AI down on the farm: MSU-linked startup puts machine learning to work for sows

TOM HENDERSON / CRAINS DETROIT BUSINESS

- Motion Grazer AI founded by MSU swine veterinarian
- Technology pairs cameras with AI to evaluate whether sows should be culled or keep breeding
- Red Cedar Ventures has invested $50,000 in the company

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Motion Grazer AI

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It's not quite up there with "what's good for the goose is good for the gander," but Madonna Benjamin, a former pig farmer in Ontario turned agtech professor at Michigan State University, hopes there will be a lot of revenue for her startup, Motion Grazer AI Inc., and increased profits for pig farms with this business plan: "What's good for the mango is good for the sow."

"I was reading an article on mangoes and a camera system that had been developed," said Benjamin, who recently was promoted from assistant to associate professor at MSU and is also a swine extension veterinarian in the school's College of Veterinary Medicine. "Mangoes were loaded on a conveyor belt, and you could tell from the overhead camera and how they sat on the belt if there had been a loss of flesh and if they were overripe.

"I thought, if they can do it with mangoes, sows are a lot bigger, we should be able to do it with sows," she said.

In 2016, the Michigan Pork Producers gave her a $25,000 grant to get started. "That was a big deal," she said.

The problem she wanted to solve is a big and growing problem for the pork industry. What are the signs that a sow is beginning to have physical problems that might interfere with breeding? Is it being overfed or underfed? Is it starting to have trouble with its gait that might be a precursor to bigger health problems? And if a sow is having trouble with its gait, should you cull it from the herd, now, and butcher it, or try to get one more litter?

Right now, those decisions are made by workers watching sows as they walk and by physically measuring them at various body points, a time-consuming and labor-intensive process that is, says Benjamin, notoriously inaccurate. Some sows are mistakenly culled a year or two early, and others are allowed to breed when they aren't healthy enough to do so.

Getting one or two litters out of a sow can easily be the difference between profit and loss on a particular sow.

Madonna Benjamin

Benjamin said one main reason for the decline in recent years in the number of litters per sow is the universal practice of artificial insemination. Sows no longer need the bone structure that allows male pigs to mount them. They are bred, now, to have much less bone structure and more meat, leaving them more likely to have gait issues.

From 1979-1989, Benjamin, her two brothers and her father owned a pig farm in Oldcastle, a small unincorporated community near Windsor. "I really liked working with sows and with piglets," she said.

She decided she wanted to be a veterinarian and got her doctor of veterinary medicine degree from the University of Guelph in 1995 and a master's degree in animal welfare from MSU in 1998.

After earning her degree from the University of Guelph, Benjamin worked for Elanco Animal Health in Guelph, where she researched the effect of the use of electric prods to control the movement of pigs. She found that the prods created stress and lactic acidosis, a buildup of lactic acids that leads to serious side effects. Her work improved the quality of life for sows — and as a result increased the health of farm operations, she said.

Next, she wanted to see if there was a way to commercialize the technology that worked for mango farmers on her favorite farm animal.

"When you are conducting research, you have these ethereal thoughts about wouldn't it be nice some day to make a difference. But when you shift from the research perspective to the business perspective, you go from 'things are over the horizon' to 'the horizon is now,'" she said.

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Michael Lavagnino

After the initial $25,000 from the Michigan Pork Producers Association, the entrepreneurial support system at MSU kicked in. Michael Lavagnino, a specialist in MSU's College of Engineering; Steven Yik, a graduate student in engineering; and Benjamin began interviewing Michigan farmers, traveling to farms weekly to assess their needs and how technology might help.

Yik introduced Benjamin to Daniel Morris, an associate professor in the Department of Electrical and Computer Engineering in the College of Engineering who was a co-adviser for Yik's master's program. Eventually, Morris, Yik and Lavagnino collaborated on developing what they call a SIMKit. SIM stands for Sow in Motion. The kit is a combination of an overhead camera to monitor sows as they move from the farrowing barn to the breeding barn and software that uses machine learning to analyze data.

Daniel Morris

Morris was eventually named Motion Grazer's chief technology officer. He, Lavagnino and Benjamin are part-time employees. The only full-time employee is John McIntyre, an entrepreneur-in-residence at Spartan Innovations since 2012 and a serial entrepreneur with a history with biotech companies.

From 1995-2005, McIntyre was president and CEO of Okemos-based Emerald BioAgriculture Corp., which made products to increase the yield and quality of agricultural crops; and from 2005-2011 he was president and CEO of Kalamazoo-based Vestaron Corp., which developed environmentally friendly insecticides from spider venom. In 2019 it moved its headquarters to North Carolina but kept a research facility in Kalamazoo.

John McIntyre

In 2019, the team had enough information from pig farmers and the work on the SIMkit had progressed to the point where the MTRAC AgBio Innovation Hub began the work of fast-tracking Motion Grazer's path

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to commercialization. MTRAC is an acronym for Michigan Translational Research and Commercialization, a statewide program funded by the Michigan Economic Development Corp.

Since 2017, McIntyre had served as director of the Spartan Innovations Venture Fellows program, and a team of advisers that included an MBA student and two Ph.D. students was put together to offer mentorship and advice.

In March 2020, an MTRAC grant of $96,000 was awarded to commercialize the technology. Last October, Motion Grazer was formally launched and McIntyre left his entrepreneur-in-residence position to become CEO.

Red Cedar Ventures became the first investor in the company with a convertible note of $50,000.

"We like John McIntyre, and we like agtech. It's an exciting company for MSU," said Jeff Wesley, Red Cedar's executive director.

McIntyre said he has met with 25-30 potential investors and hopes to raise $750,000-$1 million this year and $1 million to $1.25 million early next. "Nobody has said no, yet. We're looking for someone to wave their hands excitedly and want to invest," said McIntyre. "I'm optimistic we can raise the first round in the next several months."

He said an early use of funds will be to hire five or six employees, including at least two sales staff and two or three experts in machine learning.

Skip Simms, the vice president of Ann Arbor Spark and managing director of the Ann Arbor-based Michigan Angel Fund, is one of those potential investors who has vetted the technology on behalf of his angel group. He likes the market opportunity and is eager to see how Motion Grazer's technology improves in the near future as it gets ready to go to market.

"I have known John for several years, going back to Vestaron. He has found yet another company addressing a challenge in the ag space," said Simms. "It's classic in that there is a wasteful and costly aspect to raising pigs and hogs that unless you are in the business, you can't appreciate. It appears Motion Grazer could solve a real problem. This needs a little more validation but this should take only months, not years."

Motion Grazer has filed for two patents, one for the hardware and software involved in the SIMkit, the other for the algorithms that power the machine learning that happens as cameras monitor an individual sow's gait over time and measure key points on her body.

McIntyre said the company is now assessing a better camera system and has contracted with SpinDance Labs in Holland to refine its algorithms. The company is currently studying and filming sows at the Michigan State University Swine Farm and three other area swine farms.

He said the company will be looking for a small Lansing area lab and office in 2022 and expects to have its system ready to go to market my mid-2022. He said revenue will be based on a monthly subscription basis, with initial outlay minimal for farmers, perhaps $2,000 per overhead camera per barn.

Motion Grazer AI's initial market will be swine, but it plans to branch out to cows, sheep and poultry, too.

Joseph Connor

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Joseph Connor founded Carthage, Ill.-based Carthage Veterinary Service Ltd. in 1976. He also founded Professional Swine Management, a consulting firm that works with pig farmers in the U.S. and abroad. He said the Motion Grazer team reached out to him about their technology and he's been impressed.

"There are high labor costs now in identifying animals that need an intervention," Connor said. "Artificial intelligence can do this more proactively and accurately than the techniques we use today. It can increase the time a sow can stay in the herd and can determine the ideal feeding rate to make sure you don't overfeed or underfeed a sow. This can be a game changer for the industry assuming hurdles they are working on can be overcome," he said.