HOW TECHNOLOGY CAN HELP

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Automation will bring efficiencies in farm data collection, decision-making and labour saving. Using sensing technologies, artificial intelligence or robotics, woolgrowers will be able to optimize their production systems and to be more profitable, efficient, safer, and more environmentally friendly.

These technologies will also contribute to improved animal welfare and reducing disease incidence, increasing the monitoring and control of the animals and facilitating early detection and prevention.

Several AWI investments in Agri technology are investigating the direct or indirect detection, control or reduction of the incidence of flystrike in the flock. These projects are summarised below.

AWI SMART TAGS

AWI's smart tags aim to enable woolgrowers to track, monitor and assess the status of their flock in real time and make more informed decisions to increase their enterprise's profitability.

The ultimate goal is to provide a tool to remotely monitor the animals, detect welfare issues, improve reproduction management and collect data from the paddock. AWI anticipates that smart tags could be used for research and data analysis purposes to help woolgrowers optimise their flock's productivity. For example, in relation to flystrike management, wild dog alerts, grazing optimisation, health alerts and reproduction optimisation.

AWI is collaborating with various research organisations to investigate different behaviours and relating them to specific paddock events or welfare issues. Some of the objectives are:

- IMPROVING REPRODUCTIVE MANAGEMENT: In collaboration with the University of Sydney, this project aims to understand male and female reproductive behaviour such as heat, joining or lambing and how these behaviours can be detected using AWI smart tags.

- IMPROVING GRAZING MANAGEMENT: Murdoch University, DEDJTR (Victoria) and NextGen Agri will extend the capacity of the AWI smart tags to enable woolgrowers to optimise grazing decisions. The project will generate smart tag data across a range of grazing situations and use this data to train machine learning algorithms that can accurately predict feed on offer and detect grazing behaviour which, for example, will inform decisions regarding the time to shift sheep between paddocks or determine the appropriate amount and timing of supplementation.

- PREDATION AND WELFARE ALERTS: Central Queensland University researchers are assessing the ability of AWI smart tags to help woolgrowers detect animal health and wellbeing issues faced by sheep. Predation by wild dogs and animal health issues (worms, flies, lice) are major issues for the wool industry with significant impacts on profitability and animal welfare. AWI smart tags have the potential to provide woolgrowers with an early warning of behaviours associated with predation by wild dogs or the development of more subtle welfare issues in individual sheep in their flock. This will enable producers to detect and manage problems well before they turn into more significant issues.

ARTIFICIAL INTELLIGENCE IN WOOL PRODUCTION

Favourable results were achieved in an AWI-funded pilot study led by NextGen Agri and University of Sydney. The project provided a pilot evaluation on the utility of Artificial Intelligence (AI), and in particular, Deep Learning, in accurately predicting performance outcomes from images, biomarkers and on-animal sensor output.

This project clearly demonstrated that with the correct training data set, machine learning models will be very powerful in predicting a range of informative traits from image-based inputs of sheep. This could be used for example to predict breech strike susceptibility based on image data, to facilitate data collection in the paddock and to normalize scoring systems.

The researchers also evaluated potential scenarios for AI to be used in complex decision-making processes and combining complex data from multiple sources which again, could represent an opportunity for these technologies to support flystrike management strategies.

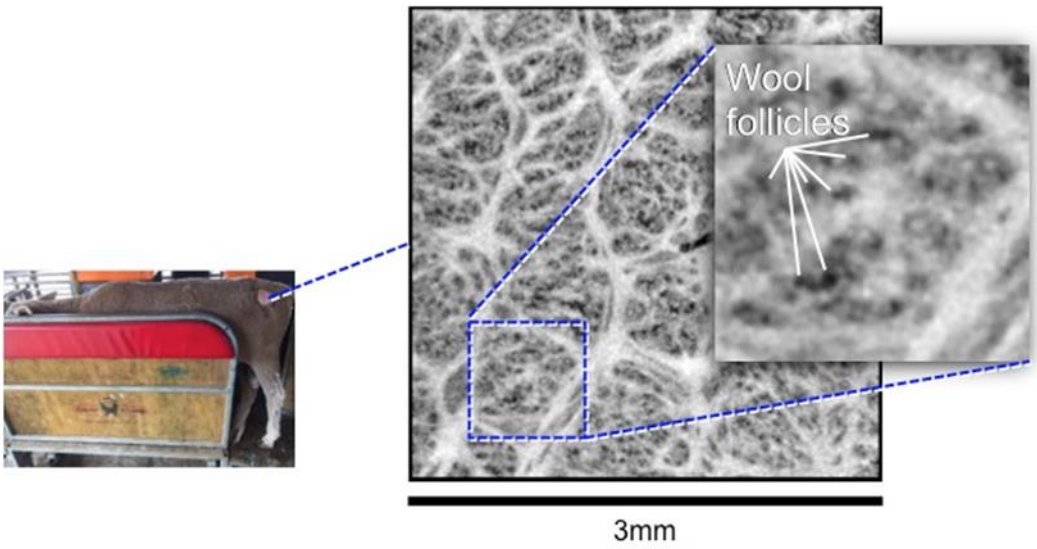
FOLLICLE DENSITY MEASUREMENT AND DIAMETER

There are good prospects for reducing the incidence of flystrike over the longer term by breeding for key flystrike resistant traits, i.e. reducing breech wrinkle, breech wool cover, dags and urine stain.

Breeding for lower wrinkle may lead to decreased fleece weights although sheep that are relatively high in fleece weight and low in wrinkle have been identified, and the industry is selecting and breeding from these to ensure they maintain and/or increase productivity whilst decreasing wrinkle in their flocks.

However, by selecting sheep with an optimum density of wool fibres we can improve both quantity and quality. In addition, wool follicle density is highly heritable so genetic gains can be made if the trait can be measured cost effectively.

This project led by the University of Adelaide aims to develop a point-and-click scanner that enables farmers to measure wool follicle density and diameter on-farm and with sheep at a much younger age than is currently possible at a much lower cost than presently available. Safe, non-invasive imaging can look below the skin surface and analyse the wool follicles. This will allow woolgrowers and ram breeders to identify high value sheep earlier, which could increase productivity of current sheep flocks and facilitate increased rate of genetic improvement.



Picture: University of Adelaide

VALIDATION OF PULSE OXIMETERS

Could pulse oximeter technology detect changes in blood Oxygen levels that that may coincide with early signs of *Haemonchus contortus* (Barber's Pole Worm) infections in sheep?

AWI is collaborating with Dawbuts in this proof of concept study that may provide the foundation for further research into practical on-farm devices such as ear tags with built-in pulse oximeter sensors.

Ideally, these would allow for continual monitoring and provide early detection signals to farm managers, such that *H. contortus* infections can be treated before they compromise animal health and welfare.

MORE INFORMATION

More information on the AWI Agri-Technology program is available at:
www.wool.com/sheep/agritechnology/ or contact Carolina Diaz email: carolina.diaz@wool.com.

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