

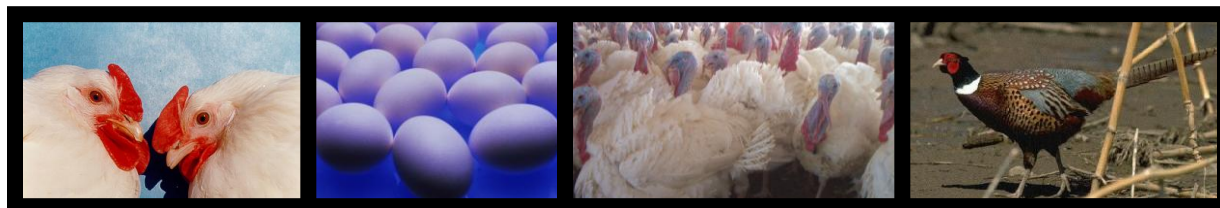
PENNSSTATE



**DEPARTMENT OF POULTRY SCIENCE**  
**COLLEGE OF AGRICULTURAL SCIENCES**

# STRATEGIC PLAN

JULY 1, 2008 TO JUNE 30, 2013



**MARCH 23, 2009**

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## **EXECUTIVE SUMMARY**

The Department of Poultry Science has a long and rich history of programmatic excellence and national leadership that dates back to 1895. Our main stakeholder group, the \$32 billion poultry industry, is the most technologically advanced and economically efficient sector of modern animal agriculture.

As one of only 7 independent Poultry Science Departments in the United States, we are uniquely and strategically situated as *the* center of poultry excellence in the Northeast and Mid-Atlantic regions of the country. Moreover, with a concentration of faculty expertise in reproductive biology, we have become the only Poultry Science Department in the nation with such a focus. This is particularly relevant to Pennsylvania's large egg, broiler breeder, and embryo industries and our geographic location on the eastern end of the U.S. 'egg belt', where 4 states (Iowa, Indiana, Ohio, and Pennsylvania) produce 38% of the nation's eggs.

Our mission is to discover, translate, and implement knowledge in poultry and avian science to enhance the productivity and well-being of animals that contribute to human nutrition and health. As set forth in this strategic plan, our four unit goals are: (1) To enhance student success and increase undergraduate and graduate enrollments in the animal and avian sciences; (2) To enhance fundamental and applied research aimed at solving complex and relevant problems through multi-disciplinary approaches; (3) To strengthen communication with, and support of, stakeholders; and (4) To enhance departmental human resources through professional development activities, fostering of diversity and multi-cultural awareness, and maintenance of a safe and stimulating working environment.

As a highly student-centered unit, we will continue to strive to enhance the quality of our undergraduate and graduate student experiences, increase enrollment in our programs (all co-sponsored), and grow our scholarship, endowment, and graduate support funds during the next five years. Through 3 proposed tenure track faculty hires [avian veterinarian, avian ethologist (behavior and well-being), and avian gastrointestinal microbiologist], we will enhance and expand our multi-disciplinary research efforts into areas that directly support 4 of the 5 College Strategic Initiatives: Energy; Food, Diet and Health; Pest Prediction and Response; and Water Quality and Quantity. We will actively engage in the College's effort to reframe Extension by providing leadership to the Poultry Natural Work Group (NWG) and by actively participating in several other relevant NWGs. Lastly, we will seek to accomplish the above goals while continuing to maintain a welcoming, supportive, and inclusive departmental climate.

## STRATEGIC CHALLENGES AND STRATEGIC ADVANTAGES

Like many of the academic departments in the College of Agricultural Sciences, the Department of Poultry Science is a commodity-based unit. As such, its main external stakeholder group is the poultry industry.

### THE U.S. POULTRY INDUSTRY

The poultry industry is the most technologically advanced and economically efficient sector of modern animal agriculture. Within the global industry, the United States is the largest producer of poultry meat and also produces approximately 9% of the world's eggs, which ranks second behind China. According to the USDA's Economic Research Service, the total farm value of U.S. poultry production was \$31.9 billion in 2007. Broiler production (8.9 billion birds; 36 billion pounds) accounted for two-thirds of this value (\$21.5 billion), eggs (90.6 billion) for \$6.7 billion, and turkey (265 million birds; 7.9 billion pounds) for \$3.7 billion.

U.S. per capita consumption of poultry meat has increased by approximately 120% since 1975 and now exceeds that of beef or pork. In contrast, U.S. per capita egg consumption peaked at 402 in 1945, declined steadily to a nadir of 233 in 1991 due primarily to health concerns about cholesterol, and has rebounded to 255 as additional information about the dietary cholesterol-blood cholesterol relationship became available. In addition, approximately 30% of eggs are now consumed in the form of products (vs. shell eggs) which represents a 3-fold increase since 1966.

The poultry industry is a major feed grain user, accounting for approximately 100 billion pounds of feed yearly. With about 15% of total poultry production being exported (second behind Brazil), the U.S. poultry industry is heavily influenced by currency fluctuations, trade negotiations, and economic growth in its major importing markets. Due to high energy and feed costs, last year was a very difficult one for the meat-bird industry and was marked by Pilgrim's Pride, the world's largest chicken company, filing for Chapter 11 bankruptcy protection on December 1, 2008. In contrast, despite the high feed and energy costs, egg producers enjoyed record prices and high profit margins in 2007, which continued into 2008.

### PENN STATE'S RELATIONSHIP WITH THE PENNSYLVANIA POULTRY INDUSTRY

Penn State has a long and rich history of poultry programmatic excellence and national leadership that dates back to 1895, when the first resident short course in Poultry Husbandry was taught. The Poultry Extension and Poultry Husbandry Departments were established in 1916 and 1920, respectively, with the name of the latter being changed to Poultry Science in 1963. Thus, for over 90 years, Penn State has actively engaged producers and other stakeholders (which include many of our alumni) through educational programs and translational research. In addition, many of our alumni have held/hold key leadership positions in industry, government, and academia.

The continued existence of an independent Poultry Science Department at Penn State (2002-08 demographics appear in **Appendix Table 1**) is also undoubtedly tied to Pennsylvania's large, diverse, and proactive poultry industry. The Commonwealth ranks

4<sup>th</sup> nationally in egg production, 8<sup>th</sup> in turkey production, 14<sup>th</sup> in broiler production, and 3<sup>rd</sup> in the number of egg-type chicks hatched ([http://www.nass.usda.gov/Statistics by State/Pennsylvania/Publications/Annual Statistical Bulletin/2007 2008/poultry-trout.pdf](http://www.nass.usda.gov/Statistics_by_State/Pennsylvania/Publications/Annual_Statistical_Bulletin/2007_2008/poultry-trout.pdf)). According to the most recent USDA National Agricultural Statistics Service data, the farm value of Pennsylvania poultry and eggs was \$864 million in 2007. However, since this figure does not take into account the Commonwealth's very sizable game bird, broiler breeder, and embryo industries (for vaccine production), the value of the industry certainly exceeds \$1 billion. Pennsylvania was the first state in the nation to institute steps to reduce the risk of *Salmonella enteritidis* (SE) contamination of shell eggs with a voluntary industry program for effective flock testing and management (the Pennsylvania Egg Quality Assurance Program). Other examples of areas where Pennsylvania has been a national leader include its avian influenza monitoring program, which was recently adopted by the USDA as the model for the national program, and Pennsylvania's nutrient management program for confined animal feeding operations. Penn State Poultry Scientists and avian health professionals have been involved in helping to establish all of the above programs.

## U.S. ACADEMIC POULTRY SCIENCE DEPARTMENTS AND THE ESTABLISHMENT OF REGIONAL CONSORTIA

Despite the phenomenal growth of the American poultry industry during the past 5 decades, a paradoxical 85% decline in the number of independent Poultry Science Departments has transpired since 1960, when 44 existed, to today's current 7 (**Appendix Table 2**). The 7 remaining departments are all located in the Land Grant institutions of major poultry producing states, with 6 concentrated in the nation's southeastern quadrant where most of the broiler production occurs. Penn State is thus uniquely and strategically situated as *the* center of poultry excellence in the Northeast and Mid-Atlantic regions of the country (see below).

There are a number of reasons for the decline in U.S. Poultry Science departments over the years. The most common explanations put forth in review articles on the subject include: (1) Experiment Stations located outside of concentrated poultry producing regions made adjustments in program emphases to reflect the decline in poultry in their state; (2) low student numbers; (3) failure to offer curricula tailored to the needs of the industry; and (4) companies established in-house research and development groups. Although several states (e.g., Iowa, Ohio, and Indiana) have experienced greatly increased egg production long after their poultry departments had been dissolved, a concomitant increase in poultry FTEs at their respective Land Grant institutions did not transpire. The most likely reason for this inaction is the establishment in 1993 of the Midwest Poultry Consortium Center of Excellence at the University of Wisconsin-Madison (<http://www.mwpoultry.org>). There, students from Midwestern universities are able to take resident poultry classes during the summer, with credits transferring to the student's home university. The consortium has since expanded to the Great Plains and Florida.

A similar consortium model for Mid-Atlantic universities across all three missions (teaching, research, and extension) was proposed by North Carolina State University in 1995, but buy-in by individual faculty was very limited. Possible reasons why this idea failed to advance beyond the discussion stage include the fact that interstate poultry

Extension programming and joint planning of regional and national meetings was already the norm, while many of the USDA multi-state poultry research projects were, or have since become, national in scope.

Although barriers to regional teaching programs were overcome in the Midwest, universities in the Mid-Atlantic region were unable to follow suit. However, considering the economic climate of today, it is possible that a discussion of regionalized resident poultry teaching programs will again resurface. Bottlenecks also have been encountered with regard to the offering of poultry courses and certificate programs via distance education. For example, a proposal brought forth by Auburn University in 2008 to form a poultry science distance education consortium under the auspices of the Great Plains Agriculture Interactive Distance Education Alliance (AG\*IDEA; <http://www.agidea.org>) has apparently not been enthusiastically embraced by other institutions. According to our College's Office of Undergraduate Education, Penn State's decision to date to not join the consortium has been budgetary and requires approval at the highest level of administration (Provost's Office). Nevertheless, in terms of distance education needs, our unit would be interested in: (1) developing/participating in a certificate course for Complex Managers (broiler, layer, hatchery, and/or processing plant); and (2) until an avian veterinarian is hired (see below), a senior-level course in avian diseases for the alternate years in which AN SC 425 (*Principles of Avian Diseases*) is not taught.

## **EXTENSION/OUTREACH PROGRAMS**

Stakeholder education, engagement, and support remain a priority for our unit and we continue to enjoy an excellent and mutually enthusiastic relationship with all sectors of Pennsylvania's diverse poultry industry. The Department also sponsors or co-sponsors a wide variety of educational conferences, workshops, and seminars which have historically been well attended (**Appendix Table 3**). As Extension is reframed in 2009, the new Poultry Natural Work Group (**PNWG**) will enhance communication among specialists and agents and serve to strengthen one of the strongest multi-disciplinary and cutting-edge teams of individuals in the U.S. Yet, in order to even better serve the citizens of Pennsylvania and beyond, we have proposed new faculty positions in avian health, poultry behavior and well-being, and gastrointestinal microbiology (see below). Each position has an educational and translational research component and addresses issues of critical programmatic importance that are in line with many of the College's Strategic Initiative areas. Moreover, in recognition that the Pennsylvania poultry industry has greatly expanded into the Central Susquehanna region (Snyder, Union, Columbia, Northumberland, and Montour Counties), and in response to expressed stakeholder and Extension Educator needs, we will propose the addition of a multi-county poultry agent to the PNWG (see below).

Youth programs will remain a major component of our Extension/Outreach portfolio and we plan to be an active participant in the 4-H Natural Work Group. The critical importance of 4-H and other youth programs as vehicles for undergraduate student recruitment into the College are described in the next section. Our unit's involvement and successes in state 4-H programming and leadership in the state and national Embryology in the Classroom Program as well as the National 4-H Poultry and Egg Conference are clearly strategic advantages in the recruiting arena.

## EDUCATIONAL PROGRAMS AND STUDENT RECRUITMENT

Excellence in education has also been a hallmark of our programs. Despite the net loss of 2 tenure-track faculty positions since 2002, we have been able to maintain a productive teaching program (**Appendix Table 4**) by assigning an Extension Specialist (Hulet) to teach courses in the area of poultry production and management.

***Undergraduate Program.*** The merger of the Poultry Technology and Management (**P T M**) and Dairy Science (**D SC**) majors in 1999, to create the Animal Sciences (**AN SC**) major, continues to be synergistic in that the current enrollment (347 in Fall 2008) is now more than double the sum of the P T M and D SC majors prior to the merger. Moreover, the AN SC major has grown steadily since inception (**Appendix Figure 1**) and is the largest undergraduate program in the College of Agricultural Sciences. Our unit also contributes to the Environmental Resource Management major but no longer co-sponsors the Animal Bioscience major, which has been discontinued in 2008 and replaced by the new Veterinary and Biomedical Sciences major.

Our students are considered to be among the best and brightest in the nation and continue to be actively recruited by the poultry industry (job placement has essentially been 100% for decades). Moreover, they have very successfully competed with peers from programs much larger in size for national awards at the U.S. Poultry & Egg Association's College Student Career Program (**Appendix Table 5**) and in intercollegiate poultry judging contests (**Appendix Table 6**).

During the past decade, membership has greatly increased in the Poultry Science Club and, in concert with this growth in the population of poultry-interest students, the number of scholarships and funds awarded by our unit has more than doubled since 1999 (**Appendix Figure 2**). Furthermore, in 2005, a minor in Poultry and Avian Science (**P A S**) was launched (see below).

The shortage of qualified graduates, resulting from the marked decline in the number of Poultry Science departments nationwide, continues to pose a great challenge for the U.S. poultry industry. However, because Penn State has retained an independent Poultry Science department that is productive, progressive, and responsive to student and stakeholder needs, we enjoy a tremendous programmatic and geographic advantage in terms of student recruitment and job placement. In fact, although the number of open industrial positions has shrunk during these recent difficult economic times, our students are still obtaining attractive full-time job and internship offers as of March 2009.

Yet, student recruiting remains an ongoing challenge. With the realization that this programmatic area needed to be enhanced, Phillip Clauer was hired in 2002 to head our unit's youth programs, undergraduate recruiting efforts, and small flock outreach efforts. Under Phil's leadership, K-12 interest in poultry science has greatly increased in Pennsylvania, as evidenced by a marked growth in the number of active 4-H poultry clubs and participation in 4-H programs such as Embryology in the Classroom. The number of county show opportunities and programs, as well as poultry exhibitors at the Pennsylvania Farm Show, have also greatly increased. In addition, in 2008, the Pennsylvania Delegation won the National 4-H Judging Contest and had the individual with the highest overall score. A number of our current undergraduate students competed on the Pennsylvania team or on other (e.g., Ohio) state 4-H teams. However, with current economic challenges

threatening state support for youth programs and resulting in the cancellation of the 2009 PA Governor's School for the Agricultural Sciences, there is great concern because these activities represent some of the College's major venues for the recruitment of outstanding students. Should the funding cuts become permanent, we will need to turn to other recruiting vehicles that involve working directly with select middle and high schools.

To date, 25 students with a mean grade point average (**GPA**) of 3.23 have graduated with a minor in P A S and 6 are currently enrolled (average GPA of 3.45). While most have pursued career opportunities in industry, a number of students have continued their education in graduate or veterinary schools. Although we consider the P A S minor to be very successful in meeting the needs of our students and the department, a proposal to effect changes in the curriculum was approved by the University Faculty Senate in March 2009. These revisions were made with the goal of attracting additional students with career interests in the allied industries (e.g., sales and marketing) or related fields (e.g., feed science, food science, and wildlife biology). Through instructor and curricular changes in two of the prescribed courses, and an expanded list of supporting courses, we hope to attract more Agribusiness Management, Food Science, and Wildlife and Fisheries Science majors into the program as they represent the interest areas of several of the current Poultry Science Club members.

***Graduate Program.*** In recognition that most of the graduate students supervised by Poultry Science faculty were enrolled in inter-departmental or inter-college doctoral programs, the Department discontinued granting a Ph.D. degree in Poultry Science in 1978. Three decades later, our faculty remain actively engaged in a wide variety of inter-departmental and inter-college graduate degree programs, including Animal Science, Physiology, Neuroscience, Ecology, Pathobiology, and Cell and Developmental Biology.

Funding of graduate stipends has been the Department's most pressing challenge in recent years. The College's redirection of \$525,000 in graduate stipend support from the units as part of the "Straw Lion" plan enacted in FY 2004-05, combined with voluntary increases in our unit's stipends (to Grade 14, half-time for Ph.D. students and Grade 12, half-time for M.S. students) in order to enhance competitiveness in recruiting, has resulted in essentially a 57% reduction in the number of departmental assistantships (from 7 to 3). To date, the Poultry Science faculty has procured other funding sources (grants from federal agencies, industry support, inter-college graduate program support, Bunton-Waller Fellowships, etc.) in order to meet this shortfall. Yet, with the anticipated further growth in our graduate student numbers due to the recent hiring of three reproductive biologists with majority research appointments, more grants to will need to be submitted and won, and additional leveraged funding will be sought from other sources (industry, inter-college programs, etc.).

## **RESEARCH PROGRAMS: REPRODUCTIVE BIOLOGY AND BEYOND**

During the past decade, our unit's biggest challenge has been the loss of 5 tenure track faculty (Mashaly, Roush, Johnson, Leach, and Barbato) due to downsizings, retirements, and resignations. These individuals represented **56%** of our unit's faculty who were in place in 2000. Not unexpectedly, the amount of F &A generated and our graduate student numbers declined in concert with a loss of research FTEs (**Appendix Table 7**). Fortunately,

the hiring of Phil Clauer (August 2001) and Ramesh Ramachandran (January 2002) helped to collectively fill some of the immediate extension, teaching, and research needs in our unit. However, our College faced major budget deficits in the early 2000s, and **5 years** passed before we made our next faculty hire (Paul Bartell in August 2007) as part of the College's multi-department Reproductive Biology Initiative (**RBI**). Bartell's hiring thus began the process of strategically re-building our faculty, and we have since hired two additional faculty members (Francisco Diaz and Alan Johnson) who, like Bartell, hold 75% research appointments and possess cutting-edge skill sets. As a result, our unit's refereed publications, external funding, and graduate student numbers are anticipated to grow significantly in the near future.

With faculty expertise spanning neuroendocrinology (Ramachandran), biological rhythms (Bartell), oocyte growth and differentiation (Diaz), ovarian biology and endocrinology (Johnson), embryonic development and incubation (Hulet), pullet development, laying hen management, and egg quality and production (Patterson and Elkin), we have seized an opportunity to become the only Poultry Science department in the country that is focused more on reproductive biology, as opposed to muscle (meat) production. This is particularly relevant to Pennsylvania's large egg, broiler breeder, and embryo industries as well as our strategic location in the eastern end of the U.S. 'egg belt', where four states (Iowa, Indiana, Ohio, and Pennsylvania) now produce 38% of the nation's eggs. Most of our faculty are active members of the new Center for Reproductive Biology and Health (<http://www.das.psu.edu/crbh>) in the Huck Institutes of the Life Sciences, and their engagement with faculty in other units and disciplines should help to enhance the multi-disciplinary nature of our research programs. Ultimately, the knowledge discovered will be disseminated into our teaching and extension programs.

With mergers, in house research and development groups, and (now) difficult economic times, industrial-sponsored funding for applied research in the animal sciences has become more difficult to procure over the past two decades. A voluntary program that is unique to Pennsylvania – The Pennsylvania Poultry Industry Research Check-Off Program – has helped College of Agricultural Sciences faculty to counter this trend by providing an average of \$60,000 for competitive applied broiler and egg research annually since 1995. The program was established by former Poultry Science Department Head William Weaver and is currently administered by the present Department head. Although the cast of supporting member companies has changed over the years due to mergers or budgetary issues, it is clear that the Pennsylvania poultry industry continues to demonstrate its strong and enthusiastic support of Penn State poultry science research. Overall, the member companies feel that they are benefitting from the program by having access to the latest research on high priority topics that they (the industry) ask to be investigated.

## **PERSONNEL NEEDS**

As partners in the College's Reproductive Biology Initiative, we began the process of strategically re-building the Poultry Science faculty through the filling of three tenure-track faculty positions between August 2007 and July 2009. As a result, Penn State has recruited a world-class group of reproductive biologists, formed a Center of Reproductive Biology and Health in the Huck Institutes of the Life Sciences, and is primed for success. Although this helped to partially alleviate the issue of 'critical mass' in our unit (we currently have



20% less tenure-track faculty positions as compared to 7 years ago) and greatly strengthened our fundamental research capacity, additional critical personnel needs (described below) remain in order to address current and future challenges.

•***Avian Veterinarian Position.*** In our previous strategic plan (2005-2008), we expressed the desire to hire an avian veterinarian who would develop proactive science-based educational programs to increase producer, consumer, and veterinary practitioner awareness/understanding of key poultry health-related issues such as biosecurity, endemic and emerging diseases, food safety and quality, and antibiotic-free/organic food-production systems. In addition to serving as the 'educational point person' for avian health issues in the College of Agricultural Sciences, the holder of this position would be expected to develop an externally funded, multi-disciplinary, and translational research program that would address problems relevant to both bird and human health. Another responsibility of this position would be to teach AN SC 425 (*Principles of Avian Diseases*), one of the prescribed courses in the P A S minor, on an annual basis. Hiring an avian veterinarian during this next 5-year strategic planning cycle remains a high priority of our unit and is relevant to three of the College's Strategic Initiatives: Pest Prediction and Response; Food, Diet, and Health; and Water Quality and Quantity.

•***Poultry Behavior and Well-Being Position.*** One of modern animal agriculture's greatest contemporary challenges is that of public education, and one of its greatest contemporary threats comes from animal rights groups with vegan agendas, large budgets, and sizable legal teams. The elimination of modern animal agriculture, and not improvement of animal well-being, is their true goal. Compounded by the fact that fewer than 2% of the American population farm for a living, opportunities for outreach continue to grow, but animal rights groups have taken advantage of the public's unfamiliarity with how their food is produced to advance their agendas. An example is the recent passage of Proposition 2 in California (*Standards for Confining Farm Animals*), by a margin of 63% to 37%. This is clearly a 'wake-up call' for animal agriculture in general, and egg producers in particular. As a result, many experts predict the demise of the California egg industry, which was once the largest in the nation.

Industry and academia must therefore become more pro-active in explaining to the public how their food animals are humanely raised and continue to bring science-based information into the dialogue. In this regard, filling a faculty position in poultry behavior and well-being would help Penn State and Pennsylvania poultry producers to proactively address animal well-being issues by educating the public (as well as our students) while countering animal rightist rhetoric. This position would complement the proposed avian veterinarian position and would serve to address current and future welfare issues that are part of a national dialogue on modern animal agricultural production methods. Besides expanding the AN SC Program's course offerings in the area of animal ethology and well-being, the holder of this position would be expected to develop an externally funded research program whose goal is to improve the health, growth, reproductive performance, and welfare of domestic fowl through new management practices and environmental designs. Science-based information would then be translated, thereby increasing producer and consumer awareness/understanding of poultry welfare issues.

•**Gastrointestinal Microbiologist Position.** The addition of a gastrointestinal microbiologist to the Poultry Science faculty would complement ongoing research efforts in nutrient management, antibiotic-free growth promotion, and the utilization of co-products of biofuel and biodiesel production. Through cutting-edge approaches such as metagenomics (in which the DNA of entire communities of microbes are studied simultaneously), a better understanding of how diet and environment alter intestinal microflora will be obtained. This has tremendous implications with regard to nutrient utilization and excretion, bird health, and air, water, and odor emissions from confined animal feeding operations. With the ever expanding rural-urban interface, these issues are front and center in many communities across Pennsylvania and the nation. Thus, many opportunities are anticipated to exist for multi-disciplinary research collaborations within the College (e.g., the human gastrointestinal microbial ecologist position in the Food Science Department and scientists in the *E. coli* Reference Center at the Animal Diagnostic Laboratory) as well as across the University (Penn State Institutes of Energy and the Environment) and beyond. This position would also contribute to our undergraduate and graduate teaching programs.

•**Central Susquehanna Multi-County Poultry Educator.** In recognition that the Pennsylvania poultry industry has greatly expanded into the Central Susquehanna region (Snyder, Union, Columbia, Northumberland, and Montour Counties) and, in response to expressed stakeholder and Extension Educator needs, we will propose the addition of a multi-county poultry educator to the PNWG.

## FACILITIES

Over the past 7 years, our laboratories and offices in Henning Building have been presented with a significant and expensive challenge in terms of damage from an antiquated heating and cooling system. Several heating system leaks have occurred since 2002, resulting in thousands of dollars of unreimbursed losses (due to the University's \$25,000 deductible limit per incident). Henning Building remains in dire need of renovation and we are ecstatic that it has become a planning priority for the College as part of the University's Capital Plan.

On a more positive note, the Poultry Education and Research Center (**PERC**), a 6-building 50,000 ft<sup>2</sup> facility built in 1994 at the cost of \$6 million, still ranks among the best poultry teaching and research centers in the country. Part of the University's Association for Assessment and Accreditation of Laboratory Animal Care-approved facilities for agricultural animals, the PERC allows for a wide range of research activities involving chickens, turkeys, ducks, quail and, most recently, passerines. A work force consisting of a Manager, four Technical Service workers, and four undergraduates living at the PERC (in exchange for 6 hours of work weekly) provide assistance to researchers, help collect data, and keep the facilities in pristine condition.

Recently, the repair and upgrade of our two egg incubator and hatcher units was facilitated via deep discount pricing from the vendor. State-of-the-art digital systems now control the units and, with the performance upgrade, the ability to conduct incubation research and educational programs, such as the International Hatchery Workshop, have been greatly enhanced.

## **MISSION**

The mission of the Department of Poultry Science is to discover, translate, and implement knowledge in poultry and avian science to enhance the productivity and well-being of animals that contribute to human nutrition and health.

## **VISION**

The Department of Poultry Science will continue to be a nationally and internationally recognized center for teaching, research, and extension/outreach scholarship and leadership in poultry and avian science.

## **CORE VALUES**

- Our highest priorities are excellence, scholarship, productivity, creativity, and innovation in education, research, and extension/outreach
- Strong commitment to meeting the educational needs of undergraduate students interested in a career in poultry and avian science by providing high quality teaching and advising, by encouraging participation in internships, the Poultry Science Club, intercollegiate poultry judging activities, independent research projects, and international programs, and by fostering multi-cultural awareness
- Dedication to high quality graduate education through mentoring in the classroom and the laboratory, active participation in inter-college/inter-departmental programs, encouragement to grow intellectually through seminars, workshops, lab meetings, journal clubs, and attendance at professional scientific meetings, and providing opportunities to garner teaching experience
- Maintenance of an overall balance between fundamental and applied research in poultry and avian science
- Commitment to communicate effectively and responsibly with stakeholders while providing service through educational programs, web- and print-based information delivery, problem solving, and multi-disciplinary collaborative research
- Commitment to youth education in the poultry and avian sciences
- Nurturing of our faculty and staff by encouraging professional growth, demonstrating a strong commitment to diversity and cross-cultural understanding, and providing a safe and stimulating work environment in our offices, laboratories, and animal facilities
- Commitment to the College, its mission, and its systems approach to the organization of teaching, research, and extension

## STRATEGIC INITIATIVES

### ENERGY

During the past five years, the production of ethanol from corn and biodiesel from soybean oil has increased greatly in the U.S. The respective co-products generated during of these processes, namely distillers dried grains with solubles and glycerin, represent dietary sources of energy for poultry and livestock. Although there are clearly limitations to the amount that these and other co-products can be incorporated into animal diets, they nonetheless represent economically and environmentally advantageous routes for 'disposal'. Moreover, analogous to how phytase has revolutionized commercial poultry and swine feeding programs to enhance phosphorus utilization and reduce manure phosphorus contents, a wide array of exogenous enzymes (e.g., proteases, carbohydrases, and lipases) are commercially available for inclusion in poultry and swine diets and may further enhance the digestion of poorer quality co-products of biofuel and biodiesel production. Thus, many poultry and livestock extension programs across the country, including Penn State's, are conducting research aimed at the nutritional utilization of these alternative feedstuffs.

Intestinal bacteria survive on dietary compounds which are either resistant to digestive processes or are absorbed so slowly by their host that the bacteria can successfully compete for them. Thus, depending upon whether pathogenic species are present, the composition and activity of the gut microflora can have either beneficial or detrimental effects on the health, immune status, and productive performance of the host. Since the influence on gut microflora of alternative feedstuffs, such as energy co-products and alternatives to antibiotic growth promotants, is poorly defined, we have identified the need to hire a gastrointestinal microbiologist (see page 10). Although the Penn State Institutes for Energy and the Environment has identified Bioenergy Science and Systems hiring priorities in biofuel production, we feel that co-product utilization is an important area that also merits attention. Thus, we hope to jointly submit a future proposal for a faculty position in this area, most likely in conjunction with a unit whose interests lie in the production of genetically modified grains or oilseeds.

Another energy-related practice that is of great interest to the meat-bird industry is the utilization of poultry litter as fuel source for heating facilities for brooding and growing birds. By burning a waste product and generating heat, this process holds great potential as an economically advantageous and environmentally friendly approach to reducing energy costs as well as the pollution potential of poultry operations.

### ENTREPRENEURSHIP

From the undergraduate resident education standpoint, It is envisioned that the topic of entrepreneurship could be introduced into the 'animal sciences' section of AG 150S (*Be a Master Student!*) and through guest speakers in AN SC 290W (*Careers in Animal Agriculture*). In addition, supporting courses on this subject could be added to the AN SC Major's Business Management Option. From the graduate education standpoint, guest speakers who have commercially developed their intellectual property, as well as

personnel from the University's Office of Technology Transfer, could be invited to present departmental seminars. For faculty, entrepreneurship has been encouraged in the form of seeking patent protection of intellectual property and, within the past decade, two inventions by Poultry Science faculty members led to patents and the establishment of a company. From the Outreach standpoint, fostering profitability, translating research, and encouraging/assisting small business development have been ongoing activities of our Extension Specialists.

## **FOOD, DIET, AND HEALTH**

Virtually all that we do to enhance poultry productive and reproductive efficiency and health relates to (human) food, diet, and health. For example, growth and development research (Ramachandran and Vasilatos-Younken) has focused on adipose tissue hormones, such as adiponectin, visfatin, and sirtuin, whose manipulation could potentially lead to reductions in the fat content of meat-type (broiler) chickens and has relevance to obesity and insulin resistance in humans. Other studies have focused on the modification of egg nutrient composition or enrichment of eggs with nutraceuticals (Patterson and Elkin). Food safety research to improve gut health and attenuate pathogens, such as *Clostridium perfringens* and *Salmonella enteritidis*, through dietary supplementation of prebiotics, probiotics, organic acids, and essential oils (Hulet and Patterson) is also ongoing and particularly relevant to organic or antibiotic-free 'natural' poultry production practices. Research and Outreach programs focused on improving water and air quality for bird and human (farmer) health and the environment are also being conducted (Hulet and Patterson). The role of biological clocks in reproduction and skeletal biology has implications for both animal and human health (Bartell). Likewise, research aimed at understanding the molecular and functional interactions between oocytes and granulosa cells can lead to the development of better therapeutic interventions for infertility or species preservation as well as better reproductive management tools for animal agricultural production (Diaz). Lastly, since laying hens (chickens) are the only animals to develop spontaneous ovarian cancer like a human, and the type of cancer is also similar in that it develops from the ovarian surface epithelium, a research project focused on the etiology of this neoplasia is ongoing (Ramachandran and Elkin).

All three proposed faculty positions (avian health, poultry behavior and well-being, and gastrointestinal microbiology; see *Personnel Needs section on pages 8-10*) directly relate to this Strategic Initiative and have implications for both avian and human health.

## **PEST PREDICTION AND RESPONSE**

Our department's Extension Specialists work closely with avian veterinarians and other health professionals in the Pennsylvania Animal Diagnostic Laboratory System, the Pennsylvania Department of Agriculture, the USDA, and the poultry industry in order to ensure optimal flock health and promote biosecurity practices in Pennsylvania and beyond. In the event of a disease outbreak in the Commonwealth, such as the low pathogenic avian influenza (AI; serotype H7N2) outbreak that occurred 2001-02, Poultry Science faculty assisted in the mass depopulation of 7 flocks and also utilized in-house bird composting as

a biosecure method to control the outbreak. The use of water-based foam for mass depopulation of poultry has also been investigated jointly with other Poultry Extension Specialists from the Mid-Atlantic Region.

Poultry Science Extension Specialists are also involved in a multi-disciplinary effort to reduce fly problems associated with poultry facilities. Cooperative Extension educators (Capital Region and Berks County), as well as faculty from the Department of Entomology, have been partners in this effort. However, it is felt that the addition of a Livestock Entomologist would strengthen the multi-disciplinary team. Such a position existed in the past but was not re-filled when the faculty member retired nearly a decade ago.

With many of Pennsylvania's chicken and turkey producers migrating to antibiotic-free or organic methods of production, the incidence of enteric disease has increased. As a result, researchers at Penn State and beyond are investigating the effectiveness of dietary prebiotics, probiotics, exogenous enzymes, phytobiotics, and other natural agents to attenuate intestinal pathogens. However, as mentioned previously in the energy Strategic Initiative section, the recruitment of a gastrointestinal microbiologist would help to advance our understanding of the influence of dietary components on gut microflora in the context of bird health. Examples of other multi-disciplinary research projects related to pathogen reduction and bird health include the use of vegetative buffers (trees) to capture dust and microorganisms emanating from poultry facilities, and various nutritional strategies to reduce ammonia production in confined animal feeding operations.

A number of educational programs sponsored or co-sponsored by our department address poultry health (and human health, in the case of zoonotic diseases) and include the Poultry Sales and Service Conference (in conjunction with the Northeast Conference on Avian Diseases), the Game Breeders and Hunting Preserves Conference, Poultry Progress Day, and the Poultry Management and Health Seminar (**Appendix Table 3**). With regard to university preparedness and response, the Poultry Science Department Head serves on the University's Animal Issues Response Team.

Research efforts in poultry well-being use science-based approaches to assessing bird stress. Recent work on various gas mixtures for controlled atmospheric stunning (CAS) of poultry are currently under investigation in the Department of Poultry Science. The potential uses of this methodology are two-fold: (1) for mass depopulation following a natural disease outbreak or a bioterrorism incident; and (2) in poultry processing. Animal rights groups have proclaimed CAS to be a more human method of rendering birds unconscious prior to exsanguination during processing and are putting pressure on McDonalds and other large restaurant chains to only purchase birds processed using CAS; however, the American restaurant industry has been resistive to this pressure because to date there has been little scientific evidence to back up this claim and the systems are very expensive.

## **WATER QUALITY AND QUANTITY**

Water quality is an issue that transcends both animal and human health. Poultry Science Extension Specialists are very active in this area both locally and nationally as members of a USDA multi-state project (\$1035: *Nutritional and Management Abatement Strategies for Improvement of Poultry Air and Water Quality*). The overarching goal of this group's work

is to develop environmentally sound and economically sustainable methods by which the poultry industry can mitigate causes of non-point source pollution while protecting water quality. These include mortality management, nutritional strategies to attenuate nitrogen and phosphorus excretion, and manure/litter management. An additional goal of this work is to develop cost-effective practices that maintain profitability while protecting the environment.

A related effort in reducing air emissions of ammonia, dust, and pathogens using vegetative buffers is also relevant and was previously discussed under the “Pest Prediction and Response” Strategic Initiative. Research employing nutritional approaches to attenuate enteric diseases and enhancing nutrient utilization through dietary supplementation of exogenous enzymes are ongoing and relevant to soil and water quality. Utilization of poultry litter as fuel source for heating bird brooding and growing facilities holds great potential as an economically advantageous and environmentally friendly approach to reducing the pollution potential of poultry operations.

## UNIT GOALS AND STRATEGIES

### **GOAL A. ENHANCE STUDENT SUCCESS AND INCREASE UNDERGRADUATE AND GRADUATE ENROLLMENT IN THE ANIMAL AND AVIAN SCIENCES**

#### MEASURABLE TARGETS

1. Collectively enhance and grow the AN SC undergraduate major by 5% annually with our colleagues in the Dairy and Animal Science Department.
2. Increase enrollment in the P A S minor by 10% per year.
3. Increase annual spendable scholarship funds for poultry-interest students to \$50,000 by 2013.
4. Place every P A S minor enrollee in an internship prior to graduation.
5. Achieve 100% job placement for every P A S minor enrollee seeking to enter the workforce.
6. Increase graduate student enrollment by 20% per year, spread among the six inter-departmental and inter-college graduate degree programs in which are faculty are active (Animal Science, Physiology, Neuroscience, Ecology, Pathobiology, and Cell and Developmental Biology).
7. Develop new graduate courses, particularly in reproductive biology and related areas.

## STRATEGIES AND ACTIONS FOR 2008-2013

1. Utilize the latest classroom technologies (e.g., 'clickers') and provide more experiential learning through laboratories and 'hands-on' experiences in poultry and livestock management classes; continue to successfully assist students in procuring externships and internships.
2. Hire an avian veterinarian in response to increased undergraduate student interest in avian medicine and to meet increasing teaching and advising needs in the P A S minor and AN SC major.
3. Recruit and retain a high quality and diverse pool of undergraduate students.
  - a. Reach out to nontraditional and international student audiences.
  - b. Further integrate county extension offices, industry contacts, alumni, and current students into the recruitment process.
  - c. Increase marketing efforts via consultation with College and University marketing personnel from and through periodic revision of our unit's website and recruiting brochures.
4. Devise new ways of reaching resident, distance, and extension students through technology and alternative scheduling.
  - a. Explore offering existing courses via the World Campus or possibly joining a web-based consortium such as AG\*IDEA (see page 5).
5. Expand local, regional, national, and international relationships with poultry companies and allied industries in order to enhance internship and employment opportunities for our students
  - a. Increase the number of company visits by faculty and students
  - b. Facilitate interactions between students, faculty, and industry personnel through the educational programs (e.g., International Hatchery Workshop) which would bring potential employers to campus under an alternative venue (as opposed to career fairs). (*Also see Measurable Target 7 in Goal C.*)
  - c. Explore opportunities for international experiences for poultry-interest students in some of the leading poultry producing or importing countries (e.g., The Netherlands, Brazil, Mexico, Japan, China).
  - d. Encourage students to enroll in foreign language courses (e.g., SPAN 105, 106, and 107; *Spanish for Students in the Field of Agricultural Sciences, Spanish for the Agricultural Industries, and Spanish Immersion Experience*, respectively).
6. Increase undergraduate student research experiences.
  - a. Increase the number of independent study and honors thesis projects



7. Enhance graduate student support, recruitment, retention, and training efforts.
  - a. Continue to aggressively seek external sources of graduate funding, such as federal training grants for graduate student support. In the reproductive biology area, it is anticipated that the CRBH will be the lead vehicle for accomplishing this.
  - b. Recruitment of graduate students will be encouraged primarily through improvement of the existing departmental web site and contact with colleagues; however, we realize that the most important recruiting tools are ultimately the quality of our research programs and the ability to obtain extramural funding to support tuition and stipends.
  - c. Retention will be targeted through the provision of adequate physical and intellectual resources for the student to accomplish his/her research project, effective mentoring, and the careful establishment of skillful and helpful thesis advisory committees.
  - d. Build scientific and grant writing skills, enhance communication (presentation) skills, and discuss the responsible conduct of research in the context of graduate courses such as AN SC 502 (*Scientific Scholarship*) and AN SC 590 (*Colloquium*).

## **GOAL B. ENHANCE FUNDAMENTAL AND APPLIED RESEARCH AIMED AT SOLVING COMPLEX AND RELEVANT PROBLEMS THROUGH INTERDISCIPLINARY APPROACHES**

### **MEASURABLE TARGETS**

1. Increase the amount of research expenditures to at least \$1,500,000 annually by 2013.
2. Publish 20 refereed journal articles annually by 2013.
3. Procure co-funded faculty positions in response to requests for proposals from various Penn State Institutes.
4. Increase the number of invention disclosures.

### **STRATEGIES AND ACTIONS FOR 2008-2013**

1. Hire three tenure-track faculty in the areas of avian health (veterinarian), poultry behavior and well-being, and gastrointestinal microbiology in order to enhance discovery and translational research efforts. Where appropriate, submit proposals for co-funded positions from various Penn State Institutes.

2. Increase the numbers of proposals submitted to, and funded by, federal granting agencies by 100%.
  - a. In addition to these competitive grant programs, we will also seek support from non-federal sources, including state-supported grant programs, commodity groups, private sponsors, industry contracts, and foundations.
  - b. It is expected that the research program of each faculty member will become sustainable and supported virtually entirely through external monies.
3. Improve collaborative research efforts on and off campus.
  - a. Become active in the CRBH as well as in future centers of excellence.
  - b. Continue to actively participate in USDA multi-state projects.
4. Support professional development activities for faculty, post-doctoral scholars, and research aides.
  - a. Expend 1.5% of our operating budget to support the acquisition of new skills or tools by departmental personnel.
5. Encourage eligible Poultry Science faculty members to pursue long-term (i.e., sabbaticals) and short-term international research experiences.
  - a. Seek support from Fulbright, Fogarty, OECD, and IAEA programs.

## **GOAL C. STRENGTHEN COMMUNICATION WITH, AND SUPPORT OF, STAKEHOLDERS**

### **MEASURABLE TARGETS**

1. Actively engage in the College initiative to reframe Extension.
2. Increase the quality and scope of our extension educational programs through 3 new faculty hires.
3. Expand poultry educational programs for producers and allied industry members in the 5-county Central Susquehanna Region of Pennsylvania and beyond.
4. Involve stakeholders in faculty and Extension educator searches.
5. Enhance stakeholder involvement in Extension program planning and evaluation.
6. Use of stakeholder advisory groups by Extension Specialists and the Department Head.

7. Enhance stakeholder interactions with undergraduates through speaking engagements at Poultry Science Club meetings, industry visits, professional mentoring, and promoting internship and employment opportunities.

### **STRATEGIES AND ACTIONS FOR 2008-2013**

1. Poultry Science faculty with Extension appointments (**Appendix Table 8**) will actively participate in one or more of the Natural Work Groups.
2. Continue to provide local, state, regional, and national leadership in poultry education through outreach programs, extension conferences, publications, and via internet technologies.
3. Hire an avian veterinarian, an animal ethologist, and a gastrointestinal microbiologist (all tenure track faculty) to deliver educational programming and conduct translational research in the respective areas of pre-harvest food safety and animal health, animal behavior and well-being, and digestive physiology (in the context of nutrient management, antibiotic-free growth promotion, and the utilization of co-products of biofuel and biodiesel production). These positions address the main challenges and issues (i.e., animal health, animal rightists, and environmental concerns) confronting the poultry industry as identified by our stakeholders in a recent survey.
4. Hiring by Cooperative Extension of a multi-county poultry educator to serve the 5-county Central Susquehanna Region of Pennsylvania.
5. During faculty interviews, continue to schedule a luncheon for each candidate to meet with stakeholders (typically Poultry Science Affiliate Program Group members from the poultry and allied industries).
6. Continue to promote and enhance youth venues (e.g., Youth Poultry 101 and 4-H and FFA programs) in order to facilitate undergraduate recruitment.
7. Develop a departmental 4-H endowment in order to support youth programs and activities such as participation in the National 4-H Poultry Judging Contest.
8. Continue to invite alumni and other stakeholders from the poultry and allied industries to speak at Poultry Science Club meetings. Also encourage them to host Club members on industry trips and provide professional mentoring if requested by individual students.
9. Hold periodic (e.g., quarterly or semi-annual) meetings with management teams of key Pennsylvania companies to encourage and promote better communication between parties.

10. Establish resident and/or web-based training programs (e.g., Complex Manager Certificate Course) for poultry professionals.
11. Continue to interact closely with, and seek advice from, the Poultry Science Affiliate Program Group.

**Goal D. ENHANCE DEPARTMENTAL HUMAN RESOURCES THROUGH PROFESSIONAL DEVELOPMENT ACTIVITIES, FOSTERING OF DIVERSITY AND MULTICULTURAL AWARENESS, AND MAINTENANCE OF A SAFE AND STIMULATING WORKING ENVIRONMENT IN OUR OFFICES, LABORATORIES, AND ANIMAL FACILITIES**

**MEASURABLE TARGETS**

1. Participation of faculty, staff, and graduate students in professional development activities.
2. Establishment of a departmental "Climate Committee" consisting of faculty, staff, and students to assess, on an ongoing basis, the overall climate within the department. This committee will provide recommendations to the Department Head regarding issues of working environment and the promotion of diversity and multicultural awareness in all missions of the Department.
3. Recruitment of faculty, staff, and students from underrepresented groups.
4. Participation of department personnel in programs and events that enhance diversity and promote gender equity.
5. Promotion of the College's Agricultural Spanish Program through company visits with the Instructor, financial support of students and faculty participating in the summer intensive program in Mexico, and provision of bi-lingual materials from the poultry industry.
6. Participation of faculty and students in international meetings, study tours, exchanges, sabbaticals, and research and outreach collaborations.
7. Nominations of faculty, staff, and students for various local, national, and international awards. Greater involvement of the Department's Faculty Recognition Committee will be sought in this regard.

**STRATEGIES AND ACTIONS FOR 2008-2013**

1. Continue to set aside 1.5% of the department's annual operating budget to support faculty, staff, and graduate student professional development activities.
2. Expansion of duties, improved effectiveness of performance in existing duties, and/or greater productivity as reflected in annual performance evaluations of staff and faculty.
3. Encourage participation in Human Resource Development Center (HRDC) and Staff Development programs and Center for Academic Computing workshops.
4. Encourage participation of faculty and students in international activities and second language-building skills by helping to co-fund travel expenses, conference costs, etc.
5. Continue to enhance interactions between faculty, staff, and students by holding ice cream socials, receptions, celebrations, Holiday gatherings, the annual Poultry Science Alumni and Friends Reunion (football tailgate), etc.
6. Maintain contact with retired faculty and staff through the annual departmental newsletter and invitations to special department events.
7. Climate assessments over time should reflect continuing improvements in satisfaction of department personnel regarding their working environment, and documentation of areas of concern and actions taken by the Department to address concerns of significance will reflect effective improvement.
8. Number of programs and activities that support diversity, promote multicultural awareness, and support activities and initiatives that benefit women.
9. Number/percentage change in individuals from underrepresented groups hired, retained, and advanced in the Department workforce.
10. Number of faculty, staff, and students nominated for local, national, and international awards.
11. Number of local, national, and international awards and honors received by faculty, staff, and students.

## PRIORITIZED LIST OF DEPARTMENTAL PROGRAMS

### PROGRAMS TO BE ENHANCED:

Reproductive Biology (ongoing)  
 Health and Well-Being (new)  
 Intestinal Microbial Ecology (new)  
 Growth Biology (ongoing)

### PROGRAMS TO BE DE-EMPHASIZED:

Poultry Breeding/Quantitative Genetics  
 Avian Transgenesis

## IMPLEMENTATION OF COST SAVINGS AND COST AVOIDANCE

- In 2003 and 2006, the Department purchased a van from Fleet Services for pooled use by Extension Specialists (due to mileage constraints of the contract, the van purchased in 2003 had to be replaced with a new van in 2006). We estimate that this has resulted in an estimated annual cost savings of \$7,000 as compared to renting a vehicle for each trip.
- Several annual instrument maintenance contracts have been discontinued at an estimated savings of \$5,000 annually.
- The Manager of the PERC has negotiated with vendors to obtain deep discounts for items such as paper products for egg handling and in some cases has been able to obtain items at vendor cost. This has resulted in an estimated savings of several thousand dollars annually.
- In 2008, Genesis IV conversion kits for 2 Chick Master<sup>®</sup> incubator displays and 2 Chick Master<sup>®</sup> hatcher displays were obtained at 50% cost from the vendor. This resulted in a cost savings of \$16,700.

## REVENUE GENERATION

The Department's main source of revenue generation is the sale of poultry meat and eggs to local businesses, Penn State Food Services, and the general public. Sales income fluctuates annually based on both the number of broilers, turkeys, and laying hens used in various research projects and whether meat and eggs from these animals can be sold (which is based on animal protocols approved by the Office for Research Protections).

The net loss of faculty positions in our unit since 2002, combined with a major re-direction in research program areas (i.e., emphasis on reproductive biology), resulted in an inability to reach our sales target of \$20,000 for both FY 2006-07 and FY 2007-08. Therefore, in FY 2008-09, a reduction of our unit's sales income target from \$20,000 to \$12,000 was requested and approved.

## APPENDIX

- TABLE 1: DEPARTMENT DEMOGRAPHICS (n), 2002-2008
- TABLE 2: COMPARISON OF CURRENT TENURE TRACK FACULTY NUMBERS AND STUDENT ENROLLMENT IN THE SEVEN U.S. POULTRY SCIENCE DEPARTMENTS
- TABLE 3: MAJOR DEPARTMENT-SPONSORED CONFERENCES, WORKSHOPS, AND SEMINARS, 2002-08
- TABLE 4: STUDENT CREDIT HOURS (SCH) GENERATED BY THE DEPARTMENT, 2002-2008
- TABLE 5: PENN STATE POULTRY SCIENCE CLUB PLACINGS AT THE U.S. POULTRY & EGG ASSOCIATION'S COLLEGE STUDENT AWARDS PROGRAM AT THE INTERNATIONAL POULTRY EXPOSITION (ATLANTA, GA), 2000-09
- TABLE 6: PENN STATE INTERCOLLEGIATE POULTRY JUDGING TEAM PLACINGS, 2001-08
- TABLE 7: DEPARTMENT RESEARCH REPORT CARD, 2002-08
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- FIGURE 1: ANIMAL SCIENCES (AN SC) AND ANIMAL BIOSCIENCE (AN BIO) ENROLLMENTS, 1998-2008
- FIGURE 2: POULTRY SCHOLARSHIPS AND SCHOLARSHIP RECIPIENTS, 1999-2008

**TABLE 1: DEPARTMENT DEMOGRAPHICS (n), 2002-2008**

Tenure Track Faculty FTE <sup>1</sup>	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
Instruction	1.63	1.13	0.98	0.78	0.78	1.28
Research	5.88	4.38	3.53	2.73	2.73	4.23
Extension	1.74	1.74	1.74	1.74	1.74	1.74
Total	9.25	7.25 <sup>2</sup>	6.25 <sup>3</sup>	5.25 <sup>4</sup>	5.25	7.25 <sup>5</sup>
<b>Rank</b>						
Assistant Professor	2	2	1	1	1	3
Associate Professor	5	3	3	2	2	2
Professor	3	3	3	3	3	3
<b>Gender</b>						
Male	8	6	6	5	5	7
Female	2	2	1	1	1	1
<b>Ethnicity</b>						
African American	1	0	0	0	0	0
Asian American	1	1	1	1	1	1
Caucasian	8	7	6	5	5	6
Hispanic American	0	0	0	0	0	1

<sup>1</sup>Includes Department Head plus 0.25 FTE for R. Vasilatos-Younken (25% research appointment in Poultry Science and 75% appointment as Senior Associate Dean of the Graduate School). Since 1 July 2008: G. F. Barbato (Associate Professor) resigned, A. L. Johnson (Professor) has been hired, and R. Ramachandran has been promoted to Associate Professor; thus current tenure track FTE = 7.25.

<sup>2</sup>W. B. Roush and M. M. Mashaly retired.

<sup>3</sup>S. E. Johnson left department.

<sup>4</sup>R. M. Leach, Jr. retired and Paul Patterson was promoted to Professor.

<sup>5</sup>P. A. Bartell and F. J. Diaz were hired.



**TABLE 2: COMPARISON OF CURRENT TENURE TRACK FACULTY NUMBERS AND STUDENT ENROLLMENT IN THE SEVEN U.S. POULTRY SCIENCE DEPARTMENTS<sup>1</sup>**

Item	Institution						
	Auburn	MSU	NCSU	PSU	TAMU	U. Ark.	U. Ga.
Tenure Track Faculty FTE (n)							
Instruction	4.2	2.5	3.6	1.3	5.8	2.5	4.3
Research	9.2	2.3	9.9	4.25	3.9	13.5	6.6
Extension	4.1	0.3	6.0	1.7	3.0	0.0	7.6
Total	17.5	6.0 <sup>2</sup>	19.5	7.25 <sup>3</sup>	12.7 <sup>4</sup>	16.0 <sup>5</sup>	18.5
Enrollment							
Undergraduate	56	42	81	22 <sup>6</sup>	143	80	47 <sup>7</sup>
Graduate	22	12	14	6	30	30	16

<sup>1</sup>MSU=Mississippi State University; NCSU=North Carolina State University; PSU=Penn State University; TAMU=Texas A & M University; U. Ark.=University of Arkansas; U. Ga.=University of Georgia. Includes Department Heads.

<sup>2</sup>0.9 FTE of the tenure track faculty appointments are categorized as administrative. Does not include two Assistant Professors who are not tenure track.

<sup>3</sup>Does not include 0.55 Instruction FTE and 0.6 Extension FTE from non-tenure track positions.

<sup>4</sup>Three positions are currently vacant.

<sup>5</sup>All 6 of the Extension faculty and 1 Research FTE are non-tenure track.

<sup>6</sup>Estimated based on Poultry & Avian Science minors (6) plus anticipated enrollees that are currently freshman and sophomores (must be 5<sup>th</sup> semester standing to enroll).

<sup>7</sup>Twenty-one Poultry Science majors plus 26 Avian Biology majors.

**TABLE 3: MAJOR DEPARTMENT-SPONSORED CONFERENCES, WORKSHOPS, AND SEMINARS, 2002-08**

Item	Attendance					
	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
Game Breeders and Hunting Preserves Conference	120	141	84	89	110	107
Poultry Sales and Service Conference <sup>1</sup>	125	135	--- <sup>7</sup>	146	152	160
Poultry Progress Day <sup>2</sup>	78	81	110	125	73	118
Mid-Atlantic Nutrition Conference <sup>3</sup>	195	201	205	233	219	255
North Atlantic Poultry Health and Management Conference <sup>4</sup>	96	73	81	---	---	---
Poultry Management and Health Seminar <sup>5</sup>	35	35	35	30	30	30
Youth Poultry 101 <sup>6</sup>	---	---	---	---	---	79

<sup>1</sup>Since 2007, held jointly with the Northeast Conference on Avian Diseases.

<sup>2</sup>Held annually at the Lancaster County Farm and Home Center (Lancaster, PA) and jointly sponsored by Penn State Cooperative Extension and the PennAg Industries Poultry Council.

<sup>3</sup>Former Maryland Nutrition Conference. The 1<sup>st</sup> Mid-Atlantic Poultry Nutrition Conference (MANC), held in 2003, coincided with the 50<sup>th</sup> – and last – Maryland Nutrition Conference. The MANC is jointly sponsored by the University of Maryland, the University of Delaware, Penn State University, Rutgers University, Virginia Tech, the University of Pennsylvania School of Veterinary Medicine, the Maryland Feed Industry Council, and the American Feed Industry Association.

<sup>4</sup>Former New Hampshire Poultry Health Conference; was discontinued in 2005.

<sup>5</sup>Held monthly (except for January) between September and June in Lancaster County. Figures are average attendance.

<sup>6</sup>Initially offered in 2008; enrollment is being capped at 75 in 2009 in order to keep break-out group sizes manageable.

<sup>7</sup>Was not held in 2004 because the department hosted the North Atlantic Poultry Health and Management Conference.

**TABLE 4: STUDENT CREDIT HOURS (SCH) GENERATED BY THE DEPARTMENT, 2002-2008<sup>1</sup>**

Item	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
	SCH Generated					
Undergraduate courses	682	736	499	483	540	418
Graduate courses	54	70	102	67	57	134
Total	736	806	601	550	597	552
	Total SCH/Resident Instruction FTE					
Department of Poultry Science	434	505	352	833	686	493
College of Agricultural Sciences average <sup>2</sup>	253	258	248	250	245	263

<sup>1</sup>Data obtained from University Performance Indicators and Penn State FactBook<sup>plus</sup>.

<sup>2</sup>Fall semester of each year; data for budgeted full-time faculty only.

**TABLE 5: PENN STATE POULTRY SCIENCE CLUB PLACINGS AT THE U.S. POULTRY & EGG ASSOCIATION'S COLLEGE STUDENT AWARDS PROGRAM AT THE INTERNATIONAL POULTRY EXPOSITION (ATLANTA, GA), 2000-09<sup>1</sup>**

Year	Award		
	Club of the Year	Best Scrapbook	Student of the Year
	Rank	Rank	Rank
2009	2 <sup>nd</sup>	1 <sup>st</sup>	3 <sup>rd</sup> (K. Kreider)
2008	1 <sup>st</sup>	1 <sup>st</sup>	2 <sup>nd</sup> (T. Topper)
2007	1 <sup>st</sup>	1 <sup>st</sup>	1 <sup>st</sup> (A. Herr)
2006	1 <sup>st</sup>	1 <sup>st</sup>	--- <sup>2</sup>
2005	---	1 <sup>st</sup>	---
2004	---	1 <sup>st</sup>	---
2003	1 <sup>st</sup>	1 <sup>st</sup>	---
2002	---	1 <sup>st</sup>	---
2001	---	1 <sup>st</sup>	1 <sup>st</sup> (H. Lehman)
2000	1 <sup>st</sup>	1 <sup>st</sup>	---

<sup>1</sup>Typically, clubs from 25 universities (approximately 300 students total) participate in the College Student Program each year. However, not all clubs compete for the three awards.

<sup>2</sup>Prior to 2006, there were no 2<sup>nd</sup> or 3<sup>rd</sup> place awards for either Club of the Year or Student of the Year.

**TABLE 6: PENN STATE INTERCOLLEGIATE POULTRY JUDGING TEAM PLACINGS, 2001-08<sup>1</sup>**

Year	Team Placing at National Contests			
	Fayetteville, AR (Fall)		Baton Rouge, LA (Spring)	
	Rank	# of Teams	Rank	# of Teams
2008	2 <sup>nd</sup>	10	4 <sup>th</sup>	14
2007	2 <sup>nd</sup>	12	2 <sup>nd</sup>	14
2006	2 <sup>nd,1</sup>	12	2 <sup>nd,2</sup>	12
2005	1 <sup>st</sup>	9	7 <sup>th</sup>	12
2004	3 <sup>rd</sup>	11	4 <sup>th</sup>	10
2003	--- <sup>3</sup>		--- <sup>3</sup>	
2002	--- <sup>3</sup>		8 <sup>th</sup>	11
2001	7 <sup>th</sup>	10	--- <sup>3</sup>	

<sup>1</sup>Had high overall individual score (A. Goddard).

<sup>2</sup>Had high overall individual score (A. Herr).

<sup>3</sup>Team did not participate.

**TABLE 7: DEPARTMENT RESEARCH REPORT CARD, 2002-08<sup>1</sup>**

Item	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
Tenure Track Faculty Research FTE (n)	5.88	4.38	3.53	2.73	2.73	4.23
Awards received (n)	16	23	15	6	22	12
Amount (\$)	181,856	855,218	505,002	32,917	538,146	238,281
F & A <sup>2</sup> generated (\$)	76,204	98,815	45,150	41,472	23,904	28,736
Refereed journal articles (n)	10	11	8	10	10	13
Grad students advised or co-advised (n)	10	9	7	9	6	6
Grad student advisory committee memberships (n)	23	14	9	7	11	7
Undergraduate research projects supervised (n)	2	2	4	4	2	7

<sup>1</sup>Includes Unit Leader.

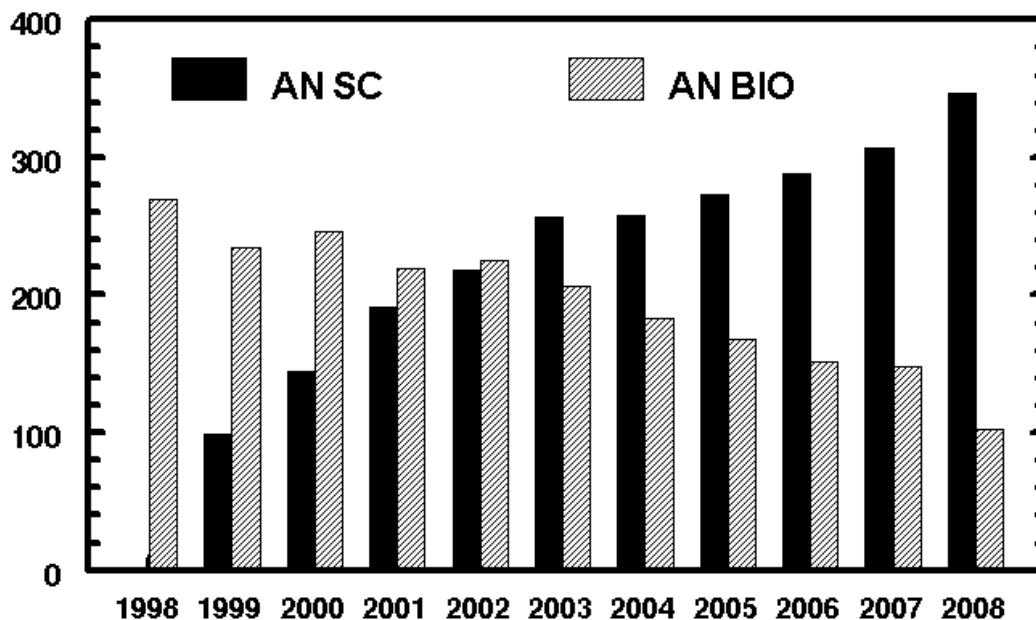
<sup>2</sup>F & A = facilities and administrative cost (overhead).

**TABLE 8: POULTRY SCIENCE EXTENSION FACULTY AND THEIR NATURAL WORK GROUPS (NWG)**

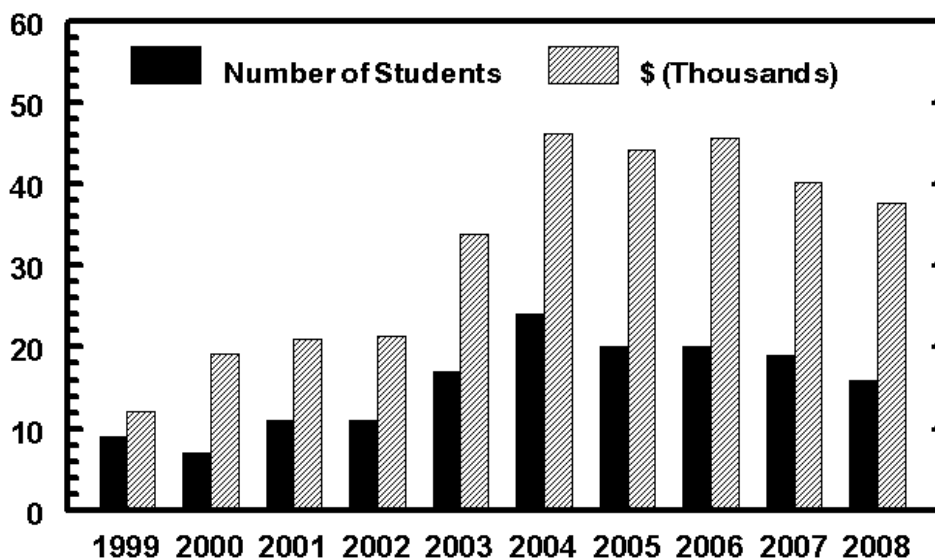
Name	FTE Extension	NWG	
		4-H Youth	Poultry
Phillip J. Clauer	0.60	X	X
R. Michael Hulet	0.70		X
Paul H. Patterson	0.70		X

**TABLE 9: ASSESSMENT OF STUDENT LEARNING OUTCOMES FOR UNDERGRADUATE AND GRADUATE PROGRAMS**

<b>Program</b>	<b>Objective</b>	<b>Skills and Experiences</b>		<b>Courses that Map to Program Competencies</b>
Undergraduate	Basic Knowledge of Normal and Abnormal Avian Anatomy and Function	Proper handling of live birds and procurement of blood and tissue samples	Ability to recognize disease symptoms in poultry	AN SC 211, 311, 421, 423, and 425
	Basic Understanding of Commercial Poultry Production	Industry and trade show visits	Internship(s)	AN SC 311 and 395
	Oral and Written Communication Skills	Presentation of seminars and reports to students and faculty	Technical writing	ENGL 202 and AN SC 311
	Critical Thinking and Analysis	Group projects to solve problems using “real world” data	Internships	AN SC 311, 421, and 496
	Working Knowledge of Laboratory Skills and Introduction to Research (science-related majors)	Conduct of an independent research project and participation in College and University poster competitions	Assist faculty with data collection and analysis	B M B 211 and 212 and AN SC 496
Graduate	Ability to Think Critically	Develop hypotheses and design experiments to test them (e.g., research proposal writing)	Participation in journal clubs	AN SC 502 and 590
	Knowledge of the Primary Literature on the Thesis Topic	Conduct of on-line literature searches (e.g., PUB MED)	Read the key papers, past and present	AN SC 597A (Foundation Readings in the Animal Sciences)
	Develop Effective Communication Skills	Write reports, abstracts, manuscripts, and research proposals; seek feedback from professors and peers	Present seminars, posters, and papers at professional meetings	Candidacy exams; AN SC 502 and 590
	Ability to Design Experiments and Analyze and Interpret Data	Knowledge of experimental designs and procedures	Master statistical software packages	STAT 597I (Applied Statistics for Experimental Design)
	Develop Competent Laboratory Skills	Ability to follow directions	Impeccable record keeping	
	Awareness of Research Policies, Procedures, and Ethics	Complete IACUC protocol application, EHS animal worker questionnaire, etc.	Maintain an up-to-date chemical inventory	ORP and EHS Seminars and Workshops



**FIGURE 1: ANIMAL SCIENCES (AN SC) AND ANIMAL BIOSCIENCE (AN BIO) ENROLLMENTS, 1998-2008.** In 1999, the Poultry Technology & Management (P T M) major was merged with the Dairy & Animal Science (D A S) major to create the Animal Sciences (AN SC) major. Students who were enrolled in either D A S or P T M at that time were permitted to graduate in those majors. Animal Bioscience (AN BIO), which was jointly sponsored by the Poultry Science, Dairy & Animal Science, and Veterinary Science (now Veterinary & Biomedical Sciences; VB SC) Departments since 1976, was discontinued in 2008. As was the case with the P T M and D A S majors, students enrolled in AN BIO will be permitted to graduate in that major. A new major, VB SC, was established in Fall 2008 with an initial enrollment of 71; it is overseen solely by the VB SC Department.



**FIGURE 2: POULTRY SCHOLARSHIPS AND SCHOLARSHIP RECIPIENTS, 1999-2008.** Amount awarded includes funds from the Animal Sciences Program, the College of Agricultural Sciences, and the Schreyer Honors College.