

Ability to adapt to change

Beef operations from a wheelchair



By Rob Cook
2011 Nuffield Scholar

March 2012
Nuffield Australia Project No. 1108



© 2010 Nuffield Australia.

All rights reserved.

This publication has been prepared in good faith on the basis of information available at the date of publication without any independent verification. Nuffield Australia does not guarantee or warrant the accuracy, reliability, completeness or currency of the information in this publication nor its usefulness in achieving any purpose.

Readers are responsible for assessing the relevance and accuracy of the content of this publication. Nuffield Australia will not be liable for any loss, damage, cost or expense incurred or arising by reason of any person using or relying on the information in this publication.

Products may be identified by proprietary or trade names to help readers identify particular types of products but this is not, and is not intended to be, an endorsement or recommendation of any product or manufacturer referred to. Other products may perform as well or better than those specifically referred to.

This publication is copyright. However, Nuffield Australia encourages wide dissemination of its research, providing the organisation is clearly acknowledged. For any enquiries concerning reproduction or acknowledgement contact the Publications Manager on ph: (03) 54800755.

Scholar Contact Details

Rob Cook
Suplejack Pastoral Company
Suplejack Downs Station
via Alice Springs
PMB 42
NT 0871

Phone: 0427 820 299
Fax: 0889 568 764
Email: rtandslcook@bigpond.com

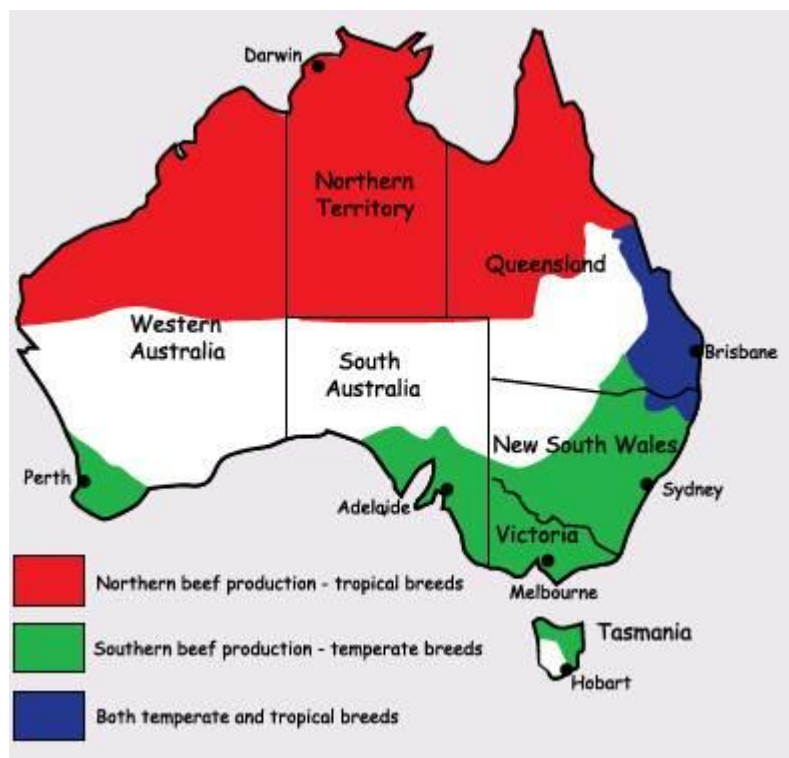
In submitting this report, the Scholar has agreed to Nuffield Australia publishing this material in its edited form.

Nuffield Australia Contact Details

Nuffield Australia
Telephone: (03) 54800755
Facsimile: (03) 54800233
Mobile: 0412696076
Email: enquiries@nuffield.com.au
PO Box 586 Moama NSW 2731

Foreword

The North Australian beef industry uniquely differs from the more intensive grazing operations throughout Australia. It includes North Queensland, Northern Territory, Pilbara and Kimberley regions.



The beef industry is a critical part of the north's economy. The \$1b industry accounts for 5 per cent of all jobs, pastoral holdings consume 90 per cent of the land area and produces 80 per cent of Australia's live cattle exports (www.regional.gov.au/regional/ona/nabis.aspx).

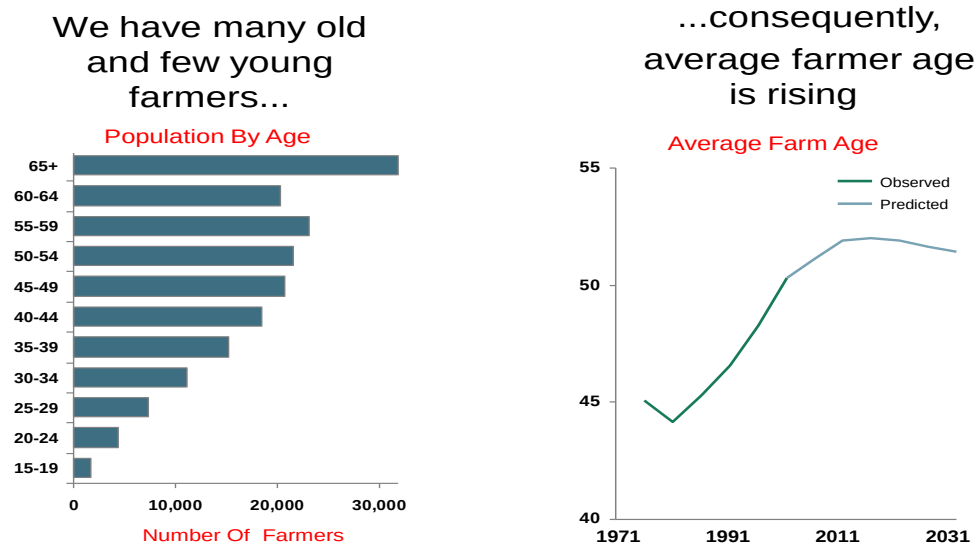
Whilst it is acknowledged that the Australian beef industry is a world leader in efficient production, animal welfare and animal traceability, it is still evident that the North Australian beef industry is "dragging the chain "when it comes to understanding and applying new technologies.

This limits industry in encouraging young Australians to enter the pastoral workforce. Technology opens up numerous opportunities to advance industry. By taking advantage of the popularity of modern technologies, industry could experience an increase in employment opportunities.

With a decreasing number of young farmers residing and working in rural Australia, we are experiencing an ageing population of farmers. In 2001, the Australian Bureau of Statistics reported more than 35,000 farmers were older than 65, and only 10,000 farmers aged 30 – 34.

This intergenerational gap has a detrimental effect on the future of Australian agriculture, and its full impact is yet to be seen (Figure 1).

Figure 1: The age structure of Australian farmers



•Source: National Land and Water Resources Audit, *Australians and National resource management* (2002); ABS, Census 1981-2006; Department of Primary Industries, Victoria, *The Micro-Dynamics of Change in Australian Agriculture* (2004)

Adding to this concern is the effect an on-farm injury would have, not only on a family business, but the wider community and industry. A farm injury that results in permanent impairment is a physical loss to the business, but their level of experience need not be a loss to industry. Experience is a valuable asset regardless of injury and physical ability; knowledge is invaluable.

One of the current issues that has an affect on the overall cost of production (COP) for the Northern beef industry, is labour availability. As a result of this, many operations in the North reluctantly rely on contract mustering to process their cattle. This can sometimes lead to management issues such as lack of quality control and overall herd management.

The fundamental objective for this report is to promote and encourage injured farmers to rely on all forms of technology necessary to remain productive in their farming community. Another objective is to provide an insight and research alternate methods, through the use of, but not limited to, technological aids to continue in beef production, in the hope of assisting Aussie farmers in similar situations. It is the opinion of this report that, by understanding,

utilising and adopting technology within the beef industry, could be a potential step in the right direction to dampen the impact that an unfortunate injury may have.

.This study would not be possible without the generous support of ANZ & Northern Territory Department of Resources.

Acknowledgements

I am truly overwhelmed by the quantity and quality of support I have been shown during this amazing experience.

- Firstly thank you to Nuffield Australia and my sponsors ANZ & Northern Territory Department of Resources.
- Ashley and Lindee Severin for their encouragement to take the first step.
- Jim Geltch and Dave & Liz Brownhill for supporting me through all my endeavours over the last two years
- My fellow scholars, Shannon, Lorre, Roma, Paul, Michael, Craig and Dave who impressed, inspired and encouraged me throughout our seven-week global focus tour. Thank you for pushing me and my flat wheelchair over 3 km in Washington DC in pouring rain.
- My parents Bill and Letty Cook for instilling the right mindset, level of determination and will, to overcome any adversity life throws us.
- Grandma and Grandad Cookie & Granny and Dooda Canning for taking care of and schooling my boys while I was away.
- Loretta & Jake and Luke & Krystle for their personal and physical support on my world wind tour of 11 countries and too many back-aching flights to mention.
- My beautiful wife Sarah and two sons Braxton and Lawson for enduring the same hardships I've faced since owning a wheelchair. Without you Sarah none of this would have been possible.
- My hosts from around the world, thank you for the hospitality, warm welcomes and best wishes and I apologise for wheeling snow, mud, dust and wet wheels into your homes.

Thank you all.

Abbreviations & Definitions

IT	Information Technology is concerned with technology to analyse information. Its main field is a combination of computing and telecommunications.
AT	Assistive Technology is an umbrella term that includes assistive, adaptive, and rehabilitative devices, for people with disabilities.
RLMS	Remote livestock modification system
OHS	Occupational Health and Safety
WOW	Walk-over weighing
MLA	Meat and Livestock Australia
COP	Cost of Production
EID	Electronic Identification Data
NLIS	National Livestock Identification Scheme

Contents

Foreword.....	iii
Acknowledgements.....	v
Abbreviations & Definitions.....	vi
Contents.....	vii
Executive Summary	viii
Introduction	10
Discussion.....	11
Chapter 1: Working Dogs.....	11
Chapter 2: Vehicle Modifications.	16
Chapter 3: Animal Handling aids.	18
Recommendations	26
References	27
Plain English Compendium Summary	28

Executive Summary

Don't look back and ask why. Look forward and ask why not.

There has never been such an emphasis on food production as there is right now. There are overwhelming forecasts for:

- Rapid growth in global population.
- Growing demands for protein in developing countries.
- World-wide economical turmoil.
- Animal welfare issues.
- Labour shortages in rural areas.

These are only some of the issues facing the Australian beef industry.

"The need to produce more with less is evident".

Industry shares a desire to lower the cost of production and raise the level of efficiency, while maintaining environmental sustainability. It is widely known that the North Australian beef industry relies heavily on a hands-on and physical approach to its operating procedures. If this ability is impaired or eliminated, can a business in beef production remain competitive and viable?

The fact is, Australian agriculture shows a high risk for work-related injuries. In Australia, there are about 85 farm injury deaths per year. And for every 1000 farms, between 200 and 600 injuries need hospital treatment each year. (<http://www.abc.net.au/health/library/stories/2003/04/17/1829466.htm>).

Although occupational health and safety (OHS), is working hard to regulate the growing concerns with operating procedures in the primary industry sector, accidents still happen.

It has been estimated that agricultural injuries in Australia, cost the farm sector a minimum of \$400 million a year. (South Australian Branch, Australian Workers Union, <http://sa.awu.net.au/55.html?3>). There are numerous ways to reduce injuries and endless measures to safeguard your business. However expecting the unexpected is like stirring the universe with an eyelash.

By understanding and implementing the use of technology and innovations we can dampen the impact an injury has on productivity. For farmers post-injury, innovative technology is the light at the end of the tunnel.

The fundamental objective for this report is to provide insight and alternate methods in beef production to assist Australian farmers suffering an injury. An injury that has financial implications changes business structure, business direction and the overall business future.

By combining IT with industry and an open-mind, it's now evident that technology could revolutionise the way injured farmers and the elderly approach the cattle industry. The purpose of this report is to show importance of keeping experienced producers producing.

Nuffield Australia provides the essential ingredients to better Australian agriculture, and more importantly Australian farmers. The exposure and networking on the scholarship took the hard work out of understanding the beef industry and disability globally.

This study consisted of travelling to countries including New Zealand, Brazil, Mexico, USA, Canada, Europe and Australia.

The key findings were:

- Support for Australian injured farmers is less than the global average.
- Innovation and technology can increase productivity and provides job opportunities.
- Improved infrastructure and yard design increase the ease of use and minimise labour.
- Introducing working dogs to beef operations supplements labour shortages and increases employment opportunities for the disabled.
- Networking is a valuable tool in sharing technological opportunities for injured farmers.

Introduction

You can take the boy out of the bush but you can't take the bush out of the boy.

Suplejack Downs Station is situated 735 km Northwest of Alice Springs, and is referred to by the Australian Geographic Magazine as Australia's most remote cattle station. Suplejack is currently running 8,000 – 10,000 head of Shorthorn- Brahman cross cattle. Our latest development is to introduce Droughtmaster bulls. Our strategic breed plan gives us the ability to access both live export and domestic markets. Over the last 15 years we have exported to various destinations including the Middle East and Southeast Asia and more recently we have sent 350 kg cattle to Indonesia, Australia's largest live export destination.

Due to road closures during the Top End's wet season, our family business places saleable cattle on agistment in the Douglas Daly area. This gives us the extended ability to access markets early in the year.

Suplejack boasts 14 permanent bores, with artesian water being reached on average at 30 metres. The average volume of water being pumped through each 50 mm column is 6750 L per hour. Including bores, pipelines and permanent dams, we maintain 30 watering points. Pests, predators and feral animals including camels, dingoes, brumbies and donkeys all contribute to the running costs due to the costs of eradication programs and land degradation. The isolation provides more than enough challenges, with poor road conditions, road closures during the wet season, limited market access and generated electricity.

In 2008 the family business faced its biggest challenge, when a routine aerial muster went terribly wrong. I was involved as a passenger in a helicopter accident resulting in C4 tetraplegia. Medical specialists encouraged me to build a new life and find a new way of making a living.

Prior to my Nuffield I was struggling with the idea of a desk job. I was under the false impression that I could no longer contribute to my family business. The opportunities Nuffield has provided have changed my life. I have eliminated the idea of finding a new job and replaced it with new ways of doing my old job.

Discussion

I have spent the last three years studying innovation and technology in the beef industry. I have called on many resources to investigate information technology, assistive technology, pneumatic systems and hydraulics applications. As many injured farmers before me, I get the feeling I am reinventing the wheel. The uniqueness of each disability and impairment requires individualised and independent solutions. A lot of left-field thinking is needed to accomplish the intended goal.

I will be addressing the use of various aids such as working dogs, animal handling equipment, vehicle modifications, assistive technologies and drafting systems to assist injured farmers in the management of a beef cattle business.

Through implementing such technologies I can continue providing Australians and global marketplaces a clean, green and safe form of protein.

Chapter 1: Working Dogs.

It has been found that dogs were domesticated approximately 15,000 years ago. (Kris Hirst, <http://archaeology.about.com/od/domestications/qt/dogs.htm>). Dogs play several roles for their human companions. From comradeship to hunting, herding and protecting, dogs have been a pivotal addition to human lives. Dogs also perform an important role in assisting mankind with all types of disabilities and disadvantages. From the blind to the deaf, limbless to wheelchairs, their ability to aid is boundless.

The northern cattle industry operates on large, vast and most times remote area of Australia's outback. During mustering the stock can travel up to 20 km in a day, and it is generally believed that the job is too big and the days too long for working dogs. The distances dogs are required to travel in the mustering camp is well beyond the capabilities of dogs in general. However by applying the use of working dogs in the more localised areas of cattle work, such as weaning, they become a key player in the team and a cheap alternative to labour.

The two main breeds used for cattle work are the Border Collie and the Kelpie dog.

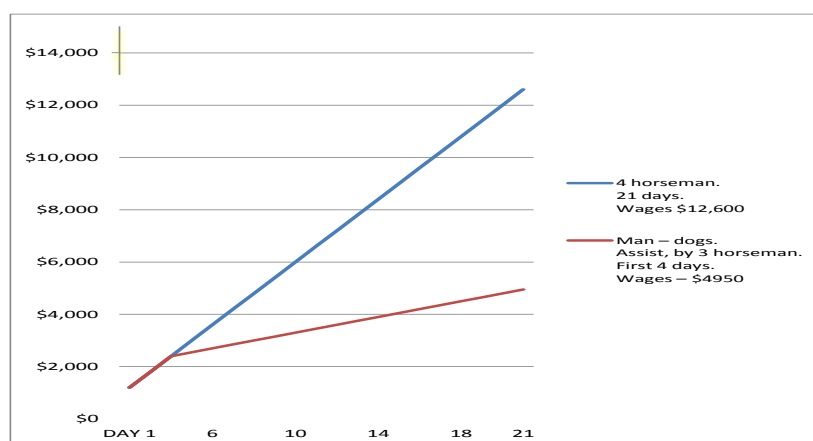
The working Kelpie is traceable to the early foundation stock in the 1870's. The first litter of the modern day kelpie was whelped on Warrock station near Casterton Victoria, owned by George Robertson (Wikipedia). They are a short-coated, prick-eared breed which was established to excel in harsh environments. Kelpies are able to muster huge areas under extreme conditions, often going without water for hours on end. Kelpies have a highly developed ability to solve problems for themselves and prefer to do so. These traits have earned Kelpies a respected reputation within the cattle industry.

The Border Collie was developed on the border between Scotland and England. Border Collies were traditionally bred solely for their herding abilities. The most distinct attribute is their ability to move stock using the "eye ". Commonly, described as "the ability to control stock by staring at them in a fixed and steady manner ". The Border Collie is considered to be the most intelligent and trainable dog in the canine world. (Kelly Whiteman, 2009).

The first Border Collie was imported into Australia in 1901 by the King and McLeod Kelpie stud. (Noonbarra working kelpie stud, <http://www.noonbarra.com/history.html>).

Regardless of the breed, a quality working dog is a tool and an asset for producers. Figure 2 outlines the costs and benefits of incorporating dogs into weaning procedures, against standard horseman weaning procedures.

Figure 2: The economies of using dogs for mustering



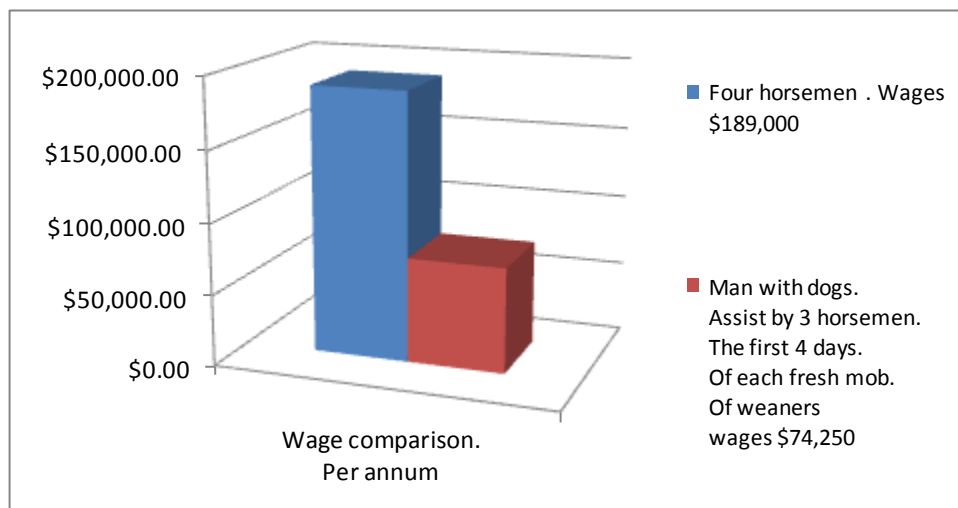
(Note: combining horse tailing with dogs throughout weaning process is considered a best practice for weaning procedures) Wages based on \$150 per man per day.

The Northern Territory currently has 2.1 million head of cattle (MLA) distributed across 227 pastoral holdings (NT Department of resources, 5 March 2006). Weaning procedures vary from station to station and generally operate right throughout the mustering season in the NT. For this example, the weaning procedures consist of yard feeding, yard education, herding behaviour and being tailed onto pasture daily over 21 days in mobs no larger than 500 head. The comparisons are based on a 10,000 head breeder property, with a calving percentage of 75%, i.e. 7500 head of weaners per annum.

2 alternate methods were investigated, involving 4 men on horses educating weaners onto pasture, for 21 days (Figure 2).

1. 1 man with dogs, assisted by 3 horseman for the first 4 days of educating weaners onto pasture.
2. 1 Man with dogs continues procedures for the remaining 17 days.

Figure 3: The wage difference per annum in the two individual weaning procedures.



(Note: horse tailing has been incorporated with the dogs, for the initial four days of each fresh mob of weaners for educational purposes.) Wages based on \$150 per man per day

Figure 3 shows that working dogs have the potential to reduce weaning costs by at least two-thirds.

Assistive Technology with Working Dogs

A perfect example of applying assistive technology with working dog operations was found in Oklahoma USA. Rancher Tom Hynes had a severe stroke in 1977, he was confined to a wheelchair and is unable to speak or make audible sounds. With no alternative than to rely on assistive technology, Tom invested in and uses a Message Mate on which he pre-records voice and whistle commands to control his Border Collies. The Message Mate is a device that records sounds for children or adults with speech problems to help them communicate with others.

Tom's commands give him the ability to communicate with his dogs. It is a small electronic touch-screen box, which has the capacity to record 10 minutes of audio. It has four pages, and can store up to 144 commands, so Tom can choose between pages depending on what dog he wants to communicate with. What started as a simple communication device was customised, giving Tom the ability to also shift stock around his Oklahoma ranch.



Tom giving an exhibition at the Houston Rodeo.



The Message Mate® Tom uses to relay commands to his dogs.

Benefits of cross-breeding working dogs

Like many Australian breeders, Louisiana breeder Len Dalton from Daltoncowdogs training facility, is striving to breed the ultimate Working dog for the cattle industry. This cross breeding program started in 2003, by crossbreeding the border Collie and/or Australian kelpies with a pit bulldog/mastiff cross, the 7/8 by 1/8 cross respectively resulted in a formidable working cow-dog. The pit bulldog/mastiff that was used as the foundation sire, was quite a large dog that was trained to hunt and hold wild cattle. As a result the disposition and temperament of the cross-breed dogs differed dramatically from the pure bred. They are calmer, more intimidated by the handler and extremely eager to please.

Once training begins, the cross breeds do not have the same level of desire to work. After they understood it was permissible to bite and pressure the cattle, their willingness to work increased dramatically. They are not as athletic due to being a larger dog, their manner in approaching work was slower and methodical and with more purpose. Their size earned them more respect with cattle and their bite is hard and straightforward with less jumping side to side reducing the amount of energy used. An added benefit of the increase in size and weight, allows them to withstand more punishment from the stock without serious injury.

Another attraction to Len Dalton's procedures was the vehicle in which he transported and trained his dogs (Figure 4).

Figure 4: Len Dalton's dog transport.



Len's electric Polaris 4X4 vehicle.

A modified version of this type of vehicle, shown here with six individual dog boxes, offers the mobility-impaired a safe, green and efficient means of transport. The quietness of the electric motor produces very little background noise while commanding dogs in the field. This vehicle carries a water tank which is set up to offer the dogs a drink throughout the day.

Chapter 2: Vehicle Modifications.

Necessity is the mother of all creation.

For the mobility-impaired, modifications add value in day to day living. For injured producers, the ability to adapt and modify machinery are valuable ways to remain productive.

AgrAbility in the USA is a nationwide assistance network for all Americans working in agriculture who suffer an injury. This organisation is represented in each state and works on a case-by-case system, offering injured farmers the assistance needed to remain productive in agriculture. Expert staff assess and assist each situation quickly, effectively and efficiently, which results in less downtime and retains injured farmers within the workforce. Research took place throughout several US states, investigating solutions to some of the barriers that restrict injured or disabled farmers.

Figure 5: Showing a mechanical tractor lift.



In Australia this type of support is limited towards people working in agriculture.

Shelf-buying of products to overcome obvious barriers doesn't exist for Australian farmers suffering a spinal cord injury. Limited by support networks, government assistance and the expense of ideal and appropriate modifications, many Aussie farmers are forced to tackle this task unassisted. The resourcefulness found in people from the bush provides the foundation that generally results in a solution. The modifications needed are as unique as each injury and disability.

A farmer suffering a spinal injury must consider many health requirements before progressing into modifications. Such an injury affects the body's ability to regulate its temperature below the level of injury, so that climate control is an important factor and will often determine the vehicle operating ability during fluctuating daily temperatures.

Using myself as an example, my first restriction was to overcome my ability to access the farm independently. By joining forces with John Deere and Quad Quip Solutions the necessary modifications are taking place. The goal was to modify a standard John Deere Gator, so that it can be independently operated by a C4 quadriplegic with limited movement in one arm.

Figure 6: John Deere Gator



The John Deere steering components have been replaced with an advanced electronic vehicle interface technology (AEVIT) from the company EMC (Electronic Mobility Controls)

located in Augusta, Maine, USA. This company was founded with the single goal of providing individuals with a high level of disability the freedom of mobility. The AEVIT relies on a drive-by-wire input device such as a joystick.

This technology eliminates the mechanically transmitted steering command which is found on conventional vehicles and replaces it with a digital electronic signal that is transmitted to intelligent drive modules that in turn command electromechanical servos to steer the front wheels. The same method is used for the braking and acceleration components.

Access into the Gator relies on the Captains chair's ability to slide in and out, horizontally from the operating position. All other controls will function from multi-sequencing switches, located in the head rest. The UHF radio used for communication and safety measures will be operated through a Push-to-Talk button. The microphone will be located on a boom pole for ease of use.

The Gator will also be fitted with an independent air-conditioning and cabin heater. By combining these technologies with a robust, endurance sufficient, diesel powered John Deere Gator, completely operated through a joystick (similar to an electric wheelchair) solves the problem of accessing the farm.

Chapter 3: Animal Handling aids.

Tell me and I'll forget, show me and I may remember, include me and I will understand.

North Australian pastoralists rely heavily on an often limited workforce throughout the cattle season. The majority of the cattle work takes place between March and November. Animal handling across North Australian cattle stations is the most labour-intensive area of general operating procedures. It is also the area that provides the greatest barrier and causes major restrictions for injured producers and wheelchair users.

How does a producer without the ability to use their arms, process cattle in the cattle yards?

By first gaining an understanding of low-stress cattle handling procedures and industry best practices, then applying technology, modifications and appropriate infrastructure, it is possible for a wheelchair producer to remain productive.

There is an old saying "*You can tell what kind of a stockman a person is by looking at the behaviour of their cattle.*"

Low stress cattle handling procedures offer many positive attributes to any beef operation including animal welfare, occupational health and safety and productivity. Low stress handling puts emphasis on a mutually beneficial outcome for both stock and stockman. By understanding basic animal instincts we can understand why they behave the way they do and what animals want. Handlers are better positioned to then work with those natural instincts and produce low stress outcomes.

Animal stress has a direct impact on productivity, both *Bos taurus* and *Bos indicus* cattle that become agitated or stressed during handling have significantly lower weight gains. Calm animals have a 10% – 14% higher weight gains. Reports show that stress in Brahman cross cattle produced tougher meat and more borderline dark cutters. (<http://www.grandin.com/behaviour/principles/assessment.temperament.html>).

To avoid unnecessary stress on livestock, many precautionary measures must be incorporated into the design and erecting of cattle handling facilities. Simple ideas such as capping the tops of posts to avoid wind howling, rubber stoppers on gates to avoid unnecessary noise and spring-loaded bolt latches (as opposed to the clanging noise of chain latches) are a start.

The design of the infrastructure will be a deciding factor to how well the livestock move through the yards. Yard size, gate size, geographical positioning and draft type all have an impact.

Curved races are more efficient and user-friendly than the standard straight race for several reasons. Firstly, a curved race restricts the animals view of the loading ramp/truck or activities taking place at the crush preventing balking. It also takes advantage of the animals' natural tendency to circle around the handler and minimises the distance a handler needs to travel between either end of the race. It is reported that curved races can reduce the time spent moving cattle by up to 50% (Vowles and Hollier 1982).



Cattle Drafting systems

The two types of draft systems commonly used throughout Northern Australia are the Pound draft and the Race draft. The Pound draft requires a person to operate the initial drafting of the cattle and a person to operate on the ground within the pound, who manually opens each draft gate. One advantage is the ability to draft out larger numbers of cattle at one time, and one disadvantage is it requires a person to work within close proximity of livestock in an enclosed area.

Figure 7: Circular cattle yards in action



The race draft requires a person to operate from a platform above the cattle within the main race of the yards; the same person has control of the initial drafting of the cattle and the control of each draft gate (without moving from the platform). One advantage is it requires less personnel and eliminates the need to work within close proximity of livestock. A disadvantage is that the person drafting the cattle only has a view of the livestock from above. Most advancing technologies such as automatic drafting work on the in-line race drafting system. Australia is amongst the world leaders in the practical use of these systems.

The latest cattle handling equipment including cattle crush, calf cradles and slide gates offer the operation by either pneumatic or hydraulic systems. Both systems result in user-friendly equipment or equipment that takes the hard work out of processing cattle. Both pneumatics and hydraulics are applications of fluid power. Pneumatics uses an easily compressible gas such as air, while hydraulics uses relatively incompressible liquid such as oil. Most pneumatic applications use pressures of about 80 to 100 psi. Hydraulics applications commonly use from 1,000 to 5,000 psi.

Cattle handling equipment operated by a pneumatic system offer many advantages over its rival, although in-line mufflers must be used to reduce noise. It is simply designed, using standard cylinders and other components and is operated by a user-friendly on-off type control. Pneumatic systems tend to have long operating lives and require very little maintenance; because gas is compressible the equipment is less likely to be damaged by shock. These systems offer easy and affordable storage of compressed air, which allows limited use of the equipment when electrical power is lost. Pneumatics also offer a very low chance of causing a fire compared to hydraulic oil.

Welfare issues surrounding over-squeezing of livestock in a crush situation are answered through the use of pneumatics, as these systems absorb excessive force whereas the fluid of hydraulics directly transfers force.

As technology evolves, so does the functionality, ability and efficiency of the cattle handling equipment. Several companies offer remote-control operations, providing paraplegics the immediate use of this cattle equipment. Further modifications are required to customise the individual needs of severely injured producers.

Assistive technology with cattle equipment

Unfortunately, it is not enough just to understand cattle, cattle production and the cattle industry. Most injured farmers have a lot more to learn in their battle to remain productive. If the desire of an injured farmer or one with a disability is to maintain a hands-on approach to their business, then they must become technology savvy.

Gone are the days of operating the old ratchet type head bail and crush, however as technology advances, disabled producers have more and more opportunities. The true challenge for farmers with physical restrictions is staying up-to-date with these technologies. Before adapting or joining technologies we need to understand the technology at hand (crawl before we walk). Consider a remote-control that operates a pneumatic cattle crush. The pneumatics are reasonably standard; it is the transmitter and receiver that gives the remote control the ability to send commands to the system.

One Australian company from Clermont Queensland, called Breckon Cattle Equipment, offer these combined technologies on a range of their products. The transmitter/receiver used on the Breckon's cattle crush is developed by a company called Elsema (Electronic Service and Manufacture), which produce the wireless technology that gives Breckons the ability to incorporate a remote-control with their pneumatic products. The hand held 433MHz GIGALINK™ transmitters are an advanced remote-control technology which is used for frequency hopping commands to the receiver. The eight channel 433 MHz receiver has eight relay outputs, ultimately eight functions.

(<http://www.elsema.com/glr4330812-24R.htm#desc>).

This type of technology has the ability to be adapted to incorporate a wheelchair and its functions, which is essentially a wheelchair operating a cattle crush (Figure 8). Wheelchairs operated by a Dynamic DX2 joystick offer many applications in assisting its user in daily living.

Figure 8: Dynamic DX2 joystick control



The DX2 is compatible with a DX environmental control unit (ECU) which directly connects to the power module of the wheelchair (Figure 9). The ECU has eight outputs and is directly controlled by the wheelchairs joystick. The ECU is commonly used for simple house-hold tasks like controlling air-conditioners and changing channels on the TV.

Figure 9: DX environmental control unit (ECU)



It is possible to directly hardwire the ECU unit to the Elsema transmitter, which would draw power from the wheelchair's battery and give the user the ability to access the transmitter through the DX2 joystick. Ultimately messages are sent to the receiver which operates the cattle crush.

Technology and imagination are sometimes all that is needed to achieve the intended outcome in modifying workplaces for injured and disabled farmers.

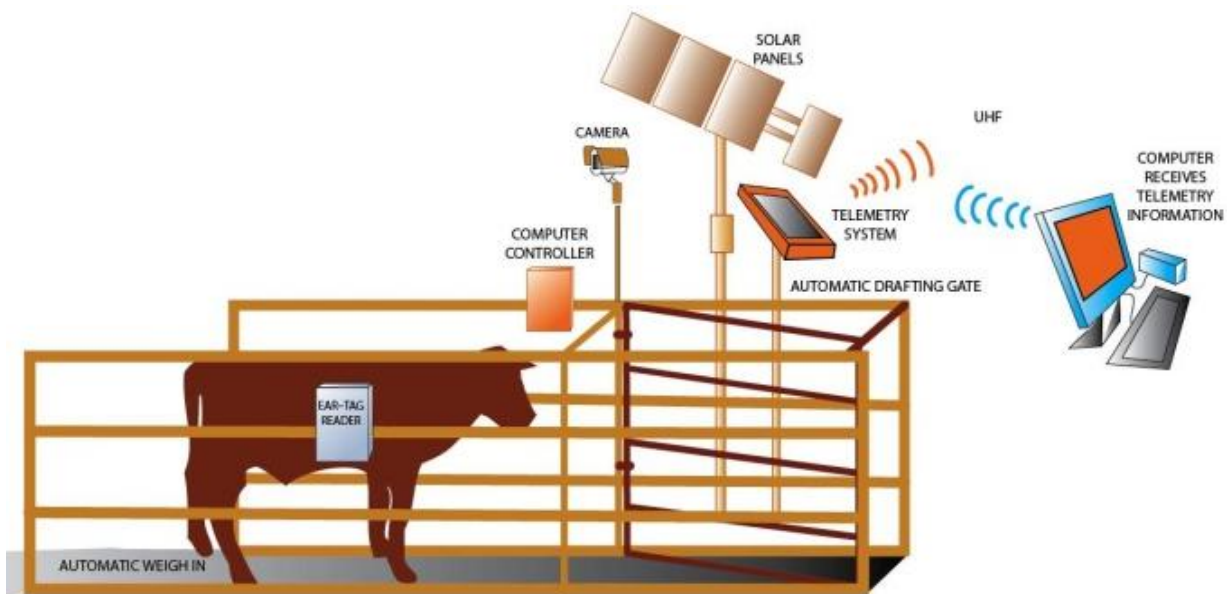
Remote and Automatic Drafting

Automatic drafting is readily seen in both the dairy industry and the sheep industry. Its full potential is only just being realised in the North Australian beef industry. The NLIS requirements for Australian beef cattle are a major driver for this type of technology and also a necessary component for these systems to operate. The automatic drafting operation is built around certain characteristics of each individual animal, which are identified through the EID of the animals NLIS tag. As the animal walks in single file through the race they walk past a reader which identifies them and they are drafted accordingly. To take full advantage of this technology a walkover weighing system (WOW) is added to the race where animals can then be drafted depending on their weight.

One Australian company is taking full advantage of this technology and combining it with a remote monitoring device, giving it the ability to operate in the most remote areas of Australia. Precision Pastoral has investigated remote animal management technologies that aim to improve the accuracy and precision of animal management on pastoral stations. Initially, commercially available products were tested, however it was found that they were unsuitable for remote operations in the harsh desert conditions. This led to the development of a Remote Livestock Management System (RLMS) for cattle, capable of collecting data from individual animals, even in cattle yards a long way from where the station manager is working. The system uses the electronic animal identification ear tag which is part of the Australian National Livestock Identification System.

The diagram below outlines the components of the Remote Livestock Management system (Figure 10).

Figure 10: Components of the Remote Livestock Management system



As the animal passes through the unit, it walks over a weighing system that records its weight. This information is used to make a management decision; an automated gate instantly drafts the animal with other animals of the same weight. This system can also draft according to information in the electronic identification data in the animals NLIS tag. For the first time, the pastoralist can manage, monitor and view individual animals from a remote location. It is an intensive system in an extensive production system.

For an injured producer, with no physical movement, this type of technology holds loads of potential and could prove the difference in the challenge of remaining productive.

Recommendations

For injured, disabled or elderly farmers the challenge is in identifying, understanding and implementing any form of technology to remain productive.

Incorporating working dogs into a beef operation not only combats labour shortages but increases the employment opportunities for injured and/or disabled people. Working dogs complement the stress-free cattle handling procedure, which is considered a best practice.

It is the opinion of this report, that understanding, utilising and adopting technology within the beef industry, could be a step in the right direction to dampen the impact that an unfortunate injury may have.

Remote and automatic drafting and monitoring is readily utilised in the dairy industry. The North Australian beef industry can also benefit from its many applications. Improved access to services such as mobile phone coverage and internet connections in rural and remote Australia offers a greater opportunity to efficiently take advantage of these technologies.

Government assistance towards rural rehabilitation for injured farmers would see an increase in active employment back in Australian agriculture. Networking and public perception would play a pivotal role in such rehabilitation. Improved health services in rural areas would offer injured farmers appropriate and necessary medical requirements, which would avoid the need to live near regional areas.

References

Kelly Whiteman, 2009. Border Collie breed information.

Vowles, W.J., Hollier, T.J., 1982. The influence of cattle yard design on the movement of animals.

Plain English Compendium Summary

Project Title:	
Nuffield Australia Project No.:	
Scholar:	Rob Cook
Organisation:	
Phone:	0427 820 299
Fax:	(08) 8956 8764
Email:	rtandslcook@bigpond.com
Objectives	To investigate innovations, modifications and all forms of technology necessary for injured producers to remain productive within the beef industry and to promote and encourage injured farmers to stay active within agriculture.
Background	Due to a helicopter accident resulting in permanent quadriplegia highlighted the need to research opportunities to remain productive within the beef industry whilst sustaining such injuries. Estimations show, agricultural injuries in Australia cost the farm sector \$400 million a year. People with high-level injuries, reluctantly and generally cease employment in agriculture. This need not be the case.
Research	This report involved visits to New Zealand, Brazil, Mexico, USA, Canada Scotland and France. It included visiting disabled and injured farmers from around the world and exploring opportunities through technology and modifications which could be used to assist injured farmers.
Outcomes	Workplace modifications hold the keys to productivity for injured farmers. • Implementing working dogs compensate for labour shortages and increase employment opportunities for injured or disabled farmers. • Australian cattle handling equipment manufacturers are among the world leaders in innovation and technologies, which offer numerous opportunities to expand their use through adaptation for injured or disabled farmers. Technology, innovation and an imagination are the stepping stones in returning injured farmers to work.
Implications	Australian agriculture has a high risk for work-related injuries. Technology is the silver bullet in keeping experienced farmers in agriculture and not losing their invaluable knowledge due to an injury.
Publications	Nuffield Australia