Georgia Tech Research Institute
Agricultural Technology Research Program

2025
ANNUAL REPORT

Transforming poultry, agribusiness, and food manufacturing through advanced technologies

Message from the Program Manager — Doug Britton, Ph.D.

Welcome to the Agricultural Technology Research Program's (ATRP) 2025 Annual Report. Our research teams are making great progress, and we are enthusiastic about the potential impact many of these developments will have. We hope this enthusiasm is evident in the report.

On behalf of our research staff, I would like to express our sincere appreciation to all of our partners who enable us to fulfill the ATRP vision:

To transform poultry, agribusiness, and food manufacturing through advanced technologies.

We want to extend a special thank you to the Georgia Poultry Federation for its long-standing support of the program and tireless efforts with our elected state officials. In addition, our continued thanks go to the State of Georgia for its financial support of the program.

Lastly, we also thank the ATRP Poultry Advisory Committee, Georgia Peanut Commission, and industrial, university, and agency collaborators for their unwavering investment of time and resources in support of ATRP initiatives.

FY 2025 Financial Statement

Total State of Georgia funding allocated for ATRP research: **$2,435,243**

ROI

$3,749,781
in external funding attracted
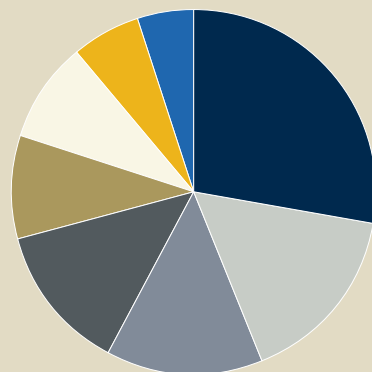
Funding Breakdown by Program Area

■	Automation and Robotics	28%
■	Environmental & Biological Systems	16%
■	Imaging & Sensing	14%
■	Technology Transfer/Outreach/Technical Assistance	13%
■	Future Concepts	9%
■	Program Support	9%
■	Row Crops	6%
■	USDA-Funded Project Cost Share	5%

ATRP by the Numbers | FY 2025

6
research prototypes in various stages of development

3
patent applications

30
published articles, papers, and presentations

21
partners collaborating on one or more projects

10
technical assistance service requests fulfilled

ATRP also participates in several outreach activities, including co-hosting the National Safety Conference for the Poultry Industry with the U.S. Poultry & Egg Association, hosting the International Food Automation Networking Conference (IFAN), publishing the *PoultryTech* newsletter, exhibiting at the International Production and Processing Expo (IPPE) and Poultry World at the Georgia National Fair, and presenting research findings at the International Conference on Robotics & Automation (ICRA) and the Poultry Science Association (PSA) Annual Meeting.

Thanks to Our Partners

Industrial collaborators support research projects by providing industry expertise and access to facilities for data collection and systems testing and contributing in-kind and cash support on an as-needed basis. University and agency partners collaborate with research teams by providing cross-disciplinary expertise and experience as well as access to research facilities and resources.

Auburn University | Aviagen | Claxton Poultry | Enviro Tech | Fieldale Farms | Georgia Institute of Technology | Georgia Peanut Commission
Georgia Poultry Federation | Harrison Poultry | Koch Foods | Mar-Jac Poultry | Perdue Farms | Pilgrim's | Salvus | Southern Poultry Research Group
Tyson Foods | University of Georgia | USDA-ARS U.S. National Poultry Research Center | U.S. Poultry & Egg Association
Wayne-Sanderson Farms | Woodruff & Howe Environmental Engineering

Project Spotlights

Rehang Shackle Device

Researchers are developing an alternative method for the rehang operation in poultry processing. Rehang occurs after the bird exits the chiller bath and is placed

onto a moving shackle line. This process is performed manually with workers lifting and hanging each individual bird. The Rehang Shackle Device attempts to simplify the rehang process by removing the need to lift the product. Rather than hanging the bird by the legs, an operator simply slides the bird onto a specially designed rehang mat positioned on a moving conveyor line. The conveyor moves in sync with the shackle line, and the mat has grooves that are designed to separate and singulate the legs of the bird. Due to the design of the rehang mat, the legs are passively aligned with the moving shackles. At the end of the conveyor, the line raises and carries the product with it — increasing the safety and efficiency of the operator by removing the need for strenuous lifting.

Detecting Tomato Spotted Wilt Virus in Peanuts

Researchers are exploring the capture of volatile organic compounds (VOCs) from peanuts along with image processing to detect spotted wilt virus. Deep learning models achieved more than 86% accuracy for plant health

classification, while 3D and phenotype analyses showed potential for further improvement. Earlier detection of the virus could help peanut growers mitigate crop losses, saving millions of dollars annually.

Egg Incubation Microbial VOC Detection

Researchers are seeking to identify common microbial volatile organic compounds (mVOCs) released from fungi and bacteria in broiler eggs during incubation. During laboratory

experiments, researchers inoculate each egg's yolk or albumen with either a control of phosphate-buffered saline (PBS) or *Salmonella* in PBS using a 30-gauge syringe. Inoculation is followed by two days cold storage before incubation. Breakout analysis is conducted at day 18. Recent results align with compounds associated with *Salmonella* in published research. VOCs were detected at low concentrations of bacteria when inoculating inside the albumen, which has the capability to fight off infection. The VOCs have been able to distinguish between albumen and yolk contamination of eggs for *Salmonella*. Removing contaminated eggs before incubation greatly reduces the risk of transfer to other eggs or the entire incubator.

Additional Projects

» **PAA Decay Kinetics**
Investigating the root causes of peracetic acid (PAA) degradation in poultry carcass chilling operations to optimize water reuse and lower the amount of PAA needed for microbial control.

» **PFAS in Poultry**
Developing methods to analyze per- and polyfluoroalkyl substances (PFAS), commonly known as forever chemicals, in analytes of interest to the poultry industry to better understand and address potential impacts.

» **Robot Learning for Closed-Loop Manipulation**
Applying artificial intelligence (AI) and learning from demonstration (LfD) approaches to train robots to manipulate products in poultry processing tasks.

» **Advanced Intelligent Cutting**
Automating bird front-half shoulder deboning with a robotic cutting system that rivals human performance.

» **VR for Robotics System Control and Tasking**
Using virtual reality (VR) to enable human-robot collaboration for completing poultry processing tasks at a human performance level.

» **Poultry House of the Future**
Designing a next-generation poultry house through a systems engineering approach that integrates modeling, structural design, behavioral modeling, and operational requirements.

» **Non-Destructive Egg Fertilization Detection via VOCs**
Using gas chromatography mass spectrometry (GC-MS) to capture volatile organic compounds (VOCs) from hatching eggs to improve incubator efficiency by providing earlier fertility detection.

» **Multi-Mycotoxin Detection in Poultry Feed**
Investigating the use of volatile organic compounds (VOCs) for earlier detection of mycotoxins in poultry feed to improve poultry health and reproduction rates.

» **Hydrogen Fuel for Poultry Cooking**
Investigating the use of hydrogen fuel in large-scale poultry cooking operations to not only diversify energy resources but also enhance moisture retention in cooked product.

» **Extendable Machine Learning-Enabled Simulation**
Creating a machine learning-ready simulation framework for predicting flock behaviors in poultry houses to allow precision poultry farming (PPF).

» **Poultry House Robotics**
Conducting field trials to benchmark the performance of a ground robot that autonomously performs broiler breeder management tasks in poultry houses.

USDA-Funded Project

ATRP also receives funding through a non-assistance cooperative agreement with USDA's Agricultural Research Service (ARS). The Poultry Processing Research and Innovation project seeks to develop safe and effective poultry processing strategies to reduce foodborne contaminants and enhance the sustainability of poultry processing. The project involves three ATRP-initiated research efforts: Enhanced Chilling Automation via Directed Motion, Integrated Management of Poultry Processing Waters, and On-Farm Processing and Transport (FPaT).

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ATRP Poultry Advisory Committee | FY 2025 (July 1, 2024-June 30, 2025)

ATRP is conducted in cooperation with the Georgia Poultry Federation with input from an external Advisory Committee consisting of representatives from leading poultry companies and allied organizations.

Members

David Sewell, Koch Foods (Chair) | **Doug Aldridge**, Aviagen | **Randy Segars**, Boehringer Ingelheim
Buddhika Jayasena, Cantrell-Gainco Group | **Steve Snyder**, Claxton Poultry | **Mark Hamby**, Cobb-Vantress
William Herring, Cobb-Vantress | **Bill Crider**, Crider Foods | **Kelly Horne**, Darling Ingredients
Terry Paschall, Darling Ingredients | **David Walker**, Darling Ingredients | **Jimmy Kemp**, Fieldale Farms
Ken Martin, Fieldale Farms | **John Wright**, Fieldale Farms | **Paul Breure**, Foodmate | **Roger Huezo**, Foodmate
Jim James, Foodmate | **Jason Bragg**, Georgia EMC | **Drew Stewart**, Georgia Power | **Jordan Allison**, Harrison Poultry
Joe Gasbarro, JBT-Prime Equipment Group | **Cezary Mroz**, JBT-Prime Equipment Group | **Luke Pollock**, Marel
Morris Darnell, Mar-Jac Poultry | **Jonathan Green**, Mar-Jac Poultry | **John Weeks**, Mar-Jac Poultry
Mike Bell, MP Equipment | **Tom Van Doorn**, MP Equipment | **Tim Little**, Perdue Farms | **Damon Simpson**, Perdue Farms
Lucas Hill, Pilgrim's | **Adam Willis**, Pilgrim's | **Andre Tatar**, Salvus | **Derrick Arp**, Simmons Engineering Company
Mike Rhodes, Southern Company | **David Marsh**, Teleios Automation | **Terry Bruce**, Tip Top Poultry
Randy Payne, Tip Top Poultry | **Chetan Kapoor**, Tyson Foods | **Manoj Virippil**, Tyson Foods
Juanfra DeVillena, Wayne-Sanderson Farms | **Dwayne Holifield**, Wayne-Sanderson Farms

Advisors

Mike Giles, Georgia Poultry Federation | **Louise Dufour-Zavala**, Georgia Poultry Laboratory Network
Todd Applegate, University of Georgia | **Denise Heard**, U.S. Poultry & Egg Association

ATRP Row Crops Research Initiative

ATRP's Row Crops Research Initiative focused on peanuts is conducted in cooperation with the Georgia Peanut Commission.

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