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Use of novel technology to identify reproductive performance in the northern beef herd

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Female fertility, a major profit driver for the northern beef industry, is difficult and expensive to measure. The issue of low reproductive rates in the breeder herd is recognised as a major contributor to poor business performance (McCosker et al., 2010). A recent population-based study has shown that herd fertility is highly variable across the region with median annual pregnancy rates varying from 66% to 85% (McGowan et al., 2014). The reasons cited for the suboptimal fertility in northern Australia were multifactorial and included cow body condition score, poor quality pastures and out of season calving in the previous calving season.

The focus on growth-related genetic improvement in the northern beef herd has meant there has been little attention given to fertility-related genetics, possibly due to the high labour requirement to obtain this information. A recent study has shown that there is a genetic component to herd reproductive efficiency, where it was identified that heifers reaching puberty earlier have shorter postpartum anoestrus periods and therefore produce more calves in their lifetime (Johnston et al., 2009). The aim of the current study is to use novel technologies to identify the age at onset of puberty, birth date and maternal parentage. These three parameters are currently difficult to measure and/or require a high labour component for seedstock producers interested in doing so.

The technologies to be used to identify reproductive efficiency are Taggle ear tags and Walk-over-Weighing (WoW). Taggle Systems produce a low powered radiolocation ear tag that transmits to stationary towers every 15 minutes and can provide a location estimate over an area of 15,000ha. Walk-over-Weighing captures an animal's weight and identity in a paddock situation rather than having to muster animals to a set of cattle yards.

Preliminary studies evaluating the location accuracy of Taggle ear tags were conducted by placing the tags in a 4 x 3 grid. There was considerable variance around the location with a range from ±8m to ±50m and an average of ±22mm. It is assumed that the radio signal was reflected, due to the varying topography and a manmade structure in the initial experiment, which will be further investigated when replicated at various sites.

The current experiment is exploring the animal associations derived from Taggle compared with those recorded using Proximity Loggers. The final experiment will assess whether associations between teaser steers and pre-pubertal heifers can be used to derive the onset of puberty.

Walk-over-Weighing is commercially available and is being assessed in the extensive beef industry however there is limited information in the scientific literature. Similar systems have been used in the sheep industry to track growth rates and to derive maternal parentage (Richards et al., 2007). Walk-over-Weighing will be tested for its ability to derive the birth date based on the loss of weight at parturition and maternal parentage based on the frequency with which a calf follows its mother to water compared to an unrelated animal.

The uptake of technology will be pivotal for the northern beef industry to improve productivity. This study will determine whether Taggle and WoW technologies can accurately and practically measure reproductive performance to improve profitability.

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McCosker, T., et al. (2010). *Meat & Livestock Australia*.
McGowan, M., et al. (2014). *Meat & Livestock Australia*.
Richards, J., et al. (2007). *Proceedings of the Association for the Advancement of Animal Breeding and Genetics*.