



Crush-Side Genotyping

Using portable DNA sequencing technology to calculate genomic breeding values on-farm for the northern beef industry

Background

Genomic selection lets us select genetically superior animals from the day they are born. This significantly increases the rate of genetic gain in a herd. Determining the genetic make-up of an animal, known as its genotype, currently has a turn around time of almost 3 months. This makes genomic selection unfeasible on most low-input, expansive northern beef operations.

Project Description

To implement genomic selection in northern Australia a rapid, on-farm genotyping alternative is required. My PhD project aims to develop a pipeline for crush-side genotyping. Crush-side genotyping uses a portable DNA sequencer, known as a MinION (photo right), to rapidly sequence and genotype cattle, on-farm, for genomic selection. A DNA sequencer 'reads' DNA like a VCR reads a cassette and will determine an animal's genetic makeup for genomic prediction.

We want to give producers the ability to genotype animals when they want, to produce breeding values when they need them



The MinION, which is about the size of an iPhone, can sequence DNA from tail hair or tissue samples anywhere. This will allow even the most remote properties in northern Australia to introduce genomic selection.

Project Aims

- Demonstrate the feasibility of crush-side genotyping
- Develop methods to increase the accuracy of genotyping and therefore GEBVs
- Develop a pipeline to implement crush-side genotyping
- Trial crush-side genotyping on-farm

What we know so far

- We have genotyped over 100 animals on the MinION from tail hair, tissue and blood samples.
- Error rate on the MinION is less than 1%
- Currently GEBVs can be calculated in under an hour using the MinION. We believe accurate GEBVs will be achievable in under 20 minutes within 2 years.





Researcher Profile

Harry Lamb
PhD candidate, QAAFI
Bachelors of Engineering and Biotechnology (Hons Class I)

Harry grew up on a small cattle property an hour outside of Brisbane where he developed a love for the beef industry. He has combined his passion for the industry with a background in science and engineering to develop *crush-side genotyping* at the Queensland Alliance for Agriculture and Food Innovation. He hopes to help secure a sustainable future by facilitating the development and adoption of technology in the northern beef industry.

