

Heritable Genetic Modification in Food Animals

Committee

Eric M. Hallerman

Chair

Eric Hallerman is Professor of Fish and Wildlife Conservation at Virginia Polytechnic Institute and State University. His research includes applied population genetics of aquatic organisms, aquaculture genetics, and risk assessment and public policy issues pertaining to biotechnology-derived animals. He teaches courses in ichthyology, genetics, and conservation genetics. He has received the American Fisheries Society Excellence in Fisheries Education Award, been recognized as a Fellow, inducted into the Genetics Section Hall of Excellence, and received the Thomas Jefferson Medal for Outstanding Contributions to Natural Sciences by the Virginia Museum of Natural History Foundation. Among other activities, he has co-convened and participated in several workshops on animal biotechnology research and oversight. He holds a B.S. in environmental science and an M.S. in biology from the University of Illinois. He received a Ph.D. in fisheries and aquaculture from Auburn University. He served on the National Academy of Sciences Committee on Agricultural Biotechnology, Health, and the Environment and the Committee on Defining Science-Based Concerns Associated with Products of Animal Biotechnology.

Bernadette M. Dunham

Member

Bernadette Dunham joined the Milken Institute School of Public Health - George Washington University in 2016, where her focus is on One Health issues. In October 2019, she was appointed a member of the National Academies of Sciences, Engineering and Medicine (NASEM) Board on Agriculture and Natural Resources (3-year term and reappointed in 2023). She served as Advisor to the Food and Drug Administration's One Health Initiative from 2019-2021, and as Director of the FDA-Center for Veterinary Medicine from 2008-2016. Dr. Dunham serves on the Leadership Council for the National Institute for Antimicrobial Resistance, Research and Education, Ames, IA, and on the Executive Advisory Board for the Center for Animal and Human Health in Appalachia, Lincoln Memorial University, TN. She is a Distinguished Fellow of the National Academies of Practice; an Honorary Diplomate and Awardee of the K.F. Meyer - James H. Steele Gold-Headed Cane Award from the American Veterinary One Health Society (founded as the American Veterinary Epidemiology Society). She has served on peer review panels for the NASEM; the American Heart Association - New York State Affiliate; United States Department of Agriculture-Cooperative State Research, Education and Extension Service, Competitive Programs; and the National Institutes of Health. She received her D.V.M. degree from the Ontario Veterinary College, University of Guelph, Ontario, Canada and her Ph.D. from Boston University, MA.

Lyda G. Garcia

Member

Lyda G. Garcia is currently an Associate Professor and Extension Meat Specialist (fresh meats) at The Ohio State University. Prior to OSU, she was a visiting Assistant Professor at Texas Tech University. Her primary professional/research expertise is in Meat Science, Fresh Meats. Her relevance to this committee is in her understanding, and experiences, of the impacts of animal welfare, genetics, and nutrition on meat quality and safety leading to One Health. A healthy animal produces wholesome meat. Her most recent relevant honors include: 2023: Women for Economic and Leadership Development (WELD) Honoree; 2022: State Winner – Ohio National Association of County Agricultural Agents (NACAA) Search for Excellence in Livestock Production; 2021: 2nd Place – Team Teaching, OSU Extension – Extension Annual Conference Award Winner. She is an active member of the American Meat Science Association. She focuses on applied research of food animals and meat science for livestock producers and meat processors using practical approaches and innovative thought processes, aiming to serve world needs. Dr. Garcia's education and training include Texas Tech University (B.S.); West Texas A&M University (M.S.), Texas A&M University (Ph.D.); and Texas Tech University (post doc).

Fred Gould

Member

Fred Gould is Executive Director of the North Carolina State Genetics and Genomics Academy and Co-director of the Genetic Engineering and Society Center. His recent scholarship and teaching focuses on societal issues related to genomics and genetic engineering. Dr. Gould conducts research on the application of evolutionary biology and population genetics to enable sustainable use of insect-resistant crops and genetically engineered agricultural pests. He also does research aimed at development of strategies for using engineered insect vectors of pathogens to decrease human disease. He is a fellow of the Entomological Society of America and of the American Association for the Advancement of Science. In 2011, he was elected to the U.S. National Academy of Sciences. Dr. Gould received his B.S. in biology from Queens College and a Ph.D. in ecology and evolutionary biology from the State University of New York at Stony Brook. Dr. Gould has served on several National Academies of Sciences, Engineering, and Medicine (NASEM)–National Research Council (NRC) committees studying the environmental and health effects of the commercialization of genetically engineered crops. He chaired the NASEM-NRC 2016 report on “Genetically Engineered Crops: Experiences and Prospects”. He served on the National Research Council's Board on Agriculture and Natural Resources until 2020.

Darrell R. Kapczynski

Member

Darrell R. Kapczynski is Research Microbiologist at the USDA Biosafety Level 3 laboratory in Athens, Georgia, with over 35 years of research experience. He develops transgenic approaches to genetically modify birds to enhance resistance from transboundary diseases. He also develops vaccines for protection against infectious diseases and conducts comparative immunology studies of avian species. He is also involved with understanding the ecology and evolution of highly pathogenic avian influenza viruses. He was a recipient of the 2007 USDA Agricultural Research Service's SAA Early Career Scientist of the Year award for improved control measures in the field of avian medicine to protect poultry against avian viral diseases. He received the 2017 Technology Transfer Award from the Federal Laboratory Consortium (FLC) for the "Recombinant Highly Pathogenic Avian Influenza Virus Vaccine," a reverse genetics vaccine that was made and transferred to Zoetis. He received his B.S. from West Georgia College in 1987 and his M.S. and Ph.D. from the University of Georgia in 1996 and 1998 in Medical Microbiology.

Elizabeth Maga

Member

Elizabeth Maga is Associate Professor of Applied Molecular Genetics in the Department of Animal Science at the University of California, Davis (UC Davis). Her research focuses on applying biotechnology to animal agriculture as a tool to improve animal and human health. Her current work is directed at translating the use of lysozyme-rich milk from genetically engineered goats to fight intestinal diseases and the generation of gene-edited pigs for agricultural and biomedical purposes. Dr. Maga has taught courses in molecular biology, introductory animal science and advances in animal biotechnology as well as lactation and integrative animal biology at UC Davis. She has received multiple USDA National Institute of Food and Agriculture research grants to study the impact of transgene presence and expression on the biology of the transgenic animal and a Grand Challenges Explorations Award from the Bill and Melinda Gates Foundation to study the effects of milk on malnutrition using a pig model. She has a B.S. in Chemical Engineering from Colorado State University (1988) and a Ph.D. in Food Science and Technology from UC Davis (1994).

Fiona M. McCarthy

Member

Fiona McCarthy is a trained member of the Gene Ontology Consortium and the only member providing GO annotations for farm animals. In 2012 she moved to the University of Arizona, where she has served as Professor since 2019. The overall goal of her research is to develop resources which enable agricultural researchers to effectively apply genomic technologies to improve animal production, health, and welfare. Dr. McCarthy has twenty years' experience in developing curated biological information and online resources to support the application of genomic technologies across the agricultural sector. She is a member of the Functional Annotation of Animal Genomes (FAANG) Encode Project and has served as the joint Bioinformatics Coordinator for the USDA National Animal Genome Research Program since 2018. Her research provides standardized information about gene names, gene product function and how to better model changes in gene expression. Dr. McCarthy routinely collaborates with researchers from agriculture, environmental science, and human health. She has authored more than fifty peer-reviewed publications related to farm animal genomics. She received her Ph.D. from the University of Queensland developing recombinant vaccines for feedlot cattle.

Mike J. McGrew

Member

Mike J. McGrew is a Professor at the Roslin Institute of the Royal (Dick) College of Veterinary Studies at the University of Edinburgh. He has been a Principal Investigator at the University of Edinburgh for 12 years. His research group uses avian stem cells to produce chickens with precise genetic modifications to investigate disease resistance. He is a known leader in the field of genome editing of poultry. His group also used avian stem cells for biobanking: the ability to freeze reproductive cells and re-establish bird species from frozen cells. He was awarded the 2017 March Award for Conservation in Genetic Diversity by the Rare Breed Survival Trust and is a member of the British Society of Developmental Biology. He received his PhD in Biochemistry from the Boston School of Medicine in 1997.

William M. Muir

Member

William Muir is Professor Emeritus from Purdue University and CEO at Genesys Bioinformatics Services, LLC which conducts bioinformatic analysis with USDA funding. At Purdue, his work focused on biotechnology risk assessment, evolutionary genetics, bioinformatics, animal well-being, and identification of quantitative trait loci (QTL) associated with traits. He received a Certificate of Excellence from the Council for Agricultural Science and Technology in recognition of creation of outstanding educational materials, "The Science and Regulation of Food from Genetically Engineered Animals." He participated as a panelist in the Pew Initiative on Food and Biotechnology's Workshop on Exploring the Moral and Ethical Aspects of Genetically Engineered and Cloned Animals. He received his Ph.D. from Purdue University in 1977 in Animal Breeding and Genetics, Evolutionary Biology, and Bioinformatics. He served on the National Research Council (NRC) Committee on Agricultural Biotechnology, Health, and the Environment and on the NRC Committee on Defining Science-Based Concerns Associated with Products of Animal Biotechnology.

James D. Murray

Member

James Murray is Professor Emeritus, having retired after 33 years in the Department of Animal Science and School of Veterinary Medicine at the University of California, Davis (UC Davis). Before UC Davis, he worked at the Australian National University and at the C.S.I.R.O. Division of Animal Production. Professor Murray's laboratory focused on the production and study of transgenic and gene edited animals, including mice, sheep, goats, pigs, and cattle. His work encompassed the construction of expression vectors, the production and characterization of transgenic and gene edited animals, the study of the physiological and phenotypic consequences of expression of an inserted transgene or edit, including an extensive record of studying the consequences of feeding transgenic and control milk to young animals and assessing their impact on gastrointestinal (GI) tract health and the GI microbiota. Murray founded the Transgenic Animal Research Conference, a biannual international meeting focused on the production, characterization, and application of non-murine genetically engineered and gene edited animals. He was elected a Fellow of the American Association for the Advancement of Science in 2002. He received his B.Sc. (1974) and M.Sc. (1975) degrees from the University of Wyoming (Laramie). He then received a Fulbright-Hays Pre-doctoral Fellowship to study in Australia, obtaining his Ph.D. from Macquarie University (North Ryde, N.S.W.) in 1980. Professor Murray served as a reviewer for the National Research Council report "Science-Based Concerns of Animals Produced Through Biotechnology" in 2002.

Jon M. Oatley

Member

Jon Oatley is Associate Dean for Research and Director of the Functional Genomics Initiative and Center for Reproductive Biology and is a tenured Professor at Washington State University. His research focuses on engineering food animals with enhanced resiliency and production efficiency traits using gene editing technologies and devising reproductive biotechnologies for efficient dissemination of heritable genetic modifications. Dr. Oatley has published more than 90 scholarly works in these areas of research and has been awarded multiple grants from the National Institutes of Health and USDA-National Institute of Food and Agriculture. His research accomplishments have garnered awards from several professional scientific societies. Recently, Dr. Oatley became the first academic scientist to be granted investigational food use authorization by the Food and Drug Administration (FDA) for introduction of edible products from CRISPR-Cas9 edited livestock into the human food supply. Beyond research, Dr. Oatley has worked with the FDA, American Association of Veterinary Medical Colleges, and Association of Public and Land-Grant Universities in workshops and task forces to help shape policies on gene editing of food animals. He has testified before the US Congress on 21st century applications of biotechnology for animal agriculture. Dr. Oatley received a B.S. degree in Animal Sciences from the University of Nevada-Reno, M.S. and Ph.D. degrees from Washington State University and completed a postdoctoral fellowship at the University of Pennsylvania.

Penny K. Riggs

Member

Penny Riggs is an Associate Professor of functional genomics in the Department of Animal Science with an adjunct appointment in the Department of Veterinary Integrative Biosciences at Texas A&M University in College Station, Texas, USA. She served as Associate Vice President for Research at Texas A&M University from 2019-2022, and as a Senior Advisor in the U.S. Department of the Interior's Office of the Secretary, 2018-2019. Her research focuses on analyses of gene, RNA, and protein expression and signaling that regulate or influence aspects of skeletal muscle traits, as well as other genetic contributions to growth and developmental phenotypes in livestock and other mammalian species. Dr. Riggs' teaching roles reflect her multidisciplinary interests in agricultural and environmental public policy, and have included courses in mammalian developmental genetics, current issues in animal agriculture, and an interdisciplinary course on the impact of technological advancements on society. She is a past-Chair of the Public Policy Committee of the American Society of Animal Science and is a recipient of the Purdue University Animal Sciences Distinguished Alumna award. She earned a B.S. degree in biology and M.S. in animal cytogenetics from Purdue University. As a Regents' Graduate Fellow, she completed a Ph.D. in molecular genetics at Texas A&M University, followed by postdoctoral work at NASA Johnson Space Center and the University of Texas M. D. Anderson Cancer Center. She received an executive certificate in public policy from the John F. Kennedy School of Government at Harvard University, Executive Education, in 2023.

Thomas E. Spencer

Member

Thomas Spencer is Curators' Distinguished Professor of Animal Sciences at University of Missouri, a position he has held since 2015, and Vice Chancellor for Research at University of Missouri since 2020. He is a reproductive and developmental biologist recognized for his work on the development and function of the uterus and placenta in domestic ruminants and mouse genetic models. His research has employed several genetic strategies to modify genomes including CRISPR-Cas9 gene editing in sheep and cattle embryos. He has actively served the scientific community as a member of the National Institutes of Health (NIH) Pregnancy and Neonatology study section, chair of USDA National Institute of Food and Agriculture's Reproduction panel, champion of the NIH-USDA Dual Purpose with Dual Benefit program, and chair of the Gordon Research Conference on Reproductive Tract Biology. He has received numerous awards, including the Society for the Study of Reproduction Research Award (2013) and Trainee Mentoring Award (2016). Spencer graduated from Auburn University with a B.S. and M.S. in Animal and Dairy Sciences and he earned a Ph.D. in Physiology of Reproduction from Texas A&M University. He completed his postdoctoral research in molecular and cell biology at Baylor College of Medicine in Houston, Texas. He was elected to membership in the National Academy of Sciences in 2019.

Virginia A. Stallings

Member

Virginia A. Stallings, M.D., is Professor of Pediatrics at the University of Pennsylvania Perelman School of Medicine, and Director of the Nutrition Center and the Jean A. Cortner Endowed Chair in Gastroenterology, Hematology, and Nutrition at Children's Hospital of Philadelphia. Her research interests include pediatric nutrition, evaluation of dietary intake and energy expenditure, and nutrition-related chronic disease. Dr. Stallings has served on several National Academies of Sciences, Engineering, and Medicine Committees: Committee on Food Allergies: Global Burden, Causes, Treatment, Prevention, and Public Policy; Committee on Nutrition Standards for National School Lunch and Breakfast Programs; Committee on Nutrition Services for Medicare Beneficiaries; Committee on the Scientific Basis for Dietary Risk Eligibility Criteria for WIC (Women, Infants, and Children) Programs; Committee to Review the WIC Food Packages (2003); the Committee to Review Child and Adult Care Food Program Meal Requirements; and the Committee to Review the Dietary Reference

Intakes for Sodium and Potassium. She is a former member (1997-2000) and co-vice chair (2000-2002) of the Food and Nutrition Board. Dr. Stallings is board certified in pediatrics and clinical nutrition. She received the Fomon Nutrition Award from the American Academy of Pediatrics. Dr. Stallings is a member of the Board of Trustees of the Philadelphia College of Osteopathic Medicine and Board of Directors for American Society for Nutrition. Dr. Stallings earned a B.S. in nutrition and foods from Auburn University, a M.S. in human nutrition and biochemistry from Cornell University, and a M.D. from the University of Alabama in Birmingham School of Medicine. She is a member of the National Academy of Medicine.

Aspen M. Workman

Member

Aspen Workman has been a Research Scientist in the Animal Health Genomics Research Unit at the USDA's Agricultural Research Service in Clay Center, Nebraska since 2014. Her research focuses on discovering critical host-pathogen interactions that contribute to disease pathogenesis, with the aim of developing intervention strategies that enhance host resistance, improve animal health and welfare, and promote the sustainability of cattle production. She recently reported the production of the first gene-edited calf with genetic resistance to bovine viral diarrhea virus (BVDV), a significant viral pathogen that poses a major challenge to the cattle industry. She won a pre-doctoral fellowship from the USDA and received the Ruth L. Kirschstein National Research Service Award from the National Institutes of Health for her doctoral training. She received her Ph.D. in Microbiology and Molecular Biology in 2011 from the University of Nebraska-Lincoln with post-doctoral training in viral immunology.

Albaraa Sarsour

Staff Officer

Robin Schoen

Staff Officer