

Innovative applications for thermography in pig production

Infrared cameras have not been widely applied in pig production so far, for two main reasons: the costs were too high and the thermographic pictures obtained were too difficult to read, and did not include the necessary adjustments. This has changed due to the latest developments, and as it turns out, thermography offers many more exciting topics to discover.

by **Sofia Marysheva,**
Degree2act Team.
www.degree2act.com

This article explores some of the advantages and tells the story of the research and challenges that have occurred along the way.

Some important aspects to have in mind for correct interpretation of thermographic photos are:

- **Camera resolution and sensitivity:** The higher the resolution, the greater the detection capacity.

- **Emissivity:** The effectiveness of a body to emit thermal radiation is affected by the characteristics of that body, which in the case of pigs are: race, age and the area of the body that is detected.

- **Reflection:** The facilities of a farm (infrared lamps for piglets, heated platforms, etc), affect the accuracy of the measurements.

- **Environment:** Ambient temperature, air speed, relative humidity, type and intensity of lighting, etc influence the thermal pattern.

So, by using thermography, the goal was to find a tool for early detection of hyperthermia, before any other clinical signs appear, thus being able to prevent disease outbreaks and provide individual

care to those animals who need it most. In terms of a bigger picture, the aim was to enable veterinarians and producers to better manage health status, reducing the use of antibiotics through early detection, without jeopardising herd health status, using antibiotics only if needed. Our commitment stands with global concerns about antimicrobial resistance and animal welfare and therefore we also wanted to play our part.

There are plenty of hardware options available on the market, but there is no specific software. So we began developing an app and called it 'Degree2act'.

Initially, the idea was to use an infrared portable camera Flir One (Flir Systems USA) connected to a smartphone. Our mobile app would be available worldwide, for both iOS and Android. The hardware is not expensive and is a non-invasive solution with an intuitive interface, that would provide data in a comprehensive format, give metrics and statistics.

So the adventure began

It took us about two years to unite the necessary research base to even begin adjusting the algorithm for automated detection of hyperthermia. Over 10,000 measurements, and counting, are now the basis of the algorithm developed specifically for pig farming by the Degree2act team.

Speaking of the team, it is composed of veterinarians, small producers, veterinary students, medical doctors, physicists, statisticians, mathematicians, computer technicians, sales, and marketing; in short, a group of very



different people without conflict of interest but with one common aim: to provide a tool to vets and farmers everywhere and to make it useful for animal health and welfare.

In fact, when the algorithm was ready and the first functional version was released, we began to discover other applications and our horizons broadened in a whole new way.

Aside from hyperthermia the following new developments are under way, and will constitute new features for the farmers and vets to use in their routine jobs:

- **Oestrus cycle management:**

A special feature for reproduction efficiency, intended to detect the optimal moment for insemination in sows, based on detection of body temperature variations.

- **Pain management:**

A special feature for castration, which will explore the link between pain and temperature alterations.

- **Hyperthermia detection:**

This will help to identify the piglets that are at risk of death by hyperthermia and act accordingly.

- **Heat stress:**

Identify pigs that are suffering heat stress and improve their welfare.

But, as time passes, other devices become available, so in parallel our team is working on adapting the original app to the ones we consider best for farm life:

- **Flir One, Pro, LT, Gen 3.**

This is the original device that Degree2act was developed for and that it currently works with. It is currently available for Android only, the iOS version still needs a few adjustments.

We are also exploring the following devices:

- **Flir Ex-Series:**

A powerful IR camera with a built-in screen, WiFi connection, long-lasting battery and higher resolution.

- **CATS61:**

A robust smartphone with integrated Flir Lepton sensor, indoor air quality sensor and laser assisted distance measurement.

- **Blackview 9800 Pro:**

An indestructible smartphone with Flir Lepton sensor, but slightly bigger than CATS61, plus it is waterproof and has a very powerful battery.

Platform for collaboration

Degree2act has always been a complex project, but it is also an open platform for collaboration between specialists in different fields.

Collaboration, creativity and commitment have always been at the core of the project, and in 2019 Degree2act was voted as winning best practice in health management by the EU PiG innovation group committee.

The committee includes major European independent research institutions, responsible for agriculture and animal production in 13 countries.

The entire meat sector is undergoing great transformation and giving new use to unused technology is exactly the sort of innovation it needs to keep up with consumer trends to become more efficient and profitable. ■

