

Tangible technologies

Swinburne’s most recent products range from a one-shot solution for cattle ticks, to implant coatings, and gold detectors using cosmic rays.

TICKING OFF A COST WITH SINGLE-DOSE LIVESTOCK VACCINES

An immune boosting formula developed at Swinburne is helping control cattle ticks and other parasites.



A vaccine formulation has been developed to avoid the cost of expensive vaccine booster shots in Australian cattle production, while preventing the spread of infectious diseases.

Developed by Swinburne biomaterial researchers, Professor David Mainwaring and Dr Mohammad Al Kobaisi, the patented technology slowly releases immune-boosting components, which prolongs and increases the effectiveness of a single vaccine injection.

“The real innovation is the formulation that enables the controlled release of the bioactive constituent to provide the same immunological protections as multi-dose vaccines,” said Dr Elicia Wong, Capsular Technologies’ Chief Operating Officer.

Capsular was founded in 2017 as a spin off from the Cooperative Research Centre for Polymers to commercialise the outcomes of the Swinburne project.

The biopolymer-based vaccine emulsion involves immune-stimulating parasitic proteins tethered to hydrogel particles that are readily transported and broken down slowly in the lymphatic system. The emulsion is formulated in pharmacological oils, which further boosts immune responses, producing a product for subcutaneous or muscular injection.

In early testing funded by Meat and Livestock Australia (MLA), Mainwaring and his collaborators from the University of Queensland showed that a single dose triggered strong and sustained immune responses against cattle ticks, a parasite that costs the Australian beef and dairy

industries approximately \$175 million a year. The new vaccine was also shown to control active tick infestations in Australian cattle, killing about 80% of the tick parasites over 40 days — a level of disease protection greater than the conventional multi-dose immunisation strategy.

“This formulation is now ready for further testing at longer durations of anti-tick immunity with free-ranging cattle of Australia’s northern herd,” said Mainwaring.

Capsular is planning a longer follow-up study in herds of high-quality beef type cattle, replacing the Brahman breeds, the mainstay of northern Australian beef production. Here it is especially difficult and expensive to muster animals for frequent booster injections. As such, said Wong, the industry is really telling them that the market needs a one-and-done anti-tick vaccine.

The research program of Capsular also has two targets in active testing for pig health: one involves a vaccine for highly contagious viral illnesses that leave livestock weak; the other is aimed at controlling the respiratory pathogen pleuropneumonia, a bacterium often responsible for the sudden death of pigs. For now, however, the anti-tick vaccine remains the company’s top priority, according to Wong. The company hopes to begin pivotal testing of its cattle tick vaccine next year, a vital step towards certification and commercialisation. If all goes well, it’s expected the innovation could reach the market in the next two to five years.

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