

How do you decide whether to adopt new technology?

Incorporating health and safety in the decision-making process

Catherine Trask, Canadian Centre for Health and Safety in Agriculture

Canadian pork production has been transitioning into large-scale high-production barns. This transition has spurred several process changes and technological advancements throughout the Pork Value Chain. So let's say you are presented with a new technology, tool, or method to help production. How do you decide if it is going to have a net benefit to your business?

There are a lot of things to consider: implementation and maintenance costs, productivity impacts, worker and manager preferences, food safety and animal handling regulations. Worker health and safety is another consideration that can impact the bottom line. For example, if a new tool increases risk factors for injury, injury and work loss may require overtime or recruiting and training replacement workers to



Fig 1 Research Study Team (L to R) Catherine Trask, Lee Whittington, Olugbenga Adebayo, Xiaohe Zeng, Bernardo Predicala

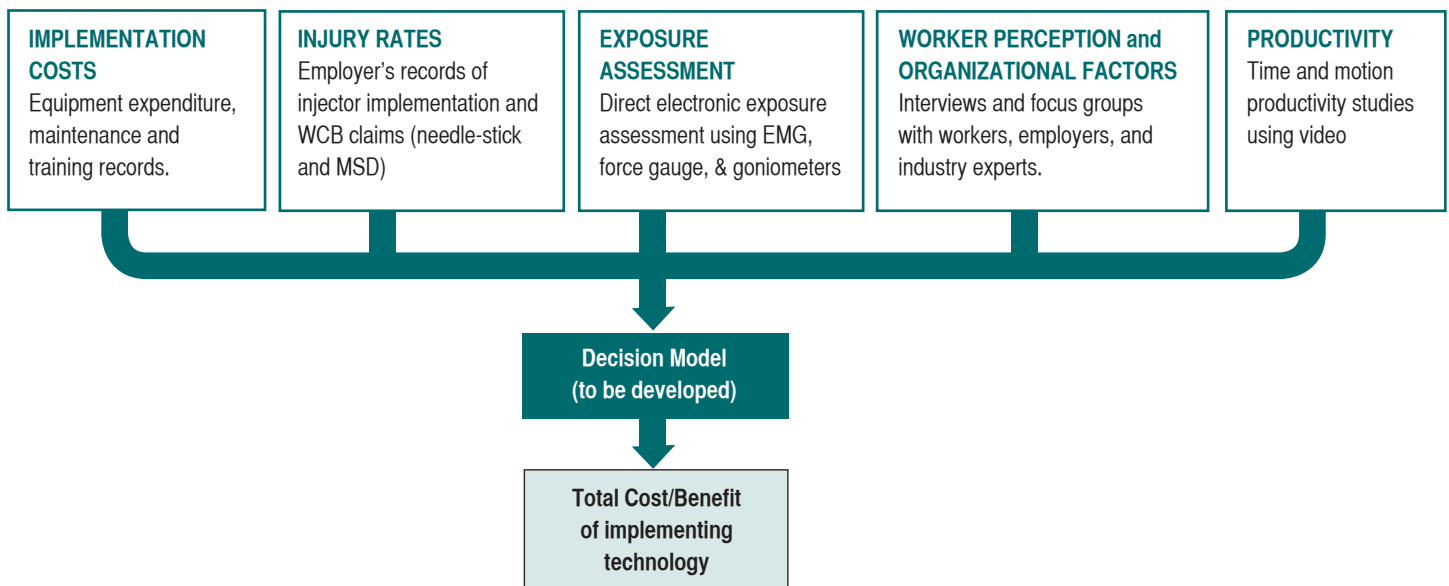


Fig 2 There are many aspects to consider when making a decision about adopting a new technology

Although innovations may have an impact on worker health and safety, they can be difficult to integrate with business decisions.

make up for absenteeism. Although technological innovations may have an impact on worker health and safety, these impacts (whether positive or negative) can be difficult to quantify and integrate with business decisions.

To address this, the Prairie Swine Centre is collaborating with the Canadian Centre for Health and Safety in Agriculture at the University of Saskatchewan to evaluate the health and safety effects of new technologies. This will help producers decide if they want to adopt a new technology. The goal of this project is to develop a suite of performance measures (a 'toolkit') which can be applied to decision-making about new technologies. The specific technology we are investigating in this study is needle-less injectors, and we are comparing them with conventional needle injectors in a comprehensive evaluation that attempts to incorporate all the decision-making factors.

This last summer we conducted ergonomic evaluations at the Prairie Swine Centre during nursery pig injections and piglet processing. More than 650 injections were assessed using electromyography (EMG) to measure muscle activation and forces in the hand and wrist, as well as a posture sensor glove which records finger, hand, and wrist position during injection tasks. Processing is currently underway to determine muscle force and hand/wrist posture for each injection method. The study is still ongoing. This year we will conduct interviews on worker preferences, compare injury rates before and after the adoption of the needle-less injector, and evaluate the cost of each method.

For more information on this and other ergonomics studies, check out the Ergonomics Lab website of the Canadian Centre for Health and Safety in Agriculture : <http://research-groups.usask.ca/ergolab/index.php>



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water, utilities and nutrients used to produce a kilo of pork, and complete the story by accounting for the nutrients returned to the soil for future crops. Additionally, health and behaviour data are not far behind building a tool set for real-time management. But this approach also enhances transparency and traceability, something that is growing in importance of branded products.

Grain and oilseed farming has been aided by GPS, and more recently, aerial monitoring equipment (drones) which make it possible to link a point on the field with a management practice to improve productivity and lower costs.

What is the pork industry equivalent technology to GPS and drones used in arable farming?

The number of devices to monitor farm activity is growing every month. I want to mention a few that I have seen, and we can begin to think of the potential these have to impact your business - in the near future.

I thought I would start with a few that are under investigation now as part of Prairie Swine Centre research or demonstration activities. Dr. Catherine Trask, Canada Research Chair in Ergonomics and Musculoskeletal Health at the University of Saskatchewan is featured in this issue. Her team is using microsensors measuring muscles in the hand and forearm to measure repetitive motion from common practices such as castration and tail docking to see differences in technique and equipment that may have an impact on reducing repetitive stress injury.

Feed ranks highest in cost of production, even in periods of low grain prices such as now. Two Canadian firms have their equipment installed in PSC to allow controlled gestation feeding. The JYGA G3 and Maximus gestation feeding systems monitor feed disappearance in our specialized gestation rooms, producing data for researchers. For the past three years the JYGA Gestal units have fed one of our five farrowing rooms. Recently we compared that 4x/day feeding program to a simple modified feed tube and hand feeding 3X/day. The results reinforce that even good hand feeding technique cannot compare to the efficiency of small amounts fed often, as seen in the other two systems. In fact feed cost was reduced by \$9/ farrowing in favour of the limit feeding systems, and additionally the JYGA Gestal allows continuous monitoring and provides alerts when the sow falls below the feed curve.

Be Seen Be Safe and Farm Health Monitor are in the late stages of development and will generate biosecurity data (specifically who comes and goes from your property) and allows the stockperson to

contribute to real-time alerts on changes in disease presence on the farm. This technology represents not only new ways to capture data - through geofencing - but also is a good example of the democratization of data as multiple entry people and facilities can freely add data to a system that deidentifies and shares the data for others to use in managing their herd health.

Speaking of herd health, this past week I was reminded of the 'Cough monitor'. A technology that has been used in health research in the UK. This was one of the examples cited by Caithrin Rintoul, CEO of the agtech platform Provender, in his presentation at the Ontario Pork annual general meeting. Mr. Rintoul's company philosophy was stated as "faster, more seamless technology into the hands of farmers".

Precision feeding of market hogs has been under investigation at Agriculture Canada that can alter the diet daily for each individual pig that enters the feeder. This captures data on feed disappearance, and growth rate today, and translating this into alterations to the diet tomorrow. The evidence suggests this technique can improve feeding costs by 8% (>\$10/hog) and reduce Nitrogen excretion by 40%.

The use of infrared cameras in conjunction with water disappearance to investigate real-time monitoring of pig health through external body temperature readings, eventually even linking this to meat quality.

The Innovators Club meeting at Banff this past January was treated to a presentation by Dr. Ricardo Segundo of Optimal Pork Producers in Spain. Dr. Segundo demonstrated a new syringe with RFID capability that provides a perfect trail for all injectables, links the pig to the dose, date and even the lot code of the product used. Farms Mother is a custom software solution designed to capture the data from every device and animal on the farm and bring it to a single easy-to-read dashboard so that management, located anywhere in the world, can access the data for analysis and correlations between performance and environmental conditions or feed and water disappearance by pen in real-time.

Valerie, an EU initiative seeks to create a search process that links products and services to synthesize tech papers suited to the individual farm asking the question. Image having access to research and popular press, and perhaps even video that is resident on the web all searched and reported - just for you, right now.

None of this is science fiction - the technology exists today, not all of it applied to livestock agriculture, but with some effort it could.

