Infrared camera tech measured as tool for swine health

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Depending on the results of a nearly-completed research project, infrared cameras could soon become a key tool in the fight for swine herd health and the protection of Canada's swine export market.

The project -- a collaboration between the Prairie Swine Centre (PSC) in Saskatoon and the University of Saskatchewan's Department of Food and Bioproduct Sciences -- seeks answers to two questions. First, can infrared cameras be used to identify sick or stressed pigs before they're taken to the packing plant? Second, to what extent can they be used to predict a pig's tendency for poor meat quality?

"If producers can easily identify sick animals then they can determine whether it's better to treat or euthanize them on-farm rather than send them to a processor where they could pose a food safety risk," says Jennifer Brown, a researcher with the PSC and the project's primary investigator.

"Having a simple tool like this could improve the welfare of animals and reduce waste by not transporting animals that are not suitable for food, all while improving food safety," Brown says.

The potential for reducing disease in the supply chain cannot be underestimated, she says.

"Certainly the one disease we are very wary of in North America is African Swine Fever, which decimated pig herds in China last year. If it ever came to North America there would be a lot of concern that it would spread in our swine herds. It would be totally devastating for pig producers because our borders would be closed and we wouldn't be exporting any animals."

When combined with specialized software, infrared cameras can be used to identify high body temperature which -- just like with humans -- can be an indicator of sickness or stress.

"We are looking at pigs' body temperature in two regions," says Brown, an adjunct professor with the College of Agriculture and Bioresources who teaches half an undergraduate course in Animal and Poultry Science.

"We are looking at the back of the pigs, which is a large area we can get the average temperature from. We are also looking at the eye region because it has been shown to be one of the more sensitive areas in terms of responding to disease and changes in temperature."

Brown is collaborating with Phyllis Shand with the Department of Food and Bioproduct Sciences on the meat quality side of the project. This component looks at the potential of infrared tech in predicting a given pig's likelihood for winding up as substandard meat.

"It typically relates to a problem that is pretty common in pork meat which is known as pale, soft and exudative (PSE) pork," says Brown. "That's the main meat quality problem you might find in pork and it's usually related to transport and handling at high temperatures. PSE pork has a poor appearance and is not marketable as a fresh product,

"If we can identify pigs that are more prone to having that PSE trait they can be rested longer in pens. That's going to improve their meat quality."

Ultimately, infrared camera-based temperature detection will have to work at scale in order to be a true asset to the swine industry. Brown says the next step will be attempting to automate the image collection and analysis process (it's currently being done manually) so data can be gathered in real time.

"The hope is that we can automate procedures to collect infrared data so producers or packing plants would get a flag if an animal was to show a temperature over a certain threshold."

Although the project's goal isn't primarily related to animal welfare, there's no doubt that using infrared cameras to assess pig health is less invasive than alternative methods, she says.

"Infrared is a beautiful technology because you can assess an animal's temperature, whether it be the whole body or specific parts of the body, totally non-invasively. A lot of our stress assessments involve respiration rate, heart rate or blood pressure which all require some kind of contact or interference with the animals. With infrared the animals aren't aware of the process or subjected to any stress.."

A good piece of news -- especially for producers -- is that suitable infrared cameras have come down in price significantly in recent years. A sub-test of the project involved comparing the efficacy of a research-grade infrared camera (costing over $10,000) to a handheld counterpart that is available for around $1,000.

"We compared those two cameras to see if we were able to get data that was as reliable on the cheap camera as on the expensive one and it did very well in that comparison. That was not surprising since the technology is the same, with the main difference being the image resolution," she says.

This research is an example of USask's frequent collaborations with the PSC, an institution dedicated to swine research. Originally conceived as the university's swine research unit, since 1991 it has acted as an arm's length, non-profit agency associated with the university but operating as a distinct entity.