

Farmers tough on artificial limbs

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When a farmer or rancher is injured on the job, there's an 11 percent chance that an amputation will occur. That's two and a half times more likely than in any other industry.

Most of these [amputations](#) involve fingers or toes. But the artificial hands, arms, legs, feet and other prostheses used by [agricultural workers](#) with a major [limb amputation](#) don't seem to be durable, affordable or adaptable enough for their lifestyles, according to a new Northwestern Medicine study.

Published online in the journal *Disability and Rehabilitation: Assistive Technology*, this is the first study to provide detailed information on the limitations facing farmers and ranchers with prosthetics.

The study is part of a larger research project at the Northwestern University Prosthetics-Orthotics Center that aims to design educational materials tailored to the specific needs of farmers and ranchers with amputations and work with prosthesis manufacturers to develop and reengineer more robust products and components.

"We are also exploring how products created for people with amputations in developing countries may benefit farmers and ranchers here in the U.S.," said Craig Heckathorne, research engineer in physical medicine and rehabilitation at Northwestern University Feinberg School of Medicine and second author of the study.

Results of this ongoing research could benefit people with amputations

who work in other physically demanding professions such as the military, construction, forestry, [commercial fishing](#), mining and manufacturing.

"There are lot of issues and challenges to farming with a prosthesis," said Stefania Fatone, research associate professor in physical medicine and rehabilitation at Feinberg and corresponding author of the study. "They often need to climb ladders and silos, lift bags of feed and seed and walk on uneven terrain, in all kinds of weather conditions. Also, a dairy farmer may have very different needs than a corn farmer or cattle rancher."

Heckathorne and Kathryn Waldera, research engineer in physical medicine and rehabilitation at Feinberg and lead author of the study, conducted intensive one-on-one interviews with 40 American farmers and ranchers with amputations to gather information about how current and past prostheses were used, prosthetic failures and their ability to complete farm tasks while using a prosthesis. They also interviewed 26 prosthetists, who provide services to farmers and ranchers. Prosthetists are trained health care professionals who design and fit prostheses to help people with limb loss function more fully.

The study found that the common problems farmers and ranchers face revolve around these themes:

- **Durability:** Lack of durability and utility was the major theme identified by this study. Farmers report breaking bolts when jumping, lifting or performing other on-the-farm tasks. Many reported using their prosthesis as a tool to carry out work on the farm, too. Farmers' prostheses seem to deteriorate faster and fail more frequently than those of non-farmers with amputations, the study found.

- **Safety:** Farmers reported many falls and secondary injuries due to use of their prosthesis. Researchers found that many safety problems may be related to durability issues.
- **Environment:** Weather, dirt and rough terrain can be tough on prostheses, leading them to break more easily, according to the study. Farmers reported that prostheses sometimes get stuck in mud, caught in weeds and exposed to chemicals, rain, snow and extreme cold and heat. All farmers interviewed in this study avoided using myoelectric prostheses while on the job because of the risk of exposure to harsh environments.
- **Adaptation:** Many farmers said they chose to use a prosthesis as an adaptation to address the challenges of farming after an amputation. But, a modern-day prosthesis is not a complete replacement for an intact limb. Farmers reported having to make additional changes in routines, farm equipment and in attitude to successfully return to farming after an amputation.
- **Cost:** Prostheses are expensive, and farmers and the prosthetists who work with them reported that medical insurance coverage for the devices is often inadequate. Some farmers report having no insurance or high deductible insurance because they are self-employed or a small business owner. The high cost of the devices may drive some farmers to repair their own prosthesis or go without a replacement, which could affect durability and safety. Some farmers in rural areas have to travel great distances to get to a prosthetist's clinic, which also adds to costs.
- **Education:** Prosthetists are not typically trained about the needs and lifestyles of farmers and ranchers and may prescribe inappropriate prosthetic choices, according to the study. Some farmers indicated that they were not consistently educated and trained on the operation of their device. However, some prosthetists reported that farmers had unrealistic expectations of their prosthesis.

These findings have provided a framework for an even larger study on this issue, the researchers said. They are currently recruiting [farmers](#) and ranchers with amputations from across the United States to take part.

Provided by Northwestern University

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