Office of Agricultural Communications

MAFES Research Highlights

---

cover

Spring 1999
Volume 62, Number 2

Contents

From the Director

Vance H. Watson

The 1859 publication of Charles Darwin's controversial treatise, *The Origin of Species*, ushered in an era of extensive scientific questioning and research.

Classical liberal arts education had fallen out of favor in the mid-1800s, and as one university president of the period noted, there was not a single institution in the country to provide agriculturists, manufacturers, mechanics or merchants with tool s for their professions.

Mississippi State University was founded as a land grant university under the 1862 Morrill Act that provided federal aid to agricultural and mechanical colleges. Known as the land grant system, these colleges were originally endowed by grants of public lands in the developing western United States.

The passage of the 1887 Hatch Act authorized A. and M. colleges to obtain a growing body of scientific subject matter for teaching. Although the Hatch bill was named for

Missouri's William Henry Hatch, Mississippi Senator James Z. George introduced the first experiment station bill in 1885 only to see it stall in the Congress.

Land grant institutions were among the first institutions of higher learning in the country to give applied science and mechanical arts a recognized place in the college curriculum. By broadening the scope of traditional higher education, land grants m ade higher education available to every American.

In 1887, the Mississippi Legislature provided for the establishment of agricultural experiment stations. The 10 MAFES branch experiment stations and six associated research units located around the state allow research scientists to experiment under ty pical Mississippi growing conditions.

MAFES scientists know that our research improves life for Mississippians, and we try to keep ourselves and our research in the "real world" to learn what our clients need.

In this issue, we've included several of MAFES' real world research projects:

MAFES research is examining ways to help Mississippi poultry growers produce better chicks and eggs for less money. Poultry researchers share their research in the article Poultry Still Mississippi's Top Agricultural Product.

MAFES recently received patents for three new bermudagrasses. MAFES Agronomist Jeff Krans talks about the development and use of these ground covers in the story MAFES Develops Three New Grasses.

MAFES scientists are active in the Southern Association of Agricultural Scientists, a professional organization that provides opportunities for presenting research findings. A selection of MAFES research reports can be found in MAFES We ll Represented at SAAS Centennial.

Each spring, MAFES and Extension personnel meet on-site with producers and suppliers at the Central Mississippi Research and Extension Center in Raymond and the Northeast Mississippi Research and Extension Center in Verona. Producers and suppliers come together and share their needs and desires. Learn more about the 1999 Advisory Council meetings in the story Meet with Advisory Councils.

MAFES is also pleased to present its first cookbook, *A Taste of Class*, authored by culinary researcher Cary Sutphin. The MAFES cookbook offers a collection of menus featuring MAFES food products. Read the story MAFES Culinary Research Presents *A Taste of Class*.

It's our real world research that keeps Mississippi a leader in producing agricultural commodities.

Poultry Still Mississippi's Top Agricultural Product

With an estimated total farm production value of $1.43 billion for 1998, poultry has been Mississippi's top agricultural product for the past several years. MAFES researchers are

working to ensure that this product stays number one.

"Mississippians eat more chicken than any other meat. The per capita consumption per person in Mississippi is 100 pounds of poultry each year, and demand for it continues to grow," said Wallace Morgan, MAFES poultry researcher and head of the poultry science department at Mississippi State University. Poultry includes any bird that has been domesticated and is used for commercial food production, including chickens, turkey, geese and ducks. Mississippi poultry producers focus their efforts on chickens.

"The poultry industry has been very good for Mississippi's economy and has provided a very good living for many in the state, " Morgan said. MAFES works closely with the U.S. Dept. of Agriculture in developing ways to improve the poultry industry.

"We have a very good cooperative partnership with MAFES. For example, USDA uses MAFES poultry processing facilities, and MAFES uses USDA environmental research equipment, " said David May, USDA Agriculture Research Service (ARS) poultry scien tist.

Dynamics of Poultry Production.

Andalusian, Buttercup, Dutch Bantam, Chantecler, Rhode Island Red, La Fleche, and Frizzle are a few colorful names for some "old" breeds of chicken. Although these breeds still exist, today's commercial poultry companies produce greatly improved and adapted breeds, thanks to modern research techniques such as genetics and adaptive biotechnology.

Modern broilers, like those most commonly produced in Mississippi, are a cross of the old White Plymouth Rock, the Cornish and other selected breeds. Modern broilers come from strains like Cobb, Ross, Arbor Acre and Peterson, the names of primary breed er production companies.

These modern breeds were developed many years ago using selective breeding and genetic engineering to maximize the desirable traits found in the traditional chicken breeds.

Economic Importance.

Until a generation ago, most poultry was raised by individual farmers who kept the local grocer supplied. Now, the industry is a high-tech conglomerate in which producers raise, process, market and ship the birds to large grocery corporations located acro ss the country.

The majority of the country's poultry-producing states are in the Southeast. Mississippi is fourth among the top broiler-producing states, following Georgia, Arkansas and Alabama. MAFES research has enabled the Mississippi broiler industry to grow more rapidly than any other state's.

Chicken houses are familiar sights along roadsides in central and south central Mississippi. In 1998, the top-producing counties included Scott, Smith, Leake, Simpson and Jones.

To meet public demands for an increased supply of broilers, Mississippi producers are constructing more chicken farms. In the last three years, the number and size of houses on a typical broiler farm in Mississippi have increased by about 10 percent. T here are 2,750 broiler farms in the state today. "Some other states have declined in production of both poultry and other agricultural products due to urban spread and population increases. Mississippi will probably continue to see growth in its poultry production because of the state's long agricu ltural heritage," Morgan said.

That's great news for Mississippi producers. Poultry consumption is increasing in this country, and additional export markets are being developed, Morgan said.

In 1998, Mississippi farmers grew more than 720 million broilers, with a farm gate value of about 37 cents per pound.

Mississippi supplies out-of-state markets with more than 90 percent of all broilers produced. Although the United States has a high preference for white chicken meat, other countries prefer the fattier dark meat. This dual marketing approach works well for Mississippi poultry production.

Poultry Processing.

Poultry is a unique agricultural commodity in Mississippi since it is both produced and processed within the state. Seventeen plants slaughter broilers, and two facilities process "spent" hens, or hens that lay table eggs and eggs to be hatched as broilers.

In-state processors include Marshall Durbin, Sanderson Farms, Tyson Foods, Wayne Farms, Choctaw Maid, B.C. Rogers, Peco Foods, Valley Fresh, Southern Hens and Lady Forest Farms. Cal-Maine Foods, headquartered in Jackson, processes eggs.

Farmers contract with broiler companies, or integrators, to raise broilers. Integrators supply chicks, feed and veterinary supplies to the farmer at no cost. Chicken producers provide labor, pay utility costs and manage the broiler houses.

History.

Poultry production is not new to Mississippi agriculture. In 1946, Mississippi State established a poultry science department to research ways to develop poultry as a new industry for the state.

By the 1950s, the industry had caught on, and MSU turned its investigations to basic poultry immunology, nutrition and genetics. For the next 20 years, research efforts focused on developing high-energy diets for chickens.

"One of the major needs of the industry was diet formulation. Researchers at MSU devised a "least-cost formulation" method for feeding poultry. Chicken nutrient requirements and costs of each ingredient were programmed into computers, wh ich then calculated a formula for high-energy, low-cost feed," Morgan said.

This development made Mississippi a national contender in the poultry industry.

Poultry Research.

MAFES focuses its poultry research on waste management, market development, nutrition, packaging methods, genetics and reproduction, and poultry management. Some MAFES and USDA cooperative research projects include:

Waste Management. Waste management is a key objective in poultry research, and scientists are researching ways to get the most benefits out of a rather undesirable part of this major industry.

Wood shavings spread on the floors of broiler houses absorb waste and improve air quality. After removal from the houses, the litter can be used as a major component in fertilizing forage and pasture lands in Mississippi. Many farmers depend on chicken litter as a source of plant nutrients, including nitrogen, phosphorous and potassium. The by-product also improves soil water-holding and nutrient capacities.

"Because of its high nutrient content, chicken litter is an excellent plant fertilizer, but over-application may lead to soil nutrient build-up, or burning. We are currently researching implications of heavy land applications on nutrient status an d the quality of adjacent waters, " said Billy Kingery, MAFES agronomist.

Kingery is also studying forage management systems that maximize nutrient utilization in a cooperative project with USDA-ARS Agronomist Geoff Brink, MAFES Animal Scientists Butch Withers and Joey Murphey, MAFES Researcher Billy Johnson and MSU-Extensio n Soil Specialist Larry Oldham.

A major goal of such studies is to determine how much chicken litter a producer can apply to an acre of land without impacting water quality.

"Generating nutrient values of chicken litter produced in Mississippi is important because of the large size of the state's poultry industry. The Environmental Protection Agency is increasing its regulations and restrictions of fertilizer applicat ions, so we are researching other ways to use it, " said Tim Chamblee, MAFES poultry researcher.

Other states have analyzed chicken litter produced on their farms, but Mississippi producers need a better idea of the chemical content of waste produced on their poultry farms, Chamblee said.

Nutrient content of chicken diets varies from company to company and from state to state. Methods of litter management and the length of time litter remains in chicken houses also influence nutrient content.

Chamblee is investigating the viability of using chicken litter on a variety of crops, and is also looking at the potential of using it as a component in compost for lawns and gardens.

Human Health. Some MAFES research has possible benefits for both human health and poultry management.

Many chickens suffer from essential pulmonary hypertension syndrome (EPHS), a detrimental condition that results in "flip-overs, " or heart attacks, and "water belly, " or fluid accumulation in the abdominal area.

The cause of EPHS is degeneration of muscle in the right ventricle of the heart with resultant elevated blood pressure in the lungs. This excess pressure forces fluid out of circulation and can lead to heart attacks. Male juvenile birds are especially susceptible to flipping over, and each year, the Mississippi poultry industry loses $10 million because of EPHS.

Bacteria cause poultry flip-overs. Research has revealed that a bacterium may cause many heart attacks in humans. Investigations by MAFES Poultry Researcher Paul Thaxton and graduate student Jeanetta Tankson are exploring a similar relationship between EPHS and bacteria.

The researchers investigated chicken life cycles from egg to market and found that many bacteria enter the chicken during the hatching process. A part of all normal life processes, most bacteria are not detrimental. Thaxton and Tankson grew the bacteri um *Enterococcu fecalis* and re-injected it into birds. Within 48 hours, 97 percent of the challenged birds experienced EPHS.

Reproduction. MAFES Poultry Scientist Chris McDaniel is studying ways to improve rooster fertility by adapting human sperm quality analyzers to measure rooster sperm concentration, viability and motility. His investigations could increase hatch ing of Mississippi broilers by 5 percent, and increase Mississippi's annual gain to 45.8 million broilers at a value of $8.7 million at hatching ("Fertility Testing May Aid Poultry Industry, " *Highlights* Vol. 61:4).

Not content to rest on its previous accomplishments, MAFES is currently researching methods to improve poultry production. Specifics include improving poultry diets, reducing physiological stress on poultry, improving eggshell quality and developing pa ckaging methods to extend shelf life of poultry. MAFES researchers are extremely interested in developing a vaccine against coccidiosis, a common cause of poultry mortality that results in multi-million dollar losses to poultry producers nationwide.

"Because poultry production is so vital to Mississippi, we're looking at developing, at least in practice, a Center of Excellence for Poultry, so that Mississippi State would be recognized nationally as a place of poultry research, " Morgan s aid.

Selected Data Trends for the Mississippi Broiler Industry				
	1990	**1995**	**1996**	**1997**
Broilers Produced	415.1 mill.	644.0 mill.	675.9 mill.	720.3 mill.
Pounds Produced	1.694 bill.	2.962 bill.	3.109 bill.	3.313 bill.
Percent Annual Increase	4%	9%	6%	6.6%
Farm Value	$534 mill.	$1,113 mill.	$1,197 mill.	$1,226 mill.
Percent Annual Growth*	3%	3.2%	6%	6.6%
Economic Impact	$3.36 bill.	$7.00 bill.	$7.63 bill.	$7.712 bill.
**Change during previous year*				
Source: Departments of Ag Economics and Poultry Science, Mississippi State University and National Agricultural Statistics Service.				

Workshops Help Solve Poultry Problems

By Linda Breazeale

Government, university and industry representatives have teamed up to address some costly issues impacting Mississippi's poultry.

MAFES Poultry Researcher Wallace Morgan said four highly technical, day-long workshops in 1997 and 1998 trained about 230 poultry industry managers. Workshop developers used problem-based learning strategies, similar to teaching methods used at the Mis sissippi State University College of Veterinary Medicine. More workshops will take place this year.

"We wanted to help poultry companies improve their technicians' problem-solving skills, " Morgan said. "They worked on situations involving ventilation, disease prevention, hatchery sanitation and vaccination programs. "

In post-workshop surveys, participants indicated the potential of saving the industry several hundred million dollars by implementing the existing techno-logies they learned.

MSU Professor of Avian Medicine Danny Magee said developers wanted to focus on interaction of the participants rather than on lecture-based material. "Participants seemed to get more out of hallway discussions in previous lecture-style meetings. Facilitators helped guide those small group conversations in positive directions, " Magee said. "We focused not so much on the answer to a parti cular problem, but on the discussion leading to the answer. "

Magee said this method was a variant of the problem-based learning used at MSU. The "directed learning" activities allowed technicians to explore side issues.

Researchers with the U.S. Department of Agriculture's Agricultural Research Service (USDA-ARS) also participated in the workshops.

USDA-ARS Poultry Researcher David May said information exchanges between all the agencies involved had and will have multiple benefits in the future. "One of our goals was to bridge the gap between poultry companies and growers. Participating researchers also were able to learn what areas needed more or less research, " May said. "In addition to getting technical information, technicians were able to improve their communication skills with one another. We wanted to expand their network of resource people."

May said technicians were accustomed to using the university and USDA for guidance, but they learned to use each other as well.

Michael McAlpin, a technician at Peco Farms Inc. in Bay Springs, said interaction between company representatives made the workshops unique. "The poultry industry is changing rapidly, and companies often respond to situations differently, " McAlpin said. "In the workshops, we were able to get more than one opinion on how to handle a problem. Discussions were also on a much more understandable level."

McAlpin services 22 poultry farms that house 1.6 million chickens. He said follow-up visits with counterparts from other companies are not unusual now.

"We don't learn from each other just at the workshop. We continue to share problems with other technicians and compare how we do things, " McAlpin said. "It may be as unplanned as bumping into someone at the store or as official as rid ing with someone on a farm visit."

MAFES Develops Three New Grasses

After 11 years of research, a team of MAFES scientists has released three improved turf bermudagrasses for commercialization. These cultivars, MS-Choice, MS-Express, and MS-Pride are the first plants ever to be patented by Mississippi State University.

All require vegetative establishment from plugs, sprigs or sod because they lack viable seed production. The cultivars are marketed only as certified planting stock in an effort to maintain genetic purity. Certified production of planting stock is moni tored by the Mississippi Seed Improvement Association, and the grasses are marketed exclusively by the Mississippi Sod Producers Association.

"Even though the university turned the license for the grass over to commercial producers, Mississippi State University is still responsible for the pureness and integrity of the grass, " said Jeff Krans, MAFES agronomist. "We maintain t he grasses in both field plots and greenhouses in case the commercial grasses are ever lost."

Each of the three cultivars has different characteristics that make them suitable for different uses.

MS-Choice. MS-Choice is best suited for sports fields, home lawns, and golf tees and fairways. It has proven a high-quality grass by ranking sixth in overall turf quality among 28 cultivars tested.

MS-Choice is used at MSU's Scott Field on the football field. It is unique for a university to be able to use its own grass on its athletic fields. "We've been so impressed with it on Scott Field that we're using it on our four new recreational sports softball fields and on two new soccer fields, " MSU Director of Land-scape Charles Scoggins said. "The traffic tolerance of MS-Choice is exceptional."

MS-Choice has a thick, leafy, closed canopy near the soil surface. The canopy produces a highly resilient feel, which is often described as walking on carpet.

"In addition to the cushiony feel, some players and coaches have noticed improved footing and excellent durability in the MS-Choice grass, " Krans said.

The canopy is also able to tolerate frequent mowing while showing little or no damage from scalping. The grass maintains a dark green color with less-than-normal nitrogen fertilization.

"Since the grass needs less fertilization, lawns will need less mowing, " Krans said. "That is an attractive characteristic for homeowners."

The fact that the grass has no seedheads also reduces the need for mowing. The lack of

seedheads also presents homeowners with a pollen-free lawn. MS-Choice is not recommended for use in heavy shade, but it does have much better tolerance for shade tha n other available bermudagrasses.

One small drawback to MS-Choice is that under high-fertility conditions, thatch may accumulate.

"Under excessive accumulation of thatch, grass may be slow to green-up in the spring," Krans said. "Even though the grass has exhibited good resistance to leafspot, it showed some susceptibility to dollarspot and mites. Dollarspot tends to attack bermudagrass when nitrogen levels are low, usually in the spring and fall."

Recommended mowing heights for MS-Choice are one-half to two inches, with dethatching recommended every two years. Nitrogen should be applied annually with 2 to 6 pounds per 1,000 square feet.

MS-Express. MS-Express ranked fourth overall in turfgrass quality among 28 grasses tested. This high-quality grass was developed for use on golf putting greens and tennis courts. Perhaps the most desirable characteristic of MS-Express is its hig h rhizome density.

"Rhizomes refer to the underground stems of a grass," Krans said. "Of the 28 cultivars we tested, MS-Express had the highest density, which helps the grass recover from injury and survive cold temperatures. It makes the grass hardy and v igorous."

MS-Express has a recovery rate advantage over other grasses in excessive winter overseeded turfs and in recuperation from traffic stress.

This variety also has vigorous shoot growth. When compared with 27 other bermudagrasses, MS-Express had the highest establishment rate four to five weeks after planting.

"High shoot density and upright leaf growth of this cultivar provide for excellent surface uniformity and smoothness that improves ball roll on the putting surface," Krans said.

Early-spring green-up allows for early-season golf and a quick transition back to bermudagrass following winter dormancy. This follows winter overseeding turf back to bermudagrass turf.

MS-Express has a nondwarf type turf appearance that limits the low mowing height. It cannot be continuously mowed below 3/16 inch. For short periods of time (one to two weeks), MS-Express can tolerate low mowing at 5/32-inch to 1/8-inch cutting heights . Specialists recommend applying 6 to 12 pounds of nitrogen per 1,000 square feet annually, as well as annual dethatching.

MS-Pride. MS-Pride may be the best bermudagrass turf yet. Out of 28 cultivars tested for overall turfgrass quality, it tied for first with Tifway II. MS-Pride is rated that high because of its enhanced sod strength, dense canopy, prolonged fall color and improved disease resistance. Of the 28 cultivars tested, MS-Pride also had the highest sod strength value. "Since sod must be handled at least twice, once during harvest and once during installation, sod strength is an important factor for landscape contractors," Krans said.

The grass also has a high shoot density to help it combat weed encroachment and give it a thick appearance. MS-Pride has a fine leaf texture and produces fewer seedheads than MS-Express.

Prolonged fall color is an additional appeal of the grass. And, MS-Pride has improved disease resistance to help reduce the need for costly fungicides.

MS-Pride is ideal on golf tees, fairways, sports fields and home lawns.

Its best mowing height is 1/2 to 2 inches. MS-Pride requires four to six pounds per 1,000 square feet of nitrogen every year, but should only need dethatching once every three years.

"We're using it on our varsity softball fields and like the favorable way it compares to Tifway II. We solid-sodded with MS-Pride and were able to use the fields almost immediately," Scoggins said.

MAFES Well Represented at SAAS Centennial

Lifelong learning is an important aspect of research. MAFES scientists realize that to continue producing top-quality research, they need to stay abreast of research presently being conducted.

MAFES scientists attended the Southern Association of Agricultural Scientists Conference held from Jan. 30 through Feb. 3 at the Peabody Hotel in Memphis, Tenn. Research areas included academics, communications, economics, education, agronomy, horticul ture, sustainable agriculture, rural sociology, animal and dairy science, biochemistry and biotechnology, food science and technology, and soil and water.

SAAS serves as an annual consortium for scientists at land-grant institutions from the 13 southern states.

- ## Food Animals

The Impact of Safety Regulations (21CFR123) on Three Catfish Processors: A Case Study

Juan Jose Herrera, C.W. "Bill" Herndon, Jr., and Lisa House

The U.S. Department of Agriculture's Food and Safety and Inspection Service and the Food and Drug Administration have embraced the Hazard Analysis Critical Control Points (HACCP) system for meat, poultry and seafood inspection. New federal regulations mandate use of HACCP in fighting food-borne microbial pathogens.

Implementation costs of HACCP and other Sanitation Standard Operating Procedure guidelines were estimated for three Mississippi catfish processors. Each company

represented a different level of complexity of processing and ranged in size and set-up fro m a large firm with three critical control points (CCP) to a small firm with one CCP. The CCP represent stages in processing where contamination could occur.

Receiving of fish was the CCP operation evaluated at all three firms. Batter recirculation was evaluated at the large- and medium-sized firms and metal detection was the additional CCP evaluated at the large firm.

Even though the large firm incurred more cost per pound processed, it was able to more effectively employ HACCP principles to improve product quality than the two smaller firms.

This study showed that establishing process controls through HACCP principles reduces food quality problems and increases customer satisfaction related to food product safety.

Herrera was a graduate research assistant in Agricultural Economics at Mississippi State University. Herndon and House are MAFES agricultural economists at MSU.

Physico-Chemical, Microbial and Sensorial Properties of Catfish Fillets with Varying Surface Color

R.S. Chamul, J.L. Silva, and A. Supatanont

Catfish muscle fillets are generally white in appearance. Depending on the pH of the muscle (determined by the level of glycogen), the color of muscle fillets can range from white to deep pink. Dark muscles have higher water-holding capacity and usuall y have higher odor scores.

This study examined the correlation between catfish color and pH, texture (hardness), water-holding capacity (WHC), muscle glycogen content, psychrotrophic plate count (PPC), total coliform count and sensory characteristics.

Fresh catfish fillets were obtained from commercial catfish processing plant during the 1998 summer. Color values (Hunter "L", "a", and "b" values) were measured initially on all samples that had been packed on Styrofoam trays with pads and wrapped with PVC. Fish were kept at 4 C, with analyses run on days 1, 4, 8 and 12 for pH, color (Hunter "L", "a", "b", hue), WHC, muscle glycogen, coliforms, total aerobics (PPC), texture and sensory anal ysis for appearance, color, odor, and firmness.

Over time, appearance, color, odor and firmness scores dropped, except for white fillets, for which color scores increased.

Chamul is a research assistant at Mississippi State University. Silva is a MAFES food processing engineer at MSU, and Supatanont was a laboratory assistant there.

Characteristics of Raw and Baked Catfish Fillets from Different Strains

J. L. Silva, S.Y. Park, B. Bosworth, and S. Chamul

Quality attributes of three strains of catfish, "USDA-103," "Norris," and "Channel x Blue Hybrid," were studied on raw, frozen-thawed, and cooked fillets.

Raw fillets from "Norris" had higher Hunter "L" (brightness), hue, and chroma (intensity) values, but they were smaller and had the largest head-to-body ratio. "Channel x Blue" had the smallest head-to-body ratio and the h ighest pH and shear force, or meat firmness.

Attributes of frozen-thawed fillets did not differ among the three strains. Although the Hunter "L," "a" (redness), and "b" (yellowness) values were lower, pH was slightly higher, and shear and compression (elasticity or t oughness) force were similar to raw fillets. Baked "Norris" fillets had higher Hunter "L, " hue, shear and compression forces and lower Hunter "a" values. "Norris" produced the smallest baked fillets.

Panelists rated "Channel x Blue" frozen-thawed fillets as less white and firm. "Norris" fillets had the lowest color intensity and light reflectiveness. Panelists did not find differences among the three strains upon cooking.

Overall, panelists liked "Norris" and "USDA-103" cooked fillets better than "Channel x Blue" cooked fillets, but they rated the frozen-thawed fillets from the three strains similarly.

Silva is a MAFES food processing engineer at Mississippi State University. Park is a former graduate student at MSU and Chamul is a research assistant there. Bosworth is a research geneticist with the USDA-ARS in Stoneville, Miss.

Microbiological, Chemical and Physical Changes of Beheaded Farm-Raised Channel Catfish (*Ictalarus punctatus*) as affected by Season and Holding Prior to Processing

J. A. Figuero and J. L. Silva

Environmental or processing conditions may change catfish during storage. Different commercial practices may affect shelf life and quality of catfish products.

This study examined changes in fillet quality and initial counts with harvest season and holding at 5 C after deheading and eviscerating. After holding for up to 30 hours, the fish were filleted and evaluated.

Initial psychrotrophic counts (PPC) were higher in summer fish but lower by holding fish for 26 hours. PPC is a measure of cold-loving bacteria. Winter fish PPC did not change with holding. Winter fillets had higher pH values than summer fish and had a decrease in moisture from 78 to 44 percent after 30 hours of holding. Winter fish showed color changes (based on Hunter "L", "a", "b", values). Hunter "L" values increased with holding time.

Figuero is a MAFES research assistant at Mississippi State University. Silva is a MAFES food processing engineer there.

Diets with Various Fats and Subsequent Packaging Conditions on Rancidity Development and Sensory Ratings of Bacon

Daniel E. Etzler and Robert W. Rogers

This study evaluated the effects of fat supplementation of swine diets, packaging, and storage time on sensory evaluations and processing characteristics of bacon.

Five corn-soy dietary treatments were supplemented with one of the following fat sources: 10 percent fish oil; 10 percent fish meal; 10 percent restaurant grease; 5 percent fish oil; 5 percent fish meal; 13.99 percent protein control mixture of non-sup plemented corn-soybean meal.

All fish products were manufactured from catfish waste products. Diets were fed to 47 crossbred barrows (offspring of Hampshire boars) and Landrace sows. All animals were randomly assigned to one of the diets listed above. The average initial weight of the barrows was 63 kilograms, and the diets were fed 43 to 57 days until the animals reached a slaughter weight of about 120 kilograms.

After using conventional slaughtering and cutting techniques, the bellies were processed into bacon by conventional methods.

Half was vacuum packed, while the other half was placed in non-vacuum packaging. Packages of bacon were then placed in either refrigerated or frozen storage for one, seven or 13 weeks. A trained sensory panel evaluated products for taste, texture and o ther sensory properties.

Bacon from the 10 percent fish oil-treated animals scored lower for overall acceptability than bacon from the control, 10 percent fish meal or 5 percent fish oil dietary treatments. Bacon from the 10 percent fish meal treatment caramelized during cooki ng and produced a dark brown or black color. The frozen, non-vacuum packaged bacon was more rancid than the other products after both seven and 13 weeks of storage. Freezing affected the vacuum pack-aged bacon from animals fed the 10 percent fish oil or 10 percent fish meal diets as indicated with lower sensory scores.

Meat packers generally do not have control over diets fed to animals they process, so the need to properly package and store products is paramount. Based on these results, these types of products need to be vacuum packaged and stored under refrigeratio n in order to achieve maximum shelf-life with acceptable quality.

Etzler was a graduate student in food sciences at Mississippi State University. Rogers is a MAFES animal scientist at MSU.

- ## Horticulture

North Mississippi Yellow Squash Trials

Kent E. Cushman and Thomas E. Horgan

Ten cultivars of yellow crookneck squash were direct-seeded in plots in northern Mississippi on June 15, 1998, into raised beds covered with white-on-black plastic mulch and drip irrigated.

Twelve harvests were made. There were no significant differences between any of the 10 cultivars in total or early marketable yield.

When compared side-by-side to seven other trials (five spring and two fall plantings) in Mississippi, Alabama and North Carolina, cultivars like 'Supersett', 'Medallion', 'Sundance', 'Prelude II', 'Goldie', and 'Dixie' were frequently among the top-ran ked crooknecks for total yield.

These cultivars were also more frequently tested and, therefore, might be more confidently recommended for spring plantings over other cultivars that performed well but were not as often tested.

Cushman and Horgan are MAFES horticulturists at the North Mississippi Branch Experiment Station in Verona.

The Impact of Controlled-Release Fertilizer Source and Rate on Large Container Production

Patricia R. Knight and Charles H. Gilliam

Influence of fertilizer source and rate was investigated for *Lagerstroemia indica x fauriei* 'Natchez' and *Magnolia grandiflora* 'Little Gem' planted in large containers.

Uniform 1-liter liners were transplanted into 57-liter containers on June 13, 1997, and placed on a gravel container pad with overhead irrigation. Fertilizers evaluated were Woodace 20N-2.2P-6.3K and Osmocote Plus 15N-3.9P-6.9K. Three rates were used (10, 15, or 20 grams of nitrogen per container) during the first year. Medium was 100 percent pine bark amended with 3 kilograms per cubic meter of dolomitic limestone. Data collected included growth and foliar color ratings.

Fertilizer source did not influence height or caliper for *Lagerstroemia* or *Magnolia*, nor did it affect foliar color ratings of *Lagerstroemia*. Height and caliper of *Lagerstroemia* was greater for plants grown with 20 grams of nitrogen per container, compared to 10 grams. However, increasing the fertilizer rate from 15 to 20 grams of nitrogen per container did not further increase growth.

There was an interaction between source and rate for foliar color ratings of *Magnolia*. Plants grown using the low rate of Osmocote had higher foliar color ratings than plants grown using the medium or high rates of Osmocote and the low rate of W oodace. Plants grown using the medium and high rates of Woodace were similar to all other treatments

Knight is a MAFES horticulturist at the South Mississippi Branch Experiment Station in Poplarville. Gilliam is a professor in the Auburn University Department of Horticulture.

Media Containing Earthworm Castings as Related to Plant Growth of Marigold

Pablo Hidalgo, Frank B. Matta and Richard Harkess

Earthworm (*Eisenia fetida andrei*) castings were tested at Mississippi State University in 1997 as a growth media for marigolds (*Tagetes erecta*).

Results showed that earthworm castings increased the growth index, increased stem diameter, enhanced root growth, increased dry weight, increased flower initiation, and increased flower numbers when compared to peat moss (perlite 7:3, Sunshine®, an d pine bark: sand 4:1).

Mixture of castings with peat moss (perlite 7:3, pine bark: sand 4:1) at the ratios of 1:1, 2:1 and 3:1 (media: castings) showed better performance for all growth parameters previously mentioned when greater amounts of castings were used.

Hildago is a doctoral student in plant and soil sciences at Mississippi State University. Matta and Harkess are MAFES horticulturists at MSU.

Nitrogen and Calcium Influence Incidence of Fire Blight in 'Royal Gala' Apple

Francisco Salcedo, Frank Matta and Frank Killebrew

This study evaluated fire blight (*Erwinia amylovora*) susceptibility of 'Royal Gala' apple trees after treatment with ammonium nitrate, calcium nitrate, and lime applications.

In 1996, neither ammonium nitrate nor calcium nitrate affected fire blight susceptibility of 'Royal Gala' apple trees. However, both nitrogen fertilizers increased trunk diameter.

Tree height was increased by ammonium nitrate applied at the rate of .1 lb per tree, but tree height was not affected by calcium. Calcium, or soluble lime, also did not influence fire blight susceptibility or tree growth in 1996 or 1997. Neither ammoni um nitrate nor calcium nitrate influenced fire blight susceptibility or affected tree growth in 1997.

Trees were planted in February 1995, and nitrogen was applied the next year.

Levels of nitrogen included ammonium nitrate at .1 and .3 pounds per tree, and calcium nitrate at .1 and .3 pounds per tree. None were sufficient to contribute to fire blight susceptibility, although these levels did result in increased tree growth, pa rticularly trunk diameter.

Such levels are desirable since fire blight susceptibility was not increased. The maximum nitrogen levels to avoid fire blight susceptibility must be identified.

Both nitrogen levels (.1 and .3 pounds per tree) avoided fire blight, but maximum nitrogen levels to avoid fire blight were not established.

Salcedo is a doctoral student in plant and soil sciences at Mississippi State University. Matta is a MAFES horticulturist there and Killebrew is an MSU Extension Service specialist.

Accel and Carbaryl Influence Fruit Set and Quality of Three Apple Cultivars Grown in Mississippi

Maria Sindoni and Frank Matta

This 1997 study examined the effects of Accel and carbaryl on the fruit set and quality of three apple cultivars: 'Empire', 'Jon-A-Red', and 'Braeburn'. Characteristics examined included fruit length, fruit diameter, fruit length to diameter ratio, w eight, fruit set, and fruit quality attributes (pH levels, firmness, hunter color and soluble solids content)

Chemical treatments evaluated were: carbaryl at 0.05 percent, 0.1 percent, and 0.2 percent; Accel at 25 part per million (ppm), 50 ppm, and 75 ppm; and hand thinning (control).

Carbaryl at 0.2 percent and Accel at 50 ppm and 75 ppm reduced fruit set of all cultivars, compared to hand thinning. Accel and carbaryl increased yield (total fruit weight per tree), soluble solids content, percent of fruit in red color, and length to diameter ratio, depending on cultivar and concentration.

Juice was less acidic with treatments of 0.05 percent and 0.1 percent carbaryl and with 25 ppm and 50 ppm Accel. Accel at 25 ppm rendered acid in 'Braeburn' juice. Treatments of Accel reduced the firmness of 'Jon-A-Red' and 'Braeburn', while carbaryl h ad no effect on fruit firmness.

Sindoni is a doctoral student in Plant and Soil Sciences at Mississippi State University. Matta is a MAFES horticulturist at MSU.

Accel, Ethephon and Wilthin Decreased Fruit Set and Increased Fruit Quality of Apple

Ajaz M. Ansari, Frank B. Matta, Mohammad Baqir and Tauqir Abbas

The influence of chemical thinners, Accel, ethephon and Wilthin, was evaluated on apple cultivars 'Royal Gala', 'Blushing Gold', and 'Ultra Gold'.

Accel was applied at 25, 50 and 75 ppm; ethephon at 100, 200 and 300 ppm; and Wilthin at 0.5, 1.0, and 1.5 percent. Water was used as a control. Fruit Set. All treatments of Accel, ethephon and Wilthin reduced the fruit set of 'Royal Gala', 'Ultra Gold', and 'Blushing Golden'.

Fruit Yield. All concentrations of Accel increased the fruit yield of 'Royal Gala' but did not affect the fruit yield of 'Ultra Gold' and 'Blushing Golden'. Ethephon at 300 ppm increased the fruit yield of 'Royal Gala'.

The yield of 'Ultra Golden' increased at 200 ppm and 300 ppm, while the yield of 'Blushing Golden' was not affected.

Wilthin at 1.5 percent increased the yield of 'Royal Gala', but Wilthin at 0.5 percent

and 1.0 percent had no effect. Wilthin did not affect yields of 'Ultra Gold' and 'Blushing Golden'.

Levels of pH. All concentrations of Accel increased the pH of 'Royal Gala' making it less acidic. At 50 ppm and 75 ppm, Accel increased the pH of 'Ultra Gold'. At 25 ppm and 50 ppm, Accel increased the pH of 'Blushing Golden'. At all concentra tions, Ethephon and Wilthin increased the pH of 'Royal Gala', 'Ultra Gold' and 'Blushing Golden'.

SSC. Accel at 25 ppm increased solid soluble concentration (a measure of total sugars) of 'Royal Gala'. Accel at 75 ppm increased SSC but did not affect SSC of 'Blushing Golden'. Ethephon at 300 ppm increased SSC of 'Royal Gala' and 'Ultra G old'. Ethephon had no influence on SSC of 'Blushing Golden'. Wilthin at 0.5 percent and 1.5 percent increased SSC of 'Royal Gala' and 'Ultra Gold'. Wilthin had no influence on SSC of 'Blushing Golden'.

Ansari is a postdoctoral student in plant and soil sciences at Mississippi State University. Matta is a MAFES horticulturist there. Baquir is a recent Ph.D graduate of MSU, and Abbas is a Ph.D. candidate in plant and soil sciences there.

- ## Agronomy

UNR Cotton Response to Seeding Rates

N.W. Buehring, R.R. Dobbs and G.A. Jones

Since no seeding rate information on ultra-narrow-row (UNR) cotton was available, a study on a Catalpa silty clay loam soil evaluated 7.5-inch rows. Seeding rates ranged from 90,000 to 175,000 seeds per acre, which resulted in 53,000 to 100,000 plants per acre. These compared to 30-inch-row cotton seeded at 75,000 seeds per acre (43,000 plants per acre). Suregrow SG125 variety was planted in a spring- tilled stale seedbed on May 12, 1997, and June 9, 1998. Dry weather delayed the 1998 planting.

No differences in first bloom or nodes above white flower were noted in 1997. However, with the late 1998 planting, the UNR cotton at all seeding rates had more plants blooming on Aug. 18 and fewer nodes above white flower than 30-inch rows on Sept. 10 . Both years, plant height at maturity, boll retention, first fruiting position bolls, bolls per plant, nodes per plant, and handpicked lint yield showed no response differences between populations for the UNR and the standard 30-inch rows.

The UNR cotton at 90,000 seeds per acre and the standard 30-inch rows had more bolls in the second fruiting position than UNR cotton did at 125,000 to 175,000 seeds per acre in 1997 but not in 1998. Mean lint yields for the study ranged from 585 in 199 8 to 920 pounds per acre in 1997.

Buehring is superintendent, Dobbs is a research assistant and Jones is a former research assistant at the North Mississippi Branch Experiment Station in Verona.

Corn Response to Starter Fertilizer and Tillage on a Clay Soil

R.R. Dobbs, N.W. Buehring, G.A. Jones, and J.J. Varco

A study to evaluate Amisorb (carpramid, a nutrient absorption enhancer) was conducted in the spring of 1997. Amisorb at 2.34 liters per hectare was applied alone and in combination with liquid starter fertilizer (10-34-0) at 13.44 kilograms of nitrogen and 47 kilograms of P_2O_5 per hectare. Treatments were evaluated (1997-98) in both conventional and no-tillage treatments on a Catalpa silty clay soil at Verona, Miss.

Each year, granular potash (0-0-60) was applied at 47 kilograms of P_2O_5 per hectare to all treatments except the checks with no P_2O_5 and starter fertilizer treatments. A squeeze-pump applicator with a coulter was used to apply starter fertilizer subsurface band at planting, 5 centimeters to the side of the seed furrow and 5 centimeters deep. A dribble starter fertilizer treatment was applied on the soil surface following the planter press wheel using a squeez e pump. All plots were sidedressed with 32 percent UAN solution 225 and 46 days after planting (DAP) in 1997 and 32 DAP in 1998 for a total of 179 kilograms of nitrogen per hectare.

The 10-34-0 starter fertilizer treatments were taller than the non-starter treatments at the time of sidedress.

Amisorb alone showed no height advantage compared to the check for both tillage systems. Neither Amisorb, with or without starter fertilizer, nor starter fertilizer alone affected physiological maturity, seed test weight or yield in either tillage syst em.

Dobbs is a MAFES research assistant at the North Mississippi Research and Experiment Station in Verona. Buehring is the MAFES superintendent and Jones is a former research assistant there. Varco is a MAFES agronomist at MSU.

- ## Agricultural Economics

Measuring the Impact of Boating Safety Policy

Diane Hite and Todd Gabe

Potential benefits from the adoption of uniform state-level boating safety policies in the United States were evaluated both nationally and in the Southeast region.

In the year evaluated (1994), there were 6,958 boating accidents in the nation and 1,174 in the 16 southern states.

The study examined how mandatory youth licensing requirements or increased law enforcement affected boating safety. Results confirmed that adoption of youth certification programs and the addition of law enforcement officials reduced accidents 30 perce nt nationally and 35 percent in the Southeast.

Hite is a MAFES agricultural economist at Mississippi State University. Gabe is in the Department of Agricultural, Environmental and Development Economics at Ohio State University.

Portera Inaugurated as MSU's 16th President

Mississippi State will become the region's leading land-grant university in undergraduate instruction and a top-50 public research university while expanding service to the state, newly inaugurated President Malcolm Portera said during Feb. 6 inauguration activities.

Portera, the 16th president to lead the university since 1878, was formally installed in Humphrey Coliseum ceremonies attended by dignitaries, higher education representatives and supporters.

In his inaugural address, Portera said that the university's ambitious goals for the next several years make up what he called the "Leadership for the 21st Century Initiative." The plan covers prior ties in teaching, research and service and other areas such as campus life, financial and physical resources and intercollegiate athletics.

The Leadership for the 21st Century priorities were developed in consultation with university and state leaders during his first 13 months in office, Portera said. He succeeded former president Donald Zacharias on Jan. 1, 1998.

The formal investiture was conducted by Cass Pennington, president of the Board of Trustees of State Institutions of Higher Learning.

"We will become a top-50 research university, and we will seek to join such prestigious institutions as the University of Illinois, Indiana University, the University of Michigan, and Penn State as a Carnegie Foundation Research I institution,&quo t; Portera said. "We will accelerate our economic development and service linkages as a land-grant institution to change this state, to expand its economy and to improve the lives of all its citizens," he said.

Portera devoted much of his speech to the history and character of what began as Mississippi A&M and became popularly known as "The People's College."

"By every measure, A&M College was created to meet a need of the people of the state," Portera said. "This university offers people hope; hope for a better life, a secure future and a key to unlock the potential that every parent sees i n the eyes of their offspring."

Portera cited the university's current rank of 66th in the National Science Foundation listing of public research universities, its designation last year as one of five Truman Foundation Honor Institutions, and the selection last year of student Peter Umbdenstock of Biloxi as the top mechanical engineering student in the nation.

-MSU Memo

In Brief

MAFES Sponsors Good Lab Practices Seminar

By Rebekah Ray

A scientific study is only as good as the ability to reproduce and reconstruct the investigation, researchers were reminded recently at Mississippi State University.

A Good Laboratory Practices Seminar hosted March 1 and 2 advised researchers of ways to ensure the reliability of their research. The Biomedical Center at the MSU College of Veterinary Medicine sponsored the first day, and the second day was sponsored by the Mississippi Agricultural and Forestry Experiment Station, the agricultural research arm of the university.

"The Good Laboratory Practices Seminar reminded scientists that good research practices improve the quality of their research," said Euel Coats, MAFES weed scientist and coordinator of the workshop.

Simple techniques such as recording data in permanent ink and initialing and dating mistakes help validate findings. The Environmental Protection Agency and the Food and Drug Administration regulate the data they will take. The two organizations can refuse to look at findings not obtained under GLP guidelines, Coats said.

MSU Receives $10 Million Remote Sensing Grant

By Rebekah Ray

Mississippi State University and MAFES have received $10 million in federal funds to implement the Remote Sensing Technologies Center (RSTC) for developing new ways to apply space-based technologies to agriculture, forestry, wildlife and transportation .

An educational forum featuring researchers involved with the RSTC was hosted for MSU faculty and personnel on Jan. 19.

"The Remote Sensing Technologies Center will move Mississippi State toward the top of the list of research institutions. Our faculty are working across disciplines in projects such as this one to develop the technical capacity to help our ec onomy grow substantially," MSU President Malcolm Portera said at the forum.

Mississippi State University, NASA Stennis Space Center's Commercial Remote Sensing Program and the Mississippi Space Commerce Initiative at the University of Mississippi are working together to increase the use of remote sensing products.

The RSTC will work with NASA's Space Center in Picayune, Miss., to determine suitable applications of those developments.

Mississippi State will use information from this technology in a cross-disciplinary approach combining units campus-wide for research and education. Through computational modeling, satellite data will be analyzed and interpreted while workforce develop ment will include education and outreach strategies.

"The RSTC will help determine how to use remote sensing in agriculture, forest resources and transportation. For example, remote sensing can reveal stressed spots in crops and better regulate plant growth," said David Shaw, RSTC director and MAFES weed scientist.

Remote sensing uses satellite technology and airborne platforms to produce and transmit data describing earth's surface.

For more information on the RSTC, call Shaw at (662) 325-2598, or download information

from www.rstc.msstate.edu.

Simulation Can Help Predict Crop Yields

By Bonnie Coblentz

Knowing what the weather will be like is about the only variable keeping Mississippi State University researchers from being able to predict some cotton and soybean yields.

Computer programs have been developed to simulate crop growth. The goal is to know how plants will respond to environmental variable, said Harry Hodges, MAFES agronomist.

"We have spent a lot of effort to develop these equations and then put them together in combinations that reasonably reflect what plants do in the real world," Hodges said. "Crop responses to weather and soils are unique each year becaus e so many variables impact the plant, but these can be simplified and made understandable and predictable."

The Glycim Commax and Gossym Commax computer programs were developed as a collaborative effort of MAFES, the U.S. Department of Agriculture and Clemson University. The programs factor in plant responses to individual variables and combinations of varia bles.

"Our approach is relatively unique in that we are detecting the environmental variables and the plants' response to them and trying to develop a mechanistic model," Hodges said. "Others have developed relatively simpler models that have been shown to simulate the crop in general but are not sensitive to unique weather experiences."

The program works when the producer inputs information on soil types, seed variety, management practices, and daily information on weather, insect pressure and other factors. The program analyzes the data to help farmers make management decisions.

Program developers are trying to simplify the model so farmers can use information more readily.

Gossym Commax, the cotton crop simulation program, has about 300 users in Mississippi and across the Cotton Belt. The soybean counterpart, Glycim Commax, is in more limited use as it has not yet been released to the public.

MAFES Agronomist Frank Whisler began field testing Glycim in 1997 with 12 farmers in Mississippi, Louisiana, Alabama, Arkansas, Missouri and Tennessee.

R.O.W. Signs Mean MAFES Research

By Rebekah Ray

Some MAFES research takes place on roadsides across the state.

"We have test sites located across Mississippi to do vegetative management research for the Mississippi Department of Transportation. We test herbicides at these sites to help MDOT engineers know the effectiveness of products," said Euel Coat s, MAFES weed

scientist.

The results of this research are vital. Results of the right-of-way (R.O.W.) research have resulted in lower levels of pesticide usage and have developed less detrimental methods of controlling weeds. These results have meant substantial savings on che mical treatments for Mississippi.

"Our approach is a model other states look at and emulate," said Jim Taylor, MAFES research assistant.

Herbicides are tested on small plots that are about 1,000 feet long and run about 30 feet back from the road. Plots are divided into 10-foot test strips that go from the road to the fence. Each strip receives a different treatment. MAFES works closely with chemical companies to develop and market pesticides, Taylor said.

R.O.W. research done by MAFES has been funded since 1990. Earlier weed treatment programs resulted many times in brownout and turfgrass injury. Now, herbicides are applied when weeds are small and are germinating, which reduces brownout. Applications o f herbicides to smaller weeds requires lower rates of herbicides.

Between 15 and 20 experiments are conducted around the state each year. The $300,000 research project is funded in part by the MDOT.

"We use information from MAFES to establish proper application rates of herbicide and to know what products to use to control vegetation. MAFES also trains our employees about application rates and how to obtain those rates," said John Vance, state maintenance engineer with the MDOT.

MAFES, USDA-ARS Fight Corn Pests

By Rebekah Ray

Corn pests that cost Mississippi growers $7 million last year are being attacked by two scientists at Mississippi State University.

USDA Agricultural Research Geneticist Paul Williams and Research Entomologist Frank M. Davis are battling southwestern corn borers and fall armyworms. Their 'weaponry' includes the germplasms Mp713 and Mp714 that have been jointly released by MAFES and USDA-ARS.

"Corn borers and fall armyworms are serious pests in the South. Last summer borer levels were very high in the Mississippi Delta. These two germplasms could be used to increase resistance in hybrids to southwestern corn borer and fall armyworm inf estations," Williams said.

Germplasms such as Mp713 and Mp714 can be used by plant breeders to introduce superior genetic traits into commercial hybrids for improved crop production. The presence of corn borers has increased in Mississippi as more acres of corn are planted and as farmers practice reduced-tillage management. In 1998 Mississippi harvested 500,000 acres of corn.

Corn borers tunnel into stalks and move down to the plant base, where they prepare to spend the winter by eating around the base. Wind blows these infested stalks over making mechanical harvesting of ears more difficult.

Fall armyworms are most serious on corn planted late in the season because insect populations increase as weather warms. The pests feed on leaves and ears and move from plant to plant like an army.

New MAFES Rice May Threaten Standard

By Bonnie Coblentz

A new rice variety soon to be in commercial production is giving indications it may be a strong contender for the state's most popular variety.

Priscilla was released in 1997 by MAFES Agronomist Dwight Kanter. The new variety started as a cross an Arkansas researcher made in the early 1980s between three existing varieties.

"In early tests, Priscilla was one of the highest yielding semi-dwarfs we observed," Kanter said.

Lemont, the current most popular variety, occupies about 73 percent of Mississippi's rice acreage. Priscilla has averaged yields 10 to 20 bushels per acre higher than this standard semi-dwarf.

In addition to high yields, Priscilla is characterized by good stalk strength and lodging resistance, or the ability of the rice plant to stand up at maturity, making harvest more efficient. The variety also has a higher tolerance to sheaf blight dise ase, to which the current leading variety is very susceptible.

On-farm tests under commercial growing conditions with a wide range of soil types, management practices and weather conditions show Priscilla is well suited for Delta production.

Updates

Ryan joins MAFES Animal and Dairy Sciences

MAFES Reproductive Biologist Peter Ryan has recently joined the Department of Animal and Dairy Sciences and the College of Veterinary Medicine at Mississippi State University. He will continue researching the reproductive hormone relaxin and its role in e quine and swine reproduction. He will also spearhead equine research in nutrition and reproduction. Reproductive tissue is the only adult mammal tissue that undergoes reorganization similar to that seen during embryogenesis. Ryan's research investigates how the relaxin assists with tissue remodeling to facilitate follicular growth, ovulation, implantat ion, pregnancy and parturition in domestic livestock.

Another focus of Ryan's research on relaxin will be problems associated with late-term

abortions in mares. He will study relaxin as a possible diagnostic marker for monitoring placental function and fetal well being. From Ontario, Canada, Ryan received a bachelor's degree in reproductive physiology at Trinity College, the University of Dublin. At the Ontario Veterinary College, University of Guelph, he received master's and doctorate degrees in reproductive endocrinol ogy, specializing in equine and swine research.

Reynolds Receives Outstanding Young Weed Scientist Award

By Lani Jefcoat

MAFES Weed Scientist Daniel Reynolds received the Outstanding Young Weed Scientist Award at the Southern Society of Weed Scientists annual meeting held in Greensboro, N.C.

"I am pleased that he has been recognized with this award because it demonstrates the caliber of young scientists we are able to attract at this university," said Richard Mullenax, department head of plant and soil sciences at Mississippi Sta te University.

As a MAFES weed scientist, Reynold's research focuses on the impact of transgenic technologies on crop tolerance and economics of crop production. Reynolds holds an undergraduate degree in general agriculture with a minor in plant science from the University of Arkansas, Monticello. His master's degree is in agronomy-weed science from the University of Arkansas, Fayetteville, and his doctorate in cr op science-weed science is from Oklahoma State University.

Silva Serves on IFT Committee

MAFES Food Engineer Juan Silva serves on the Committee on Diversity (CDT) of the Institute of Food Technologists (IFT), a nonprofit scientific society for food science and food technology employees.

The IFT is a professional association of food scientists and technologists and serves to promote food science and its components. The CDT encourages the food industry to employ and promote worthy women and minorities and further the cultural and profes sional diversity of the IFT.

Founded in 1939, the IFT has 28,000 members and is headquartered in Chicago. A native of Venezuela, Silva has been a research scientist in the Department of Food Science and Technology at Mississippi State University since 1986.

MAFES Scientists Receive Patents

The tenacity required for productive research has paid off for MAFES researchers Dawn S. Luthe, Tibor Pechan and Nancy Reichert. The three recently received U.S. patents for biological discoveries.

Biochemists Luthe and Pechan, together with USDA-ARS Research Geneticist W. Paul Williams and MSU doctoral student Bing-Hua Jiang, received a patent for using the DNA

molecule 33KD cysteine proteinase to make plants more insect resistant.

The germplasm containing 33KD has shown resistance to crop pests such as the fall armyworm, corn earworm, European corn borer, Asian corn borer, spotted stem borer, Southwestern corn borer, sugarcane borer, tobacco budworm and the African maize stem bo rer. These insects damage row crops such as corn, cotton and soybeans.

The gene may provide another means of resistance, particularly when used in "gene stacking," a process in which more than one resistance gene is implanted through adaptive biotechnology.

Horticulturist Reichert and MSU postdoctoral research assistant Yinghui Dan were awarded a patent for developing a new method to produce transgenic soybean plants via genetic engineering. With earlier methods, only a few, non-agronomically acceptable varieties could be genetically engineered, many of which contained harmful mutations, such as sterility with no seed pod development.

Research funds from MAFES and the Mississippi Soybean Promotion Board enabled Reichert and Dan to devise a method that allows DNA to be introduced into virtually any soybean variety for generating transgenic plants. This new method of genetic engineeri ng should result in easier and earlier generations of value-enhanced soybeans that are disease and pest resistant and have altered oil profiles.

Inglis, Ma join MAFES

By Lani Jefcoat

MAFES Insect Pathologist G. Douglas Inglis and MAFES Entomologist Peter Ma have recently joined the Department of Entomology and Plant Pathology at Mississippi State University.

Inglis' research will focus on microbial control of plant bugs, boll worms, and southwestern corn borers, as well as disease prevention in mass-reared insects in insectaries.

Inglis had been a post-doctoral fellow at Agriculture and Agrifood Canada in Lethbridge, Alberta, where his research focused on molecular pathology and microbial control of grasshoppers and locusts.

Inglis received a B.Sc. from the University of Alberta in Edmonton, Alberta, in 1985. At the University of Guelph in Ontario, he received a M.Sc. in 1989. He received a Ph.D. in insect pathology from the Department of Biological Sciences at Simon Frase r University in Burnaby, British Columbia, in 1996.

Ma received his undergraduate degree from Hong Kong Baptist College. In 1983, he came to Mississippi State University and received his M.S. degree in entomology. He received a Ph.D. from Cornell University in 1992, where he worked until returning to Mi ssissippi State last December.

At Cornell, Ma researched neurosecretions in insects and focused on neuropeptides in the corn earworm. Neuropeptides turn on sex pheromone production in female moths and affect other physiological functions.

His work also includes putting neuropeptide genes that encode multiple peptides into baculovirus vector. This recombinant virus has increased insecticidal activity when compared to the wild type virus. He uses recombinant DNA technology to generate re combinant viruses for future use in controlling pest insects on corn and cotton.

Stewart moves to Mississippi State

By Lani Jefcoat

MAFES Entomologist Scott Stewart has joined the research staff at Mississippi State University after working at the Central Mississippi Research and Extension Center in Raymond.

At Mississippi State, Stewart will continue researching insect pest management in row crops, particularly cotton, corn, and soybeans. At CMREC, Stewart focused primarily on cotton insect pest management.

MAFES AND EXTENSION
Meet with Advisory Councils

By Rebekah Ray

Each spring, Experiment Station researchers and Extension Service specialists travel to Raymond and Verona to consult with the producers and suppliers who drive Mississippi's agricultural industries.

"We're in the best of times and the worst of times," said MAFES Director Vance Watson, in his welcoming statements at each of the two meetings. "Markets change and demands change, yet agriculture is still impacting the world."

"We appreciate the sacrifices you made to attend these council meetings. You are voluntary stake-holders in the work and research we do," Watson said.

Advisory councils help guide the efforts of the Central Mississippi Research and Extension Center in Raymond and North Mississippi Research and Extension Center in Verona. Advisors from all of Mississippi's major commodity groups participate.

"It may seem that Mississippi has always had to work a little harder to do as well as other states, but what we've done, we've done well," said MSU Vice President Rodney Foil, in presenting his vision of the future of agriculture to bot h groups.

According to Foil, agriculture faces many changes:

- Information technology
- Biotechnology
- A global economy
- A shift in demographics
- Production of designer foods
- Structural shifts that result from these changes

"Land-grant institutions such as Mississippi State can help us prepare to meet these changes. We need to continue to work smarter and to adopt technology because ultimately, the consumer is the beneficiary of what we do," Foil said.

- **Central Mississippi Advisory Council**

  In its third year, the Central Mississippi Advisory Council met at Eagle Ridge Conference Center in Raymond on Feb. 23. Almost 175 suppliers and producers registered for the event.

  "Most of our programs come from your recommendations. You hold us accountable and give us direction for other programs," said Butch Withers, head of the Central Mississippi Research and Extension Center.

  Beef. Producers expressed appreciation for continued funding and research from Mississippi State. They desired more diversified marketing strategies to sell beef cattle and asked for a certification process for ryegrass growers.

  "There is a good representation of beef producers across the southern part of the state," said Gregg Smith, Brown Loam Branch Experiment Station superintendent. Smith served as group spokesperson.

  Dairy. Producers were primarily concerned about the lack of willing and dependable workers. Effects of heat stress on animals during summer months also concerned them.

  "This is my first year to attend. I've really enjoyed the interactions between producers and researchers and extension personnel," said Max Anderson, a dairy producer in Newton.

  Forage. Forage producers were interested in studies on heifer development through second breedings, stocking rates on summer forages, carcass evaluations on steers, and steer grazing on ryegrass varieties.

  Field Crops. Producers were particularly interested in technologies such as GPS and its application to them.

  Fruits and Vegetables. Producers expressed concerns about the effect of soil insects on root crops such as sweetpotatoes, as well as methods to control whiteflies, weeds, deer and diseases. They would also like to see blueberry research e xpanded to more northern parts of the state.

  "Research from land grant institutions is vital to farmers. It's given to us at no charge, and we can believe what these researchers say because they are scientists," said Louis Guedon, a fifth generation farmer who produces and markets butte rbeans, peas, sweetpotatoes and squash in Fayette.

  Ornamental Crops. Producers asked that more research be made available to growers. They suggested that ornamental horticulturists should be stationed at Crystal Springs and in the Jackson area.

Forestry. Producers asked for more elementary and youth education, suggested that the Extension Service continue serving as link between research and individual land owners, and asked for a forestry products promotion board.

- **North Mississippi Advisory Council**

"Today's farmers each feed 135 people, most of whom are over-seas. Meetings like this enable me to let Sen. Cochran know what's on your mind," said Hunt Shipman, aide to Mississippi Senator Thad Cochran.

Shipman spoke at the advisory council meeting on Feb. 25 at the North Mississippi Research and Extension Center (NMREC) in Verona. Almost 200 producers, suppliers and MSU personnel attended.

"Farmers can't make sound economic decisions with the kind of crop insurance available right now. Crop insurance in other parts of the country works really well. Since much crop insurance was written to benefit other geographic areas, we're trying to figure out how to make it work really well for this part of the country," Shipman said.

Farmers are also concerned with weather and natural occurrences, technology, attitudes and preferences of buyers, and agricultural policies and laws, Shipman said.

"Food, water, land, air and natural resources are important to all of us in Mississippi. As producers, you control about 80 percent of it as private resources," said MSU Extension Director Ron Brown. "We're here to listen to you so that we can do a better job serving you."

Counties represented at NMREC included Alcorn, Benton, Chickasaw, Clay, Grenada, Itawamba, Lafayette, Lee, Lowndes, Marshall, Monroe, Noxubee, Oktibbeha, Panola, Pontotoc, Prentiss, Tate, Tippah, Tishimingo, Union, Webster, Winston and Yalobusha.

"Stakeholder input is extremely important to us. We use your input to determine our program plans. We want to know what you need," said Marty Fuller, MAFES assistant director and interim head of NMREC.

Grain Crops. Producers requested that information concerning crop insurance make it to growers as soon as possible. They would also like to see soybean variety trials brought back to Verona.

Beef. Beef producers asked for less costly artificial insemination schools, development of more reliable forages, more information on bull management, and more information on forming alliances to market cattle. Cotton. Cotton producers discussed the advantages and disadvantages of using UNR with cotton.

Dairy. Producers talked about better milk quality, silage and waste management. They asked for more information on cow health.

Fruits and Vegetables. Producers discussed damage caused by and prevention of

carpenter bees, and they expressed a need for crop insurance. They also asked that fruit research not be removed from the Pontotoc Ridge-Flatwoods Experiment St ation in Pontotoc.

Sweetpotatoes. Sweetpotato producers asked for an entomologist to research damage done to sweetpotatoes by insects. They also announced that the National Sweetpotato Convention will be held Jan. 23-25, 2000, in Tunica, Miss.

Swine. Swine producers hold quarterly meetings around the state and are exploring the use of various marketing strategies.

Equine. New agricenters around the state present opportunities for horse producers to promote equine activities. Producers were particularly interested in using therapeutic riding programs for physically, visually and hearing impaired peo ple.

"I am very interested in the therapeutic riding program. My 39-year-old daughter is severely brain damaged, and I feel she can walk now because she learned to ride a horse," said Mary Alsup, a Noxubee County resident.

Forestry. Producers need to create an awareness of the impact forestry has on Mississippi. Additional discussions included kudzu eradication, beaver control, logger and vendor training, use of GIS in forestry management, more wildlife and forestry management programs, and using computer software management programs.

Ornamental Crops. Producers would like to see horticultural specialists located around the state and felt that workshops offered throughout the year could help them stay abreast of advances in the industry. They also requested information on soil mulches available in Mississippi.

MAFES Culinary Research Presents *A Taste of Class*

By Rebekah Ray

Creole Chicken and Grits. Warm Quail Salad. Southern Snowball. Roasted Broccoli Florets. Fallen Chocolate Souffle. Praline Pound Cake.

These recipes, paired with informative sidebars concerning Mississippi State University's contributions to the food industry, make up the recently released, award-winning MAFES cookbook, *A Taste of Class*.

"This cookbook represents the way Mississippi State entertains its guests. We wanted to share our good life with others," said Cary Sutphin, author of the 175-page book and an instructor in the Human Sciences Food and Enology Laboratory at th e university.

A Taste of Class features more than 150 recipes, which are organized in a menu format. Sutphin developed these recipes during his two decades of service to MSU. Many of them have been served over the years to prominent university guests, such as Willard Scott and Miss Lillian Carter.

MAFES food products, including catfish and the famous cheeses, are key ingredients in several recipes, such as Pasta-Crusted Catfish and MSU Edam Cornbread.

"I pulled menus people were happy with and organized them in dining styles. Everything in the book has been served on campus. Some recipes in the collection were created for the university's special friends, such as Salad Adele," Sutphin said . This strawberry-and-spinach salad was named for Adele McComas, wife of the late MSU President, Dr. James D. McComas.

Sidebars concerning herbs, cooking methods, food production and display techniques accompany many of the recipes.

Also included is information on:

- MSU's Vallagret Cheese.
- Mississippi pecan production and the state's sweetpotato production
- Mississippi's role as a leader in the catfish industry
- Mississippi rice production
- The Scoville Scale for determining the relative hotness of chili peppers
- The sex of eggplants
- The Mississippi beef industry
- Hints for properly cooking beets

Released Feb. 14, the cookbook has already received awards from the American Advertising Federation for its layout, design and appearance, and a gold award from Agricultural Communicators in Education.

As a MAFES culinary researcher, Sutphin plans menus and creates recipes to serve at events for entertaining university guests.

"I provide a dimension of hospitality unique to MSU. My work concentrates on promoting Mississippi State food products and the Mississippi culture," Sutphin said.

A graduate of the Culinary Institute of America and Mississippi State, Sutphin has worked at MSU for more than 20 years. He coordinates entertainment for many visitors who are involved in agricultural research and is the administrator of the A.B. McKay Food and Enology Laboratory.

A former head of horticulture at Mississippi State, McKay was a powerful influence in agricultural research.

Part of the MAFES mission is to assure a bountiful supply of safe and affordable food products and to increase the value of Mississippi's agricultural products.

"Numerous recipes in this collection were developed from Mississippi products, many of which have been the focus of MAFES research. This cookbook is a showcase of our culinary research activities," said MAFES Director Vance Watson.

The cookbook is $24.95 and is available in specialty and gift shops across Mississippi. Orders may be placed by calling MAFES at (662) 325-3000.

Most Popular Pie at MSU

MSU Chess Pie is without a doubt the most popular pie on campus. Bob Goodwin, former Head Baker at MSU, scaled down this recipe because of the numerous requests from alumni who wanted to bake a "State College" chess pie.

MSU Chess Pie
Makes 2 Pies

Cream together *(not completely)*:
1 cup sugar
1/2 cup margarine
Add:
4 eggs
3/4 cup sugar
Stir together and add to other mixture:
1/2 cup milk
2 tablespoons flour
1/2 cup sugar
Stir in:
1 teaspoon vanilla

Pour the mixture into a bowl, cover it, and let it sit up overnight in the refrigerator.

Pour into two unbaked pie shells, and bake in a 350-degree oven for 35-40 minutes.

Roasted Corn Chowder with MSU Cheddar Cheese
Serves 8

6 ears fresh sweet corn

Brush lightly with butter and grill until toasted.

Cut corn from the cobs (*about 3 cups cut corn*), reserving the corn and cobs.

2 tablespoons butter
1 cup onion, diced
2 celery stalks, diced
1 leek, trimmed and split, washed, diced
1 large red bell pepper, seeded and diced

Melt butter in a soup kettle, and saute corn and vegetables until soft but not browned.

2 quarts rich chicken broth

Add and bring to a boil, reduce to a simmer, and add corn cobs. Simmer 45 minutes, and remove corn cobs.

8 ounces MSU Cheddar Cheese, grated

Stir into hot soup and serve immediately.

Mention of a trademark or commercial product does not constitute nor imply endorsement of the product by the Mississippi Agricultural and Forestry Experiment Station or approval over other products that also may be suitable.
