. Reported incidences of theft have decreased.

Analysis of results and reflection: While the reports of thefts have decreased, the safety of employees and students working after hours continues to be of concern. Additional keypad locks will continue to be a priority.

Ongoing improvement actions: Providing a safe and secure environment for members of the Entomology Department continues to be a priority.

Entomology Strategic Plan 2009-2014

Entomology Strategic Plan Implementation Project 2009-2014

Annual Review of Progress

Unit Mission

Our mission is to improve the quality of human life and protect our environment through a better understanding of insects and related arthropods. We conduct fundamental and applied research on insects, deliver information through education and outreach activities, educate graduate and undergraduate students, develop and provide resources for agricultural and pest management professionals, implement integrative and effective systems for insect pest management, and enhance science education and public appreciation of human-insect interactions.

Unit Objective	ENT Objective 1: Prepare Students for Leadership in an Innovation-Driven Economy and Global Society
Related Goals/Metrics	Ag Goal 1. Prepare Students for Leadership in an Innovation-Driven Economy and Global Society ENT Metric 1.1 Graduate an average of 5 PhD and 4 MS students each year (based on a 4 yr. avg). ENT Metric 1.2 Publish approximately 0.5 refereed publications/graduate student/year and 1.5 scientific presentations/graduate student/year. ENT Metric 1.3 Maintain a multi-year average of 8 post-doctoral scholars within the Department. ENT Metric 1.4 Increase the number of grants that support graduate student assistantships and tuition. UK Goal 1. Prepare Students for Leading Roles in an Innovation-driven Economy and Global Society.
Related Mission Area	Education

Strategies (Not Required)

Develop a recruitment program in the department involving senior PhD students paired with faculty members to visit selected colleges in Kentucky Encourage faculty to participate in the ABT program with the College of Agriculture

Encourage faculty to include graduate assistantships in grant proposals

Continue to seek outside funding for endowed graduate fellowships

Continue to fund the publication scholarship program within the department

Assessment Method

Using IRPE annual reports, calculate the four-year average of PhD and MS graduates to determine if department has met goal of 5 PhD and 4 MS students graduating each year. Using Graduate School data and chair survey, calculate the number of refereed publications/graduate student/year and the number of scientific presentations/graduate student/ year. Using IRPE annual reports, calculate the four-year average number of post-doctoral scholars in the Department. Using SAP data, calculate the number of grant funded assistantships within the Department.

Actual Results

Data Tables

Descriptive Results

Year 1

In the baseline period (05-09) the 4-year average number of PhD students graduated was 3.8; the number of MS students graduated was 3. In the first year of data collection (2010) the 4-year average number of PhD students graduated was 4.8 and the number of MS students was 4. In the baseline period (05-09), the 4-year average number of postdoctoral scholars in the Department was 8. In the first year of data collection (2010), the 4-year average number of post-doctoral scholars in the Department was 9.

Year 2

In the second year of data collection, the 4-year average number of PhD students graduated was 5 and the number of MS students graduating was 4. In the second year of data collection, the 4-year average number of post-doctoral scholars in the Department of Entomology was 9.

Year 3

1. In the third year of data collection, the 4-year average number of PhD students graduated was 4.5 and the number of MS students graduating was 3.
2. In the third year of data collection, graduate students in Entomology published 0.9 publications/graduate/year. Students presented 1.5 presentations/graduate student/year.
3. In the third year of data collection, the 4-year average number of post-doctoral students in the Department of Entomology was 9.
4. In the third year of data collection, three students were awarded NSF Dissertation Fellowships that provided fellowship funding and tuition. Graduate students in the Entomology program have received a 3-year Graduate Student Fellowship and a Presidential Fellowship from the Graduate School at the University of Kentucky.

Year 4

1. In year 4 of data collection, the 4-year average number of PhD students graduated was 4.7 and the number of MS students graduating was 3.
2. In year 4 of data collection, graduate students in Entomology published 0.6 publications/graduate/year. Students presented 1.3 presentations/graduate student/year.
3. In year 4 of data collection, the 4-year average number of post-doctoral students in the Department of Entomology was 8.
4. In year 4 of data collection, two students hold NSF Dissertation Fellowships that provided fellowship funding and tuition. Graduate students in the Entomology program received competitive fellowships from the Graduate School.

Year 5

Analysis of Results and Reflection	Improvement Actions

Year 1

The department has met our goals of graduating (based on a 4-year average) 5 PhD students and 4 MS students between 2006 and 2010. The 4-year average number of post-doc scholars has increased from a baseline average of 8 in 2009 to an average of 9 in 2010.

Year 2

The department is slightly below out goal for PhD student graduation numbers. The department has met our goal for graduating MS students. The department has exceeded our goal for average number of post-doc scholars enrolled in the Entomology program.

Year 3

During the third year of data collection, the department of Entomology is slightly below out goal for multi-year average number of PhD and MS student graduation numbers. During this third year of data collection, the Department met its goal of 1.5 graduate student presentations/year and exceeded our goal of 0.5 refereed publications/graduate student/year. In this third year, the department has exceeded our goal for average number of post-doc scholars enrolled in the Entomology program. The numbers of applicants to the Entomology program has fluctuated during the past two years for unknown reasons. The faculty admitted a large cohort of new graduate students in 2011 (N=15). As this cohort of students graduates, our multi-year average number of PhD and MS graduates should increase and reach our goals of 5 PhD and 4 MS students. The Department has met or exceeded our goals for graduate student productivity. The numbers of post-doctoral researchers in the Entomology program is largely dependent on faculty securing extramural grant funding. Funding for federally competitive grants, which are the types of grants that fund post-docs, has

Entomology faculty will continue to evaluate the current graduate student recruiting activities to determine how to increase the number of graduate student applications to our graduate programs. Entomology will continue to recruit and mentor graduate students to maintain our average number of PhD and MS graduates at 5 and 4. The faculty will continue to recruit post-doc scholars to their research programs.

The Entomology faculty has discussed new approaches to recruit graduate students to our program. We will continue to recruit and mentor graduate students to maintain our average numbers of PhD and MS graduates. The faculty will continue to recruit postdoc scholars to their research programs, which will be highly dependent on the success of faculty in securing external grants.

Three new Dissertation Fellowships awarded by the National Science Foundation to students in Entomology have increased the number of grants that support graduate student fellowships and tuition. The department will continue to work with current students to submit NSF dissertation fellowships and dissertation improvement grants. We will continue to encourage faculty to include graduate assistantship stipends in grant proposals. The department will also continue to participate in UK Graduate School's fellowship competitions.

become more competitive, so there might be a slight reduction in the multi-year average number of post-docs within the Entomology program.	
Year 4 During the 4th year of data collection, the Department of Entomology remains slightly below our goal for the four-year average number of PhD and MS graduates. The Department is also slightly below our goal for graduate student presentations, but we exceed our goal for publications. Funding from federal sources remains very competitive, thus our numbers of postdoctoral and PhD students may continue to show slight decreases.	The Department faculty members will continue to work with graduate students to encourage them to submit applications for federal and graduate school fellowships. Faculty will be strongly encouraged to include graduate student assistantships and tuition costs in their grant proposals.
Year 5	

Unit Objective	ENT Objective 2: Promote Research and Creative Work to Increase the Intellectual, Social and Economic Capital of Kentucky and the World Beyond its Borders

Related Goals/Metrics	Ag Goal 2. Promote Research and Creative Work to Increase the Intellectual, Social and Economic Capital of Kentucky and the World Beyond its Borders ENT Goal 2. Promote Research and Creative Work to Increase the Intellectual, Social and Economic Capital of Kentucky and the World Beyond its Borders ENT Metric 2.1 Maintain the annual total of external awards at over $2.2M. ENT Metric 2.2 Maintain a multi-year average of federal competitive grant awards at approximately 50% of the Department's extramural funding portfolio ENT Metric 2.3 Maintain a multi-year average of 4 refereed journal publications/research FTE / year ENT Metric 2.4 Increase the number of patent submittals and patents awarded by an average of 1 per year UK Goal 2. Promote Research and Creative Work to Increase the Intellectual, Social, and Economic Capital of Kentucky and the World beyond its Borders.
Related Mission Area	Research and Creative Work

Strategies (Not Required)

Aggressively pursue extramural research funding from diverse sources

Provide creative incentives for faculty to seek extramural funding

When needed, provide partial funding for graduate students, if a faculty member is between grants

Assessment Method

Using IRPE annual reports, determine if the department is maintaining an annual total of external awards at over $2.2M.

Using IRPE annual reports, calculate the multi-year average of federal competitive grant awards within the Department's extramural funding portfolio.

Using IRPE annual reports, calculate the multi-year average number of refereed journal publications/research FTE / year.

Using IRPE annual reports and chair survey determine the number of patent submittals and patents awarded to entomology faculty.

Actual Results

Data Tables

Descriptive Results

Year 1

In 2009 over $2.3 million in grants were awarded to faculty in the Department of Entomology. In 2009, 36 % of the grants awarded to faculty in the department were from federally competitive sources. In 2009, the faculty in the Department published 5.1 journal publications/research FTE. In 2009 one patent was awarded to faculty in the Department of Entomology.

Year 2

In 2010, over $2.6 million in grants were awarded to faculty in the Dept. of Entomology. Approximately 30 % of these grants were from federally competitive sources. In 2010, the faculty published 4.3 journal publications/research FTE. In 2010, one patent was awarded to faculty in the Department of Entomology.

Year 3

1. In year 3 of data collection, over $2.5 million in grants were awarded to faculty in the Department of Entomology.
2. In year 3 of data collection, 53% of these grants were from federally competitive sources.
3. In year 3 of data collection, faculty in the Department of Entomology published 4.6 refereed journal articles and chapters / research faculty FTE.
4. in year 3 of data collection, one patent was awarded to faculty in the Department of Entomology.

Year 4

1. In year 4 of data collection, over $1.7 million in grants were awarded to faculty in the Department of Entomology.
2. In year 4 of data collection, 53% of these grants were from federally competitive sources.
3. In year 4 of data collection, faculty in the Department of Entomology published 5.2 refereed journal articles and chapters / research faculty FTE.
4. in year 4 of data collection, one patent was awarded to faculty in the Department of Entomology.

Year 5

Analysis of Results and Reflection	Improvement Actions
Year 1 The faculty in Entomology continue to seek competitive federal funding for their research programs. They are maintaining a high level of productivity as measured by refereed journal publications.	The department chair will continue to encourage faculty to seek appropriate grant funding to support their research.
Year 2 The department continues to be in the target range of all four of these metrics. The faculty in Entomology continue to seek competitive federal funding for their research programs. The faculty are maintaining a high level of productivity as measured by refereed journal publications, extramural grants, and patents.	The chair will continue to encourage faculty to seek appropriate grant funding to support their research. The chair and departmental advisory committee will continue to monitor and assess these metrics.

Year 3

In year three of data collection, the faculty in the Department of Entomology continue to submit and secure federally competitive grants. They also continue to publish in highly regarded refereed scientific journals. The Department of Entomology is in the top quartile in research productivity of all public research institutions in the United States.

The faculty in the Department of Entomology will be encouraged to continue to apply for extramural grant funds to support their programs. The chair will encourage the faculty to continue to seek patents for their new ideas and concepts. The department's advisory committee continues to focus on these metrics. Departmental funds generated by F & A revenue will be used to match College of Agriculture funds to support creative research ideas. The department will provide partial funding for graduate students when a faculty member is between grants.

Year 4

In year 4 of data collection, the faculty in Entomology continued to seek funding from federal sources. While the total funding from grants in FY 2013 fell by $800,000 compared to FY 2012, the percentage of grant funding from federally competitive sources remained constant at 53%. For 2012-2013, the number of refereed journal articles and chapters/research faculty FTE rose from 4.6 in 2011-2012 to 5.2, which represents a 13% increase. The number of patents awarded remained the same compared to the previous year.

The faculty in the Entomology Department will be strongly encouraged to apply for extramural grant funds to support their research programs, to submit proposals to federal grant agencies, to submit research findings to professional journals, and to submit intellectual property as patent submissions.

Year 5

Unit Objective	ENT Objective 3: Develop the Human and Physical Resources of the College to Achieve Top 20 Stature
Related Goals/Metrics	Ag Goal 3. Develop the Human and Physical Resources of the College to Achieve Top 20 Stature
	ENT Goal 3. Develop the Human and Physical Resources of the College to Achieve Top 20 Stature
	ENT Metric 3.1 Maintain the department's upper 25% quartile ranking according to Academic Analytics' Faculty Productivity Index.
	ENT Metric 3.2 Add one more endowed faculty chair
	ENT Metric 3.3 Renovate / modernize research laboratories in Ag Science North and Dimmock Building
	UK Goal 3. Develop the Human and Physical Resources of the University to Achieve the Institution's Top 20 Goals.

Related Mission Area	Overall

Strategies (Not Required)

Continue to encourage faculty, staff, and graduate student creativity

Develop plans and pursue funding to renovate research facilities

Work towards housing all members of the department in one building

Promote the accomplishments and recognition of the members of the department locally, regionally, nationally, and internationally.

Retain outstanding mid-career faculty members

Aggressively recruit outstanding new faculty members in high opportunity areas

Assessment Method

Using nationally recognized measures for graduate programs (e.g., NRC and Academic Analytics' Faculty Productivity Index) maintain an upper quartile ranking for the graduate program. Add one more endowed faculty chair for the entomology faculty. Renovate / modernize research laboratories in Ag Science North and the Animal Pathology Building.

Actual Results

Data Tables

Descriptive Results

Year 1

In the recent NRC rankings of graduate programs, the graduate program in Entomology at UK was considered one of the top 4 programs in the country based on the "r-statistic" calculated by the NRC. Discussions with potential donors are underway to initiate funding for an endowed chair within the Department. The renovations for Dr. Zhou's lab in Ag Science North is

completed. Renovations of Drs. Palli and Webb's laboratories are underway. The renovations of Dr. White's lab in Animal Pathology are almost completed.

Year 2

In the recent Academic Analytics assessment of entomology graduate programs based on measures of faculty productivity, the Department of Entomology at UK was ranked 11th. This places the Dept. of Entomology at UK in the upper 25% of all graduate programs in Entomology. Among the 80 graduate programs at UK, Academic Analytics ranked the graduate program in Entomology 8th. This places the Entomology program among the top 10% of graduate programs at UK. Discussions with potential donors have continued regarding an endowed chair within the Department. The renovations of Dr. Jen White's lab have been completed. The renovations of Dr. Palli's lab have been completed. The renovations of Dr. Webb's lab should be completed by Dec 2011.

Year 3

1. During the third year of data collection, Department of Entomology was ranked 11th in the Academic Analytics assessment of graduate programs. This places the Department of Entomology in the upper 25% of all graduate programs in Entomology in the United States.
2. Discussions regarding an additional endowed faculty chair in the Department of Entomology have continued with potential donors.
3. The renovations of Drs. Webb and Palli's laboratories in Ag North have been completed.

Year 4

1. During year 4 of data collection, no national comparative data were available for Entomology programs in the United States. The Department continues to have an excellent national reputation. The Department remains in the upper 25% of all graduate programs in the Entomology.
2. In 2012-2013, the chair continued to have discussions with potential donors regarding the establishment of a second endowed chair in the Department.
3. The Department worked with the College administration in 2012-2013 to start construction of a new field storage facility at the North Farm.

Year 5

Analysis of Results and Reflection	Improvement Actions
Year 1 Excellent progress in laboratory renovations have been made during 2010	The Chair will continue to work to secure funding for an additional endowed chair in Entomology.
Year 2 Excellent progress in laboratory renovations have been made during 2010. The department will continue to strive for high rankings by the Academic Analytics group.	The chair and the awards committee will nominate individuals for university, regional, and national recognition in order to promote the accomplishments of departmental faculty. The chair will continue to work to secure funding for an additional endowed chair in Entomology. The chair will continue to work on improving the departmental facilities at the Spindletop Research Farm.
Year 3 In year three of data collection, the Department continues to be ranked among the top Entomology programs in the United States. The major renovations of laboratory space in Ag North have been completed. Little progress has been made to add a second endowed faculty chair in the Department of Entomology. The chair has engaged in discussions with the Kentucky Pest Control Association to create an endowed chair in urban entomology, however this effort has not yet been successful. The department received two regional awards - one in research and one in extension from the Entomological Association of America. The department also received the extension/ research team award from the College of Agriculture Experiment Station. An Entomology graduate student was awarded the Comstock Award by the Entomological Society of America, the highest graduate student award from the society. A plan for a new research facility at Spindletop has been submitted to the college administration. The department did retain	While budgetary constraints prohibit the hiring of additional faculty members, discussions with potential donors will continue in order to add a second endowed chair to the department. Plans will continue to be developed to improve the departmental facilities at the Spindletop (North) research farm. The department will continue to explore providing funds from the incentive account for renovation projects when the College of Agriculture provides the majority of funding.

outstanding mid-career faculty members due to laboratory improvements. No additional faculty were added because there were no retirements or resignations.	
Year 4 In year 4, the Department continued to be recognized as a top Entomology program. Faculty continued to recruit outstanding graduate students and postdoctoral students. However, the number of individuals recruited to the Department is limited by declines in grant funds available to the Department.	Budget constraints prohibit the hiring of any new faculty, but discussions with potential donors will continue. Plans for a new storage facility at the North Farm will continue with support from the Dean of the College of Agriculture, Food and Environment (CAFE).
Year 5	

Unit Objective	ENT Objective 4: Promote Diversity and Inclusion
Related Goals/Metrics	Ag Goal 4 Promote Diversity and Inclusion ENT Goal 4. Promote Diversity and Inclusion ENT Metric 4.1 Increase the percentages of graduate students, professional staff, and faculty from under-represented groups by 5% in each group ENT Metric 4.2 Increase the percentage of female faculty to 20% of the faculty UK Goal 4. Promote Diversity and Inclusion

Related Mission Area	Overall

Strategies (Not Required)

Recruit members of the Department from diverse sources

Maintain an open environment in which diversity is recognized and welcomed

Targeted recruitment activities will be a significant activity in all departmental searches

Assessment Method

Using data provided by the University of Kentucky, calculate the percentages of graduate students, professional staff, and faculty in under-represented groups. Determine increases or decreases in each group. Using data from the University of Kentucky, determine the percentage of female faculty in the Department of Entomology.

Actual Results

Data Tables

Descriptive Results

Year 1

Compared to baseline 2009 data, the percentage of females on the Entomology faculty remained constant at 11 %. Compared to 2009 data, the percentage of female staff members in Entomology remained constant at 70%. The percentage of female graduate students enrolled in the graduate program in Entomology in 2010 was 41 %.

Year 2

The percentage of females on the Entomology faculty remained constant at 11%. The percentage of female staff members in Entomology declined to 60%. The percentage of female graduate student enrolled in the graduate program in Entomology increased to 51%.

Year 3

1. In the third year of data collection, the percentage of female graduate students enrolled in the graduate program in Entomology increased slightly to 53%. Due to individuals leaving technical positions for other employment opportunities, the percentage of female staff members in Entomology declined to 50%. During the third year of data collection, three females with PhD degrees in Entomology were hired as instructors within the Department of Entomology.
2. During the third year of data collection, the percentage of females on the Entomology faculty remained constant at 11 %. The faculty in the Department of Entomology is internationally diverse, individuals are citizens of the following countries; Canada, China, Great Britain, India, and Venezuela.

Year 4

1. In the 4th year of data collection, the percentage of females on the Entomology faculty remained constant at 11%. The faculty in the Department remained internationally diverse.
2. In the 4th year of data collection, the percentage of female graduate students was 48% and the percentage of female staff members was 61%. One female with a PhD in Entomology was also hired as an instructor in the Department of Entomology during the 4th year of data collection.

Year 5

Analysis of Results and Reflection	Improvement Actions

Year 1	
Continued recruiting efforts are needed to increase the percentage of under-represented groups in the department. Continued efforts are needed to increase the percentage of females on the faculty in Entomology.	The chair will continue to develop recruitment plans for the department.
Year 2	
Continued recruiting efforts are needed to increase the percentage of under-represented groups in the department. Efforts to increase the percentage of females on the faculty in Entomology will depend upon the ability to fill vacant positions when they become available within the department.	The chair and faculty will work with adjunct members of the department at Kentucky State University to enhance our recruitment efforts.
Year 3	
The department faculty and chair will continue efforts to increase the percentage of under -represented groups in the graduate program in Entomology. Increasing the percentage of females on the faculty in Entomology will occur when vacant positions become available in the department.	During year 3 of data collection, the chair has continued discussions with faculty at Kentucky State University to enhance our recruitment efforts. Two members of the Kentucky State University faculty are adjunct faculty members in the Department of Entomology at the University of Kentucky.
Year 4	In year 5, the chair will continue to work with adjunct faculty from Kentucky State
While the percentage of females on the Entomology faculty remained constant at 11% and the faculty in the Department remained internationally diverse, the percentage of female graduate students declined slightly by 2%. Due to the hiring of two new individuals, the percentage of female staff members increased by 11% in 2012-2013. Increasing the percentage of females on the Entomology faculty will occur when vacant positions become available.	University to recruit underrepresented groups to the graduate program in Entomology. When faculty positions become available, every effort will be made to recruit and hire individuals from underrepresented groups.
Year 5	

Unit Objective	ENT Objective 5: Improve the Quality of Life for Kentuckians through Extension, Outreach and Service
Related Goals/Metrics	Ag Goal 5 Improve the Quality of Life for Kentuckians through Extension, Outreach and Service ENT Goal 5. Improve the Quality of Life for Kentuckians through Extension, Outreach and Service ENT Metric 5.1 Continue to create responsive programs to support agents and client needs, measured by bi-annual agent evaluations of programs. ENT Metric 5.2 Maintain our level of grantsmanship in Extension or Integrated Projects as evidenced by numbers of proposals submitted and funded ENT Metric 5.3 Maintain the quality and visibility of the Department's web-based resources UK Goal 5. Improve the Quality of Life of Kentuckians through Engagement, Outreach, and Service.
Related Mission Area	Overall

Strategies (Not Required)

Maintain the level of faculty commitment to extension programs within the department

Continue to seek creative approaches to research/extension split appointments

Continue to support the IPM extension program within the department

Continue to creatively use web-based technologies to distribute current and up to date information

Pursue new funding sources to maintain the quality of extension programs

Assessment Method

Using the College of Agriculture bi-annual agent evaluations of Extension Entomology Specialists, continue to create responsive programs to support extension agents and clientele needs. Using University of Kentucky data and Chair survey data, maintain the current levels of grantsmanship in Extension and Integrated Projects, determined by the numbers of

proposals submitted and funded. Based on Google statistics, maintain the quality and visibility of the Department's web-based resources.

Actual Results

Data Tables

Descriptive Results

Year 1

Compared to evaluations of Entomology Extension programs in 2008, the Extension specialists and their programs in 2010 were rated similarly positively for their degree of interaction, responsiveness, value of their programs information, and effectiveness of program/information. The Extension faculty continue to seek grants to support their programs and have been successful in securing grant funds from industry, state and federal sources. The ENT-fact series continue to be a widely used source of information on the web. **Year 2**

The Extension specialists are evaluated on a two-year cycle. Extension faculty continue to seek grants to support their programs.

In 2010, the Entomology departmental website received 2,370,000 page views, an increase of 13% over 2009. Visitors were from 217 countries. 84,000 visits were from Kentucky in 2010, an increase of 10 % over 2009.

The most popular page on our website was the Bed Bug Factsheet which received 304,000 page views in 2010.

Year 3

1. During year three of data collection, the percentage of female faculty involved in Extension programs remained constant. The percentage of female staff devoted to Extension programs remained at 50%, surpassing the goal of 20%.
2. During the third year of data collection, Extension faculty received funding for 11 grants that supported their programs.

Year 4

1. During year 4, the percentage of female faculty involved in Extension programs remained constant. The percentage of female staff devoted to Extension programs remained at 50%.

2. During year 4, Extension faculty received funding for 8 grants that supported Entomology Extension programs.

Year 5

Analysis of Results and Reflection	Improvement Actions
Year 1 The chair will continue to assist the Extension faculty to meet the needs of their programs.	The chair will meet with the Extension faculty to discuss their programs.
Year 2 The chair continues to work with Entomology Extension faculty to meet the needs of their programs. We continue to update the contents on our website to provide current and timely information.	The chair will meet with our new computer IT employee in the Department of Entomology to continue to improve the content of our website.
Year 3 During year three, the chair continued to work with Extension faculty to provide the resources needed to meet the needs of the citizens of Kentucky. The Extension faculty and staff continue to update information on our website to provide timely and up-to-date information on insects and arthropods that affect the quality of life of Kentuckians.	The chair will meet with the computer IT employee and the Extension staff member who is responsible for the content of the Departmental website to evaluate the website for modifications and updates.

Year 4

Although the number of grants received in support of Extension programs in 2012-2013 fell by three, this decrease may be the result of a decrease in available grant funding and the competitiveness for those limited grants. In year 4, the Extension program continued to meet or surpass the goals of this objective, as well as to meet the needs of the citizens of Kentucky. Up-to-date information on arthropods and insects that positively affected the quality of life of Kentuckians was provided by Entomology Extension faculty members. A long-range planning committee on the future direction of Entomology Extension was formed by the chair and made recommendations.

The Department chair and Extension faculty will meet to discuss recommendations from
the long-range planning committee on the future directions of Extension in the Department of Entomology. The department chair will also continue to stress the importance of external grant funding for Extension programs.

Year 5

Appendix 4

Department of Entomology

Student Learning Outcomes Assessment

Department of Entomology
Masters of Entomology Program Assessment Plan

1. Introduction College of Agriculture, Food & Environment (CAFE), Department of Entomology, PhD, MS graduate programs

Unit Mission Statement Our mission is to improve the quality of human life and protect our environment through a better understanding of insects and related arthropods. We conduct fundamental and applied research on insects, deliver information through education and outreach activities, educate graduate and undergraduate students, develop and provide resources for agricultural and pest management professionals, implement integrative and effective systems for insect pest management, and enhance science education and public appreciation of human-insect interactions.

2. Assessment Oversight, Resources

2.1. College Learning Outcomes Assessment Coordinator (Larry Grabau, CAFE Associate Dean Academic Programs)
2.2. Unit Assessment Coordinator (Charles Fox, Department of Entomology, Director of Graduate Studies)

3. Program-Level Learning Outcomes
Learning outcomes for PhD and MS in Entomology

3.1. Student will demonstrate proficiency/understanding of basic principles, processes and patterns in student's area of expertise (insect organismal biology, pest management and/or molecular biology).
3.2. Student will exhibit breadth of understanding of a diversity of subjects in entomology.
3.3. Student will demonstrate proficiency in concepts and applications of mathematics and/or statistics for analysis and problem solving.
3.4. Student will demonstrate research skills (e.g., hypothesis testing, collection, analysis and discussion of data), effective communication skills, including proficiency in technical and/or scientific writing and an ability to prepare and deliver effective oral presentations.

4. Curriculum Map

The Department of Entomology offers graduate work leading to the Master of Science (Plan A – Thesis and Plan B -- Non-thesis) and the Doctor of Philosophy degrees. The graduate student handbook is updated on the Department's website (http://www.ca.uky.edu/entomology/dept/gradprogram.asp).
Individual graduate programs are planned by students in consultation with their advisor, and advisory committee, and the Director of Graduate Studies. Study and research are available in various areas of entomology including applied entomology, araneology, behavior, biochemistry, biological control, ecology, genetics, plant resistance, insect biology, medical and veterinary entomology, molecular biology, physiology, systematics, and taxonomy. The discipline of entomology, similar to all agricultural and biological sciences, has evolved significantly during the past two decades and continues to

undergo rapid changes. To increase flexibility in the core curricula, the PhD and MS core curricula are the responsibility of the graduate faculty in Entomology.

During their first year of graduate studies, M.S. (Plan A) and Ph.D. students are required to prepare a formal written research proposal encompassing a thorough literature review, clear statement of objectives, and materials and methods of the project. A research proposal seminar will be presented to the Department upon completion of the written research proposal. An exit seminar, usually presented during the last semester of the student's tenure, is required for M.S. (plans A and B) and Ph.D. students. August graduates will present their seminar in the preceding spring. M.S. students using the Plan B option will be required to provide a detailed outline of their practicum to their Advisory Committee. The practicum must be a minimum of 3 credit hours (maximum of 6 credit hours) and may consist of library research, special problems, internships, etc., as agreed upon by the student and major professor, and approved by the Advisory Committee. M.S. and Ph.D. students will be required to post a formal notification of scheduled examinations on the notice board in the main departmental office two weeks prior to the examination date.

All M.S. and Ph.D. students must satisfy the following core course requirements:
1. An undergraduate course in general entomology. Students who have not had such a course must take ENT 300.
2. STA 570 Basic Statistical Analysis
3. Each M.S. student must take two semesters of ENT 770, Entomological Seminar, (or approved equivalent seminars) and Ph.D. candidates must take four semesters of approved seminars.
4. Ph.D. and M.S. candidates using the Plan A option must take a minimum of one course from two of the following core areas. M.S. candidates using the Plan B option must take a minimum of one course from all three core areas.

Core Area 1: Insect Behavior, Ecology, Evolution and Systematics.
ENT 564 Insect Taxonomy
ENT 568 Insect Behavior
ENT 607 Advanced Evolution
ENT 625 Insect-Plant Relationships
ENT 660 Immature Insects
ENT 665 Insect Ecology
ENT 667 Invasive Species Biology

Core Area 2: Insect Molecular Biology, Physiology and Genetics.
ENT 635 Insect Physiology
ENT 636 Insect Molecular Biology

Core Area 3: Pest Management and Applied Ecology.
ENT 530 Integrated Pest Management
ENT 561 Insects Affecting Human and Animal Health
ENT 574 Advanced Applied Entomology

ENT 680 Biological Control

In all cases, an equivalent graduate level course from another institution is acceptable upon approval of the Advisory Committee. Such approval will not decrease the minimum number of credits required, but simply will permit the student to take other courses.

5. Assessment Methods and Measures (Formative and Summative recommended
Learning Outcome 1.
Assessment:
PhD: Written and oral qualifying examination before advancement to candidacy and oral dissertation defense following completion of PhD research.
Masters: Oral final examination.

Learning Outcome 2.
Assessment:
PhD: Completion of required coursework with performance above the graduate school and departmental minimum GPA, prior to qualifying examination; qualifying examination before advancement to candidacy
Masters: Completion of required coursework, oral final examination

Learning Outcome 3.
Assessment:
PhD: Completion of required math and/or statistics prior to qualifying examination, committee evaluation of statistical application to dissertation research, defense of dissertation
Masters: Completion of required math and/or statistics courses, oral examination including defense of thesis (MS Plan A) or practicum (MS Plan B) and included statistical approaches

Learning Outcome 4.
Assessment:
PhD: Completion and successful oral defense of written PhD dissertation; written and oral qualifying exam questions; publication of dissertation research in regional, national or international journals; oral presentation of dissertation research at Entomology department seminar; presentation of dissertation research as poster or oral presentation at regional and/or national meeting(s) of appropriate professional society(ies); oral defense of dissertation
Masters: Completion and successful oral defense of written MS thesis; presentation of thesis research as poster or oral presentation at regional and/or national meeting(s) of appropriate professional society(ies); publication of thesis research in regional, national or international journals; defense of thesis (MS Plan A) or defense of practicum (MS Plan B).

6. Data Collection and Review
6.1. Data Collection Process/Procedures

6.1.1. Data will be collected at oral examinations and student presentations.
6.1.2. Learning outcomes assessment forms attached.
6.1.3. The benchmark/target for each learning outcome will be good or outstanding
6.1.4. Faculty will be responsible for the collection of data.

7. Assessment Cycle and Data Analysis

7.1 Assessment Cycle [3 years]

7.1.1. In 2017, all data will be summarized, presented and discussed by the faculty. Collecting data from 2015 to 2017 will provide sufficient data for a meaningful assessment of our learning outcomes.

7.1.2. In fall 2015, 2016, and 2017, one faculty meeting will be devoted to a discussion of learning outcomes assessment and improvement actions

7.2. Data Analysis Process/Procedures

7.2.1. All data and findings will be shared with all faculty members of the Department of Entomology. Focused faculty meetings will be scheduled to discuss the data and assess our graduate programs

7.2.2. The DGS, Department Chair, and faculty members of the departmental curriculum committee will be involved in the analysis of the data.

7.2.3. The results align directly with our department mission and goals.

7.2.4. Based on our learning outcomes assessment we will modify our graduate curriculum to address learning outcomes that need improvement

7.3. Data Analysis Report Process/Procedures Data collected on learning outcomes assessment will be included in the Departmental Review Self Study documents.

8. Teaching Effectiveness

8.1. Teaching effectiveness in graduate courses will be assessed using TCE forms.
8.2. Teaching effectiveness will be improved by consultations with members of CELT.

9. What are the plans to evaluate students' post-graduate success? The Department tracks graduates to determine their post-graduate success

10.Appendices – Learning outcomes assessment forms attached

Department of Entomology
Doctor of Entomology Program Assessment Plan

1. Introduction College of Agriculture, Food & Environment (CAFE), Department of Entomology, PhD, MS graduate programs

Unit Mission Statement Our mission is to improve the quality of human life and protect our environment through a better understanding of insects and related arthropods. We conduct fundamental and applied research on insects, deliver information through education and outreach activities, educate graduate and undergraduate students, develop and provide resources for agricultural and pest management professionals, implement integrative and effective systems for insect pest management, and enhance science education and public appreciation of human-insect interactions.
1.1. Basic Assessment Approach

2. Assessment Oversight, Resources
2.1. College Learning Outcomes Assessment Coordinator (Larry Grabau, CAFE Associate Dean Academic Programs)
2.2. Unit Assessment Coordinator (Charles Fox, Department of Entomology, Director of Graduate Studies)

3. Program-Level Learning Outcomes
Learning outcomes for PhD and MS in Entomology
3.1. Student will demonstrate proficiency/understanding of basic principles, processes and patterns in student's area of expertise (insect organismal biology, pest management and/or molecular biology).
3.2. Student will exhibit breadth of understanding of a diversity of subjects in entomology.
3.3. Student will demonstrate proficiency in concepts and applications of mathematics and/or statistics for analysis and problem solving.
3.4. Student will demonstrate research skills (e.g., hypothesis testing, collection, analysis and discussion of data), effective communication skills, including proficiency in technical and/or scientific writing and an ability to prepare and deliver effective oral presentations.

4. Curriculum Map
The Department of Entomology offers graduate work leading to the Master of Science (Plan A – Thesis and Plan B -- Non-thesis) and the Doctor of Philosophy degrees. The graduate student handbook is updated on the Department's website (http://www.ca.uky.edu/entomology/dept/gradprogram.asp).
Individual graduate programs are planned by students in consultation with their advisor, and advisory committee, and the Director of Graduate Studies. Study and research are available in various areas of entomology including applied entomology, araneology, behavior, biochemistry, biological control, ecology, genetics, plant resistance, insect biology, medical and veterinary entomology, molecular biology, physiology, systematics, and taxonomy. The discipline of entomology, similar to all agricultural and biological

sciences, has evolved significantly during the past two decades and continues to undergo rapid changes. To increase flexibility in the core curricula, the PhD and MS core curricula are the responsibility of the graduate faculty in Entomology.

During their first year of graduate studies, M.S. (Plan A) and Ph.D. students are required to prepare a formal written research proposal encompassing a thorough literature review, clear statement of objectives, and materials and methods of the project. A research proposal seminar will be presented to the Department upon completion of the written research proposal. An exit seminar, usually presented during the last semester of the student's tenure, is required for M.S. (plans A and B) and Ph.D. students. August graduates will present their seminar in the preceding spring. M.S. students using the Plan B option will be required to provide a detailed outline of their practicum to their Advisory Committee. The practicum must be a minimum of 3 credit hours (maximum of 6 credit hours) and may consist of library research, special problems, internships, etc., as agreed upon by the student and major professor, and approved by the Advisory Committee. M.S. and Ph.D. students will be required to post a formal notification of scheduled examinations on the notice board in the main departmental office two weeks prior to the examination date.

All M.S. and Ph.D. students must satisfy the following core course requirements:
1. An undergraduate course in general entomology. Students who have not had such a course must take ENT 300.
2. STA 570 Basic Statistical Analysis
3. Each M.S. student must take two semesters of ENT 770, Entomological Seminar, (or approved equivalent seminars) and Ph.D. candidates must take four semesters of approved seminars.
4. Ph.D. and M.S. candidates using the Plan A option must take a minimum of one course from two of the following core areas. M.S. candidates using the Plan B option must take a minimum of one course from all three core areas.

Core Area 1: Insect Behavior, Ecology, Evolution and Systematics.
ENT 564 Insect Taxonomy
ENT 568 Insect Behavior
ENT 607 Advanced Evolution
ENT 625 Insect-Plant Relationships
ENT 660 Immature Insects
ENT 665 Insect Ecology
ENT 667 Invasive Species Biology

Core Area 2: Insect Molecular Biology, Physiology and Genetics.
ENT 635 Insect Physiology
ENT 636 Insect Molecular Biology

Core Area 3: Pest Management and Applied Ecology.
ENT 530 Integrated Pest Management
ENT 561 Insects Affecting Human and Animal Health

ENT 574 Advanced Applied Entomology
ENT 680 Biological Control

In all cases, an equivalent graduate level course from another institution is acceptable upon approval of the Advisory Committee. Such approval will not decrease the minimum number of credits required, but simply will permit the student to take other courses.

5. Assessment Methods and Measures (Formative and Summative recommended
Learning Outcome 1.
Assessment:
PhD: Written and oral qualifying examination before advancement to candidacy and oral dissertation defense following completion of PhD research.
Masters: Oral final examination.

Learning Outcome 2.
Assessment:
PhD: Completion of required coursework, with performance above the graduate school and departmental minimum GPA, prior to qualifying examination; qualifying examination before advancement to candidacy
Masters: Completion of required coursework, oral final examination

Learning Outcome 3.
Assessment:
PhD: Completion of required math and/or statistics prior to qualifying examination, committee evaluation of statistical application to dissertation research, defense of dissertation.
Masters: Completion of required math and/or statistics courses, oral examination includes defense of thesis (MS Plan A) or practicum (MS Plan B) and included statistical approaches

Learning Outcome 4.
Assessment:
PhD: Completion and successful oral defense of written PhD dissertation; written and oral qualifying exam questions; publication of dissertation research in regional, national or international journals; oral presentation of dissertation research at Entomology department seminar; presentation of dissertation research as poster or oral presentation at regional and/or national meeting(s) of appropriate professional society(ies); oral defense of dissertation
Masters: Completion and successful oral defense of written MS thesis, presentation of thesis research as poster or oral presentation at regional and/or national meeting(s) of appropriate professional society(ies), publication of thesis research in regional, national or international journals, defense of thesis (MS Plan A) or defense of practicum (MS Plan B).

6. Data Collection and Review

6.1. Data Collection Process/Procedures

6.1.1. Data will be collected at oral examinations and student presentations.

6.1.2. Learning outcomes assessment forms attached.

6.1.3. The benchmark/target for each learning outcome will be good or outstanding

6.1.4. Faculty will be responsible for the collection of data.

7. Assessment Cycle and Data Analysis

7.1 Assessment Cycle [3 years]

7.1.1. In 2017, all data will be summarized, presented and discussed by the faculty. Collecting data from 2015 to 2017 will provide sufficient data for a meaningful assessment of our learning outcomes.

7.1.2. In fall 2015, 2016, and 2017, one faculty meeting will be devoted to a discussion of learning outcomes assessment and improvement actions.

7.2. Data Analysis Process/Procedures

7.2.1. All data and findings will be shared with all faculty members of the Department of Entomology. Focused faculty meetings will be scheduled to discuss the data and assess our graduate programs

7.2.2. The DGS, Department Chair, and faculty members of the departmental curriculum committee will be involved in the analysis of the data.

7.2.3. The results align directly with our department mission and goals.

7.2.4. Based on our learning outcomes assessment, we will modify our graduate curriculum to address learning outcomes that need improvement.

7.3. Data Analysis Report Process/Procedures Data collected on learning outcomes assessment will be included in the Departmental Review Self Study documents.

8. Teaching Effectiveness

8.1. Teaching effectiveness in graduate courses will be assessed using TCE forms.

8.2. Teaching effectiveness will be improved by consultations with members of CELT.

9. What are the plans to evaluate students' post-graduate success?

The Department tracks graduates to determine their post-graduate success.

10.Appendices – Learning outcomes assessment forms attached

University of Kentucky

Annual Assessment Reporting
2013-2014

Please complete this form for the program's 2013-2014 academic year student learning outcomes assessment. If you conducted multiple assessments, please fill in as needed by starting a new section. If you have documents relevant to the assessment conducted, please add them as an appendix. Add hyperlinks to websites as necessary. For our records, please save the file as Program Name and Level (e.g. English_Master).

College: CAFE
Department: Entomology
Program Name: Entomology
Level (Masters):

	Assessment #1
Outcome(s) Assessed	**Student demonstrates proficiency/understanding of basic principles, processes and patterns in student's area of expertise**
Assessment Method/Tools	Entomology Learning Outcomes Assessment Form (attached)
Benchmark/ Target	Target -- majority of MS students are assessed at Good or Outstanding levels
Results	Because each faculty member has been involved in relatively few MS exit exams during the past year (typically one or two exams), the members of the faculty will discuss their assessments of this outcome collectively at a faculty meeting.
Interpretation of Results	The members of the entomology faculty will discuss these assessments relative to our graduate core curriculum and the format for our MS exit exams.
Improvement Action	Based on the results of the faculty discussion, we might modify our core curriculum to address issues. We will also discuss the format of our MS exit exams to determine if we need to alter the current format.

University of Kentucky

Annual Assessment Reporting

2013-2014

	Assessment #2
Outcome(s) Assessed	**Student exhibits breath of understanding of a diversity of subjects in entomology**
Assessment Method/Tools	Entomology Learning Outcomes Assessment Form (attached)
Benchmark/ Target	Target -- Majority of MS students are assessed at Good or Outstanding levels
Results	Because each faculty member has been involved in relatively few MS exit exams during the past year (typically one or two exams), the members of the faculty will discuss their assessments of this outcome collectively at a faculty meeting.
Interpretation of Results	The members of the entomology faculty will discuss these assessments relative to our graduate core curriculum and the format for our MS exit exams.
Improvement Action	Based on the results of the faculty discussion, we might modify our core curriculum to address issues. We will also discuss the format of our MS exit exams to determine if we need to alter the current format.

University of Kentucky

Annual Assessment Reporting

2013-2014

	Assessment #3
Outcome(s) Assessed	**Student demonstrates effective communication skills, including proficiency in ability to prepare and deliver effective oral presentations**
Assessment Method/Tools	Learning outcomes assessment form (presentations) attached
Benchmark/ Target	Target -- Majority of MS students are assessed at Good or Outstanding levels
Results	Because relatively few MS presentations are made during an academic year (typically one or two each semester), the members of the faculty will discuss their assessments of this outcome collectively at a faculty meeting.
Interpretation of Results	The members of the entomology faculty will discuss these assessments relative to our expectations for scientific presentations at professional meetings.
Improvement Action	Based on the results of the faculty discussion, we could decide if the faculty needs to increase our focus on the presentation skills of our MS students.

Learning Outcomes Assessment Form

Semester of exam: Fall _____ Spring _____ Summer _____ **Year**: _____

Exam type: Qualifying ____ MS Thesis-A ____ MS Thesis-B ____ Final Doctoral ____

Student name: _____

A. Student demonstrates proficiency/understanding of basic principles, processes and patterns in student's area of expertise (insect organismal biology, pest management and/or molecular biology).

Assessment: Insufficient data to Judge (0) ____ Unacceptable (1) ____

Adequate (2) ____ Good (3) ____ Outstanding (4) ____

B. Student exhibits breadth of understanding of a diversity of subjects in entomology.

Assessment: Insufficient data to Judge (0) ____ Unacceptable (1) ____

Adequate (2) ____ Good (3) ____ Outstanding (4) ____

C. Student is able to critically analyze the entomological literature, make valid scientific observations, use these to formulate testable scientific hypotheses, and apply appropriate methodologies to test these hypotheses.

Assessment: Insufficient data to Judge (0) ____ Unacceptable (1) ____

Adequate (2) ____ Good (3) ____ Outstanding (4) ____

D. Student demonstrates proficiency in concepts and applications of mathematics and/or statistics for analysis and problem solving.

Assessment: Insufficient data to Judge (0) ____ Unacceptable (1) ____

Adequate (2) ____ Good (3) ____ Outstanding (4) ____

E. Student demonstrates effective communication skills, including proficiency in technical and/or scientific writing and ability to prepare and deliver effective oral presentations.

Assessment: Insufficient data to Judge (0) ____ Unacceptable (1) ____

Adequate (2) ____ Good (3) ____ Outstanding (4) ____

Department of Entomology
Learning Outcomes Assessment Form (Presentations)

Student _____ **Date**_____ **Faculty Reviewer** _____

Title: _____

Type of Seminar **Proposal** **Exit**

Student Learning Outcome

Student will demonstrate effective communication skills, including proficiency in an ability to prepare and deliver effective oral presentations.

Circle the appropriate score for each category. E = excellent, VG = Very good, G = Good, F = Fair, NI = Needs improvement, NA = not applicable

Content	**E**	**VG**	**G**	**F**	**NI**	**NA**
Introduction & background w/ pertinent literature cited	5	4	3	2	1	0
Objectives clearly stated & concise	5	4	3	2	1	0
Materials & methods (study design) clear & concise	5	4	3	2	1	0
Results & discussion clear, concise, and accurate	5	4	3	2	1	0
Significance of results to field of study	5	4	3	2	1	0

Presentation

Organization	**E**	**VG**	**G**	**F**	**NI**	**NA**
Logical order, minimum redundancy	5	4	3	2	1	0
Smooth transitions between presentation sections	5	4	3	2	1	0

Slides	**E**	**VG**	**G**	**F**	**NI**	**NA**
Legible, large fonts, color contrast, no conflicting backgrounds	5	4	3	2	1	0
Text w/ no grammatical errors; not excessively wordy	5	4	3	2	1	0

Delivery	**E**	**VG**	**G**	**F**	**NI**	**NA**
Clear and audible speech	5	4	3	2	1	0
Eye contact with audience	5	4	3	2	1	0
Effective use of figures and/or tables	5	4	3	2	1	0
Effective use of time	5	4	3	2	1	0

University of Kentucky

Annual Assessment Reporting
2013-2014

Please complete this form for the program's 2013-2014 academic year student learning outcomes assessment. If you conducted multiple assessments, please fill in as needed by starting a new section. If you have documents relevant to the assessment conducted, please add them as an appendix. Add hyperlinks to websites as necessary. For our records, please save the file as Program Name and Level (e.g. English_Master).

College: CAFE
Department: Entomology
Program Name: Entomology
Level (Doctorate):

	Assessment #1
Outcome(s) Assessed	**Student demonstrates proficiency/understanding of basic principles, processes and patterns in student's area of expertise**
Assessment Method/Tools	Entomology Learning Outcomes Assessment Form (attached)
Benchmark/ Target	Target -- majority of PhD students are assessed at Good or Outstanding levels
Results	Because each faculty member has been involved in relatively few PhD exams during the past year (typically one or two exams), the members of the faculty will discuss their assessments of this outcome collectively at a faculty meeting.
Interpretation of Results	The members of the entomology faculty will discuss these assessments relative to our graduate core curriculum and the format for our PhD exams.
Improvement Action	Based on the results of the faculty discussion, we could consider a modification of our core curriculum to address issues. We will also discuss the format of our PhD exams to determine if we need to alter the current format.

University of Kentucky

Annual Assessment Reporting

2013-2014

	Assessment #2
Outcome(s) Assessed	**Student exhibits breath of understanding of a diversity of subjects in entomology**
Assessment Method/Tools	Entomology Learning Outcomes Assessment Form (attached)
Benchmark/ Target	Target -- Majority of PhD students are assessed at Good or Outstanding levels
Results	Because each faculty member has been involved in relatively few PhD exams during the past year (typically one or two exams), the members of the faculty will discuss their assessments of this outcome collectively at a faculty meeting.
Interpretation of Results	The members of the entomology faculty will discuss these assessments relative to our graduate core curriculum and the format for our PhD exams.
Improvement Action	Based on the results of the faculty discussion, we could modify our core curriculum to address issues. We will also discuss the format of our PhD exams to determine if we need to alter the current format.

University of Kentucky

Annual Assessment Reporting

2013-2014

	Assessment #3
Outcome(s) Assessed	**Student demonstrates effective communication skills, including proficiency in ability to prepare and deliver effective oral presentations**
Assessment Method/Tools	Learning outcomes assessment form (presentations) attached
Benchmark/ Target	Target -- Majority of PhD students are assessed at Good or Outstanding levels
Results	Because relatively few PhD presentations are made during an academic year (typically one or two each semester), the members of the faculty will discuss their assessments of this outcome collectively at a faculty meeting.
Interpretation of Results	The members of the entomology faculty will discuss these assessments relative to our expectations for scientific presentations at professional meetings.
Improvement Action	Based on the results of the faculty discussion, we would decide if the faculty needs to increase our focus on the presentation skills of our PhD students.

Learning Outcomes Assessment Form

Semester of exam: Fall _____ Spring _____ Summer _____ **Year**: _____

Exam type: Qualifying ____ MS Thesis-A ____ MS Thesis-B ____ Final Doctoral ____

Student name: _____

A. Student demonstrates proficiency/understanding of basic principles, processes and patterns in student's area of expertise (insect organismal biology, pest management and/or molecular biology).

Assessment: Insufficient data to Judge (0) ____ Unacceptable (1) ____

Adequate (2) ____ Good (3) ____ Outstanding (4) ____

B. Student exhibits breadth of understanding of a diversity of subjects in entomology.

Assessment: Insufficient data to Judge (0) ____ Unacceptable (1) ____

Adequate (2) ____ Good (3) ____ Outstanding (4) ____

C. Student is able to critically analyze the entomological literature, make valid scientific observations, use these to formulate testable scientific hypotheses, and apply appropriate methodologies to test these hypotheses.

Assessment: Insufficient data to Judge (0) ____ Unacceptable (1) ____

Adequate (2) ____ Good (3) ____ Outstanding (4) ____

D. Student demonstrates proficiency in concepts and applications of mathematics and/or statistics for analysis and problem solving.

Assessment: Insufficient data to Judge (0) ____ Unacceptable (1) ____

Adequate (2) ____ Good (3) ____ Outstanding (4) ____

E. Student demonstrates effective communication skills, including proficiency in technical and/or scientific writing and ability to prepare and deliver effective oral presentations.

Assessment: Insufficient data to Judge (0) ____ Unacceptable (1) ____

Adequate (2) ____ Good (3) ____ Outstanding (4) ____

Department of Entomology
Learning Outcomes Assessment Form (Presentations)

Student _____ **Date**_____ **Faculty Reviewer** _____

Title: _____

Type of Seminar **Proposal** **Exit**

Student Learning Outcome

Student will demonstrate effective communication skills, including proficiency in an ability to prepare and deliver effective oral presentations.

Circle the appropriate score for each category. E = excellent, VG = Very good, G = Good, F = Fair, NI = Needs improvement, NA = not applicable

Content	**E**	**VG**	**G**	**F**	**NI**	**NA**
Introduction & background w/ pertinent literature cited	5	4	3	2	1	0
Objectives clearly stated & concise	5	4	3	2	1	0
Materials & methods (study design) clear & concise	5	4	3	2	1	0
Results & discussion clear, concise, and accurate	5	4	3	2	1	0
Significance of results to field of study	5	4	3	2	1	0

Presentation

Organization	**E**	**VG**	**G**	**F**	**NI**	**NA**
Logical order, minimum redundancy	5	4	3	2	1	0
Smooth transitions between presentation sections	5	4	3	2	1	0

Slides	**E**	**VG**	**G**	**F**	**NI**	**NA**
Legible, large fonts, color contrast, no conflicting backgrounds	5	4	3	2	1	0
Text w/ no grammatical errors; not excessively wordy	5	4	3	2	1	0

Delivery	**E**	**VG**	**G**	**F**	**NI**	**NA**
Clear and audible speech	5	4	3	2	1	0
Eye contact with audience	5	4	3	2	1	0
Effective use of figures and/or tables	5	4	3	2	1	0
Effective use of time	5	4	3	2	1	0

UNIVERSITY OF KENTUCKY®

Annual Student Learning Outcomes Report

Entomology
Entomology - Master
Spring 2012 Entomology MS

Student Learning Outcome(s) Assessed

ent.m: Profiency - Student will demonstrate proficiency/understanding of basic principles, processes and patterns in student's area of expertise (insect organismal biology, pest management and/or molecular biology).

ent.m: Breadth - Student will exhibit breadth of understanding of a diversity of subjects in classical and modern entomology.

ent.m: Statistical Analysis - Student will demonstrate proficiency in concepts and applications of mathematics and/or statistics for analysis and problem solving.

ent.m: Communicate - Student will demonstrate effective communication skills, including proficiency in technical and/or scientific writing and an ability to prepare and deliver effective oral presentations.

Assessment Methods and Tools

The number of students completing MS degrees each year.

The number of graduate student refereed publications in scientific journals.

The number of graduate student presentations at scientific meetings.

Results

In 2011, the 4-year average number of MS students graduating was 3.0.

Graduate students published 0.9 publications/graduate student/year.

Graduate students presented 1.5 presentations/graduate student/year.

Interpretation of Results

The Department of Entomology is slightly below our goal for the multi-year average number of students graduating with MS degrees.

The Department met our goal of 1.5 graduate student presentations/graduate student/year.

The Department exceeded our goal of 0.5 refereed publications/graduate student/year.

Improvement Action

The number of applicants to the MS program in Entomology has fluctuated during the past two years for unknown reasons. In 2011, the faculty admitted 8 new students to the MS program in Entomology. As these students complete their MS degrees, our multi-year average number of MS graduates should increase.

The Department has met or exceeding our goals for graduate student productivity.

The faculty and graduate students in the Department of Entomology have created a graduate student survey that was sent to all graduate students in May 2012. The results of this survey will be discussed with faculty and students in fall 2012.

Reflection

Attachments

No Attachments

Annual Student Learning Outcomes Report

Entomology
Entomology - Doctor
Fall 2013 Entomology PhD

Student Learning Outcome(s) Assessed

ENT Goal 1. Prepare Students for Leadership in an Innovation-Driven Economy and Global Society Educating students was one of the earliest missions of the Department and remains the most important way that we enhance the future of the Commonwealth. Graduate education is fully integrated with our other missions – research and extension. The Department expects its graduates to become leaders in their professions and their communities. To this end, the Department must attract and graduate outstanding students with diverse backgrounds and the skills to meet the challenges of the future.

Assessment Methods and Tools

The number of students completing PhD degrees each year

The number of graduate student refeered publications in scientific journals

The number of graduate student presentations at scientific meetings

The number of PhD students successfully completing their qualifying exams

Results

In 2012-13, the 4 year average number of PhD students graduated was 4.3.

In 2012-13, graduate students in Entomology published 0.7 publications/graduate student/year.

In 2012-13. graduate students in Entomology presented 1.6 presentations/graduate student/year.

Four (of four) PhD students successfully completed their qualifying exams during 2012-13.

Interpretation of Results

Based on a 4 - year average number of students completing their PhD degrees in Entomology, the Department of Entomology is slightly below our goal of graduating 5 PhD students/ year.

The Department has met our goals for graduate student presentations and publications. Our goals are 1.5 presentations/graduate student/year and 0.5 publications/graduate student/year.

The number of PhD students passing their qualifying exams during 2012-13 met the min goal for the Department (4-6 students/year).

Improvement Action

The number of applicants to our graduate program continues to fluctuate yearly for no apparent reasons. In 2013, we admitted 4 new PhD students to the graduate program. However, the number of applications recevied for 2014 admission remains relatively low. The Department continues to be close to our goals for numbers of PhD students graduating each year and our productivity measures look good.

Reflection

The Entomology faculty, in consultation with the graduate students in the Department, has approved a list of guidelines for mentoring graduate students. This document includes expectations of advisors and provides the background and philosophy for mentoring graduate students in Entomology. The faculty in Entomology are dedicated to improving our graduate education program at UK.

Attachments

Graduate Student Mentoring Sept 2013.docx

UNIVERSITY OF KENTUCKY®

Annual Student Learning Outcomes Report

Entomology
Entomology - Master
Spring 2012 Entomology MS

Student Learning Outcome(s) Assessed

ent.m: Profiency - Student will demonstrate proficiency/understanding of basic principles, processes and patterns in student's area of expertise (insect organismal biology, pest management and/or molecular biology).

ent.m: Breadth - Student will exhibit breadth of understanding of a diversity of subjects in classical and modern entomology.

ent.m: Statistical Analysis - Student will demonstrate proficiency in concepts and applications of mathematics and/or statistics for analysis and problem solving.

ent.m: Communicate - Student will demonstrate effective communication skills, including proficiency in technical and/or scientific writing and an ability to prepare and deliver effective oral presentations.

Assessment Methods and Tools

The number of students completing MS degrees each year.

The number of graduate student refereed publications in scientific journals.

The number of graduate student presentations at scientific meetings.

Results

In 2011, the 4-year average number of MS students graduating was 3.0.

Graduate students published 0.9 publications/graduate student/year.

Graduate students presented 1.5 presentations/graduate student/year.

Interpretation of Results

The Department of Entomology is slightly below our goal for the multi-year average number of students graduating with MS degrees.

The Department met our goal of 1.5 graduate student presentations/graduate student/year.

The Department exceeded our goal of 0.5 refereed publications/graduate student/year.

Improvement Action

The number of applicants to the MS program in Entomology has fluctuated during the past two years for unknown reasons. In 2011, the faculty admitted 8 new students to the MS program in Entomology. As these students complete their MS degrees, our multi-year average number of MS graduates should increase.

The Department has met or exceeding our goals for graduate student productivity.

The faculty and graduate students in the Department of Entomology have created a graduate student survey that was sent to all graduate students in May 2012. The results of this survey will be discussed with faculty and students in fall 2012.

Reflection

Attachments

No Attachments

UNIVERSITY OF KENTUCKY®

Annual Student Learning Outcomes Report

Entomology
Entomology - Doctor
Spring 2012 Entomology PhD

Student Learning Outcome(s) Assessed

ent.d: Proficiency - Student will demonstrate proficiency/understanding of basic principles, processes and patterns in student's area of expertise (insect organismal biology, pest management and/or molecular biology).

ent.d: Breadth - Student will exhibit breadth of understanding of a diversity of subjects in classical and modern entomology.

ent.d: Statistical Analysis - Student will demonstrate proficiency in concepts and applications of mathematics and/or statistics for analysis and problem solving.

ent.d: Communicate - Student will demonstrate effective communication skills, including proficiency in technical and/or scientific writing and an ability to prepare and deliver effective oral presentations.

Assessment Methods and Tools

1. The number of students completing PhD degrees each year.
2. The number of graduate student refereed publications in scientific journals
3. The number of graduate student presentations at scientific meetings
4. The number of PhD students successfully completing their qualifying exams.

Results

In 2011, the 4-year average number of PhD students graduated was 4.5.

Graduate students in Entomology published 0.9 publications/graduate student/year.

Graduate students in Entomology presented 1.5 presentations/graduate student/year.

Three (of three) PhD students successfully completed their qualifying exams during 2011.

Interpretation of Results

Based on a 4-year average of students completing their PhD degrees in Entomology, the Department is slightly below our goal of graduating 5 PhD students/year.

The Department has met its goal of 1.5 presentations/graduate student/year and exceeding our goal of 0.5 refereed publications/graduate student/year.

The number of PhD students passing their qualifying exams during 2011 was below the Department goal of 4-6 students/year.

Improvement Action

The numbers of applicants to the graduate program in Entomology has fluctuated greatly during the past two years for unknown reasons. The faculty in Entomology admitted a lar cohort of new graduate students in 2011 (N=15). As this cohort of students graduates, our multi-year average number of PhD graduates should increase to reach our goal of 5 PhD students/year. The department has met or exceeded our goals for graduate student productivity. The number of PhD students passing their qualifying exam was below our goal. T faculty will continue to encourage their PhD students to take their exams in a timely manner.

Following discussions with the faculty in Entomology, an annual graduate student evaluation process has been established for our graduate program. This annual review of gradua student progress occurs in June/July of each year. The forms are signed by the faculty advisor and the graduate student and sent to the Director of Graduate Studies. The faculty a graduate students have also worked on a graduate student survey of the graduate program in Entomology. This survey was sent out to all current graduate students in May 2012. T results will be discussed by the faculty and graduate students in fall 2012.

Reflection

Attachments

No Attachments

University of Kentucky
HLMM Improvement Action Plan Rubric

Program Name: Entomology

Degree Level: Doctor

College: Agriculture

I. Method(s)

Meets Expectations	Needs Improvement	Absent
A. Relationship between assessment tools and outcomes		
A general explanation is provided about how the assessment tools relate to the outcome measured (e.g., the faculty wrote test items, essay questions, etc. to match the outcome, or the instrument was selected "because its general description appeared to match our outcome"). ◉	At a superficial level, it appears the content assessed by the assessment tools matches the outcome, but no explanation is provided. ○	Seemingly no relationship between outcome and assessment tools. ○
Comments:		
B. Data collection and Research design integrity		
Enough information is provided to understand the data collection process, such as a description of the sample, evaluation protocol, evaluation conditions, and student motivation. When and where the data were collected (e.g., representative sampling, adequate motivation, two or more trained raters for performance assessment, pre-post design to measure gain, cutoff defended for performance vs. a criterion) is also included. ◉	Limited information is provided about data collection such as who and how many took the assessment, but not enough to judge the veracity of the process (e.g., thirty-five seniors took the test). There appears to be a mismatch with specifications of desired results. ○	No information is provided about data collection process or data not collected. ○
Comments:		

C. Specification of desired benchmark/target		
Desired benchmark/target is specified (e.g., our students will gain ½ standard deviation from junior to senior year; our students will score above a faculty-determined standard). "Gathering baseline data" is acceptable for this rating. ◉	Desired results are specified (e.g., student growth, comparison to previous year's data, comparison to faculty standards, performance vs. a criterion), but lack specificity (e.g., students will grow; students will perform better than last year). ○	No a priori benchmarks/targets for outcomes. ○
Comments:		

II. Results

Results are present and directly relate to outcomes. The desired benchmarks for the outcomes are clearly presented, and were derived by appropriate analysis. ◉	Results are present, but it is unclear how they relate to the outcomes or the benchmark/target for the outcomes. Presentation lacks clarity or difficult to follow. Analysis may or may not be present. ○	No results presented. ○
Comments:		

III. Analysis

Interpretations of results seem to be reasonable inferences given the outcomes, benchmarks/targets, and methodology. The person or persons involved in the analysis are listed. ○	Interpretation attempted, but the interpretation does not refer back to the outcomes or benchmarks/targets for the outcomes. Or, the interpretations are clearly not supported by the methodology and/or results. There is no mention of the person or persons that completed the analysis. ◉	No interpretation attempted. ○
Comments: This needs more specificity.		

IV. Improvement Action

Examples of improvements (or plans to improve) are documented and directly related to findings of assessment. These improvements are very specific (e.g., approximate dates of and person(s) responsible for implementation, and where in curriculum/activities and department/program they will occur.) ○	Examples of improvements are documented but the link between them and the assessment findings is not clear. The improvements lack specificity. ◉	No mention of any improvements. ○
Comments: While recruiting meets one of your assessment goals, it doesn't address the ot		

Overall Comments:

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Annual Improvement Action Plan

Entomology
Entomology - Master
2009-2010

Outcome

Outcome 1

Aligned Program Goals

ent.m: Profiency - Student will demonstrate proficiency/understanding of basic principles, processes and patterns in student's area of expertise (insect organismal biology, pest management and/or molecular biology).
ent.m: Breadth - Student will exhibit breadth of understanding of a diversity of subjects in classical and modern entomology.

Assessment Tools

1. The number of students completing MS degrees each year.
2. The number of MS students publications.
3. The number of MS student presentations at scientific meetings.

Benchmark/Target

This first year is benchmark data.

Results

In 2009, 8 MS students completed their degrees.

Analysis

The number of students graduated with MS degrees in Entomology was significantly above our target of 4 MS students per year.

Improvement Action

Continue to encourage faculty to recruit and mentor MS students in Entomology.

Graphic/Tabular Data

Spring 2010 ENT

Annual Student Learning Assessment Report

College/Unit:	Entomology
Program/Unit:	Entomology - Doctor
Improvement Project:	Spring 2010 ENT
Assessment Date:	Jan 27, 2011 9:53 AM

Outcome

Title: Outcome 1

Linked to Student Learning Outcomes:

- ent.d: Proficiency — Student will demonstrate proficiency/understanding of basic principles, processes and patterns in student's area of expertise (insect organismal biology, pest management and/or molecular biology).
- ent.d: Breadth — Student will exhibit breadth of understanding of a diversity of subjects in classical and modern entomology.

Methods:

Assessment Tools:

The number of students completing PhD degrees each year.

The number of graduate student refeered publications.

The number of graduate student presentations at scientific meetings

The number of students successfully completing their qualifying exams.

Benchmark/Target:

This first year is benchmark data.

Results:

In 2009, 3 PhD students completed their degrees.

Analysis:

The number of students graduated with PhD degrees in Entomology was slightly below our target of 4 PhD students per year.

Improvement Action:

Encourage faculty to recruit additional PhD students to the program.

Graphic/Tabular Data Attached:

Appendix 5
Department of Entomology Publications 2010-2014

(2015 publications were not available when the self-study was completed.)
2014 Publications

Books and Book Chapters

Fox, C.W., and T.A. Mousseau, eds. *The Year in Evolutionary Biology*, vol. 1320, July 2014. Annals of the New York Academy of Sciences and Wiley Online Library. 92 pp.

Nieves-Aldrey, J.L., and M.J. Sharkey. Ants, bees, wasps and the majority of insect parasitoids. pp 395–408. IN: P. Vargas and R. Zardoya, eds. *The Tree of Life.* Sinauer, Sunderland, MA.

Rieske, L.K., and W.R. Cooper. Asian chestnut gall wasp, *Dryocosmus kuriphilus* (Hymenoptera: Cynipidae). pp. 237–244. IN: R.G. Van Driesche, R.G. Reardon, and R. Reardon, eds. *Saving Trees, Saving Forests: Use of Classical Biological Control to Preserve Forests in North America.* USDA Forest Service FHTET-2013-02. Morgantown, WV.

Refereed Journal Articles

Adkins, J.K., and L.K. Rieske. A terrestrial invader threatens a benthic community: Potential effects of hemlock woolly adelgid-induced loss of eastern hemlock on invertebrate shredders in headwater streams. Biological Invasions. Published online: doi:10.1007/s10530-014-0786-y.

Andrews, E.S., Y. Fu, M. Calvitti, and S.L. Dobson. Interspecific transfer of a *Wolbachia* infection into *Aedes albopictus* (Diptera: Culicidae) yields a novel phenotype capable of rescuing a superinfection. Journal of Medical Entomology 51(6):1192–1198. Published online: doi:10.1603/ME14086.

Asplen, M.K., N. Bano, C.M. Brady, N. Desneux, K.R. Hopper, C. Malouines, K. Oliver, J.A. White, and G.E. Heimpel. Specialisation of bacterial endosymbionts that protect aphids from parasitoids. Ecological Entomology. Published online: doi:10.1111/een.12153.

Ayayee, P.A., F. Yang, and L.K. Rieske. Micromechanical properties of the stylet insertion point: A potential contributor to resistance against the hemlock woolly adelgid, *Adelges tsugae*? Insects 5(2):364–376. Published online: doi:10.3390/insects5020364.

Bourtzis, K., S.L. Dobson, Z. Xi, J.L. Rasgon, M. Calvitti, L.A. Moreira, H.C. Bossin, R. Moretti, L.A. Baton, G.L. Hughes, P. Mavingui, and J.R.L. Gilles. Harnessing mosquito-*Wolbachia* symbiosis for vector and disease control. Acta Tropica 132:S150–S163. Published online: doi:10.1016/j.actatropica.2013.11.004.

Brady, C.M., M. Asplen, G.E. Heimpel, K.R. Hopper, C. Linnen, K.M. Oliver, J.A. Wulff, and J.A. White. Worldwide populations of *Aphis craccivora* have diverse facultative bacterial symbionts. Microbial Ecology 67:195–204. Published online: doi:10.1007/s00248-013-0314-0.

Colvin, S.M., and K.V. Yeargan. Predator fauna associated with oleander aphids on four milkweed species and the effect of those host plants on the development and fecundity of *Cycloneda munda* and *Harmonia axyridis*. Journal of the Kansas Entomological Society 87:280–298.

Crowder, D.W., and J.D. Harwood. Promoting biological control in a rapidly changing world. Biological Control 75:1–7.

Cui, Y., Y. Sui, J. Xu, F. Zhu, and S.R. Palli. Juvenile hormone regulates *Aedes aegypti* Kruppel homolog 1 through a conserved E box motif. Insect Biochemistry Molecular Biology 52:23–32.

Dobbs E.K., and D.A. Potter. Conservation biological control and pest performance in lawn turf: Does mowing height matter? Environmental Management 53(3): 648–659.

Dodd, L.E., and L.K. Rieske. Variation in nocturnal Lepidoptera and other insects in a second-growth forest. Journal of the Kentucky Academy of Science 74:3–9.

Dorémus, T., I. Darboux, M. Cusson, V. Jouan, M. Frayssinet, D.B. Stoltz, B.A. Webb, and A-N Volkoff. Specificities of ichnoviruses associated with campoplegine wasps: Genome, genes and role in host-parasitoid interaction. Current Opinion in Insect Sciences 6:44–51. Published online: doi:10.1016/j.cois.2014.09.017.

Dykstra, H., S. Weldon, A. Martinez, J.A. White, K. Hopper, G. Heimpel, M. Asplen, and K. Oliver. Factors limiting the spread of the protective symbiont *Hamiltonella defensa* in the aphid *Aphis craccivora*. Applied and Environmental Microbiology 80:5818–5827.

Farahani, F., A.A. Talebi, E. Rakhshani, C. van Achterberg, and M.J. Sharkey. A contribution to the knowledge of Agathidinae (Hymenoptera: Braconidae) from Iran with description of a new species. Biologia 69: 228–235.

Fulton, S.A., L.E. Dodd, and L.K. Rieske. Hydric habitats are important to foraging bats in the Bluegrass Region's urban parks. Urban Naturalist 3:1–13.

Gordon, J.R., M.F. Potter, M.H. Goodman, and K.F. Haynes. Population variation in and selection for resistance to pyrethroid-neonicotinoid insecticides in the bed bug. Scientific Reports 4:3826. Published online: doi:10.1038/srep03836.

Graziosi, I., and L.K. Rieske. Potential fecundity of a highly invasive gallmaker, *Dryocosmus kuriphilus* (Hymenoptera: Cynipidae). Environmental Entomology 43:1053–1058.

Guo, L., P. Liang, X. Zhou, and X.W. Gao. Novel mutations and mutation combinations of ryanodine receptor in a chlorantraniliprole resistant population of *Plutella xylostella* (L.). Scientific Reports 4:6924. Published online: doi:10.1038/srep06924.

Guo, L., Y. Wang, X. Zhou, Z.Y. Li, P. Liang, and X.W. Gao. Functional analysis of a point mutation in the ryanodine receptor of *Plutella xylostella* (L.) associated with resistance to chlorantraniliprole. Pest Management Science 7:1083–1089.

He, Q., D. Wen, Q. Jia, C. Cui, J. Wang, S.R. Palli, and S. Li. Heat shock protein 83 (Hsp83) facilitates methoprene-tolerant (Met) nuclear import to modulate juvenile hormone signaling. Journal of Biological Chemistry. Published online: doi:10.1074/jbc.M114.582825.

Johnson, J., J.K. Adkins, and L.K. Rieske. Canopy vegetation influences ant communities in headwater stream riparian zones of central Appalachia. Journal of Insect Science 14. Published online: doi:10.1093/jisesa/ieu099.

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Appendix 6
Entomology Faculty Snapshot 2014-2015

All ENT Faculty by Title Series		
Title Series	Faculty	Percent
Regular	14	58%
Extension	4	17%
Adjunct	4	17%
Part Time	1	4%
Post Retirement	1	4%
Total	24	100%

Full Time Faculty by Rank		
Rank	Faculty	Percent
Professor	15	83%
Associate	3	17%

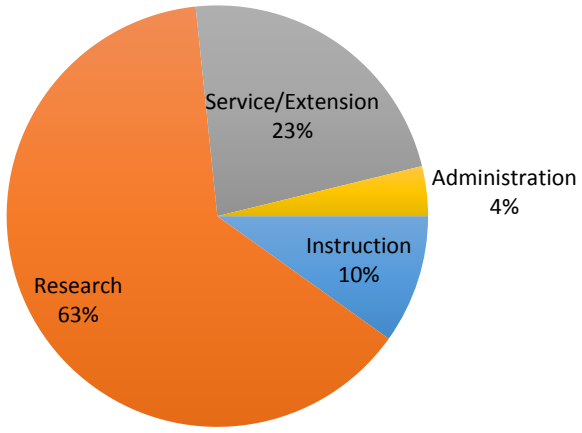
All ENT Faculty by Full Time/Part Time Status		
FT/PT Status	Faculty	Percent
Full Time	18	75%
Part Time	6	25%

Full Time Faculty by Assignment Period		
Assignment Period	Faculty	Percent
12 month	15	83%
9 month	3	17%

Full Time Faculty Credentials		
Credentials	Faculty	Percent
Ph.D.	18	100%

Full Time Faculty by Tenure Status		
Tenure Status	Faculty	Percent
Tenured	18	100%

Distribution of Effort
Full Time Faculty Only



Full Time Faculty by Race		
Race	Faculty	Percent
Asian	2	11%
White	16	89%

Full Time Faculty by Gender		
Gender	Faculty	Percent
Female	2	11%
Male	16	89%

Full Time Faculty by Age		
Age	Faculty	Percent
40-49	4	22%
50-59	5	28%
60-65	7	39%
over 65	2	39%

Full Time Faculty by Years of Service		
Years	Faculty	Percent
7-9	3	17%
10-13	2	11%
14-16	1	5%
17-19	3	17%
20-23	1	5%
24-26	2	11%
33-35	1	6%
36+	4	22%

2014-2015 Degrees Awarded

	Total	Female	Male	Minor-ities	African Amer.
Master's	3	2	1	0	0
Doctoral	4	2	2	0	0
Total	7	4	3	0	0

Degrees Awarded Five-Year Trend

	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015
Master's	2	2	4	6	3
Doctoral	3	7	5	2	4
Total	5	9	9	8	7

KERS Faculty Contacts Five-Year Trend

	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015
African Am.	2,594	6	369	757	35
Asian Am.	440	1	0	0	0
Hispanic	1,999	0	33	704	11
Native Am.	0	1	0	0	0
Other	1,051	0	0	0	0
Total Contac	35,918	1,674	32,704	17,569	7,159

2014-2015 Enrollment (majors)

	Total	Female	Male	Minority	African Amer.
Master's	11	7	4	1	0
Doctoral	20	11	9	0	0
Post-Doc	9	3	6	1	1
Total	40	21	19	2	1

Enrollment (majors) Five-Year Trend

	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015
Master's	6	14	13	14	11
Doctoral	23	26	23	20	20
Post-Doc	12	8	7	8	9
Total	41	48	43	42	40

KERS Number of Faculty Success Stories Five-Year Trend

	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015
Number	0	0	1	5	1

2014-2015 Numbered Fact Sheets/Faculty Ratio

	Total FT Faculty	FTE Ext. Faculty
	17	3.78
Total Fact Sheets	4	4
Average	0.24	1.06

2014-2015 Attempted/Earned Student Credit Hours

	Total	Fall	Spring	Summer
Attempted SCHs	937	542	395	0
Earned SCHs	845	496	349	0
Unearned SCHs	92	46	46	0
% Earned	90.2%	91.5%	88.4%	NA

Direct Awards Five-Year Trend

2010-2011	2011-2012	2012-2013	2013-2014	2014-2015
$2,529,559	$269,695	$1,712,250	$2,565,933	$1,226,814

Grant Expenditures Five-Year Trend

2010-2011	2011-2012	2012-2013	2013-2014	2014-2015
$3,490,272	$2,635,451	$1,962,784	$1,589,368	$1,817,018

2014-2015 Primary Grant Dollar/Faculty Ratio

	Total FT Faculty	FTE Research Fac.
	17	10.51
Total	$1,226,814	$1,226,814
Average	$72,166	$116,728

Fiscal Year State Fund Balance Percentage Five-Year Trend

2010-2011	2011-2012	2012-2013	2013-2014	2014-2015
5.54%	2.66%	-0.63%	-0.13%	2.19%

2014-2015 Fiscal Year Grants

Direct Awards	$1,226,814
Federal Competetive	$120,453
% Federal Competetive	10%
Collaborative	$1,303,131

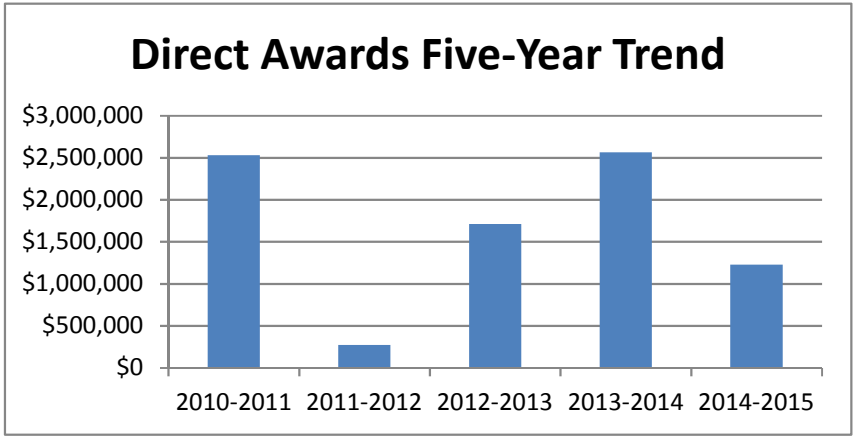
2014 Calendar Year Publications

Books and Chapters	3
Refereed Journal Articles	55
Other Research Articles	8
Total	66

Research Faculty w/Formula Funded Projects as of 6/15

25% or higher Research DOE	15
Active Project	14
Percentage	93%

2014 Calendar Year Patents	0



2014-2015 Composite Report
College of Agriculture, Food and Environment

PUBLICATIONS

Department	Total All Publications	Books & Chapters	Refereed Articles	Refereed Articles + Chapters per Research FTE	Refereed Articles + Chapters per FT Faculty Headcount
AEC	33	1	28	3.86	1.38
AFS	69	8	54	5.66	1.94
BAE	31	1	19	2.91	1.18
CLD	36	0	7	1.93	0.47
DHN	12	0	10	3.70	0.83
ENT	66	3	55	5.52	3.41
FAM	63	13	19	13.85	2.91
FOR	127	1	28	4.75	2.07
HORT	29	1	20	3.63	1.40
LA	1	0	1	0.78	0.14
PPA	54	3	37	7.94	4.44
PSS	103	4	78	4.14	2.34
RTM	16	1	15	7.37	1.78
VSC	104	18	77	6.76	5.28

INSTRUCTION

Degree Program	Undergrad. Enrollment	Graduate Enrollment	Post-Doc Enrollment	Earned SCHs	FT Faculty Headcount	Earned SCH per FT Faculty Headcount	Total Enrollment per FT Faculty Headcount
AEC	253	50	1	4,327	21	206.05	14.48
AFS	662	50	5	4,320	32	135.00	22.41
BAE	168	32	1	1,341	17	78.88	11.82
CLD	175	37	0	3,948	15	263.20	14.13
DHN	509	22	0	8,617	12	718.08	44.25
ENT	0	31	9	845	17	49.71	2.35
FAM	135	45	1	4,622	11	420.18	16.45
FOR	52	18	1	2,240	14	160.00	5.07
HORT	45	71	18	3,170	50*	63.40	2.68
LA	51	0	0	1,353	7	193.29	7.29
PPA	0	16	8	284	9	31.56	2.67
PSS	45	71	18	3,170	50*	63.40	2.68
RTM	279	7	0	4,005	9	445.00	31.78
VSC	0	23	7	193	18	10.72	1.67

* HOR and PSS faculty combined = 50

FUNDING

Department	Total Direct Grants	Collaborative Grants	% Federal Competetive	Direct Grants per Research FTE	Direct Grants per FT Faculty Headcount	Grant Expenditures	FY State Fund Balance %
AEC	$701,133	$5,490,937	12%	$93,360	$33,387	$1,111,217	6.43%
AFS	$4,246,552	$4,993,023	67%	$387,459	$132,705	$2,169,020	2.01%
BAE	$576,373	$3,772,980	0%	$83,654	$33,904	$2,230,119	7.21%
CLD	$385,004	$4,552,148	27%	$106,062	$25,667	$305,798	0.17%
DHN	$100,750	$15,412,966	11%	$37,315	$8,396	$590,213	0.20%
ENT	$1,226,814	$1,303,131	10%	$116,728	$72,166	$1,817,018	2.19%
FAM	$49,136	$2,561,136	100%	$21,271	$4,467	$1,917	12.60%
FOR	$922,140	$1,064,475	19%	$151,170	$65,867	$831,097	8.71%
HORT	$1,572,989	$1,730,991	8%	$271,673	$104,866	$1,800,958	0.62%
LA	$0	$0	0%	$0	$0	$26,900	-0.25%
PPA	$878,219	$1,352,573	87%	$174,250	$97,580	$1,031,588	2.52%
PSS	$3,624,295	$4,360,969	34%	$183,138	$103,551	$3,950,301	0.61%
RTM	$69,218	$69,218	0%	$31,898	$7,691	$76,813	3.67%
VSC	$1,094,117	$1,131,117	54%	$77,818	$60,784	$1,495,066	4.79%

EXTENSION

Department	Extension Faculty FTE	KERS Faculty Contacts	Faculty Success Stories	Numbered Fact Sheets
AEC	6.91	16,330	3	3
AFS	11.02	41,920	19	19
BAE	5.43	4,909	6	6
CLD	3.8	2,765	6	6
DHN	2.65	10,691	4	10
ENT	3.78	7,159	1	4
FAM	2.58	23,674	10	1
FOR	3.32	11,311	5	0
HORT	5.97	18,318	10	5
LA	1.1	580	2	0
PPA	2.58	1,463	1	9
PSS	9.95	38,027	20	32
RTM	0.62	–	–	–
VSC	8.3	1,650	0	4

Appendix 8

Appendix 8 is not available digitally.

If you need a hard copy of Appendix 8, contact the College of Agriculture, Food and Environment Assistant Dean of Academic Administration.

Department of Entomology

Program Review

University of Kentucky

November 13-15, 2016

Submitted by:

Dr. Robert L. Houtz Chair, *UK Department of Horticulture*

Dr. David Denlinger, *The Ohio State University, Department of Entomology*

Dr. Coby Schal, *North Carolina State University, Department of Entomology and Plant Pathology*

Dr. Ric Bessin, *UK Department of Entomology*

Dr. Brian Stevenson, *UK Department of Microbiology and Immunology*

Mr. Carl Harper, *UK Department of Entomology, Staff*

Ms. Kacie Athey, *UK Department of Entomology Graduate Student, and Staff*

Mr. Kevin Pass, *External Stakeholder, Founder of Action Pest Control*

Submitted to:

Dr. Nancy M. Cox, Dean College of Agriculture, Food and Environment

December 18, 2016

Executive Summary

The Department of Entomology Review Committee met with Entomology program members, students, stakeholders, and College of Agriculture, Food and Environment (CAFE) administration from Sunday, November 13 to Tuesday, November 15. The committee received its charge from Dr. Steve Workman, Associate Dean for Administration, and a review of the appropriate rules and procedures (http://www.uky.edu/regs/files/ar/ar1-4.pdf, and http://www.uky.edu/regs/files/gr/gr9.pdf) from Dr. Lisa Collins, Assistant Dean for Academic Administration. The site-visit, departmental self-study, and associated appendices are available at the following links:

Site Visit Agenda

Self Study

- Appendix 1
- Appendix 2
- Appendix 3
- Appendix 4
- Appendix 5
- Appendix 6
- Appendix 7

The committee developed the following report after analyzing all of the information provided in the self-study documents and information from committee interviews. The committee also confirmed the validity of the self-study document.

Strengths

The Department of Entomology is a strong department in all areas of the land-grant mission with a vibrant program in undergraduate education (e.g., participation in ABT) that could be improved. Without reiterating data available in the self-study document, the committee would like to point out the following:

- *Extension activities are widely accepted in the state as above average and exceptional in many instances, judging from the feedback from county agents and stakeholders. Extension faculty are recognized both nationally and internationally as one of the most valuable and reliable resources for*

useful and applicable information in regards to a number of entomologically- related societal issues. Extension publications from the department are voluminous (~230 over the past 5 years) and faculty engaged in extension are often the subject of news interviews at local and international levels. It should be noted that some faculty with no or minimal extension appointments are contributing significantly to the department's extension portfolio.

- *Research activities are equally noteworthy with leading numbers within CAFE as well as nationally in terms of publications and grant dollars per research FTE (see part 5, section B of the self-study document). Moreover, additional measures of research excellence, such as the quality of journal publications and the number of author citations, are equally impressive. There is also a significant level of entrepreneurship among several research faculty that is well-recognized at the college and university levels, but not as well at the departmental level (see following sections below). Also, the level of graduate education is outstanding in terms of number of graduates as well as dissertation quality and publications associated with graduating students.*
- *Instructional responsibilities in the department are primarily engaged in graduate-level education but a significant level of contribution is provided to the undergraduate ABT program. The department provides a number of graduate-level classes that equip Entomology graduates with the expertise to enter a number of different career paths including industry, academia, and government. However, there is some concern among both students and some faculty regarding the availability and timeliness of graduate-level course offerings (see following sections below).*

Weaknesses

There are only limited areas of weakness in the department and most can also be regarded as opportunities. Some of the weaknesses are a consequence of spatial separation of faculty, aging infrastructure and a slow-moving process of curriculum development.

- *Graduate students feel that there are not enough classes available to them. Although there are many officially listed courses, they are not always*

offered. Also, students do not have sufficient access to teaching experiences, especially opportunities that could lead to development of a teaching portfolio. There is a perception of "push-back" by faculty on letting graduate research assistants teach as it takes away from research time. A travel fund should be created for graduate students and post-docs beyond what is currently available. Most importantly the graduate research assistantship stipends are not nationally competitive and should be increased if the department aspires to recruit top scholars.

- *Faculty are concerned about excessive staff turnover but the self-study document (page 48) clearly indicates that the administrative staff is undergoing a philosophical restructuring with an emphasis on efficiency and effectiveness which should benefit departmental operations in the long run. There is also concern about the quality of office and lab space, especially in Ag Science North and Dimock. However, CAFE administration has made significant strides and progress to provide outstanding laboratory and office space to both existing faculty as well as new hires. Perhaps the biggest faculty concern is reflected in the demographics of the department faculty (Appendix 6 in the Self-study document). Sixty percent of the existing faculty are 60 and older, with 20% older than 65. There is a feeling that replacement of research positions is considerably easier than replacement of extension faculty, due to the need to maintain critical extension programming. Some faculty feel that colleagues involved in entrepreneurial activities are contributing less than they should to academic and departmental responsibilities, resulting in an inequity in academic workloads.*
- *Both post-docs and some staff have the desire but no identifiable routes for professional improvement and career advancement. Technical staff feel that the current performance evaluation process could be improved with less "back and forth" but acknowledge the great benefits including retirement, the UK Employee Education Program, flexible schedules, and opportunities for authorship and professional development.*

Opportunities & Threats/Challenges

The review committee recognizes the following as significant opportunities for improvements and future challenges for the Department of Entomology.

- *A reliable and consistent number of courses should be made available for graduate students as well as opportunities for official roles in teaching. The department should develop and regularly update a matrix of course offerings for the next two years. A general fund should be established specifically to support graduate student and post-doc travel. Efforts should be made to increase the graduate research assistantship stipends to nationally competitive levels.*
- *With an impending turnover of ~60% of faculty, specific plans should be developed that describe the future landscape of the department in terms of its research, extension, and instructional programs.*
- *Efforts should continue with CAFE administrative assistance to consolidate faculty, staff, and students in one location with high quality office and laboratory space.*
- *Efforts should be made to mitigate any potential gap in extension-related service to stakeholders as a consequence of future retirements. Conflicts with existing faculty over commitments to academic versus entrepreneurial activities should be resolved by departmental administration in conjunction with the CAFE Office of Research and the college's associate general counsel. Departmental administration should ensure that staff have ample opportunities for professional and career development. Extension faculty should have access to departmental funds in support of in-state travel.*

Summary of Review Committee Findings

Overall the committee was impressed with the accomplishments and performance of the department of Entomology, its faculty, staff, postdocs, and students. The department has an outstanding national and international reputation that is exceeded only by the tremendous level of support the department enjoys within

Kentucky by stakeholders and county agents. The department has recently experienced significant personnel conflicts that diminished overall morale. A highly effective new leadership is addressing many of the concerns and has already implemented several important improvements, including the recent hiring of talented junior faculty and acquisition of new and newly renovated space. Departmental administration is also assuring adherence to university policies and regulations and making great efforts and strides to see that the department's strong reputation continues.

Recommendation Report

1. *Within one year, organize a retreat or a series of meetings with all faculty, staff, and students to develop a long-range strategic plan for the department which addresses the following issues:*

    What will the future focus of the department be and how will new faculty hires fit the newly defined directions? Additionally, develop a transition strategy to manage retirement of key extension personnel to ensure continuity of programs to stakeholders and county agents. Consider all possible strategies to accomplish this, including hiring extension specialists/associates and early hires prior to retirements and/or transfer of some federally-mandated programs to the college.
2. *Charge the departmental curriculum committee with reviewing the suitability and availability of all courses offered in the department. Develop a plan to enhance undergraduate enrollment and course offerings. Greater investment in teaching assistantships may allow for higher enrollments in existing courses.*
3. *With graduate student input, create a mechanism that provides graduate students with meaningful teaching opportunities and access to travel funds. Critically evaluate graduate stipends.*
4. *Work with CAFE administration to identify how the department can become unified in a single location.*
5. *Identify mechanisms to increase collaborative research within the department and across colleges. This could result in a better balance of grant funds and publications among faculty.*

6. *Identify and develop opportunities for staff to participate in social event planning, professional development, and career enhancement.*
7. *Release a portion of Smith-Lever funds to support in-state travel by extension faculty.*

College of Agriculture, Food and Environment
Department of Entomology
Periodic Program Review
Site Visit Agenda
November 13-15, 2016

Date:	November 13, 2016
Day 1:	Sunday

12:00 – 6:00 pm Reviewers external to UK travel to Lexington

Arrival schedules: Dr. Schal arrives at Bluegrass Airport at 12:21 pm
Dr. Denlinger drives to Lexington, arriving prior to 6 pm
Mr. Pass drives to Lexington, arriving prior to 6:00 pm

Dr. Reddy Palli transports Dr. Schal to lunch and then to Hilton Lexington/Downtown, 360 W. Vine St., Lexington, KY, 859-231-9000.

6:15 – 6:30 pm Dr. Bob Houtz transports Dr. Denlinger, Dr. Schal, and Kevin Pass from Hilton Lexington/Downtown to Portofino, 249 E. Main St., Lexington, 859-253-9300.

6:30 – 8:00 pm Review Committee has dinner and working session at Portofino. Reservation in the name "Bob Houtz." Group is joined by Dr. Reddy Palli, chair of the Department of Entomology. Dr. Houtz returns reviewers to Hilton Lexington/Downtown.

Date:	November 14, 2016
Day 2:	Monday

7:30 – 8:30 am External guests on the review committee have breakfast at Hilton Lexington/Downtown and charge meal to rooms.

8:30 – 9:00 am Dr. Houtz transports external reviewers to Ag North, parks on circle.

9:00 – 10:00 am Meet with College of Agriculture, Food and Environment Associate Dean for Administration Dr. Steve Workman and Assistant Dean for Academic Administration Lisa Collins. Committee receives their charge from Dr. Workman, Dr. Collins reviews rules and procedures, S125C Ag North. Coffee will be provided.

10:00 – 10:15 am Break, review committee members walk to S-225 Ag North

10:15 – 11:30 am Department chair Dr. Palli conducts departmental facility tour and discussion – Ag Science Building North and Plant Science Building

11:30 – 11:45 am Break, walk to Ag N Ag Information Center, N-24B1

11:45 – 12:45 pm Lunch, departmental graduate students, post-doctoral scholars, and visiting scholars – Agricultural Information Center (AIC), N-24B1, Ag North. (25 invited). Sandwich buffet (Dr. Bessin recused)

12:45 – 1:00 pm Break

1:00 – 2:00 pm Departmental teaching and research faculty, AIC, N-24B1, Ag North

2:00 – 3:00 pm Departmental Extension faculty, AIC, N-24B1, Ag North

3:00 – 4:00 pm Associate Deans and Associate Director of Kentucky Agricultural Experiment Station Ag. Information Center, N-24B1, Ag North
Lesley Oliver, Research
Dr. Larry Grabau, Instruction
Dr. Jimmy Henning, Extension
Dr. Steve Workman, Administration

4:00 – 7:00 pm Work session and dinner for all committee members, S-125C, Ag North. Dinner ordered from Columbia's Steakhouse. Dinner arrives at 5:30.

6:00 pm Dr. Houtz returns external reviewers to Hilton Lexington/Downtown

Date:	November 15, 2016
Day 3:	Tuesday

7:00 – 8:00 am External members of review committee have breakfast at Hilton Lexington/Downtown. Charge to rooms.

8:00 – 8:30 am Dr. Denlinger drives Dr. Schal to Ag North. Mr. Pass drives separately. They park on the Ag N circle in a Dean's Guest space.

8:30 – 9:30 am Technical departmental staff, AIC, N-24B1 (12). (Dr. Bessin recused) Coffee provided.

9:30 – 10:30 am Departmental office staff and State Entomologist staff, AIC, N-24B1 (5) (Dr. Bessin recused). Coffee provided.

10:30 – 11:00 pm Break, walk to Weldon Suite, E. S. Good Barn

11:00 – 12:00 am Stakeholders and constituents, Weldon Suite, E. S. Good Barn. Snacks provided.

12:00 – 2:15 pm Work session and lunch, Weldon Suite, E. S. Good Barn**.** UK Catering.

2:15 – 2:30 pm Break

2:30 – 3:30 pm Committee presents preliminary findings to Associate Dean Workman and the Executive Council, Weldon Suite, E. S. Good Barn.

3:30 pm Dr. Palli transports Dr. Schal to Bluegrass Airport. Dr. Denlinger and Mr. Pass leave from Ag North.

Departure schedules: Dr. Schal departs Bluegrass Airport at 5:49 pm.

Dr. Bob Houtz	Chair, UK Department of Horticulture
Dr. David Denlinger	Ohio State University
Dr. Coby Schal	North Carolina State University
Dr. Ric Bessin	UK Department of Entomology (ENT)
Dr. Brian Stevenson	UK College of Medicine
Carl Harper	UK ENT Staff
Kacie Athey	UK ENT Graduate Student
Kevin Pass	External Stakeholder

Dr. Lisa Collins	859-257-7249
Dr. Reddy Palli	859-257-7450
Megan Lucy	859-257-7249
Tricia Coakley	859-257-7041

UK Program Review Implementation Plan

*This **required** form is described as Appendix A in AR II-I.0.6.*

College/Unit: Entomology **Date: 2/9/2017**

Recommendation/ Suggestion	Source I/E/H*	Accept/ Reject**	Unit Response (resulting goal or objective)	Actions (including needed resources)	Time Line
Within one year, organize a retreat or a series of meetings with all faculty, staff, and students to develop a long-range strategic plan for the department which addresses the following issues: o What will the future focus of the department, be and how will new faculty hires fit the newly defined directions? Additionally, develop a transition strategy to manage retirement of key extension personnel to ensure continuity of programs to stakeholders and county agents. Consider all possible strategies to accomplish this, including hiring extension specialists/associates and early hires prior to retirements and/or transfer of some federally-mandated programs to the college.	E	A	Develop a long-range strategic plan to define future directions of the department and to plan transition strategies to ensure continued excellence in Instruction, Extension and Research missions in light of expected retirement of one third of the faculty members during the next 3-4 years.	Organize a faculty retreat within a year. Hire faculty members, extension associates and research technicians 6 months in advance of anticipated retirements to ensure transfer of knowledge. Work with the college administration to identify and implement a sustainable funding source for the applicator training program.	Complete with in a year Ongoing for the next 5 years Ongoing for the next 2 years

Charge the departmental curriculum committee with reviewing the suitability and availability of all courses offered in the department. Develop a plan to enhance undergraduate enrollment and course offerings. Greater investment in teaching assistantships may allow for higher enrollments in existing courses.	E	A	Develop a long-range strategic plan to modernize graduate curriculum including courses offered. Develop plans to increase undergraduate enrollment and course offerings.	With input from faculty, particularly those with Instructional DOE's, the Curriculum Committee will generate a plan to develop courses that reflect emerging issues and utilize emerging technologies as well as to increase undergraduate enrollment and course offerings.	Complete in 2 years
With graduate student input, create a mechanism that provides graduate students with meaningful teaching opportunities and access to travel funds. Critically evaluate graduate stipends.	E	A	Explore ways to provide teaching opportunities, travel funds and an increase in stipends to Research Assistants.	Work with CAFE and the Graduate School to get support for teaching assistants and student travel. Increase graduate stipends by 5% annually until the national average stipend of $22,000 for MS and $23,000 Ph.D. is reached.	Ongoing in the next 5 years Complete in 3 years
Work with CAFE administration to identify how the department can become unified in a single location.	E	A	Consolidate Entomology department into one building.	CAFE is planning to house Entomology in the proposed Natural Resources building.	Engage in planning with college administration in the next 5 years
Identify mechanisms to increase collaborative research within the department and across colleges. This could result in a better balance of grant funds and publications among faculty.	E	A	Promote collaboration among faculty members within the department, CAFE, UK and outside the UK.	Develop one or more areas of excellence contributed by multiple faculty members within the department. Work with the departments in CAFE and UK to determine the feasibility of developing centers of excellence and interdepartmental graduate/undergraduate programs.	Ongoing in the next 5 years Ongoing in the next 5 years

Identify and develop opportunities for staff to participate in social event planning, professional development, and career enhancement.	E	A	Develop opportunities for professional development of staff. Encourage staff to organize social programs.	Consult with the staff and develop a plan for their professional development. Develop plans for annual social events organized by the staff.	Complete in 1 year Ongoing in the next 5 years
Release a portion of Smith-Lever funds to support in-state travel by extension faculty.	E	A	Support Extension faculty in state travel.	Smith-Lever funds are currently used to pay the salary of an Extension Associate. Seek funds from CAFE for this position and release Smith-Lever funds for travel.	Complete in 2 years

* **Source of Recommendation (I = Internal recommendation; E = External Review Committee recommendation; H = Unit Head recommendation)**

** **Accept/Reject Recommendation (A=Accept; R=Reject)**

Unit Head Signature: _____ **Unit Head Supervisor Signature:** Nancy M Cox **Date:** 4.10.17