

Laboratory ANALYSIS

BY PAUL PIROZZOLA AND JOHN WILLMING

Analysis from the Lab to the Bottom Line

Meat packer uses sophisticated analytical technology to determine moisture and fat content in turkey bacon for a more consistent final product and more profit.

THE CONTENT OF BOTH MOISTURE and fat in processed meats greatly contributes to the quality of the final product. These crucial constituents greatly affect certain key characteristics:

- Shrinkage or weight loss from cooking;
- Sliceability or texture of product for optimum slicing conditions;
- Flavor or taste of the product as desired by the consumer; and
- Nutritional benefit in response to consumer demand for a leaner, healthier product.

Determining of moisture and fat amounts is conducted by food testing laboratories that adhere to strict industry guidelines and USDA testing/handling procedures that address food quality and safety issues. Meat processors with sufficient resources to conduct testing typically have on-site analytical testing laboratories, in addition to freezing and distribution ca-

pabilities, completely integrated into their operations.

One processing company that conducts its own laboratory testing and analysis is Washington Courthouse, OH-based Sugar Creek Packing. Equipped with comprehensive food testing and quality assurance labs, the privately held company concentrates on processing, slicing and packaging bacon. Five USDA-inspected processing plants and a distribution center are spread across Illinois, Ohio, and Kansas. The company has a staff of approximately 1,000.

Sugar Creek Packing, one of the top five bacon slicers in the US, by volume of product sold, annually moves more than 150 million pounds of both raw and fully cooked products. Sugar Creek processes 100–120 million lbs. of pork bacon; 13–15 million lbs. of turkey bacon; 5–8 million lbs. of bacon bits and pizza toppings; plus ready-made sandwich-

es and secured meal kits. These products serve a diverse customer base: large fast-food chains, large grocery chains, large food companies and the US military. Sugar Creek is a co-packer for more than 100 retail name brands of processed meats.

State-of-the-art testing facilities enable Sugar Creek to continually strengthen its com-

mitment to food quality. Laboratory analysis ensures the highest statistical process control (SPC) and statistical quality control (SQC) of both incoming raw materials and that of final processed products.

HOW IT'S DONE

Controlling the levels of macro constituents—moisture and fat—helps maintain consistency in many of the final products. Since the raw materials can change periodically, attention to uniformity in the final turkey bacon is essential. Sugar Creek's Quality Control Manager Jeremy Korb is first to analyze moisture and fat content of incoming raw materials. This analysis leads to decisions on the process line to maximize efficiency and quality in the final product. The process involves:

- Blending major raw components, approximately 65% dark turkey meat in one process line and 35% white turkey meat in another;
- Emulsifying (combining/mixing) the two process lines;
- Extruding combined white and dark meat products, which are laid on a flat surface;
- Cooking and smoking in large batch ovens;
- Chilling;
- Slicing per desired volume; and
- Packaging in desired containers.

Sugar Creek is a company that recognizes the value of investing in lab technologies and equipment to improve quality. "Purchasing capital equipment to ensure all aspects of quality and to improve the safety of our processed meats is a commitment made by our company president, John Richardson," says Corporate Microbiologist/Process Improvement Specialist Denys Thevenot. "Mr. Richardson supports continuous improvement in all of our plants, and challenges us to use instrumentation to help our cause."

Thevenot and Korb spearheaded Sugar Creek's efforts to invest in automated analysis instrumentation that would deter-



Blended white and dark turkey meat ready to be cooked or smoked at Sugar Creek Packing's Dayton, OH processing plant.

Lab ANALYSIS

mine and help control constituent levels in the processed meat products. "We really needed equipment that could give us answers throughout the entire process—but most importantly with the front end where we do our blending," Korb says.

After evaluating this need, Sugar Creek purchased instruments that provide dedicated determination of moisture and fat levels from the organic product division of St. Joseph, MI-based LECO Corp. The manufacturer of automated laboratory analytical equipment offered a solution for Sugar Creek's desire for fast and accurate analytical information obtained without the use of wet chemicals that require disposal.

"We previously used a microwave moisture and fat extraction method that had maintenance and support problems," Korb says. "Plus, it was expensive to dispose of wet chemicals and we could not accurately verify information from [some of the] vendors who claimed specific fat contents [in their raw products]. The LECO instruments we currently use provide more explicit information that is 'true,' allow for walk-away time, and give instant results."

THE SET-UP

Sugar Creek uses three LECO instruments.

- The primary analysis instrument used for moisture determination in the final product is the TGA-601 Thermogravimetric Analyzer. Turkey bacon processed by Sugar Creek has approximately 65–70% moisture content. Moisture is tested in the lab approximately 40 times a day in two separate analyses of the blended dark turkey meat, and the blended white turkey meat.
- Fat content in turkey bacon is typically determined on the TFE2000 Total Fat/Oil Determinator, a primary analysis instrument at a level of 15% on both the final blended white turkey meat and the final blended dark turkey meat. Samples of each are individually tested 12–24 times every day, in four to eight analyses.
- A secondary determination instrument for moisture and fat, with results based on primary analyses, is the Quik-Check® Near Infrared (NIR) Spectrometer. Several units with a 20-filter configuration system are used daily for routine analytical testing of up to 38 samples each of white and dark turkey meat blends.

Using AOAC-accredited methodology on the LECO instruments, Sugar Creek can detect declining trends of in-spec product before becoming final off-spec product. Also, the quality of vendor-supplied raw materials can be validated before its use in the process formulation. Ultimately, these instruments provide a "set of eyes" to optimize the process for the best overall quality parameters. Using LECO Instruments for primary and secondary determination of moisture and fat in various meat blends, Sugar Creek has attained precision improvements to less than 0.5% stan-



Jeremy Korb, Sugar Creek Packing QA manager, discusses results obtained from the LECO Quik-Check® NIR Spectrometer with John Bowling, pre-blending manager in Dayton, OH laboratory.



LECO TGA-601 Thermogravimetric Analyzer is used by Sugar Creek Packing at the firm's Dayton, OH laboratory.

dard deviation of the expected values.

This process has decreased work, eliminated wet chemical waste and assured compliant final product. Sugar Creek realized a return on its capital equipment investment within a year through its partnership with LECO. The quality of raw materials supplied by vendors to Sugar Creek can be validated; increased consistency of finished products is assured.

OTHER AREAS OF CONCERN

Sugar Creek's continual commitment to food quality directly correlates with the company's focus on food safety. PhD microbiologists, quality control chemists and lab supervisors work with production engineers to use analysis instrumentation to conduct industry- and government-mandated tests for microbes such as *Listeria*, *E. coli* and *Salmonella*. Sugar Creek recently purchased a Polymerase Chain Reactor from another instrumentation vendor to improve automated microbiological process control methods in *Listeria* analysis, from 48-hour testing times to 24 hours.

Consequently, Sugar Creek's Washington Courthouse corporate lab is preparing for A2LA Accreditation for Biological Testing of Food Pathogens, and—because of a recently completed 650-square foot lab expansion that doubled capacity—the firm is now broadening its research and testing capabilities into new areas. Plans include increasing real-time control testing, upgrading analytical testing and adding new quality control instruments for other products such as pork bacon and bacon bits. Future improvements will coincide with advancements in testing technologies.

Integrating advanced analytical methods has enabled Sugar Creek to achieve top standards of quality and safety. The company has achieved process optimization, strengthening the bottom line that has yielded additional capital to invest in laboratory technologies. In an industry governed by stringent USDA regulations and characterized by significant requirements essential to today's demanding consumer base, the research, development and implementation of progressive analytical initiatives by Sugar Creek Packing has distinguished the company as a top supplier of consistent processed meat products.

Paul Pirozzola, Organic Product Manager, facilitates new product development and provides product/technical support for the organic product division at LECO Corp. Reach him at 269-985-5726 or paul_pirozzola@leco.com. Copywriter **John Willming** works in LECO's Technical Communications Department. He can be reached at 269-985-5711 or john_willming@leco.com. ■

LECO Corp.
St. Joseph, MI
269-985-5496
www.leco.com

Sugar Creek Packing
Washington Court House, OH
740-335-3586
www.sugar-creek.com

Copyrighted material, reprinted with permission from *Food Quality Magazine*. For more information, visit our Internet site at www.foodquality.com