

Commodity Utilization Research: Ready To Meet Today's and Tomorrow's Needs

Eighteen years before USDA's 1953 reorganization of the Agricultural Research Administration into the Agricultural Research Service, Congress authorized USDA to establish four regional research laboratories: the Western Regional Research Center, located in Albany, California; the Southern Regional Research Center, in New Orleans, Louisiana; the Eastern Regional Research Center, in Wyndmoor, Pennsylvania; and the National Center for Agricultural Utilization Research, in Peoria, Illinois.

The centers' mission, as declared in the Agricultural Adjustments Act of 1938, would be "to conduct researches into and to develop new scientific, chemical, and technical uses and new and extended markets and outlets for farm commodities and products and byproducts thereof."

Thus began a fertile, 70-year history of scientific innovation and creativity devoted not only to improving and sustaining American agriculture, but also to ensuring the well-being of the consumer and society in general. The talented scientists who staffed these four centers set their collective sights on devising new and improved processing methods and value-added uses for surpluses of corn, cotton, wheat, peanuts, potatoes, and other agricultural commodities, such as milk.

The impact of these inventions has been significant and long-lasting—from xanthan gum and dextran to reduced-lactose dairy products and hypoallergenic latex. Indeed, in 1999, the American Chemical Society designated ARS's Peoria center as a "Historic Chemical Landmark" for contributions to the mass-production of penicillin. In recent years, similar designations were bestowed on the Albany, New Orleans, and Wyndmoor centers for, respectively, establishing time-temperature standards for storing frozen foods; creating durable-press and flame-retardant cotton; and devising dehydration processes for instant-potato flakes.

In addition, scientists at the centers discovered brand new chemistries (such as epoxidation) and materials (such as superabsorbents) that have resulted in huge economic spillover impacts in the chemical and materials industries.

The inventions of yesteryear are on a continuum of innovative research excellence that's alive and well today within ARS. In the pipeline, for example, are dietary anti-inflammatories from citrus peels, shrink-resistant and itchless wool t-shirts, snacks fortified with whey protein, vegetable-oil-based hydraulic fluids, and 100-percent-fruit bars.

Changing priorities coupled with shifting economic landscapes and consumer expectations have placed greater emphasis on developing products and processing methods with the health of the environment firmly in mind.

A current example is a product called "Hydromulch," which was codeveloped by industry and ARS's Cotton Production and

Processing Research Unit in Lubbock, Texas—illustrating that the regional centers aren't alone in their commodity-utilization endeavors. Hydromulch contains byproducts of cotton ginning. When sprayed, Hydromulch reduces soil erosion and promotes the establishment of grass stands.

Another related focus is devising biobased alternatives to raw materials, processes, or products (including plastics and fuels) derived from petroleum. Hand-in-hand with that petroleum-reducing push is enabling the sustainable production of biofuels. For example, ARS is developing higher value uses for biorefinery byproducts, such as glycerol and corn germ.

At Wyndmoor, researchers are using natural enzymes instead of harsh chemical solvents to extract edible oil and pigments called "xanthophylls" from corn germ. Both are considered valuable coproducts that may help defray some of the cost of producing ethanol. And glycerol is being eyed as a high-caloric alternative to corn as feed for poultry and swine.

Another Wyndmoor team, in collaboration with its New Orleans counterparts and other partners, is researching pyrolysis. Pyrolysis involves "cooking" agricultural biomass in the absence of oxygen to produce an oil that can be refined into fuel. An intriguing coproduct of the process, dubbed "biochar," will be field tested for its potential to remediate and enrich soil, bolster crop yields, and sequester carbon.

Helping producers provide the public with an abundance of high-quality, nutritious, and safe food has always been a goal of ARS. But today, there's a twist to the mission. It involves detecting, characterizing, measuring, and purifying phytochemicals. These are believed to have important health-influencing benefits and are naturally present to varying degrees in many crops. New varieties of crops with higher concentrations or improved bioavailability of phytochemicals are a foreseeable outcome of research investigating how, and to what degree, these chemicals benefit human health.

Phytochemicals can also be mined from distiller's grains, corn germ, and other coproducts of biofuel production. Combining this new knowledge with proprietary food-processing technologies can yield health-promoting "functional foods." The benefits of conducting such research are applicable not only to the crops we eat, but also to the bioproducts we produce from them.

As it has in the past, ARS will continue to provide the nation with innovative ideas and approaches for commodity utilization, reacting to and reflecting the dynamic world in which we live.

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