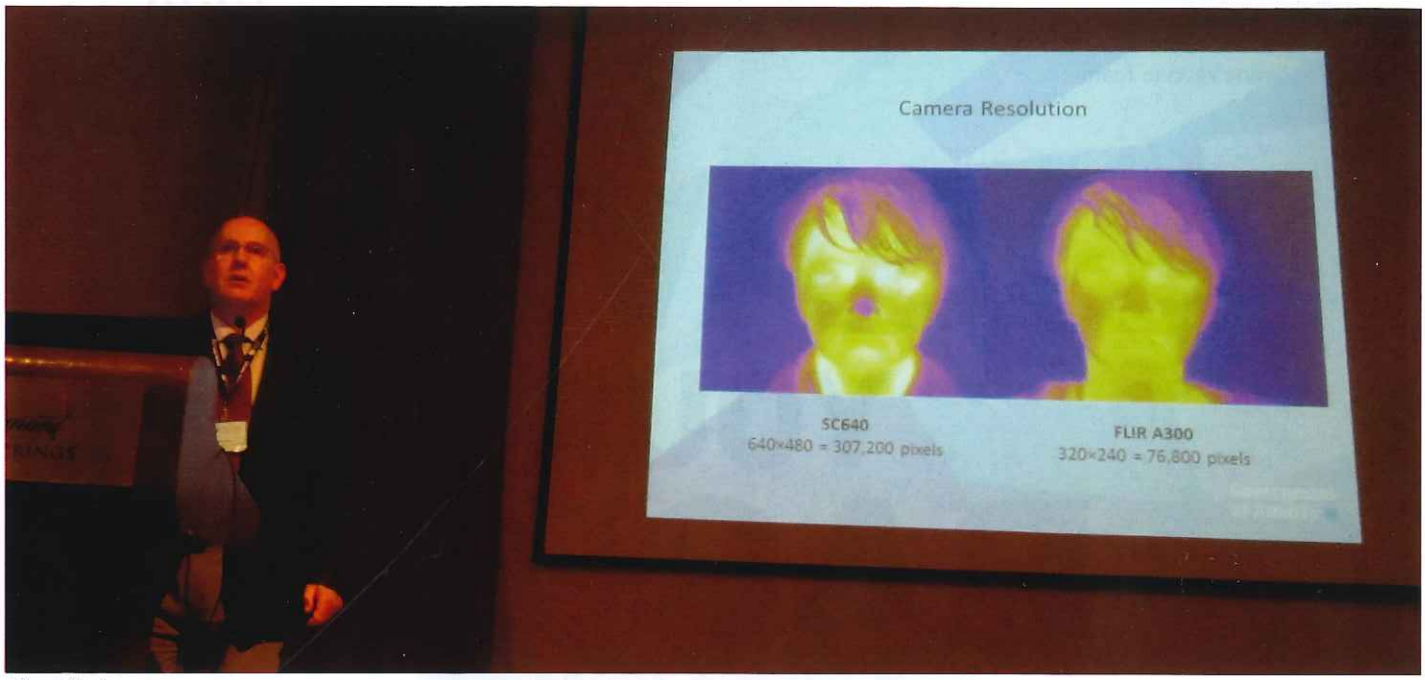
Part two: Infrared Thermography in the Swine Barn

In the always-competitive pork industry, new technology is the best thing to come along since, well, old technology. A perfect example is the use of infrared thermography (IT) in the swine barn. It's something that Dr. Nigel Cook, a research scientist with the Livestock Research and Extension Branch of Alberta Agriculture and Forestry, loves to talk about. And with over 100 peer-reviewed publications to his credit, he knows of what he speaks.

What is Infrared Thermography?

Dr. Cook explained that this technology has three main components:

CONTINUED ON PAGE 36



Nigel Cook

1. Detection of infrared radiation emitted by an object
2. Conversion of infrared radiation to temperature
3. Display of temperature distribution as an image

All objects with a temperature above absolute zero (-273.15°C or -459.67°F) emit radiation in the infrared wavelengths.

Why measure heat losses by Infrared Thermography?

Mammals and birds maintain a constant body temperature through homeostasis. Heat can be lost, however, through induction, convection, evaporation and radiation (the most common method in pigs).

Cook cited several reasons for using IT to measure heat loss:

- Non-contact
- Automatable
- Non-invasive
- Sensitive to change
- Reflects metabolic activity
- Detects febrile responses
- Behavior can be measured from infrared images

Pick a camera, any camera

Measuring heat loss by IT requires a thermal camera. There are several to choose from, each with its own pros and cons:

1. **FLIR SC640:** It has the best range, accuracy and resolution, but at $65,000 the cost may be hard to justify.
2. **FLIR A300:** The price tag of $10,000 is less prohibitive than the SC640, but its lack of portability means it needs to be hard wired, limiting its flexibility.
3. **FLIR E40bx, FLIR i3 and FLIR AX8:** These all give you portability at a more reasonable price of between $1,300 and $3,200. With the lower price, though, comes lower resolution.

Infrared thermography and disease

On average, there are between one and three emerging zoonotic pathogens per year. The most efficient way to counteract novel pathogens is to discover them early, which requires sound preparation and excellent surveillance. When incorporating IT as part of this counteraction, keep in mind that a number of factors can affect IT temperature:

- Reflected environmental infrared radiation
- Imprinted body heat
- Spatial distribution: The more animals that cluster together, the higher the ambient temperature recorded.

In a vaccination trial by Cook and his associates, they reached several conclusions about temperature:

- Setting a threshold temperature eliminates miscellaneous background
- Background temperature had no significant effect on pig temperature
- Spatial distribution affects temperature
- Vaccination affects spatial distribution
- Vaccination induces an increase in radiated temperature
- Increase in radiated temperature detected at 10 per cent prevalence
- In theory, only one pig needs to exhibit a febrile response to increase the maximum temperature recorded

There's still a lot to learn about the emerging field of infrared thermography. Whether you dive in now or choose a wait-and-see approach will depend on your needs and resources. Just be sure that if you do take the plunge, you know how to make the best use of the technology. The potential is exciting, but $65,000 is a lot to drop on a hi-res selfie. ■