



Back in the early '90s, John Miller had a hunch.

He had returned to Murdock, Neb., to work the hayfields that had been in his family for more than a century.

“When I was farming, there was a lot of time to ponder,” Miller says. “I just started thinking how can I add value to the product I was raising.”

Miller was supplying hay to commercial buyers, but saw a void in the pet food industry for small herbivores, such as rabbits, guinea pigs and chinchillas. He wanted to develop a fresh hay-based product line that could be produced, packaged and distributed right there in rural eastern Nebraska. And Miller thought maybe, just maybe, a budding technology called the Internet might be the way to make his business venture a success.

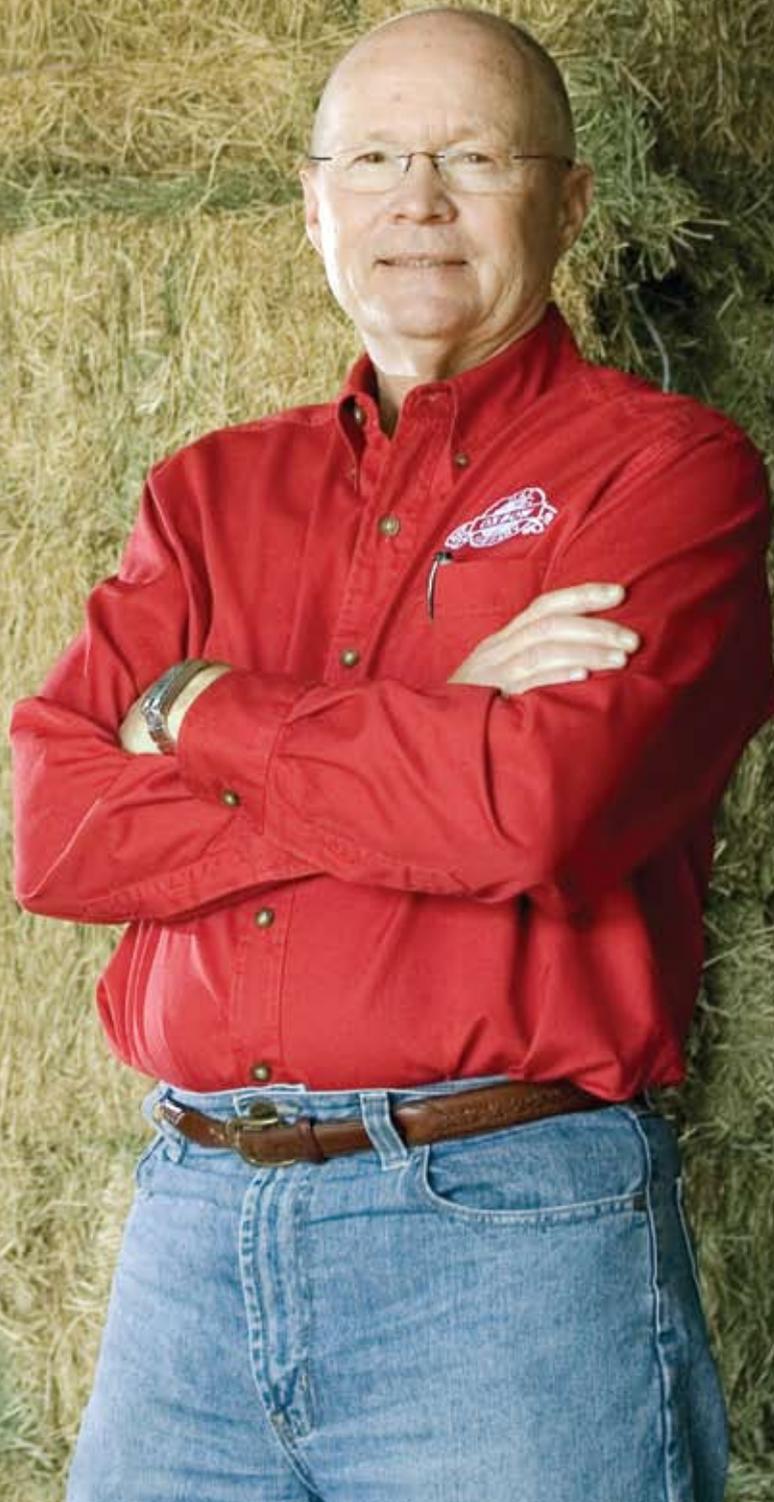
He was right. The advances in computer technology allowed Miller to research pet nutrition, partner with veterinarians and reach potential customers, all via the World Wide Web. What he didn't realize was it would help Oxbow Pet Products eventually go global.

“It's almost a miracle this thing got started,” Miller says with a laugh.



Global Farm to Market

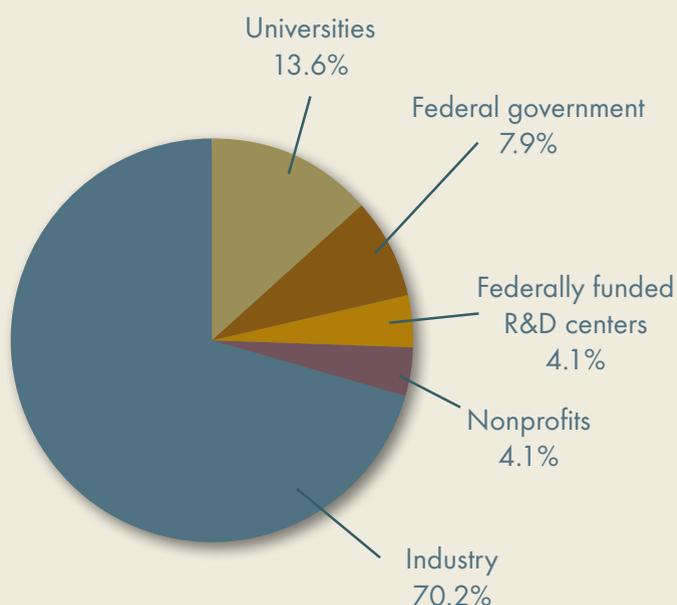
Technology spurs innovation in rural areas



United States research and development expenditures

In the United States, private industries spend billions each year to discover the next great invention.

In 2004, this sector spent about \$300 billion, which equates to about 70 percent of the total expenditures, on research and development while universities, nonprofit organizations, and the government and other federally funded organizations spent just a fraction of this amount.



Numbers are approximate.
Source: National Science Foundation

With the help of his then-12-year-old son, Miller created and printed thousands of product labels from their personal computer. The family set up an assembly line in the garage to individually glue labels on plastic bags and stuff them with pet food using a homemade contraption—another one of Miller’s ideas.

He was instrumental in getting his town of less than 300 residents Internet access, but had to make do with dial-up, “which drove you crazy, but it was better than nothing.”

Word started to spread online, and in 1997, Oxbow Pet Products received its first international order. His products are now exported to more than 20 countries.

“They found us through the Internet,” Miller says.

Although at one time access was an issue, these days the advantages of technology aren’t out of reach for rural America, says Jason Henderson, assistant vice president and executive of the Omaha Branch of the Federal Reserve Bank of Kansas City. Henderson recently researched how innovation can open doors and boost rural prosperity.

“Size and distance may limit a rural entrepreneur’s ability to produce radical new innovations,” Henderson says, “but adopting technologies helps invigorate rural economies.”

Technological innovation often spurs economic growth by creating new products, improving efficiency and connecting to new markets—opportunities many small or remote communities believe to be out of reach to them. The Internet, for example, allows some rural areas to provide business services and enables high-skilled services in remote communities.

The fastest-growing firms in rural America are providers of professional and business services, where operating costs are lower than in major metro markets and closer to home than overseas-based services.

While Miller says his location was a challenge at first, it ultimately was not a



PHOTO BY BOB GREENSPAN

JOHN MILLER, RIGHT, STARTED OXBOW PET PRODUCTS on his family farm in the '90s, using, what was then, budding technology, including dial-up Internet for product research and development. The pet food now is exported to more than 20 countries.

hindrance. Technology is more powerful.

“The whole world is your market,” Miller says, and with the Internet “you can reach the whole world.”

Importance of innovation

Innovation is the fuel entrepreneurs use to power economic regions. It can boost rural prosperity in three ways: by creating new products, improving production processes and opening doors to new markets, Henderson says.

Private industries shell out billions annually—outspending universities, nonprofit

organizations, and government and other federally funded organizations—on research and development to discover the next big thing. While inventions are critical, Henderson cautions they alone don’t transform economies. Innovation—the ingenuity behind the invention—does.

“Innovations are commercialized inventions that generate new economic value in the marketplace,” Henderson says. “The key players in this crucial game of innovation are rural entrepreneurs—inventions often are the product of homegrown businesses.”

During the past 50 years or so, more than

two-thirds of all innovations have been adopted, improved or developed by small entrepreneurial firms, leading to dramatic transformations in the economy.

Innovation improves production processes, and in turn boosts productivity. Henderson points to agriculture as an example, citing technologies such as tractors, hybrid seed corn and pesticides, all of which led to a surge in productivity growth.

“The number of labor hours to produce 100 bushels of corn dropped from 80 in 1850 to less than two today,” he says.

Innovation also affects manufacturing and retail industries in ways ranging from Henry Ford’s assembly line car production to Wal-Mart’s efficient distribution to the Internet’s quickened communication. From 1999 to 2004, manufactured shipments sold via e-commerce increased 30 percent while overall manufacturing shipments increased by

Financial gains

Rural places are typically not viewed as a seedbed for invention and innovation, typically producing less than one patent for every 10,000 people compared to the more than 2.5 patents produced in metro areas, Henderson says.

Many rural businesses that do adopt technology often see higher economic returns than those that don’t. Entrepreneurs with high-tech manufacturing firms earned about 50 percent more than low-tech factory owners, according to Census Bureau data from 2006.

With new technology comes new competitive pressure; businesses unable to keep up don’t survive. Adopting maturing technologies often depends on rural communities’ ability to disseminate knowledge.

Factors such as size and remoteness can raise the cost of transmitting knowledge and information even though the Internet and other communication technologies have improved

“ It takes a while to fully integrate technology into a business and then reap its full benefits. ”

just 1 percent. Now, about 25 percent of all manufactured shipments are e-commerce.

E-commerce technology allows rural firms to market their products to customers in places previously unreachable. Since 2003, e-commerce sales in the retail sector have grown 25 percent annually while overall retail sales have grown just 6.8 percent.

For example, Internet visits to the outdoor superstore Cabela’s, which is headquartered in rural Sydney, Neb., increased 36 percent in 2005.

Sales in the agriculture business also have benefited from Internet access. By 2004, the number of farmers using the Internet had grown to more than 50 percent. Although farmers tend to go online for price tracking, information gathering and communication purposes, buying farm products via the Internet is growing more popular.

connections. These high costs often decrease in time.

“It takes a while to fully integrate technology into a business and then reap its full benefits,” Henderson says. “Entrepreneurs often face steep learning curves before they can decide how their existing business practices need to change.”

For Paul Eurek, there were several advantages to opening a third office for his international software development services company in rural central Nebraska. Xpanxion is headquartered in Atlanta, with its largest office in Pune, India, and its newest office in Kearney, Neb.

While it may seem an odd mix of locations or an unusual place to operate a highly technical business, company chairman Eurek says technology “makes it look like we’re all in the same office. ... There really are no physical boundaries.”



PHOTO BY BOB GRENSPAN

Access to a high-quality workforce, lower operating costs and less employee turnover prompted Eurek to look to rural areas to expand. Because he wasn't limited geographically, Eurek decided to move back to his native area and open a 15-person office there about a year ago.

"I think it (locating in remote areas) is the future," Eurek says. "Part of the reason I wanted to do this in Nebraska was to show it could be done."

Public policy: Connecting to rural America

Many university and college systems nationwide were designed as institutions of technology transfer to rural places—an important role for public policy. From their beginning, land grant universities were charged with discovering new technological innovations and transferring them to rural regions. A goal of a land grant university's research and extension missions is to enhance communities' economic

viability and quality of life through this transfer of technology. This technology transfer process takes many forms across the nation's land grant campuses.

For example, the Food Science Institute and Meat Science Facility at Kansas State University provide research, teaching and technical assistance for new and existing products for related industries. Similarly, the University of Wyoming in Laramie recently added a third off-campus research center as part of its overall mission to tie the university to area agriculture.

rural communities around the state, according to the university.

Smaller, non-land grant universities are also shifting their research and curriculum to reflect the evolving technological impacts on agriculture.

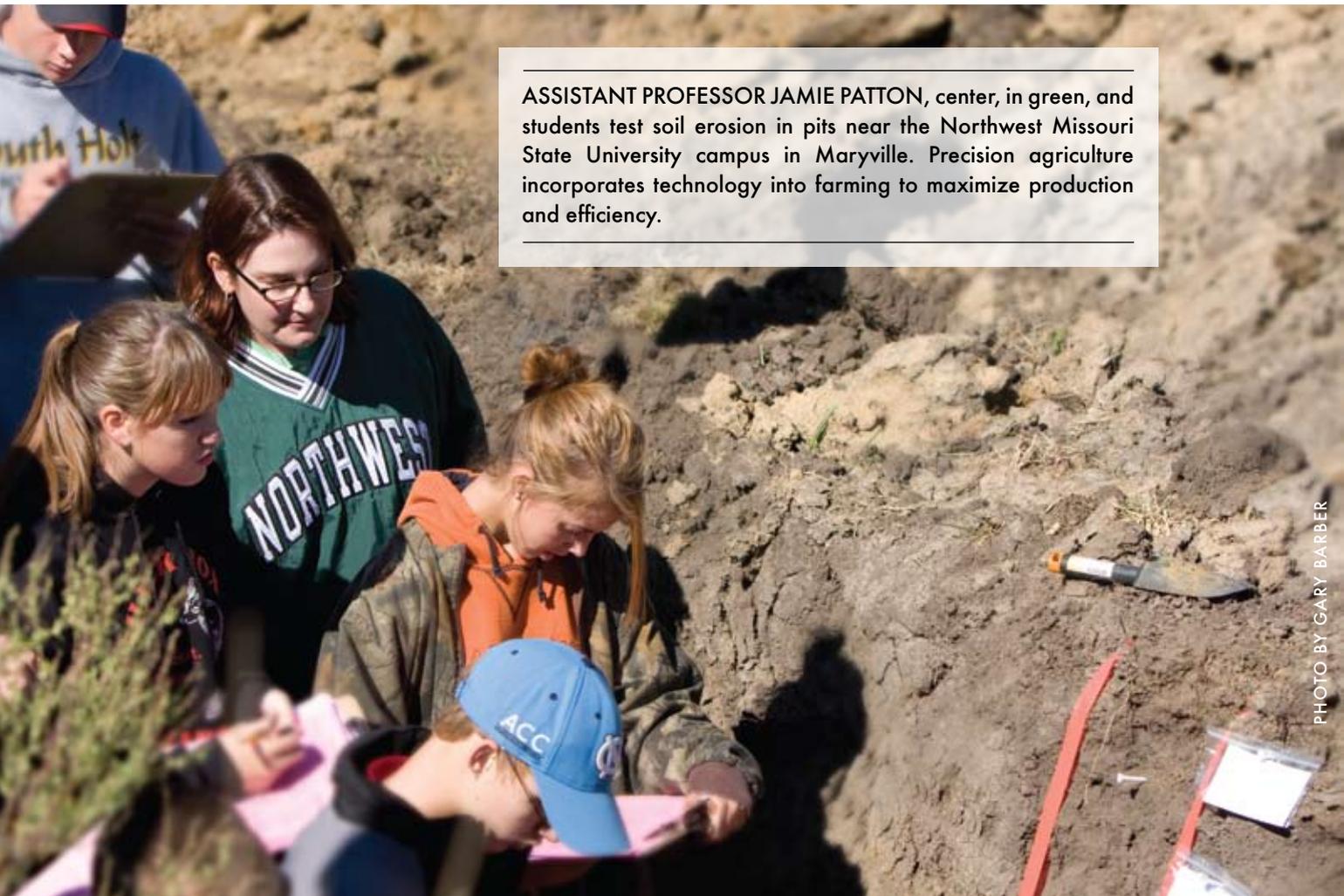
Northwest Missouri State University, with its student body of just more than 6,000, recently began offering a minor in precision agriculture—a concept that incorporates technology with farming and geography studies. Goals of precision agriculture include improved crop yield, more efficient fertilizer

“ Most of the students, they're going back to the farm. So, we're helping to train a new wave of farmers. ”

Located in the towns of Lingle, Powell and Sheridan, the centers are made up of acres of cropland, feedlots and livestock labs. The goal of this integrated research is to get results to

application, reduced erosion and pollution, better management decisions, more accurate record keeping, and increased profit.

“The old, traditional ways (of farm



ASSISTANT PROFESSOR JAMIE PATTON, center, in green, and students test soil erosion in pits near the Northwest Missouri State University campus in Maryville. Precision agriculture incorporates technology into farming to maximize production and efficiency.

businesses) are just falling by the wayside,” says Jamie Patton, assistant professor of soil sciences. “Anywhere you look, technology is being incorporated.”

It’s important to teach this in the classroom, Patton says, because “most of the students, they’re going back to the farm. So, we’re helping to train a new wave of farmers.”

Universities are a vital part of knowledge transfer, which means conducting research and disseminating information. It can improve rural America, Patton says.

Other public policy efforts that emphasize the importance of technological adoption to rural prosperity include the National Institute of Science and Technology programs that provide technical and business assistance to small manufacturers.

Another policy example is the Agriculture Innovation Center established by the 2002 Farm Bill to fund technical and business development assistance for agricultural producers. The organization helps them write business plans, conduct research and provide counselors to help new venture creation in the agricultural sector.

Additionally, Henderson says, rural communities need to find ways to tap technology in the private sector, where the majority of research and development expenditures come from. This private money often is geared toward developing products, as opposed to public programs, which focus on advancing basic research.

For many rural businesses, adopting technological innovations to enhance production and create products will boost both productivity and prosperity, Henderson says.

That certainly was the case for John Miller’s Oxbow Pet Products.

Today, Miller continues to operate from the family farm in Murdock. But now the old barn is transformed into modern office space. There are three new buildings and four loading



docks. The company employs 50, including an IT staff member.

“First you have one computer, then you have two and three. ... There’s just been this gradual, continual evolution,” Miller says. “This idea would not have become a reality without computer technology.”

T

BY BRYE STEEVES, SENIOR WRITER

FURTHER RESOURCES

THE POWER OF TECHNOLOGICAL INNOVATION IN RURAL AMERICA

By Jason Henderson
www.KansasCityFed.org/TEN

COMMENTS/QUESTIONS are welcome and should be sent to teneditors@kc.frb.org.