Over the last 30 years, Distinguished Research Professor and D.W. Brooks Professor Ignacy Misztal has been one of the principal scientists providing key developments in genetic evaluation methodology and computational strategies that improve livestock production and sustainability. Misztal came to UGA in 1996 as an associate professor. At that time the beef group at ADS (Drs. Benyshek and Bertrand) was at a forefront of beef genetic evaluation in the U.S., with over 10 breeds evaluated, and one of Dr. Misztal’s responsibilities was to contribute to that effort.

Listening to dairy farmer complaints about poor fertility and production in the summertime, he wondered whether deteriorating heat tolerance of Holsteins was an artifact of intensive selection in locations under mild climates. He developed an entirely new type of genetic model that relies on weather information for public weather stations, allowing the use of records of millions of cows. The hypothesis turned true, and his methods could identify heat tolerant sires, which were also superior for fertility and productive life. However, the industry found it more profitable to improve management (better cooling, timed AI, sexed semen) than risk lower production with more heat-tolerant bulls. His studies in heat stress were widely replicated around the world and applied at the commercial level in Australia.

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In the 2000s many commercial pig operations found that the genetic trend at nucleus farms did not transfer to commercial operations, and serious problems emerged like excessive piglet mortality and poor sow survival. Dr. Misztal developed new models for joint purebred-crossbred analyzes, found that poor sow survival is due to a generally declining fitness as opposed to specific reasons. He also found that heat stress influences pigs, more at the commercial than nucleus level because of different management, and selection of “winter” and “summer” boars is economically beneficial.

Over 10 years ago inexpensive genotyping created a revolution in animal breeding, with DNA information used to select better animals. Initial strategies for the “genomic” evaluations were complicated and involved many steps. Because the genomic information can be used to create “genomic relationships” Dr. Misztal came with an idea to merge pedigree and genomic relationships, with all computations finished in a single-step. A single step-methodology was both simpler and more accurate and is now the standard method in the field. Another challenge in the field was how to deal with a large number of genotyped animals (three million in Holsteins now). Dr. Misztal exploited the fact that DNA is inherited in large blocks, and genomic prediction does not act on single nucleotides (3 billion of them) but on the blocks. Based on the idea of blocks (from 5000 in chicken to 15,000 in Holsteins), the lab of Dr. Misztal made the genomic evaluations with millions of genotyped animals easy. The software at UGA called BLUPF90 that contains all the above ideas runs genetic evaluations of major institutions in Holsteins, Angus, broiler chickens (Cobb_Vantress), and pigs (PIC, Smithfield, ...).

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Misztal derives lots of ideas during extensive traveling (49 US states and over 40 countries), where formal and informal discussions with fellow scientists lead to many ideas that otherwise could take years to develop on their own. He taught short courses on six continents, and course participants often become excellent collaborators/students/postdocs. He is very aware of overloading, as creativity research shows that many great ideas come when seemingly doing nothing.

The success of Ignacy Misztal comes through many talented people who work in his lab. This includes Drs. Shogo Tsuruta and Yutaka Masuda, both research scientists, Dr. Lourenco, now associate professor at UGA, and four graduate students (Matias Bermann, May Jay Hollifield, Daniela Lourenco, Natalia Galore, Fiona Luise Guinan). His closest international collaborators are Drs. Andres Legarra (France) and Ignacio Aguilar (Uruguay).

Dr. Misztal received many awards including the Lush Award in Animal Breeding from ADSA, the Journal of Dairy Science Most Cited Award, the Rockefeller Prentice Research Award in Animal Breeding from the ASAS, the Beef Improvement Federation’s Pioneer Award, and the National Association of Animal Breeders’ (NAAB) Research Award. He also received three D.W. Brooks Awards for excellence in research, in global programs, and Distinguished Professorship.

In 2020 Misztal was awarded the Distinguished Research Professor title. Misztal’s research has attracted over $10 million in extramural funding from both private and public sources and he published 256 refereed papers.
On February 11, we held this year’s Focus on Genetically-Enhanced EPD’s sale in the Dan Daniel Conference Room. The Department of Animal and Dairy Science raised $5,500 for our Block and Bridle Scholarship Fund from the sale of our Lot 1 heifer whose embryo was donated to us by Rocking W Angus. The heifer was donated back to ADS so she was a definite win-win. Our 50 Angus, Hereford and SimAngus bulls averaged a little over $2,300 with some buyers getting really good bulls at a price they should be thrilled with. Our 10 open commercial Angus and Angus-cross heifers averaged $1245. This sale was 100% online and remote which unfortunately meant we didn’t get to host our annual sale luncheon or get to shake hands with our bidders and buyers. But, we are planning on face-to-face for 2022 so we can catch up then. Many thanks go to Patsie and Carroll Cannon for managing the sale, and to Brooklyn Graham of LiveAuctions TV for taking great videos of the cattle and for conducting the online auction. I want to thank Kip McMillan, Chad Westmoreland, Caleb Williams, and everyone at the Eatonton Beef Research Farm for raising an excellent set of cattle. I also want to thank Lawton Stewart and Dean Pringle for all of their hard work on organizing this sale and David Gazda from the Angus Association for his sale say service. Finally, I want to thank the Angus, Hereford, and Simmental breeders in Georgia, Alabama and South Carolina who have supported us in improving our cattle, and especially Ogeechee Angus, Gardiner Angus and Select Sires who have donated semen from several high-quality bulls for our use. The continued support of so many beef producers is tremendous, and is making it possible for us to have high quality cattle for teaching and research. Next year, we plan on selling 2 heifers to benefit Block and Bridle. One heifer will have proceeds go directly to the club, and the second heifer’s proceeds will go to the scholarship fund. Once COVID is a little more under control, we plan on having our students involved in more aspects of our beef program. Thanks to EVERYONE who helped with our sale.

Francis Fluharty,
Animal and Dairy Science
Department Head
Robert Dove is a native of Missouri who grew up on a multi-enterprise farm that included row crops, hay, cattle, swine, and chickens. Dove was very active in 4-H and FFA while in high school and developed his passion for pigs after receiving a gilt from an FFA gilt chain project. He showed pigs throughout high school.

Dove attended the University of Missouri for his undergraduate degree and worked both in the analytical lab and the swine research lab while completing his degree. He continued his post-graduate work at Missouri, receiving his M.S. degree before moving to Ames, Iowa to complete his Ph.D. at Iowa State.

Shortly after graduation, Robert accepted a position at the UGA Coastal Plains Experiment Station as a swine researcher with a small extension appointment. He spent the first 15 years of his career in Tifton conducting trace mineral research and helping with the swine youth events. In 2003, in response to budget cuts and retirements, Dove was moved to the Athens campus to continue his mineral research and extension activities. Over time, he became the only swine extension specialist in the state and now handles all swine extension duties. Dove continues to do research focused on trace minerals with current projects evaluating manganese and iodine levels in sow and nursery diets.

After his move to Athens, Robert Dove became heavily involved in the teaching program, teaching the Animal Practicum class for the next 14 years. He is currently responsible for teaching Swine Production, Animal Nutrition, and Metabolism, and Introduction to Animal Science at the undergraduate level and Mineral Nutrition at the graduate level. Dove also mentors 3-6 undergraduate research students each year with students completing projects on suckling pressure in sows, the determination of teat selection by piglets, and iron supplementation of neonatal piglets. Dove has served as the undergraduate coordinator for the Department of Animal and Dairy Science since 2010 and represents the department on several College and University committees.

In 2019, Dove was inducted into the UGA Teaching Academy and works closely with Faculty Learning Communities and the Center for Teaching and Learning, recently completing a yearlong program as a Senior Teaching Fellow. Robert Dove is constantly trying new and innovative teaching methods to increase student engagement and active learning.
A colleague of Romdhane Rekaya recently stated “Dr. Rekaya is a well-known national and international animal breeder and quantitative geneticists and his research contributions are highly valued by the global research community. Dr. Rekaya’s diverse expertise allowed him to play a leading role in several areas of research ranging from animal breeding and genetics to precision agriculture. Without a doubt he is one of the top theoretical and computational quantitative geneticists, and applied Bayesian statistician in our field.”

Rekaya is originally from the North African country of Tunisia. He completed his undergraduate studies in agricultural engineering with a specialization in animal and forage production. He was awarded a postgraduate fellowship by the Mediterranean Institute of Advanced Agricultural Studies in Zaragoza (Spain) where he received his Master of Science degree in Animal Breeding and Genetics. Through an assistantship offered by the Spanish International Cooperation Agency, he finished his PhD studies in Animal Breeding and Genetics at the Polytechnic University of Madrid (Spain).

Upon the completion of his PhD, he joined the University of Wisconsin-Madison as a research associate working primarily in the development of a system for the prediction of marbling score using ultrasound imaging and neural networks.

Shortly after, he was moved to an assistant researcher position with the responsibility to manage the breeding and genetics group database and to carry out research in the field of national and international genetic evaluation of dairy cattle.

Dr. Rekaya joined the University of Georgia in September 2001. He is currently a full rank professor at the Department of Animal and Dairy Science, a member of the Institute of Bioinformatics, and an adjunct faculty at the Department of Statistics. His primary research activities are centered on the theoretical aspects of quantitative genetics, statistical genomics and bioinformatics. Dr. Rekaya is well-recognized nationally and internationally for his research in the field of livestock and poultry genetic improvement. His diverse expertise allowed him to play a leading role in several areas of research ranging from animal breeding and genetics to precision agriculture.

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His research portfolio includes the development of theoretical and computational tools for the joint analysis of continuous and discrete responses, analysis of noisy (misclassified) discrete data in the field of animal breeding and genetics and human medicine, feed efficiency in cattle and poultry, and the genetic aspects of horn fly abundance in beef cattle.

Even before the adoption of genomic selection by the livestock industry, Rekaya was developing advanced methods to use molecular information in genetic evaluations and to incorporate SNP markers in animal breeding and human disease diagnostics applications. Availability of high-density SNP marker panels and whole genome sequence data provided an unprecedented opportunity to further enhance genomic selection and better understand the genetic basis of economically important traits. To deal with the overwhelming amount of molecular data, Rekaya and his students have developed a method based on the fixation index to prioritize the most relevant genetic markers resulting in a substantial reduction in the number of SNPs needed for the implementation of genomic selection and often an increase in prediction accuracy. The method is equally applicable to plant breeding and disease marker detection in humans.

On top of his work in the development of quantitative and computational tools for genomics and animal breeding applications, Rekaya has an active collaboration with several biologically oriented scientists. Through such efforts, several interesting questions were tackled, including feed efficiency in beef cattle and meat-type chickens, heat stress, nutrigenomics, and horn fly abundance in cattle. The latter is a billion-dollar problem for the cattle industry and Rekaya is at the forefront of it. In collaboration with engineers, computer scientists, microbiologists, and animal and poultry scientists, he is heavily involved in developing machine-based phenotyping applications and artificial intelligence tools for the implementation of precision agriculture in livestock and poultry.

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Precision or ‘smart’ agriculture is the future and we urgently need to train the next generation of scientists to lead the effort in this front. Thus, Dr. Rekaya was involved in the development of the College of Agriculture and Environmental Science data science certificate and he co-taught one course (AESC 8150) in that program.

Additionally, Dr. Rekaya has developed several software programs for the prediction of SNP co-expression associations (SNPxGE2), detection of differentially expressed genes (LSOSS), and the identification of epistatic interactions in case-control studies (ANTEPISEEKER). Both the AntEpiSeeker and SNPxGE2 have been cited extensively in the literature.

Dr. Rekaya is a prolific writer. In fact, he has published 159 refereed journal articles, 6 book chapters, and over 200 proceedings and abstracts. He has trained 21 graduate students (8 MS and 13 PhD students), most of them are industry leaders or faculty members in major US research universities. Rekaya is the instructor of four graduate courses in support of graduate programs for the Department of Animal and Dairy Science and the College of Agriculture and Environmental Science data science certificate. He has also taught seven international courses in North America, Europe, and Africa.

Dr. Rekaya is a frequent reviewer for national and international granting agencies including USDA NIFA, International Foundation for Science (IFS), and the French National Research Agency (ANR). He serves on several committees at the department, college, and university levels.

Dr. Romdhane Rekaya’s research has resulted in many significant breakthroughs and his future work will also provide additional insights that will influence our future direction. He is one of the best scientists in the world in his area, and he is highly effective in teaching and mentoring at the graduate level. His national and international reputation has brought distinction to both himself, and UGA.
News

Beef Extension Specialist
Jason Duggin

Jason Duggin is the Department of Animal and Dairy Science (ADS) Beef Extension Specialist in Northwest GA. There, he supervises the Georgia Bull Evaluation and Georgia Heifer Development (HERD) programs.

Since growing up in Manchester, TN, Duggin has been heavily involved with 4-H and FFA primarily in beef cattle evaluation and livestock judging. Duggin received his Bachelor’s Degree and Master’s Degree in Animal Science from Oklahoma State University. At OSU, Duggin was in the top ten in beef cattle judging at North American and American Royal Contests. Duggin has used his skills in beef cattle evaluation and selection, to serve as a judge at over 140 youth shows across the country. He has served on the national level through the National 4-H Livestock Judging contest management committee and as an official for the National Western Collegiate Livestock Judging Contest and Carload Judging Contest for three years where he also served as beef committee chair.

Duggin has been with ADS since 2013. He was drawn to his position of Beef Extension Specialist because it is solely committed to beef cattle. He was impressed with the support of the beef cattle industry by the Georgia Cattlemen’s Association and UGA Extension. The icing on the cake for Duggin to join ADS was the resources available at the UGA’s Northwest Georgia Research and Education Center.

Jason Duggin assists with the bull evaluation program that develops approximately 230 bulls annually across the Calhoun and Tifton locations where Duggin is also supporting in an interim role. Similarly, the HERD program in Calhoun annually develops roughly 125 heifers during a 6-month timeframe that includes reproductive analysis and subsequent breeding using Fixed Timed AI. Duggin has the opportunity to work with a large number of Georgia beef cattle producers through these programs.

Duggin works in cooperation with the Northwest Georgia Research and Education Center based in Gordon and Floyd Counties where he supports applied research and the Extension live animal programs. Currently, a 5-year project is ongoing using the CowManager® monitoring system. The system is being used to better understand how animals differ in behavior across genetic lines and management types. It is used to monitor cattle for research purposes.

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as well as to gain a better understanding of cattle in daily management practices. Working with Post-Doctorate Research Associate, Dr. Jeferson Lourenco, Duggin evaluated the behavioral differences of calves with different genetic types pre- and post-weaning. The system shows some promise in its ability to demonstrate differences in cattle for research purposes (see figures 1 and 2). The system is currently collecting data on Professor Dean Pringle’s research investigating feed efficiency and marbling EPDs in Angus cattle.

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Duggin also oversees the Georgia Master Cattleman program. This 8-week course is delivered bi-annually in Georgia rotating through its four districts. Since 2014, the Master Cattleman program has graduated over 500 participants. Duggin serves in a co-coordinator capacity with the Georgia Beef Challenge program. This live animal program allows Georgia producers to ship feeder cattle to Iowa State’s Tri-County Steer Futurity program that captures feedlot performance and carcass merit for producer education and marketing purposes.

Some of Duggin’s other roles include serving as one of the Beef Quality Assurance (BQA) coordinators for Georgia; assisting with youth livestock programming; serving as a resource to UGA County Extension Agents; supporting the Georgia Cattlemen’s Association, its local chapters, and producers. Duggin also supports educational programming in Georgia and the southeast co-coordinating events such as the Stockmanship and Stewardship series for the Southeast Region in 2018 and the Bovine Emergency Response Program for first responders in 2019 and anticipated in spring of 2020.

Jason Duggin writes popular press for the Angus Journal’s Advisor column, Georgia Cattlemen’s Magazine, and previously wrote a monthly regional update for Progressive Cattlemen’s Magazine for just shy of 4 years.

Jason and his wife Katie have two sons, Lowry (12) and Henry (11), and reside in Calhoun, GA.
Student Spotlight

**Jorge Hidalgo**, a PhD student from Mexico, showed that genetic selection has an undesirable impact of reducing the genetic variation and increasing antagonism between production and fertility traits. He also found that, thanks to the genomic information, that in Angus the genomic predictions in beef do not change much over a year even with new data. Jorge does a wonderful work while taking care of 3 kids.

**Yvette Stein**, a PhD student from South Africa, was working on multibreed genomic evaluations and on analyzes of data of pigs from commercial farms, where pigs are removed from pens sequentially, bigger pigs first. Now she has a project on increasing diversity of Holsteins, where few bulls dominate the breed.

**May Kay Hollifield**, a MS student from NC, has just completed a study on persistence of genomic evaluation over generations. Now she researches genetics of fertility in pigs.

**Matias Bermann**, a PhD student from Argentina, works on theoretical problems of how to make the genomic evaluation more accurate and unbiased. His work directly responded to questions from Zoetis, a major provider of genomic evaluations in dairy, and Cobb-Vantress, one of the two leading broiler companies in the world.
Student Spotlight

Ashley Ling grew up in Canton, GA and spent most of her free time in middle and high school horseback riding. Ling is a fourth year PhD student in the area of quantitative genetics/genomics.

Ling had always gravitated towards genetics, and after taking Introduction to Genetics of Livestock Improvement with Dr. Keith Bertrand, she became fascinated with how genetic principles could be used to benefit producers by breeding them a healthier, better-producing animal. Her research work is focused in enhancing the use of SNP marker information in livestock selection. Ling is using several marker prioritizing techniques to increase the accuracy of genomics selection in presence of high-density genotypes or sequence data.

Samet Soyalp is a first-year Master’s student from Turkey. Soyalp’s field is zootecnica which is the study of cattle and poultry breeding, feeding, and farm management. The Turkish government granted Soyalp a scholarship to study poultry breeding and genetics in the U.S. Soyalp will be testing a new method, developed by Dr. Rekaya’s group, for the implementation of genomic selection in the presence of crossbred individuals using chicken data.