

LOUISIANA Agriculture

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Assuring Our Future Through Scientific Research and Education



Building Healthy Communities

Building Healthy Communities

Linda Foster Benedict

The ultimate goal of LSU AgCenter nutrition education and nutrition research programs is to build healthier communities across Louisiana. Helping people learn to eat better, exercise more and lose weight can go a long way toward disease prevention and intervention. This will help hold down the costs of health care, improve the productivity of the workforce and enhance the quality of life for everyone.

One such program that has gained national recognition with numerous awards is Smart Bodies, which is aimed at school children in Louisiana with a mission to help prevent childhood obesity. The program, which is a partnership with Blue Cross and Blue Shield of Louisiana Foundation, helps schools meet federal and state legislative mandates for wellness and physical activity. Read more on page 8.

The AgCenter's 4-H program is involved with Smart Bodies. 4-H agents recruit the schools for the Body Walk event, and 4-H students and adult volunteers help staff the exhibit. Another example of 4-H involvement in the nutrition effort is the Food and Fitness Board, a group of senior 4-H students who conduct outreach efforts including an annual Food and Fitness Camp at the Grant Walker 4-H Educational Center in Pollock. In 2014, this camp will be for the whole family and not just the students.

Smart Portions is a nutrition education program designed to help people change to a healthier lifestyle through healthier eating habits and more physical exercise. Extension agents across the state have offered this series of eight weekly 60-minute lessons. For example, Debbie Melvin, nutrition agent in Lafourche and Terrebonne parishes, has been offering the class series for the past five years and for the past couple of years in conjunction with Thibodaux Regional Medical Center and Terrebonne General Medical Center. Read more on page 30.

Another way to teach nutrition to families is through gardening. Horticulturist Kiki Fontenot leads an AgCenter initiative encouraging school gardens, which helps children learn math and science as well as nutrition. She conducts workshops for teachers and sends a follow-up newsletter called Veggie Bytes.

Fontenot also is in charge of the Children's Garden at the AgCenter Botanic Gardens at Burden, which she uses for workshops with teachers, children and parents. The Louisiana Master Gardeners provide volunteer service by helping with the school garden programs.

The LSU AgCenter and the Southern University Agricultural Center are both involved with federally funded outreach programs, which include the Expanded Food and Nutrition Program (EFNEP) and the Supplemental Nutrition Assistance Program-Education (SNAP-Ed).

EFNEP is designed to empower limited-income families with young children to make informed decisions about food purchasing, food safety and meal management. SNAP-Ed reaches people receiving food stamps, which include the elderly. The program's goal is to help people adopt healthy food choices within a limited budget and incorporate active lifestyles and habits that promote good health.

Two other programs that reach limited-resource families are the AgCenter's Healthy Beginnings for Your Baby and Southern University's Parents Preparing for Success, which includes additional teaching about financial management. Read more about these programs on page 26.

The newest program, which is called Healthy Communities, takes a holistic approach to helping people learn to live a healthier lifestyle with the aim of disease prevention. See the story on page 10. The AgCenter is partnering with Southern University and the Pennington Biomedical Research Center.

"People want information that allows them to make the decision," said Gina E. Eubanks, LSU AgCenter program leader for food and nutrition and also the vice chancellor for extension at the Southern University Ag Center. "We can provide people with the knowledge, but it must be presented in a way that people decide for themselves that this is what I need to do."

For more information about nutrition education programs, contact your local parish extension office. You can also go to www.LSUAgCenter.com and search for nutrition.

Linda Foster Benedict is associate director and professor in LSU AgCenter Communications.

LOUISIANA Agriculture

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ON THE COVER: Fourth grade students and a parent volunteer at Park Forest Elementary in East Baton Rouge Parish participate in the Body Walk, one component of the Smart Bodies program. Photo by John Wozniak



The All-America Selections Display Garden at the Botanic Gardens at Burden has won a national design award. Photo by Katie Guitreau

LSU AgCenter, LSU join in promoting Burden Museum & Gardens

The LSU AgCenter Botanic Gardens, LSU Rural Life Museum and Windrush Gardens all occupy the 440 acres of land in the center of Baton Rouge, which at one time was the Windrush Plantation owned by the Burden family.

Now, all parts have been pulled together under one name – the Burden Museum & Gardens.

"This new branding will help us raise the profile of the site and promote it as a destination for the city, state, region, country and the world," said John Russin, AgCenter vice chancellor.

The largest share of the property, more than 400 acres, is the Botanic Gardens, which is the new name for the former Burden Center.

For more information about the research projects, educational programs, display gardens and special events at the Botanic Gardens and other parts of Burden Museum & Gardens, go to www.discover-burden.com.

Botanic Gardens wins national design award

The LSU AgCenter Botanic Gardens at Burden has received a national award for the design of its All-America Selections Display Garden. This 50-foot-by-200-foot

garden features flowers and vegetables recommended by All-America Selections, a nonprofit organization.

The garden won first place in the category for AAS display gardens with fewer than 10,000 visitors per year, according to Jeff Kuehny, Botanic Gardens director.

The garden was established in 2008 and the planting design was created by Katie Guitreau, Botanic Gardens landscape manager. She changes the plantings each fall and spring, using the latest AAS varieties.

The All-America Selections Display Garden is one of five gardens to visit at the Botanic Gardens. The others include the Children's Garden, the Vi and Hank Stone Camellia Gardens, the Rose Garden and the Ornamental Ginger Garden.

Three new specialists join the AgCenter

Three new extension specialists have joined the AgCenter. They are Kristen Healy, public health entomologist; Melanie Lewis Ivey, plant pathologist; and Paul Price, plant pathologist.

Healy has state-wide responsibilities for mosquito control. Her research focuses on the dynamics of



Kristen Healy

container mosquitoes – those that lay eggs in standing water around homes and structures. Her work also includes honey bees and how pesticides affect them. She is based in the Department of Entomology on the LSU campus.

Lewis Ivey's work involves disease management of horticultural crops, including vegetables, small fruits, fruit and nut trees, ornamentals and turf. She is based in the Department of Plant Pathology on the LSU campus.



Melanie Lewis Ivey

Based at the Macon Ridge Research Station in Winnsboro, Price provides education about plant and crop diseases for the 13-parish Northeast Region. He is involved in collaborative research and extension projects for cotton, corn, soybean, grain sorghum and wheat.



Paul Price

Holston-West wins award for Smart Bodies

Denise Holston-West, registered dietitian and program manager for the AgCenter's Smart Bodies program, is the winner of the 2013 Southern Region Excellence in Extension Award.

The Association of Public and Land-Grant Universities awards this distinction to individuals who have a positive effect on people in their community and provide visionary leadership for the Extension System.

The Smart Bodies program addresses the childhood obesity problem in Louisiana with three components – the 2 Step in the Classroom curriculum materials, the Body Walk interactive exhibit and the Organwise Guys teaching materials.

The program was initially funded by Blue Cross and Blue Shield of Louisiana Foundation for \$1.8 million in 2004. In



Denise Holston-West

2010, Holston-West received an additional \$1.25 million in external funding from Blue Cross.

The program has been recognized with the BlueWorks Award from Blue Cross and as a National 4-H Program of Distinction.

Eubanks named new program leader

Gina Eubanks, vice chancellor for extension at the Southern University Agricultural Center, has been named program leader for food and nutrition at the LSU AgCenter.

"Our research and extension programs related to human nutrition and obesity prevention will be greatly strengthened with the addition of Dr. Eubanks to our team," said Bill Richardson, LSU vice president for agri-

culture. "Her joint appointment will enhance our working relationship with Southern University and provide more opportunities for collaboration between the two land-grant universities and efficient use of resources."

Eubanks' appointment will be 60 percent with the AgCenter and 40 percent with Southern. She will report directly to Richardson and provide programmatic supervision for AgCenter regional directors and academic department heads and directors.

One of Eubanks' first assignments is working with the Healthy Communities program in West Carroll Parish. "This



Gina Eubanks

program takes a holistic approach to health education," Eubanks said. "Good nutrition and physical fitness must work together. The whole community needs to be involved for real change to take place. The effort in this parish will serve as a model for the rest of the state."

Eubanks has been with Southern University nearly 22 years, joining the faculty as coordinator of family and consumer sciences in 1991. She rose through the ranks and was named vice chancellor for extension in 2002.

Eubanks received a B.S. degree in clothing and textiles from Southern in 1977. She was awarded an M.S. degree in clothing and textiles merchandising in 1978 and a Ph.D. in home economics in 1987, both degrees from Oklahoma State University.



Bentley Fitzpatrick, research associate at the Red River Research Station, shows students cotton after it was ginned. The display was part of the AgMagic exhibit at the Louisiana State Fair at Shreveport. Roughly 2,500 students were registered for the event, which ran from Oct. 24 to Nov. 10, from schools across northwest Louisiana, but many more showed up for unscheduled visits, according to Gwen Fontenot, 4-H agent in Natchitoches Parish. Photo by Bruce Schultz



Ken Koonce chats with students at Burger Bash, the welcome back party for students held Sept. 25 on the Baton Rouge campus. Photo by Johnny Morgan

Dean Koonce retires after 46 years

After 46 years of working for LSU in various capacities, Ken Koonce has retired as the dean of the College of Agriculture. Much has changed since 1967, he said.

Koonce's first job at the university was as a professor in experimental statistics. From there he began his climb up the administration ladder.

"From 1989-1997, I was department head in experimental statistics, providing statistical support for experiment station research people," he said.

In the AgCenter, Koonce was assistant director for intellectual property, external funding, grants and contracts.

Koonce said one of his most memorable events in that position came in the early 1990s, when he was involved in the development of Clearfield rice. The variety was developed as the main weapon against red rice, which is a nuisance weed in the rice-growing regions of Louisiana.

"This was a big deal because rice farmers were struggling to control this weed," Koonce said.

Koonce said he remembers in 1972 when the AgCenter was separated from the College of Agriculture. Even as separate entities, Koonce said, there has always been a close working relationship between the college and the AgCenter.

Koonce supports the decision to consolidate the college and the AgCenter under the same administrative structure. Bill Richardson, who was the dean before Koonce, has been named dean again. Richardson now oversees the AgCenter and the college. His title was changed from

Chancellor of the LSU AgCenter to LSU Vice President for Agriculture and Dean of the College of Agriculture.

MANRRS is back

The LSU chapter of the national society of MANRRS – Minorities in Agriculture Natural Resources and Related Sciences – held a kickoff meeting on Oct. 2 to let students know that the chapter is back and ready to regain name recognition.

The LSU chapter began losing membership around the time Hurricane Katrina caused so much disruption to south



Jewel Butler, former national president of MANRRS, is greeted by Bill Richardson, LSU vice president for agriculture and dean of the College of Agriculture, at the LSU chapter's fall kickoff meeting in the LSU Student Union on Oct. 3. Butler was the guest speaker and reminded the students that MANRRS is an organization that strongly encourages networking, diversity and personal awareness. Photo by Johnny Morgan

Louisiana. By 2007, the organization was no longer active on campus.

Bianca Teats, advisor to the LSU chapter, said before the chapter became inactive, it was recognized as one of the strongest in the country.

Through a renewed interest by current students and encouragement from the organization's national office and the College of Agriculture dean's office, the organization is back and recruiting students to become a part of the new MANRRS at LSU, Teats said.

Bill Richardson, LSU vice president for agriculture and dean of the College of Agriculture, said he was dean of the college when MANRRS was first organized at LSU, and he pledged to give the organization all the support that he has available.

"I want you to know that I'm in your corner, and I'm ready to go, and we'll make this meeting even bigger next year," Richardson said. "I want to challenge you. When you're walking around campus, each one of you can invite one more person to your next meeting."

Griffin named graduate student recruiter

James L. Griffin, the Lee F. Mason LSU Alumni Association Professor in the School of Plant, Environmental & Soil Sciences, has been named graduate student recruiter in the LSU College of Agriculture.

One of the initiatives for the college will be to increase the number of graduate students, said Bill Richardson, LSU vice president for agriculture and dean of the college.

"We intend to put forth the resources needed to enhance our recruitment," Richardson said. "Dr. Griffin's experience as a teacher and mentor at LSU will aid in coordinating these efforts across all of the college's academic units."

Across the country, undergraduate enrollment in agriculture has decreased and affected the ability to recruit the next generation of scientists, Griffin said. "Graduate students are the lifeblood of agriculture research. We can identify top-notch students studying biology and related courses in other Louisiana schools and offer them the opportunity to continue their educations."



James L. Griffin

International Programs

AgCenter scientists work to improve cattle health in Kosovo

Susan Karimiha



Visiting a beef farm in Suhareke, Kosovo, are Kreshnik Rogova, a Borlaug Fellow and manager of the Veterinary Ambulance in Suhareke, second from left; Cathy Williams, LSU AgCenter associate professor in animal sciences, third from left; and Vinicius Moreira, associate professor at the LSU AgCenter Southeast Research Station, third from right.

As part of the U.S. Department of Agriculture Norman E. Borlaug International Agricultural Science and Technology Fellowship Program, the AgCenter sent a delegation to the Republic of Kosovo for an animal health and reproduction scientific exchange in May. The visit allowed follow-up and continuance of training provided to three Borlaug Fellows from Kosovo, who had completed their fellowships at the AgCenter in 2012 and 2013 – Shaban Gollopeni, Kreshnik Rogova and Xhavit Bytyci.

Gollopeni is the head of the Animal Health and Welfare Directorate of the Food and Veterinary Agency of Kosovo. He was mentored by Phil Elzer, associate vice chancellor and professor in the School of Animal Sciences and the LSU School of Veterinary Medicine, and Sue Hagius, research associate in animal sciences. Gollopeni's fellowship, which he completed in December 2012, focused on strategies for brucellosis control.

Rogova is the manager of the Veterinary Ambulance of Suhareke and completed his fellowship in 2013. His focus was the proper selection of artificial insemination sires for overall herd improvement. His mentor was Matthew Garcia, assistant professor in animal sciences.

Bytyci is the director of the Genetic Center of Kosovo and completed his fellowship in 2013. His focus was proper selection of artificial insemination sires through the

use of multiple selection tools and technologies. Garcia also was his mentor.

The follow-up activities included a one-day animal health and reproduction seminar, observations of the workplaces and practices of the fellows, technical assistance and recommendations based on the observations, reinforcement of specific training objectives of the fellows, and discussion of future collaboration.

In addition to Elzer, Hagius and Garcia, those visiting from the AgCenter included Glen Gentry, associate professor at the Dean Lee Research and Extension Station; Susan Karimiha, International Programs facilitator and project director; Vinicius Moreira, associate professor at the Southeast Research Station; and Cathy Williams, associate professor in animal sciences.

The group also met with U.S. Embassy representatives in Kosovo to discuss their findings and the Louisiana-Kosovo experience.

Susan Karimiha is assistant program coordinator for International Programs.

AgCenter, China sign wetlands agreement

A delegation of Chinese educators and researchers attended the signing of a Letter of Intent on Oct. 29 in Baton Rouge to collaborate with LSU and AgCenter scientists.

The purpose of the agreement is to formalize collaboration and strengthen the exchange of resources and talent, said Lawrence Datnoff, head of the Department of Plant Pathology and interim director of the AgCenter International Programs office.

Datnoff and a delegation from LSU and the LSU AgCenter participated in the International Forum on Wetland Ecosystem Functions and Services hosted by the Chinese Academy of Sciences' Northeast Institute of Geography and Agro-ecology in Changchun, China, from July 28–Aug. 3.

"The conference was an opportunity for international scientists to see what is being done in other parts of the world," Datnoff said.

Bill Richardson, LSU vice president for agriculture and dean of the College of Agriculture, said the agreement will allow for a vital exchange of wetlands information.

"It's an information and technology swap – getting students and faculty up to speed on some things that will benefit all," Richardson said.

Aixin Hou, associate professor in the LSU School of the Coast and Environment, who served as a translator, said a separate agreement has been signed with the Wetlands Research Center of the U.S. Geological Survey in Lafayette.

"At the China conference, it was agreed that the Chinese and American scientists should work closer with each other in determining the best way to move forward in protecting these delicate areas," Datnoff said.

In addition to Datnoff and Hou, two other LSU AgCenter faculty members who attended the international wetlands conference were Yi jun Xu and Andy Nyman, both professors in the School of Renewable Natural Resources. Also, Irving Avrum Mendelssohn, Qianxin Lin and Christopher D'Elia from the LSU School of the Coast and Environment attended.

Xu, who was instrumental in getting the signing meeting scheduled, said he began laying the groundwork for this meeting while working for several weeks on a project in China last year.

"I proposed to the director of the institute that we have an international forum between LSU researchers and their researchers to talk specifically about wetlands," Xu said. "We covered over 600 miles during the conference, mainly in the northeastern part of the country where there are a lot of wetlands."



A volunteer shows students the chambers of the heart in the Heart Station of the Body Walk exhibit when it was on display at Park Forest Elementary School in Baton Rouge. Photo by John Wozniak

Smart Bodies: Still Going Strong

Denise Holston-West

Obesity among adults and youth is a growing health care problem at the national and local level and carries with it significant costs, both in terms of dollars and lives. In the United States, one-third of children and two-thirds of adults are classified as overweight or obese, and this increasing obesity trend seems likely to continue.

The statistics for Louisiana are particularly alarming. Findings of the Adolescent School Health Program indicated that 41.3 percent of Louisiana youth ages 2-19 years were classified as either overweight or obese. Only 5.9 percent of youth consumed fruit more than four times per day, and only 11.7 percent of youth consumed vegetables more than three times per day. Additionally, only 34 percent of youth met vigorous physical activity guidelines. To reduce the prevalence of overweight and obesity in Louisiana, it is essential that we teach younger children to adopt healthy nutrition and physical activity behaviors prior to the establishment of unhealthy habits.

Childhood obesity rates are of particular concern because children who are overweight or obese are 70 percent more likely to be overweight or obese as an adult. Being overweight or obese substantially increases a person's risk for the development of nutrition-related chronic diseases such as cardiovascular disease, type 2 diabetes, some forms of cancer, stroke, sleep apnea, hypertension and osteoarthritis. Studies have also shown that being overweight or obese can affect

school performance. For example, overweight children in one study had significantly lower math and reading test scores at the beginning of the school year than did their healthy-weight peers.

In response to the epidemic increase in childhood obesity, the LSU AgCenter, in partnership with Blue Cross and Blue Shield of Louisiana Foundation, launched the Smart Bodies program in March 2005. Smart Bodies provides comprehensive nutrition education with physical activity for elementary school children – kindergarten through fifth grade – which is integrated into core curriculum objectives. The program incorporates classroom activities with hands-on learning to teach children how to build strong bodies and active minds. The foundation's initial grant was \$1.8 million with another \$1.25 million awarded through 2015.

Smart Bodies' Three Main Components

Body Walk. Students explore nine organs of the human body in a 35-foot-by-45-foot, interactive, walk-through exhibit. At each of the stations, children participate in activities focused on the effects that different foods have on each organ. They are given a take-home activity book to share with their families. New this year to the Body Walk is the "Smart Bodies Cafeteria," in which children pretend to transform into a food.

OrganWise Guys. These 10 characters help children understand physiology and healthy behaviors. Hardy Heart, Madame Muscle, Windy the Lungs and the Kidney Brothers (among others) are manifested as cartoons in books, games, videos, posters and as dolls used in nutrition and healthy living lessons. Participating schools receive a free kit with DVDs, dolls, books, games, puzzles, music CDs, posters and banners.

2 Step in the Classroom. This classroom-based, grade-specific educational tool encourages short bouts of physical activity integrated with academic lessons. Participating schools receive curricular materials and training for each grade level, providing teachers with learning activities that incorporate movement to reinforce academic concepts. Curricular materials in both OrganWise Guys and 2 Step are linked to the Common Core Standards established by the Louisiana Department of Education.

The overall goal of the Smart Bodies Program is to promote lifelong healthy eating patterns and physically active lifestyles to Louisiana's children and their families. Milestones of the program include reaching 50 schools per year through Smart Bodies and 30,000 children with the Body Walk exhibit per year. Since March 2005, more than 450 elementary schools have implemented the Smart Bodies program, and nearly 400,000 children and adults have experienced the Body Walk.

School Recruitment

Local AgCenter extension agents recruit schools for the program and then conduct teacher trainings in the schools selected. Once the teachers have been trained, a school assembly is used to kick off the program and build excitement and enthusiasm. Following the assembly, teachers begin using the 2 Step in the Classroom and OrganWise Guys curricular materials in the classrooms. At some point during the program, the Body Walk exhibit is taken to the school and set up by volunteers either in the gymnasium or cafeteria. After the Body Walk leaves, teachers continue to implement the program in the classroom. Smart Bodies newsletters are distributed to parents and teachers to emphasize physical activity and healthy eating.

Adding to the incentive to implement the program was a federal mandate, effective in 2004, that required schools to have a wellness policy in place by 2006 to receive federal funds. In addition, the Louisiana Legislature passed a law (Act No. 734) that requires children in grades K-6 to get at least 30 minutes of moderate to vigorous physical activity daily. The 2 Step in the Classroom has also been a selling point because it provides the opportunity for students to be physically active during the school day without taking away from their academic learning time.

National Recognition and Awards

Smart Bodies was accepted by the National 4-H Headquarters as a Program of Distinction for Healthy Living in 2008 and again in 2012. Programs of Distinction are projects that reflect the high quality of 4-H youth devel-

opment programs occurring in communities across the United States. In 2009, Smart Bodies was one of four winners in the national Blue Works Awards program, which is designed to advance the mission of Blue Cross and Blue Shield to improve the quality of health care. In 2011, Smart Bodies was featured on the U.S. Department of Health and Human Service's Agency for Healthcare Research and Quality Health Care Innovations Exchange. Lastly, in 2013, Smart Bodies was included in the application that enabled LSU to be named to the President's Higher Education Community Service Honor Roll.

Research and Results

The purpose of the initial research project was to evaluate the effectiveness of Smart Bodies in promoting child wellness and preventing childhood obesity. A two-year investigation was conducted among elementary schools in East Baton Rouge Parish. After schools were clustered, they were pair-matched and then randomly assigned to an intervention or control group. Only fourth- and fifth-grade students with parental consent were included in the research. Heights and weights were measured, and body mass index health reports were generated and mailed home to parents.

Analysis of the research data indicated that students who participated in Smart Bodies significantly increased their knowledge about the health benefits of eating fruits and vegetables and significantly increased their self-efficacy scores related to fruit and vegetable intake. Body mass index health reports were effective in increasing both school and parent awareness of children's weight status. One-year follow-up measurements of height and weights showed that the percentage of students considered at risk or overweight remained the same among the Smart Bodies group of students, whereas a slight increase was observed in the control group of students. The Smart Bodies program aims to equip students with the knowledge and intention necessary to adopt positive lifestyle behaviors.

The 2 Step in the Classroom program was assessed in a separate evaluation. Research-grade pedometers were used to assess overall physical activity during implementation of the 2 Step in the Classroom program. Analysis of the data indicated an overall 7 percent increase in steps while participating in the program. Female students benefitted more than male students with a 13 percent increase in steps during the intervention.

The results of both research projects suggest that, when implemented correctly, Smart Bodies is effective in teaching children about the importance of taking care of their bodies. If children learn how to adopt a healthy lifestyle, they will be less likely to experience the consequences associated with obesity later in life.

To find out more about the Smart Bodies program, visit www.smartbodies.org or Facebook <https://www.facebook.com/SmartBodiesLA>.

Denise Holston-West is an instructor in the School of Nutrition and Food Sciences.



Chelsea Shepherd helps her little brother, Jacob Martinez, 4, try some kiwifruit at one of the exhibits at the Family Fall Fest in Oak Grove, sponsored by the LSU AgCenter, Southern University and the Pennington Biomedical Research Center. "He'll eat anything," she said. Photo by Linda Foster Benedict

Family Fest draws 400, kicks off Healthy Communities program

Linda Foster Benedict

Cars were lined up for a mile trying to get into the Family Fall Fest at the Thomas Jason Lingo Center in Oak Grove on a sunny Saturday morning on Oct. 12, reported Brenda Bradley as she arrived.

Bradley, a member of the town council here, was one of the planners for this event, which attracted more than 400 men, women and children of all shapes, ages and sizes from across West Carroll Parish.

The fest theme was "Live Life Healthy," and it featured more than 20 health-related exhibits, free food, health screenings, door prizes and outdoor activities for the children, which included inflatable play equipment, a petting zoo and games.

"We were so pleased with the turnout," said Monica Stewart, LSU AgCenter family and consumer science agent and the chief organizer. She had worked tirelessly to promote

the fest, the first ever of this scale in this parish of 11,600 in the northeast corner of Louisiana.

She had blanketed the parish with radio spots, digital signs and flyers distributed in all the schools and even at the Oak Grove High School football game the Friday night before.

The purpose of the fest was to kick off the new Healthy Communities program sponsored by the AgCenter in partnership with the Pennington Biomedical Research Center and the Southern University Agricultural Center, said Stewart, who was hired June 1, 2013, as the program's coordinator.

The goal of Healthy Communities, which will span the next four or five years, is to improve the health status of the people who live in West Carroll Parish, one of the poorest counties in the nation and among the highest for obesity problems.

The program's success in this parish will then be used as a model for similar programs in other Louisiana parishes.

The program's success in this parish will then be used as a model for similar programs in other Louisiana parishes, according to Gina Eubanks, LSU AgCenter program leader for food and nutrition. Louisiana holds the national record for the highest percentage of people overweight or obese – 34.7 percent. The most recent state-by-state data on obesity rates for youth 10-17 years old show Louisiana in fourth place with 21.1 percent, Eubanks said.

"This is so good for our community," Bradley said of the Healthy Communities program. She is executive director of Partners in Prevention, which works in the schools to prevent drug and alcohol abuse. Her organization was one of the exhibitors at the fest.

Bradley also is a member of the Healthy Communities advisory board that Stewart is putting together. This board, which will include about two dozen people from throughout the parish, will oversee and provide direction for the program.

"We want this effort to be locally driven and to meet the needs of this community," said Stephanie Broyles, a scientist with Pennington Biomedical, who will conduct research as part of this project. "We want to develop an intervention strategy that will actually work and help people become healthier."

The idea for Healthy Communities started when top officials with the LSU AgCenter and Pennington Biomedical met in 2012 to explore the possibility of together obtaining funding from the National Institutes of Health and the



Bobbie Anderson, who lives in Pioneer, won the door prize offered at the session on cooking with sweet potatoes taught by Dorris Thompson, a nutrition educator with the LSU AgCenter. Photo by Linda Foster Benedict

Johnson&Johnson pharmaceutical corporation for health intervention in a rural community. Most health intervention research programs occur in urban areas with more services, Broyles said.

With Pennington Biomedical's national reputation for nutrition and health research and the AgCenter's ability to run effective educational programs in every Louisiana parish, the two groups began pursuing grants.

So far, however, no proposals have received major funding, but the officials decided to move forward anyway in the hope that grants will materialize eventually. Pennington Biomedical has used funds to support the project secured through the Louisiana Clinical & Translational Science Center, which is a partnership with the LSU Health Science Center and Tulane University to support innovative research.

"The Delta region in our state has some of the country's highest levels of poverty, obesity and chronic disease. We aim to concentrate efforts in this region, starting with West Carroll Parish. By working together and combining our resources, we feel we can make a difference," said Bill Richardson, LSU vice president for agriculture.

West Carroll Parish was selected because even though among the poorest and unhealthiest in the country, it has an infrastructure in place for community betterment. The Lingo Center, for example, where the Fall Family Fest was held, is a 31,000-square-foot facility that includes an auditorium, meeting rooms, kitchen and the AgCenter extension office. Built in 1997, it is managed by the Northeast Educational Development Foundation and offers a host of entertainment and educational events as well as an RV park.

Oak Grove is the largest town in the parish but has few parks or other opportunities for physical activity. The other parish towns have no such amenities, according to Terri Crawford, AgCenter family and consumer science agent.

Crawford and other representatives from the AgCenter and from Pennington Biomedical met with about 40 people from throughout the parish in July 2012 to lay the groundwork for the project. They asked the group to assess



Terri Crawford, extension agent seated in the center, administered a scan test of the heel of the foot to check people's bone density. If the level was below normal, she encouraged them to visit their doctor. Photo by Linda Foster Benedict



Stephanie Allen, a nurse with West Carroll Health Systems sitting at left, said blood pressures tended to be a bit high among participants at the fest; sugar levels tended to be good. Photo by Linda Foster Benedict

the parish's health status and the issues and barriers to improvement.

"They told us there was a lack of access to physical activity and limited access to fresh produce," Crawford said.

When asked to give school-like grades on the health status of the West Carroll Parish people, the group gave a C-minus to the adults and a D to the teens, Crawford said.

"They were all in favor of any health education and intervention programs we could bring their way," Crawford said.

The Healthy Communities program will serve as a laboratory for testing how best to conduct chronic disease intervention in a rural setting. "We want to find how the environment enables or inhibits health choices," Broyles said.

Broyles said the LSU Public Policy Research Lab will conduct a phone survey in which people will be asked what they eat, what health conditions they have and how often they exercise. The Pennington Biomedical team will travel to the parish and gather physical evidence, including blood samples and blood pressure readings, as well as more survey data.

Melissa Cater, an assistant professor with the LSU AgCenter Organization Development and Evaluation office, is also gathering baseline data. In August, she, Stewart and Crawford canvassed the parish, recording places where people could buy fresh fruits and vegetables.

They found 18 spots and will go back in a few years and see if this number and the quantity of fresh produce available have increased.

The advisory committee will help the educators and researchers determine the best ways to reach people and garner support to build more recreational facilities, community gardens and fresh food markets.

There will definitely be more health fairs, such as the one on Oct. 12, Stewart said.

"This is the best one I've been to," Bobbie Anderson, of Pioneer, a tiny town just outside Oak Grove, said of the fair.

Linda Foster Benedict is a professor and associate director in LSU AgCenter Communications.

"The Delta region in our state has some of the country's highest levels of poverty, obesity and chronic disease. We aim to concentrate efforts in this region, starting with West Carroll Parish. By working together and combining our resources, we feel we can make a difference."

Bill Richardson, LSU vice president for agriculture

Consuming orange juice is good for children and adolescents

Carol O'Neil

The severity of the childhood obesity epidemic and its potential health consequences has nutritionists and other scientists looking for immediate and simple solutions to a very complex problem. Causes of overweight and obesity are multifactorial, with genetic, environmental (e.g. poverty and lack of access to nutrient-rich foods), and behavioral factors (e.g. lack of physical activity, poor diet and screen time) playing important roles even in very young children.

Yet, sensationalists continue to advocate simplistic approaches to reverse the epidemic; thus, single nutrients, foods or food groups have been identified as major causes of the epidemic. One example is the maelstrom that has surrounded consumption of 100 percent fruit juice. Nearly 20 years ago, concerns about the increasing levels of 100 percent fruit juice consumption appeared, and it was identified as a beverage associated with overweight in children. Later studies that looked at 100 percent fruit juice and weight showed inconsistent results, but the overwhelming majority showed that 100 percent fruit juice was not associated with higher weight in children.

To compound the problem, many scientists and consumers alike viewed and continue to view 100 percent fruit juice as an "empty calorie" beverage. A recent comment in the literature stated "that fruit juices should be viewed similarly to other high sugar items such as candy and desserts." Some pediatricians have also branded 100 percent fruit juice as "essentially empty calories" and "worse than soda." It is unclear how a food or beverage defined by the 2010 Dietary Guidelines for Americans as nutrient-dense and recommended by MyPlate, the consumer interpretation of the guidelines, has sunk into such disrepute.

The allegations against 100 percent fruit juice have been made in spite of recent findings that consumption of 100 percent fruit juice has been associated with higher intakes of key nutrients, diet quality, and an increase in total and whole fruit consumption, but not with

higher weight status. Orange juice is the most popular 100 percent fruit juice consumed in the United States, so it was used in this study. One 8-ounce serving of 100 percent orange juice provides only 112 calories, 21 grams total sugars, 124 milligrams vitamin C, 27 milligrams magnesium, 74 dietary folate equivalents, 496 milligrams potassium (a nutrient of public health concern), and only 0.06 gram saturated fatty acids and 2.5 milligrams sodium – the latter are both nutrients to limit. Several types of orange juice are also fortified with fiber, calcium or vitamin D; these were also identified as nutrients of public health concern in the 2010 Dietary Guidelines for Americans.

The purpose of this report was to compare the diet quality, nutrient adequacy, food group intake and weight status of children and adolescents (2-18 years of age) who consumed 100 percent orange juice and those who did not. The participants were all part of the National Health and Nutrition Examination Survey from 2003-2006. This study design provides results representative of the U.S. population and allows generalizations to be made.

Diet quality, measured by the Healthy Eating Index – 2005, is how

well a person, or in this case a group, adheres to the Dietary Guidelines for Americans. Total Healthy Eating Index scores were higher in 100 percent orange juice consumers as compared to nonconsumers in both children and adolescents (Figure 1), suggesting orange juice consumers had better diets than nonconsumers.

Those participants who drank 100 percent orange juice had higher intakes of energy, protein, carbohydrates, total fat and dietary fiber. Consumers were also less likely to be below the estimated average requirement than nonconsumers for vitamins A, B-6 and C; and folate and magnesium. These vitamins and minerals are associated with a wide variety of health benefits. Consumption of 100 percent orange juice was also associated with greater intake of whole fruit, which likely leads to the higher intake of dietary fiber.

The single biggest question remaining is: Does consumption of 100 percent orange juice mean higher measures of adiposity in children. There was no difference between body weight or body mass index in children who consumed 100 percent orange juice and those who did not; waist circumference was smaller in children who consumed 100 percent orange juice. The likelihood of being overweight, obese, or overweight or obese was not greater in children who consumed 100 percent orange juice.

Therefore, consumption of 100 percent orange juice at these levels was associated with nutritional benefits for children and adolescents, including better diet quality and increased nutrient adequacy of nutrients often under consumed by children. Perhaps most importantly, consumption of 100 percent orange juice was not associated with body weight or adiposity parameters or an increased risk of overweight or obesity in children. For children and adolescents, consumption of 100 percent orange juice provided a variety of nutritional and health benefits.

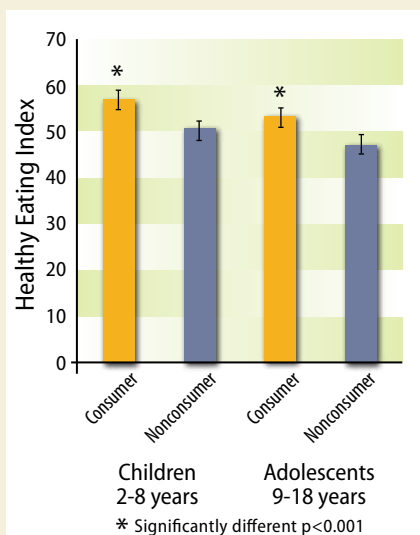


Figure 1. Healthy Eating Index scores of children and adolescents who consumed orange juice.

Carol O'Neil is a professor in the School of Nutrition and Food Sciences.

We Can! Louisiana

Adapting the Dietary Guidelines for All Americans

Bernestine B. McGee and Glenda S. Johnson

The Dietary Guidelines for Americans are science-based recommendations to promote health, reduce the risk of chronic diseases, and reduce the prevalence of overweight and obesity through diet and physical activity. The Dietary Guidelines for Americans 2010, published by the U.S. Department of Health and Human Services and the U.S. Department of Agriculture, emphasize three major goals for Americans: balance calories with physical activity to manage weight; consume more of certain foods and nutrients such as fruits, vegetables, whole grains, fat-free and low-fat dairy products and seafood; and consume fewer foods with sodium, saturated fats, trans fats, cholesterol, added sugars and refined grains.

Studies have shown that most Americans are not meeting the dietary guidelines, especially low-income groups, some racial and ethnic groups, and children. There is convincing evidence that regular physical activity and appropriate dietary patterns protect against chronic diseases and unhealthy weight gain. The nutrition information in the dietary guidelines is of little value if consumers do not follow the recommendations and make the necessary dietary changes to lead more healthful lives. Effective strategies must be identified to enhance adherence to the healthful food and physical activity patterns set forth in the Dietary Guidelines for Americans, particularly for diverse population groups in the United States.

Obesity in Louisiana

Obesity prevalence in Louisiana was 34.7 percent while Colorado had the lowest rate at 20.5 percent, according to the latest report from the Centers for Disease Control and Prevention. As income decreases, obesity rates tend to increase. Low-income families generally live in neighborhoods lacking safe outdoor areas for exercise and play and have limited access to supermarkets selling fresh produce and healthful foods. Recent findings have reported that childhood obesity is declining in several states; however, obesity rates in rural Louisiana children do not reflect this decline. The most recent state-by-state data on obesity rates for youth 10-17 years old indicated Louisiana ranked fourth in the country with 21.1 percent.

States with the highest obesity rates		
Rank	State	Percentage of obesity (Based on 2012 CDC Data)
1	Louisiana	34.7%
2	Mississippi	34.6%
3	Arkansas	34.5%
4	West Virginia	33.8%
5	Alabama	33.0%

Childhood Obesity Prevention Research at Southern University

Research shows that parents and caregivers are the primary influence on 8- to 13-year-old children. The family is a major influence on eating behavior of children and adolescents. The family mediates children's dietary patterns in two ways: the family is a provider of food, and the family influences food attitudes, preferences and values that affect lifetime eating habits. The amount that children exercise and eat, and whether they are overweight, often has a lot to do with the examples set by parents.

There is a consensus among health researchers and professionals that health promotion programs and associated materials should be culturally sensitive. The concept of cultural sensitivity can be considered as the extent to which ethnic or cultural characteristics, experiences, norms, values, behavioral patterns and beliefs, as well as relevant historical, environmental and social forces, are incorporated in the design, delivery and evaluation of targeted health promotion materials and programs. Another term related to cultural sensitivity is cultural tailoring, which is the process of creating culturally sensitive interventions, often involving adapting existing materials and programs for racial or ethnic subpopulations.

Cultural tailoring is recommended when implementing national health campaigns, such as the U.S. Dietary Guidelines or Choose MyPlate with rural, low-income populations. Low levels of economic and social resources in disadvantaged communities may make it difficult for the participants to assimilate and use print information accompanying the campaigns. In addition, most print materials used with national campaigns have been developed for middle-income, nonminority populations and usually require high literacy levels. For this reason, Southern University researchers chose to tailor the National Institutes of Health program titled We Can! (Ways to Enhance Children's Activity & Nutrition) to implement research related to preventing childhood overweight and obesity in Louisiana families.

The NIH We Can! program is designed for parents and caregivers to encourage healthful eating, increase physical activity and reduce "screen time" (television, computer, video games) in children 8-13 years old. We Can! Louisiana is an educational program aimed at promoting adherence to the healthful food and physical activity recommendations set forth in the U.S. Dietary Guidelines for Americans and the resulting effect on reducing weight gain and the risk factors for obesity-related chronic disease in parents and children in rural Louisiana communities. Findings from focus group sessions held with rural Louisiana parents and children and community advisory committee sessions guided the plan-

ning of the education program and materials that reflected the ethnic and cultural characteristics, beliefs, values and traditions that influence dietary and physical activity behaviors and perceptions of health and obesity prevention in the target population.

The education program was designed with input from representatives of the target population, including time and location of classes. It included topics gathered from the focus groups that were historical, social, cultural and environmental that influence health behavior of the target population. Culturally tailoring the national We Can! program included adding pictures to the front cover of the parents' handbook and adding foods and physical activities that were not included on the Dietary Guidelines to reflect the ethnicity of the target population. To ensure that the materials were at the appropriate grade level for the audience's ability to comprehend the information, the researchers employed several measures for developing print materials for low-literacy readers.

The weekly We Can! Louisiana parent sessions included food preparation instructions, physical activity and discussion sessions on progress and challenges in following recommended child-feeding principles, as well as self-efficacy and social support for meeting the U.S. Dietary Guidelines for Americans recommendations. It also has a gardening component. The biweekly sessions were held with the children to reinforce the parental instructions. Parents and children demonstrated sustained interest in weekly nutrition and physical activities and offered suggestions for making the program interesting. We Can! Louisiana began in May 2012 in St. Landry Parish and concluded in November 2013.

Empowering parents and caregivers to make behavioral choices that support a healthy lifestyle can help children and families attain and maintain a healthy weight, reduce their risk of chronic disease and promote overall health. Some strategies for parent and caregivers and children emphasized in We Can! Louisiana include:

- Choose a sufficient amount of a variety of fruits and vegetables every day.
- Decrease consumption of high-fat foods and energy-dense foods low in nutrient value.
- Enjoy small portions at home and at restaurants.
- Substitute water, fat-free milk or low-fat milk for sweetened beverages.
- Engage in at least 60 minutes of moderate physical activity on most – preferably all – days of the week.
- Reduce sedentary activity by limiting screen time (watching TV, using a home computer for fun or playing video games) to no more than two hours per day.
- Support and enable family physical activity.

Bernestine B. McGee is a professor and Glenda S. Johnson is a nutrition research scientist in the Human Nutrition and Food Program, Southern University and A&M College, Baton Rouge, La.

SCIENCE NOTE

Nutrition for Mom and Baby

Diane D. Sasser and Carol J. Lammi-Keefe

The building blocks for a child's success begin with the mother's care and nutrition for herself and her baby. The Dietary Guidelines for Americans developed by the U.S. Department of Agriculture and the U.S. Department of Health and Human Services include recommendations for women capable of becoming pregnant and women who are pregnant and breast-feeding.

Research continues to support breast-feeding as the best practice for supplying on-demand nutrients, antibodies to fend off diseases, and other factors continuously being discovered by science. If a mother decides not to breast-feed, she can be secure in knowing that formulas on the U.S. market have been made to contain all of the currently known and tested ingredients in breast milk. Formulas change as more becomes known about the composition of breast milk and the factors found in breast milk that are important to growth, brain development and defense against infections.

LSU AgCenter researchers have studied the composition of breast milk and identified novel molecules that are only recently beginning to be investigated in breast milk. Recent work demonstrates that the breast milk of women with gestational diabetes during pregnancy is similar in many ways to breast milk of women who had pregnancies uncomplicated by diabetes. This leads to the recommendation that all new mothers be advised to breast-feed their newborns unless otherwise advised by their doctors.

Recommendations for Women Capable of Becoming Pregnant

- Consume foods that are good sources of heme iron (meat, poultry, fish).
- Consume other foods and beverages that help iron be absorbed into the body. Examples are vitamin C-rich foods (citrus fruits and juices, such as orange juice).
- Consume foods high in folate (liver; leafy green vegetables, such as spinach, kale, mustard greens; asparagus; oranges; dried beans and legumes, such as red beans, black beans; grain products enriched with folic acid).
- Consume 400 micrograms per day of synthetic folic acid – this can be purchased at grocery stores, pharmacies and discount stores.

Source: Dietary Guidelines for Americans, 2010

Recommendations for Pregnant and Breast-Feeding Women

- Eat 8 to 12 ounces (approximately three to four 3-ounce servings) of varied seafood types each week. Excellent choices are salmon, tuna and herring; good choices are flounder, catfish and shrimp.
- Limit albacore tuna to 6 ounces per week.
- Do not eat fish that can be high in methyl mercury (shark, tilefish, swordfish, king mackerel).
- If pregnant, take an iron supplement as recommended by your doctor.

Source: Dietary Guidelines for Americans, 2010

Diane D. Sasser is the Adrienne Gravois Brazan Professor in the School of Nutrition and Food Sciences and project director for Healthy Beginnings and SNAP-Ed, and Carol J. Lammi-Keefe is the Alma Beth Clark Professor of Human Nutrition in the School of Nutrition and Food Sciences.

Let's Move the 100 Way

Fatemeh Malekian and Charisma Deberry



The “Let’s Move the 100 Way” program consisted of 13 lessons conducted at Crestworth Learning Academy in Baton Rouge. Photo by Fred Sibley

Louisiana youth are more likely to be overweight or obese than their peers in other states. Some children consume a majority of their calories at school (breakfast, lunch and snack) and depend on school physical education programs for adequate fitness lessons. Schools sell many foods and drinks outside the school meal program. A competitive food is defined as any food items sold in competition to the reimbursable school meal. These so-called competitive foods are widely available to students through a la carte lines in the cafeteria, vending machines, school stores, snack bars and other venues. These snack foods are often high in fat, sugar, salt and calories and have little nutritional value. This glaring health inequality needs attention in schools, particularly where many of the students are disadvantaged and reside in food deserts. A food desert is an area with a substantial share of residents with low incomes and lack of access to a grocery store or other healthy, affordable fresh fruit and vegetable options. Lack of access to healthy food options has a disproportionately negative impact on underserved students.

The Southern University Agricultural Research and Extension Center programs are specifically targeted to

address the scientific, technological, social, economic and cultural needs of Louisiana citizens. Louisiana is consistently ranked as one of the most obese states in America. Being obese or overweight is associated with increased risk for chronic diseases such as diabetes, cardiovascular disease and some forms of cancer. Obesity in adolescence often continues into adulthood.

Partnering with a local nonprofit organization, 100 Black Men Inc., Southern researchers launched “Let’s Move the 100 Way” in January 2013 to conduct a research and extension program on obesity, nutrition and health of middle school students at Crestworth Learning Academy, a school in the Scotlandville neighborhood in Baton Rouge. “Let’s Move the 100 Way” sought to increase nutrition knowledge and encourage children to eat a variety of healthy foods and get the students involved in structured physical activity.

Crestworth Learning Academy was selected as the program site because of the disadvantaged background of the student population and its location in Scotlandville, an area classified as a food desert. The program was designed to encourage children to make healthy lifestyle and food choices.

The Study

Crestworth administrators granted access to the entire student population twice a week for “Let’s Move,” which was conducted as an in-service enrichment offering during the spring semester in 2013.

One part of the study involved observing the choices made by students for several days at the school cafeteria. The observation was conducted to gain insight about the participants’ daily consumption and food choices.

Using the intervention method of research, an instructor conducted 13 nutrition and health education lessons. These 50-minute lessons included food preparation and food safety. Hands-on activities such as making healthy trail mixes, measuring sugar in sodas, measuring fat in fried foods and reading nutrition facts from popular food labels were incorporated. In some classes fresh fruits and vegetables and water were served. After class sessions, handouts and other nutrition information were sent home with students.

In addition, a weekly physical fitness program was developed for the school. Because of lack of equipment, the 100 Black Men organization provided approximately \$4,000 of new sporting equipment and class supplies. The physical activity coach from the school and a kinesiology student from Louisiana State University guided students in activities and using the new equipment.

Pre- and posttests were completed for the program by 131 participating students. A majority, 58 percent, of the students were male with 42 percent females. The students were between the ages 11-17 years old in grades six through eight. All student participants identified themselves as African-American.



Fatemeh Malekian taught some of the nutrition classes as part of the “Let’s Move” program at Crestworth Learning Academy in Baton Rouge. Photo by Fred Sibley

Results

The participants’ knowledge of nutrition and food label recognition was tested before and after the 13-session series. A separate class of students that did not have the intervention was also tested to compare scores. The results showed significant gains in knowledge for the 131 participants. Informal observations of the students indicated that they tended to choose healthier snacks toward the end of the sessions, and they increased their physical activity.

Limitations

The study was a small-scale trial that depended on Crestworth administrators and undergraduate staff assistants without formal research backgrounds to follow a research protocol. The lack of research staff training may have contributed to a lack of compliance by school administrators to the research design. The student staff workers may have reported implementing more of the intervention than they actually did to please the researchers. Another limitation was the use of an underperforming school as a test site; many students are far behind grade-level in core subject areas, making it difficult to teach enrichment courses. The varying ages of student’s participants (11-17) may have affected student concentration and ability to retain taught lessons.

Future Research and Intervention

Future studies should be directed toward the question of whether reducing access to competitive foods compared to the consumption of locally grown fruits and vegetables has long-term positive effects on obesity and other health issues among African-American students. Also, the surrounding environment in the African-American communities can contribute to the overall dietary habits of the children and adolescents in the aforementioned populations. Future studies should focus on ethnic disparities and why they exist as well as how to effectively implement the competitive food policies in the African-American schools, especially in the middle and high schools where access to the competitive foods tends to be greater. An increase in programs such as the mobile market sponsored by Big River Economic Development Alliances, mobile pantries and community gardens would provide easier access to fresh fruits and vegetables in food desert areas.

Fatemeh Malekian is a professor and Charisma Deberry is a research associate in the Southern University Agricultural Center.

U.S. Consumers' Demand for Healthy, Nutritious Foods

R. Wes Harrison

Consumer attitudes and behavior regarding healthy and nutritious foods in the United States have undergone significant changes the past several decades. These changes have contributed to a growth in the consumption of “healthy” foods, as well as a growth in the demand for minimally processed foods. Healthy foods are defined by the U.S. Department of Agriculture (USDA) as items that belong to one of the major food groups – vegetables, fruits, grains, dairy and protein – in amounts equal to at least half the portion size recommended by the Dietary Guidelines for Americans 2010. In addition, healthy foods contain only moderate amounts of saturated fats, added sugars and sodium. Less healthy foods are high in saturated fat and added sugars and tend to be higher in calories. Foods typically considered healthy include all minimally processed whole fruits and vegetables, whole grains, low-fat dairy products, lean meats and seafood.

The increase in consumption of healthy food is associated with an abundance of scientific evidence regarding linkages between diet and good health. The rising costs of health care coupled with a high incidence of obesity and diet-related disease have also led to increased public concern about health and nutrition. The incidence of obesity has become a chief national health concern, particularly among states in the Deep South. The latest data from the Center for Disease Control (CDC) place the incidence of obesity in the United States from 20.5 percent in Colorado to 34.7 percent in Louisiana. Thirteen states have a prevalence of obesity greater than 30 percent, including Alabama, Arkansas, Louisiana and Mississippi. The prevalence of obesity among children across the U.S. averages about 15 percent, down slightly from 2003, but remains at levels for concern. The most recent state-by-state data on obesity rates for youth 10-17 years old indicated Louisiana ranked fourth in the country with 21.1 percent.

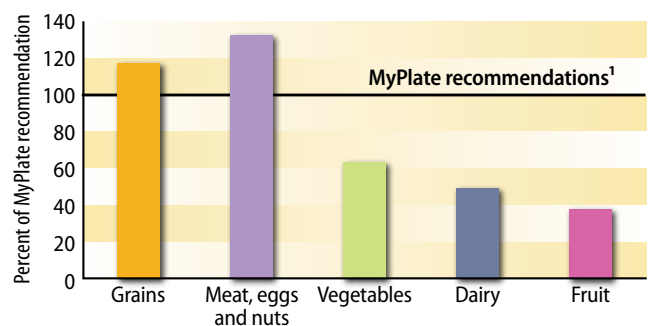
The primary economic factors affecting demand for healthy foods are changes in consumer attitudes regarding health and wellness, relative prices between healthy and less healthy foods, consumer incomes, and the availability and access of healthy foods in grocery stores and restaurants. Because the demand for food is affected by consumers' knowledge about health and nutrition, and prices and income, the changes in demand for food are not uniform across socioeconomic groups or geographic regions. Consumer incomes, regional differences in food culture, the prevalence of poverty and public policy all play a role in determining food choices. For instance, consumers more likely to purchase healthier foods have higher levels of education and income, tend to be older, and tend to live in the West and Northeast regions of the United States.

Despite growth in the demand for healthy foods by some

consumers, the average person in the United States consumes less than the recommended dietary intake of healthier foods. Figure 1 shows the average dietary intake by U.S. consumers in 2011 compared to USDA's recommendations for the major food groups. The chart indicates that the average American consumes greater than the recommended amounts of grains and meat and too little from the fruit, dairy and vegetable groups. In fact, the average American consumes less than 40 percent of the recommended amount from the fruit group, which contains items generally associated with the healthiest foods.

Other important factors affecting the demand for healthy foods are the relative prices of healthy versus less healthy foods. Some USDA studies suggest that healthy foods, such as fresh fruits and vegetables, average as much as 22 percent to 44 percent higher in price relative to less healthy foods. This is an important statistic for low-income consumers seeking healthier food options. For instance, a 2009 USDA study found that a 10 percent reduction in prices of fruits and vegetables would lead to a 2 percent to 5 percent increase in the consumption of fresh fruits and vegetables for households of four earning approximately \$22,000 annually, which is the 2009 poverty level. The percentage of Louisiana residents with income levels less than 125 percent of the poverty level was 22.7 percent in 2012.

In 2012, the USDA estimated that 44.6 million people per month, or about 15 percent of Americans, received food assistance under USDA's Supplemental Nutrition Assistance Program (SNAP). Approximately 16 percent of Americans in the Deep South receive SNAP assistance. The percentage of Louisiana residents receiving SNAP benefits ranges from 9.6 percent in Cameron Parish to 38.4 percent in East Carroll Parish, with a state average of 19.3 percent. This amounts to approximately 868,000 Louisiana residents receiving



Note: Rice and durum flour data were discontinued and are not included in the 2011 total for grains.

¹ Based on a 2,000-calorie diet.

Source: USDA, Economic Research Service, Loss-Adjusted Food Availability Data

Figure 1. Average dietary intake by U.S. consumers in 2011 compared to USDA's recommendations for the major food groups.

Using the Remote Food Photography Method to Assess Diets

Georgianna Tuuri

It is difficult for nutrition researchers to accurately determine what people eat and how often they eat. The most common method to find out what someone consumes is to ask them what they ate the previous day. This method, called the 24-hour recall, is relatively easy to administer and not too time-consuming, but people may forget what they have eaten the day before, and it may not represent their typical diets. Another way to estimate dietary intake is to ask people to keep written records of everything they eat or drink for several days. The length of time these records are kept can vary from a few days to several weeks. While this method is more representative of what a person normally eats, remembering and writing down all the food and beverages consumed creates a burden for a participant. Food items may be forgotten, and participants may tire of recording the information.

A new dietary assessment method, called the Remote Food Photography Method (RFPM), offers an alternative to traditional approaches. Instead of interviewing people or asking them to write down what they eat or drink, the RFPM relies on pictures taken from camera-enabled smartphones. Participants don't have to come to a laboratory or spend time writing down the dietary information. They simply take a picture before and after eating or drinking using a smartphone. The images are then sent via a wireless network to a custom-built server at Pennington Biomedical Research Center. Food images are compared to food pictures

of certain portion sizes, and the calories and important food components are calculated by registered dietitians. This semi-automatic process uses both computer automation and human input. In addition, researchers send email or text messages to help participants remember to collect food images and communicate with subjects if they have questions about particular foods eaten.

Recently, this novel dietary assessment method was used to examine if a person's age was associated with the number of times each day that food was consumed and if age was related to the energy density, or kilocalories per gram, of a person's diet. Fifty-four Caucasian and African-American men and women from south Louisiana used the RFPM to record their food and beverage intake. They ranged in age from 16 to 65 years of age. Before using the RFPM the participants learned about the study and practiced taking pictures and sending them to the researchers. They were asked to continue practicing their usual dietary habits and to send pictures of everything they ate or drank each time they consumed food. The participants' daily physical activities were estimated, and they were measured for height and weight. Body mass index (BMI) values, which describe people's weight in relation to their height, were calculated, and the daily calorie needs estimated. Participants began sending pictures using the RFPM on a Wednesday, and this day was considered a practice day. Over the next three days (Thursday through Saturday)

participants continued recording and sending information. Researchers sent text messages to remind participants to take and send pictures and communicated with them about their dietary intake. The number of times each day that participants sent pictures was recorded, and the average energy density of their diets was calculated.

The three-day diet records collected using the RFPM indicated that most people ate about four times per day and the average energy density was about 1.7 kilocalories per gram of food eaten. To see if age predicted the number of eating occasions and the energy density of the diet, it was important to control for the influence of other variables such as gender, race and weight status. Using backward stepwise regression while controlling for these other influences, it was found that age did predict the number of times each day that people ate, but their age was not related to the energy density of their diets. Older participants tended to eat more frequently than younger ones. It is often assumed that adolescents snack more than adults, but the findings from this study suggest that this may not be true. Further research, with larger groups of individuals, is needed, but the RFPM offers an effective way to estimate dietary intake. The results from this study were presented at the 2013 Experimental Biology Meeting in Boston, Mass., and are published in the April 2013 edition of the *Federation of American Societies for Experimental Biology Journal*.

Georgianna Tuuri is an associate professor in the School of Nutrition and Food Sciences.

SNAP benefits in 2012. Congress is currently debating policies that would reduce SNAP benefits for many low-income households across the United States. A decision to reduce or eliminate SNAP benefits would further reduce low-income household access to a healthier diet and would also negatively affect grocery and supermarket retailers located in areas with high SNAP redemption rates.

Education regarding linkages between a nutritious diet and good health, combined with rising incomes for some consumers, has significantly increased the demand

for healthy foods in the United States during the past few decades. However, this growth has not been uniform across socioeconomic groups. Growing disparity between the wealthiest and poorest Americans has left the poorest Americans behind with respect to affordability and access to healthier diets.

R. Wes Harrison is the Warner L. Bruner Regents Professor in the Department of Agricultural Economics & Agribusiness.

Links to all references used in this article are available in the online version of this magazine at www.LSUAgCenter.com.

Dietary Resistant Starch

Investigating the Mechanism for Beneficial Health Effects

Michael J. Keenan and Roy J. Martin

Americans do not consume enough fiber in their diets. Fiber is a diverse substance that comes from or can be synthesized from foods. One of the major differences among fibers is the property of fermentability. Some fiber components are fermentable, and others are not. For a food substance to be a fiber, it must not be digestible, which means the substance reaches the large intestine. Bacteria that populate the large intestine feed on the fiber if it is fermentable. Fermentable fibers are often called prebiotics. Bacteria that colonize the large intestine are often referred to as the microbiota. People possess more bacterial cells in their large intestine than they have cells in their bodies. When people buy capsules or tablets containing what are considered beneficial bacteria, these bacteria are called probiotics.

Resistant starch is a term that did not exist until the 1980s, when starch was discovered in the large intestine of individuals during autopsies. There are two types of starch compounds. One, amylose, is a single chain of glucose compounds with two ends that amylase enzymes can act on in digestion of the starch in the small intestine. The other, amylopectin, has many branches for the amylase enzyme in the small intestine to digest.

Resistant starches of type 1 (RS1) and type 2 (RS2) usually are high in amylose (Table1). RS1 is found in whole-grain products that have not been overly processed, and RS2 can be found in a high-amylose cornstarch. Cornstarch from the grocery store is about 80 percent amylopectin and 20 percent amylose, while high-amylose cornstarch is about 60 percent amylose and 40 percent amylopectin. The latter is the result of a reduction in the amount of the branching enzyme that promotes the production of amylopectin in a naturally occurring corn variety. The resistant starch in this corn variety is an RS2. However, the major property that promotes resistance to digestion by the amylase enzymes in our small intestine is the granular structure.

Table 1. Types of Resistant Starch

Type of Resistant Starch	Description	Examples
RS1	Physically inaccessible, non-digestible matrix	Whole or partly milled grains and seeds
RS2	Tightly packed, ungelatinized starch granules	Raw potato starch Green bananas High-amylose cornstarch
RS3	Retrograded starch (cooled gelatinized starch)	Cooked and cooled potato, bread and pudding
RS4	Chemically modified starch	Etherized, esterified or cross-bonded starches (used in processed foods)

High-amylose or high-amylopectin starches can be resistant to digestion when the granular structure prevents access to the starch by amylase enzymes. Resistant starch 3 (RS3) occurs in raw potatoes, but the granular structure of the starches is destroyed when the potato is cooked, and then a granular structure reforms when the potato is cooled as in potato salad. Adding various chemical components such as fatty acids to starch compounds or chemically linking the starch compounds together creates resistant starch, or type 4 (RS4).

Feeding an RS2 in pre-clinical studies in rodents has allowed LSU AgCenter researchers to make many observations and investigate the mechanism for beneficial health effects. When anyone is fed resistant starch, it has a lower energy value than starch that is completely digested because the bacteria in the large intestine use a certain amount of the energy contained in the resistant starch when they ferment it. By measuring the energy value of the RS2 used in the studies, AgCenter researchers have been able to ensure the control diets and diets with resistant starch were equal in energy so they could determine if a reduction in body fat was the result of more than a reduced dietary energy. They observed reduced abdominal fat when diets were of equal energy. The research team also observed improvements in functioning of the pancreas and glucose handling when a rat model for type 2 diabetes was fed resistant starch; and in elderly mice, eating resistant starch improved their food intake response to a fast, their stability in agility tasks and their performance in mental tasks.

The mechanism for these beneficial health effects is likely the fermentation of resistant starch into products such as short-chain fatty acids that appear to lead to the production of hormones that can increase energy expenditure and lead to beneficial signaling in the brain. AgCenter researchers have observed an increased use of fat for energy in mice. Additionally, the very presence of an increased amount of the bacteria that ferment resistant starch may likely promote beneficial health effects.

Several studies by other investigators have demonstrated that bacteria can interact with the host organism and alter metabolism. For example, using a metal tube inserted into the stomach of the mice through the mouth, researchers have transplanted the microbiota from genetically obese mice into normal, healthy, bacteria-free mice, and those mice became obese. In several studies, the AgCenter researchers have demonstrated increases in the bacteria known to ferment resistant starch and global bacterial changes in the whole microbiota.

Recently, AgCenter researchers demonstrated that a high-fat (42 percent of energy) diet partially reduces the fermenta-

Pregnancy, Weight Gain and Omega-3 Fatty Acids

Carol J. Lammi-Keefe

Pregnancy – a normal, naturally occurring state for women – is sometimes described by scientists, physicians and health care providers as “inflammatory,” a term usually associated with disease. This inflammatory state is necessary for a baby to develop normally, as long as it is carefully monitored and controlled.

Hormonal changes that occur in a woman during pregnancy induce a low level of inflammation. Alterations in the body’s response to the inflammation act to push nutrients vital for the infant’s development across the placenta. It is a sophisticated and necessary biological response to ensure that growth and developmental requirements of the fetus are met.

The mother’s state of health plays an important role in her successful pregnancy. Women who are overweight or who gain too much weight during pregnancy may have decreased ability to handle blood glucose (sugar), and this can be accompanied by an increased state of inflammation, which is evidenced by more inflammatory molecules circulating in the blood.

Women who enter pregnancy over-

weight or who gain too much weight during pregnancy may further decrease an already lessened ability of their bodies to produce enough insulin or to respond to insulin, which is the hormone that mitigates blood sugar. Less insulin or a lessened response to the insulin produced can create a more inflammatory response. As a result, the developing fetus is exposed to excess glucose and fats. The long-term consequence for these fetuses is that they may exhibit adult diseases as early as childhood.

Scientists and researchers in the past decade determined that omega-3 fatty acids found in cold water marine fish – such as salmon, herring, mackerel, tuna and sardines – are important for infant development, particularly the development of the baby’s brain and eyes. More recent research has found that other molecules, resolvins and protectins, made from these fatty acids act as anti-inflammatory mediators to help protect against inflammation. The resolvins and protectins are simple structures made from the long chain omega-3 fatty acids, eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA).

Just how resolvins and protectins neutralize and protect against inflammatory response in pregnancies complicated by overweight or excessive weight gain is not known. One aspect to answering the question is determining the role diet plays during pregnancy in invoking a response of these anti-inflammatory lipid mediators.

Investigators in the School of Nutrition and Food Sciences and at Woman’s Hospital, Baton Rouge, collaborating with researchers at the LSU Health Sciences Center, New Orleans, in a clinical trial starting this fall, will examine how resolvins and protectins are related to inflammation. They will also investigate the mother’s ability to handle glucose during pregnancy and if these molecules are related to infant adiposity (or fatness) at birth.

It is unknown for now, but something as simple as a diet rich in EPA and DHA might lead to healthier, happier babies.

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tion and effects of resistant starch compared to a low-fat diet (18 percent of energy), but a moderate-fat diet (28 percent of energy) is no different in fermentation and effects than the low-fat diet. The latter is encouraging because average fat consumption of Americans is in the moderate range; therefore, most Americans should benefit from consumption of resistant starch.

Future studies need to discriminate between the effects of fermentation of resistant starch and the effects of the presence of the bacteria in the large intestine of organisms that are fed resistant starch. Many of these types of studies have involved transferring bacteria into mice that have been raised without the presence of any bacteria (called germ-free). However, several scientists have begun investigating how to transfer bacteria to rodents that already have bacteria in their large intestine. These studies use strong antibiotic drugs to reduce the number of bacteria so that the bacteria transferred from individuals fed resistant starch will take hold in the large intestine of the target individuals.

Other studies need to investigate lower effective dietary levels of resistant starch other than the higher levels used in mechanistic studies. Recently, another lab used lower dietary levels of resistant starch and demonstrated that less body fat was observed when rats were fed resistant starch at levels as low as eight percent of the weight of the diet. Around 10 percent of the weight of the diet in rodents matches the human requirement for fiber. However, their control diets were higher in energy than the diets with resistant starch.

Additionally, AgCenter researchers have begun to investigate effects of resistant starch using whole-grain resistant starch (from whole-grain flour rather than isolated starch from corn flour). They have found in preliminary studies that the whole-grain flour is fermented to a greater extent than the isolated starch.

Michael J. Keenan is an associate professor, and Roy J. Martin is a professor emeritus in the School of Nutrition and Food Sciences.

More Protein in Rice

Improving the Nutritional Profile

Ida Wenefrida, Herry S. Utomo and Steve D. Linscombe

Grain protein content is an important component that determines a nutritional value of rice. Improving protein content in rice will help enhance its nutritional profile. Recent trends indicate that developing healthy lifestyles is an increasingly important goal for many. To help achieve this goal, nutrient profiling systems were developed to assist individuals in identifying and selecting foods based on their criteria and preferences to establish individualized healthy lifestyles. Rice with higher protein content will have a better status in the nutrient-profiling systems.

Rice provides a source of carbohydrates. It is also a natural source of dietary fiber, vitamins, minerals, specific oils and other disease-fighting phyto-compounds. Continuing advancements in nutrigenomics and nutrigenetics will help improve public knowledge of the importance of specific aspects of food nutrition for optimum fitness and health. Improving the nutritional values of rice becomes increasingly important. Through a better understanding of the molecular basis for human health and genetic predisposition to certain diseases through human genomes, establishing personalized nutritional requirements are becoming more attainable. High-protein grains can provide the base for developing novel foods and fibers or nutrient-dense food products that can be tailored as functional foods to meet the needs for individuals with specific genetic traits.

Improving protein content of rice also could have worldwide practical applications in addition to helping establish healthy lifestyles. Rice feeds nearly a half of the world's population, and rice consumption per capita has remained stable since the 1960s. Current total world rice production is 476.8 million metric tons – mostly for human consumption. The United States produces around 9.4 million metric tons of rice, about a half of which is exported, providing around 12 percent of the world rice trade. Rice alone provides nearly 34 million metric tons of protein, which is about half of total protein provided by legumes. In many parts of Asia, rice is the main source of diets, and in these regions, widespread malnutrition occurs.

Between 2010 and 2012, nearly 870 million people in the world were chronically malnourished. This represents 12.5 percent of the global population. Every year, about 19 million children suffer from severe acute malnutrition, and at least 3.5 million of them die from malnutrition-related causes. High-protein rice could help remediate malnutrition problems worldwide.

Grain amino acid content

Protein is made of amino acids. Similar to other cereals, rice has imbalanced amino acid profiles, lacking a few essential amino acids. Lysine, threonine and methionine

are among the most critical and are limiting factors in rice grain for human nutrition (Table 1). A significant amount of research has been put into efforts to improve these essential amino acids. Each amino acid is synthesized through specific biochemical pathways. Lysine, for example, is synthesized through a branch of the aspartate (Asp)-family pathway that also gives rise to the synthesis of two additional essential amino acids – methionine and threonine. This synthetic pathway has been researched extensively and has provided a road map in developing models for improving the lysine grain content. The excess of free lysine, however, can be harmful to plant growth and seed development. Because lysine is an easily soluble amino acid, the free lysine can be lost during food preparation. Genetic engineering has been used to improve seed lysine content.

Methods for improving protein content

Improving protein content can be outlined in four different approaches:

- Manipulating seed protein bodies.
- Modulating certain biosynthetic pathways to overproduce essential and limiting amino acids.
- Increasing nitrogen relocation to the grain through the introduction of transgenes.
- Exploiting new genetic variance.

The discovery of opaque2 and other opaque mutant genotypes in maize (corn) is an example of manipulating seed protein bodies to cause higher protein content. It has accelerated the development and commercialization of “quality protein maize” varieties. These varieties have been planted in 23 developing countries and grown on more than 10 million acres. Various technologies have been employed to improve protein content, including conventional and mutational breeding, genetic engineering, marker-assisted selection and genomic analysis.

Development of high-protein rice

The grain-quality enhancement program at the Rice Research Station is working on improving protein content in rice. Promising protein-rice lines are being tested in advanced trials. Protein contents of five select protein lines are shown in Table 2 together with their yield and milling qualities. In addition to the advanced lines, new protein lines are being developed from Louisiana varieties and germ-plasm lines. For example, 79 lines have been developed from the variety Cocodrie with a range of crude protein content between 10.5 percent and 14.5 percent (Figure 1) and 183 lines from the variety Cypress having protein content ranging from 10.5 percent to 14.2 percent (Figure 1).

Future releases of high-protein rice as commercial varieties will open the door for producing high-quantity rice products for various purposes. High-protein rice can be used to facilitate production of rice-based food products that are more nutritious. Rice milk, high-protein rice flour and whole-grain rice cereals are examples of potential markets that emphasize the nutritional quality of rice.

High-protein rice can be used as an effective tool to reduce acute world malnutrition. A bag of rice, for example, will be well received because the utensils and the know-how to cook the food are already in place in many parts of the world. Because rice is the staple food of diverse populations from various cultures and religious backgrounds, it can be

used to reach to almost any target population. Rice is acceptable in any religious belief or vegetarian population. Besides rice-based products with higher protein content, high-protein rice can directly be used to produce ready-to-be-delivered bulk rice to support humanitarian programs.

Ida Wenefrida is an assistant professor-research, Herry S. Utomo is an associate professor, and Steve D. Linscombe is professor and director, Rice Research Station, Crowley, La.

Acknowledgement

This research is supported partially by the Louisiana Rice Research Board and the National Institute of Food and Agriculture.

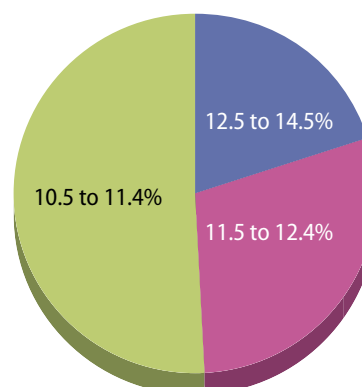
Table 1. Content of essential amino acids (as a percentage of protein) in major storage protein in rice, wheat and corn and World Health Organization-recommended levels for human consumption.

Amino acid	Rice	Wheat	Barley	Rye	WHO recommended levels
Cysteine	2.5	2.6	2.9	2.9	3.5
Methionine	2.9	1.3	1.7	1.7	3.5
Lysine	3.5	2.0	3.1	3.3	5.5
Isoleucine	4.6	3.6	3.6	3.6	4.0
Leucine	8.0	6.7	7.2	6.7	7.0
Phenylalanine	5.2	5.1	5.5	4.9	6.0
Tyrosine	4.9	2.6	2.7	2.1	6.0
Threonine	3.5	2.7	3.3	3.4	4.0
Tryptophan	-	1.1	2.0	1.8	1.0
Valine	6.5	3.7	4.6	4.4	5.0
Histidine	2.3	2.2	1.9	2.1	-

Table 2. Milling quality, yield and protein content of select high-protein rice lines.

Rice Line	Milling Quality		Yield pounds per acre	Crude Protein Content	
	Whole	Total		Brown rice	Milled rice
06PCY120024	55.7	70.1	4,695.2	13.6	10.88
06PCY120025	51	68.6	4,383.4	13.1	11.28
06PCY122425	51.8	68.4	4,494.8	12.6	10.83
06PFR200828	41.1	69	4,022.6	14.3	11.6
07PCC201570	58.1	70.1	7,331.6	12.0	10.71
Cypress	58.5	70.3	7,325.0	9.06	7.44
Cocodrie	61.3	71.8	7,021.7	9.13	8.11
Francis	48.3	69.9	5,692.7	9.24	8.21
Mahatma	-	-	-	-	8.68
Cajun Country	-	-	-	-	8.13
Rice flour	-	-	-	-	6.11

Cocodrie-derived lines



Cypress-derived lines

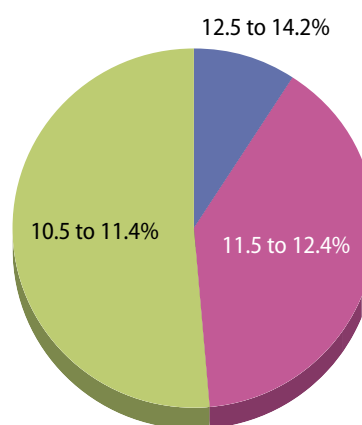


Figure 1. Distributions of newly developed lines according to their crude protein content – 79 lines derived from rice variety Cocodrie and 183 lines derived from Cypress.

Berry good for you!

Antioxidants, phytochemicals, anthocyanins and diet

Heli Roy

Research has shown that including fruits and vegetables in the diet is important for the maintenance of health and prevention of disease. Fruits and vegetables have many nutrients such as vitamins C and A and fiber. They also contain non-nutritive antioxidants called phytochemicals, which help reduce the risk of chronic diseases such as heart disease, diabetes, obesity, cancer and neurodegenerative diseases. Antioxidants are involved in the prevention of free-radical-induced damage to the DNA, eliminating free radicals and influencing enzyme actions in the cells and organs. These are the events that cause aging and damage to blood vessel walls and internal organs and can then lead to chronic diseases.

One group of phytochemicals called anthocyanins in berries and fruits give these foods a range of colors from red to blue; other phytochemicals give fruits, vegetables and spices their green, yellow, orange or white color. In addition to providing color to berries, fruits and vegetables, they are also strong antioxidants. They reduce small blood vessel permeability and increase their strength, reduce platelet aggregation and improve collagen function. Other phytochemicals eliminate harmful compounds from the body to protect us against cancer and organ damage. Some have similar actions to hormones in our body, while others reduce inflammation. Recent data

indicate that some phytochemicals may even help in the fight against obesity and diabetes.

One of the hallmarks of a disease state is when small capillaries allow substances to move in and out of the blood vessels easily. This causes protein molecules to move in spaces where they should not be and draw water with them, resulting in swelling and negative cellular changes. Berry anthocyanins strengthen the small blood vessel walls to make them stronger and tighter so that large protein molecules cannot move out into intercellular spaces.

Platelets are a special type of blood cells that circulate in the bloodstream. They are involved in blood clotting. When there is a wound, they help form clots, so we don't bleed to death. Excessive aggregation of platelets is one of the causes of heart attacks and strokes; another one is an injury to the internal wall of the blood vessels. Excessively sticky platelets can form clots inside blood vessels, and these clots can get caught in tiny blood vessels in the heart and the brain. Anthocyanins in berries can help reduce platelet stickiness and keep them flowing and reduce the chances of a heart attack or stroke.

Because cancer is a slow-developing disease, diet over time can play a role in its prevention. Several different phytochemicals in many fruits, vegetables, spices, coffee, tea and cocoa kill cancerous cells in the body or disrupt cancer cell growth and development.

These phytochemicals influence the enzyme system in the cell and either delay or prevent the cancer from growing and developing.

Berries, fruits and vegetables have been shown to help in the prevention of neurodegenerative diseases such as Alzheimer's and Parkinson's and age-related decline in brain

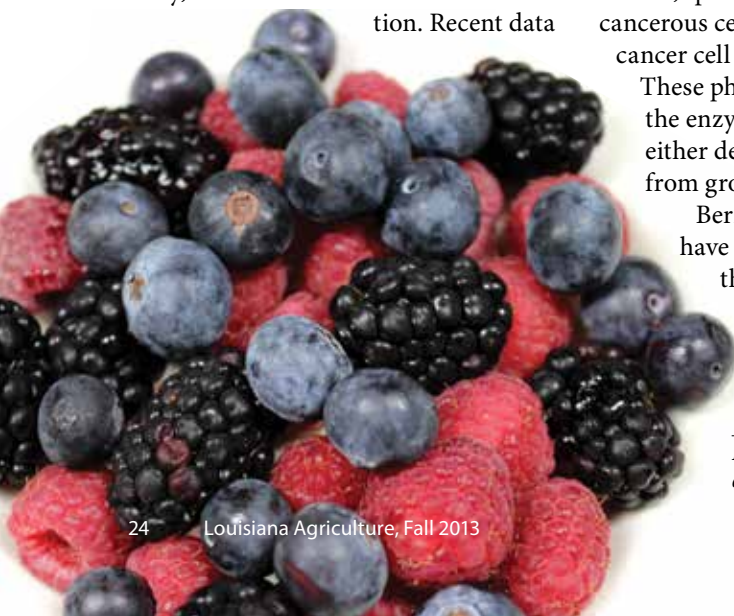
functioning. Nerve cells are covered in a layer of fat to protect them from damage, but the fat itself can get oxidized from lack of antioxidants in the diet. Phytochemicals are strong antioxidants and can remove harmful oxidants that could damage the fat layer or the nerve cells themselves. Some of the phytochemicals can enter the brain as well to protect it from oxidative damage. Regular consumption of berries has been found to result in reduced decline in age-related decline in brain functioning.

Diabetes is increasing worldwide as obesity increases. Type 2 diabetes occurs because of pancreatic beta cell damage. However, phytochemicals can offer protection against oxidative damage and protect the beta cells. Not only do they protect the beta cells themselves, they also increase the intake of blood sugar by the muscle cells and prevent an excess release of sugar from the liver to the bloodstream, thereby preventing abnormally high blood sugar levels.

For obesity to develop in an individual, the fat cells must become fully saturated with fat and new fat cells made. The fat cells then increasingly take in fat and expand as a person's weight increases. New research indicates that phytochemicals from plants prevent the new fat cell from developing and maturing, thereby limiting the number of fat cells a person forms and the amount of fat an individual can accumulate. The existing fat cells, however, have an almost endless limit to holding onto fat.

Phytochemicals from fruits and vegetables are powerful antioxidants that prevent free-radical-induced damage to our cells and organs and, thereby, delay aging related chronic diseases. Including a variety of fruits and vegetables in the diet can delay and prevent the development of cardiovascular disease, diabetes, cancer, hypertension and heart disease.

Heli Roy is an associate professor in the School of Nutrition and Food Sciences and outreach coordinator at Pennington Biomedical Research Center.



Women, Lifestyle Habits and Eye Health

Carol J. Lammi-Keefe, Holiday Durham and Ann H. Shaw

Quality of life in later years is associated with protection against age-related changes to health status. While change with time is inescapable, lifestyle, such as diet, is known to delay the onset and extent of some changes. Age-related macular degeneration affects the eyesight of more than 14 percent of individuals 70-79 years of age, and it is the leading cause of blindness in the elderly. For adults between the ages of 60 and 75 years, one-third will develop age-related macular degeneration after 75 years of age. More women develop this disease than men, and they are more at risk over age 55.

Other factors that affect risk include race – with Caucasians more susceptible than African-Americans and Asians – smoking history, obesity, high blood pressure/hypertension, and a family history of age-related macular degeneration.

Lifestyle factors that may decrease risk for this debilitating disease include increasing the intake of dietary lutein. This plant pigment is found in dark green leafy vegetables, such as spinach, kale, collard greens and turnip greens, as well as broccoli.

More recently, evidence also points to increasing the consumption of cold-water marine fish – such as salmon, herring, mackerel, tuna and sardines – which contain DHA or docosahexaenoic acid.

It is known that DHA is preferentially transferred across the placenta to the developing fetus during pregnancy, essentially depleting women of DHA. But does this put women who have been pregnant at greater risk for developing macular degeneration? To answer this question we investigated the relationship between the number of pregnancies/babies and the risk for age-related macular degeneration. Underlining the hypothesis was the finding that intake of DHA during pregnancy is low in the United States.

Women in Baton Rouge who were 50 years of age and older and patients at private eye care facilities participated in our study. Information on their eye and physical health was collected.

We found that women with age-related macular degeneration had given birth to more babies than women who had never been diagnosed with age-related macular degeneration. Women who were older and more overweight were also more likely to be diagnosed with age-related macular degeneration.

Based on our findings, some steps that women can take to protect against age-related macular degeneration include increased intake of foods that are good sources of both lutein – such as spinach, kale, and broccoli – and DHA, which is found in fish such as salmon, herring, mackerel, tuna and sardines. Women should also keep body weight within normal weight limits.

Supplementation with DHA found in cold-water marine fish during pregnancy may help protect the mother against development of age-related macular degeneration in later years. That is, while the consumption of DHA is recommended during pregnancy for infant brain and eye development, it is also recommended for protecting the mother against age-related macular degeneration in later years.

Carol J. Lammi-Keefe is the Alma Beth Clark Professor in the School of Nutrition and Food Sciences. Holiday Durham is an instructor at the Pennington Biomedical Research Center. Ann H. Shaw is an optometrist in Baton Rouge, La.

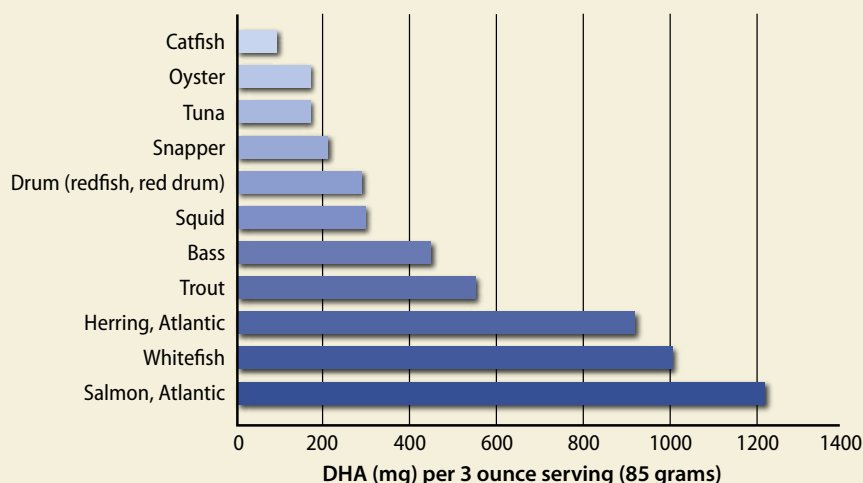


Figure 1. DHA content in fish.

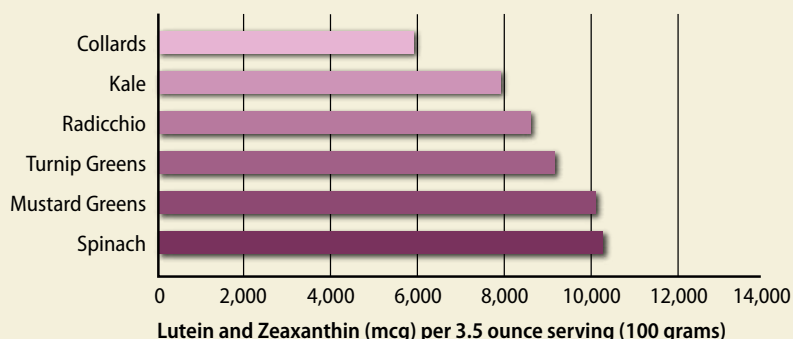


Figure 2. Lutein and Zeaxanthin in Leafy Greens

Nutrition Education Programs Benefit Everybody

De'Shoin York Friendship, Diane D. Sasser and Heli Roy



Southern University Agricultural Center nutrition educator Marquetta Anderson presents prizes to winners of the food bingo competition at Oak Park Plaza Apartments as part of the SNAP-Ed program. Anderson used the time spent with the residents to help them to choose healthy meals and to have some fun in the process. After the presentation and games, Anderson presented the residents with a low-calorie, healthy treat. Anderson also shares nutrition information at the Women, Infants and Children (WIC) nutrition sites in Baton Rouge.

Children who do not receive good nutrition suffer from poor health and obesity and run the risk of becoming unhealthy adults with chronic diseases such as diabetes and heart conditions. Missing school potentially results in falling behind in academic achievement. For the parents, missing work because of illness or their children's illness could affect work productivity. Like the pebble in the pond, the repercussions of poor health eventually touch everybody.

The first step in creating change is helping families understand the need for change. But with more than half of children in Louisiana living in poverty, many families are simply trying to survive. Federal programs exist to provide assistance in moving families beyond survival mode and onto a path of health, safety and empowerment. Grants from the U.S. Department of Health and Human Services, such as the Temporary Assistance for Needy Families program, and from the U.S. Department of Agriculture provide mechanisms to assist eligible individuals and families. Each of these funding sources includes educational programs for assisting limited-resource audiences in acquiring the knowledge, skills and attitudes necessary for better health and well-being.

The LSU AgCenter and the Southern University Agricultural Center provide educational programs backed by research-based information. Between these collaborative efforts, disadvantaged youth, families and seniors in all 64 parishes throughout Louisiana are offered services.

Nutrition and Parenting

Two of these educational programs are Healthy Beginnings for Your Baby and Parents Preparing for Success. Each program has its own mission and target audience, and both use interactive teaching methods to disseminate information such as child safety and nutrition, care for self, financial management and parenting strategies.

More than 1,600 young mothers annually learn about the importance of healthful food and activity choices prenatally and for the baby after birth. In an evaluation of participants in the programs, it was found that average knowledge and skills gained in effective parenting practices improved by 29 percent in a before and after measure. Also, participants' average knowledge and skills gained in effective

The LSU AgCenter and the Southern University Agricultural Center provide educational programs backed by research-based information. Between these collaborative efforts, disadvantaged youth, families and seniors in all 64 parishes throughout Louisiana are offered services.

tive financial management practices improved by 28.6 percent. The comments from one young mother are typical of what is captured in face-to-face follow-up interviews: “She showed me a way to save...I was...going to the store just buying and buying and...and then you know buying things [food items] I really didn’t need. I guess just cuz I wanted them.”

EFNEP

The mission of the Expanded Food and Nutrition Education Program (EFNEP), a state and federal partnership, is to assist low-income families and youth improve their health, to have a better quality of life through improved diets, and to make a better selection when buying foods by managing their food budgets. The core elements of EFNEP are diversity, empowerment and peer delivery. The program empowers its staff and participants to make positive changes in their personal lives and involves individuals from the community to deliver its messages.

EFNEP is focused on wellness and food. Wellness encompasses chronic disease prevention, and the foods aspect focuses on accessing and prepar-

ing healthy foods, making better food choices, stretching food dollars and food safety.

Annually, more than 2,000 families and 14,000 youth are enrolled in EFNEP in Louisiana. At the end of the program 95.6 percent made a positive change in their eating habits, 21.3 percent ate two or more fruit a day compared to 13.8 percent at the onset, while 34.1 percent ate two or more vegetables a day compared to 23.8 percent at the onset. Also, 31.7 percent made a positive change in physical activity at the completion of the program.

SNAP

The Supplemental Nutrition Assistance Program (SNAP) is the largest nutrition assistance program administered by the USDA. The mission of SNAP-Ed, (the educational piece of SNAP), is to improve the likelihood that SNAP participants (youth and adults) will adopt healthy food choices within a limited budget and incorporate active lifestyles and habits that promote good health.

Key objectives of SNAP-Ed are for SNAP participants to: 1) increase consumption of fruits, vegetables, whole grains or nonfat and low-fat dairy by

one serving per day; 2) increase physical activity; and 3) practice three of the 2010 Dietary Guidelines.

The SNAP-Ed program uses various teaching methods to communicate its message to its participants. Whether through a school garden, the Smart Bodies program, Smart Portions classes, the Families First Nutrition Education and Wellness System, the Traveling Kitchen or Family Nutrition Night, participants are engaged in a dynamic learning experience.

Evaluations of the results of the program, including its workshops and activities, indicate that 97 percent of adults were trying new, healthier recipes for their family; 4-H campers increased their number of steps per day to an average of 11,967 steps; 75 percent of parents improved in considering healthy food choices when meal planning; 70 percent reported purchasing more fruits for their children; and 60 percent reported they are incorporating more vegetables into their family meals.

The results of each of these programs indicate potential positive changes in health for children and families. Those results will benefit schools, communities and workplaces across the state.

De’Shoin York Friendship is an associate specialist in nutrition and the director of the Expanded Food and Nutrition Program (EFNEP) at the Southern University Agricultural Center. Diane D. Sasser is the Adrienne Gravois Brazon Professor and director for the Healthy Beginnings for Your Baby Program and the LSU AgCenter SNAP-Ed Program. Heli Roy is director of EFNEP at the LSU AgCenter and an associate professor in the School of Nutrition and Food Sciences.

Nutritionists help school meet health challenge

Tobie Blanchard

Barbe Elementary School in Lake Charles received a gold award of distinction from the U.S. Department of Agriculture Food and Nutrition Service’s HealthierUS Schools Challenge in 2013. The award recognizes schools that have created healthier school environments through promotion of nutrition and physical activity.

Shatonia McCarty, an LSU AgCenter nutrition agent, and Carol Sensley, with the Southern University Agricultural Center, worked with Barbe to meet the challenge. Armed with the AgCenter’s

Smart Choices curriculum, they helped students, parents and faculty learn how to improve their eating habits.

“I am trying to help them live a healthier lifestyle and improve the quality of their lives,” McCarty said.

McCarty visits the school monthly and attends nutrition events at the school for parents. The school incorporates Smart Bodies into its lessons and has had the Body Walk exhibit at the school.

McCarty also used pedometers to get the students, parents and faculty to move more. Sensley helped teach the students different exercises.

Barbe Elementary School Assistant Principal Sharon Ruffin-Hardy said it was an honor for the school to be recognized, but they could not have reached this goal without their partnership with the AgCenter.

“It is because we had all these components in place that we received this award,” Ruffin-Hardy said.

The HealthierUS Schools Challenge identifies three goals schools have to meet to receive recognition – provide nutrition education, provide students with physical education and opportunity for physical activity, and improve the quality of the food served.

To accomplish the last goal, Ruffin-Hardy said they removed fried foods and added more whole grains to their menus and now offer more fruits and vegetables.

“Initially they had to get used to it,” Ruffin-Hardy said of the student’s reaction to the new lunch menu. “But now they like the variety.”

Tobie Blanchard is a writer with LSU AgCenter Communications.

Enhancing the Probiotic Characteristics of Dairy Culture Bacteria

Kayanush J. Aryana and Tanuja Muramalla

Probiotics are live microorganisms, which, when consumed in adequate amounts, confer a health benefit on the host. Probiotics were first commercialized via yogurts, namely “Yakult,” which was introduced in Japan in 1935. The Danone company introduced a yogurt product called “Activia” in France in 1987 and in the United States in 2006. The global probiotic products market has been steadily growing over the years and was estimated at \$24.23 billion in 2011.

Some dairy cultures are known to provide health benefits. *Lactobacillus bulgaricus* produces a large amount of lactic acid, which completely inhibits the growth of *Helicobacter pylori* bacteria, known to cause peptic ulcers. It is also effective against the pathogen *Salmonella typhimurium*.

Streptococcus thermophilus has antioxidant activity that scavenges the body for free radicals and is effective in maintaining intestinal health.

Lactobacillus acidophilus provides several benefits, including:

- Reducing the incidence of diarrhea.
- Reducing toxic amine levels in blood of dialysis patients who have small bowel bacterial overgrowth.
- Producing lactase to digest lactose in lactose-intolerant subjects.
- Helping reduce serum cholesterol levels and risk for coronary heart disease.
- Helping recolonize the gastrointestinal tract after antibiotic therapy to aid digestion.
- Producing the bacteriocin CH5 that inhibits certain yeasts, molds and pathogenic bacteria.
- Improving bowel regularity.
- Benefiting the immune system.
- Decreasing the incidence of fever, cough and runny nose.
- Producing anti-inflammatory effects.
- Inhibiting breast cancer cell growth.
- Having positive effects on chemotherapy patients.
- Improving lipid metabolism.
- Producing vitamin K.

Characteristics of effective probiotics include being able to survive the passage through the digestive system, attach to the intestinal epithelia and colonize, maintain good viability, and use the nutrients and substances in a normal diet. These probiotics also are nonpathogenic and nontoxic; have a beneficial effect on a host; are stable during processing, storage and transportation; and are anti-inflammatory, immunostimulatory and antimutagenic.

A basic requirement for a bacterium to be an effective probiotic is the ability to survive stomach acid and bile in the gastrointestinal (GI) tract, move into the lower GI tract

“alive” and proliferate there, conferring the health benefits on the host. The question is whether these probiotic characteristics of acid tolerance and bile tolerance can be enhanced.

Low homogenization pressures and mild pulsed electric field conditions were studied to determine whether they can stimulate dairy culture bacteria to improve their probiotic characteristics of acid tolerance and bile tolerance. Under several mild homogenization pressures, *Streptococcus thermophilus* ST-M5, *Lactobacillus delbrueckii* ssp. *bulgaricus* LB-12 and *Lactobacillus acidophilus* LA-K were individually inoculated in cool, autoclaved skim milk and homogenized. Another set of experiments used mild pulsed electric field treatments – a technology used for nonthermal pasteurization.

Acid tolerance of the yogurt cultures LB-12 and ST-M5 was significantly improved by all of the low homogenization pressures studied. Homogenization pressures at the higher levels significantly improved the acid tolerance of LA-K. All mild homogenization pressures studied significantly improved bile tolerance of ST-M5 but not of LB-12, which was significantly decreased. Bile tolerance of LA-K was significantly improved only at one homogenization pressure.

Mild pulsed electric field treatments significantly improved the acid tolerance of LA-K and LB-12 but not of ST-M5.

Different bacteria sometimes exhibited a different response when subjected to the same low homogenization pressure or same mild pulsed electric field treatment. Depending upon the desired improvement in the characteristics of a culture bacterium, low homogenization pressure or mild pulsed electric field treatments could be used selectively. Pretreating cultures with some low homogenization pressures or mild pulsed electric fields can improve certain probiotic characteristics.

These results indicate that the probiotic characteristics – namely acid tolerance and bile tolerance – can be enhanced using certain processing conditions. It is a step toward providing consumers with probiotics that do not have to be taken in high initial doses as currently recommended.

Because bacteria typically do not like acidic (low pH) environments, improving the acid tolerance of health-beneficial culture bacteria also has implications in food safety where low pH can kill some pathogenic bacteria but preserve the health-beneficial bacteria with enhanced acid tolerance.

The next steps are to study if other dairy culture bacteria (such as *Lactobacilli* and *Lactococci*) also behave in the same manner or if they require different processes to enhance their probiotic characteristics.

Kayanush J. Aryana is a professor in the School of Animal Sciences and School of Nutrition and Food Sciences; Tanuja Muramalla is an instructor at the University of Hyderabad, India, and a former LSU graduate student.



Kayanush Aryana is a professor of dairy foods technology in the School of Animal Sciences and Department of Food Science. Photo by John Wozniak

Researcher works to improve yogurt's health profile

Tobie Blanchard

The popular Dairy Store on LSU's campus features ice cream in flavors such as Tiger Bite and Rum Raisin, but on the other side of the Dairy Science building, LSU AgCenter researchers are working on ways to make dairy products healthier. One of those researchers, Kayanush Aryana, is adding healthy ingredients to yogurt such as immune boosters, omega-3 fatty acids and fiber.

"We've also tried heart healthy yogurt. We've added ingredients such as magnesium, manganese, niacin, riboflavin, thiamine, folic acid and fiber," Aryana said.

When used in small amounts, some of these added ingredients have little effect on the taste and texture of the yogurt.

Aryana is also working with lutein, which promotes eye health. But, lutein affects the color of the end product.

"Because lutein is a carotenoid, it will bring its red color into the product. So you

want to go with lutein in strawberry yogurt instead of lemon yogurt," Aryana said.

Aryana has determined that the lutein is stable in the yogurt over time and has shown that it does not alter the yogurt's microbial profile.

For the product to be considered yogurt, it must contain the cultures *Lactobacillus bulgaricus* and *Streptococcus thermophilus*. Aryana says these microorganisms, also known as starter bacteria, have their own benefits, such as helping maintain good intestinal and digestive health.

L. bulgaricus produces large amounts of lactic acid, thus inhibiting the growth of gut pathogens. *S. thermophilus* has antioxidant activity, which scavenges the body for free radicals.

But these bacteria often are killed off in large numbers before they establish and impart their health benefits.

"These culture bacteria are susceptible to the stomach acids and the bile," Aryana said.

So he is studying ways to enhance their acid and bile tolerances using pulsed electric fields among other techniques.

Aryana also is working with Pennington Biomedical Research Center as the lead institution on a National Institutes of Health grant to study slowly digestible starch. The five-year study is looking at the role of this starch on diabetes risk factors in pre-diabetic people. Aryana is looking at using yogurt as one of the vehicles to deliver the starch.

Tobie Blanchard is a writer in LSU AgCenter Communications.



Debbie Melvin passes out Hershey kisses to participants of her Smart Portions class. The class was doing an exercise on savoring food. In the eight-week session she teaches people how to make sensible food choices and healthy lifestyle habits. Photo by Tobie Blanchard

Nutrition agent measures success with habit changes

Tobie Blanchard

Debbie Melvin likes to say that it takes 30 days to make something a habit. She spends eight Monday evenings with a group of women helping them form healthy habits they can have for the rest of their lives.

She also spends three mornings a week exercising with her Strong Women group.

Melvin, an LSU AgCenter nutrition agent in Lafourche and Terrebonne parishes, has been teaching Smart Portions classes for five years and doing Strong Women for six.

The eight-week Smart Portions program arms participants with knowledge necessary to make positive lifestyle changes that can lead to a healthy weight.

But Melvin doesn't want her clients obsessed with the number on the scale or the amount of calories they consume.

"My aim for them is not focusing on those numbers. It's preventing them from getting chronic diseases," Melvin said.

Melvin holds the classes at Thibodaux Regional

Medical Center. Following the Smart Portions program has helped people with high cholesterol or high blood pressure get off medicine.

"There is a huge segment that we think we can keep out of the hospital for a long part of their life, if we can get them to a healthy state. And maintaining nutrition is obviously critical with built-in exercise, too," said Brenda Hansen, Education and Training Director at Thibodaux Regional.

Lynette Callahan went through the program in 2009. She has gone from taking five different medications for issues such as high blood pressure and cholesterol to needing only one.

She described herself as a person who ate everything Sunday night then started a new diet Monday morning. She would lose some weight, but said she always gained back more. Smart Portions ended that cycle for her.

"It planted the seed for sound nutrition – just basic eating, no gimmicks, no fad diets," Callahan said.

Callahan said Smart Portions also encouraged her to

start an exercise routine. She said she started going for short walks, then jogs. Now she competes in triathlons and half marathons.

Mary Strickland began the program in 2010. She had seen how diabetes had ravaged her mother's legs, causing her to lose several toes, and swore her own children would never see her like that. She said the day she started Smart Portions was the day her life changed.

"What is so wonderful about the program is you have the tools," Strickland said. "Once you go through this course, and you understand it, you have the tools to get back on track quickly."

Strickland has lost 125 pounds using what she has learned through Smart Portions.

The program includes lessons such as proper portion sizes, strategies to prevent overeating, tips for breaking bad habits, smart choices when eating out and healthful foods that will keep you feeling full longer.

Melvin said many restrictive fad diets create an adversarial relationship with food. She wants that relationship to be positive.

"That's not freedom. That's not living to me. I want them to live a full life," she said.

Participants in the program keep food journals, which Melvin reviews. Volunteers Mary Delaune and Debbie Robichaux weigh in participants each session. Melvin doesn't want to see them at the scale but observes their progress in their individual folders. The volunteers also serve healthy recipes Melvin prepares for clients to taste during the classes.

Cheryl Boudreaux said she joined because she was tired of being overweight and limiting herself in what she can do.

"I think I have a lot of good years left in me, and I want to continue to be active and enjoy my grandchildren," Boudreaux said.

Melvin practices what she preaches with her Strong Women group. The women meet three mornings a week at a recreation center in Thibodaux.

Melvin was trained as one of the national program's community leaders. The program aims to help women improve muscle mass, bone density and overall function as they age.

"There are people with osteoporosis, osteopenia. There are people who have had accidents, broken ankles, broken legs, and yet their doctors have told them they've come back strong because they began strong," Melvin said.

The class includes weight lighting, floor exercises, stretching and a good deal of socializing. Melvin said after they connected with the exercises, they connected with each other. Melvin believes the social bond is a big part of getting them to the class.

Faye Blanchard agrees. She lives about 40 minutes from Thibodaux but drives in three days a week just for the class.

"The group keeps me motivated to keep moving. I could probably do the same routine at home. I have all

the weights. But you just get involved with doing things at home, and you don't make time to do it," Blanchard said.

The classes are taught by Monica Stock, a chatty exercise enthusiast who gets the women talking while they work out.

"We share with each other. We enjoy our time together," Stock said. "That is as much a benefit to their health as the exercises are."

Many of the women in the group are over 70 and are active gardeners, enjoying fishing and other activities. Being a part of Strong Women increases their agility and helps them enjoy a better quality of life.

Melvin has seen people make drastic improvements in their lives, from losing weight, getting off medications and starting and sticking to exercise regimens. She has done pre- and post-tests with participants and before and after body fat analyses, but she said that is not how she rates success.

"I don't know how to measure success except if I can get them to change one habit, that's success."

Tobie Blanchard is a writer with LSU AgCenter Communications.



Lynette Callahan, a graduate of the Smart Portions program, speaks to the current class about how Smart Portions has helped her lose weight, reduce her need for medications and develop a love for exercise. Photo by Tobie Blanchard

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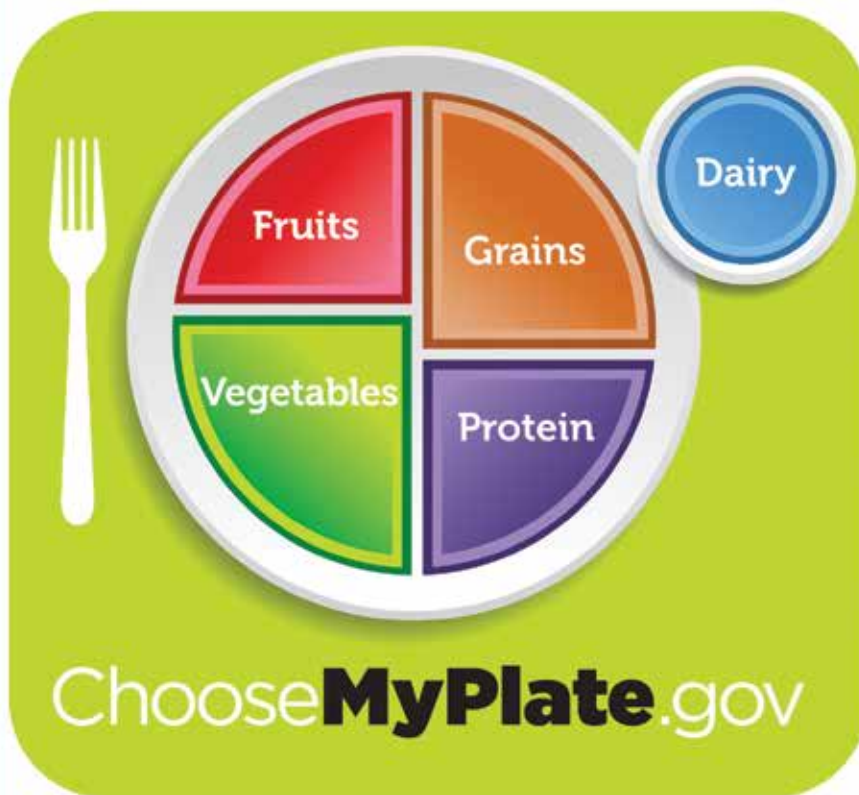
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Choose Louisiana Foods for a Healthful Plate



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LSUAgCenter.com/Parish

MyPlate reflects the dietary guidelines recommended by the USDA for a healthy lifestyle.

An active lifestyle and delicious Louisiana-grown foods can help you stay healthy. Follow the MyPlate recommendations and build half your plate with vegetables and fruits and the other half with whole grains and protein.

Some good Louisiana-grown choices are:

Fruits:

Blueberries	Satsumas	Lemons
Strawberries	Grapefruit	Oranges
Watermelons	Kumquats	Peaches

Vegetables

Sweet Potatoes	Collards	Okra
Tomatoes	Cabbage	Peppers
Southern Peas	Turnips	

Grains

Rice

Protein

Pecans	Fish	Crabs
Beef	Crawfish	Oysters
Poultry	Shrimp	Dairy

