

The E-Beef Project: Supporting the Grazing Community and the Environment by promoting the adoption of new and emerging technologies

John McLaughlin^A, Kate Paterson^B

^AGulf Savannah NRM

^BDesert Channels Queensland

John.McLaughlin@northerngulf.com.au

Abstract

The E-Beef Project is a four-year project that aims to promote grazing best management practice by demonstrating how the use of technology and timely management decisions can enhance pastures, groundcover, soils, land condition, business profitability and adaptability. The project is funded through the National Landcare Program's Smart Farming Partnership and involves three regional NRM organisations and the Queensland Department of Agriculture & Fisheries. There is a strong consensus in the Australian agricultural sector that AgTech has the potential to be transformative by making things more accessible, faster, and smarter. However, technology adoption is especially challenging for beef businesses in Queensland's rangelands. For this reason various research groups and industry bodies have supported efforts to promote the adoption of new and emerging technologies in these regions and have urged businesses to use data more effectively. E-Beef has focused on the factors that influence the successful implementation of innovative tools and how these can improve productivity and profitability. Central to this is the concept that businesses that are financially sound and are operating efficiently are better able to manage their natural resources.

Keywords: *Animal production; Farm management; Land management; Liveweight gain; Producer groups; Grazing systems*

Introduction

The most influential force acting on civilisation today is digital technology (Hajkowicz & Dawson, 2019). This term is in some ways all encompassing, referring to electrical devices that use information provided in digital form. The special ingredient that gives a device the status of *digital* is connectivity. Computers and sensors are examples of digital technologies that become powerful when connected and integrated with conventional systems.

In what is being referred to as the fourth industrial revolution, the current era of digital transformation is rapidly changing how individuals, organisations, industries, and economies function and interact (Hajkowicz & Dawson, 2019). The level of digitisation, however, is not equally paced. Around the world, and in Australia, agriculture has tended to lag behind in the adoption of technology (Office of the Chief Economist, 2018). Digital agriculture is the use of digital technology to integrate production from the paddock to the consumer. AgTech can provide the industry with tools and information to make more informed decisions and improve productivity (GHG & AgThetic, 2018). Recent decades have seen the growth in agricultural productivity in Australia halved in relation to historical norms (ABARES, 2021) and AgTech is considered one of the most promising tools for boosting productivity and improving global competitiveness while ensuring the success of the sector domestically (Dufty & Jackson, 2018).

Cattle properties in the vast and remote Australian Rangelands are at significant disadvantages when it comes to their involvement in this new digital revolution (Dufty &

Jackson, 2018; Thomas, et al., 2020). Many of the core assumptions that are necessary for digital adoption are lacking or simply absent – such as connectivity, digital literacy and access to services and skilled personnel. In a period when agricultural productivity is waning, it is essential that these beef businesses are provided with equal opportunities to adopt and utilise technologies to ensure their long-term viability.

The E-Beef Project aims to tackle this challenge directly by supporting beef businesses in the rangelands of Queensland to adopt technologies. The Project, which began in 2019, is funded through the National Landcare Program's Smart Farming Partnership and involves three NRM Organisations (Desert Channels Queensland, Southern Gulf NRM and Gulf Savannah NRM) and the Queensland Department of Agriculture and Fisheries (QDAF). The support offered by the project and its resources aims to overcome the traditional challenges and barriers to adoption in these regions. The lessons learnt from these trials are shared and communicated with the broader grazing community and with the technology providers themselves.

The core assumption of E-Beef is that digital technologies, when used properly, can improve on-farm decision-making and business productivity, assisting landholders with implementing grazing best management practices – enhancing pastures, groundcover, soils, land condition, business profitability and adaptability. In this way, technology adoption is capable of ensuring the long-term sustainability of beef businesses and the ecosystems on which they rely.

This paper will discuss the on-ground activities involved in the E-Beef Project and highlight some of the key learnings to date. It will do this by providing recommendations in the form of a framework that can be used to successfully plan, manage and deliver future extension projects focused on technology adoption.

Discussion

Extension projects that focus on the adoption of new and emerging *digital technologies* are relatively new in the Queensland Rangelands. The novelty of such projects, unsurprisingly, brings new challenges across all aspects of the project from design to delivery. Given the priority of AgTech within the beef industry, made clear by its large presence at Beef Week 2021, it seems guaranteed that similar projects will take place in the future. It is therefore essential that organisations that plan to be involved in these projects develop a framework for the successful delivery of AgTech adoption projects. Building organisational capacity and industry knowledge on how to design, plan, deliver, coordinate and communicate technology adoption projects is critical to ensuring that such activities provide real impact for landholders, the environment, regional communities and the broader grazing industry.

Designing a Project

The project design is obviously critical to setting the long-term course of any project. Decisions made during this stage will shape the project and can confine or enable future activities. A critical first step is to identify the level of digitisation in the community that you are dealing with. This will determine the level of complexity that you are able to deliver. In the case of E-Beef, we are working in a community with comparatively low rates of digital literacy and technology adoption. The project aimed to include technology, business management and Grazing Land Management (GLM) – each adding levels of intricacy. To simplify the project it may have been more achievable to limit the aims of the project to the *successful adoption of technology*, with reference to the future potential of technologies to assist business management and GLM.

During the design phase it is also important to consider what factors will be used to measure success. These factors, in order to be meaningful, must be measurable and able to be monitored. This requires time, resources and processes to be devoted to validating these metrics. In the case of E-Beef, these include; pastures, groundcover, soils, land condition, business profitability and adaptability. If there are too many factors being monitored as part of a trial it has the potential to distract from ensuring the successful adoption of the technology.



Technology projects should also be agile. When possible, aspects of the project should be changeable or modifiable as needed, rather than locked in for the project's entirety. A mantra of the technology world is to 'fail fast and fail often' – allowing organisations to quickly realise flawed concepts and to avoid pursuing failed directions. For example, it may be beneficial to incorporate 'stop-go' checkpoints. This is useful with trials involving software or subscriptions where there is the option to renew membership as the project progresses. It could also be used with trials of technologies on specific properties or with certain landholders. The 'stop-go' mentality prioritises agility and allows funding and resources to be shifted away from parts of the project that are not working and towards areas that have momentum with producers.

Selecting technologies to trial

Selecting which technologies to trial is obviously an integral aspect of an AgTech adoption project. The technologies must be relevant to the industry and the region while providing real impact for landholders. The technologies which are considered must align with the overall aims of the project and its intended outcomes, which for E-Beef included key NRM objectives.

A major consideration for the project is to decide if the project plans to deal with commercial or pre-commercial products. This will ultimately shape the project activities and it is important to distinguish between two areas: Research & Development versus Adoption. Projects that seek to boost adoption by landholders should seek technologies that are commercially available. This involves setting up *Demonstration Sites* that other landholders can learn from. It is important to distinguish these from R&D trials which are not adoption projects, but rather research exercises involving *Trial Sites*. If these distinctions aren't drawn it can lead to confusion throughout the project.

Categorising technologies is an important process when selecting which products to trial in an adoption project and can help to define a product's value proposition. This involves getting to

the core function(s) of a technology to ensure that it meets the needs of the project and that it is obvious to participating graziers what the technology can do for them. Categories may include: Efficiency improver, time-saver, productivity booster, unlocking new value, providing new insights/information, rethinking/redesigning processes or management, or a mixture of these. The category of technology will significantly impact the complexity of the adoption and the level of support that's needed. It will also influence the level of impact that a product can have on a business. For example, let's look at two technologies from the E-Beef Project: Farmbot Water Monitoring Systems & Agersens eShepherd Virtual Fencing. The Water Monitoring System is ultimately a time saving device that reduces time and labour required to monitor water. This is a relatively simple value proposition with a straightforward adoption process. On the other hand, the Virtual Fencing technology compels graziers to rethink and redesign how they manage their property. It requires deeper and more critical thinking, and the value is more difficult to quantify. This technology has a more complicated adoption journey and requires additional resources and support to ensure its successful integration.

Understanding all costs associated with technologies is another essential aspect of the selection process. Sometimes referred to as the 'hidden costs', there are often numerous expenses that are involved in purchasing technologies that exceed the *per unit* cost. For example, installation costs, freight, subscriptions and software access, additional infrastructure requirements (i.e. base stations, new panels, etc.) and so on. The E-Beef Project encountered this situation many times, often catching the team by surprise. This can lead to problems such as budget issues or makes it more difficult to demonstrate the technologies 'return on investment'. If these costs are ongoing, it can have a major effect on whether the technology continues to be used on the property following the end of the official trial period.

Selecting trial sites

Selecting an appropriate trial site is paramount to the success of a trial. This point is particularly true for certain technology categorisations – most notably those that 'provide new information/insights' and those that can enable landholders to 'rethink/redesign their business' – as these require a much deeper level of commitment and engagement.

One of the most important aspects of selecting a trial site is to involve the technology providers in the process. They know their product the best and can provide much needed insights on how to utilise it fully and which type of producer and business it may excel in. Engaging the technology providers in this step and allowing dialogue between them and potential candidates is critical to finding 'the perfect match'.

Trial sites that are easily and readily accessible are also advantageous. This means that trial sites are close in terms of their proximity to project staff and that roads and general infrastructure allows access for as much of the year as possible. This is critical for maintaining monitoring and contact throughout the year and for addressing problems as they arise.

Property infrastructure may also be critical for the successful functioning of technologies. This comes back to understanding the technology and involving the suppliers to ensure that the trial site of choice is adequately equipped to adopt the technology without needing to make major alterations or improvements.

The choice of landholders is also pivotal. It is preferred that property owners have a clear reason for adopting a technology, and an obvious plan for implementation and generating value. A simple way to ensure this is to have graziers apply, with reasoning, to trial the technology. Otherwise, you can end up with a technology solution looking for a problem to solve on a property who isn't quite sure of the product's function or how they plan to use it.

The final point to consider when selecting trial sites is to consider the impact of the trial on the grazing business. It is common sense that landholders are likely to pay more attention to trials that have a significant influence on their business. This involves two factors; 1. The size of the

operation, and 2. The size of the trial. For example, a small trial on a large operation may be too insignificant in terms of the upside or reward to warrant substantial interest or dedication.

Monitoring a trial

Monitoring of technology trials is easier said than done. Monitoring should be considered as an exercise to measure the utility and functionality of a technology. The question to ask is *can you reasonably link the output or measurement that you are recording to the adoption of the technology?* Can the data you wish to collect be measured or monitored? This will depend largely on the type of technology that is being dealt with. In some cases, such as those that improve efficiency or save time; measuring the benefits can be straightforward. In other instances, it may be more valuable to document the experiences of landholders in a qualitative sense, particularly when the technology is more complex. It's also vital to consider whether the data that is being collected can be analysed in a meaningful sense. The key consideration is how will the information being collected be analysed at the end of the project to evaluate success against the outcomes. Monitoring is time-consuming and can be resource-intensive, and thus must be valuable in assessing the key aims of the project.

Conclusion

While it is evident that digital technologies have the potential to be transformative to agricultural businesses, the adoption of these new and innovative tools remains a major challenge for many within the industry. The E-Beef Project was designed to address some of the obstacles faced by beef producers in the Queensland Rangelands, providing them with support in their efforts to adopt AgTech solutions. The aim – to assist graziers in implementing grazing best management practices by demonstrating how timely and informed management decisions can enhance pastures, groundcover, soils, land condition, business profitability and adaptability. When reflecting on this project to date, the team has identified four key areas that help to construct a framework for the successful delivery of AgTech adoption projects.

The four key areas assessed in this report were as follows: Designing a project, selecting technologies to trial, selecting trial sites and monitoring a trial. When planning for and undertaking these aspects of a technology adoption project, the E-Beef Team suggests taking a deliberate, considered and structured approach. The development of a framework or guide for extension staff to refer to would be highly beneficial and may go a long way to ensuring that the activities and technologies trialled are able to meet the project's objectives.

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Conflicts of Interest

The authors would like to acknowledge that one of the project officers working on the E-Beef Project is a local from the area that they work in, and their family are involved in one of the producer groups for that region. This has provided a valuable insight to the project's success by enabling the project officer to collect more genuine feedback from local landholders on a qualitative level.

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