

NC STATE
UNIVERSITY

Prestage Department
of Poultry Science



Annual Report

2017

DEPARTMENT OF POULTRY SCIENCE

SCOTT HALL



Poultry science departments are commodity departments housed in land-grant universities. Since 1862, land-grant universities have served a unique function with commodity department faculty contributing knowledge. Commodity departments concentrate on a central application with each faculty contributing to overall application goals.

Commodity departments led the way with multidisciplinary programs well before multidisciplinary became popular and expected. Responding to the realities of industry and the need for trained and educated agricultural leaders, commodity departments pursued research and application collaboratively to have the broadest possible impact.

The Prestage Department of Poultry Science (PDPS) is one of six departments of poultry science in the United States. Embracing the challenge of being responsive to industry needs while leading the industry through cutting-edge scientific research, the department is creating a vision for immediate, short-term and long-term programs that support education and industry at local, state, national and international levels.

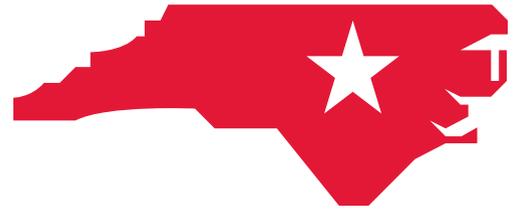
Poultry science departments historically differentiated themselves through disciplinary focus: physiology, reproduction, nutrition or disease research, for example. The resulting specialization may offer opportunities to support industry unaddressed by current faculty. PDPS intends to fully commit to its multidisciplinary roots with integrated poultry systems for broilers, layers and turkeys and other markets.

The Prestage Department of Poultry Science works to support industry needs through foundational and applied research, developing a well-trained workforce and engaging with industry members and the public via outreach and extension.

This annual report illustrates the importance of poultry and the department's operations, accomplishments and changes to demonstrate the value PDPS adds to NC State, the state of North Carolina and the national and international poultry industry.

Why Poultry Science?

NC Poultry



No. 1 Commodity

Broilers were North Carolina's top agricultural commodity based on farm income.

Food animal products accounted for more than 2/3 of 2016 agricultural receipts in North Carolina.

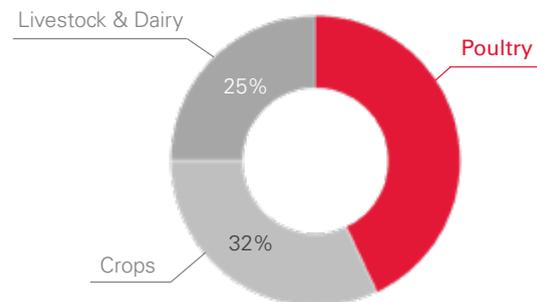
Broilers – chickens raised for meat – were the most important agricultural commodity in North Carolina in 2016.

Broilers, turkeys and chicken eggs made up more than 40% of the state's 2016 farm income.



\$4.5+ Billion

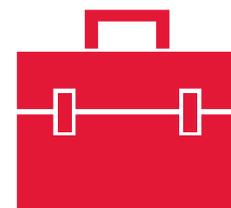
N.C. cash receipts from broilers, turkeys and eggs



Turkeys were the **No. 3** agricultural commodity in N.C.

Poultry was **43%** of N.C.'s 2016 farm receipts.

Chicken eggs were the **No. 6** agricultural commodity in N.C.



125,000+

jobs in N.C. came from poultry.

US Poultry



Poultry products were the primary food animal products in 2016 in the U.S. (USDA-ERS). The USDA projects that poultry will continue to dominate food animal production through 2020.

As demand for poultry increases, the industry must solve multiple challenges: sustainability concerns, environmentally-sound approaches to animal waste management, consumer emphasis on animal welfare and alternative production systems such as antibiotic-free, cage-free, free-range and organic poultry and eggs, avian diseases and trade barriers.



\$38.5+ Billion

U.S. cash receipts from broilers, turkeys and eggs

SHAPING THE FUTURE

“I think we need to envision where the industry is going, and to move faster than the university has typically been known to move, so that we can meet the needs of our large, diverse poultry industry in North Carolina.”

Department Head Pat Curtis

OF POULTRY SCIENCE

Vision

Be the
Global Leader
in innovative poultry
education, research
and outreach

PDPS started refocusing to spark innovative solutions to difficult problems.

From welcoming a new department head to refocusing positions, the Prestige Department of Poultry Science spent 2017 planning for the future.

New initiatives, student engagement and faculty recognition were some of the ways PDPS demonstrated commitment to education, industry and communities.

There are more changes ahead, but the changes already in place will position PDPS students, faculty and staff to meaningfully contribute to all of CALS' core strategic themes.

PDPS has embraced opportunities to help solve food, agriculture and environment challenges in line with NC State and CALS innovation and diversity goals.

To address the grand challenges facing poultry producers, poultry science departments must be positioned to address all stages of poultry production. The major stages are summarized below – opportunities for universities are incorporated.

Poultry production starts with intensive genetic line selection for improved meat quality and live performance. Selected animals provide **Primary Genetics** for breeding parent animals of farm birds raised for meat or eggs.

Breeding parent animals produce healthy offspring efficiently. **Breeder Management** is a critical stage of production that expands animal populations to meet industry needs.

Incubation and Hatchery Management must scale to meet industry needs and requires unique infrastructure and expertise. Universities have the opportunity to address the incubation and hatchery management segment of the poultry industry. Industry has reached out to PDPS, interested in an incubation learning center to benefit PDPS students and industry overall.

Growout/Production is a common way to think about poultry production. This is when birds are raised to market maturity. **Feed Milling** supports growout/production by formulating and producing high-quality poultry feeds. The NC State feed mill program leads innovation in feed formulation, production and feed mill technology. NC State has focused on growout/production because it involves the largest number of birds, impacts a larger number of producers and provides opportunities to study disease and production challenges and opportunities.

Live birds and eggs go through **Processing** – preparing carcasses and pieces – and/or **Further Processing** – adding breading, seasoning or other preparations – before consumers buy them. Producers recover initial feed and production costs during processing. Universities have the opportunity to fill a current gap in the processing segment of the poultry industry.

Processing impacts food safety and quality because handling and storage affect product quality and susceptibility to food-borne pathogens. **Waste Management** helps ensure food production sustainability while also considering environmental impacts from every stage of poultry production.

The Poultry Industry



Eleven broiler companies have North Carolina locations and most have members on the North Carolina Poultry Federation Industry Advisory Board. PDPS partners with these in-state (and out-of-state) operations with the support of stakeholders, partners and alumni who influence the global poultry industry.

PDPS has faculty, Extension field faculty and Extension associates focused on broiler growout/production. To support faculty, PDPS has built integrated research facilities and capabilities to rival other educational centers of animal production sciences.

PDPS has identified key expansion areas to support industry: Extension broiler/breeder, hatchery and incubation, animal welfare, feed extrusion, youth programs, and processing and meat science.

Broilers



819 Million
broilers contributed
\$3.1 Billion
to N.C. in 2016.



Turkeys



33.5 Million
turkeys contributed
\$1 Billion
to N.C. in 2016.

PDPS has one of the only research facilities dedicated to turkeys. Through a generous \$1 million endowment, the Talley family signaled the turkey industry's support of continued turkey research at NC State.

Four turkey companies have corporate offices in North Carolina and members on the North Carolina Poultry Federation Industry Advisory Board. Higher production efficiency and technological advancements explain the decreased number of birds and increased meat production.

The PDPS turkey science program has been well-supported by turkey producers, who continue to rely on faculty expertise in basic and applied research. The program addresses nutrition, disease, gut health, genetics, management, processing and food safety, employee training, career recruitment and employee retention.

The newly named Talley Turkey Education Unit supports the turkey industry with a variety of buildings and spaces for research across a turkey's lifespan.

Many integrated egg companies have North Carolina locations: four have corporate offices in North Carolina and most have members on the North Carolina Poultry Federation Industry Advisory Board.

The department sees the need for two new positions to join the current specialist in layers and egg production. Prafulla Regmi, new professor of Animal Welfare starting June 1, will fill a critical gap in the department to assist the industry with its commitment to improving animal welfare.

The industry faces consumer pressure for cage-free living conditions, antibiotic reduction and concerns about diseases like avian influenza. To meet these pressures, PDPS has researched ways to maintain or increase production with set-ups that have often been difficult to use in large operations.

A second position investigating housing, nutrition and reproduction interactions will allow PDPS to continue to offer innovations to industry. PDPS has already raised \$1 million dollars for this position with a generous gift from Braswell Family Farms.

Layers and Eggs



3.7 Billion
table and hatching eggs
contributed
\$450 Million
to N.C. in 2016.





12,000 Chicks
from industry



\$1.9 Million
from industry



60,000 Layer Eggs
from industry

In FY2017, the department received support from companies donating equipment, feed, feed additives, software, other supplies and cash. PDPS continues to develop partnerships with companies producing laying hens and probiotics.

While partnering with industry leaders, PDPS took a leading role in two joint CALS and CVM initiatives: the Food Animal Initiative (FAI) and the **Animal Food and Nutrition Consortium (AFNC)**. Multiple PDPS faculty members are involved in the FAI's development.

The AFNC is a new industry-member consortium connecting feed and food animal companies with university faculty to conduct research responsive to industry needs.



Partnering for Innovation

Undergraduate Recruitment Support

Each year, the U.S. Poultry & Egg Association (USPoultry) and other donors gift PDPS with student recruitment funds. In FY2017 the department received \$70,000 to support events. The Poultry Science Summer Institute (PSSI) workshop for high school students run by Kim Livingston receives most of the USPoultry funds. PSSI students explore their interest in poultry science and learn about pathways to higher education.

Lynn Worley-Davis, the Undergraduate Teaching Coordinator also receives USPoultry funds for a variety of events. Worley-Davis focuses on recruitment into the Ag Institute and 4-year degree programs (including students transferring from the Ag Institute into B.S. programs).

USPoultry funds enhance STEM outreach to state K-12 schools and Poultry Science Club activities including FFA Poultry Judging and Farm Animal Days.

25+ Company Partnerships

supported teaching, research and extension.

Department Rankings

NC State is one of six universities in the U.S. with a poultry science department: Texas A&M (TAMU), the University of Arkansas (UAR), Mississippi State (MS State), Auburn and the University of Georgia (UGA) also have independent poultry science departments.

Through its Ag Institute, NC State offers a 2-year Associate in Applied Science (AAS) in Livestock and Poultry Science. When these students are included in undergraduate counts, PDPS ranked 1st for undergraduate enrollments in poultry science.

PDPS taught 17.6% of U.S. students pursuing a 4-year poultry science degree. The department ranked 2nd for M.S. students and 3rd for Ph.D.

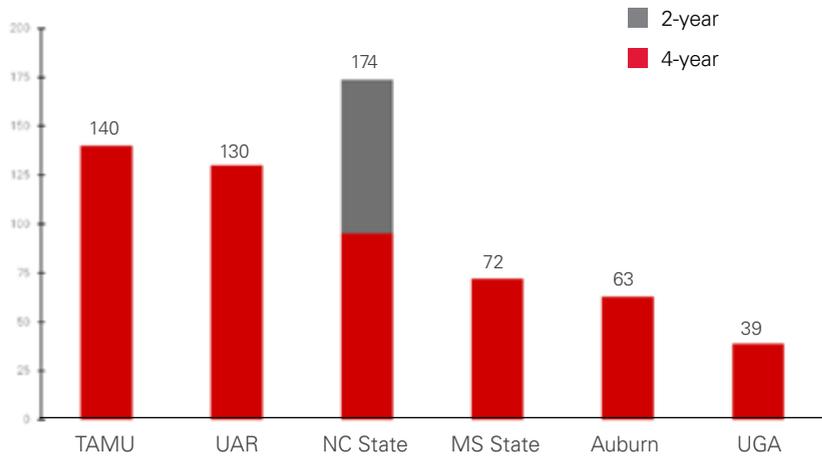
students, reaching 15% and 12% of U.S. students, respectively. PDPS was 1st in number of graduate students when including Physiology graduate students.

PDPS was 2nd in department size as measured by Full-Time Equivalent (FTE) faculty members. UGA had the largest department with 20.4 FTEs; NC State had 18. PDPS ranked 4th for teaching faculty with 4.1 FTEs. FTE faculty does not include one PHY-funded faculty.

NC State ranked 2nd in research FTEs (8.4) and 2nd in Extension FTEs (5.0).

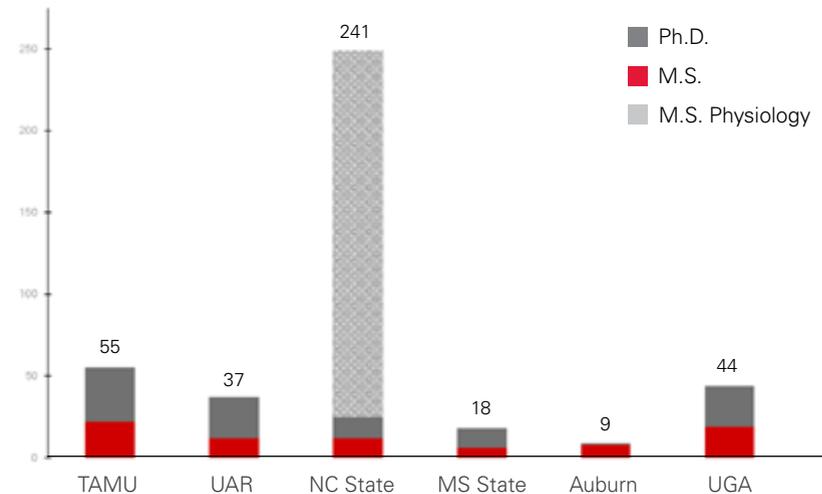
PDPS teaches almost 30% of all poultry undergraduates in the U.S.

Undergraduate Students



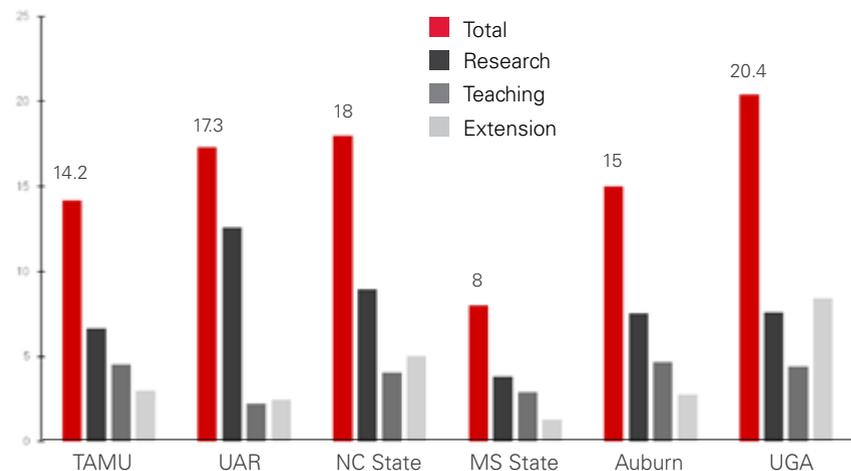
1st
in Undergraduate
Enrollment

Graduate Students



1st
in Graduate
Enrollment

FTE Faculty



2nd
in FTE Faculty

Budget

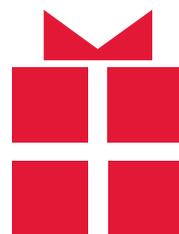
With a FY2017 operating budget of \$2.4 million, PDPS supported research, academics and extension activities. The operating budget was more than matched by external funds for an overall return on investment of 134%.

In FY2017, PDPS generated \$4.1 million from Testing Service Agreements and farm, feed mill and Extension receipts and grants.



\$2.4 Million

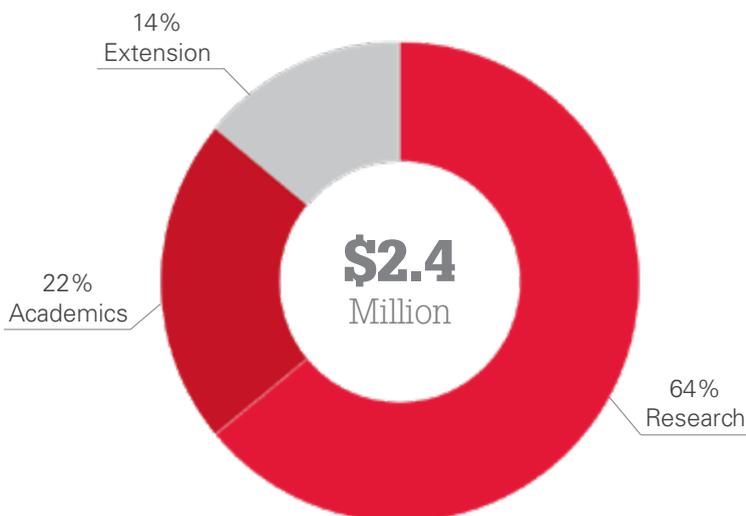
Operating budget in FY2017



\$2.2 Million

in material and cash gifts

Operating Budget Divisions



Budget and Management Changes

The department started a shift to predictive budgeting focused on a five-year plan to address NC State and CALS strategic goals of investing in faculty and infrastructure. Individual budget lines were identified for

- the animal units (Chicken Education Unit, Talley Turkey Education Unit, Scott Hall Bird Wing),
- student recruiting,
- marketing and
- staff development.

The department started prioritizing funding needs identified by an ongoing visioning process. Identified needs include education unit and Scott Hall renovations/repairs and new positions.

The department began a farm operations cost analysis with the goal of increasing efficiency. To maximize return on investment, PDPS pursued new partnership agreements such as the Broiler Breeder Industry Agreement.

Unit managers now handle day-to-day operations of the educational units. Each educational unit's policies are set by faculty advisory committees who collaborate to develop protocols for incorporating actual costs into each unit's facilities fees.

Each unit identified renovations that will reduce operational costs, maintenance and repair needs and renovation and expansion needs. Each unit continues to develop processes to conduct impactful research and prepare students to develop innovative industry practices.

Faculty and Staff Changes

Faculty

Patricia Curtis returned to NC State as the PDPS **Department Head**. Curtis was previously at Auburn University.

Jesse Grimes, the Departmental Extension Leader, is the new **Director of Graduate and Certificate Programs**. The DGCP position will rotate regularly. The DGCP and graduate committee are responsible for graduate policies, recruiting efforts, admissions and assistantships.

Ondulla Toomer, USDA - ARS Research Chemist (Market Quality and Handling Research Unit), joined the department as an **Adjunct Associate Professor**. Toomer completed her Ph.D. at NC State.

Prafulla Regmi was hired as Assistant Professor in a new **Animal Welfare** position. Regmi will join PDPS on June 1, 2018.

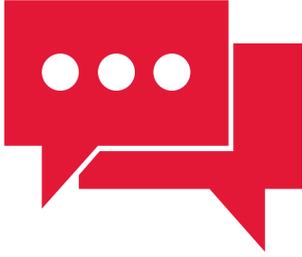
Staff

Chelsey Coleman started in the refocused **Business Coordinator** position, providing business center support in response to a major departmental need.

Natasha Dillon is the new **Graduate Services Coordinator** serving Poultry Science and the Physiology Graduate Program. Dillon is expanding graduate student services and contributing to student recruitment efforts.

Rhea Hebert started in the refocused **Web Specialist** position, providing website and instructional design/ed tech support to the department.

Marilyn Mayer started in a refocused **Administrative Support Associate** position. As technical editor, Mayer provides faculty research publication and grant support.



Communications and Technology

In 2017, PDPS pursued increased communications, marketing and information technology by refocusing and refilling a position with dedicated communications duties. The department also contracted with CAAT IT for computing management.

The new Web Specialist added new website pages to heighten visibility for research labs and job-seeking resources. She worked with the department's social media coordinator to promote research, academics and extension activities. In addition to Twitter, Facebook and Instagram accounts, PDPS used YouTube to support teaching and to connect communities to content that supports poultry in and beyond N.C.

With a strengthened communications foundation, PDPS is prepared to expand its marketing and outreach efforts with updated technology and up-to-date content. New iPad kiosks and digital signs were identified as department priorities.

Explore PDPS Online

Prestige Department of Poultry Science
cals.ncsu.edu/prestage-department-of-poultry-science

Poultry Extension
poultry.ces.ncsu.edu



@NCStatePDPS



NCStatePDPS



NCStatePDPS

Academics



4.1 Years

Average time to degree completion
for undergraduates

The Prestage Department of Poultry Science teaches 2-year and 4-year undergraduate degrees and graduate degrees at the masters and doctoral levels.

PDPS already meets the NC State 120-credit-hour requirement and offers students unique learning opportunities in and out of the classroom.

95%
**Graduation and Job
Placement Rates**



Teaching

	COURSES	CREDIT HOURS	STUDENTS
Poultry Science (PO)	46	106	810
Cross-listed (PO +)	15	45	474
Ag Institute (PO)	4	10	94
Physiology (PHY)	8	12	308
Nutrition (NTR)	2	6	8
Biotechnology (BIT)	10	18	96
Feed Milling (FM)	9	20	49
Life Sciences First Year (LSC)	1	1	16
Total	101	236	1855

In 2017, PDPS offered flexibility through online course options: just over 40% of PO and PO cross-listed enrollment came from distance education (DE).

PDPS's support of other departments and interdisciplinary programs is reflected by the number of cross-listed and non-poultry courses taught by department faculty.

33%
Credit Hours
Taught Outside
PDPS

477
Students in Non-PO
Courses Taught by
PO Faculty

474
Students in PO
Courses Under Non-
PO Prefix

Undergraduate Programs

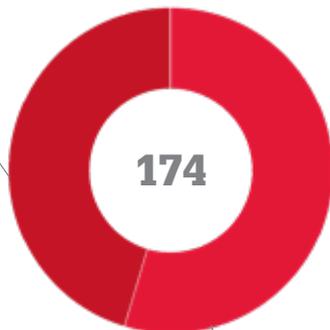
PDPS supports 2-year degrees through the Ag Institute and offers 4-year-degree students two concentration options: Technology and Science.

Ag Institute graduates earn an Associate of Applied Science. 4-year students earn a Bachelor of Science.

Undergraduate students have two PO minor options: Poultry Science and Feed Milling.



79
Ag Institute
(2-year)



95
4-year undergraduate

18
Poultry Science Minors

15
Feed Milling Minors



PDPS student take research and service out of the classroom.

Thirty-four undergraduate students (36%) participated in research in 2017 with almost 40% of those students working on their own research projects.

Participation in student groups like the Poultry Science Club gives students even more opportunities to spread their wings.



Poultry Science Club

With 40 active members, the Poultry Science Club (PSC) is a thriving student group offering students professional development and outreach opportunities.

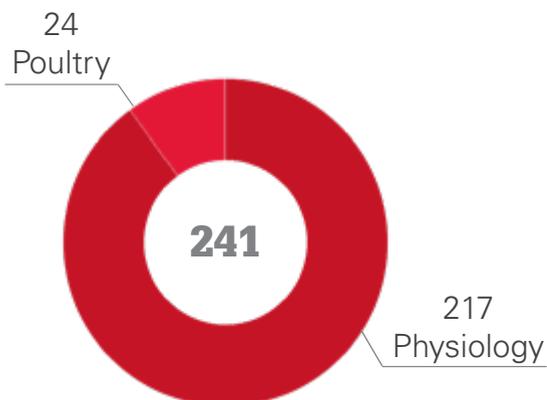
In addition to volunteering at the NC State Fair and CALS' Farm Animal Days, members attend the International Production & Processing Expo (IPPE) each year and host industry representatives at their club meetings.

PSC members won multiple awards at the 2018 IPPE by embodying the NC State think and do spirit.

Graduate Programs

PDPS offers four graduate degrees. Students can choose a thesis (M.S.) or non-thesis (MOP) option, complete a Professional Science Master degree or pursue their Ph.D. Advanced undergraduates are eligible for the Accelerated Baccalaureate program.

In addition to their degree, students can complete a Graduate Certificate in Feed Science.



12
Poultry M.S. Students
average across semesters

9
Poultry Ph.D. Students
average across semesters



41%

of PDPS graduate students were international.



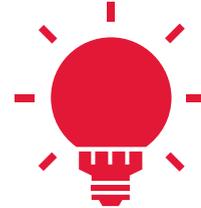
19

students presented at professional meetings.



Graduate students completed

5 Masters Theses.



Graduate students wrote

1 Research Proposal.



Graduate students published

3 Research Papers.



Graduate students won

5 Presentation Awards.

Robert Beckstead participated in the ongoing Doctoral Mentoring Fellowship Program to establish a bridge from the Animal Science masters degree program at N.C. A&T to the PDPS Ph.D. program. The program will help PDPS increase grad student diversity.

Research

PDPS research addresses poultry management, nutrition, genomics, immunology, physiology, parasitology, microbiology, toxicology, biotechnology, virology, embryology and processing.

Research faculty were 40% of PDPS FTEs. They worked collaboratively with department and NC State colleagues, North Carolina partners, and U.S. and global communities.



66 Publications

Published or under review in 2017



175 Presentations

Presented in 2017



Scholarly Contributions

Research faculty published or had in press 17 research articles, two book chapters, three non-peer-reviewed articles and 36 abstracts, and had another 8 articles under review in 2017.

In addition to their own publications, faculty contributed to scholarly journals as editors and peer reviewers. PDPS faculty served on the editorial boards of 14 scientific journals and reviewed manuscripts for another 18 journals.

To share their knowledge as widely as possible, PDPS faculty presented research findings at international meetings and global corporate headquarters.

Research. Collaboration. Innovation.



A new research initiative headed by PDPS faculty member Peter Ferket is dedicated to fostering collaboration between university faculty and industry.

The Animal Food and Nutrition Consortium (AFNC) is a foundational constituent of the NC State Animal Academy and the CALS Food Animal Initiative (FAI). It's mission is to promote innovation and advance the nutrition, metabolism and gastrointestinal health of production and companion animals.

The Animal Food and Nutrition Consortium is a unique opportunity to put companies on the forefront of innovation. The kind of innovation that pays back in more profitable products and greater market share. With a stronger, better developed workforce. A true pipeline to success.

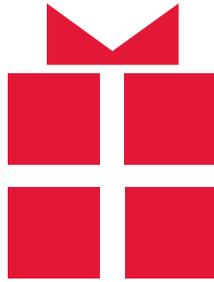
Every \$1 of operational funds allocated
to research is almost doubled by departmental revenues.

Grants Awarded FY2017

	NUMBER	AMOUNT
USDA	1	
NSF	1	
NGOs	4	
NC Agriculture Foundation	4	
CALS Dean's Office	1	
Total	11	\$970,000

All External Funds FY2017

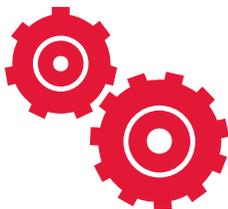
	AMOUNT (millions)	% FUNDS (rounded)
Materials and Money	\$1.9	34%
Feed Mill, Farm, Extension Receipts	\$1.5	28%
Testing Service Agreements	\$1.2	20%
External Grants	\$0.72	13%
Internal Grants	\$0.24	4%
Total	\$5.5+	100%



Material and money donations of
\$1.9 Million
supported research across the
department.

Innovation-Driving Donations

PDPS research faculty bring in donations and gifts to support and expand their initiatives. From facilities to dedicated research funds, donations help drive departmental research.



Repete donated

\$206K

in equipment and software,
enhancing feed mill automation.



An anonymous

\$75K

donation supported the Fund for
Cultured Chicken Meat Science.

Extension and Outreach

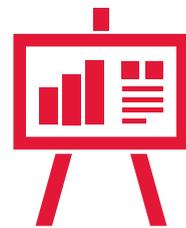
PDPS supported N.C. Cooperative Extension – the strategic partnership of North Carolina’s two land-grant universities, NC State and N.C. A&T State University, and all North Carolina counties and the Eastern Band of Cherokee Indians.

PDPS had 5 FTE extension faculty. Faculty and Area Specialized Agents for poultry offered state-wide workshops and events.



60 Publications

Published or under review in 2017



30 Events

Conferences, courses and workshops



Over 2,350 participants
attended extension programs and events supported by
33 sponsors.

Most-Attended Events

525

State FFA and 4-H
Youth Events

275

N.C. Youth Market
Turkey Show

200

N.C. Turkey
Industry Days

Program Revenue

\$88K+

Faculty and Area Specialized Agents offered local, regional, state, national and international outreach programs that brought poultry and food safety knowledge to wide audiences.

Revenues from these programs covered costs and ensured that poultry-related NC State Extension and outreach programs continue to provide innovative solutions to everyone from backyard hobbyists to global companies.

K-12 Programs

Extension supported STEM education in K-12 classrooms through 4-H School Enrichment, 4-H Embryology projects, competitions, events and special programs.

Embryology projects exemplified these programs. Second- and 3rd-graders incubated and hatched chicks in their own classrooms, learning chicken development and where their food comes from.



4500 N.C. Classrooms
Impacted by poultry extension



12K K-12 Students
Impacted by poultry extension

Supporting Large-Scale Producers

PDPS extension faculty supported industry to help them comply with North Carolina and U.S. safety regulations.

Hazard Analysis and Critical Control Points (HACCP) and Food Safety Modernization Act (FSMA) training kept company employees up-to-date on needed safety information and processes.

Extension faculty provided Nutrient Management Plan support for commercial poultry growers, ensuring environmentally-sound production processes.



2500 Large Producers

Reached by educational programs

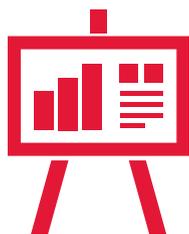


\$1.2 Million

Savings and profits from extension

Supporting Small-Scale Producers

To help small-scale producers safely sell niche-market, value-added meat and eggs to consumers, extension faculty offered educational programs designed with smaller operations in mind. These programs educated producers and returned savings and profits to their operations.



1600 Small Producers

Reached by educational programs



\$320K

Savings and profits from extension

Many PDPS faculty, staff and students were recognized for their accomplishments over the past year. Highlights include:

The department received a \$1 million endowment from Windell and Judy Talley and family. The endowment funds will renovate and update the **Talley Turkey Education Unit** on Mid Pines Road, named February 22, 2018.

The department received a \$25,000 endowment from the Hamby family to support M.S. and Ph.D. students with the **Hamby Family Graduate Student Award**. The funds honor the memory of NC State alum John W. Hamby Jr.

Faculty member **Edgar Oviedo** won NC State's Outstanding Global Engagement Award for his many international activities.

Faculty member **Matthew Livingston** won the Southern Poultry Science Society Student Research Award in Physiology.

Physiology Program faculty member **Elaine Bohorquez** won the CALS Outstanding Graduate Instructor award.

Faculty member and Undergraduate Teaching Coordinator **Lynn Worley-Davis** received the CALS Outstanding Contributions to Teaching and Advising Award and an Honorary State FFA Degree from the Future Farmers of America.

The **Poultry Science Club** won Club of the Year and 2nd place for their club scrapbook at the 2018 IPPE in Atlanta.

Undergraduate **Susan Jones**, Poultry Science Club president, won Student of the Year at the 2018 IPPE. Vice President **Ben Alig** won third place and Service Co-Chair **Hannah Robinson** won fifth place.

Graduating senior **Ben Alig** won the CALS Outstanding Senior Award. Alig plans to pursue graduate study at PDPS under Peter Ferket.

Awards and Honors



NC State University promotes equal opportunity and prohibits discrimination and harassment based upon one's age, color, disability, gender identity, genetic information, national origin, race, religion, sex (including pregnancy), sexual orientation and veteran status.



NC STATE
UNIVERSITY

Prestage Department
of Poultry Science

cals.ncsu.edu/prestage-department-of-poultry-science