PROJECT SUMMARY

Project Number and Title: 5A-113: Brain Measures of Positive Welfare in Pigs

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Project Participants: Associate Professor Dominique Blache, Dr Luoyang Ding, Professor Archa Fox and Professor Shane Maloney, The University of Western Australia, Associate Professor Darry' D'Souza, Dr Kate Plush, Mr Robert Hewitt, SunPork Group, Ms Katelyn Tomas, The University of Queensland

Aims and Objectives:
The aims of this project were to test the following hypotheses:

1.   Negative environmental conditions will negatively affect parameters of production and meat quality and these effects might be amplified by exposure to the acute stressor.
2.   There will be an interaction between environmental conditions and the acute stressor on the concentration of plasma cortisol. Negative environmental conditions will increase cortisol in plasma and these effects will be amplified by exposure to the acute stressor.
3.   There will be an interaction between environmental conditions and the acute stressor on the expression of NEAT1 and its concentration in plasma, saliva, and brain tissue. The direction of changes cannot be hypothesised because NEAT1 has never been measured under psychological stress conditions.
4.   The near infrared spectrum from the prefrontal cortex region will be different between pigs exposed to different environmental conditions or exposed, or not, to an acute stressor.

Key Findings:
This was a pilot project designed to try to find new methodologies or new biomarkers of quality of life in pigs. We subjected pigs to long-term and short-term positive or negative challenges. Key findings include:

- Validation of methodologies to measure a marker of cellular stress, NEAT1, at the whole organism level and in different biological media.
- There was a decrease in the expression of NEAT1 Total, that encodes paraspeckles, in saliva samples after the acute stress suggesting it may be a useful indicator for acute mental stress in pigs.
- Mid Infrared spectroscopy (MIR), combined with machine learning, identified changes in the biochemical constitution of the prefrontal cortex that were associated with acute stress but not with environmental conditions.

Applications to Industry:
The potential of NEAT-1 as a biomarker of welfare still needs to be explored more closely with negative or positive events or in response to the above "very positive experiential state" before this can be applied in an industry setting.

The use of spectroscopy is very promising and should be explored further to apply this technology to biological samples obtained from live animals over time, so that the technology can be validated as a reliable method to assess the quality of life of food-producing animals.