

GRADUATE STUDIES IN ANIMAL AND POULTRY SCIENCES AT VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY

GENERAL INFORMATION

The Department of Animal and Poultry Sciences at Virginia Tech offers the M.S. and Ph.D. degrees. Students may specialize in the areas of genetics, genomics, immunology, management, molecular biology, muscle biology, nutrition, physiology, and product quality assurance. M.S. students may also specialize in the area of livestock or poultry management. Interdisciplinary and interdepartmental programs are encouraged and students are given wide latitude to develop customized programs of study directed toward specific career goals. The department has 27 faculty members who serve the needs of about 500 undergraduate and about 40 graduate students.

The College of Agriculture and Life Sciences at Virginia Tech has a total enrollment of 1,372 undergraduate and 233 graduate students. The College is composed of 10 academic departments and offers comprehensive programs in instruction, research and extension.

Virginia Tech is a Land-Grant University. Founded in 1872, it has the largest student body in Virginia with more than 21,000 undergraduate students. As a comprehensive research university, Virginia Tech is committed to serving the needs of people within the Commonwealth of Virginia and beyond. Graduate education is an integral part of Virginia Tech's overall mission with a graduate enrollment of more than 3,600 students. With an instructional faculty of 1,410 in eight academic colleges and an annual research budget of more than \$130 million, Virginia Tech is nationally recognized for its programs in teaching, research and public service.

International programs are an important part of the mission of Virginia Tech. Currently more than 1,500 international students representing 108 countries are enrolled at the University. Cooperative programs between Virginia Tech faculty and international colleagues abound as the University seeks to take advantage of unique educational opportunities that arise from international collaboration. The Office of International Research and Cooperation, located in the College of Agriculture and Life Sciences, provides leadership in this area, and the Cranwell International Center serves as a focal point for meeting the needs of international students.

Blacksburg, VA, the home of Virginia Tech, is a town of 41,000 people located on a high plateau between the Blue Ridge and Appalachian Mountains. The area is noted for its natural beauty and outdoor recreational opportunities. Comprehensive airline service is provided through Roanoke, VA, 40 miles away. Virginia is a diverse state encompassing Atlantic beaches, forested mountains, areas of great historical significance and thriving urban and cultural centers. Although often thought of in terms of its urban areas, the state produces large numbers of feeder cattle and slaughter hogs, has a thriving horse industry and is one of the largest sheep-producing states in the Eastern U.S. The state also ranks fourth nationally in turkey production, eighth in broiler production and twenty-fourth in egg production. Virginia has a long tradition of national leadership in agriculture, and agriculture remains the state's largest industry.

FACILITIES

The Department of Animal and Poultry Sciences is located in Litton-Reaves Hall which was constructed in 1981. The Department shares that building with the Department of Dairy Science and maintains close relationships and active collaboration with that department. Laboratory and animal handling facilities in Litton-Reaves Hall provide support for the more intensive elements of the Department's research programs.

State of the art research laboratories supporting all areas of graduate research are located in Litton Reaves on campus. Livestock facilities are located on the campus, at the nearby Kentland farm and at outlying agricultural research and extension centers across the state. Biosafety Level 2 animal research facilities are located in Litton Reaves on campus. On campus, a 200-ewe sheep flock, a 150-cow beef herd, a 40-sow swine herd, a five-building turkey center with facilities for >2,000 young and 1,500 adult chickens, and a herd of 75 to 120 horses provide resources for teaching and research. The historical Kentland Plantation, 20 miles from campus, provides resources for grazing and animal research. The Shenandoah Valley and Southwest Virginia Agricultural Research and Extension Centers, each 100 miles from campus, provide additional resources for beef cattle forage nutrition and management. The Tidewater Agricultural Research and Extension Center in Suffolk supports an active off-campus program in swine research and extension. The Middleburg Agricultural Research and Extension Center, near Washington, D.C., is the centerpiece for a unique program in equine forage nutrition.

Extrdepartmental facilities also contribute importantly to the overall program of the Department. These include comprehensive data processing facilities maintained by the Computer Center, an electron microscopy laboratory, DNA sequencing facility, animal health and physiology laboratories in the Virginia-Maryland Regional College of Veterinary Medicine, and embryo manipulation and microinjection facilities for production of transgenic animals in the Department of Dairy Science. The Fralin Biotechnology Center has a shared confocal microscope facility.

For further information about the Department of Animal and Poultry Sciences, visit our web page at <http://www.apsc.vt.edu>.

FACULTY

W. E. Beal:

B.S.: Michigan State University, 1974

M.S. University of Wyoming, 1976

Ph.D.: Cornell University, 1979

Phone: (540) 231-4750 E-mail: wbeal@vt.edu

Dr. Beal's beef cattle reproductive physiology research is focused on controlling estrus and ovulation in heifers and postpartum cows to facilitate the use of artificial insemination or embryo transfer. Ultrasound evaluation of ovarian function as well as early pregnancy diagnosis and fetal sexing with ultrasonography are key research methods. The program endeavors to evaluate the interactions among reproduction, lactation and nutrition in beef cattle.

R. A. Dalloul

B.S. American University of Beirut (Lebanon) 1993
M.S. American University of Beirut (Lebanon) 1995
Ph.D. University of Maryland (College Park) 2002
Phone (540) 231-0633 E-mail: rdalloul@vt.edu

Dr. Dalloul's research goals are directed towards better characterizing the host-pathogen interactions in the context of host immunity and resistance to pathogens, with emphasis on poultry gastrointestinal immunity and overall health. Also of particular interest is the stimulation of avian mucosal immunity and investigating the underlying mechanisms of mucosal immune responses to dietary and environmental stimuli. Technologies such as microarrays, real-time PCR, and flow cytometry help dissect the molecular and cellular processes of immunity to such antigenic challenges. Dr. Dalloul's Avian Immunobiology Laboratory tackles such challenges employing both basic and applied methodologies, thus exposing students to the most fundamental as well as the whole-animal approach of research.

D. M. Denbow:

B.S.,M.S.: University of Maryland, 1975, 1977
Ph.D.: North Carolina State University, 1980
Phone: (540) 231-6843 E-mail: denbowdm@vt.edu

Dr. Denbow's research is in the areas of physiology and management of poultry. Specific areas of interest include food intake regulation, dietary effects on behavior, effects of gut microflora on obesity and use of medicinal plants as substitutes for antibiotics. Considerable research has been conducted on the role of various neurotransmitters on food intake regulation within the brain, and how diet can influence these neurotransmitter levels and thereby alter behavior. Such studies involve injection of neurotransmitters directly into the central nervous system and measurement of neurotransmitter levels in response to various manipulations. Recent research has also focused on whether alterations in gut microflora are associated with changes in growth or obesity. In addition, research is also being conducted on the use of plants and their products as possible substitutes for antibiotics.

E. A. Dunnington:

B.S.,M.S.,Ph.D.: Virginia Polytechnic Institute and
State University, 1974, 1975, 1978
Phone: (540) 231-9179 E-mail: dunning@vt.edu

Dr. Dunnington is involved in teaching both equine science and animal behavior classes.

J. Escobar:

Lic.: University of Costa Rica
M.S.: University of Illinois at Urbana-Champaign
Ph.D.: University of Illinois at Urbana-Champaign
Postdoc: USDA/ARS Children's Nutrition Research Center at Baylor College of
Medicine
Phone: (540) 231-4425 E-mail: escobar@vt.edu

Dr. Escobar's research goal is to study endocrine, cellular, and molecular mechanisms that regulate the growth and nutritional needs of food-producing animals during health and disease. We also investigate the effect of compounds such as probiotics, nutraceuticals, and plasma proteins on intestinal physiology and growth during a disease challenge. We use *in vivo* and *in vitro* models to study signaling pathways responsible for the changes in metabolism, nutrition, intestinal function, and muscle growth during

infection. Dr. Escobar's program focuses on amino acid requirements and the signaling components leading to translation initiation in muscle. Students are exposed to a multidisciplinary research approach including growth assays, cell culture, surgery, molecular biology, HPLC, microscopy, analytical chemistry, and biochemistry. A BSL-2 facility for farm animals and a well-equipped laboratory are available to support the research projects of graduate students, postdocs, and visiting scholars.

M.J. Estienne:

B.S., M.S.: Virginia Polytechnic Institute and State University, 1982, 1984

Ph.D.: University of Georgia, 1987

Phone: (757) 657-6450, ext. 408 E-mail: mestienn@vt.edu

The broad objective of Dr. Estienne's research is increasing reproductive efficiency in swine operations employing artificial insemination. Basic and applied studies are conducted that focus on enhancing semen quality and libido in boars and synchronizing estrus and ovulation in gilts. The program also endeavors to evaluate the interaction between nutrition and reproduction in swine.

D. E. Eversole:

B.S.: The Ohio State University, 1973

Ph.D.: Michigan State University, 1978

Phone: (540) 231-4738 E-mail: deversol@vt.edu

Dr. Eversole's areas of research include applied studies in mineral supplementation, cow/calf management, and feedlot nutrition. The research is directly applicable to the beef cattle industry and has elucidated solutions to problems affecting the efficacy of beef cattle performance and management. Considerable work has focused on vitamin E, selenium, copper, and zinc supplemental levels in salt-mineral mixtures for weaned calves, gestating cows, and growing bulls. Studies are conducted to examine the effects of vitamin and trace-mineral supplementation on immune function in beef cattle.

S. P. Greiner: Extension Specialist, Beef and Sheep

B.S.: Iowa State University, 1988

M.S.: Michigan State University, 1993

Ph.D.: Iowa State University, 1997

Phone: (540) 231-9159 E-mail: sgreiner@vt.edu

Dr. Greiner is responsible for developing statewide educational programs and leadership in beef cattle genetics as well as sheep production and management. His programs focus on applied strategies for genetic improvement, carcass merit evaluation and improvement, value-added management opportunities, and animal identification. Scott's current research interests involve the application of animal identification technologies for beef cattle, use of ultrasound in beef and sheep breeding programs, beef cattle retained ownership strategies, and evaluation of hair sheep genetics.

A. F. Harper: Extension Animal Scientist, Swine

B.S.,M.S.,Ph.D.: Virginia Polytechnic Institute and State University, 1979,1982,1992

Phone: (757) 657-6450, ext. 410 E-mail: alharper@vt.edu

Dr. Harper is responsible for the development and dissemination of educational programs in the area of swine production and management. Target clientele for this program include local Virginia Extension Agents, swine producers and related swine industry people. Potential graduate opportunities in this program include production oriented swine research on commercial farms and at the Virginia Tech-Tidewater Agricultural Research and Extension Center.

Honglin Jiang

B.S.: Nanjing University, 1987

M.S.: Nanjing Agricultural University, 1993

Ph.D.: Purdue University, 1997

Phone: (573) 882-5094 E-mail: hljiang@vt.edu

Dr. Jiang's research is in the areas of Animal Physiology and Functional Genomics. He is interested in identifying genes that play important roles in animal growth and reproduction, and characterizing the function and control of these genes. He is particularly interested in genes that are expressed in hypothalamus, pituitary, liver and ovary that are involved in the neuroendocrine and endocrine control of growth, metabolism and reproduction. Dr. Jiang's research involves a variety of techniques including those of molecular biology, genomics (bioinformatics and microarray), and whole animal physiology. His current research focuses are on 1) delineating the molecular mechanisms for liver-specific, hormonal and nutritional control of the growth hormone receptor gene expression, 2) identifying and characterizing ovarian genes that control follicular development, and 3) identifying and characterizing hypothalamic genes that control anterior pituitary hormone secretions.

J. W. Knight:

B.S.: University of Southwestern Louisiana, 1970

M.S.,Ph.D.: University of Florida, 1972, 1975

Phone: (540) 231-4749 E-mail: knight@vt.edu

Dr. Knight teaches undergraduate and graduate courses in physiology of reproduction and a University Honors Colloquium on "Controversial Issues in Science and Society." His current areas of research emphasis include production of transgenic swine that express human therapeutic proteins, aspects of embryo culture, maternal-conceptus interrelationships during pregnancy and placental function. He also has an ardent interest in the application of basic scientific knowledge to contemporary ethical, moral and philosophical issues.

R. M. Lewis:

B.S.: University of California-Davis, 1981

M.S.: Texas A&M, 1989

Ph.D.: Virginia Polytechnic Institute and State University, 1990

Phone: (540) 231-1906 E-mail: rmlewis@vt.edu

Dr Lewis's research interests are in animal breeding and genetics with three main themes: (i) assessing risk when making selection decisions; (ii) devising strategies and objectives for breeding schemes; and, (iii) predicting animal performance, including growth, maternal merit and disease resistance under different conditions of genetic selection and nutrition. His work involves theory, simulation and field studies. Dr. Lewis is also investigating ways gene-assisted selection interacts with more classical quantitative selection regimes, using gene expression in hepatic tissue under environmental challenges, such as beneficial nutrients and toxicants, as the model system. Dr. Lewis's experimental and field work historically have focused on sheep, which continues through close collaboration with colleagues in the United Kingdom. His species interests have expanded to consider mice as part of his toxicogenomics program and, more recently, poultry. Dr. Lewis teaches graduate level courses in Animal Breeding and Genetics, including matrix algebra for the biological sciences, stochastic simulation modeling in quantitative genetics, and design of economic selection indices. He is also leading a national initiative to develop a graduate-level distance learning curriculum in Animal Breeding and Genetics.

A. P. McElroy

B.S., M.S., PhD.: Texas A&M University, 1993, 1995, 1998

Phone: (540) 231-8750 E-mail: amcelroy@vt.edu

Dr. McElroy is involved in the development and applications of research to address concerns of the broiler industry and improve efficiency and profitability of broiler production. Research interests are in the areas of physiology, immunology, and endocrinology and how the systems interact with regard to disease resistance. Her primary research program involves the investigation of nonclassical mechanisms of immunity, with particular emphasis on intestinal mechanisms of immunity to pathogens. Current research includes the identification and investigation of effector cells in the chicken gut in response to intestinal pathogens, the specificity and role of these responses in the development of partial or complete immunity to the pathogen, and how these cellular responses can be modulated and applied for improved vaccine development, bird health, and productivity.

D. R. Notter:

B.S.: Ohio State University, 1972

M.S.,Ph.D.: University of Nebraska, 1975, 1977

Phone: (540) 231-5135 E-mail: drnotter@vt.edu

Web Site: <http://www.apsc.vt.edu/Faculty/Notter/WWW/index.htm>

Dr. Notter conducts research in animal breeding and genetics and serves as chair of the Department's Graduate Education Committee. Research with sheep focuses on the development of genetic evaluation methodology for the U.S. National Sheep Improvement Program, the evaluation and further development of hair sheep genetic resources, and the study of genetic control of parasite resistance and seasonal breeding in small ruminants. He is also involved in the management of farm animal genetic diversity and the management of endangered populations.

E. J. Smith:

B.S.: University of Sierra Leone, 1984

M.S.: Oregon State University, 1989

Ph.D.: Oregon State University, 1991

Phone: (540) 231-6797 E-mail: esmith@vt.edu

Dr. Smith's research, teaching and experiential learning interests involve the development of genomic tools essential for understanding the hereditary basis of economically important poultry traits. These tools have primarily involved random and gene-based DNA markers essential for developing high-density genetic maps in the turkey and chicken. The tools developed have also permitted comparative genome analysis with genetic-information rich species including human and mouse. Current research efforts involve the development of microsattelite- and EST-based turkey genome map as well as the use of ESTs developed from a normalized chicken cDNA library to characterize the chicken genome. The chicken ESTs are also being used to compare genomes of economically important poultry, to characterize commercialized poultry lines for single nucleotide polymorphisms, and for linkage disequilibrium analysis of the chicken genome.

R. K. Splan:

B.S.: Michigan State University, 1994

M.S., Ph.D.: University of Nebraska, 1996, 1999

Phone: (540) 231-4740 E-mail: rsplan@vt.edu

Dr. Splan is responsible for teaching and research in equine science. Research interests focus primarily on genetic evaluation and selection procedures for performance horses. She also has an interest in livestock genetic diversity and development of conservation programs for rare breeds or endangered populations. Dr. Splan teaches Horse Production, Equine Evaluation, Breeding and Genetics, and coaches the collegiate horse judging team. She oversees the equine science program on campus. Her responsibilities include supervision of the breeding herd of 2 stallions and 40 mares as well as young horses produced in the breeding program.

M. L. Wahlberg: Extension Specialist, 4-H Livestock

B.S.: University of Connecticut, 1975

M.S., Ph.D.: Pennsylvania State University, 1978, 1981

Phone: (540) 231-9161 E-mail: wahlberg@vt.edu

Dr. Wahlberg is responsible for curriculum development and coordination of 4-H beef, sheep and swine programs. He teaches livestock selection and evaluation, and trains the state 4-H livestock judging team. Dr. Wahlberg serves as resource person in ruminant nutrition for extension agents and livestock producers.

K. E. Webb, Jr.:

B.S.: Ohio University, 1965

M.S., Ph.D.: University of Kentucky, 1967, 1969

Phone: (540) 231-4732 E-mail: webbk@vt.edu

Dr. Webb's research is focused on the study of absorption and utilization of the end products of protein digestion in beef cattle, sheep, poultry, and swine. Special areas of interest include the study of amino acid and peptide transport mechanisms, tissue utilization of peptide amino acids, characterization of peptide transporters, adaptation of nutrient transport mechanisms, and absorption of amino acid analogs. Fundamental approaches to solving nutritional problems are emphasized with molecular to whole-animal methodologies being employed. Students are exposed to a wide variety of analytical approaches including the use of isolated membrane preparations, cell cultures, tissue explants, molecular techniques, surgical approaches, electronic monitoring of physiological processes, computer applications, and many others. A well-equipped analytical laboratory is available to support graduate student research projects.

E. A. Wong:

B.S.: Massachusetts Institute of Technology, 1976

Ph.D.: University of California, San Diego, 1981

Phone: (540) 231-4737 E-mail: ewong@vt.edu

Dr. Wong's principal responsibilities are to teach and conduct research in the application of molecular biology techniques to the improvement of farm animals. Research projects in the laboratory involve an analysis of the regulation of expression of genes involved in growth and reproduction. In particular, his laboratory has cloned and characterized the cDNAs and genes encoding turkey prolactin and the transcription factor Pit-1 and cDNAs encoding peptide transporter proteins from ruminants and nonruminants. He is interested in determining the molecular mechanisms which control expression of these genes and ultimately utilizing this knowledge to alter growth or reproductive traits of farm animals.

C. M. Wood:

B.S.: University of Florida, 1979

M.S.: Mississippi State University, 1982

Ph.D.: Iowa State University, 1986

Phone: (540) 231-6936 E-mail: piglady@vt.edu

Dr. Wood's responsibilities include undergraduate advising and teaching (introductory Animal Production lecture and lab; Swine Production), research in swine genetics and management, and swine extension work. Current research projects include 1) the assessment of real-time ultrasound, 2) assessment of the ability of EPD's on purebred sires to predict crossbred daughter performance, and 3) the interaction of genetics and nutrition relative to nutrient management.

ADMISSION PROCEDURES AND REQUIREMENTS

Application materials can be requested directly from the Department or from the Graduate School. Prospective applicants are encouraged to contact the Department early in the application process in order to allow interaction with prospective major professors. Applications and all related materials for admission must reach the Graduate School Office at least eight weeks before the beginning of the semester in which enrollment is requested.

Minimum requirements for acceptance are based upon the student's grade point average and on the results of the Graduate Record Examination (GRE). The Graduate Record Examination is required for all applicants. Consideration for admission to the Graduate School is contingent upon receipt of:

- 1) an official academic transcript showing courses taken and degree(s) earned;
- 2) evidence of a Bachelor's degree from a four-year or equivalent accredited college or university;
- 3) documentation of at least a 3.0 Grade Point Average (on a 4.0 scale) for the last half of the credits earned for the undergraduate degree; or, the completion of 12 graduate course credits with at least a 3.0 Grade Point Average.

Students who do not meet the admission requirement of a 3.0 Grade Point Average may be considered for Provisional Acceptance based on performance on the Graduate Record Exam or other mitigating factors. Requirements and funding restrictions for students admitted with Provisional status are described in detail on the Graduate Education website at www.grads.vt.edu.

The results of the analytical writing section of the GRE will be considered in admission decisions, but there is no minimum score for admission. GRE subject tests are not required.

We attempt to evaluate both U.S. and international students on the same quality standards and neither favor nor discriminate against either group in our acceptance policy. International students whose first language is not English are required to submit results of the Test of English as a Foreign Language (TOEFL) and to meet University requirements of certification of competence in English. A TOEFL score of 550 (paper) or 213 (computer) is required by the Graduate School.

FINANCIAL AID, STIPENDS AND FEES

Graduate teaching and research assistantships are available from the Department on a competitive basis. Most involve a one-half-time (20 hr/wk) commitment to the Department. Teaching assistantships are awarded for the academic year. Support during the summer months may be available from the research program of the major professor. Students who receive graduate teaching assistantships normally are required to assist with one course/semester during the academic year. All assistantship students will assist with the research program of their major professor and with other departmental activities. The background, level of experience and educational goals of the student are considered in assigning specific responsibilities in order to maximize the student's opportunities for professional development. All students must assist with the department teaching program for a minimum of one semester per degree.

Base monthly assistantship stipends (effective August 10, 2008) range from \$1,561 for first-year M.S. students to \$1,702 for Ph.D. students who have completed the preliminary examination. Costs (per semester) for graduate students to attend Virginia Tech for 2008-09 include in-state tuition of \$3,934.50 and an academic fee of \$262.50, comprehensive fees (including technology fee, health center, student center, athletic and bus fees) of \$670.50, and out-of-state tuition of \$3,480.50. Out-of-state students must also pay a \$85 capital and equipment fee. Waivers of tuition, but not of the \$670.50 comprehensive, technology, and capital & equipment fees, are provided students holding graduate assistantships and fellowships.

Students who wish to be considered for academic-year assistantships beginning in the Fall Semester (August) must have their **completed applications (including transcripts, letters of reference, GRE scores, and, if necessary, TOEFL scores)** received by March 1 of that year. Students who wish to be considered for assistantship funding beginning with the Spring Semester (January) must have completed applications received by August 1 of the previous year.

For Additional Information

D. R. Notter, Chair
Graduate Education Committee
Department of Animal and Poultry Sciences (0306)
Virginia Tech
Blacksburg, VA 24061
Phone: 540/231-5135
FAX: 540/231-3010
Email: drnotter@vt.edu
<http://www.apsc.vt.edu>

Graduate School (0325)
Virginia Tech
Blacksburg, VA 24061
Phone: 540/231-6691
FAX: 540/231-3714
<http://www.grads.vt.edu>

Online application: www.grads.vt.edu/homeapply.html

