



2016-2017  
LEGISLATIVE  
REPORT





**Douglas D. Buhler**  
Director,  
MSU AgBioResearch

Reflecting on the accomplishments of Michigan State University Extension and MSU AgBioResearch, we continue to be proud of our ability to extend the reach of MSU's cutting-edge research and to help make Michigan a great place to live, raise a family and do business. None of this would be possible without strong support from the Michigan Legislature.

We are particularly grateful for the recent contribution in the State budget to assist with the Michigan Alliance for Animal Agriculture, workforce development and community college partnerships, food processing educational laboratory and mobile food labs, and the Michigan Tree Fruit Commission. This will allow us to expand our impact on all sectors of the Michigan agriculture industry and respond promptly to a host of emerging issues, such as bovine leukemia virus in dairy and beef cattle, and an invasive pest known as spotted wing drosophila threatening the fruit industry.

In this report, you will see how we have diligently used your investments to move Michigan agriculture forward and to sustain its sizeable economic contribution to the state.

Our organizations, along with MSU, have never been institutions that rest on our laurels. In addition to our recent successes featured in this publication, we look forward to expanding our work in key areas.

Over the next few years, we will be tackling some tough issues, among them, helping residents manage stress to improve health outcomes and assisting families concerned about the opioid epidemic. Connecting people to important resources in social, emotional and behavioral health will breathe new life into important issues while strengthening families and communities.

In addition, we are expanding the close relationship we have enjoyed with the city of Detroit since placing our first MSU Extension agriculture agent in Wayne County in 1917. We are working with the city, community leadership, residents and other stakeholders to build a new center that will serve as a hub of continued revitalization for Detroit neighborhoods. The center, located on the site of a former elementary school in northwestern Detroit, will directly provide residents with free and low-cost educational activities through a robust set of education and youth and community development programs.

Looking forward, we encourage you to learn more about the new Food@MSU initiative by visiting [food.msu.edu](http://food.msu.edu). Our goal is to provide consumers with information to make better informed decisions about food, and its impact on our health and on our planet. Food was the primary reason MSU was founded in 1855, and this new campaign demonstrates our continued commitment to the future of food in Michigan and around the globe.

Sincerely,

Douglas D. Buhler  
Director  
MSU AgBioResearch

Jeffrey W. Dwyer  
Director  
MSU Extension



**Jeffrey W. Dwyer**  
Director,  
MSU Extension



## Connecting consumers with experts online

Michigan residents have easier access than ever to get important questions answered through Ask an Expert, an online question and answer portal available on the Michigan State University Extension website.

Through the process, Michigan residents ask questions and receive expert answers quickly on a broad range of subjects, regardless of local staffing. Experts provide university research-based information that helps residents improve their quality of life, family, garden, business and community.

Ask an Expert is part of the national eXtension network. The system allows MSU Extension staff to deliver educational information and increase engagement with new and existing audiences using easily accessible online communication methods.

In 2016, 116 MSU Extension staff members and specially trained MSU Extension Master Gardener volunteers answered 2,784 questions (in addition to 7,806 questions answered via the hotline: see page 21). While experts received questions on numerous topics, more than 90 percent of them were related to plants and pests, which included identification, pest management, general plant culture, and soil and fertility management. Other question topics included zoning and land use, canning and food safety, equine, and human nutrition.

- **80% said Ask an Expert answered their question.**
- **76% said the answers had enough detail and were understandable by users.**
- **62% are considering changing a practice or have changed practices based on the answer they received.**

## Connecting with Michigan residents

Since its inception more than 100 years ago, Michigan State University Extension has been actively helping people improve their lives by reaching them where they are – in their homes, farms, businesses and communities.

Through the combined face-to-face trainings, online webinars, social media, website interaction and electronic newsletters, MSU Extension has made more than 12.1 million connections, according to the most recent data.

More than 149,000 adults and 212,000 youth participated in MSU Extension programming in the most recent year. More than 5.3 million people viewed more than 9.8 million pages on the MSU Extension website. Of those, more than 1 million were Michigan residents. MSU Extension remains one of the most visited Cooperative Extension System education websites in the country.

MSU Extension also distributed a series of electronic newsletters that cater to residents' unique interest. Last year, nearly 1.9 million newsletters covering 90 topic areas were distributed to more than 53,000 email addresses. This includes 30,000 new subscribers following the addition of the popular 4-H Today newsletter into the MSU Extension newsletter system.

MSU Extension uses social media channels to reach people with educational content. Currently, MSU Extension reaches more than 4,300 Facebook followers and more than 3,200 Twitter followers. In addition, Michigan 4-H families and volunteers stay informed about activities through social media channels, including on Michigan 4-H Facebook, with more than 4,700 likes, and on Twitter with more than 1,456 followers.



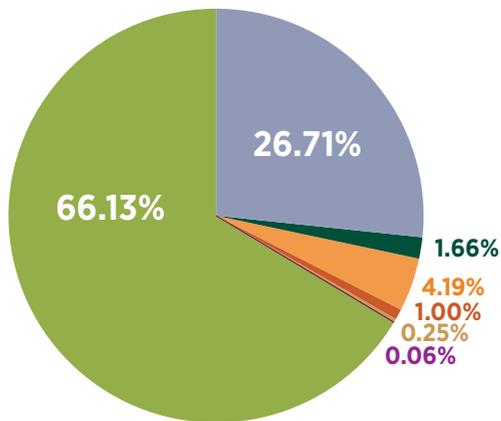
Photo: © iStock.com/Vavebrakmedia

### Year-to-year increase using most recently available data:

- **36.90% increase in connections made by MSU Extension**
- **2.70% increase in participation in MSU Extension programs**
- **46.80% increase in MSU Extension website unique visits**
- **412% increase in sign-ups for topic newsletter distribution**

MICHIGAN STATE UNIVERSITY | AgBioResearch

**FUNDING**  
FISCAL YEAR 2016-2017

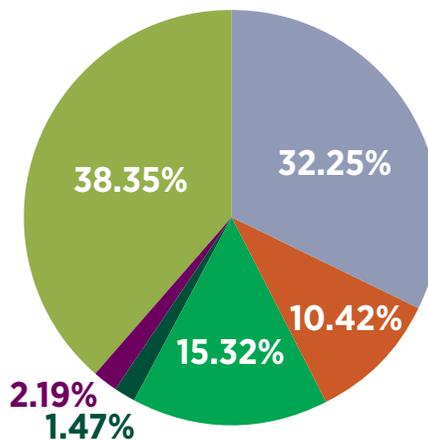


-  **State Appropriations**  
\$33,243,100 ..... 26.71%  
FY Oct. 2016–Sept. 2017
-  **MSU General Fund**  
\$2,057,920 ..... 1.66%  
FY July 2016–June 2017
-  **Federal Hatch**  
\$5,208,926 ..... 4.19%  
FY Oct. 2016–Sept. 2017
-  **Federal Hatch Multistate**  
\$1,246,729 ..... 1.00%  
FY Oct. 2016–Sept. 2017
-  **Federal McIntire-Stennis**  
\$309,403 ..... 0.25%  
FY Oct. 2016–Sept. 2017
-  **Federal Animal Health**  
\$77,424 ..... 0.06%  
FY Oct. 2016–Sept. 2017
-  **Grants**  
\$82,295,754 ..... 66.13%  
FY July 2016–June 2017

TOTAL: \$124,439,256

MICHIGAN STATE UNIVERSITY | Extension

**FUNDING**  
FISCAL YEAR 2016-2017



-  **State Appropriations**  
\$28,672,600 ..... 32.25%  
FY Oct. 2016–Sept. 2017
-  **MSU General Fund**  
\$1,305,030 ..... 1.47%  
FY July 2016–June 2017
-  **Federal Cooperative Extension**  
\$9,265,087 ..... 10.42%  
FY Oct. 2016–Sept. 2017
-  **Federal Special Projects**  
\$1,944,344 ..... 2.19%  
FY Oct. 2016–Sept. 2017
-  **County Investments**  
\$13,617,028 ..... 15.32%  
FY Varies
-  **Grants**  
\$34,094,467 ..... 38.35%  
FY July 2016–June 2017

TOTAL: \$88,898,556



## Leveraging State funding

The state's \$61.9 million investment in MSU AgBioResearch and MSU Extension generated a total impact of more than \$1 billion for Michigan residents in 2016-17.

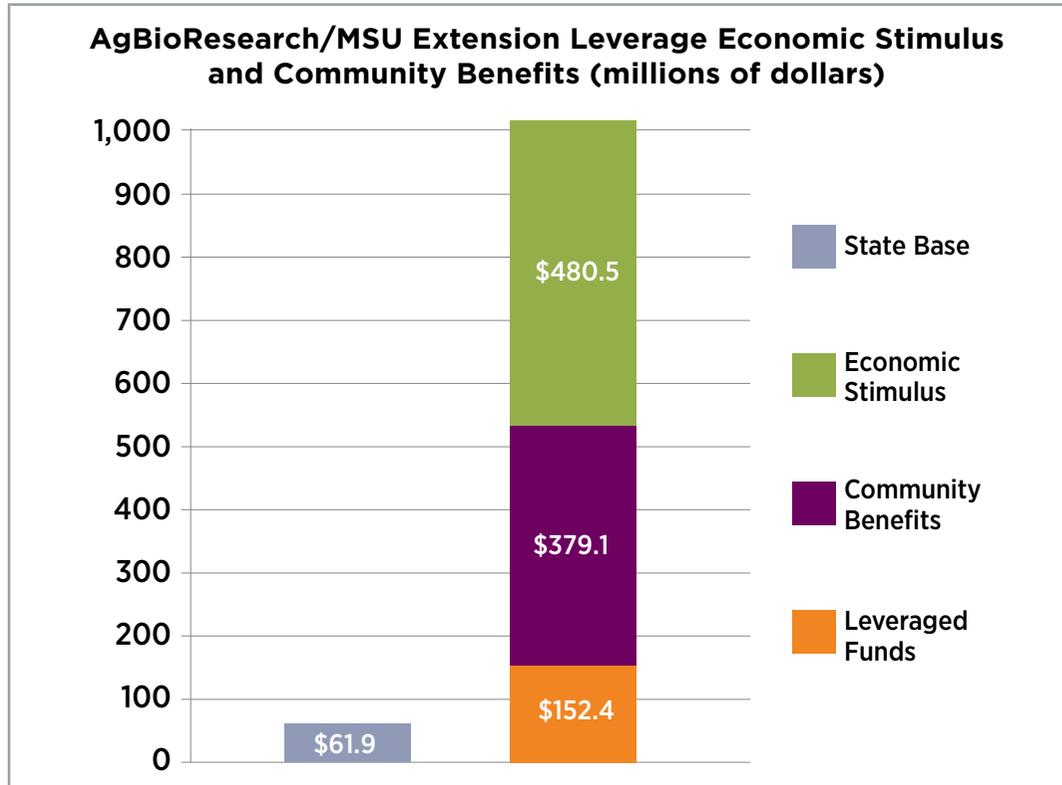
Every dollar the state invested in MSU AgBioResearch and MSU Extension resulted in:

- **LEVERAGE** of an additional \$2.50 in federal funds and external contracts, grants and other revenues to serve Michigan residents.
- **COMMUNITY BENEFITS** worth an additional \$6.22 to the state and nation.

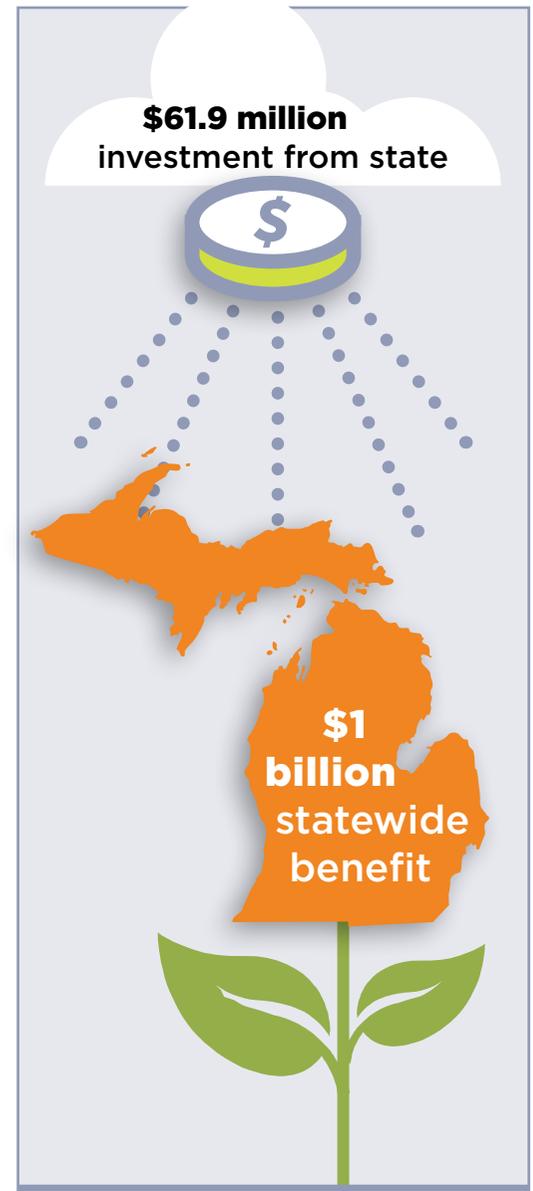
When the leveraged funds and community benefits are added to the initial investment, they yield a net **ECONOMIC STIMULUS** valued at more than \$480 million in state economic activity and state tax revenues.

Combining the above effects, along with the additional tax revenue, returns to the state economic and social benefits in a **BENEFIT/COST RATIO** of 18:1.

Continuing to invest in MSU AgBioResearch and MSU Extension is vital to the state's economy, our communities and our residents.



Economic analysis by Steven R. Miller, Center for Economic Analysis, MSU Department of Agricultural, Food and Resource Economics



# MSU Product Center - Food•Ag•Bio Fueling the Economy

(7/1/2016 - 6/30/2017)

## Economic Impact



**JOBS**

**RETAINED:**

**486**

**CREATED:**

**461**

The Michigan State University Product Center works with entrepreneurs to grow businesses, create jobs, and strengthen the economic vitality of Michigan communities. The center connects food entrepreneurs with innovation counselors who offer the latest research, help identify markets, innovate new products and help guide the process from concept to launch.

**PRODUCT CENTER CLIENTS SERVED**

**6 8 9**





## Closing the farm-to-table gap with Breakfast on the Farm

The number of farmers in the U.S. declines each year, representing less than 2 percent of the country's population. This makes it difficult for farmers to personally interact with consumers, something that has become increasingly important when more than 70 percent of consumers admit to knowing very little about farming.

Michigan State University Extension works to improve this disparity with programs like Breakfast on the Farm (BOTF). BOTF is an open door for the community to learn how its food is produced, and meet the local farmers who produce it.

Since its debut in 2009, BOTF has hosted 37 on-farm events, giving 83,486 visitors an opportunity to enjoy a free, farm-fresh breakfast and learn more about agriculture and daily life on a modern farm. Since 2012, exit surveys show that participants have an increased level of trust for local farms after their visit.

- After visiting, 90% surveyed indicated they would talk to others about what they learned at BOTF.
- Since 2012, BOTF exit surveys show that participants have an increased level of trust that farmers will keep milk safe for consumers, and care for animals and the environment.
- About 20% of households increased dairy product purchases.



Photo: ANR Communications & Marketing

## Developing biodegradable plastics to reduce negative environmental impacts

Plastics are among the most widely used products in the world today, but there's a catch: Americans toss out more than 30 million tons of plastic each year, less than 10 percent is recycled.

Because of its molecular structure, conventional plastic can take upwards of 1,000 years to degrade in a landfill. Rafael Auras, an associate professor in the School of Packaging at Michigan State University, believes this is a problem that can be solved through utilization of biodegradable and compostable materials.

Agricultural applications of plastic include mulch films, which suppress weeds, retain soil moisture and soil bed structure, and control soil temperature, among other benefits. Mulch films have traditionally been made of petroleum-based, nonbiodegradable plastics. When they are contaminated in the field, it is costly to remove and recycle them.

- **Auras and collaborators performed a study placing three mulch films over the beds of tomato plants. He found that the white biodegradable film was compromised quickly, primarily through sunlight damage (photodegradation), resulting in poor performance. The black film, however, maintained its structure longer and was comparable in weed suppression to the conventional plastic.**



Photo: Rafael Auras

## Protecting Michigan's fruit from invasive spotted wing drosophila

Michigan ranks first and fourth, respectively, in tart and sweet cherry production and third in blueberry production in the U.S. Both industries have a zero-tolerance policy for larvae in fruit. Detections of the invasive pest, spotted wing drosophila (SWD), result in rejection of fruit and economic losses for farmers.



Photo: ANR Communications & Marketing

Lab research indicates SWD can turn over a generation in as little as five days, allowing them to spread rapidly, having great potential to devastate Michigan's blueberry and cherry industries. SWD has been the primary pest in Michigan blueberries since 2011 and losses are rapidly growing in cherries, causing cherry growers to double pest management costs.

Research efforts at Michigan State University focus on finding the most effective management solutions for SWD. Controlling SWD requires significant changes in growers' traditional pest management practices, including when and how often to spray insecticides. MSU Extension offers workshops and educational meetings to assist growers with pest management decisions and reduce risks associated with SWD. Growers who attended the meetings indicated:

- **82% improved their SWD management knowledge.**
- **100% indicated SWD as their farm's major source of economic losses.**
- **69% of growers participating in MSU Extension training reported no crop losses from SWD.**

## Improving genetic selection may hold key to peaceful pig grouping

In 2009, the Michigan Legislature passed an amendment to the Animal Industry Act introducing a series of new standards that require more living space for gestating sows, laying hens and veal calves. By April 1, 2020, producers will need to house pregnant pigs so they can turn about freely, prompting a move from individual stalls to group pens.

In addition, researchers at Michigan State University and Scotland's Rural College are looking for ways to manage pigs so they live more harmoniously together. A key factor may be rooted in genetics. Breeding programs have traditionally focused on production traits and other relatively easy-to-measure physical characteristics. Though it's sometimes difficult to quantify, MSU researcher Janice Siegford said that behavior should also be taken into consideration, since whether pigs fight or coexist peacefully can have large impacts on their health, growth and quality of life.

- Data collected from more than 1,000 pigs at the MSU Swine Teaching and Research Center by Siegford's team will be combined with information from 3,000 pigs obtained by collaborators Simon Turner and Rick D'Eath of Scotland's Rural College. The team is now evaluating the heritability of aggression, the impacts of pigs' behavior on others in their group and whether breeding for social pigs will affect pork production.



Photo: iStock.com/dusanpedic



Photo: iStock.com/aspenrock

## Lighting the way to the future

The market for greenhouse-grown ornamentals has become increasingly competitive, reducing grower profitability and increasing the need to cut operating costs. As crop margins continue to decrease, energy costs are becoming a grower's largest expenses. Michigan State University Extension assists ornamental plant growers in finding methods to reduce energy costs while still producing high-quality plants.

Using supplemental lighting is essential in greenhouses to increase crop quality and control flowering of some crops. In fact, 72 percent of greenhouse facilities use high-pressure sodium lamps for supplemental lighting of crops. To address this concern, the MSU Extension floriculture team offered three regional meetings and an online course on greenhouse and horticultural lighting:

- 101 greenhouse growers (representing 3.3 million square feet) attended from eight Michigan counties.
- Attendees reported the information learned was worth over \$100,000 to their businesses.
- Over half of the greenhouse growers (42 acres) who responded to the postsurvey made a change in their facilities as a result of the information they learned.

## Breeding better wheat

Ensuring that Michigan farmers have the best tools to meet emerging challenges and continue to produce wheat at record-setting levels lies at the heart of the Michigan State University wheat breeding and genetics program.

To develop the best new varieties of wheat and get them in the hands of farmers as quickly as possible, the team blends traditional plant breeding with cutting-edge genomic technology.

Through genomic selection, breeders can read and analyze the genotype – the collection of genetic information – of the new varieties they develop as early as the first cross. This helps predict in the lab how they will perform long before they make it to the field.

In addition to breeding new varieties, the team conducts research on wheat genetics, adding new genetic information to the pool of breeding resources. They are working to clone new genes for disease resistance from goatgrass. They are also making progress toward discovering genes that could increase grain yield by maximizing the energy generated through photosynthesis.

- Michigan ranks 12th nationally in wheat production, with over 600,000 acres and 8,000 farmers adding \$388 million to the state's economy.



Photo: MSU Communications & Brand Strategy



Photo: ANR Communications & Marketing

## Protecting pigs and people with proper biosecurity and hygiene

When a few hogs at a handful of Michigan fairs contracted swine influenza in 2016, the contagious virus put all pigs at the events at risk of infection. Even more concerning was the potential for both exhibitors and fairgoers to contract the zoonotic disease. As the summer wore on, it became crucially important for fairs to protect the health of people and pigs by preventing the spread of the disease.

To help at this critical time, Michigan State University Extension partnered with the Michigan Department of Agriculture and Rural Development and the Michigan Association of Fairs and Exhibitions to inform fair personnel and Michigan 4-H staff about important strategies for diminishing the risk of swine influenza infection. These endeavors are a part of MSU Extension's multi-year effort to educate 4-H youth about biosecurity and measures they should implement at their fairs, farms and facilities to prevent the spread of disease. As a result of these combined efforts:

- 11,007 Michigan youth who participated in 4-H swine projects served as the front line of defense against swine influenza by practicing good biosecurity practices.
- More than 1,000 people visited the MSU Extension swine influenza website during the fair season and accessed information and resources to help prevent the spread of the disease.



## Improving calf health

In order for newborn calves to survive, passive transfer of antibodies must occur, meaning that the calves must ingest the mother's colostrum in the first few hours after they are born. Passive transfer of these antibodies protects calves from disease until their own immune systems become active.

Michigan State University Extension gathered data from 50 dairy farms across the state to determine the prevalence of failure of passive transfer (FPT) in bull calves to see whether this differs from heifer calves on the same farm. This information led to identifying the best management practices to reduce FPT in dairy calves on Michigan dairy farms.

Of the 1,050 calves sampled for serum total protein as an indicator of passive immunity transfer through colostrum, data revealed that bulls typically fared worse than heifers. In response to the research:

- Producers are feeding more high-quality colostrum to calves within four hours of birth.
- Farms considered administering a second colostrum feeding within six to 12 hours.
- Changes result in higher passive transfer of immunity that will result in reduced calf mortality, higher growth rates and healthier animals.



Photo: ANR Communications & Marketing

Photo: ANR Communications & Marketing



## Increasing access to important field crop research with webinar series

Five years ago, Michigan State University Extension educators decided to change the way they conduct winter field crop programs by using a webinar format in addition to traditional in-person meetings. The annual Field Crops Webinar Series reaches underserved audiences who may have trouble attending regular programs due to scheduling conflicts, geography or ability. It gives participants the flexibility to join live sessions or access recorded versions online.

Through the webinars, experts share research results and key points pertinent to crop production for the upcoming year. Topics have included western bean cutworm, resistant and troublesome weed control, soybean sudden death syndrome and wheat stripe rust management, wheat inputs selection, soil fertility for field crops and forage, as well as cover crops for potato and soybean systems.

During 2016-17, 214 individuals from 50 Michigan counties, five other Midwest states, and Ontario participated in the program. As a result of the webinars:

- Participants who responded to a survey collectively managed 383,047 total field crop acres.
- \$680,057 was projected in savings or added revenue to farms based on growers who indicated that they intend to implement 174 practice changes.
- Participants earned 603 Michigan Department of Agriculture and Rural Development pesticide applicator recertification credits.

## Controlling soybean diseases with lab, field tools

Michigan’s agricultural community prides itself on the variety of its crops. From apples to sugar beets, Michigan boasts the nation’s second-most diverse cropping system. Despite this diversity, a few commodities dominate the bulk of Michigan farmland: corn, soybeans, dry beans and wheat.

These four staples are the focus of Martin Chilvers’ research program at Michigan State University. As a plant pathologist and assistant professor in the MSU Department of Plant, Soil and Microbial Sciences, Chilvers is searching for ways to combat diseases that threaten some of Michigan’s highest valued crops.

Chilvers has led a team of scientists from across the country to identify the diversity and prevalence of fungus-like soybean diseases in 11 states.

- Numerous species of fungus-like organisms called *oomycetes* cause soybean seedling blight.
- In addition to his work with oomycetes, Chilvers has tackled other soybean challenges such as sudden death syndrome and white mold, and diseases of corn, dry bean and wheat.
- According to the Michigan Soybean Promotion Committee, soybeans contribute \$1.67 billion to the state’s economy each year — and more than 14,000 jobs.



Photo: © istock.com/jennivev84



Photo: © istock/ulsanpetkovic

## Combating antibiotic resistance and understanding changing regulations in animal agriculture

Focused on combating antibiotic resistance, the United States Food and Drug Administration (FDA) recently made several changes to the Veterinary Feed Directive policy. On Jan. 1, 2017, the FDA moved all human medically important feed-grade antibiotics to the feed directive drug process. This significantly changed how producers manage the health of their herds. Other groups such as feed mills, drug companies, retail feed outlets, veterinarians and youth livestock producers have also been affected by these changes.

With ties to all of the affected groups, Michigan State University Extension is in a unique position to help the industry transition to these new regulations with ease. MSU Extension developed an approach to create awareness and provide relevant information to impacted audiences. The organization employed several educational methods to make the feed directive policy changes transparent including:

- Educational presentations and webinars for veterinarians, commercial producers, people and businesses supporting the agriculture industry and youth producers. (One-on-one assistance was provided upon request.)
- The creation of resources housed on the Michigan Department of Agriculture and Rural Development feed directive website.
- A feed directive awareness campaign composed of online announcements, articles and publications targeted at various audiences affected by the feed directive changes.



## Pairing education with food access throughout Michigan

Michigan State University Extension and Michigan food banks are teaming up to combine important food access and nutrition education through popular backpack food programs that help reduce child hunger.

The programs provide a backpack of food with important nutrition education to children on weekends when food access might be limited.

MSU Extension's Making Healthy Choices newsletters, developed through funding from the U.S. Department of Agriculture's Supplemental Nutrition Assistance Program–Education, allow each child participating in the programs to take home a newsletter each week with his or her backpack of food.

Each of the 30 newsletters in the series focuses on a different part of making healthy choices such as learning about a food group, choosing nutritious ingredients, making the most of food products, budgeting and shopping for groceries. Each includes a simple, low-cost recipe and a tip for healthy eating.

Making Healthy Choices newsletters are available online and distributed throughout Michigan.



## Creating new programs and partnerships in Flint

Flint residents face ongoing challenges related to lead exposure and food access. In partnership with the Flint community and Michigan Department of Health and Human Services, Michigan State University Extension continues to build on existing efforts by creating new resources and programs including a healthy corner store and pantry initiative as well as a new cooking and nutrition lesson series.

The Refresh MI Store and Refresh MI Pantry initiative provides education and resources to help store owners and pantry directors create environments that encourage and offer nutritious choices to their patrons. Modification examples include increasing the range of nutritious food and drink options, and adding nutrition education materials to food shelves. Cooking for One is a six-lesson series that teaches nutrition and cooking basics.

- Throughout 2017, Cooking for One is being piloted with multiple groups of Flint residents with a focus on seniors, youth aging out of foster care, persons with disabilities and single adults.
- Seven stores and 10 food pantries located in the greater Flint area are currently participating in the Refresh MI Store and Refresh MI Pantry initiatives.



Photo ©iStock.com/IPC/GutenberglUK Ltd

- In the 2016-17 school year, an average of 13,000 newsletters were distributed weekly from 131 sites across 18 counties.
- Distribution partners include Food Bank of Eastern Michigan, Gleaners Community Food Bank, Manna Food Project and the Father Fred Foundation.

## Fighting obesity and improving nutrition in Michigan communities

According to the Centers for Disease Control and Prevention, Michigan has the 16th highest rate of obesity in the United States with a little more than 31 percent of adults considered obese and another 35 percent considered overweight.

Through funding from the U.S. Department of Agriculture's Supplemental Nutrition Assistance Program—Education and Expanded Food and Nutrition Education Program, Michigan State University Extension delivers affordable, relevant, evidence-based education to help adults, young people and families in urban and rural communities be healthy.

Programs focus on helping participants gain the skills they need to buy and prepare nutritious, budget-friendly foods and increase physical activity. In 2016, these programs reached more than 119,000 people across the state in nearly 1,500 locations. Through the programs:

- 79% of youth participants improved their abilities or gained knowledge about how to choose foods following the federal Dietary Guidelines for Americans.
- 80% of adult participants made a positive change in at least one nutrition practice, such as preparing foods without adding salt or using Nutrition Facts labels to make food choices.
- 74% of adult participants made a positive change in at least one food resource management practice, such as planning meals in advance or comparing prices when shopping.



## Uncovering the role of the placenta in pregnancy immune tolerance

Margaret Petroff, an associate professor at Michigan State University, believes that decoding secrets to immune tolerance could lead to treatment breakthroughs for a variety of conditions.

Petroff and her team are studying a form of immune tolerance familiar to many women: pregnancy.

“Pregnancy is something that, despite its prevalence, we still have a lot to learn about,” Petroff said. “Half of the fetus’s genetic material is from the mother, and half is from the father. That half from the father is foreign to the mother, so we want to know how her immune system copes with it.”

Although blood between the mother and the fetus never mix, other genetic material does. The placenta acts as the biological pathway between mother and fetus and is responsible for the transport of nutrients and oxygen. But the organ also sheds genetic material that Petroff believes may be interacting with the mother’s immune system.

- In some cases, the mother’s immune system malfunctions during pregnancy. This can result in a number of complications, but one of the most common is preeclampsia. Petroff’s team has identified preeclampsia as a research priority because of its prevalence and that little is known about what causes it.



Photo: iStock.com/jovanmalic

Photo: iStock.com/bowdenimages





## Empowering healthy lifestyle choices for a healthier generation

Helping youth develop healthy habits and attitudes about food, nutrition and physical activity can help to ensure they develop healthy lifestyles in adulthood. With today's high rates of obesity and chronic disease wreaking havoc on families physically, mentally and financially, instilling young people with the skills and knowledge to make healthy choices throughout their lives can reduce this stress and build a healthier generation.

Michigan 4-H Youth Development is helping build this future generation by teaching youth about food, nutrition, physical activity and personal safety. As a result of these various programs and activities, youth are empowered to make proactive decisions about healthy lifestyles, now and in the future. In the 2015-16 program year, 4-H healthy living programming reached 3,435 Michigan youth. Highlights include:

- 54 youth who attended 4-H Challenge U Funfest, a weekend of learning about topics such as mindfulness, cooking, food preservation and more.
- 153 participants at 4-H Mentoring Weekend, which featured a healthy living focus through sessions including healthy beverage choices, stress management and relaxing.
- 12 youth who took part in the first 4-H Health and Food Science Camp, where youth explored MSU's Food Science and Human Nutrition Department with hands-on learning about kinesiology, food and more.

## Responding to stress in farm communities throughout Michigan

In 2016, the Centers for Disease Control and Prevention reported that 90 out of every 100,000 farmers commit suicide, six times higher than the national rate of suicide. To help respond to the needs of Michigan farmers and their families, Michigan State University Extension developed the Communicating With Farmers Under Stress workshop. It was designed for people who work with agricultural producers and farm families to help them learn more about managing stress and communicating with those in need. It highlights existing resources and programs including MSU Extension's Stress Less With Mindfulness that introduces participants to the experience and practice of mindfulness to reduce stress.

In 2016, MSU Extension social-emotional programs reached over 5,000 Michigan residents. Since October 2016, 315 industry professionals have attended Communicating With Farmers Under Stress workshops.

- 97% of workshop participants learned where to send people for help in the community, and of those, over 50% said their awareness of community resources greatly increased.
- 92% of workshop participants now recognize warning signs of depression, suicide and mental illness.
- 97% of Stress Less With Mindfulness participants now use mindful breathing to calm themselves in the face of stress and would recommend the educational series to someone else.



**FROM THE DEAN**

Although I'm relatively new to the College of Agriculture and Natural Resources in an administrative role, my roots in the college go back over 30 years; counting my time in 4-H, it extends to well over 40 years.

I grew up in Jackson, Michigan, and started my college career the way many of our students do – at a two-year community college. From there, I attended Michigan State University where I earned bachelor and doctoral degrees in forestry and forest ecology, respectively.

And so, it is with gratefulness that I approach the work that's done day in and day out by our researchers in MSU AgBioResearch and educators in MSU Extension. They do this work because it is purpose-driven, life-changing work – not only for them but also for Michigan's residents.

As I read through these numbers and statistics, I am reminded that behind every number there is a story – people whose homes, families, careers and communities are changed because of work that is made possible through your efforts and those of our state's taxpayers.

We are constantly and consistently cognizant of the great responsibility we have to be good stewards of the resources allocated to our efforts. The recent allocation to the M-AAA initiative, workforce development and food labs, both mobile and on campus, bolsters this commitment.

Ron Hendrick  
Professor and Dean  
College of Agriculture and Natural Resources  
Michigan State University



**Ron Hendrick**  
Professor and Dean  
College of Agriculture and  
Natural Resources

## Michigan Alliance for Animal Agriculture continues growth, expands impact on industry

Rapid growth best defines the Michigan Alliance for Animal Agriculture (M-AAA) over its first three years. From \$630,000 in funding in 2015 to nearly \$1.5 million in 2017, the animal agriculture industry is the beneficiary of an increasing commitment from a diverse group of partners.

M-AAA was established by commodity organizations and Michigan State University (MSU) in 2014 to enhance research, outreach and educational programs within animal agriculture. Projects conducted by MSU researchers focus on priorities such as the growth and sustainability of animal agriculture, improvements in food safety, protection of the environment and growth in the livestock sector workforce.

“The Michigan Alliance for Animal Agriculture is a natural fit for MSU,” said George Smith, associate director of MSU AgBioResearch and a member of the M-AAA leadership team. “It stays true to the land-grant mission that has guided our institution since its inception and provides a platform for support of



Photo: © iStock.com/snowflck



Photo: MSU Communications & Brand Strategy

research on real-life problems impacting the Michigan animal agriculture industries.

“We’re thrilled about how the program has been received, as evidenced by the tremendous support from the State of Michigan, our commodity groups and MSU.”

Since the alliance’s inception two years ago with more than half a million dollars in funding, the State of Michigan has continually supported the M-AAA program. Taking its support a step further, the State recently devoted \$2.5 million to M-AAA in its 2018 budget, bringing total available funding for M-AAA to \$3.1 million in 2018.

The competitive grants program is divided into three categories: applied research, extension and seed grants. Each proposal is reviewed by a team composed of faculty experts and M-AAA stakeholders. Funding is determined collectively by M-AAA representatives based on relevance to the defined industry priorities.

Completed projects have examined topics such as creating online and in-person resources for meat processors. MSU Extension educator Jeannine Schwehofer has led in-person workshops for more than 30 meat processors and regulatory personnel to help them follow a specialized retail meat processing variance, which mandates a set of trainings and procedures for processors.

Adam Lock, an associate professor in the MSU Department of Animal Science, undertook research that showed feeding dairy cows a palmitic acid-enriched fat supplement during summer months would increase a producer’s gross income by \$1.48 per cow per day based on current Michigan milk prices. On a 500-cow dairy farm averaging 80 pounds of milk, this would have resulted in an income increase of more than \$22,000 per herd per month during the summer.

“Research through M-AAA is tackling some of the most urgent subjects in animal agriculture today,” said Ron Bates, director of MSU Extension agriculture and agribusiness, and a member of the M-AAA leadership team. “Threats from infectious diseases are greater than ever. Challenges with food safety and antibiotic resistance are growing. The M-AAA is working to close the research gap and find solutions that propel our industry long into the future.”



Photo: ©istock.com/leebyj

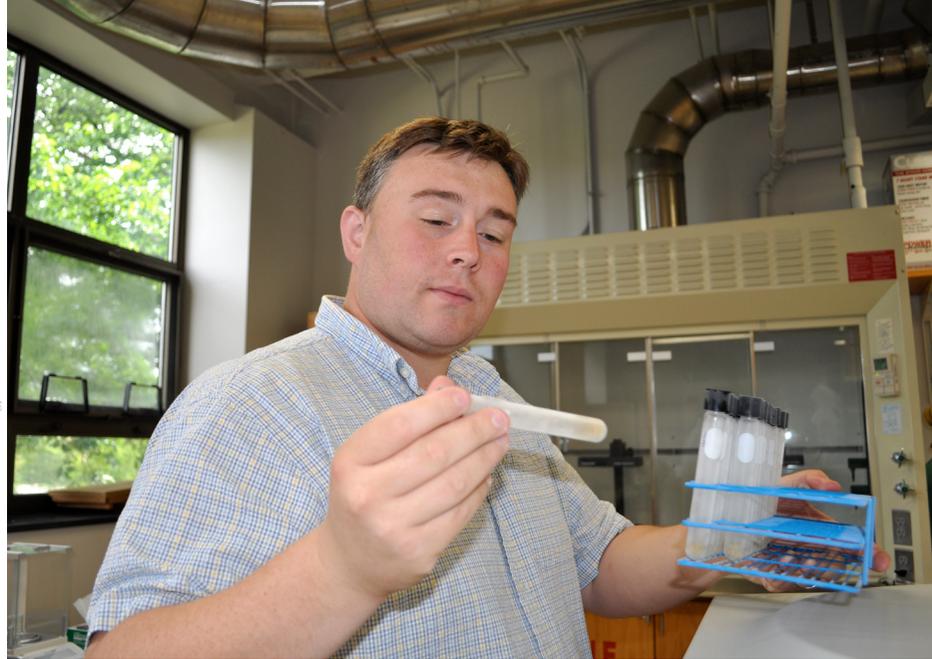


Photo: MSU Communications & Brand Strategy

**A significant factor limiting the growth of agriculture in Michigan is a lagging number of available employees. To meet the needs of the industry, workers in production, distribution, food safety and many other areas need to be trained.**

- The State of Michigan has pledged \$1.2 million in support of workforce development and community college partnerships with MSU for 2018.
- MSU is seeking to create a food-processing curriculum and expand partnerships with several community colleges across the state. Through the Institute of Agricultural Technology within the College of Agriculture and Natural Resources, MSU works with community colleges to offer 10- to 24-month certificate programs that give students hands-on experience in a variety of agricultural disciplines.
- A multitude of jobs in agriculture fall under the umbrella of food processing, and preparing students for these careers requires cutting-edge physical spaces.
- With a one-time investment of \$3.2 million from the State of Michigan in 2018, MSU will upgrade the Food Processing Education Laboratory on the East Lansing campus. The university will also be able to mobilize some of these food-processing techniques through innovative mobile food labs, bringing these educational experiences to students at partner community colleges.

## Assessing a community's tourism fitness

Michigan tourism generated \$38 billion in economic activity and nearly \$2.4 billion in tax revenue in 2014. As such, tourism is one of the state's significant industries and is vital to the survival and revitalization of many rural and urban communities. Michigan State University Extension developed the First Impressions Tourism (FIT) program to meet the needs of Michigan's rural communities that are interested in community revitalization via tourism and recreation.

FIT helps communities learn about their strengths and weaknesses through the eyes of first-time, unannounced visitors who conduct a comprehensive community assessment. FIT involves assessing the host community, sharing the results in an open community forum and providing recommendations to drive community action. Each community is required to form a community leadership team consisting of public and private stakeholders. In 2016, nearly 140 participants attended presentations or in some way participated in the first two pilot Michigan-based FIT programs:

- **100% agreed or strongly agreed that the program can help Michigan communities who are interested in developing tourism.**
- **94% agreed or strongly agreed that they envisioned themselves or their community using the information shared to advance tourism.**
- **88% agreed or strongly agreed that awareness of community assets increased as a result of participating in the program.**

## Forming community partnerships to identify economic development opportunities

While big changes are often possible only when communities work together, large-scale collaboration is hard. A new Michigan State University Extension program is providing the essential leadership and organizational training that will allow communities to come together, identify problems they want to solve and form an action plan to map out a path to achieving their goals.

The LEAD (Leaders Economic Alliance Development) program brought together community leaders from Mason, Lake, Newaygo and Oceana counties in partnership with MSU Extension and the U.S. Department of Agriculture. Four sessions took place, one in each county – each with a specific goal. The program offered participants a chance to develop partnerships, identify collaborators, enhance leadership skills and, crucially, develop a long-term action plan.

The highlight of the program, a civic forum, brought together dozens of community members from each of the four counties to identify goals and opportunities to work together on economic development efforts.

- **109 community leaders participated in the LEAD program, including 64 at the civic forum.**
- **The communities set long-term collaboration efforts on recreation and trails, workforce development and broadband infrastructure.**
- **MSU Extension and community subcommittees will work together in 2017 to further develop action plans.**



Photo: ©istock.com/monkeybusinessimages

## Revitalizing Detroit through strategic community partnerships

A resurgent Michigan doesn't exist without a resurgent Detroit. Michigan State University Extension has formed several strategic partnerships to ensure that the Motor City thrives.

Efforts have included planning commission members taking MSU Extension Citizen Planner training and assisting with grant applications. MSU Extension partnered with Wayne County Volunteer Day organizers to assist several nonprofit organizations on achieving community revitalization work throughout Detroit.

MSU Extension also partnered with the Detroit Association of Realtors and University Commons to hold the Baker's Dozen Realtor Forum and Home Tours designed to stabilize the homes in northwestern Detroit. Fifty-four participants learned about the latest real estate trends, and spoke with title companies, contractors and representatives of the City of Detroit Land Bank and the Wayne County treasurer about foreclosure prevention and purchasing properties.

MSU Extension is also tackling the issue of blight through a strategic partnership with Detroit Impact.

- 300 people participated in the daylong Blight Boot Camp 2016.
- 27 people attended a mobile workshop in Alfonso Wells Memorial Playground planting a community garden and attending an interactive lecture with oral histories on the park's race wall also known as the Detroit Eight Mile Wall.
- Six community grants were awarded to assist with implementing blight elimination programs in communities.



Photo: ©istock.com/caltrimages

## Promoting local arts, food and culture with rural driving tour

Arts and Eats is a free self-driving tour of Allegan and Barry counties and the surrounding rural region. Partner organizations collaborate to bring tourists quality experiences in art, local food and agriculture in those little out-of-the-way places that beg to be discovered.

Since 2011, Michigan State University Extension has played a vital role in the development and continued success of this annual event. The tour has since expanded and now includes a tour passport and evaluation program to track visitors' site satisfaction as well as a "Best Eats" competition featuring seasonal ingredients. There has been increased marketing and promotion of the tour, and resource development through grants, sponsorship and advertising.

MSU Extension has also taken the lead on development of a long-term strategic plan for tour sustainability and future expansion of the model to other regions across the state. The 2016 Arts and Eats tour:

- Welcomed thousands of travelers from over 65 Michigan zip codes, as well as Wisconsin, Florida and Connecticut.
- Included 25 art studios and galleries, four central venues, 14 eateries and eight farms.
- Recorded over 1,000 site visits.



Photo: ©istock.com/jacoblund

## Helping Michigan's homeowners take control of their finances

Homebuyers must assess their own financial situations and the financial options available to them. Research suggests individuals in the pre-buying process may not accurately estimate their own financial status, including debt and creditworthiness, which leads to undesirable financial decisions.

Homeownership education helps consumers make informed decisions based on their individual situations. Courses taught by Michigan State University Extension educators discuss advantages of homeownership and steps in the homebuying process, understanding costs of homeownership and maintaining the investment, mortgage loan basics and the importance of good credit, and ways to determine how much house a potential homeowner can afford.

In 2016, MSU Extension reached over 860 adults in over 230 programs. As a result:

- **86% can identify the best type of mortgage for their needs.**
- **89% will review the closing disclosure to ensure fees are similar to the loan estimate.**
- **88% now understand predatory lending practices.**
- **84% are making changes to improve their credit reports and scores.**
- **84% can calculate reasonable housing costs based on a budget; 83% save money for home ownership and 81% set aside funds for home maintenance.**



Photo: ©istock.com/70057

## Providing vital continuing education to local elected officials on land use issues

The Michigan Land Division Act, one of the most complex laws on the books, is also one of the most important as it is a fundamental part of community development. The statute establishes how local governments can review and approve the splitting and use of land, but few organizations offer training on the topic.

Michigan State University Extension developed a comprehensive training on the statute for local elected officials while also creating an opportunity for their professional development through continuing education opportunities. By educating officials at the state and county levels, MSU Extension is training a group who will have a profound impact on the lives of millions of Michigan residents. Through its online and in-person training, MSU Extension enhanced the knowledge of participants, reduced legal risk to communities and increased quality treatment of residents, which in turn helps Michigan communities increase the effectiveness of community development initiatives.

- **77% of participants reported increasing knowledge of legal responsibilities and limitations in their roles.**
- **77% reported increased skill in making better development review decisions.**
- **71% reported increased knowledge in where to find valuable information related to zoning, land division and subdivision issues.**
- **68% reported increased confidence in suggesting improved standards or review procedures for their local governments.**

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## Solving lawn and garden challenges with consumer horticulture hotline

Responders on the Michigan State University Extension Lawn and Garden Hotline assist residents throughout the state, regardless of the location of the caller or expert. They provide reliable, research-based information to help Michigan residents solve lawn and gardening challenges. In 2016, the hotline received calls from all 83 counties in Michigan.

When callers ask about fertilizer use, insect control and plant disease prevention, responders provide environmentally friendly advice that helps them maintain healthy soils, solve landscaping issues, and grow fruits and vegetables in their home landscape.

Consumers who contact the hotlines are directed to a variety of lawn and garden tools and services available through MSU Extension. These services encompass soil testing, MSU Diagnostic Services, the Gardening in Michigan website, Ask an Expert and Smart Gardening tip sheets and articles.

- **From 2012 to 2016, calls increased 14%. There were 7,806 total contacts in 2016.**
- **Calls from the lower half of Michigan, where consumer horticulture educators were traditionally located, have increased by an average of 25%.**
- **Calls from Michigan's Thumb area, where consumer horticulture educators were not traditionally located, have increased 236% in the first five years of the state hotline.**



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## Training the next generation of farmers

In 2012, Michigan State University Extension developed the Beginning Farmer Webinar Series as a response to ongoing inquiries from those with little to no experience in farming, but who had an interest in engaging in agriculture in Michigan's Upper Peninsula.

As interest increased, the webinar series expanded into a statewide effort. Over the past five years, MSU Extension presented 73 Beginning Farmer webinars to 960 participants.

Webinar topics cover a large variety of topics, including expanding a farm business, making farm operation choices, creating new jobs and developing or changing a farm business plan that includes marketing, finances, operation size and commodities produced.

To determine long-range impacts, online surveys were sent to all people who participated in the program over a five-year period. Of the survey responses:

- **57% indicated the webinar series contributed to starting a farming business.**
- **45% expanded their current business as a result of the program.**
- **70% indicated the webinar series contributed to making changes to their farming operation.**
- **For 12% of respondents, the webinar series contributed to creating new jobs.**



Photo: ANR Communications &amp; Marketing

## Helping small harbor communities dream big

Michigan is home to more than 80 public marinas and harbors, managed by the state, county or local government. They are part of a boating industry that contributes \$2.4 billion in economic activity to the state each year; however, maintaining and improving these facilities is an ongoing challenge.

Working with many partners, Michigan Sea Grant's Sustainable Small Harbors Project has enabled six communities with public harbors to do in-depth self-assessments, uncovering strengths and weaknesses related to their waterfront assets. Community members brainstormed and developed concrete designs for future harbor projects. Several communities have now leveraged the designs to win more than \$3 million in grants to fund projects.

- **The City of New Baltimore used its designs to win a \$2.85 million grant from the Michigan Natural Resources Trust to purchase a private marina on Lake St. Clair, which will be opened for public use. The city will use additional funds from a different grant to upgrade the marina facilities for accessibility.**
- **Using the designs, Au Gres won a \$30,000 grant from the Saginaw Chippewa Indian Tribe to renovate the formerly state-owned Au Gres Mooring Facility.**
- **In Ontonagon, the project prompted a revitalization of the Downtown Development Authority.**

## Preparing Michigan youth for future employment

By the time they enter the workforce, today's youth will address problems not yet identified with tools that don't currently exist. In fact, research indicates 65 percent of today's grade school students will work jobs that have not yet been imagined. With so much uncertainty, young people need more than an education to prepare for future careers: they need well-rounded skills applicable to any job as well as the ability to explore potential opportunities in a safe way.

To meet this need, Michigan 4-H offers programs that focus on entrepreneurship, financial literacy, career exploration and workforce preparation. Through these activities, Michigan 4-H arms young Michiganders with skills and competencies critical to any job while allowing youth to explore career options and entrepreneurship. In 2016, this programming reached 11,100 participants in 80 Michigan counties. After their involvement in these vocational activities, youth showed significant increases in a variety of skills, including a:

- **57% increase in those who understood the parts of a business plan.**
- **50% increase in those who were aware of what employers look for on a job application or resume.**



Photo: ANR Communications &amp; Marketing



## Plotting a solution to prevent chronic wasting disease in Michigan wildlife

A disease of the nervous system exclusive to deer, elk, moose, caribou and other hoofed, antlered, ruminant mammals, chronic wasting disease (CWD) is similar to mad cow disease. The fatal sickness manifests in a range of behavioral issues, including listlessness, tremors, nervousness and increased thirst, as well as weight loss over time.

There is no known cure or vaccine for CWD, which is notoriously difficult to control. It spreads through direct fluid contact, and the structurally abnormal proteins are shed into the environment where the disease can persist for over a decade.

To control CWD outbreaks and prevent it from gaining a foothold in the state, Michigan State University wildlife researchers are using expertise in deer behavior and population dynamics to develop a predictive model identifying regions with dense deer populations and close proximity to states with CWD problems. This will give the Michigan Department of Natural Resources a valuable tool to fight the disease.

- **Hunting, primarily deer hunting, annually contributes about \$2 billion to Michigan's economy.**
- **Nine CWD cases have been identified in Michigan since the disease was first discovered in the state in 2015.**
- **Researchers in New York developed a similar tool in 2005, contributing to that state eliminating the disease by 2010.**



Photo ©istock.com/Tom Tietz



## Restoring ecosystems through fire

Working alongside U.S. Forest Service fire managers in northern Wisconsin who are currently undertaking major projects to restore ecologically significant barrens ecosystems, Michigan State University scientists are improving methods to restore barrens.

Historically, periodic fires have voided barrens of shrubs, grasses and large trees that contribute to ecosystem succession, the process by which barrens transform into woodland. As human management of ecosystems has increased, fires have become less frequent and intense, causing succession to occur at a more rapid pace.

As the importance of fire in both woodland and barrens ecosystems has become more apparent, prescribed burns have emerged as a common tool for forest managers as they work to preserve and restore barrens. Researchers are in the middle of a three-year project to provide managers with more information on the impact of fire on various aspects of the environment, including soil, plant root systems and microbial life.

- Barrens in Wisconsin have shrunk to one percent of their original area, threatening species.
- Prescribed burns often fail to heat the soil sufficiently to kill tree roots, allowing them to grow back.
- Conducting prescribed burns when fires would naturally occur may overcome the soil temperature issue and make them more effective.

Photo: Jessica Misesel

Photo: ANR Communications & Marketing



## Fishing for the latest in research, trends, lake management at Great Lakes Fishery workshops

Fishing, whether for recreation or profit, makes an important contribution to Michigan's economy. The impact of sport fishing is estimated to be in excess of \$4 billion annually and provides more than 38,000 jobs, according to the state Department of Natural Resources.

Michigan Sea Grant Extension, in partnership with fisheries agencies and stakeholder organizations such as Michigan Fish Producers and Michigan Charter Boat associations, holds workshops to discuss the latest research findings, lake management updates and fishing trends. Workshops provide valuable information for anglers, commercial fishers, charter captains, resource professionals and others. In addition, attendees have the opportunity to weigh in on important fisheries management issues and interact with scientists.

Stakeholders have contributed input toward management decisions over the years such as reductions in chinook salmon stocking, adaptive management regulations for Saginaw Bay yellow perch and walleye, and engagement with native cisco restoration efforts in lakes Huron and Michigan.

- 10 workshops were held in 2017, involving more than 500 stakeholders.
- Fishery-related businesses gain insights relating to Great Lakes fisheries resources around which their businesses depend.
- Recreational anglers learn the latest in fishing trends and also can become citizen scientists by collecting data through the Great Lakes Angler Diary program.

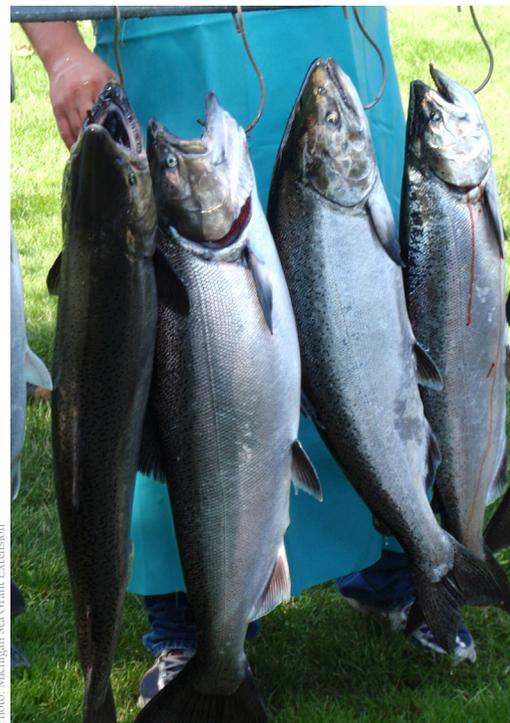


Photo: Michigan Sea Grant Extension



## Cultivating environmental caretakers and conservationists

As the Great Lakes State, Michigan is known for its great outdoors. From sunny lakeshores to rustic forests, these natural resources are one of Michigan's premier assets. Whether utilized for recreation or commerce, Michigan's environmental resources play a key role in the life of every Michigander and are critically important to protect and preserve.

To build a future generation of environmental stewards able and interested in natural resource conservation, Michigan State University Extension offers many environmental education programs. These programs teach young people the science and ecology behind Michigan's environmental assets, expose youth to future careers in these fields and help them develop an awareness for their role in protecting natural resources. As a result of these programs in 2016:

- 2,170 kids in southeastern Michigan explored the physical, chemical, cultural and biological dimensions of the Great Lakes watersheds, specifically the Detroit River and Lake Erie, through the Great Lakes Education Program.
- 70 teens from throughout Michigan learned about coastal ecology, fisheries management, limnology, invasive species management and forestry at 4-H Great Lakes Natural Resources Camp.
- 15 state youth researched an environmental issue and presented their recommendations to the Michigan Senate Committee on Natural Resources, Environment and Great Lakes through the Michigan 4-H Youth Conservation Council.



Photo: Michigan DNR

## Protecting Kirtland's warbler with jack pine forest management

The Kirtland's warbler is a small, endangered bird that lives half of the year in a handful of counties in Michigan's northern Lower Peninsula and winters in the Bahamas.

A recovery effort began in the mid-1970s and continues today, led by the U.S. Fish and Wildlife Service (USFWS), the Michigan Department of Natural Resources and the U.S. Forest Service. The program has been a resounding success in recovering the Kirtland's warbler population — so much so that the USFWS is moving toward delisting the species as endangered. However, there are concerns over the long-term financial sustainability of habitat management.

Michigan State University professor David Rothstein and a team of researchers are looking at new ways to manage these forests in order to improve their production of marketable forest products while still ensuring the sustainability of the Kirtland's warbler population.

- Rothstein said the current plan is to let jack pine plantations grow for 50 years, but the data show that they achieve peak biomass nearly 20 years prior. Harvesting at 30 years would regenerate warbler habitat and allow the group to extend rotation ages in other areas with the goal of producing higher value timber for the logging industry.

## Selecting trees that flourish in urban settings

Bert Cregg, associate professor in the Michigan State University Department of Horticulture, and a team of MSU researchers are studying trees in urban settings with an eye on identifying species that are adaptable to increasing stress. It is critical for landscapers and urban foresters to consider climate projections when planting trees.

With funding from MSU Project GREEN (Generating Research and Extension to meet Economic and Environmental Needs) and the Michigan Nursery and Landscape Association, among others, Cregg's group first embarked on the project in 2012.

In a greenhouse study, the trees were divided into three climate scenarios: average temperature for the region, 5 degrees Celsius warmer and 10 degrees Celsius warmer. In the field phase of the project, 80 trees, 10 of each type, were planted at Lafayette Park on Detroit's east side, while another identical 80 were planted in the city's St. Aubin Avenue median.

- Under hotter conditions, some cultivars responded by developing small pores under the leaves that are vital to plants' ability to regulate their temperature through transpiration.
- Cregg's team installed data loggers and sensors at each location to measure temperature and relative humidity, and the group is continuing to monitor long-term growth.



Photo: Bert Cregg



## Improving water quality through septic system education

Malfunctioning septic systems affect water quality throughout Michigan. With more than 1.2 million septic systems statewide that each generate 300 to 400 gallons of sewage daily, onsite systems treat and dispose of more than 360 million gallons of sewage on average every day.

Few educational resources exist that address essential maintenance of septic systems that also focus on safeguarding the health of Michigan families and the environment. To fill this gap, Michigan State University Extension created the Septic System Education Program.

With the help of county health departments, onsite wastewater consultants and the Michigan Department of Environmental Quality, MSU Extension held several local Homeowner Septic System Use and Maintenance workshops throughout the state as well as one statewide webinar. Participants surveyed on a 6- to 12-month basis reported the following behavioral changes in how they maintain their septic systems:

- **74.3% of in-person participants noted a change in one or more behaviors regarding their septic system.**
- **61.5% of webinar participants noted a change in one or more behaviors regarding their septic system.**
- **Both delivery methods showed a 100% increase in knowledge about some aspect of septic use and maintenance.**



Photo: ©istock.com/Victorass88

Photo: ANR Communications & Marketing



## Working with state government to conserve our natural heritage

Michigan State University Extension's Michigan Natural Features Inventory (MNFI) discovers, defines and delivers biodiversity data through research and field work to create a database that is used by state agencies and the public to conserve the unique natural heritage of Michigan's flora and fauna. Data gathered by MNFI through the Natural Heritage Database (NHD) track population trends and ecological requirements while determining the geographic range of threatened and endangered species.

MFNI works closely with the Michigan departments of Natural Resources, Transportation and Environmental Quality to help them carry out their duties with respect to Michigan's unique natural environments. Through the NHD, MNFI provides scientific expertise and comprehensive information on the location of habitats and rare species, which helps agencies guide land use and management activities. State and federal agencies, tribal communities and the public uses the NHD to help make decisions. In 2016, there were:

- **Nearly 3,000 NHD queries from state agencies.**
- **Over 5,000 NHD queries from public and federal agencies.**
- **Over 30 research projects for state and federal agencies, and tribes.**



Photo: MSU Communications & Brand Strategy

## Testing for food toxin in U.S. grocery store items

In hot, humid regions of the world, a food toxin known as *aflatoxin* is produced by molds that contaminate crops. Aflatoxin can cause liver cancer, child stunting and immune system dysfunction.

Michigan State University scientist Felicia Wu has devoted much of her career to investigating aflatoxin, which occurs most often in corn, peanuts and tree nuts.

The bulk of her work takes place in Africa, but Wu is also interested in digging into food safety closer to home.

From 2012 to 2014, Wu and a research team performed a risk assessment by testing for the presence of another fungal toxin, ochratoxin A (OTA), in items plucked directly off of U.S. grocery store shelves — the first study of its kind in the country. Like aflatoxin, OTA has been associated with health risks. In a variety of animal species, kidney diseases and renal cancer have been linked to the toxin.

- Nearly 2,300 samples were selected from nine locations spanning the continental U.S. Foods included in the study – dried fruits, nuts, cereals, infant formula, wine, milk, coffee, cocoa and pork – were those likely to have detectable OTA. Organic, nonorganic and imported foods were represented.
- Results showed there is a negligible risk to Americans from OTA exposure.

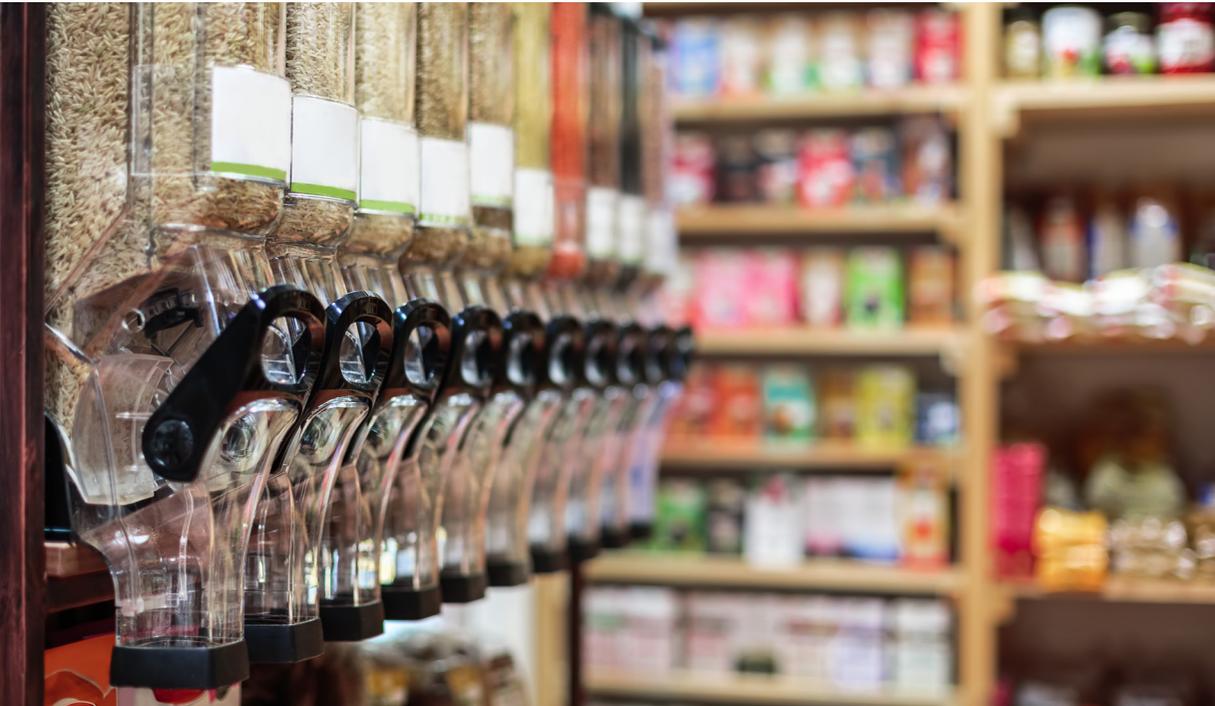


Photo: ©istock.com/Vall843d

## Helping meat processors comply with state food safety regulations

Retail food establishments that cure meat products and package them in reduced oxygen packaging must follow Specialized Retail Meat Processing Variance requirements as set forth by the Michigan Department of Agriculture and Rural Development (MDARD). When these new requirements were put into place, processors needed a reliable source to help them learn how to comply with the variance.

In response, Michigan State University Extension developed a package of comprehensive training programs and resources to help processors comply with the variance. In-person and online programs guide processors through the variance application process. Additional courses teach both processors and MDARD inspectors proper recordkeeping methods and introduce them to technology that can assist in compliance, all of which makes the processors better prepared for MDARD inspections. As part of MSU Extension's educational resources:

- Participants were taught best practices for implementing variance requirements.
- Participants were introduced to the use of data loggers, pH meters, water activity meters, thermometer calibration equipment and other tools to help assist with compliance.
- Meat processors and MDARD inspectors were taught proper meat-curing techniques.



Photo: ©iStock.com/GeorgeMuresan

## Providing food safety training to reduce foodborne illness

The Centers for Disease Control and Prevention estimates that 48 million foodborne illness cases occur in the United States every year. At least 128,000 Americans are hospitalized and 3,000 die after eating contaminated food.

Michigan State University Extension food safety education programs train participants to prevent incidents of foodborne illness associated with unsafe food handling practices. ServSafe and Cooking for Crowds are two programs that focus on equipping people who cook and prepare food for the public with the knowledge they need to do their jobs well and handle food safely. ServSafe is a national certification program offered by MSU Extension for people who work in food service. Cooking for Crowds is designed for nonprofit organizations.

Cooking for Crowds evaluation results estimate that within 3 months after the class, a typical participant reaches an average of 428 individuals with served food.

- 80% of ServSafe participants passed the certificate exam with an average score of 81%.
- 89% of Cooking for Crowds participants know the correct methods of cleaning and sanitizing food preparation surfaces.
- 77% of Cooking for Crowds participants understand the cause of foodborne pathogens.



Photo: ©iStock.com/CristiNistor

## Empowering parents with the skills to support positive discipline and future success



Photo: Pixabay.com/sathyatripodi

Many parents struggle with finding effective discipline for their young children. Despite this common problem, research shows addressing this issue is critical since helping young kids learn self-control is crucial to their ability to be successful now and in the future.

To support parents and caretakers in this important task, Michigan State

University Extension offers Positive Discipline workshops to help adults learn how they can create appropriate environments and experiences to strengthen self-control development. As a result of these classes, nearly 200 parents and caregivers who attended these workshops in 2016 reported statistically significant increases in their understanding of and ability to implement positive discipline with young children. In particular, attendees reported a:

- 11% increase in their understanding of the importance of “me” in creating an environment where children can learn and practice discipline and self-control.
- 10% increase in their knowledge of the difference between punishment and discipline.
- 7% increase in their ability to utilize appropriate consequences for children.
- 5% increase in those that had the skills to implement positive discipline with young children.

## Growing aquaculture industry offers opportunities for youth, job development

Global demands for food sources has made aquaculture – the breeding, rearing and harvesting of aquatic animals or plants – the fastest growing sector of the seafood industry worldwide. While the private industry in Michigan is relatively small, there is huge potential for growth. Helping train a knowledgeable workforce is one of the keys to growing a sustainable and low-impact industry within the state.

Michigan Sea Grant Extension helped facilitate an Aquaculture Challenge program for high school classes. The program explores the potential and impact of aquaculture on the food system. The integrative learning curriculum also meets Michigan science standards. The competition is based on creating a mini-fish and plant farm within the classroom. Students design and monitor an aquaculture system, and create a business plan for an actual aquaculture business.

Michigan Sea Grant Extension also is developing an Aquaculture Technician Certification program, along with Lake Superior State University and area community colleges.

- This year, with funding from the North Central Regional Aquaculture Center and Michigan Sea Grant, students in 10 classrooms from Detroit to Sault Ste. Marie participated in the Aquaculture Challenge.
- The two-year Aquaculture Technician Certification program will allow a new generation to explore low-impact, sustainable aquaculture opportunities.



Photo: Michigan Sea Grant



Photo: National 4-H Council

## Serving the underserved: Preparing the children of Detroit for success

With nearly one-fifth of the state's population living in Wayne County, the metro-Detroit area is critically important to Michigan. As a result, many resources are focused on helping the county's residents with community and economic development, financial literacy, health and nutrition, and other issues. But even more important than addressing current issues is helping the next generation – Wayne County's children – prepare for future success.

Michigan 4-H is stepping up to meet this need. Through a variety of programs, Michigan 4-H is helping Detroit youth discover natural resources, develop STEM (science, technology, engineering and math) literacy, enhance workforce readiness and more. During the 2015-2016 program year, Michigan 4-H reached more than 22,000 young people in Wayne County. This included:

- 3,114 youth participated in Stepping Stones, an outdoor educational program that introduces youth to experiential learning through fishing, camping, archery, water studies and nature exploration.
- 887 youth who engaged in Archery in the Schools and archery afterschool programs, which teach rules of safety and shooting techniques, as well as concentration, discipline, respect and responsibility.
- 61 youth participated in 4-H robotics camps that allowed youth to design and program robots to perform a specific challenge.

## Making a difference in college education enrollment

Studies show individuals with college degrees earn more over the course of a lifetime and enjoy lower unemployment rates than those without a postsecondary degree. With more college graduates, Michigan would benefit greatly through higher taxable earnings, more disposable income and lower rates of unemployment – just some of the benefits of a more skilled and educated workforce.

Michigan State University Extension's 4-H Youth Development program helps prepare the next generation of college graduates. Through its wide range of programs, Michigan 4-H promotes personal growth, career exploration and goal-setting. In addition, the program prepares youth for postsecondary education by helping build important life skills, increasing college aspirations and improving college readiness. As a result:

- 61% of Michigan 4-H youth have enrolled in college education since 2009, significantly higher than the average Michigan student rate of 53.7%.
- 4-H alumni are more likely to go to college than their same-age peers in 77% of Michigan counties.
- 45% of Michigan 4-H'ers who earned a bachelor's degree did so in the highly sought after fields of science, technology, engineering and math. This is a rate 11% higher than the Michigan average.



Photo: ANR Communications &amp; Marketing



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